

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Water Resource Management

SOUTHEAST DISTRICT • GROUP 3 BASIN • 2006

Water Quality Assessment Report

Lake Worth Lagoon–Palm Beach Coast

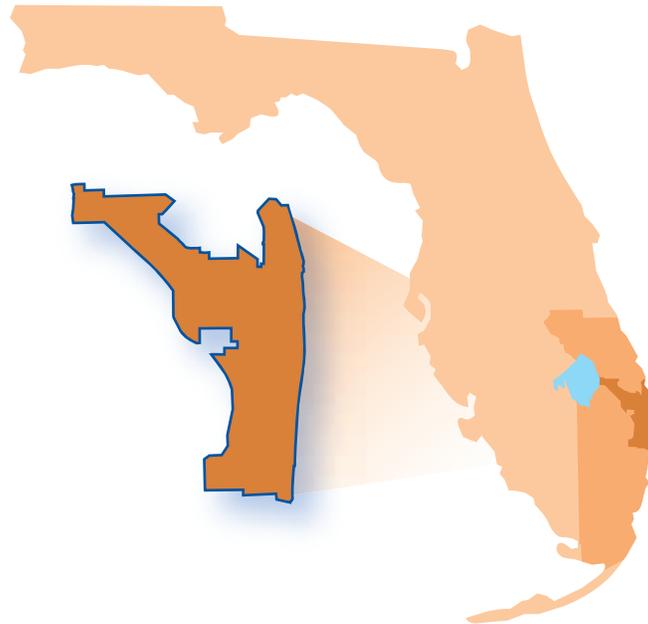


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2006

Water Quality Assessment Report

Lake Worth Lagoon–Palm Beach Coast





Acknowledgments

The *Lake Worth Lagoon–Palm Beach Coast Water Quality Assessment Report* was prepared by the Southeast District Basin Team, Florida Department of Environmental Protection, as part of a five-year cycle to restore and protect Florida's water quality. Team members include the following:

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Web Sites

Florida Department of Environmental Protection, Bureau of Watershed Management

TMDL Program

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

Identification of Impaired Surface Waters Rule

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

STORET Program

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

2004 305(b) Report

http://www.dep.state.fl.us/water/docs/2004_Integrated_Report.pdf

Criteria for Surface Water Quality Classifications

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

Status Reports

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

Allocation Technical Advisory Committee (ATAC) Report

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

U.S. Environmental Protection Agency

Region 4: Total Maximum Daily Loads in Florida

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

National STORET Program

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

Preface

Content Features

- **Executive Summary:** Appears at the beginning of every report and provides an overview of the watershed management, its implementation, and how this approach will be used to identify impaired waters.
- **Sidebar:** Appears throughout the report and provides additional information pertinent to the text on that page.
- **Noteworthy:** Appears on pages near text that needs additional information but is too lengthy to fit in a sidebar.
- **Definitions:** Appear where scientific terms occur that may not be familiar to all readers. The word being defined is bold-faced in the text.
- **References:** Appear at the end of Chapter 5 and provide a complete listing of all sources used in the text.
- **Appendices:** Appear at the end of the report and provide additional information on a range of subjects such as bioassessment methodology, rainfall and stream flow, types of natural communities, STORET stations, water quality statistics, land use, and permitted facilities.



Executive Summary

Lake Worth Lagoon–Palm Beach Coast

The Water Quality Assessment Report for the Lake Worth Lagoon–Palm Beach Coast Basin is part of the implementation of the Florida Department of Environmental Protection’s (Department) watershed management approach for restoring and protecting water resources and addressing Total Maximum Daily Load (TMDL) Program requirements. A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet the waterbody’s designated uses. A waterbody that does not meet its designated uses is defined as impaired. The watershed approach, which is implemented using a cyclical management process, provides a framework for implementing the requirements of the 1972 federal Clean Water Act and the 1999 Florida Watershed Restoration Act (Chapter 99-223, Laws of Florida).

A Status Report, published during Phase 1 of the watershed management cycle, provided a *Planning List*, or preliminary identification, of potentially impaired waterbodies in the Lake Worth Lagoon–Palm Beach Coast Basin. This Assessment Report presents the results of additional data gathered during Phase 2 of the cycle. The report contains a *Verified List* of impaired waters (**Table 4.3** in Chapter 4) that has been adopted by Secretarial Order and approved by the U.S. Environmental Protection Agency (EPA). TMDLs must be developed and implemented for these waters, unless the impairment is documented to be a naturally occurring condition that cannot be abated by a TMDL, or unless a management plan already in place is expected to correct the problem. The Verified List also constitutes the Group 3 basin-specific 303(d) list of impaired waters, so called because it is required under Section 303(d) of the Clean Water Act. See **Noteworthy** in Chapter 1 for a description of the contents of this report, by chapter.

In the Lake Worth Lagoon–Palm Beach Coast Basin, state, federal, regional, and local agencies and organizations are making progress towards identifying problems and improving water quality. Through its watershed management activities, the Department works with these entities to support programs that are improving water quality and restoring and protecting ecological resources. The Department’s TMDL Program objectives will be carried out in the basin through close coordination with key stakeholders such as the South Florida Water Management District (SFWMD), the U.S. Army Corps of Engineers (USACE), the Department’s Southeast District offices in West Palm Beach and Port St. Lucie, the Florida Department of Agriculture and Consumer Services, and Palm Beach and Broward Counties, as well as municipalities and water control districts. Private citizens, local and national environmental groups, and universities are also actively involved in providing input and guidance to programs that protect and restore the waterbodies and aquatic resources of this area.



Not only do stakeholders in the basin share responsibilities in achieving water quality improvement objectives, they also play a crucial role in providing the Department with important monitoring data and information on management activities. Significant data providers in the basin include the SFWMD, Lake Worth Drainage District, Palm Beach and Broward Counties, the Department, Florida Department of Health, Loxahatchee River District, Florida LakeWatch, USACOE, and the Florida Fish and Wildlife Conservation Commission.

During the next few years, considerable data analysis will be done to establish TMDLs for impaired waters in the Lake Worth Lagoon–Palm Beach Coast Basin, establish the initial allocations of pollutant load reductions needed to meet those TMDLs, and produce a Basin Management Action Plan to reduce the amount of pollutants that cause impairments. These activities depend heavily on the active participation of the water management district, local governments, businesses, and other stakeholders. The Department will work with these organizations and individuals to undertake or continue reductions in the discharge of pollutants and achieve the established TMDLs for impaired waterbodies.

Summary of Findings

The Department’s assessment shows that 10 waterbodies or waterbody segments in the Lake Worth Lagoon–Palm Beach Coast Basin are impaired and require the development of TMDLs. The following summarizes, by planning unit, impairments by waterbody types and the primary pollutants. Planning units are smaller areas in the basin that provide a more detailed geographic basis for identifying and assessing water quality improvement activities.

L-8 Planning Unit

Of the two waterbody segments in the L-8 Planning Unit, one segment has sufficient data for assessment. Of these, one is verified impaired for at least one parameter assessed and one remains on the Planning List.

The one verified impaired segment in the planning unit, and the parameter of impairment, is as follows:

L-8 Canal (waterbody identification number [WBID] 3233)	Dissolved oxygen (DO)
---	-----------------------

Other potential impairments in the planning unit include biology, iron, mercury, and turbidity. Most of these problems are either directly or indirectly related to the stage height of Lake Okeechobee and associated influence on the water flow direction. The SFWMD control structure known as Culvert 10A is at the headwaters of the L-8 Canal and plays a significant role in the DO level of the canal.

C-51 Planning Unit

Of the seven waterbody segments in the C-51 Planning Unit, two segments have sufficient data for assessment. Of these, two are verified impaired for at least one parameter assessed and five remain on the Planning List.

The two verified impaired segments in the planning unit, and the parameters of impairment, are as follows:

C-51 (WBID 3245)	DO, nutrients (chlorophyll <i>a</i>)
Lake Clarke (WBID 3245B)	DO, nutrients (Trophic State Index [TSI])

Other potential impairments in the planning unit include nutrients (chlorophyll *a*) and iron. Most of these problems are either directly or indirectly related to the subsurface interactions of ground water and surface water and urban stormwater runoff.

West Palm Beach Water Catchment Planning Unit

The one waterbody segment that makes up the West Palm Beach Water Catchment Planning Unit does not have sufficient data for assessment. There are no segments verified impaired for at least one parameter assessed on the Planning List or that meet standards.

C-17 Planning Unit

Of the three waterbody segments in the C-17 Planning Unit, two segments have sufficient data for assessment. Of these, one is verified impaired for at least one parameter assessed and two remain on the Planning List.

The one verified impaired segment in the planning unit, and the parameters of impairment, are as follows:

PB Stations/D Canals (WBID 3242A)	DO, nutrients (chlorophyll <i>a</i>)
-----------------------------------	--

Other potential impairments in the planning unit include biological oxygen demand (BOD), fecal and total coliforms, DO, and iron. Most of these problems are either directly or indirectly related to urban stormwater runoff from portions of several incorporated areas including West Palm Beach, Palm Beach Gardens, Riviera Beach, Lake Park, and Mangonia Park.

C-16 and C-16 North Planning Units

Of the six waterbody segments in the C-16 and C-16 North Planning Units, which are discussed together in this report, three have sufficient data for assessment. Of these, there are no segments verified impaired for at least one parameter assessed and two remain on the Planning List.

Other potential impairments in the planning units include total coliforms, BOD, and iron. Most of these problems are either directly or indirectly related to the subsurface interactions of ground water and surface water and urban stormwater runoff.





C-15 Planning Unit

Of the five waterbody segments in the C-15 Planning Unit, two segments have sufficient data for assessment. Of these, one is verified impaired for at least one parameter assessed and one remains on the Planning List.

The one verified impaired segment in the planning unit, and the parameters of impairment, are as follows:

Lake Ida (WBID 3262A)	Nutrients (TSI)
-----------------------	-----------------

Other potential impairments in the planning unit are DO, iron, and fecal coliforms. Most of these problems are either directly or indirectly related to excessive inflow of phosphorous and nitrogen, as well as urban stormwater runoff.

Hillsboro Canal Planning Unit

Of the six waterbody segments in the Hillsboro Canal Planning Unit, three segments have sufficient data for assessment. Of these, one is verified impaired for at least one parameter assessed, one will remain on the Planning List, and one meets standards.

The one verified impaired segment in the planning unit, and the parameters of impairment, are as follows:

E-4 Canal (WBID 3264D)	Nutrients (chlorophyll <i>a</i>)
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Other potential impairments in the planning unit include fecal coliforms and DO. Most of these problems are either directly or indirectly related to bacteria, stagnant water in the canals, and urban stormwater runoff.

Intracoastal Planning Unit

Of the 22 waterbody segments in the Intracoastal Planning Unit, 21 segments have sufficient data for assessment. Of these, 5 are verified impaired for at least 1 parameter assessed, 1 remains on the Planning List, and 16 meet standards.

The five verified impaired segments in the planning unit, and the parameters of impairment, are as follows:

Intracoastal Waterways Above Pompano (WBID 3226F)	Copper
Hillsboro Inlet Park (WBID 8096B)	Historical chlorophyll
Intracoastal 2 (WBID 8097)	Mercury in fish
Phil Foster Park (WBID 3226EB)	Mercury in fish
Lake Worth Lagoon South Segment (WBID 3226F2)	Copper

Other potential impairments in the planning unit include lead. Most of these problems are either directly or indirectly related to ground water influences.

Total Maximum Daily Load Priority Areas

The Lake Worth Lagoon–Palm Beach Coast Basin has several water-body segments that were designated as priority areas based on EPA’s 1998 303(d) Consent Decree listing of impaired waters. The priority areas from EPA’s 1998 list have been retained as high or low. Under the Department’s Impaired Waters methodology, priority areas are divided into high, medium, and low.

There is one planning unit considered a high priority area, the L-8 Canal. There are six planning units with medium priority areas: C-15, C-16, C-17, C-51, Hillsboro Canal, and the Intracoastal. The southeast coast of Florida has been designated as a low priority for mercury in fish and will be addressed on a statewide basis with the TMDL development due date of 2011. The southeast coast of Florida is listed on the Master and Verified Lists for the purpose of TMDL development, but is not designated a planning unit in this report. For a detailed explanation of the Department’s determination of priority areas, please see Chapter 5.





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Chapter 1: Introduction

Purposes and Content of the Assessment Report

The Florida Department of Environmental Protection (Department) is implementing a statewide watershed management approach for restoring and protecting water quality and addressing **Total Maximum Daily Load** (TMDL) Program requirements. Under Section 303(d) of the 1972 federal Clean Water Act and the 1999 Florida Watershed Restoration Act (FWRA) (Chapter 99-223, Laws of Florida), TMDLs must be developed for all waters that do not meet their designated uses (such as drinking water, recreation, and shellfish harvesting) and are thus defined as impaired.

TMDLs will be developed, and the corresponding reductions in pollutant loads allocated, as part of the watershed management approach, which rotates through the state's 52 river basins over a 5-year cycle. Extensive public participation from diverse stakeholders in each of these basins is crucial in all phases of the cycle.

A Status Report published during Phase 1 of the watershed management cycle provided a *Planning List*, or preliminary identification, of potentially impaired waterbodies in the Lake Worth Lagoon–Palm Beach Coast Basin. A copy of the report can be found at http://www.dep.state.fl.us/water/tmdl/stat_rep.htm.

This Assessment Report, which updates the information in the Status Report, incorporates data collected from the Department's strategic monitoring and gathered from other agencies and groups during Phase 2 of the watershed cycle. The report contains a *Verified List* of impaired waters required by the FWRA and Section 303(d) of the federal Clean Water Act, for which TMDLs must be developed and implemented (see **Noteworthy** for a description of the Assessment Report's contents, by chapter). Based on the assessment results, in the Lake Worth Lagoon–Palm Beach Coast Basin 12 waterbodies or waterbody segments are verified impaired for 1 or more parameters. TMDLs must be developed for these waters, unless the impairment is documented to be a naturally occurring condition that a TMDL cannot abate, or unless a management plan is already in place to correct the problem.

This report is intended for distribution to a broad range of potential stakeholders, including decision makers in federal, state, regional, tribal, and local governments; public and private interests; and citizens.

The Verified List is required by Subsection 403.067(40), Florida Statutes, and Section 303(d) of the federal Clean Water Act. The Department has adopted the Verified List of impaired waters in accordance with the FWRA and the Identification of Impaired Surface Waters Rule (Rule 62-303, Florida Administrative Code). The U.S. Environmental



Total Maximum Daily Load

The maximum amount of a given pollutant that a waterbody can assimilate and remain healthy, such that all of its designated uses are met.



Protection Agency (EPA) has also approved this list as the current 303(d) list of impaired waters for the basin, so called because it is required under Section 303(d) of the Clean Water Act.

The first 303(d) list, which was required by the EPA in 1998, is to be amended annually to include basin updates. Florida's 1998 303(d) list included a number of waterbodies in the Lake Worth Lagoon–Palm Beach Coast Basin. **Tables 3.4 through 3.11** in Chapter 3 list these waters, by planning unit.

This Assessment Report follows the EPA's guidance for meshing Clean Water Act requirements for Section 305(b) water quality reports and Section 303(d) lists of impaired waters. The integrated water quality assessment is used to identify the status of data sufficiency, the potential for impairment, and the need for TMDL development for each waterbody or waterbody segment in the basin.

Appendix A describes the legislative and regulatory background for TMDL development and implementation through the watershed management approach, and briefly explains the TMDL Program. Background information on the Department's TMDL Program, the process of TMDL development and implementation, lists of impaired and potentially impaired waters, and assessments for other parts of the state are available at <http://www.dep.state.fl.us/water/tmdl/index.htm>.

Stakeholder Involvement

The FWRA requires the Department to work closely with stakeholders to develop and implement TMDLs. In addition, the Department's Allocation Technical Advisory Committee (ATAC) report, submitted to the legislature, recommends relying on stakeholder involvement. Stakeholder involvement in the TMDL process will vary with each phase of implementation to achieve different purposes (**Table 1.1**). A copy of the ATAC report is available at <http://www.dep.state.fl.us/water/tmdl/docs/Allocation.pdf>.

The Department will work cooperatively with a number of key stakeholders to develop, allocate, and implement TMDLs in the Lake Worth Lagoon–Palm Beach Coast Basin. These include the South Florida Water Management District (SFWMD), the U.S. Army Corps of Engineers (USACOE), the Department's Southeast District offices in West Palm Beach and Port St. Lucie, the Florida Department of Agriculture and Consumer Services, Palm Beach and Broward Counties, municipalities and water control districts, private citizens, local and national environmental groups, and universities.

Table 1.1: Stakeholder Involvement in the TMDL Program

Watershed Management Cycle	Nature of Stakeholder Involvement
Phase 1: Preliminary Evaluation	Close coordination with local stakeholders to conduct a preliminary basin water quality assessment; inventory existing and proposed management activities; identify management objectives and issues of concern; develop a Strategic Monitoring Plan; and produce a preliminary Status Report that includes a Planning List of potentially impaired waters
Phase 2: Strategic Monitoring and Assessment	Cooperative efforts between the Department and local stakeholders to collect additional data; get data into STORET (the EPA’s national water quality STOR age and RETR ieval database); complete water quality assessment; produce a final Assessment Report that includes a Verified List of impaired waters for Secretarial adoption; and provide an opportunity for stakeholders to document reasonable assurance (for Department review) that existing or proposed management plans and projects are adequate to restore water quality without the establishment of a TMDL
Phase 3: Development and Adoption of TMDLs	Coordination with stakeholders to discuss TMDL model framework, including model requirements, parameters to be modeled, model endpoints, design run scenarios, and preliminary allocations; communication of science used in the process; public workshops for rule adoption of TMDLs
Phase 4: Development of Basin Management Action Plan	Broad stakeholder participation in developing a Basin Management Action Plan (B-MAP) (including detailed allocations and implementation strategies), incorporating it into existing management plans where feasible; public meetings during the planning process
Phase 5: Implementation of Basin Management Action Plan	Emphasis on implementing the B-MAP, other voluntary stakeholder actions, and local watershed management structures; Department will continue to provide technical assistance, fulfill oversight responsibilities, and administer National Pollutant Discharge Elimination System point and nonpoint source permits

Coordination with the South Florida Water Management District in Implementing the Total Maximum Daily Load Program

The goals of the Department’s TMDL Program—to identify impaired waterbodies, develop targets for restoration, and establish a watershed management framework to improve water quality—complement water management district programs existing and under way.

For many years, the SFWMD has exercised responsibilities related to water supply, floodplain protection and management, water quality, and the protection of natural systems. SFWMD has been the lead state/regional agency involved with the Comprehensive Everglades Restoration Program (CERP) and, with the USACOE, the Department, and others, has developed a plan that includes regional solutions that will improve water quality in the Lake Worth Lagoon and improve delivery and timing of water to the estuary and other receiving waters. Chapter 2 of this report provides more detailed descriptions of the CERP.

Throughout the various phases of this cycle, the Department and SFWMD will continue to work together in identifying, verifying, and addressing impaired waterbodies.



The Watershed Management Cycle in the Florida Department of Environmental Protection’s Southeast District

Figure 1.1 shows the order in which the Department’s Southeast District basins will be evaluated under the watershed management cycle. These groups are identified according to a U.S. Geological Survey classification system using hydrologic unit codes.

Lake Okeechobee, a Group 1 basin, was the first basin in the district to undergo a preliminary assessment in 2000. It includes waterbodies in the Lake Okeechobee and Taylor Creek hydrologic units. An Assessment Report on the basin was published in 2002. TMDLs for impaired waterbodies were completed in 2003, and water quality improvement measures are in progress.

A preliminary assessment for the Group 2 basin, St. Lucie–Loxahatchee, was completed in 2001. This basin includes parts of the St. Johns River–Upper, Indian River–South, and Southeast Florida Coast hydrologic units. A Verified List of waters requiring TMDLs was produced in 2003.

Groups 3, 4, and 5 areas are all located in the Southeast Florida Coast hydrologic unit. The Group 3 basin, Lake Worth Lagoon–Palm Beach Coast, was assessed on a preliminary basis in 2002, and the basin is the subject of this Assessment Report. Similarly, a preliminary assessment for the Group 4 basin, the Biscayne Bay–Southeast Coast area, was initiated in 2003, and a preliminary assessment for the Group 5 basin, Everglades, began 2004. In 2005, the cycle will resume with the Group 1 basin, Lake Okeechobee.



Figure 1.1: Schedule for Implementing the Watershed Management Cycle in the Department's Southeast District, Basin Groups 1 through 5

Contents of This Report

- **Chapter 1: Introduction** briefly characterizes the purpose and content of the Water Quality Assessment Report, discusses stakeholder involvement, and describes how the watershed management cycle will be implemented in the Department's Southeast District.
- **Chapter 2: Basin Overview** characterizes the basin's general setting, water resources, major water quality trends, and watershed management issues and activities.
- **Chapter 3: Surface Water Quality Assessment** discusses the scope of the assessment, summarizes data-gathering activities and sources of data, describes the EPA's terminology for designated use attainment and its integrated report categories, and provides, by basin planning unit, an evaluation of water quality, a discussion of permitted discharges and land uses, a summary of ecological priorities and problems, and an overview of water quality improvement plans and projects.
- **Chapter 4: The Verified List of Impaired Waters** contains the Verified List of impaired waters, discusses public participation, describes documentation of reasonable assurance, lists the pollutants causing impairments, provides listings based on other information indicating a nutrient imbalance, and describes the adoption process for the Verified List.
- **Chapter 5: TMDL Development, Allocation, and Implementation** discusses the prioritization of listed waters, TMDL development, TMDL allocation and implementation, and the development of a Basin Management Action Plan.

Chapter 2: Basin Overview

Basin Setting

The Lake Worth Lagoon–Palm Beach Coast Basin includes the eastern portion of Palm Beach County south of the Loxahatchee River Basin, and extends southward to include the Hillsboro Canal watershed of southern Palm Beach County and northern Broward County. Its boundary extends from the Everglades Agricultural Area (EAA) and Water Conservation Area (WCA)-1 on the western side to the Atlantic Ocean on the eastern side. The basin covers approximately 700 square miles (**Figure 2.1**).

The C-51, C-16, C-17, and C-15 Canals; the West Palm Beach (WPB) Water Catchment area; and the Intracoastal watershed are the primary drainage basins for the Lake Worth Lagoon (LWL) and the Atlantic Intracoastal Waterway (AICW) in this region. The northern watersheds (L-8, WPB Water Catchment, and C-17) also can contribute to the Loxahatchee River Basin (located in the Group 2 area) and were part of its natural drainage area before development. Watersheds in the southern part of this group (C-15 and Hillsboro Canal) drain to the AICW south of the lagoon.

The LWL is the major estuarine resource of Palm Beach County. The drainage areas immediately surrounding the lagoon and emptying into it, as well as the watersheds that contribute water to the major conveyance canals, significantly influence its water quality. Stormwater pollutants and excessive freshwater inflows from canals, as well as the bulkheading along the LWL shoreline, continue to present problems, although the problems of past years related to the discharge of domestic wastewater have diminished. According to the *Lake Worth Lagoon Management Plan* (Palm Beach County Department of Environmental Resources Management [PBC/DERM] and Florida Department of Environmental Protection [Department], Southeast District, 1998), the most important challenges today are the result of freshwater runoff: undesirable salinity fluctuation, excessive suspended matter, reduced water clarity, a high rate of sedimentation, and nutrient loading. Although the LWL receives inflow of locally generated stormwater and water from the other major canals, the main source of fresh water discharged to the lagoon is the West Palm Beach Canal (C-51).

The coastal area of Palm Beach County was first to be developed, because it contains a natural ridge that historically existed as well-drained, habitable land. Over the years, drainage improvements made land to the west of the coastal ridge suitable for development. Much of the land to the west of the urban coastal area is now covered by urban development or exists as agricultural cropland, both depending on a network of canals that drain the area. Most runoff from these urban/residential and agricultural



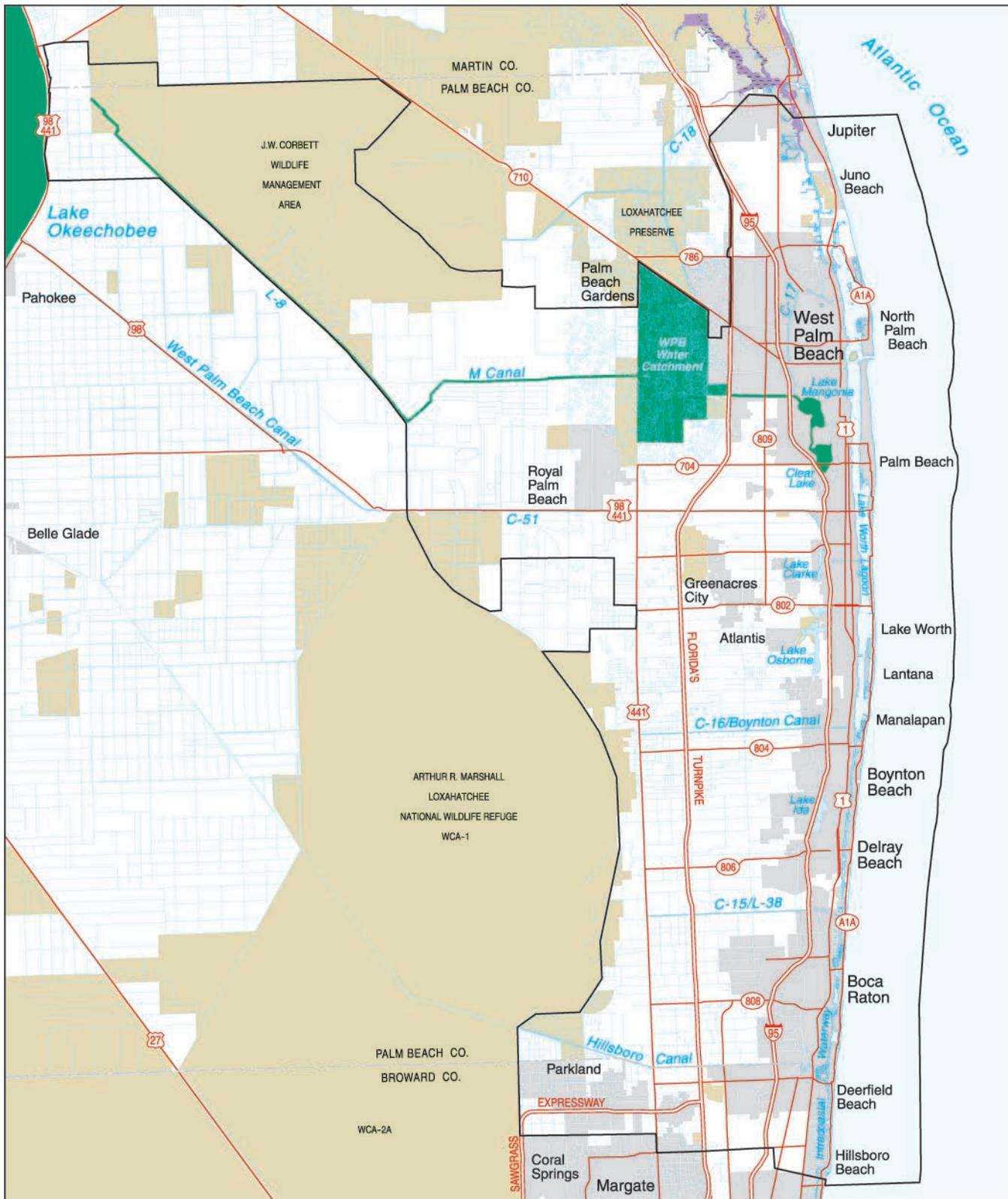


Figure 2.1: Geopolitical Map of the Lake Worth Lagoon–Palm Beach Coast Basin

lands enters the canal systems and is ultimately conveyed to the LWL or the AICW via secondary canals operated by water control districts and the major canals maintained by the South Florida Water Management District (SFWMD). Some of these canals also discharge to the WCAs to the west of the basin. Control structures and pumping stations are used to regulate levels and divert flow in canals for flood control, irrigation, and ground water recharge to prevent saltwater intrusion.

Within the coastal area, there are several significant lakes. The city of West Palm Beach uses Clear Lake and Lake Mangonia, located northwest of West Palm Beach, as reservoirs for potable water supply. Farther south, a chain of freshwater lakes provides recreational opportunities to Palm Beach County residents and also attenuates canal water that would be discharged to the LWL.

To the north and west of the urban coastal area, several natural wetland areas contribute to flow in the canal systems. Within the northwestern part of the basin, the largely undeveloped J. W. Corbett Wildlife Management Area provides high-quality runoff to the L-8 Canal. The WPB Water Catchment, a wetland area in the northeastern part of the basin, is a source of surface water used for potable supply and ground water recharge for municipal wellfields. West of the basin's boundary lie two WCAs, water storage areas that include freshwater remnants of the Everglades. The WCAs store and can supply irrigation water to the EAA to the north and west; they provide stormwater protection, ground water recharge, and water to canals in the urban coastal areas.

WCA-1, the northernmost conservation area, contains most of the Arthur R. Marshall Loxahatchee National Wildlife Refuge. It is maintained to provide water storage and flood control, as well as habitat for native fish and wildlife populations. A 57-mile canal and levee surrounds WCA-1. WCA-1, located in western Palm Beach County, adjoins much of the basin's area. It receives water from and releases water to the basin via the C-51, Hillsboro, and C-16 Canals, as well as several smaller canals. WCA-2, located just south of WCA-1, provides water to the Everglades and to canals in Broward and Dade Counties to the east and south.

Eastern Palm Beach County includes the most heavily developed urban areas of the county and is one of the more heavily urbanized areas in the state. According to the 2000 U.S. Census, the West Palm Beach–Boca Raton–Delray Beach Metropolitan Statistical Area of eastern Palm Beach County had an average population density of 573 people per square mile. Over the 1990–2000 Census period, the population grew in Palm Beach County by approximately 31 percent, most of which was in the area included in the Lake Worth Lagoon–Palm Beach Coast Basin.

Land uses (from 1995 SFWMD land use/land cover data) reflect the population density in this area. Over 47 percent of the total area of the Lake Worth Lagoon–Palm Beach Coast Basin (including land and water) is identified as urban. Further subdivided, over 32 percent is residential, approximately 6 percent is in commercial/industrial/institutional categories, and 5 percent is in recreational use (e.g., golf courses, parks, and athletic fields). Approximately 16 percent of the total area is in agricultural land use, most of which is in field or row crop production, citrus groves,



Sources of Information

Much of the information about the Lake Worth Lagoon–Palm Beach Coast Basin in this chapter was obtained from the following references:

- *Lake Worth Lagoon Management Plan (PBC/DERM and Department, 1998),*
- *Comprehensive Everglades Restoration Plan (CERP) (CERP Web site, available at <http://www.evergladesplan.org/>),*
- *Ecosummaries for Palm Beach County waterbodies (Lake Worth Lagoon, West Palm Beach Canal, L-8 Canal, M Canal, Water Conservation Areas 1N and 2A) (Department Web site, available at <http://www.dep.state.fl.us/southeast/ecosum/ecosummain.htm>),*
- *Atlas of Eastern Palm Beach County Surface Water Management Basins (SFWMD, 1988), and*
- *The Southeast Florida Environment—A Region Under Stress (U.S. Geological Survey, 1992), (McPherson and Halley, 1996).*

Other references used are individually cited in this chapter.



nurseries, or pasture. Other major land cover categories include barren land (e.g., beaches and other nonvegetated areas, approximately 16 percent) and water (approximately 12 percent). Overall, less than 4 percent of the area is covered by wetlands and upland forests cover approximately 0.5 percent.

Surface Water Resources

The Lake Worth Lagoon–Palm Beach Coast Basin contains numerous surface waterbodies. Surface waters, including lakes, streams, wetlands, and springs, occupy over 86,400 acres, or about 19.5 percent of the total basin area. This section delineates the basin’s hydrology, describes the movement and management of water in the basin, briefly describes the major characteristics of surface waters that influence water quality, and describes surface water classifications and special designations.

The basin includes the coastal ridge and an area that would naturally exist as poorly-drained flatwoods and lowlands to the west. Most of the lower southeast coast of Florida is nearly level and was subject to severe flooding prior to the drainage modifications that led to development. Under the Central and Southern Florida (C&SF) Project of 1948, the U.S. Congress authorized the U.S. Army Corps of Engineers (USACOE) to implement a major regional drainage and flood control program (C&SF Flood Control District, 1973). The C&SF Project and accompanying smaller-scale drainage projects significantly altered the region’s hydrology and led to alteration of the area’s landscape as wetlands were drained, natural drainage features were modified, and land was converted to the urban/residential and agricultural land uses of today. These drainage improvements connected isolated wetland areas and conveyed most of the water eastward to the estuary, resulting in an enlargement of the overall watershed area of the LWL and coastal estuary system.

Watersheds

Figure 2.2 shows the watersheds in the Lake Worth Lagoon–Palm Beach Coast Basin. (A more detailed discussion in Chapter 3 provides information on each planning unit.) The USACOE originally delineated the surface water management watersheds in this area in the 1950s under the C&SF Project to provide flood control. Based on the region’s hydrology, a system of canals, levees, and control structures was constructed to provide flood protection for southeastern Florida. As part of the C&SF Project, several major water conveyance canals were constructed in the Lake Worth Lagoon–Palm Beach Coast Basin: L-8, C-51 (West Palm Beach Canal), C-17 (Earman River), C-16 (Boynton Canal), C-15, and Hillsboro Canal. The WPB Water Catchment, which is not associated with a canal, is a remnant of the Loxahatchee Slough wetland that is incorporated into the city of West Palm Beach; it stores and filters canal water used for potable supply and recharges ground water. The Intracoastal watershed, which is not associated with a particular canal, includes the estuarine receiving waterbodies, the LWL, and the AICW.

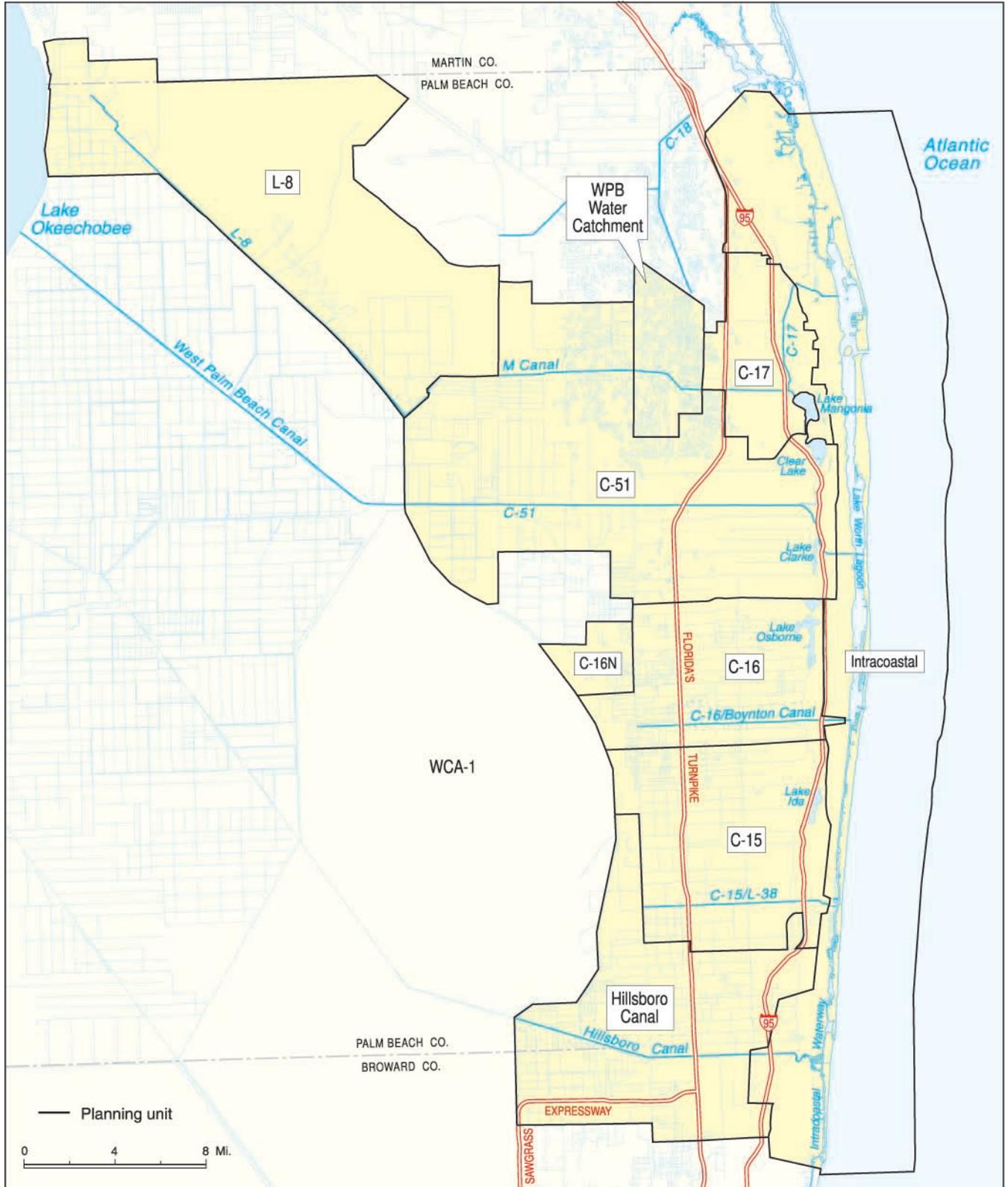


Figure 2.2: Surface Water Resources of the Lake Worth Lagoon–Palm Beach Coast Basin



The SFWMD regulates and maintains the primary canals in South Florida. The management and regulation of secondary canals is the responsibility of county governments or water control districts. Water control districts were established or ratified under Chapter 298, Florida Statutes (F.S.), and operate as distinct entities that work in cooperation with the SFWMD, Palm Beach County, and Broward County to provide consistency in level of service to this entire area. There are 11 independent water control (or drainage) districts that have jurisdictional areas within the basin's boundaries (**Figure 3.2**).

Lake Worth Lagoon

The estuarine waterbodies of Palm Beach County consist of a 45-mile-long series of shallow, elongated lagoons interconnected by the AICW (**Figure 2.3**). The LWL is about 20 miles long, up to a half-mile wide, and 8 feet deep, and is the most significant estuarine feature. Originally, the LWL was an isolated freshwater lagoon, but its character changed with the dredging of the AICW and inlets to the Atlantic Ocean. Beginning in the late 19th century, canals were dredged to connect the coastal lagoons and create the AICW for navigational purposes. By 1910, the AICW extended from Jupiter Inlet to Biscayne Bay. Over time, inlets were dredged to improve water circulation in the canal/estuary system and provide access to the Atlantic Ocean. Within the LWL, these inlets include the Lake Worth Inlet (Palm Beach Inlet) and the South Lake Worth Inlet (Boynton Inlet).

Major infusions of fresh water began entering the estuarine system in the 1950s with the construction of the C&SF canals. These canals—Earman River (C-17), West Palm Beach Canal (C-51), and Boynton Canal (C-16)—are the 3 primary watersheds of eastern Palm Beach County that drain into the LWL. The C-51, which provides the largest inflow into the lagoon, currently discharges an average of over 300 million gallons per day of fresh water (PBC/DERM and Department, 1998). Salinity fluctuations in the estuary correspond with seasonal variations in the freshwater inflow from C-51, causing problems in the estuary's ecology.

With the drainage provided by the C&SF Project came further development around the lagoon. Currently, LWL is divided between 13 different municipalities, and the area surrounding it is intensively developed. Approximately 65 percent of the lagoon's shoreline is bulkheaded, and only 19 percent of the shoreline remains fringed by mangroves. By the 1940s, the condition of the lagoon was at its worst. In addition to the massive discharges of fresh water via the C&SF canals and local runoff, polluted stormwater and sewage inflows were taking their toll. Some improvements in water quality were realized after sewage discharges were reduced in the 1960s and 1970s, due to the passing of more protective wastewater treatment regulations. The water quality and ecology of the LWL, however, continue to be adversely affected by the freshwater discharges and associated suspended sediments and nutrient loads.

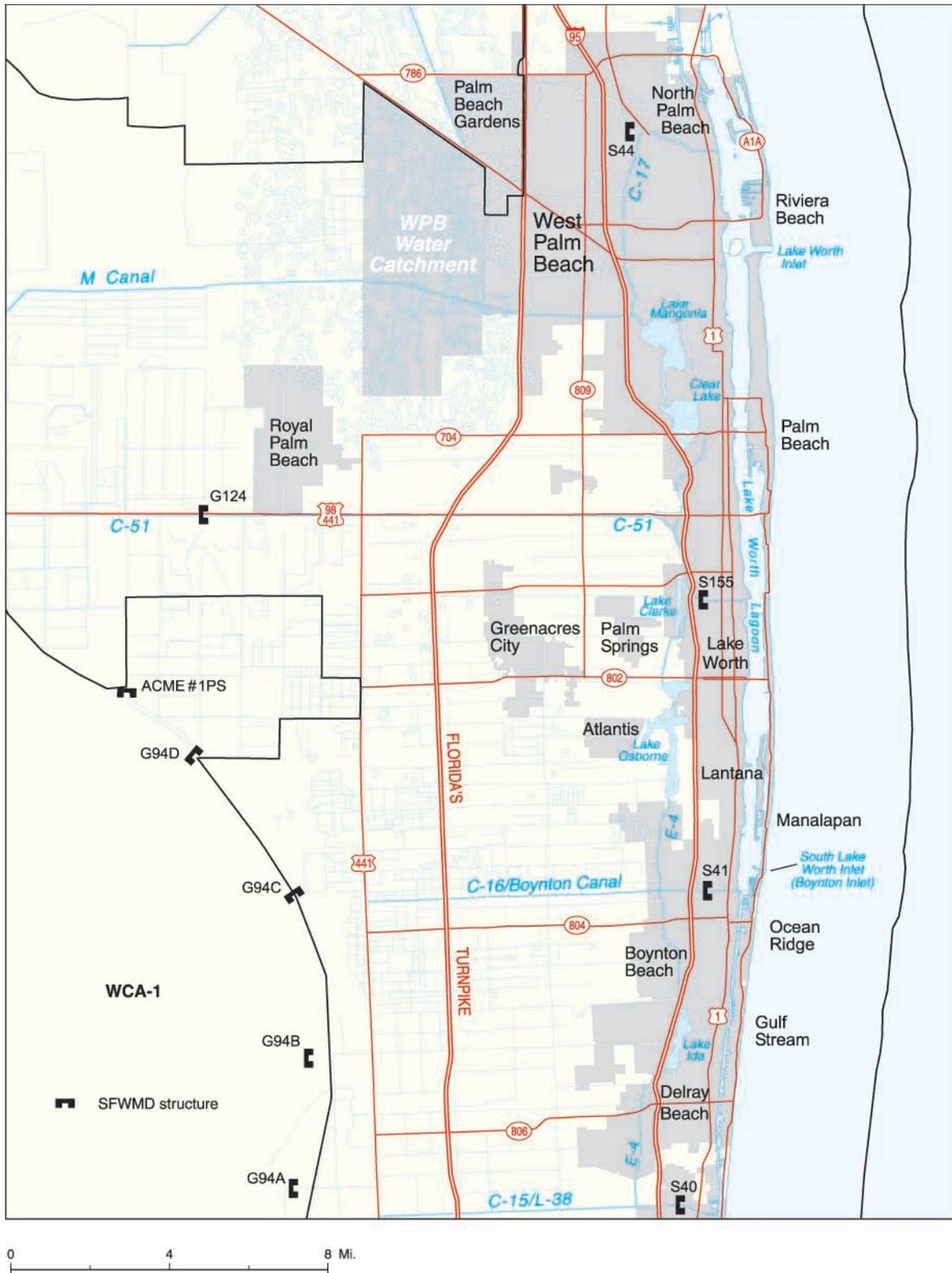


Figure 2.3: Enlarged Map of the Lake Worth Lagoon and Coastal Region



Because of the lagoon's configuration, the points of entry of canal discharges, and the locations of the inlets that provide flushing, the portions of the lagoon that are farthest from inlets are more affected than others. Research shows that the central portion of the lagoon (between Palm Beach Inlet and South Lake Worth Inlet) is subject to the lowest salinities over the longest periods (Zarillo, 2003). The northern part of the lagoon, which receives fewer impacts from the freshwater inflows and also benefits from better circulation via the Lake Worth Inlet, has higher and more stable salinity levels. The southern portion of the LWL also suffers from depressed salinity, but periods of low salinity occur over shorter durations than they do in the central segment of the lagoon.

Lakes

A chain of freshwater lakes is located along the western slope of the coastal ridge in the eastern part of the C-15, C-16, and C-51 watersheds. These lakes include Pine Lake, Lake Clarke, Lake Osborne, Lake Ida, Lake Eden, and their connecting waterbody, the E-4 Canal (**Figure 2.3**). Over the years, the natural character of the lakes has been changed by historical dredge-and-fill activities, the encroachment of urban and residential growth into riparian areas and floodplains, the spread of nonnative, invasive plant species, and increased discharge of pollutants and sediment in stormwater from canals.

North of the chain of lakes are two other large freshwater lakes, Clear Lake and Lake Mangonia, that receive water from the WPB Water Catchment. The city of West Palm Beach uses these reservoirs for potable supply.

Coral Reefs

There are two main coral reef tracks within the Lake Worth Lagoon–Palm Beach Coast Basin Group. The Southeastern Coast reef system runs from northern Monroe County to Palm Beach County in a series of discontinuous reef lines paralleling the shore. Duane and Meisburger (1969) and Goldberg (1973) defined the habitat at limited locations and provided information on the coral fauna. There are generally three lines of reef—one that nominally crests in 10 to 13 feet of water (First Reef), another in 20 to 26 feet (Second Reef), and a third in 49 to 69 feet (Third Reef).

The Florida Keys reef is not directly affected by water quality coming from the Lake Worth Lagoon–Palm Beach Coast Basin Group, but remains an extremely valuable resource to the basin. Arching southwest 356 kilometers from south of Miami to the Dry Tortugas, the Florida Reef Tract comprises one of the largest reef communities in the world. Except between Rebecca Shoal and the Dry Tortugas, it is almost continuous. The Florida Reef Tract has been described as a bank reef system composed of an almost continuous reef community with elongated reef habitats paralleling one another. The reef ecosystems consist of distinct habitat types: nearshore patch reefs, midchannel reefs, offshore patch reefs, seagrass beds, back reefs/reef flats, bank or transitional reefs, intermediate reefs, deep reefs, outlier reefs, and sand/soft bottom areas. In addition to the bank reefs, over 6,000 circular to oval patch reefs lie along the Florida Reef Tract in 7 to 30 feet of water. For further information, please

see *Status of Coral Reefs in Florida* by Billy D. Causey, Richard E. Dodge, Walter Jaap, Ken Banks, Joanne Delaney, Brian D. Keller, and Richard Spieler.

There are several impacts on these reef tracts from impaired water quality in the southeast Florida. Some of these include discharge of treated wastewater from outfalls having adverse effects on reef growth. Urban runoff specifically containing coliform bacteria has been related to reef die-off. A Land-Based Sources of Pollution and Water Quality Focus Area Technical Advisory Committee exists as part of the Southeast Florida Coral Reef Initiative (SFCRI) to more fully evaluate the impacts from the watershed.

Offshore Reef Water Quality Monitoring Program

The coastal marine waters off southeast Florida support an extensive reef ecosystem, which anchors highly diverse biological communities. These reefs provide habitat for many ecologically and economically significant organisms, including numerous managed and protected (i.e., threatened or endangered) species. Hard corals, soft corals, sponges, fish, and algae along with a multitude of invertebrate species, make up the complex and fragile reef ecosystem. Multiple commercial and recreational fisheries (e.g., spiny lobster, grouper, snapper, grunts, and hogfish) exist in the nearshore waters.

Beyond their environmental significance, the offshore waters are a critical socioeconomic resource of the southeast coast. In 2001, the artificial and natural reef systems of Miami-Dade, Broward, and Palm Beach Counties contributed \$3.8 billion in sales to the local economy as well as almost 60,000 jobs (full and part-time, see <http://www.broward.org/bri01714.pdf>). Furthermore, it was estimated that residents and visitors spent almost 23 million “person days” on the reefs of Miami-Dade, Broward, and Palm Beach Counties.

All of the reef species and habitats have a great dependence on the quality and consistency of the nearshore water. These systems are considered to be under significant pressure from anthropogenic sources (i.e., modified levels of freshwater input, nutrient enrichment, and increased turbidity/suspended solids from sewage outfalls, septic systems, and agricultural and upland runoff). Surprisingly, little information is available to document these stresses. Unlike the estuarine (i.e., ICW/Intracoastal Lagoon of Broward, Biscayne Bay in Miami-Dade, and Lake Worth Lagoon in Palm Beach) and inland waterbodies of the region (e.g., freshwater canal systems and the Everglades), relatively little surface water quality data exists for Florida’s offshore waters. This, however, is changing. For example, the Florida Department of Health initiated a swimming-beach bacteriological monitoring program for all coastal counties in Florida (for data on Broward, see <http://apps3.doh.state.fl.us/env/Beach/beachresults.cfm?county=Broward>; for Miami-Dade, see <http://apps3.doh.state.fl.us/env/beach/beachresults.cfm?county=Dade>; and for Palm Beach, see <http://apps3.doh.state.fl.us/env/beach/beachresults.cfm?county=Palm+Beach>). These data are used for assessing potential sewage contamination at the beaches and to determine the need for issuance of closing advisories.





Additionally, these data are used in the Impaired Surface Waters Rule (IWR) process by the Florida Department of Environmental Protection (Department). These locations represent the extreme nearshore environment as the samples are collected in the surf zone.

Miami-Dade County, through its DERM, initiated a quarterly assessment of its coastal water quality in 1994. Water quality stations were matched to biological monitoring stations that were established for assessment of potential impacts associated with beach renourishment projects. Although multiple year sampling occurred at all stations, the location and period of sampling for the stations depended on the location of associated beach renourishment projects. Salinity, temperature, pH, dissolved oxygen, turbidity, total phosphate, inorganic nitrogen (NO_x), total ammonia (NH₃-N-), and total coliform and fecal coliform bacteria have been sampled at limited locations, approximately one to three miles off the county's coastline. In general, nutrient and bacteriological concentrations in the coastal waters (based on the results of the monitoring) are extremely low, very close, or below the minimal detection limit (the lowest concentration of the compound that can be detected by the analytical method used by the laboratory) with the exception of ammonia. Ammonia is often detected but at concentrations well below the county's water quality standard (e.g., mean = 0.10 mg/L [\pm 0.10]); county standard is 0.50 mg/L). Minimal detection limits (and generally the maximal concentrations) of total phosphate and NO_x were 0.001 mg/L and 0.01 mg/L, respectively.

In Broward County, special historical water quality studies (SEFLOE I and II) were performed over 10 years ago with the installation of human wastewater outfalls, but surface water quality monitoring has not been conducted on a consistent basis. Recent newspaper articles (*Sun-Sentinel*, 2004) illustrate the public's perception of declining water quality offshore even though a paucity of data exists. The perception of poor water quality has been enhanced by the presence of multiple algal blooms over the past few years (i.e., *Codium isthmocladum* ["green" alga; Chlorophyta] and *Caulerpa verticillata* ["green" alga] during the mid and late 1990s and most recently *Lyngbya confervoides* ["blue-green" algae]; Cyanobacteria). These algae are all natural components of the reef ecosystem; however, the belief is that environmental conditions (possibly through nutrient inputs or other anthropogenic alterations) caused these otherwise "normal" algae to initiate and sustain an exceedingly abnormal growth or bloom. Qualitative surveys suggest the blooms have negatively impacted the reef's ecosystem by overgrowing sponges, hard corals, soft corals, and other sessile invertebrates. The exact cause remains unknown; however, the situation is made more complex by the diversity of possible nutrient inputs to the southeast coastal waters, including atmospheric deposition, oceanic upwelling, reef internal cycling, human wastewater outfall pipes, stormwater/oceanic inlets, and ground water seepage.

Freshwater and estuarine sampling has occurred in Palm Beach County since the mid 1970s, and this program was expanded by the DERM in the late 1980s. Nutrient enrichment of the county's interior coastal waters has long been documented, and these sources include discharges from the C&SF Project canals and urban storm sewers east of

the coastal ridge. The flood control canals provide the backbone drainage system for a variety of land uses including vast amounts of agricultural lands. The nutrient-enriched coastal water then flows offshore through the Lake Worth, South Lake Worth (Boynton Beach), Boca Raton, and Jupiter Inlets. Algal blooms on the reefs have been documented in Palm Beach County as well. In the early 1990s research attempting to link the *Codium isthmocladum* blooms with total phosphate loadings from the canals were inconclusive. More recently, reports were completed describing local cyanobacterial (*Lyngbya* sp.) blooms and linking them with wastewater outfall discharge data (Tichenor, 2003), and LaPoint is initiating funded studies of the offshore macroalgal blooms.

Fortunately, several initiatives are underway to expand water quality monitoring off Broward, Miami-Dade, and Palm Beach's shores in the coming years. The Department is coordinating the SFCRI (www.coralreef.gov/las/pdf/SEFCRI_LAS_FINAL_20May05.pdf), which has a major objective to investigate land-based sources of pollution throughout the southeast coast. Many local utilities and the National Oceanic Atmospheric Administration are planning a monitoring program to investigate the diversity of nutrient loads to offshore waters. The Broward County Department of Planning and Environmental Protection is also constructing a monitoring program with implementation planned for 2005. The Southeast Coastal Observations Regional Association (<http://www.secoora.org/>) is being developed to provide an integrated physical and meteorological monitoring network that will be the backbone for future water quality observations. All of these efforts should substantially increase the knowledge of water quality along the Lake Worth Lagoon–Palm Beach Coast and should be available for the Department to use in its second iteration of the IWR Rotating Basin schedule (approximate time frame 2008 and 2009).

Surface Water Quality Classifications

The WPB Water Catchment, M Canal, Lake Mangonia, and Clear Lake are designated as Class I waterbodies. **Figure 2.1** shows the Class I waterbodies in the basin. The WPB Water Catchment is a source of surface water used for potable supply by the city of West Palm Beach and provides ground water recharge to the municipal wellfields that surround the city. Municipal areas being served include the city of West Palm Beach, Palm Beach County, Royal Palm, the city of Riviera Beach, and Seacoast Utilities. The M Canal conveys surface water to the WPB Water Catchment from the L-8 Canal, and conveys water from the water catchment to Lake Mangonia. Lake Mangonia and Clear Lake are interconnected and, with the WPB Water Catchment, serve as potable water reservoirs for the city of West Palm Beach. The city's surface water intake is on Clear Lake.

All other waterbodies in the basin are designated Class III, which includes rivers, streams, canals, lakes, ponds, wetlands, estuaries, and impoundments that are not designated as treatment facilities. Although they may exist functionally, no Class IV waterbodies have specifically been designated in the basin. As elsewhere in Florida, there are no waterbodies designated as Class V.





Florida’s water quality standards, the foundation of the state’s program of water quality management, designate the “present and future most beneficial uses” of the waters of the state (Subsection 403.061[10], F.S.). Water quality criteria for surface water and ground water, expressed as numeric or narrative limits for specific parameters, describe the water quality necessary to maintain these uses. Florida’s surface water is classified using the following five designated use categories:

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

Special Designations

Outstanding Florida Waters

There are no waterbodies designated as Outstanding Florida Waters (OFWs) in the Lake Worth Lagoon–Palm Beach Coast Basin, except for those in John D. MacArthur Beach State Park (**Figure 2.1**).

OFWs are designated for “special protection due to their natural attributes” (Section 403.061, F.S.). These waters are listed in Section 62-302.700, Florida Administrative Code (F.A.C.). The intent of an OFW designation is to maintain ambient water quality, even if these designations are more protective than those required under the waterbody’s surface water classification. Most OFWs are associated with managed areas in the state or federal park system, such as aquatic preserves, national seashores, or wildlife refuges. Other OFWs may also be designated as “Special Waters” based on a finding that the waters are of exceptional recreational or ecological significance, and are identified as such in Rule 62-302, F.A.C.

Ground Water Resources

Aquifers

The surficial aquifer system is the sole source of fresh ground water in the Lake Worth Lagoon–Palm Beach Coast Basin. This aquifer system is unconfined and comprises permeable sands, sandstone, limestone, shell beds, and marl. The Biscayne aquifer and surrounding materials that produce water moderately well (sandy shell, moderately solutioned limestone, and sandstone) make up the production zone of the surficial aquifer system in this area. The potential for water withdrawals across the basin depends on the thickness and composition of the aquifer material. The Biscayne aquifer is by far the most productive unit of the shallow system; in the northern part of Palm Beach County, however, it is not present.

An extensive confining unit composed of less-permeable marl, limestone, and clay separates the surficial aquifer system from the underlying

Floridan aquifer. The Floridan aquifer, existing in Oligocene to Eocene-age limestones and dolomites, is highly productive. Without treatment, however, its water is not potable due to its salinity. Water can be withdrawn from two zones in the Floridan aquifer. The upper producing zone is of better quality and is being used for potable water supply after desalinization by reverse osmosis treatment. Although it can yield ample quantities of water, the lower Floridan is not used for water supply due to high dissolved solids that make treatment infeasible.

Because the surficial aquifer system is so important in terms of its close relationship to the surface water system, the remaining ground water discussion pertains to this system.

Ground Water–Surface Water Interactions

A good characterization of the recharge and discharge influences on the surficial aquifer system was provided by a three-dimensional flow model developed by the SFWMD (Shine, Padgett, and Barfknecht, 1989). This model is used as a tool for managing the development of ground water resources in eastern Palm Beach County.

Rainfall makes up approximately 80 percent of the total recharge to the aquifer in the basin, and 13 percent consists of recharge from surface water systems that are intentionally maintained to enhance recharge. The Lake Worth Drainage District canal system provides over half of the recharge from surface water systems. The remaining recharge occurs as direct infiltration of rainfall and as ground water underflow from the adjacent WCA-1 to the west. Recharge in the eastern Palm Beach County area, and in other developed areas of the southeast coast, is much lower than in predevelopment times due to the extensive drainage systems that lower the water table and the creation of impervious surfaces in urban/suburban areas.

Ground water discharge is attributable to consumptive withdrawals and to hydrologic modifications that lower the water table (i.e., canals). According to the 1989 SFWMD model, allocated withdrawals for consumptive use constituted approximately 15 percent of the total discharge from the surficial aquifer system. The major percentage of discharge (85 percent) is to surface water via canals. Ground water that leaks into canal systems is lost in 2 ways: through evapotranspiration and discharge to tide. Approximately 20 percent of the ground water that is discharged from the aquifer is lost to evapotranspiration after it leaks into canals. The major component of the discharge total (65 percent), however, was determined to consist of the ground water leaked into canals and transported to tide via the canal systems.

Ground Water Usage

Using current and projected ground water use scenarios without considering alternatives could result in moderate to severe restrictions in consumption, saltwater intrusion, and environmental effects in eastern Palm Beach County.





In areas where the surficial aquifer system is less productive but where withdrawals are significant, municipal systems will be constrained, limitations will be placed on usage, and alternative sources will be needed. According to SFWMD modeling, the largest simulated ground water—withdrawals in eastern Palm Beach County are created by the wellfields operated by Lake Worth, Boynton Beach, Delray, Jupiter, and Seacoast Utilities. In these areas, consumptive use by municipal systems withdrawing from the surficial aquifer system is being restricted.

Environmental impacts are a consequence of ground water withdrawals in lower yield/lower recharge areas, where natural wetlands depend on a high water table. The northeastern part of the basin, where the potential for further development of the ground water resource is poor, is one particular area of concern. Loxahatchee Slough and the WPB Water Catchment are both subject to adverse impacts due to withdrawals from the surficial aquifer system by Jupiter and Seacoast Utilities wellfields to the north, combined with the demands placed on the surface water system by withdrawals of the city of West Palm Beach.

The SFWMD is implementing alternatives for supplementing water supplies in areas where the surficial aquifer system is being stressed, and water use restrictions are being imposed to limit withdrawals during low-water periods. The upper Floridan aquifer is being used as an alternative supply (after treatment). In addition, measures are being taken under the Comprehensive Everglades Restoration Plan (CERP) to create above-ground and deep aquifer storage of surface water that would otherwise be lost to tide, and to reconnect and rehydrate natural wetland systems that would enhance recharge to the aquifer.

Watershed Management Activities and Processes

Over the years, management plans and activities in the Lake Worth Lagoon–Palm Beach Coast Basin have been implemented to eliminate wastewater discharges; reduce the discharges of polluted stormwater from urban and agricultural areas; and protect, preserve, and restore special areas. The following section describes historical, current, and ongoing activities and processes to address water quality problems.

Much of the progress in the basin for developing water quality restoration plans and implementing watershed and water quality improvements is attributable to coordinated local, state, and regional efforts. Many plans share common goals, and their implementation is based on various groups playing critical roles in planning, funding, managing, and executing projects. The Department continues to coordinate its efforts with these entities to obtain data, strengthen monitoring activities, and exchange information through periodic meetings. The local organizations and initiatives described in **Table 2.1** provide leadership in waterbody restoration and preservation efforts.

Table 2.1: Summary of Organizations Implementing Waterbody Restoration and Preservation Plans and Projects in the Lake Worth Lagoon–Palm Beach Coast Basin

Organization	Role
Federal, State, or Regional Organizations	
South Florida Water Management District (SFWMD)	SFWMD sponsors a wide variety of local and regional water quality planning, restoration, and monitoring efforts in the basin. It is the lead agency responsible for water management; for operating and maintaining the major network of canals, levees, dikes, and control structures; and for regulating surface management by water control districts and local governments and ground water consumptive use by utilities. SFWMD is the lead regional agency for planning and implementing the Northern Palm Beach County and Water Preserve Area Projects under the Comprehensive Everglades Restoration Program (CERP), and is also the lead agency for many conservation land acquisition efforts.
U.S. Army Corps of Engineers (USACOE), Jacksonville District	This agency is responsible for the lead federal role in CERP and the North Palm Beach County and Water Preserve Area Projects that affect the basin.
U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)	NRCS supports the agricultural community in conserving soil and water, and reducing irrigation volumes and stormwater runoff from agricultural sites.
Florida Department of Agriculture and Consumer Services (DACS)	DACS’ Office of Agricultural Water Policy is responsible for working with agricultural interests to develop best management practices (BMPs) that reduce the impact of agricultural activities on water quality.
Florida Department of Environmental Protection (Department)	The Department has a leadership role and participates on several advisory boards and councils related to protection of the environmental resources in the basin. The Department and Palm Beach County cochair the Lake Worth Lagoon Steering Committee, a group responsible for implementing the goals and objectives of the Lake Worth Lagoon Management Plan. The Department regulates many of the activities contributing to water pollution. It also actively monitors water quality in the basin and manages many state and federally funded contracts for restoration projects.
Local Governments and Organizations	
Palm Beach County	Palm Beach County Department of Environmental Resource Management (PBC/DERM) has a role in several programs that apply to water quality. Palm Beach County is a cochair of the Lake Worth Lagoon Steering Committee, a group responsible for implementing the goals and objectives of the Lake Worth Lagoon Management Plan. PBC/DERM is responsible for implementing a similar restoration program for the chain of lakes and for coordinating the acquisition of key lands to support other waterbody restoration and preservation efforts. PBC/DERM also is a copermittee in the countywide stormwater management program, which includes several local municipalities and a water control district (Northern Palm Beach Improvement District).
Broward County	Portions of the Hillsboro Canal and Intracoastal Basin are located in northern Broward County. The Broward County Department of Planning and Environmental Protection is responsible for surface water quality monitoring and evaluation, and for managing stormwater in much of Broward County.
Local Municipalities	Several municipalities in Palm Beach County support the Lake Worth Lagoon restoration effort by participating in projects. Some of these include the cities of Boynton Beach and West Palm Beach and the towns of Hypoluxo, Palm Beach, Lantana, and Ocean Ridge.



Major Programs and Projects

A number of major restoration initiatives, if continued, will have significant positive effects on the basin's water quality.

Everglades Construction Project

The Everglades Construction Project (ECP) forms the foundation for the largest ecosystem restoration program in the history of Florida, and possibly the nation. The ECP is composed of 12 interrelated construction projects located between Lake Okeechobee and the Everglades. The cornerstone of the ECP is 6 large constructed wetlands, totaling over 47,000 acres. These stormwater treatment areas (STAs) will use natural biological processes to reduce the levels of phosphorus that enter the Everglades to an interim goal of 50 parts per billion (ppb). The Everglades Nutrient Removal project, a prototype STA, has been operating since 1994 and has effectively reduced phosphorus levels below 25 ppb. The primary objectives of the ECP projects are to improve the volume, timing, and distribution of water entering the Everglades. An added secondary benefit of the ECP will be the reduction in volume of harmful discharges to sensitive estuarine systems, including the LWL. STA-1 East will divert water from the C-51 Canal westward into the Everglades, reducing harmful excessive freshwater inflows to the estuary.

Comprehensive Everglades Restoration Program

The purpose of this nationally significant federal and state program is to restore and preserve South Florida's natural ecosystems, while enhancing water supplies and providing flood control. The lead agencies are the USACOE and SFWMD. Implementation of this program will have the single largest impact in improving water quality in, and the timing and delivery of water to, the LWL.

The C&SF Project created the vast network of canals and levees, pumping stations, water control structures, and impoundments that control the hydrology of South Florida. The CERP was commissioned to review the effects of the C&SF and find alternatives to restore and protect some of the natural systems. Under Section 528 of the Federal Water Resources Development Act, projects included in CERP must be designed to meet all federal, state, and local water quality criteria. Control of high nutrient and suspended sediment loadings, as well as freshwater inflows into the LWL and the AICW from drainage and irrigation canals, are primary water quality impacts in the basin that will be addressed by CERP. The North Palm Beach Project is the CERP component with the greatest potential for significantly improving conditions in the LWL. Certain projects under the Water Preserve Areas Feasibility Study will also improve conditions in the LWL and AICW by regulating and reducing freshwater discharges.

The North Palm Beach Project—Part 1 of the CERP consists of several regional improvement projects that collectively will improve hydrology and water quality, and increase storage areas in the L-8, C-51, and C-17 watersheds. The purpose of this project is to allow for increased water supplies while helping to restore receiving waters, including Loxahatchee Slough and the LWL. Elements of this CERP project are closely tied

to other ongoing projects, including the recently completed North Palm Beach County Comprehensive Water Management Plan and the L-8 General Reevaluation Report study. Environmental enhancement is one of the main goals of the CERP efforts. The proposed project elements included under the Part 1 project include the following:

- Help rehydrate the Loxahatchee Slough and the WPB Water Catchment by the creation of backpumping facilities and STAs to divert water from the C-51 and C-17 Canals,
- Restore hydrologic connections between wetland areas,
- Reduce high discharges and pollutant loads to the LWL by creating storage reservoirs and STAs to hold water from the L-8 and C-51 Canals and reroute water from the western part of the C-51 watershed, and
- Conduct restoration activities in the LWL, removing sediment from the mouth of the C-51 Canal and the lagoon to allow sea grasses to repropagate.

Under the Water Preserve Areas Feasibility Study, several projects are proposed to capture and store excess surface water by backpumping water from the lower east coast urban areas that is normally discharged to tide. Water Preserve Area projects located in the Lake Worth Lagoon–Palm Beach Coast Basin would achieve the following:

- Provide storage of surface water that could be used to supplement flows to the WCAs, the Everglades, and urban areas of east-central/southeast Palm Beach County and northeast Broward County,
- Reduce wet season discharge to urban canals, the LWL, and AICW,
- Provide water quality treatment and storage water for discharge to WCA-1,
- Provide recharge to canals in urban areas during low water periods, and
- Provide a buffer to the Loxahatchee National Wildlife Refuge, allowing natural recharge and preserving habitat.

Lake Worth Lagoon Management Plan

To focus attention on and provide impetus to restoration efforts, the Department and Palm Beach County formed the LWL Ecosystem Management Area team. The first comprehensive workshop to address LWL issues got under way on January 31, 1997, with participation by federal, state, and regional governments that affect or oversee water management of the LWL. Business, nonprofit groups, and concerned citizens were also in attendance and were encouraged to participate. On August 19, 1998, the LWL Steering Committee approved the final management plan at a public meeting.





The LWL Steering Committee identified four program areas to be addressed, as follows:

- Water and sediment quality,
- Habitat restoration and enhancement,
- Regulatory review and pollution prevention, and
- Public use and outreach.

PBC/DERM administers the LWL Partnership Grant program, a funding program provided by the state for LWL restoration and enhancement projects. Local governments are eligible to submit construction projects through a Request for Proposal process. A Selection Committee evaluates projects, and then candidate projects are ranked and approved for funding. All grant recipients must provide a 50 percent match in funds. The projects under this program include stormwater retrofits, the restoration of natural shorelines, mangrove reestablishment, dredging and muck removal, and habitat restoration in the LWL.

Palm Beach County Chain-of-Lakes Restoration Plan

PBC/DERM developed a restoration and management plan for the chain of lakes located in the urban eastern part of the county (e.g., Pine Lake, Lake Clarke, Lake Osborne, Lake Ida, and Lake Eden). The Board of County Commissioners approved the Chain-of-Lakes Restoration and Management Plan in 1998. The plan includes a number of projects, such as creating and restoring fish and wildlife habitat along the lake shorelines; performing evaluations to improve water quality related to stormwater and sediment; identifying stormwater treatment alternatives; and obtaining public support and involvement. Projects completed to date include shoreline restoration and completion of an analysis of nutrient loading and organic sediment deposition in the system. The information is being used to develop in-lake restoration projects to address some of these problems. Funding approval is pending for a large project to address shoreline restoration and organic sediment accumulated in Lake Osborne.

U.S. Coral Reef Task Force

The U.S. Coral Reef Task Force (CRTF) was established in June 1998 through Executive Order #13089 on Coral Reef Protection to lead the U.S. response to this growing, global environmental crisis. The CRTF is responsible for overseeing implementation of the Executive Order, and developing and implementing coordinated efforts to

- map and monitor U.S. coral reefs;
- research the causes and solutions to coral reef degradation;
- reduce and mitigate coral reef degradation from pollution, overfishing, and other causes; and
- implement strategies to promote conservation and sustainable use of coral reefs internationally.

The CRTF has a Local Action Strategy (LAS) Team dealing with the reef track off the Lake Worth Lagoon–Palm Beach Coast area. The sub-teams of the LAS Team are the following:

- Land-Based Sources of Pollution/Water Quality
- Recreational Use and Fishing
- Physical Impacts from Maritime Industry and Coastal Construction
- Awareness and Appreciation

Agricultural Best Management Practices

The Florida Watershed Restoration Act authorizes the Florida Department of Agriculture and Consumer Services (DACS) to develop interim measures and agricultural best management practices (BMPs). Additional authority for agricultural BMPs is provided in legislation on nitrates and ground water (Section 576.045, F.S.), the Lake Okeechobee Protection Program (Section 373.4595, F.S.), Agricultural Water Conservation (Section 570.085, F.S.), and Florida Right to Farm Act Amendments (Section 823.14, F.S.). While BMPs are often adopted by rule, they are voluntary if not covered by regulatory programs. If they are adopted by rule and the Department verifies their effectiveness, then implementation provides a presumption of compliance with water quality standards.

Over the last several years, DACS has worked with agriculturists, soil and water conservation entities, the University of Florida's Institute of Food and Agricultural Sciences, and other major interests to improve product marketability and operational efficiency by implementing agricultural BMPs, while at the same time promoting water quality and water conservation objectives. In addition, programs have been established and are being developed to create a network of state, local, federal, and private sources of funds for developing and implementing BMPs.

Manuals for Best Management Practices

To encourage growers to use BMPs, manuals have been published for a number of agricultural industries, including container-grown plants, blended fertilizer plants, agrichemical handling and farm equipment maintenance, cow/calf operations, aquaculture, citrus, and landscaping. Many of these manuals can be downloaded at <http://www.dep.state.fl.us/water> or <http://www.floridaagwaterpolicy.com>. DACS' Office of Agricultural Water Policy is currently developing manuals for row crops, equine or horse farms, and ornamental nurseries.

The use of a BMP manual alone, however, does not afford a presumption of compliance with the Department's water quality standards. In general, qualifying for a presumption of compliance requires that a site-specific BMP assessment process be in place or that practices being used have been proven effective through research and demonstration.





- **Guide for Producing Container Grown Plants:** This manual, published in 1995 by the Southern Nurserymen's Association, includes irrigation and fertilization BMPs for the container cultivation of nursery plants. It was produced through a cooperative effort between the University of Florida, Auburn University, Tennessee Tech University, and Virginia Tech. Since the manual is not Florida-specific, an effort is currently under way to use the document in developing a Florida-specific manual.
- **BMPs for Agrichemical Handling and Farm Equipment Maintenance:** Recently revised and reprinted, this manual gives producers guidance on hazardous materials, proper pesticide handling, and the proper disposal of waste products. It was cooperatively produced in 1998 by DACS, the Department, and several industry associations.
- **Water Quality BMPs for Cow/Calf Operations:** Many cattle operators statewide have been trained in using this manual and are applying BMPs. The Florida Cattlemen's Association and several state, federal, and local agencies developed the manual, which was published in 1999. Copies were printed and distributed in 2000 using U.S. Environmental Protection Agency (EPA) Section 319 grant funds.
- **Water Quality/Quantity BMPs for Indian River Area Citrus Groves:** Although the regional BMPs in this manual apply to all or parts of 7 east coast (Volusia to Martin) counties, other Florida flatwoods citrus operations can benefit from the same practices. The Indian River Citrus League led a cooperative effort involving 15 agencies and industry associations in developing these BMPs. Beginning in 2000, the BMP manual and guidance booklets were published using EPA Section 319 and industry funds.
- **Florida Green Industries BMPs for Protection of Water Resources in Florida:** This manual provides BMPs for professional turfgrass and landscape managers. Published in 2002, it was developed through a cooperative effort by Florida Green Industries (an industry association); the Department; DACS; the Florida Department of Community Affairs; and the St. Johns, South Florida, and Southwest Florida Water Management Districts.

South Florida Water Quality Protection Plan

The South Florida Water Quality Protection Plan (SFWQPP), funded in part by the EPA, was established in the spring of 1999 in an effort to integrate water quality protection efforts, document existing water quality protection strategies, summarize existing water quality information, determine major pollutant sources, and document actions currently under way to address these sources. Due to the successful regulation efforts to mediate impacts from point pollution sources, nonpoint source pollution has become the single largest threat to South Florida waters. Nonpoint sources can be broadly subdivided into stormwater runoff from agricultural activities and stormwater runoff from urban development. Since BMPs would

address stormwater runoff from agriculture under the purview of DACS, SFWQPP has initially focused on addressing nonpoint source pollution arising from urbanization. To accomplish this, actions under the SFWQPP have included evaluating stormwater control plans to maximize their benefit in restoring and maintaining the South Florida ecosystem. Under this program, the Department is also involved in conducting an assessment of water quality conditions and pollutant loadings to waterbodies in the northern Palm Beach County area, which includes the canal watersheds contributing to the LWL and the Loxahatchee Basin to the north. More information about the SFWQPP is available at <http://www.dep.state.fl.us/southeast/wrmep/wqpp/wqpp.htm>.





Chapter 3: Surface Water Quality Assessment

Scope of the Assessment

This chapter presents the results of an updated assessment of surface water quality in the Lake Worth Lagoon–Palm Beach Coast Basin. The primary purpose of the assessment is to determine if waterbodies or waterbody segments are to be placed on the Verified List of impaired waterbodies. The listing will be in accordance with evaluation thresholds and data sufficiency and data quality requirements in the Identification of Impaired Surface Waters Rule (IWR) (Rule 62-303, Florida Administrative Code [F.A.C.]). The results of the assessment will be used to identify waters in the basin for which total maximum daily loads (TMDLs) will be developed.

The chapter describes the planning units in the basin used as a basis for the assessment. A section on each planning unit contains a general description and summary of key water quality indicators (such as nutrients, chlorophyll *a*, dissolved oxygen [DO], and microbiological parameters). Permitted discharges, land uses, ecological status, and water quality improvement plans and projects are summarized for each planning unit. The discussion notes where applicable surface water quality criteria have been exceeded and summarizes the report's findings in maps, noting potentially impaired waterbodies in each planning unit. The chapter also contains background information on sources of data and on designated use attainment, and explains the state's integrated water quality assessment process.

While potentially impaired waters and their causative pollutants are identified, it is not within the scope of this report to identify discrete sources of potential impairments. Information on the sources of impairment will be developed in subsequent phases of the watershed management cycle, including TMDL development and implementation.

Appendix A contains a discussion of the legislative and regulatory background for TMDL development and implementation. **Appendix B** provides additional information on reasonable assurance. **Appendix C** provides the methodology used to develop the Planning and Verified Lists. **Appendix D** contains the integrated water quality assessment summary (**Table D.1**) and the water quality monitoring stations used in the assessment (**Table D.2**). **Appendix E** lists permitted wastewater treatment facilities in the basin that discharge to surface water and ground water, **Appendix F** lists Level I land use by planning unit, and **Appendix G** provides the documentation the Florida Department of Environmental Protection (Department) received during the Public Comment Period. The





complete text of the IWR is available at <http://www.dep.state.fl.us/water/tmdl/docs/amendedIWR.pdf>.

Update on Strategic Monitoring and Data-Gathering Activities During Phase 2

During Phase 2 of the watershed management cycle, strategic monitoring and data-gathering activities focused first on waters on the 1998 303(d) list, followed by waters that were placed on the Planning List through the IWR assessment alone. The majority of the strategic monitoring work was conducted by the Department's Southeast District staff and included both chemical and biological monitoring and data upload to **STO**rage and **RE**Trieval (STORET) databases. Data-gathering activities included working with environmental monitoring staff in the South Florida Water Management District (SFWMD) and local and county governments to obtain applicable monitoring data from their routine monitoring programs and special water quality projects in the basin.

Eight waterbody segments on the Planning List and the 1998 303(d) list needed further data to verify impairment. Parameters included silver, cadmium, iron, lead, and selenium. Also included were biology (based on bioassessments), biological oxygen demand, DO, fecal and total coliforms, unionized ammonia, nutrients and their indicators (nitrogen, phosphorus, and chlorophyll *a*), turbidity, and total suspended solids.

Ten waterbody segments were verified impaired for at least one parameter in the Lake Worth Lagoon–Palm Beach Coast Basin as the result of strategic monitoring and data-gathering activities in Phase 2. **Table D.1** in Appendix D provides the updated impairment status of the basin through March 2, 2005.

Sources of Data

The assessment of water quality in the Lake Worth Lagoon–Palm Beach Coast Basin includes an analysis of quantitative data from various sources, some of which are readily available to the public. These sources include the U.S. Environmental Protection Agency's (EPA) Legacy and "new" STORET databases, the U.S. Geological Survey, and the Florida Department of Health. The STORET databases contain water quality data from a number of sources, including the Department, water management districts, local governments, and volunteer monitoring groups. **Appendix C** contains a detailed description of STORET and the methodology used to develop the Planning and Verified Lists, based on the IWR.

Table 3.1 summarizes the individual data providers who contributed to the IWR Database for the Lake Worth Lagoon–Palm Beach Coast Basin for the period of record used in this assessment. **Figure 3.1** contains a pie chart showing the amount of data provided by each source.

Table 3.1: Summary of Data Providers in the Lake Worth Lagoon-Palm Beach Coast Basin

Organization	Number of Data Records in Database by Year													TOTAL
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
South Florida Water Management District	3,664	4,073	4,145	4,281	3,483	4,946	4,359	4,036	6,181	2,781	2,257	1,789		45,995
Lake Worth Drainage District	4,370	3,339	3,758											11,467
Palm Beach County	2,364	2,240	1,615	1,403	1,308	547				14	580	523		10,594
Broward County	679	874	569	467	455	528	695	815	619	459	466	479		7,105
Florida Department of Environmental Protection	2,460		1,065	81	1154				67	384	447	740		6,398
Florida Department of Health											308	779	110	1,197
Loxahatchee River District			108	108	101	107	108	114	140					786
Florida LakeWatch				54	108	36						180		378
U.S. Army Corps of Engineers				342										342
Florida Fish and Wildlife Conservation Commission	48	91	89	71	23		15							337

NOTE: The period of record for data used to develop the Verified List is January 1, 1997, to June 30, 2004.

Summary of Data Providers from 1990 to 2002

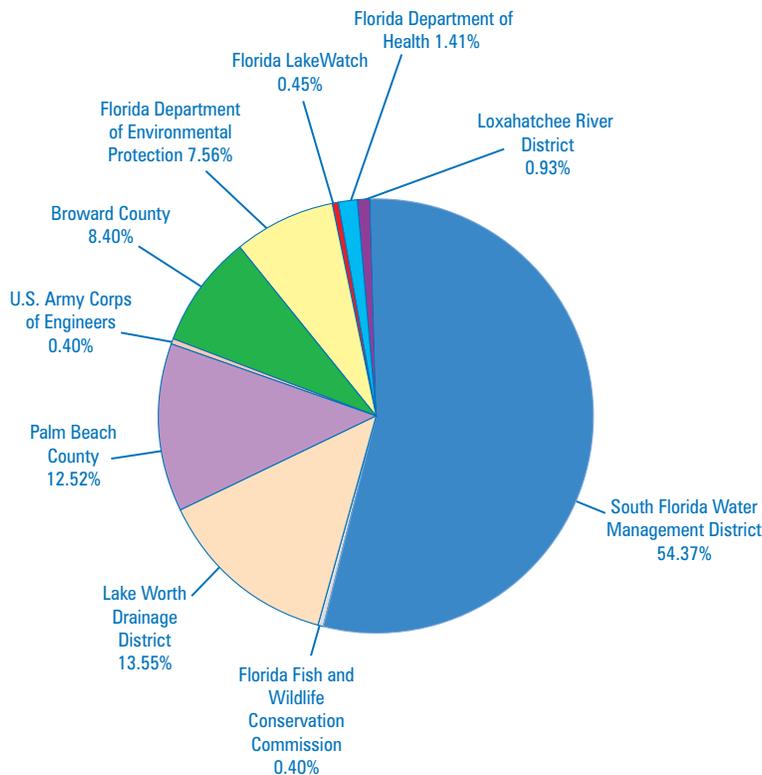


Figure 3.1: Sources of Data for the Lake Worth Lagoon-Palm Beach Coast Basin



The Department has received additional data on several canal segments under the management of the Lake Worth Drainage District. The District provided the Department with a report completed by the Florida Fish and Wildlife Conservation Commission with information on the sportfish communities found in Lake Worth Drainage District and associated South Florida Management canals (Shaffland, Gestring, and Stanford, 2001). This report provided the Department with additional data from 1995 to 1999, which met the thresholds of the IWR methodology to evaluate the aquatic use life support in particular segments of canals in the basin. The fisheries report data evaluated several canal transects and is correlated with ambient water quality data found in STORET.

In 2002, the Department created the IWR Database to evaluate data in accordance with the methodology prescribed in the Identification of IWR (Rule 62-303, F.A.C.). For the Planning List assessment, the data evaluation period of record is 10 years, and for the Verified List, 7.5 years. **Table C.2** in Appendix C shows the periods of record for the Verified and Planning Lists in the first basin rotation cycle. Data collected between January 1, 1997, and June 30, 2004, were evaluated to establish the Verified List for the Lake Worth Lagoon–Palm Beach Coast Basin (IWR Run 17.0).

To support listing decisions, the evaluation of water quality in this basin also includes qualitative information drawn from data in technical reports and documents that are not yet included in the database. Some of these sources include historical water quality or ecological information that was not uploaded to the database because of its qualitative treatment of issues.

Attainment of Designated Use

While the designated uses of a given waterbody are established using the surface water quality classification system described in Chapter 2, it is important to note that the EPA uses slightly different terminology in its description of designated uses. Because the Department is required to provide use attainment status for both the state's 305(b) report and the state's 303(d) list of impaired waters, the Department uses EPA terminology when assessing waters for use attainment. The water quality evaluations and decision processes that are defined in Florida's IWR for listing impaired waters are based on the following designated use attainment categories:

- Aquatic Life Use Support-Based Attainment**
- Primary Contact and Recreation Attainment**
- Fish and Shellfish Consumption Attainment**
- Drinking Water Use Attainment**
- Protection of Human Health**

Table 3.2 summarizes the designated uses assigned to Florida's various surface water classes.

Table 3.2: Designated Use Attainment Categories for Surface Waters in Florida

Designated Use Attainment Category Used in Impaired Surface Waters Rule Evaluation	Applicable Florida Surface Water Classification
Aquatic Life Use Support-Based Attainment	Class I, II, and III
Primary Contact and Recreation Attainment	Class I, II, and III
Fish and Shellfish Consumption Attainment	Class II
Drinking Water Use Attainment	Class I
Protection of Human Health	Class I, II, and III

Integrated Report Categories and Assessment Overview

The EPA has requested that the states merge their reporting requirements under the Clean Water Act for Section 305(b) surface water quality reports and Section 303(d) lists of impaired waters into an *Integrated Water Quality Monitoring and Assessment Report* (Wayland, 2001). This Water Quality Assessment Report integrates the 303(d) list and the 305(b) report for the Lake Worth Lagoon–Palm Beach Coast Basin.

Following the EPA’s guidance, the Department delineated waterbodies or waterbody segments in each of the state’s river basins, assessed them for impairment based on individual parameters, and then placed them into one of five major assessment categories and subcategories. These categories provide information on a waterbody’s status based on water quality, sufficiency of data, and the need for TMDL development (**Table 3.3**). This Assessment Report contains a comprehensive evaluation of waterbodies that fall into integrated report Categories 1 through 5 in the table.

Not enough recent data on chemistry, biology, and fish consumption advisories have been collected; therefore, currently only a few waterbodies or waterbody segments statewide fall into Category 1 (attaining all designated uses). In particular, fish tissues in many waterbodies statewide have not been tested for mercury. Out of 52 waterbodies or waterbody segments in the Lake Worth Lagoon–Palm Beach Coast Basin, none are in Category 1.

More waterbodies and segments statewide fall into Category 2 (attaining some uses but with insufficient data to assess completely) than Category 1 (attaining all uses), because monitoring programs can sometimes provide sufficient data for partially determining whether a designated use in a particular waterbody is attained. A total of 20 waterbody segments in the basin fall into Category 2.

Most waterbodies in the state, however, fall into Category 3 (having insufficient data). In the Lake Worth Lagoon–Palm Beach Coast Basin, the breakdown of waterbodies or segments in Category 3 is as follows:

- Category 3a—8 segments for which no data are available to determine their water quality status;



Understanding the Terms “Pollutant” and “Pollution”

For purposes of the TMDL Program, pollutants are chemical and biological constituents, introduced by humans into a waterbody, that may result in pollution (water quality impairment). There are other causes of pollution, such as physical alteration of a waterbody (for example, canals, dams, and ditches). However, TMDLs are established only for impairments caused by pollutants (a TMDL quantifies how much of a given pollutant a waterbody can receive and still meet its designated uses).

Waterbodies that are verified impaired due to specified pollutants, and therefore require a TMDL, are listed under Category 5 in the Integrated Assessment Report; waterbodies with water quality impairments due to other causes, or unknown causes, are listed under Category 4c. Although TMDLs are not established for Category 4c waterbodies, these waterbodies still may be addressed through a watershed management program (for example, the Kissimmee River restoration).

Table 3.3: Categories for Waterbodies or Waterbody Segments in the 2002 Integrated Report

Category	Description	Comments
1	Attaining all designated uses	If use attainment is verified for a waterbody or segment that was previously listed as impaired, the Department will propose that it be delisted.
2	Attaining some designated uses and insufficient or no information or data are present to determine if remaining uses are attained	If attainment is verified for some designated uses of a waterbody or segment, the Department will propose partial delisting for the uses attained. Future monitoring will be recommended to determine if remaining uses are attained.
3a	No data and information are present to determine if any designated use is attained	Future monitoring will be recommended to determine if designated uses are attained.
3b	Some data and information are present but not enough to determine if any designated use is attained	Future monitoring will be recommended to gather sufficient information and data to determine if designated uses are attained.
3c	Enough data and information are present to determine that one or more designated uses may not be attained according to the Planning List methodology	A waterbody or segment is potentially impaired for one or more designated uses. These waters will be prioritized for future monitoring to verify use attainment or impaired status.
3d	Enough data and information are present to determine that one or more designated uses are not attained according to the Verified List methodology	A waterbody or segment exceeds Verified List evaluation criteria and may be listed as impaired at the end of Phase 2 of the watershed management cycle. However, the data have not yet been fully evaluated and the waters have not been formally verified as impaired. Further monitoring and analysis may be necessary. NOTE: This category is applicable only to the Status Report. Waters that pass the Verified List criteria at this stage of the process are placed in Category 5.
4a	Impaired for one or more designated uses but does not require TMDL development because a TMDL has already been completed	After the EPA approves a TMDL for the impaired waterbody or segment, it will be included in a Basin Management Action Plan (B-MAP) to reduce pollutant loading toward attainment of designated use(s).
4b	Impaired for one or more designated uses but does not require TMDL development because the water will attain water quality standards due to existing or proposed measures	Pollutant control mechanisms designed to attain applicable water quality standards within a reasonable time frame are either proposed or in place.
4c	Impaired for one or more criteria or designated uses but does not require TMDL development because impairment is not caused by a pollutant	This category includes waterbodies or segments that are impaired because of naturally occurring conditions or pollution. The impairment is not caused by specific pollutants. (See sidebar on previous page for a discussion of the difference between the terms “pollutant” and “pollution.”)
5	One or more designated uses is not attained and a TMDL is required	Waterbodies or segments in this category are impaired for one or more designated uses by a pollutant or pollutants. Waters in this category are included on the basin-specific Verified List adopted by the Department’s Secretary as Florida’s impaired waters list and submitted to the EPA as Florida’s 303(d) list of impaired waters at the end of Phase 2.

Note: The descriptions in **Table 3.3** are consistent with the EPA’s integrated assessment categories. In the Status Reports for Groups 1 through 3 and in the Assessment Reports for Groups 1 through 2 that were previously produced, Categories 4b and 4c were reversed. That is, the description of Category 4b was previously listed as Category 4c, and the description of Category 4c was listed as Category 4b.

- Category 3b—8 segments with some data but not sufficient data for making any determinations; and
- Category 3c—4 segments that are potentially impaired based on the Planning List criteria.

A number of waters either fail to meet water quality standards for DO or show signs of biological stress or nutrient impairment. According to the IWR, specific pollutants causing DO exceedances or biological stress, or an underlying nutrient imbalance creating an imbalance in flora or fauna, must be documented for a waterbody or segment to be listed as impaired. Sometimes these conditions cannot be linked to a causative pollutant, and sometimes they may reflect natural background conditions.

Currently, two waterbodies in the basin are designated as being in Category 4. This category includes those waterbodies/segments that are impaired but do not require a TMDL for one of three reasons:

- Category 4a—No segments for which a TMDL has already been developed,
- Category 4b—No segments for which there is reasonable assurance that the designated use of an impaired waterbody will be attained by an existing or proposed pollutant control measure, and
- Category 4c—Two segments for which the impairment is not attributable to a pollutant or pollutants, but is due to natural conditions or physical/hydrologic alterations to the waterbody.

Finally, 12 waterbodies in the basin are in Category 5. These impaired waterbodies are on the Verified List of impaired waters adopted by the Department's Secretary and will require TMDLs. Chapter 5 of this report discusses in detail the waters in this category.

Planning Units

The Lake Worth Lagoon–Palm Beach Coast Basin encompasses approximately 700 square miles and a complex hydrologic system. To provide a more detailed geographic basis for identifying and assessing water quality improvement activities, the basin was subdivided into smaller areas called planning units. A planning unit is either an individual large tributary basin or a group of smaller adjacent tributary basins with similar characteristics. Planning units help organize information and management strategies around prominent watershed characteristics.

Water quality assessments were conducted for waterbody segments within planning units. Each of these smaller, hydrologically-based drainage areas within a planning unit is assigned a unique waterbody identification number (WBID). Waterbody segments are assessment units (or geographic information system polygons) that the Department used to define waterbodies when it biennially inventoried and reported on water quality to the EPA under Section 305(b) of the federal Clean Water Act. These WBIDs





Information on the L-8 Canal

Additional information on the L-8 Canal can be found in the L-8 Ecosummary, prepared by the Department's Southeast District, Assessment and Monitoring Program (available at <http://www.dep.state.fl.us/southeast/ecosum/ecosummain.htm>).

are the assessment units identified in the Department's lists of impaired waters submitted to the EPA in reports under Section 303(d) of the Clean Water Act.

The Lake Worth Lagoon–Palm Beach Coast Basin contains nine planning units: L-8 (also containing Basin 8), C-51, West Palm Beach (WPB) Water Catchment, C-17, C-16 and C-16 North (discussed together in this report), C-15, Hillsboro Canal, and Intracoastal. To the extent possible, planning unit boundaries reflect those of the surface water management watersheds previously defined by SFWMD. **Figure 3.2** shows the planning units' locations and boundaries. The remainder of this chapter provides a general description of each planning unit, information on land use and potential point sources of pollution, water quality assessments for individual waterbody segments, and summaries of ecological issues and watershed quality improvement plans and projects.

Appendix D of this report provides a water quality summary by planning unit, a list of water quality monitoring stations, and trend data. **Appendix E** includes summary information, by planning unit, for permitted wastewater treatment facilities, Superfund sites, and permitted landfill facilities. **Appendix F** lists Level I land uses, by planning unit.

Assessment by Planning Unit

• L-8 Planning Unit

General Description

The L-8 Planning Unit, located in the northwestern part of the basin, is one of the largest planning units (142 square miles). It contains two segments with WBIDs and lies mainly in northern Palm Beach County, with a portion of it in southwestern Martin County. The L-8 Canal originates at the southeastern edge of Lake Okeechobee (regulated at the S-76 structure) and extends southeastward and southward to its intersection with the C-51 Canal. It transports stormwater from the lake and its watershed, and provides water for irrigation and water supply. Several water control districts have water management responsibilities in parts of the L-8 Basin. These include the Northern Palm Beach Improvement District, Indian Trail Improvement District, and Seminole Water Control District. There are no incorporated areas in the planning unit.

The L-8 Canal connects with several other canals, including the L-40 Canal along the perimeter of the Everglades; WCA-1; the M-0 and M-1 Canals, which provide water to an area of citrus groves; and the M Canal, which provides water to the WPB Water Catchment and water supply lakes farther to the east. The L-8 Canal forms a boundary between the J. W. Corbett Wildlife Management Area to the north (which is included in the L-8 Planning Unit) and the Everglades Agricultural Area to the south. The principal watershed of the L-8 Canal is north of the canal. Basin 8, which is adjacent to the L-8 Basin where it adjoins Lake Okeechobee in southwest Martin County, is part of the L-8 Planning Unit. Basin 8, which is very small compared with the L-8 Basin, drains to the L-8 Canal.

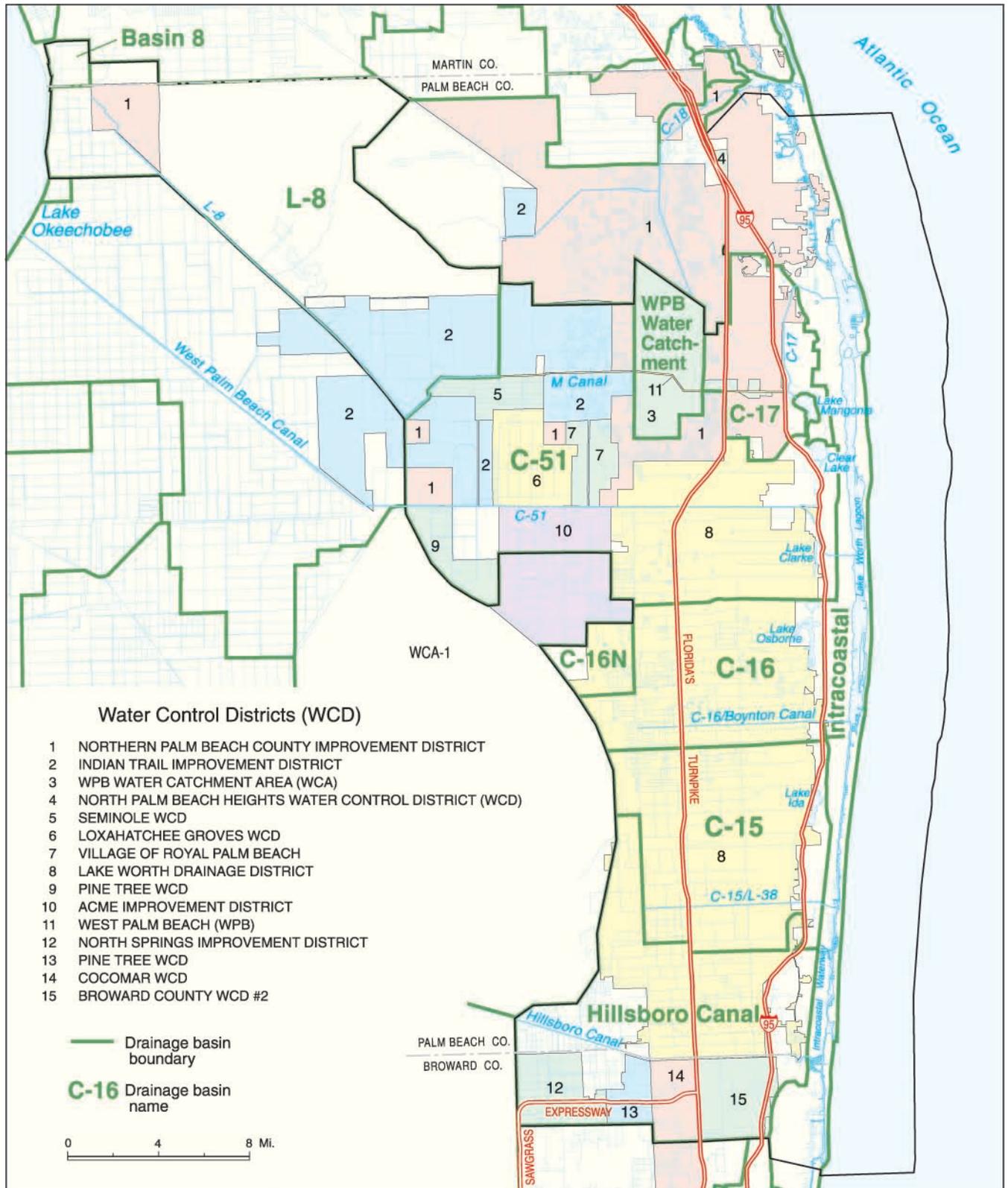


Figure 3.2: Locations and Boundaries of Planning Units in the Lake Worth Lagoon-Palm Beach Coast Basin



Water Quality Summary

The overall water quality of the L-8 Planning Unit is impacted by high loadings of nitrogen and low levels of DO. Recent sampling efforts demonstrate that this waterbody does not exhibit high concentrations of chlorophyll *a*. Additional sampling is needed in the basin to assess the iron concentrations that are possibly due to ground water influences and for turbidity concentrations in the canal.

Figure 3.3, a composite map of the planning unit, shows waters on the 1998 303(d) list, the Planning List and Verified List, and potential pollution sources. **Table 3.4** summarizes the water quality assessment status of all waterbody segments in the planning unit. Waterbodies represented by these data include the L-8 Canal.

The table and figure show that one waterbody segment in the planning unit is impaired. The L-8 Canal is impaired by the IWR methodology for DO and the causative pollutant has been linked to the total nitrogen (TN) levels. There are no other impaired parameters in the canal.

Permitted Discharges and Land Uses

Point Sources. Department records indicate that there are no permitted wastewater treatment facilities or landfills, no state or federal hazardous waste cleanup sites, and no delineated ground water contamination areas in the planning unit.

See **Noteworthy** for a definition of point sources and discussions of environmental remediation and delineated ground water contamination areas. **Appendix E** lists the basin's domestic and industrial surface discharge facilities, along with their permitted flows, by planning unit. It also lists landfills or solid waste facilities, by planning unit.

Nonpoint Sources. A portion of the pollutant load in the L-8 Canal may originate from Lake Okeechobee, which is impaired and has a TMDL for phosphorus (Department, 2001a). However, nonpoint sources in the watershed could also be responsible for pollutants in the L-8 Canal. Both agricultural and urban/residential land uses are present in the L-8 Planning Unit. Based on Level I and II land use summary information (SFWMD, 1995), the predominant land use in the planning unit is agriculture (approximately 21 percent of the area). The agricultural land is divided almost evenly between row cropland and tree crops (citrus). Approximately 6 percent of the planning unit area is in urban/residential land use (mostly single-family residential). These human land uses can be associated with nonpoint discharges of pollutants and eroded sediments (see **Noteworthy** for a definition of nonpoint sources).

By far, however, the largest portion of the planning unit is undeveloped. More than 45 percent of the area is covered by wetlands (predominated by cypress, ponds and sloughs, freshwater marsh, and wet prairie). Over 23 percent of the area is in upland forest, mainly pine flatwoods. Most of the undeveloped area is in the J. W. Corbett National Wildlife Refuge.

Appendix F provides summary information on Level I land uses in the basin, by planning unit.

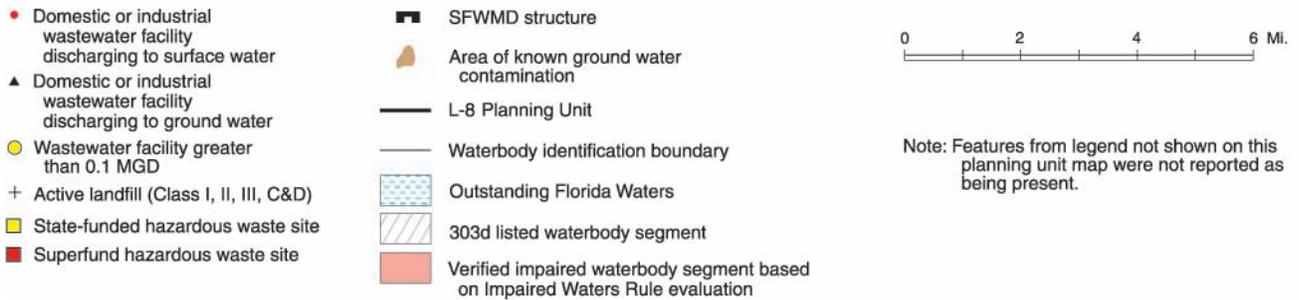
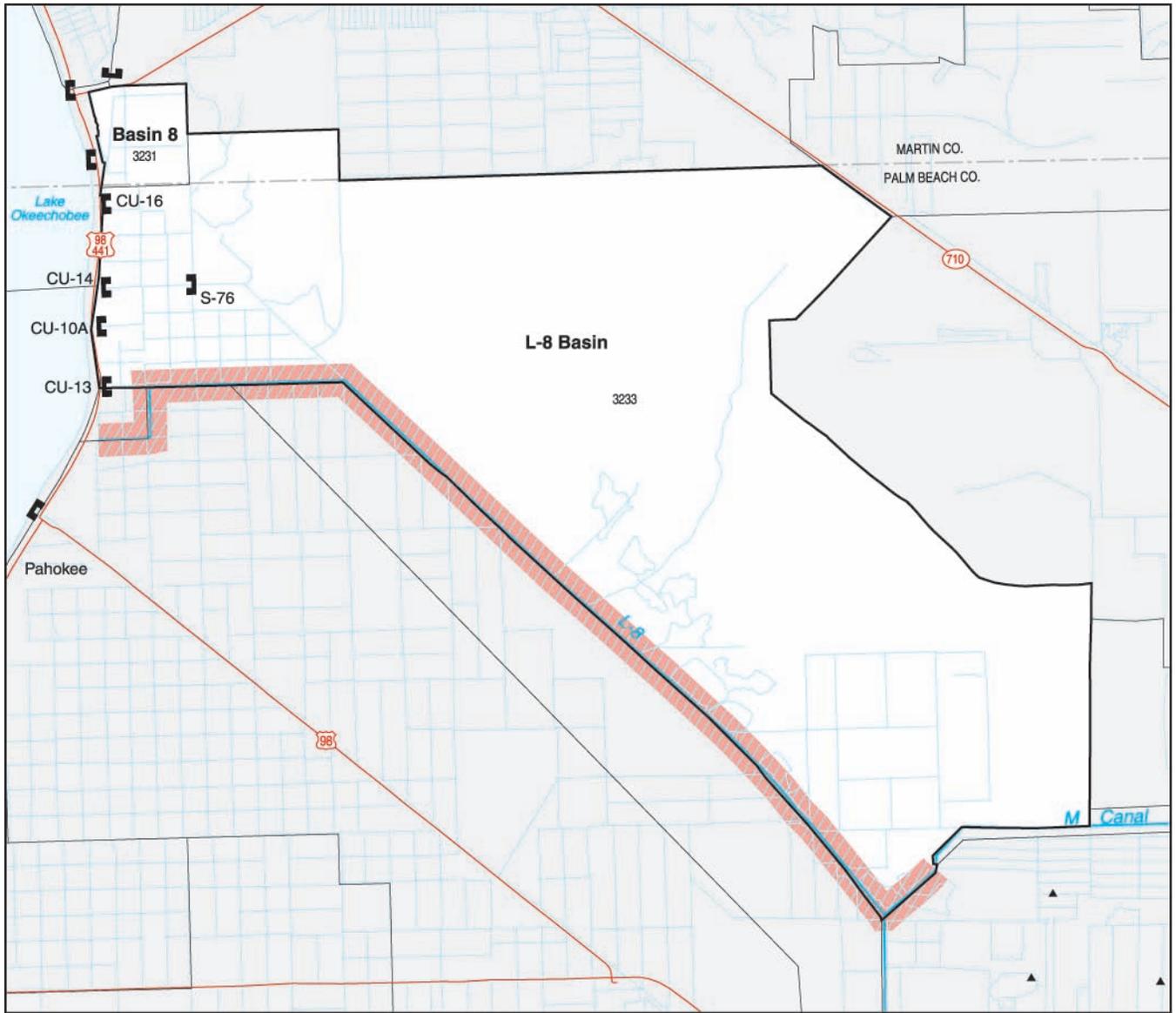


Figure 3.3: Composite Map of the L-8 Planning Unit, Including the 1998 303(d) List, Planning List and Verified List Waters, and Potential Pollution Sources

Table 3.4: Integrated Water Quality Assessment Summary for the L-8 Planning Unit

WBID	Waterbody Segment	Waterbody Type ¹	Class ²	1998 303(d) List Parameters of Concern	Data Evaluation under the Impaired Surface Waters Rule Criteria ³			EPA’s 305(b)/303(d) Integrated Report Assessment Category for WBID ⁶
					Potentially Impaired (Cat. 3c) for Listed Parameters ⁴	Verified Impaired (Cat. 4a, 4b, 4c, or 5) for Listed Parameters ⁵	Not Impaired (Cat. 2) for Listed Parameters	
3231	Basin 8	Stream	IIIF		N/A	N/A	N/A	3a
3233	L-8 Canal	Stream	IIIF	Biology, Mercury in Fish, Nutrients, DO, Turbidity	Biology, Mercury in Fish, Turbidity, Iron	DO	N/A	5
3233	L-8 Canal	Stream	IIIF	Copper	N/A	N/A	Copper	5
3233	L-8 Canal	Stream	IIIF	Lead	N/A	N/A	Lead	5

Notes:

¹The designation “stream” includes canals, rivers, and sloughs. The designation “lake” includes some marshes.

²The state’s surface water classifications are as follows:

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

³The EPA’s 305(b)/303(d) Integrated Report categories are as follows:

- 1**—Attains all designated uses;
- 2**—Attains some designated uses;
- 3a**—No data and information are available to determine if any designated use is attained;
- 3b**—Some data and information are available, but they are insufficient for determining if any designated use is attained;
- 3c**—Meets Planning List criteria and is potentially impaired for one or more designated uses;
- 3d**—Meets Verified List criteria and is potentially impaired for one or more designated uses;
- 4a**—Impaired for one or more designated uses and the TMDL is complete;
- 4b**—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future;
- 4c**—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant; and
- 5**—Water quality standards are not attained and a TMDL is required.

⁴Parameters in **bold** meet the Verified List evaluation criteria, Section 62-303.400, F.A.C.

⁵Parameters in *italics* are in Category 4 (a, b, or c) waters that do not require TMDL development.

⁶The assessment categories listed in this column represent the status of each WBID as a whole, **based on multiple parameters**. The hierarchy for assigning these categories is Category 5, then 4, then 3c, then 2, and then 3b, i.e., each WBID is assigned a category based on the highest category assigned to an individual parameter. For example, if WBID 9999 has total coliforms as Category 5, fecal coliforms as Category 3c, and coliforms-shellfish as Category 2, the single assessment call for the WBID is Category 5.

DO = Dissolved oxygen
F = Fresh water

Ecological Summary

The L-8 Canal starts out of southeastern Lake Okeechobee and passes through a large area of agricultural land consisting of citrus groves, sugarcane, and corn. Agricultural runoff to the canal is limited. Further east, the canal runs adjacent to the J. W. Corbett Wildlife Management Area and receives high quality runoff from this protected natural area. Yet further east the canal turns south for about three and one-half miles where it passes through and receives runoff from agricultural areas until its mouth at the West Palm Beach Canal.

The L-8 Canal as a human-made system is deep in comparison with its width and is “naturally” a stressed system. It is unlikely that this constructed waterbody, with its small surface to cross-sectional area ratio and the aquatic weed control program necessary to allow the canal to fulfill its design objective (transport water efficiently), would allow a waterbody of this type to consistently meet DO criterion developed for natural water systems. Although mercury is not an impairment, the mercury contamination of fish tissue is a regional depositional problem and should be addressed on a regional scale. Future restoration projects include the purchasing of rock quarry pits found at the southern portion of the canal by the Department.

It is important to note that downstream of the L-8 Canal is the Class I M Canal, which receives flow from the Class III L-8 Canal; therefore, maintaining water quality in the M Canal depends, to no small extent, on maintaining water quality in the L-8 Canal.

Water Quality Improvement Plans and Projects

The L-8 Canal is a conveyance for excess stormwater from Lake Okeechobee and agricultural areas. Implementation of agricultural best management practices (BMPs) and the treatment of water in the Lake Okeechobee Basin are components of the plan to address the lake’s impaired condition. Statewide, efforts are being made to reduce pollutant loading to stormwater from individual agricultural land holdings. These are tied to the active participation of local farmers and growers in agricultural BMP programs.

Under the North Palm Beach County Project—Part 1 of the Comprehensive Everglades Restoration Program (CERP), several elements planned for the L-8 watershed will significantly benefit receiving waters. The Pal-Mar and J. W. Corbett Wildlife Management Area Hydropattern Restoration—Other Project Element will include activities to hydrologically reconnect the natural system that once provided recharge to the Loxahatchee River Basin to the east. In addition, the L-8 Basin modifications element and the creation of the C-51 and L-8 Reservoirs will benefit the northern Palm Beach County area. These projects will provide storage, treatment, and regulation of stormwater flowing in the L-8 and C-51 Canals. They will also provide more water and treat the water flowing to the Loxahatchee Slough/WPB Water Catchment, as well as the Loxahatchee River. Freshwater inflows to the Lake Worth Lagoon (LWL) via the C-51 Canal will be better regulated by the created storage.

Waters will not be placed on the Verified List if the Department receives reasonable assurance that existing or proposed projects and/or programs are expected to result in the attainment of water quality standards or consistently improve water quality over time. Chapter 4 and **Appendix B** contain additional information on the requirements for reasonable assurance.

For this planning unit, no management plans or projects complying with the Department’s guidance for reasonable assurance have been provided for the list of impaired waters.



Information on Point Sources in Planning Units

Point sources discharging pollutants to surface water or ground water originate from discrete, well-defined areas such as a facility discharge from the end of a pipe, a disposal well, or a wastewater sprayfield. Point sources generally fall into two major types: domestic wastewater sources (which consist of sewage from homes, businesses, and

institutions) and industrial wastewater sources (which include wastewater, runoff, and leachate from industrial or commercial storage, handling, or processing facilities). Landfills, hazardous waste sites, Dry Cleaning Solvent Cleanup Program sites, and petroleum facility discharges are also considered point sources. These sites have the potential to

leach contaminants into ground water and surface water.

Identifying the source of water-body impairment is an important part of assessing water quality and developing TMDLs. As part of this report, information is presented on point sources, including permitted facilities that discharge wastewater and landfills.

Environmental Remediation

Environmental remediation activities cover a broad spectrum of cleanup programs. These include state-managed hazardous waste, dry cleaning, and petroleum cleanup programs; as well as the federal Superfund and Resource Conservation and Recovery Act programs. These programs are designed to remediate ground water and soil contamination that pose a

threat to public health and the environment.

The National Priorities List (NPL) is a consolidated list of the uncontrolled hazardous waste sites that pose the greatest threat to public health or the environment. Sites are listed on the NPL upon the completion of a preliminary assessment, site inspection, and hazardous ranking system evaluation to determine their

potential for adverse impacts and priority for corrective action. The EPA Superfund program administers the cleanup of NPL sites.

The Department's state-funded cleanup program administers the cleanup of contaminated hazardous waste sites when enforcement action taken against a responsible party is unsuccessful or when no responsible party is identified.

Delineated Ground Water Contamination Areas

The Department's Delineation Program was established in response to the discovery of ground water contaminated by ethylene dibromide, a soil fumigant that was historically used in 38 Florida counties to control nematodes in citrus groves and row crops. The program currently includes ground water contaminated by other pesticides, industrial solvents, and nutrients. However, the coverage of delineated areas in this program is not intended to include all sources of contaminated ground

water in Florida. The Delineation Program is designed to ensure the protection of public health when consuming potable ground water supplies and to minimize the potential for cross-contamination of adjacent ground water resources.

The Delineation Program's primary responsibilities are as follows:

- Delineate areas of ground water contamination,
- Implement a water well construction permitting/

application process that requires stringent construction standards, and

- Require water testing after completion of the well to ensure the potable quality of the water source.

Any newly constructed water wells in delineated areas, and existing water wells found to be contaminated, are remediated by installing individual water treatment systems or by connecting the users to public water supply systems.

Nonpoint Sources and Land Uses

Rainfall generates stormwater runoff. As it flows over the land and through the ground, runoff may carry nonpoint source pollutants from many different sources

to lakes, rivers, and estuaries in a watershed, and into ground water supplies. Nonpoint sources also include atmospheric deposition and leaching from agricultural

lands, urban areas, and unvegetated lands. The pollutants in runoff often include fertilizers, bacteria, metals, sediments, and petroleum compounds.

- C-51 Planning Unit

General Description

C-51 is the largest planning unit in the basin (approximately 170 square miles), and contains 7 segments with WBIDs. The C-51 Canal is the main artery conveying water in the Palm Beach County area east of the WCAs.

The West Palm Beach Canal extends from the southeastern part of Lake Okeechobee to the Atlantic Intracoastal Waterway (AICW) at the LWL (at the S-155 structure). It was constructed as part of the Central and South Florida (C&SF) Project to lower Lake Okeechobee and drain a part of the Everglades that is now known as the Everglades Agricultural Area (EAA). West of the Lake Worth Lagoon–Palm Beach Coast Basin boundary, this canal is otherwise known as L-12 and L-10. East of its juncture with the L-8 Canal, at the basin boundary, the West Palm Beach Canal is known as the C-51 Canal. It provides flood protection and drainage, discharges flood flows from the L-8 watershed, supplies water under low natural flows, maintains ground water levels, and prevents saltwater intrusion. It also continues to transport excess flows from Lake Okeechobee and water drained from the EAA. The C-51 Canal is the largest inflow into the LWL and has a great impact on the health of the estuary, causing extreme fluctuations in salinity levels as well as transporting of pollutants.

The planning unit includes a number of incorporated areas: West Palm Beach, Lake Worth, Royal Palm Beach, Greenacres City, Palm Springs, Lake Clarke Shores, Cloud Lake, Glen Ridge, and Haverhill. Six water control districts have jurisdiction over secondary canals in portions of the C-51 watershed: the Lake Worth Drainage District, Acme Improvement District, Pine Tree Water Control District, Indian Trail Improvement District, Seminole Water Control District, and Northern Palm Beach County Improvement District.

Outside its watershed, sources of water to C-51 include Lake Okeechobee; the L-8, L-40, and L-7 Canals; and secondary agricultural canals west of the Lake Worth Lagoon–Palm Beach Coast Basin boundary. Typically, in the western part of the C-51 Planning Unit, excess water may be discharged to Water Caution Area (WCA)-1 or to tide at the LWL. In the eastern part of the planning unit, excess water is discharged to tide. In the planning unit, the main inflows to C-51 are Lake Worth Drainage District Canals E-1, E-2, E-3, and E-4, which can have very large inflows.

Clear Lake and Lake Mangonia, located in the northeast part of the planning unit, are artificially maintained lakes that provide potable water to the city of West Palm Beach water system. These lakes are not hydrologically connected to C-51 or any of the other canals that provide drainage and flood control. Instead, they receive water from the M Canal, which is fed by the L-8 Canal. The M Canal extends across the northern part of the C-51 Planning Unit from its juncture with L-8 to the WPB Water Catchment and does not discharge water to or receive water from the C-51 Canal. The water elevation is maintained in M Canal along its course to reduce inflows from adjacent surface waterbodies, maintaining its good water



Information on the West Palm Beach Canal

Additional information on the C-51 Canal (also known as the West Palm Beach Canal) and the M Canal can be found in Ecosummaries prepared by the Department's Southeast District, Assessment and Monitoring Program. The West Palm Beach Canal Ecosummary is available at <http://www.dep.state.fl.us/southeast/ecosum/ecosummain.htm>.

The M Canal Ecosummary is available at <http://www.dep.state.fl.us/southeast/ecosum/ecosummain.htm>.



quality. From the WPB Water Catchment, the M Canal extends across the C-17 watershed and discharges to Lake Mangonia.

The C-51 Planning Unit also includes Pine Lake and Lake Clarke, the northernmost members of the freshwater chain of lakes on the coastal ridge. The lakes in the chain are connected by the E-4 Canal, which intersects with the C-51 Canal east of Lake Clarke.

Water Quality Summary

The overall water quality of the C-51 Planning Unit is impacted by high loadings of nitrogen and phosphorus, and low levels of DO. The C-51 shows low levels of DO linked to elevated nitrogen levels. Chlorophyll *a* concentrations indicate an imbalance between in-stream flora and fauna. Lake Clarke has low DO levels that are linked to the colimitation of nitrogen and phosphorus. Elevated nutrient levels have caused an imbalance in the Trophic State Index (TSI) levels for the lake. Additional sampling is needed in the basin to assess the iron concentrations in Okeehetee Park, Lake Clarke, and the C-51.

Figure 3.4, a composite map of the planning unit, shows waters on the 1998 303(d) list, the Planning List and Verified List, and potential pollution sources. **Table 3.5** summarizes the water quality assessment status of all waterbody segments in the planning unit. Waterbodies represented by these data include the C-51 Canal, Clear Lake, Clear Lake Drain, Lake Clarke, Lake Mangonia, the M Canal West, and Okeehetee Park.

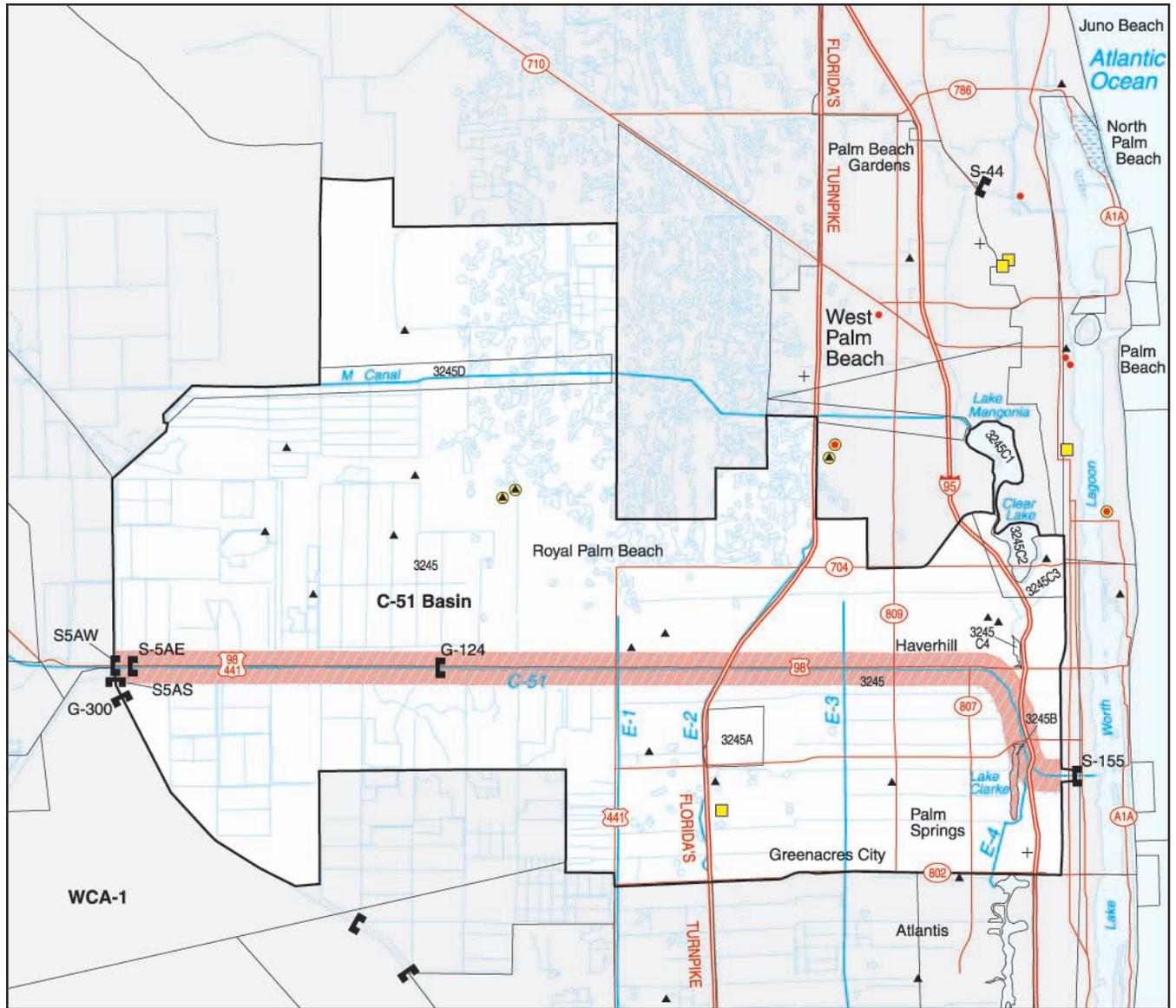
The table and figure show that two waterbody segments in the planning unit are impaired.

Permitted Discharges and Land Uses

Point Sources. According to the Department's database, there are 16 permitted wastewater treatment facilities in the C-51 Planning Unit (8 domestic wastewater and 8 industrial wastewater). None of these are permitted to discharge directly to surface water, and all are relatively small facilities. There is 1 permitted operating solid waste facility (receiving construction and demolition [C&D] debris), and 6 other facilities are inactive or closed. There is 1 hazardous waste site and 1 brownfield site. **Figure 3.4** shows the locations of these facilities and sites in the planning unit.

Appendix E lists the basin's domestic and industrial surface discharge facilities, along with their permitted flows, by planning unit. It also lists landfills or solid waste facilities, by planning unit.

Nonpoint Sources. Runoff from urban and agricultural areas may affect water quality in the C-51 Canal and the network of canals flowing into it. In the planning unit, the predominant land use is urban/residential (over 58 percent). This includes about 41 percent in residential use and the rest in commercial, industrial, institutional, recreational, and other urban land use categories. Approximately 17 percent of the planning unit (mostly in the western part) is in agricultural land uses (mainly field crops, row crops, and citrus trees). Transportation and utility land uses cover approximately 4 percent of the area. All of these human land uses can be associated with nonpoint discharges of pollutants and eroded sediments.



- Domestic or industrial wastewater facility discharging to surface water
- ▲ Domestic or industrial wastewater facility discharging to ground water
- Wastewater facility greater than 0.1 MGD
- + Active landfill (Class I, II, III, C&D)
- State-funded hazardous waste site
- Superfund hazardous waste site
- SFWMD structure
- Area of known ground water contamination
- C-51 Planning Unit
- Waterbody identification boundary
- Outstanding Florida Waters
- 303d listed waterbody segment
- Verified impaired waterbody segment based on Impaired Waters Rule evaluation



Note: Features from legend not shown on this planning unit map were not reported as being present.

Figure 3.4: Composite Map of the C-51 Planning Unit, Including the 1998 303(d) List, Planning List and Verified List Waters, and Potential Pollution Sources

Table 3.5: Integrated Water Quality Assessment Summary for the C-51 Planning Unit

WBID	Waterbody Segment	Waterbody Type ¹	Class ²	1998 303(d) List Parameters of Concern	Data Evaluation under the Impaired Surface Waters Rule Criteria ³			
					Potentially Impaired (Cat. 3c) for Listed Parameters ⁴	Verified Impaired (Cat. 4a, 4b, 4c, or 5) for Listed Parameters ⁵	Not Impaired (Cat. 2) for Listed Parameters	EPA’s 305(b)/303(d) Integrated Report Assessment Category for WBID ⁶
3245	C-51	Stream	IIIF	Nutrients, DO, Coliforms, Iron	Iron	DO, Nutrients (Chlorophyll a)	Coliforms, Lead, Turbidity, Copper	5
3245A	Okeehetee Park	Lake	IIIF		Iron			3c
3245B	Lake Clarke	Lake	IIIF		Iron	DO, Nutrients (TSI)	Turbidity	5
3245C1	Lake Mangonia	Lake	IIIF		N/A	N/A	N/A	3b
3245C2	Clear Lake	Lake	IIIF		N/A	N/A	N/A	3b
3245C3	Clear Lake Drain	Lake	IIIF		N/A	N/A	N/A	3a
3245D	M Canal West	Lake	I		N/A	N/A	N/A	3a

Notes:

¹The designation “stream” includes canals, rivers, and sloughs. The designation “lake” includes some marshes.

²The state’s surface water classifications are as follows:

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

³The EPA’s 305(b)/303(d) Integrated Report categories are as follows:

- 1**—Attains all designated uses;
- 2**—Attains some designated uses;
- 3a**—No data and information are available to determine if any designated use is attained;
- 3b**—Some data and information are available, but they are insufficient for determining if any designated use is attained;
- 3c**—Meets Planning List criteria and is potentially impaired for one or more designated uses;
- 3d**—Meets Verified List criteria and is potentially impaired for one or more designated uses;
- 4a**—Impaired for one or more designated uses and the TMDL is complete;
- 4b**—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future;
- 4c**—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant; and
- 5**—Water quality standards are not attained and a TMDL is required.

⁴Parameters in **bold** meet the Verified List evaluation criteria, Section 62-303.400, F.A.C.

⁵Parameters in *italics* are in Category 4 (a, b, or c) waters that do not require TMDL development.

⁶The assessment categories listed in this column represent the status of each WBID as a whole, **based on multiple parameters**. The hierarchy for assigning these categories is Category 5, then 4, then 3c, then 2, and then 3b, i.e., each WBID is assigned a category based on the highest category assigned to an individual parameter. For example, if WBID 9999 has total coliforms as Category 5, fecal coliforms as Category 3c, and coliforms-shellfish as Category 2, the single assessment call for the WBID is Category 5.

DO = Dissolved oxygen
 F = Fresh water
 TSI = Trophic State Index

Undeveloped land in the form of upland forest (pine flatwoods and other coniferous forest) makes up approximately 10 percent of the land area. The remaining land cover percentages are water (5 percent) and wetlands (4 percent). Inflows to the main canal from outside the watershed are from agricultural lands.

Appendix F provides summary information on Level I land uses in the basin, by planning unit.

Ecological Summary

The C-51 Planning Unit is influenced by drainage from sugarcane in the Everglades Agricultural Area; further east, the L-8, L-40, and L-7 Canals drain into it. As it enters the coastal urban area, the C-51 Planning Unit receives stormwater runoff from the cities of Royal Palm Beach and Haverhill to the north and Wellington and Palm Springs to the south. The Acme Drainage District, Indian Trail Improvement District, and the Lake Worth Drainage District all drain into the West Palm Beach Canal. After it passes the south side of the Palm Beach International Airport, the West Palm Beach Canal turns south for a short distance and then turns east again to empty into the Lake Worth Lagoon.

The C-51 Canal has adversely impacted the Lake Worth Lagoon due to freshwater releases resulting in accumulation and sedimentation of suspended solids, which in turn resulted in an impaired benthic macroinvertebrate community. Sediments from varying locations within the lagoon were found to contain elevated concentrations of several metals including lead (from leaded gas), zinc, copper, cadmium, and chromium (from motor vehicles and runoff from paved roads and parking lots), derivatives of petroleum (mostly from diesel fuel), and polychlorinated biphenyls (PCBs) (from electrical transformers). Also, sporadic freshwater releases foster an unstable salinity regime in the lagoon, which prevents the establishment of normal estuarine biota.

Water Quality Improvement Plans and Projects

As discussed in the L-8 Planning Unit section, the CERP North Palm Beach County Project–Part 1 includes as a primary component a project to store, distribute, and regulate stormwater in the major canals. Excess water that currently is transported from the agricultural areas to the west and discharged via the C-51 Canal into the LWL would be stored and distributed to the WPB Water Catchment/Loxahatchee Slough wetland area and northward to the Loxahatchee River Basin. The treatment of water held in storage reservoirs would be provided by stormwater treatment areas (STAs). If implemented as intended, this project will improve water quality in the canal system, minimize the impacts of freshwater releases to the LWL, and provide fresh water to areas where it is needed.

Under the Water Preservation Areas Feasibility Study, there is one proposed project in the C-51 Planning Unit: the Acme Basin B Discharge Treatment Area and Impoundment. This element will provide water quality treatment and stormwater attenuation of runoff from a western portion of the C-51 Planning Unit adjacent to WCA-1. This water would then be discharged to WCA-1 or to an alternative location.





Because a significant portion of the planning unit is in agricultural land use, the implementation of agricultural BMPs is important to help reduce pollutant loadings to stormwater, as discussed previously.

As described in Chapter 2, Palm Beach County Department of Environmental Resources Management (PBC/DERM, 1992) has implemented a program to restore the freshwater chain of lakes by reducing nutrient loading, reestablishing natural shoreline and aquatic vegetation, and removing sediment. Lakes in the planning unit will ultimately benefit if the county is able to pursue this program.

Waters will not be placed on the Verified List if the Department receives reasonable assurance that existing or proposed projects and/or programs are expected to result in the attainment of water quality standards or consistently improve water quality over time. Chapter 4 and **Appendix B** contain more detailed documentation of the requirements for reasonable assurance.

For this planning unit, no management plans or projects complying with the Department's guidance for reasonable assurance have been provided for the list of impaired waters.

- **West Palm Beach Water Catchment Planning Unit**

General Description

The southern portion of Loxahatchee Slough is designated as the WPB Water Catchment Planning Unit. It covers about 20 square miles and contains 1 segment with WBIDs.

The planning unit lies in the city of West Palm Beach and is located north of the C-51 Planning Unit and east of the L-8 Planning Unit. This 12,000-acre wetland area provides storage of water for distribution to Lake Mangonia and Clear Lake as a potable surface water supply for the city of West Palm Beach, and also provides recharge to the surficial aquifer system. The WPB Water Catchment receives water from the L-8 Canal via the M Canal and from the Loxahatchee River Basin by way of the C-18 Canal.

Water Quality Summary

The quantity of recent water quality data available for the WPB Water Catchment Planning Unit does not meet the data sufficiency requirements of the IWR. The Department has focused on ambient water quality conditions of waterbodies and has gathered sufficient water quality data for a significant amount of sources surrounding the WPB Water Catchment Planning Unit.

Figure 3.5, a composite map of the planning unit, shows waters on the 1998 303(d) list, the Planning List and Verified List, and potential pollution sources. **Table 3.6** summarizes the water quality assessment status of all waterbody segments in the planning unit. Waterbodies represented by these data include WPB Water Catchment (WBID 3243).

The table and figure show that no waterbody segments in the planning unit are impaired.

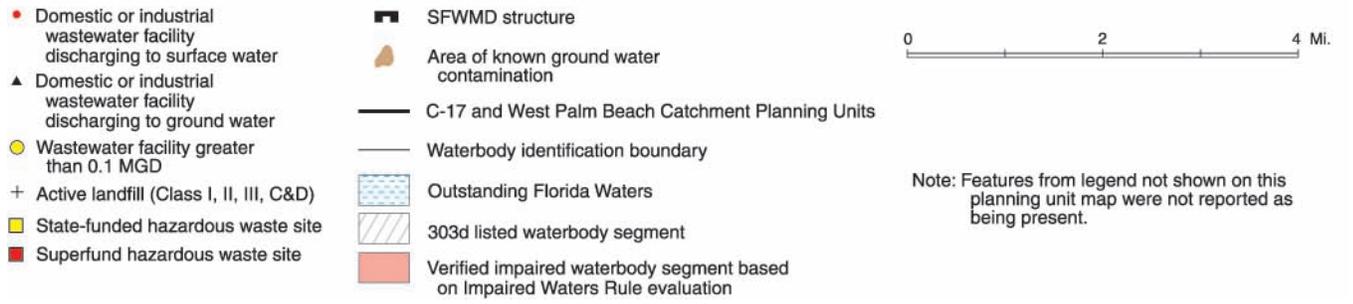
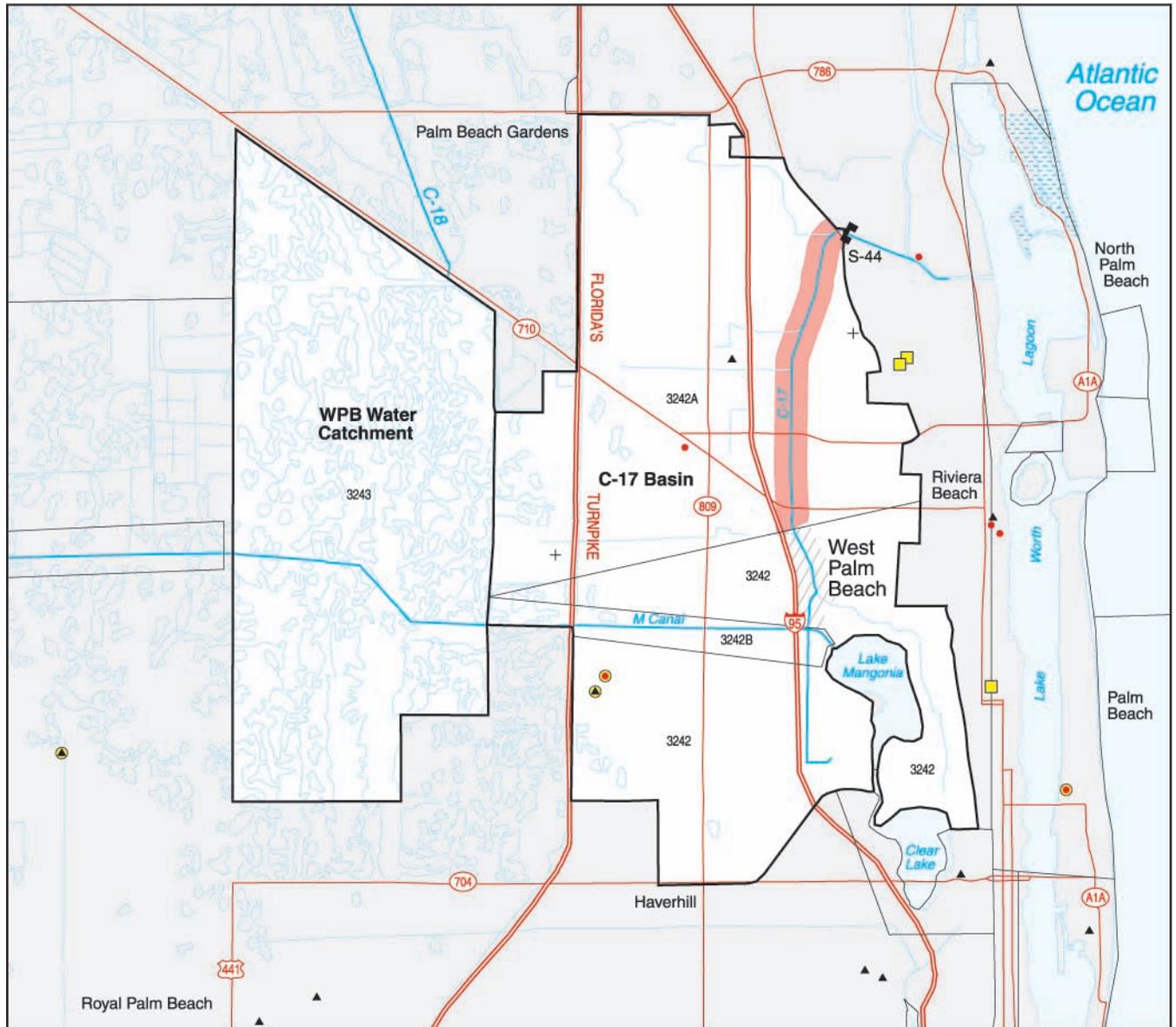


Figure 3.5: Composite Map of the C-17 and West Palm Beach Water Catchment Planning Units, Including the 1998 303(d) List, Planning List and Verified List Waters, and Potential Pollution Sources

Table 3.6: Integrated Water Quality Assessment Summary for the West Palm Beach Water Catchment Planning Unit

WBID	Waterbody Segment	Waterbody Type ¹	Class ²	1998 303(d) List Parameters of Concern	Data Evaluation under the Impaired Surface Waters Rule Criteria ³			
					Potentially Impaired (Cat. 3c) for Listed Parameters ⁴	Verified Impaired (Cat. 4a, 4b, 4c, or 5) for Listed Parameters ⁵	Not Impaired (Cat. 2) for Listed Parameters	EPA’s 305(b)/303(d) Integrated Report Assessment Category for WBID ⁶
3243	WPB Water Catchment	Stream	I		N/A		N/A	3a

Notes:

¹The designation “stream” includes canals, rivers, and sloughs. The designation “lake” includes some marshes.

²The state’s surface water classifications are as follows:

Class I: Potable water supplies

Class II: Shellfish propagation or harvesting

Class III: Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife

Class IV: Agricultural water supplies

Class V: Navigation, utility, and industrial use (there are no state waters currently in this class)

³The EPA’s 305(b)/303(d) Integrated Report categories are as follows:

1—Attains all designated uses;

2—Attains some designated uses;

3a—No data and information are available to determine if any designated use is attained;

3b—Some data and information are available, but they are insufficient for determining if any designated use is attained;

3c—Meets Planning List criteria and is potentially impaired for one or more designated uses;

3d—Meets Verified List criteria and is potentially impaired for one or more designated uses;

4a—Impaired for one or more designated uses and the TMDL is complete;

4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future;

4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant; and

5—Water quality standards are not attained and a TMDL is required.

⁴Parameters in **bold** meet the Verified List evaluation criteria, Section 62-303.400, F.A.C.

⁵Parameters in *italics* are in Category 4 (a, b, or c) waters that do not require TMDL development.

⁶The assessment categories listed in this column represent the status of each WBID as a whole, **based on multiple parameters**. The hierarchy for assigning these categories is Category 5, then 4, then 3c, then 2, and then 3b, i.e., each WBID is assigned a category based on the highest category assigned to an individual parameter. For example, if WBID 9999 has total coliforms as Category 5, fecal coliforms as Category 3c, and coliforms-shellfish as Category 2, the single assessment call for the WBID is Category 5.

Permitted Discharges and Land Uses

Point Sources. There are no point sources in the planning unit.

Nonpoint Sources. According to the SFWMD land use coverage, this planning unit is completely undeveloped, with more than 89 percent of it in wetland cover. The remainder is in upland forest or water. Nonpoint sources outside the planning unit, however, could affect water quality.

Appendix F provides summary information on Level I land uses in the basin, by planning unit.

Ecological Summary

The WPB Water Catchment Planning Unit is an extremely significant and ecologically valuable wetland preserve that serves multiple purposes including providing drinking water for West Palm Beach, Palm Beach, and South Palm Beach. The existing ecosystem is one of few places characteristic of a pristine Everglades remnant attracting great blue, little blue, little green, and tricolor herons; wood storks; great egrets; ibises; limpkins; turtles; alligators; gar; bass; bream and mudfish; black vultures; and

red-shouldered hawks. Snail kites and the ubiquitous apple snail are regular year-round sights. A bald eagle nest is active yearly and Rosette Spoonbills have been noted on several occasions feeding on the abundant shrimp. On both sides of the planning unit, raccoons, armadillos, deer, wild hogs, wading birds, ospreys, wild ducks, and numerous types of reptiles and amphibians are common. Pig frog choruses are heard throughout the swamp.

Little is known about the historical water quality within the WPB Water Catchment Planning Unit because no long-term sampling program has ever existed.

In response to proposed changes in flow and potential consequences to water quality, and the need to possess viable background water quality data, the Department's Southeast District Water Quality Section initiated monthly sampling beginning in January 2004. Preliminary findings of this cooperative effort, supported and assisted by the city of West Palm Beach, indicate that the water quality within the interior of the marsh is clean, clear, and extremely low in nutrients. Protecting the integrity of this environmentally sensitive ecosystem for future generations of humans and wildlife to enjoy requires the continued minimization of human impacts to the greatest extent possible.

Water Quality Improvement Plans and Projects

The WPB Water Catchment is managed to store water for public supply and aquifer recharge. The planning unit will benefit from the various projects to restore natural connection to the watershed to the west, and to provide additional water via the C-51, L-8, and C-17 Canals for potable supply and for the Loxahatchee River Basin to the north.

Waters will not be placed on the Verified List if the Department receives reasonable assurance that existing or proposed projects and/or programs are expected to result in the attainment of water quality standards or consistently improve water quality over time. Chapter 4 and **Appendix B** contain more detailed documentation of the requirements for reasonable assurance.

For this planning unit, no management plans or projects complying with the Department's guidance for reasonable assurance have been provided for the list of impaired waters.

- **C-17 Planning Unit**

General Description

The C-17 Planning Unit includes the drainage basin of the C-17 Canal (Earman River), which is located in the northeastern part of the basin, adjacent to the WPB Water Catchment and north of the C-51 Planning Unit. The C-17 Planning Unit covers about 33 square miles and contains 3 segments with WBIDs.

The C-17 Canal, which provides drainage and stormwater protection for a 33-square-mile watershed, is used to maintain ground water levels and prevent saltwater intrusion. It is regulated at the S-44 structure. Below the S-44 structure, the canal conveys water eastward, where it is discharged to tide at the LWL. Although C-17 is the only C&SF Project canal in the





basin, the M Canal crosses the planning unit, conveying potable water from the WPB Water Catchment to Lake Mangonia. At their intersection, there is no exchange of water between the C-17 and M Canals.

The planning unit includes portions of several incorporated areas: West Palm Beach, Palm Beach Gardens, Riviera Beach, Lake Park, and Mangonia Park. It lies in the Northern Palm Beach County Improvement District.

Water Quality Summary

The overall water quality of the C-17 Planning Unit lacks the quantity of recent water quality data to make an impairment call for the C-17 segment and the M Canal East. There is sufficient data to verify that there are high concentrations of TN and total phosphorus (TP), and low levels of DO in the PB Stations/D Canals waterbody. Future data collection is required to evaluate the iron concentrations and abundance of coliforms in the planning unit. The increased nutrient loads in the planning unit have the potential to increase chlorophyll *a* concentrations and could cause an imbalance between in-stream flora and fauna. The low DO conditions inhibit the ability of many stream organisms to grow and reproduce.

Figure 3.5, a composite map of the planning unit, shows waters on the 1998 303(d) list, the Planning List and Verified List, and potential pollution sources. **Table 3.7** summarizes the water quality assessment status of all waterbody segments in the planning unit. Waterbodies represented by these data include the C-17 segment, M Canal East, and PB Stations/D Canals.

The table and figure show that one waterbody segment in the planning unit is impaired. The PB Stations/D Canals waterbody contains the C-17 Canal flowing north to south through the WBID and is impaired for DO and nutrients (chlorophyll *a*). The causative pollutant is verified to be the colimitation of nitrogen and phosphorus, which has increased the chlorophyll *a* abundance in the canal.

Permitted Discharges and Land Uses

Point Sources. According to the Department's wastewater facility database, there are two wastewater treatment facilities in the planning unit, both of which discharge to surface water. The city of West Palm Beach East Central Regional Wastewater Treatment Plant is permitted to discharge treated effluent to the Atlantic Ocean via an offshore outfall, but may in the future discharge reclaimed water to the M Canal. In the planning unit, stormwater from a concrete batch plant is also discharged to surface water under a National Pollution Discharge Elimination System permit. There are eight permitted solid waste facilities, two of which are active landfills. There are no state-funded or federal hazardous waste remediation sites, no brownfield sites, and no delineated ground water contamination areas. **Figure 3.5** shows the locations of permitted wastewater treatment facilities and landfills in the planning unit.

Appendix E lists the basin's domestic and industrial surface discharge facilities, along with their permitted flows, by planning unit. It also lists landfills or solid waste facilities, by planning unit.

Table 3.7: Integrated Water Quality Assessment Summary for the C-17 Planning Unit

WBID	Waterbody Segment	Waterbody Type ¹	Class ²	1998 303(d) List Parameters of Concern	Data Evaluation under the Impaired Surface Waters Rule Criteria ³			
					Potentially Impaired (Cat. 3c) for Listed Parameters ⁴	Verified Impaired (Cat. 4a, 4b, 4c, or 5) for Listed Parameters ⁵	Not Impaired (Cat. 2) for Listed Parameters	EPA's 305(b)/303(d) Integrated Report Assessment Category for WBID ⁶
3242	C-17 Segment	Stream	I	BOD, Coli-forms, DO	BOD, Coli-forms, DO, Iron	N/A	Nutrients	3c
3242A	PB Stations/D Canals	Stream	IIIF		Iron	DO, Nutrients (Chlorophyll a)	Turbidity	5
3242B	M Canal East	Stream	I		N/A	N/A	Nutrients (Chlorophyll a)	2

Notes:

¹The designation “stream” includes canals, rivers, and sloughs. The designation “lake” includes some marshes.

²The state’s surface water classifications are as follows:

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

³The EPA’s 305(b)/303(d) Integrated Report categories are as follows:

- 1**—Attains all designated uses;
- 2**—Attains some designated uses;
- 3a**—No data and information are available to determine if any designated use is attained;
- 3b**—Some data and information are available, but they are insufficient for determining if any designated use is attained;
- 3c**—Meets Planning List criteria and is potentially impaired for one or more designated uses;
- 3d**—Meets Verified List criteria and is potentially impaired for one or more designated uses;
- 4a**—Impaired for one or more designated uses and the TMDL is complete;
- 4b**—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future;
- 4c**—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant; and
- 5**—Water quality standards are not attained and a TMDL is required.

⁴Parameters in **bold** meet the Verified List evaluation criteria, Section 62-303.400, F.A.C.

⁵Parameters in *italics* are in Category 4 (a, b, or c) waters that do not require TMDL development.

⁶The assessment categories listed in this column represent the status of each WBID as a whole, **based on multiple parameters**. The hierarchy for assigning these categories is Category 5, then 4, then 3c, then 2, and then 3b, i.e., each WBID is assigned a category based on the highest category assigned to an individual parameter. For example, if WBID 9999 has total coliforms as Category 5, fecal coliforms as Category 3c, and coliforms-shellfish as Category 2, the single assessment call for the WBID is Category 5.

BOD = Biological oxygen demand
 DO = Dissolved oxygen
 F = Fresh water

Nonpoint Sources. More than 66 percent of the land area in the planning unit is in urban/residential land uses. Approximately 36 percent of the total area is residential (8 percent low-density, 13 percent medium-density, and 15 percent high-density residential), approximately 10 percent is commercial, and 6 percent is in industrial land uses. Approximately 8 percent of the entire planning unit is used for transportation and utilities. Florida’s Turnpike, Interstate 95, Beeline Highway, and Military Trail are major roadways in the planning unit. Urban areas and transportation corridors may constitute significant nonpoint pollutant source areas. All of these human land uses can be associated with nonpoint discharges of pollutants and eroded sediments. Undeveloped areas in the C-17 Planning



Unit include upland forest (11 percent), wetlands (5 percent), and water (5 percent).

Appendix F provides summary information on Level I land uses in the basin, by planning unit.

Water Quality Improvement Plans and Projects

One component of the CERP North Palm Beach County–Part 1 project is in this planning unit. The C-17 Backpumping Element is designed to collect and reroute water in the C-17 Canal. It includes project activities designed to reduce the amount of stormwater released to tide and to provide a mechanism to transfer that excess water to the WPB Water Catchment so that it can be used for water supply, recharge, and distribution to the Loxahatchee River Basin to the north.

Waters will not be placed on the Verified List if the Department receives reasonable assurance that existing or proposed projects and/or programs are expected to result in the attainment of water quality standards or consistently improve water quality over time. Chapter 4 and **Appendix B** contain additional information on the requirements for reasonable assurance.

For this planning unit, no management plans or projects complying with the Department's guidance for reasonable assurance have been provided for the list of impaired waters.

- **C-16 and C-16 North Planning Units**

General Description

The C-16 and C-16 North Planning Units are located in east central Palm Beach County, south of the C-51 Planning Unit, and for the most part lie within the Lake Worth Drainage District. They contain 6 segments with WBIDs. The C-16 Planning Unit is the larger and more urbanized of the 2, covering approximately 58 square miles (compared with C-16 North, which covers about 9 square miles).

Both planning units drain to the C-16 Canal, which is an extension of the Boynton Canal, and to WCA-1. The C-16 Canal extends easterly from WCA-1 to the southern end of the LWL and provides drainage, flood protection, and protection against saltwater intrusion for the C-16 watershed. Excess water is discharged to the LWL via the S-41 structure. Water is supplied to the canal system by pumping from WCA-1 and by rainfall in both the C-16 and C-16 North watersheds. Lake Worth Drainage District Canals E-1, E-2, E-3, and E-4 drain to and intersect C-16 and provide for some transfer of water between the C-16/C-16 North, C-15, and Hillsboro Canal watersheds, where control structures do not exist. The C-16 North Planning Unit lies adjacent to WCA-1 and north of the Boynton Canal. Most runoff from C-16 North is received by the WCA.

Although most of the waterbodies in these planning units are canals, the eastern part of the C-16 Planning Unit contains part of the chain of lakes that formed along the coastal ridge. Lake Osborne, connected to the chain via the E-4 Canal, is located in the C-16 Planning Unit.

Although most of the area is unincorporated, incorporated areas in the C-16 watershed include Atlantis, as well as portions of Boynton Beach,

Lantana, Greenacres City, and Lake Worth. There are no incorporated areas in the C-16 North Planning Unit.

Water Quality Summary

The C-16 and C-16 North Planning Units do not meet the data sufficiency requirements of the IWR for several parameters. Lake Osborne meets the data sufficiency requirements of the IWR as a waterbody that is impaired but is not due to a pollutant. This waterbody is influenced by the increased amount of freshwater inflows coming in from the E-4 and L-14 Canals reducing the amount of DO in the lake. Other potential impairments in the planning units are from coliforms in Lake Osborne, and BOD and iron in Boynton Canal.

The C-16 Planning Unit is a unique system of canals that is used for flood protection, stormwater runoff, and socioeconomic uses such as sport fishing. The Department received a fisheries report completed by the Florida Fish and Wildlife Conservation Commission (FWC) on additional data evaluating the health of several species of exotic fish in canals under the jurisdiction of the Lake Worth Drainage District. The fisheries report (Shaffland et al., 2001) included the catch rates (by electrofishing) of several sport fish species and exotic species such as largemouth bass (*Micropterus salmoides*), butterfly peacock (*Cichla ocellaris*), bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), Mayan cichlid (*Cichlasoma urophthalmus*), and jaguar guapote (*C. managuense*), and is being used by the Department, in addition to the water quality sample data taken in the canals, to evaluate the impairment of the C-16 Planning Unit canals.

The fisheries report provided additional data on the E-4 (WBID 3262) and Boynton (WBID 3256B) Canals to verify that the canals met the aquatic life-use support criteria in the IWR, and that the high concentrations of chlorophyll *a* and low concentrations of DO were not causing an imbalance of flora and fauna.

Figure 3.6, a composite map of the planning units, shows waters on the 1998 303(d) list, the Planning List and Verified List, and potential pollution sources. **Table 3.8** summarizes the water quality assessment status of all waterbody segments in the planning unit. Waterbodies represented by these data include the Boynton, C-16, L-14, and E-4 Canals, and Lake Osborne.

The table and figure show that one waterbody segment in the planning unit is impaired. Lake Osborne is impaired for DO but the impairment is not due to a pollutant; nitrogen and phosphorus levels are elevated but did not exceed the IWR thresholds.

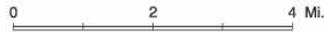
Permitted Discharges and Land Uses

Point Sources. In these two planning units, there are eight permitted wastewater treatment facilities; seven treating domestic wastewater, and one treating industrial wastewater. None of these facilities discharge to surface water. There are two closed solid waste landfills in the C-16 Planning Unit. There are no state or National Priorities List (NPL) hazardous waste cleanup sites or delineated ground water contamination areas in either





- Domestic or industrial wastewater facility discharging to surface water
- ▲ Domestic or industrial wastewater facility discharging to ground water
- Wastewater facility greater than 0.1 MGD
- + Active landfill (Class I, II, III, C&D)
- State-funded hazardous waste site
- Superfund hazardous waste site
- SFWMD structure
- Area of known ground water contamination
- C-15, C-16, and C-16N Planning Units
- Waterbody identification boundary
- Outstanding Florida Waters
- 303(d) listed waterbody segment
- Verified impaired waterbody segment based on Impaired Waters Rule evaluation



Note: Features from legend not shown on this planning unit map were not reported as being present.

Figure 3.6: Composite Map of the C-15, C-16, and C-16 North Planning Units, Including the 1998 303(d) List, Planning List and Verified List Waters, and Potential Pollution Sources

Table 3.8: Integrated Water Quality Assessment Summary for the C-16 and C-16 North Planning Units

WBID	Waterbody Segment	Waterbody Type ¹	Class ²	1998 303(d) List Parameters of Concern	Data Evaluation under the Impaired Surface Waters Rule Criteria ³			
					Potentially Impaired (Cat. 3c) for Listed Parameters ⁴	Verified Impaired (Cat. 4a, 4b, 4c, or 5) for Listed Parameters ⁵	Not Impaired (Cat. 2) for Listed Parameters	EPA's 305(b)/303(d) Integrated Report Assessment Category for WBID ⁶
3256	C-16	Stream	IIIF	N/A	N/A	N/A	N/A	3a
3256A	Lake Osborne	Lake	IIIF	Coliforms	Coliforms	DO	Nutrients (TSI), Turbidity	4c
3256B	Boynton Canal	Stream	IIIF	BOD, Coliforms, DO, Nutrients	BOD, Iron	N/A	Nutrients (Chlorophyll a), Coliforms, Turbidity, DO	3c
3256C	L-14 Canal	Stream	IIIF	N/A	N/A	N/A	N/A	3a
3256D	Canal E-4	Stream	IIIF	N/A	N/A	N/A	Nutrients (Chlorophyll a)	3a
3257	C-16N	Stream	IIIF	N/A	N/A	N/A	N/A	3a

Notes:

¹The designation "stream" includes canals, rivers, and sloughs. The designation "lake" includes some marshes.

²The state's surface water classifications are as follows:

Class I: Potable water supplies

Class II: Shellfish propagation or harvesting

Class III: Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife

Class IV: Agricultural water supplies

Class V: Navigation, utility, and industrial use (there are no state waters currently in this class)

³The EPA's 305(b)/303(d) Integrated Report categories are as follows:

1—Attains all designated uses;

2—Attains some designated uses;

3a—No data and information are available to determine if any designated use is attained;

3b—Some data and information are available, but they are insufficient for determining if any designated use is attained;

3c—Meets Planning List criteria and is potentially impaired for one or more designated uses;

3d—Meets Verified List criteria and is potentially impaired for one or more designated uses;

4a—Impaired for one or more designated uses and the TMDL is complete;

4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future;

4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant; and

5—Water quality standards are not attained and a TMDL is required.

⁴Parameters in **bold** meet the Verified List evaluation criteria, Section 62-303.400, F.A.C.

⁵Parameters in *italics* are in Category 4 (a, b, or c) waters that do not require TMDL development.

⁶The assessment categories listed in this column represent the status of each WBID as a whole, **based on multiple parameters**. The hierarchy for assigning these categories is Category 5, then 4, then 3c, then 2, and then 3b, i.e., each WBID is assigned a category based on the highest category assigned to an individual parameter. For example, if WBID 9999 has total coliforms as Category 5, fecal coliforms as Category 3c, and coliforms-shellfish as Category 2, the single assessment call for the WBID is Category 5.

BOD = Biological oxygen demand

DO = Dissolved oxygen

F = Fresh water

TSI = Trophic State Index



planning unit. **Figure 3.6** shows the locations of permitted wastewater treatment facilities and landfills in the planning units.

Appendix E lists the basin's domestic and industrial surface discharge facilities, along with their permitted flows, by planning unit. It also lists landfills or solid waste facilities, by planning unit.

Nonpoint Sources. Predominant land uses in the 2 planning units are urban/built-up (more than 56 percent of C-16 and 30 percent of C-16 North) and agricultural (21 percent of C-16 and 31 percent of C-16 North). Medium- and low-density residential development are the predominant urban land uses. The predominant agricultural practice in both is row crop farming. Because a number of local roads and Florida's Turnpike are present in the C-16 Planning Unit, transportation and utilities constitute a significant percentage of its area (3.5 percent). All of these human land uses can be associated with nonpoint discharges of pollutants and eroded sediments. Only about 5 percent of the land area in C-16 is covered by wetlands, compared with 37 percent of C-16 North. Approximately 5 percent of C-16 is covered by upland forest, compared with 18 percent of C-16 North.

Appendix F provides summary information on Level I land uses in the basin, by planning unit.

Water Quality Improvement Plans and Projects

A CERP element in the Water Preserve Areas Feasibility Study is the Strazulla Wetlands, which includes water control structures and the acquisition of 3,335 acres of mostly wetlands in much of C-16 North and a portion of C-16 adjacent to WCA-1. This element will provide a connection to the Loxahatchee National Wildlife Area and preserve some critical habitat in the area.

Approximately 21 percent of C-16 and 31 percent of C-16 North are used for a variety of agricultural purposes. Like elsewhere, the implementation of BMPs to reduce polluted runoff from agricultural operations is very important to improving water quality in the receiving waterbodies.

As described in Chapter 2, PBC/DERM has implemented a program to restore the freshwater chain of lakes by reducing nutrient loading, reestablishing natural shoreline and aquatic vegetation, and removing sediment. PBC/DERM currently has a restoration plan for Lake Osborne under this program.

Waters will not be placed on the Verified List if the Department receives reasonable assurance that existing or proposed projects and/or programs are expected to result in the attainment of water quality standards or consistently improve water quality over time. Chapter 4 and **Appendix B** contain additional information on the requirements for reasonable assurance.

For this planning unit, no management plans or projects complying with the Department's guidance for reasonable assurance have been provided for the list of impaired waters.

- C-15 Planning Unit

General Description

The C-15 Planning Unit covers about 75 square miles and contains 5 segments with WBIDs. It lies within the Lake Worth Drainage District. The planning unit encompasses the watershed of the C-15 Canal, which includes an area of about 75 square miles in southeastern Palm Beach County. The planning unit is bounded on the west by WCA-1 and on the north by the C-16 Canal watershed. The C-15 Canal is the eastern extension of the Lake Worth Drainage District L-38 Canal that extends laterally from WCA-1 to the coastal area. Flow in L-38/C-15 is to the east, and C-15 discharges to the AICW. C-15 and connecting canals provide flood protection and drainage for the watershed; they also maintain a ground water elevation that prevents saltwater intrusion. The C-15 Canal level is regulated at the S-40 structure west of the AICW. The 4 main Lake Worth Drainage District north-south equalizing canals (E-1, E-2, E-3, and E-4) drain to C-15 in this watershed and provide opportunities for the interbasin transfer of water. The L-30 Canal, located north of L-38/C-15, is also a main east-west lateral canal in the planning unit.

The C-15 Planning Unit includes portions of Boca Raton, Delray Beach, and Boynton Beach. The western half of the planning unit is in unincorporated Palm Beach County. The planning unit also includes the southern extent of the Palm Beach chain of lakes, located on the coastal ridge, that are connected by the E-4 Canal. Lake Ida, the main lake in the planning unit, receives flows from E-4 and L-30.

Water Quality Summary

The overall water quality of the C-15 Planning Unit does not meet the data sufficiency requirement in the IWR to determine the impairment status of the canals in the basin. There is sufficient data to evaluate the nutrient levels of Lake Ida, which is severely degraded due to elevated phosphorus levels coming from the E-4 and L-30 Canals.

The C-15 Planning Unit is a unique system of canals with recent sampling that demonstrates high concentrations of nitrogen and phosphorus and low concentrations of DO. The Department received a fisheries report completed by the FWC on additional data evaluating the health of several species of exotic fish in canals under the jurisdiction of the Lake Worth Drainage District. The fisheries report (Shaffland et al., 2001) included the catch rates (by electrofishing) of several sport fish species and exotic species such as largemouth bass (*Micropterus salmoides*), butterfly peacock (*Cichla ocellaris*), bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), Mayan cichlid (*Cichlasoma urophthalmus*), and jaguar guapote (*C. mana-guense*), and is being used by the Department, in addition to the water quality sample data taken in the canals, to evaluate the impairment of the C-15 Planning Unit canals.

The fisheries report provided additional data on the E-4 Canal (WBID 3262) to verify that the canal met the aquatic life-use support criteria in the IWR, and that the high concentrations of chlorophyll *a*





and low concentrations of DO were not causing an imbalance of flora and fauna.

Figure 3.6, a composite map of the planning unit, shows waters on the 1998 303(d) list, the Planning List and Verified List, and potential pollution sources. **Table 3.9** summarizes the water quality assessment status of all waterbody segments in the planning unit. Waterbodies represented by these data include E-1, E-2, E-3, and E-4 Canals, and Lake Ida.

The table and figure show that one waterbody segment in the planning unit is impaired. Lake Ida is impaired for nutrients (TSI) linked to phosphorus as the limiting nutrient.

Permitted Discharges and Land Uses

Point Sources. There are 8 permitted wastewater treatment facilities in the C-15 Planning Unit, 1 of which discharges to surface water (the South Central Regional Wastewater Treatment Plant). This facility, with a design flow of 24 million gallons per day (mgd), discharges treated domestic effluent to the Atlantic Ocean via an offshore outfall and also provides reclaimed water to irrigate golf courses. The Palm Beach County Southern Wastewater Treatment Plant currently uses deep well injection for disposal of treated effluent but is transitioning toward reuse, and now is also applying reclaimed water to a wetland. There are 2 permitted solid waste landfills that are inactive and 1 state-funded hazardous waste remediation site, Southern Crop Services. There are currently no delineated ground water contamination areas in the planning unit. **Figure 3.6** shows the locations of permitted wastewater treatment facilities, landfills, and the hazardous waste cleanup site in the planning unit.

Appendix E lists the basin's domestic and industrial surface discharge facilities, along with their permitted flows, by planning unit. It also lists landfills or solid waste facilities, by planning unit.

Nonpoint Sources. Over 53 percent of the planning unit includes urban and residential land uses. Medium- and high-density residential development covers more than 20 and 11 percent of the land area, respectively. Approximately 10 percent of the area is in urban recreational land uses, which include golf courses, parks, and recreational fields. Agricultural land use constitutes over 31 percent of the total area, with the predominant agricultural uses being row crops (approximately 20 percent) and nurseries (approximately 5 percent). All of these human land uses can be associated with nonpoint discharges of pollutants and eroded sediments. A relatively small percentage of the planning unit's area remains in a somewhat natural state. Upland forest and wetlands cover only about 6 percent of the total area.

Appendix F provides summary information on Level I land uses in the basin, by planning unit.

Ecological Summary

The Department received a fisheries report completed by the FWC on additional data evaluating the health of several species of exotic fish in canals under the jurisdiction of the Lake Worth Drainage District. The fisheries report (Shaffland et al., 2001) included the catch rates (by

Table 3.9: Integrated Water Quality Assessment Summary for the C-15 Planning Unit

WBID	Waterbody Segment	Waterbody Type ¹	Class ²	1998 303(d) List Parameters of Concern	Data Evaluation under the Impaired Surface Waters Rule Criteria ³			
					Potentially Impaired (Cat. 3c) for Listed Parameters ⁴	Verified Impaired (Cat. 4a, 4b, 4c, or 5) for Listed Parameters ⁵	Not Impaired (Cat. 2) for Listed Parameters	EPA's 305(b)/303(d) Integrated Report Assessment Category for WBID ⁶
3262	E-4 Canal	Stream	IIIF	N/A	Iron	N/A	Nutrients (Chlorophyll a), DO, Turbidity	3c
3262A	Lake Ida	Lake	IIIF	Nutrients, DO	N/A	Nutrients (TSI)	DO	5
3262B	E-1 Canal	Stream	IIIF	N/A	N/A	N/A	N/A	3b
3262C	E-2 Canal	Stream	IIIF	N/A	N/A	N/A	N/A	3a
3262D	E-3 Canal	Stream	IIIF	Nutrients, DO, Coliforms	DO, Fecal Coliforms, Iron	N/A	N/A	3c

Notes:

¹The designation “stream” includes canals, rivers, and sloughs. The designation “lake” includes some marshes.

²The state’s surface water classifications are as follows:

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

³The EPA’s 305(b)/303(d) Integrated Report categories are as follows:

- 1—Attains all designated uses;
- 2—Attains some designated uses;
- 3a—No data and information are available to determine if any designated use is attained;
- 3b—Some data and information are available, but they are insufficient for determining if any designated use is attained;
- 3c—Meets Planning List criteria and is potentially impaired for one or more designated uses;
- 3d—Meets Verified List criteria and is potentially impaired for one or more designated uses;
- 4a—Impaired for one or more designated uses and the TMDL is complete;
- 4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future;
- 4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant; and
- 5—Water quality standards are not attained and a TMDL is required.

⁴Parameters in **bold** meet the Verified List evaluation criteria, Section 62-303.400, F.A.C.

⁵Parameters in *italics* are in Category 4 (a, b, or c) waters that do not require TMDL development.

⁶The assessment categories listed in this column represent the status of each WBID as a whole, **based on multiple parameters**. The hierarchy for assigning these categories is Category 5, then 4, then 3c, then 2, and then 3b, i.e., each WBID is assigned a category based on the highest category assigned to an individual parameter. For example, if WBID 9999 has total coliforms as Category 5, fecal coliforms as Category 3c, and coliforms-shellfish as Category 2, the single assessment call for the WBID is Category 5.

DO = Dissolved oxygen
 F = Fresh water
 TSI = Trophic State Index

electrofishing) of several ecologically and economically important sport fish and exotic species, such as largemouth bass (*Micropterus salmoides*), butterfly peacock (*Cichla ocellaris*), bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), Mayan cichlid (*Cichlasoma urophthalmus*), and jaguar guapote (*C. managuense*), and is being used by the Department, in addition to the water quality sample data taken in the canals, to evaluate the impairment of the C-15 Planning Unit canals.

The fisheries report provided additional data on the E-4 Canal (WBID 3262) to verify that the canal met the aquatic life-use support



criteria in the IWR, and that the high concentrations of chlorophyll *a* and low concentrations of DO were not causing an imbalance of flora and fauna.

Water Quality Improvement Plans and Projects

Proposed CERP projects will be constructed in the planning unit as part of the Water Preserve Areas and North Palm Beach County–Part 1 efforts.

A major project identified in the Water Preserve Areas Feasibility Study is the Palm Beach County Agricultural Reserve, which includes a 20,000 acre-foot-capacity reservoir and, as a later phase, a network of aquifer storage and recovery wells. These projects will supplement water deliveries for central and southern Palm Beach County by capturing water that would otherwise be discharged to the LWL and the AICW during wet-weather periods. Water will be collected from the canal system in the western part of the Lake Worth Drainage District. The AICW will benefit because it will receive reduced quantities of fresh water, nutrients, and suspended solids during wet weather.

The Winsberg Farm Wetland Restoration will reduce the amount of treated wastewater that is currently being disposed of via deep well injection at the Palm Beach County Southern Wastewater Treatment Plant. The project will provide aquifer recharge and maintain green space.

Lake Ida has been significantly degraded by canal discharges and the encroachment of development along its shoreline. The chain of lakes has received special attention by the Palm Beach County Commission, and PBC/DERM has developed a restoration plan.

As is the case in other areas where agricultural activities comprise a significant part of the area, BMPs to help reduce pollutant loadings will be important to the improvement of water quality in the canals and receiving waters.

Waters will not be placed on the Verified List if the Department receives reasonable assurance that existing or proposed projects and/or programs are expected to result in the attainment of water quality standards or consistently improve water quality over time. Chapter 4 and **Appendix B** contain additional information on the requirements for reasonable assurance.

For this planning unit, no management plans or projects complying with the Department's guidance for reasonable assurance have been provided for the list of impaired waters.

- **Hillsboro Canal Planning Unit**

General Description

Located in southeastern Palm Beach and northeastern Broward Counties, the Hillsboro Canal Planning Unit covers approximately 102 square miles and is located south of the C-15 Canal watershed. It contains 6 segments with WBIDs. Approximately 60 percent of the planning unit is in Palm Beach County and 40 percent in Broward County. The Hillsboro Canal extends from west to east, connecting WCA-1 with the AICW. It is operated by SFWMD to provide flood protection and water supply to

the watershed, convey excess water from WCA-1, control seepage from WCA-2, and maintain ground water levels to protect against saltwater intrusion. Several control structures regulate flow in the Hillsboro Canal watershed, with the G-56 structure (Deerfield Lock) being the main structure regulating flow to the AICW and maintaining stage to prevent saltwater intrusion. Most of the inflow to the Hillsboro Canal is from the Lake Worth Drainage District canals in Palm Beach County, with the main inflows coming from the E-1 Canal (Broward County, 2001). These canals allow for the transfer of water between the Hillsboro Canal watershed and the C-15 and C-16 watersheds to the north, particularly in the western area of the C-15 and C-16 watersheds. Canal inflows and outflows can also occur from a network of secondary and tertiary canals in Broward County (south of the Hillsboro Canal).

The Hillsboro Canal Planning Unit includes portions of several incorporated areas: Boca Raton, Deerfield Beach, Coral Springs, Parkland, and Coconut Creek. There is a large unincorporated area in southwestern Palm Beach County. Several water control districts also have jurisdiction in the planning unit: Lake Worth Drainage District, Broward County Water Control District-2, Cocomar Water Control District, Pine Tree Water Control District, and North Springs Improvement District.

Water Quality Summary

The water quality of the Hillsboro Canal Planning Unit is impacted by elevated nutrients or low concentrations of DO in the canals. The E-1, E-4, and Hillsboro Canals are the areas with the most elevated levels of nitrogen and phosphorus, resulting in depressed levels of DO. Additional data is needed to evaluate the status of the E-2 and E-3 Canals before an impairment call can be made for these waterbodies. These canals drain into the Hillsboro Canal, contributing a significant amount of excess nutrients to the canal and potentially causing downstream impacts to the Lake Worth Lagoon.

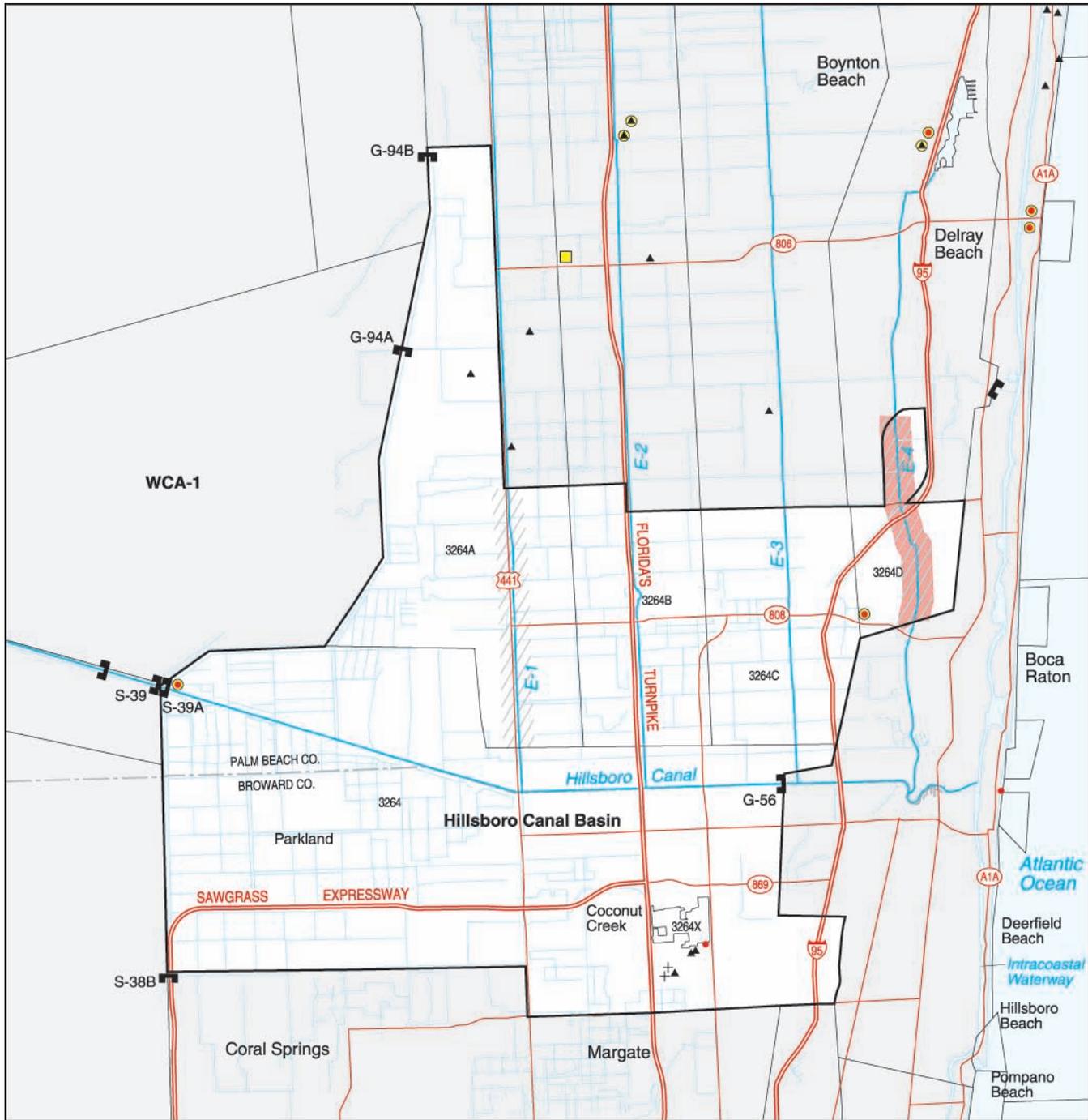
Figure 3.7, a composite map of the planning unit, shows waters on the 1998 303(d) list, the Planning List and Verified List, and potential pollution sources. **Table 3.10** summarizes the water quality assessment status of all waterbody segments in the planning unit. Waterbodies represented by these data include E1, E-2, E-3, E-4, and Hillsboro Canals, and the Lakeview Lakes.

The table and figure show that one waterbody segment in the planning unit is impaired. The E-4 Canal is verified impaired for nutrients (chlorophyll *a*) caused by the colimitation of nitrogen and phosphorus.

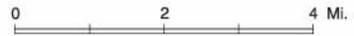
Permitted Discharges and Land Uses

Point Sources. There are 7 permitted wastewater treatment facilities in the planning unit: 3 domestic and 2 industrial wastewater facilities, 1 concrete batch plant, and 1 permit for a SFWMD aquifer storage and recovery (ASR) pilot project. One wastewater treatment facility discharges to surface water: the City of Boca Raton Wastewater Treatment Plant has a design flow of 17.5 mgd and discharges to the Atlantic Ocean via an offshore outfall. In this planning unit, Department records show that there





- Domestic or industrial wastewater facility discharging to surface water
- ▲ Domestic or industrial wastewater facility discharging to ground water
- Wastewater facility greater than 0.1 MGD
- + Active landfill (Class I, II, III, C&D)
- State-funded hazardous waste site
- Superfund hazardous waste site
- SFWMD structure
- Area of known ground water contamination
- Hillsboro Canal Planning Unit
- Waterbody identification boundary
- ▨ Outstanding Florida Waters
- ▨ 303d listed waterbody segment
- Verified impaired waterbody segment based on Impaired Waters Rule evaluation



Note: Features from legend not shown on this planning unit map were not reported as being present.

Figure 3.7: Composite Map of the Hillsboro Canal Planning Unit, Including the 1998 303(d) List, Planning List and Verified List Waters, and Potential Pollution Sources

Table 3.10: Integrated Water Quality Assessment Summary for the Hillsboro Canal Planning Unit

WBID	Waterbody Segment	Waterbody Type ¹	Class ²	1998 303(d) List Parameters of Concern	Data Evaluation under the Impaired Surface Waters Rule Criteria ³			
					Potentially Impaired (Cat. 3c) for Listed Parameters ⁴	Verified Impaired (Cat. 4a, 4b, 4c, or 5) for Listed Parameters ⁵	Not Impaired (Cat. 2) for Listed Parameters	EPA's 305(b)/303(d) Integrated Report Assessment Category for WBID ⁶
3264	Hillsboro Canal	Stream	IIIF	N/A	N/A	N/A	Nutrients (Chlorophyll <i>a</i>), DO, Historical Chlorophyll, Coliforms, Turbidity	2
3264A	E-1 Canal	Stream	IIIF	N/A	N/A	N/A	Nutrients (Chlorophyll <i>a</i>), DO	2
3264B	E-2 Canal	Stream	IIIF	N/A	N/A	N/A	N/A	3b
3264C	E-3 Canal	Stream	IIIF	N/A	N/A	N/A	N/A	3b
3264D	E-4 Canal	Stream	IIIF	Nutrients (Chlorophyll <i>a</i>), Coliforms, DO	Fecal Coliforms, DO	Nutrients (Chlorophyll <i>a</i>)	N/A	5
3264X	Lakeview Lakes	Lake	IIIF	N/A	N/A	N/A	N/A	3b

Notes:

¹The designation “stream” includes canals, rivers, and sloughs. The designation “lake” includes some marshes.

²The state’s surface water classifications are as follows:

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

³The EPA’s 305(b)/303(d) Integrated Report categories are as follows:

- 1**—Attains all designated uses;
- 2**—Attains some designated uses;
- 3a**—No data and information are available to determine if any designated use is attained;
- 3b**—Some data and information are available, but they are insufficient for determining if any designated use is attained;
- 3c**—Meets Planning List criteria and is potentially impaired for one or more designated uses;
- 3d**—Meets Verified List criteria and is potentially impaired for one or more designated uses;
- 4a**—Impaired for one or more designated uses and the TMDL is complete;
- 4b**—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future;
- 4c**—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant; and
- 5**—Water quality standards are not attained and a TMDL is required.

⁴Parameters in **bold** meet the Verified List evaluation criteria, Section 62-303.400, F.A.C.

⁵Parameters in *italics* are in Category 4 (a, b, or c) waters that do not require TMDL development.

⁶The assessment categories listed in this column represent the status of each WBID as a whole, **based on multiple parameters**. The hierarchy for assigning these categories is Category 5, then 4, then 3c, then 2, and then 3b, i.e., each WBID is assigned a category based on the highest category assigned to an individual parameter. For example, if WBID 9999 has total coliforms as Category 5, fecal coliforms as Category 3c, and coliforms-shellfish as Category 2, the single assessment call for the WBID is Category 5.

DO = Dissolved oxygen
 F = Fresh water



are 7 permitted solid waste facilities (2 are reported as active, a Class 1 solid waste landfill and a C&D landfill). There are no state or NPL hazardous waste cleanup sites or delineated ground water contamination areas. **Figure 3.7** shows the locations of permitted wastewater treatment facilities and landfills in the planning unit.

Appendix E lists the basin's domestic and industrial surface discharge facilities, along with their permitted flows, by planning unit. It also lists landfills or solid waste facilities, by planning unit.

Nonpoint Sources. The planning unit is mostly urbanized. Urban and residential land uses dominate, occupying approximately 59 percent of the total area. More than 34 percent of the area is in medium- to high-density residential development. Approximately 6 percent is in transportation- and utility-related land uses, which include roadways, utility easements, and airports. Also, more than 14 percent of the area is in agricultural land usage (approximately 6 percent in improved pasture and 6 percent in row crops). All of these human land uses can be associated with nonpoint discharges of pollutants and eroded sediments. Wetlands and upland forests each cover only approximately 6 percent of the area.

Appendix F provides summary information on Level I land uses in the basin, by planning unit.

Ecological Summary

The Department received a fisheries report completed by the FWC on additional data evaluating the health of several species of exotic fish in canals under the jurisdiction of the Lake Worth Drainage District. The fisheries report (Shaffland et al., 2001) included the catch rates (by electrofishing) of several ecologically and economically important sport fish and exotic species, such as largemouth bass (*Micropterus salmoides*), butterfly peacock (*Cichla ocellaris*), bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), Mayan cichlid (*Cichlasoma urophthalmus*), and jaguar guapote (*C. managuense*), and is being used by the Department, in addition to the water quality sample data taken in the canals, to evaluate the impairment of the Hillsboro Canal Planning Unit canals.

The fisheries report provided additional data on the E-1 and Hillsboro Canals (WBIDs 3264A and 3264, respectively) to verify that the canals met the aquatic life-use support criteria in the IWR, and that the high concentrations of chlorophyll *a* and low concentrations of DO were not causing an imbalance of flora and fauna.

Water Quality Improvement Plans and Projects

The Water Preserves Area Project under CERP includes elements that would be located in the Hillsboro Canal Planning Unit. Both elements, the Hillsboro Impoundment and the Hillsboro ASR Pilot Project, are being designed to provide storage of water from the Hillsboro Canal. The Hillsboro Impoundment includes an above-ground reservoir with a total storage capacity of approximately 15,000 acre-feet. Its planned location is the western part of the planning unit, adjacent to the canal and WCA-1. It will receive excess canal water during wet-weather periods and provide water to the canal and WCA-1 during the dry season. One of the project's

environmental benefits is the equalization of freshwater inflows to the AICW. The ASR Pilot Project, as designed, is intended to result in additional storage capacity of canal water that would otherwise be lost to tide.

Waters will not be placed on the Verified List if the Department receives reasonable assurance that existing or proposed projects and/or programs are expected to result in the attainment of water quality standards or consistently improve water quality over time. Chapter 4 and **Appendix B** contain additional information on the requirements for reasonable assurance.

For this planning unit, no management plans or projects complying with the Department's guidance for reasonable assurance have been provided for the list of impaired waters.

- **Intracoastal Planning Unit**

General Description

The Intracoastal Planning Unit covers about 85 square miles and contains 22 segments with WBIDs. It includes the eastern margin of the Lake Worth Lagoon–Palm Beach Coast Basin. This comprises the most intensively developed portion of the basin and includes the LWL, AICW, inlets that connect the estuaries to the Atlantic Ocean, and the coastal waters immediately east of the Atlantic shoreline. From north to south, the planning unit extends from south of Jupiter Inlet in northern Palm Beach County to just south of the Hillsboro Inlet in northern Broward County. It includes more than 20 incorporated municipalities. The largest of these are Jupiter, Palm Beach Gardens, and North Palm Beach (near or adjacent to the AICW north of the lagoon); Riviera Beach, West Palm Beach, Palm Beach, Lake Worth, and Boynton Beach (adjacent to the LWL); and Delray Beach and Boca Raton (adjacent to the AICW south of the lagoon).

As discussed earlier, the LWL and AICW south of the lagoon receive major inflows of fresh water from the regional canals. Canal C-17 discharges to the upper segment of the LWL. Canals C-51 and C-16 discharge to the middle and lower segments of the LWL, respectively. The C-15 and Hillsboro Canals discharge to the AICW south of the lagoon.

While inlets provide some mechanism for flushing and the restoration of salinity equilibrium, the middle and lower segments of the LWL are subject to less circulation and have longer durations of low salinity (Zarillo, 2003). Canal influences also extend to nutrient and sediment loads. In addition to the degradation associated with canal inflows, the shoreline along the LWL and AICW is highly altered by development, and there is little natural retention of local stormwater that these surface waters receive.

Water Quality Summary

The water quality of the Intracoastal Planning Unit has not been impacted by excessive nutrients that could result in depressed DO levels in the basin. The recent available water quality data shows that impairments due to a pollutant were found at the ICWW above Pompano and the Lake Worth Lagoon South Segment for copper and at the Hillsboro Inlet Park for exceedances of historical chlorophyll values. A majority of the coastal WBIDs have sufficient data to verify fecal coliform is not impaired along





the beaches and coastal parks. Each of the three waterbody segments of the Lake Worth Lagoon (north, south, and central) contains a sufficient amount of data to verify that the DO levels have not reached depressed levels according to the requirement of the IWR.

The central and south segments of the Lake Worth Lagoon have been impacted by excessive freshwater inflows flowing downstream from the C-16/Boynton Canal and more predominantly from the C-51. To a lesser extent the Hillsboro Canal carries freshwater inflows to the ICWW above Pompano (3226F). To account for these hydrologic modifications, which have the potential to result in biological degradation, the Department has listed the central and southern segments of the lagoon (3226F1 and 3226F2) for biology.

Sediment deposition is also a major contributor to the environmental degradation of the Lake Worth Lagoon. Significant amounts of mangroves and sea grass beds have been removed or destroyed due to the influx of sediment deposits to the lagoon. The Department has listed sediments as an impairment to the central segment of the Lake Worth Lagoon (3226F1).

Figures 3.8 and 3.9 are a composite maps of the planning unit, and show waters on the 1998 303(d) list, the Planning List and Verified List, and potential pollution sources. **Table 3.11** summarizes the water quality assessment status of all waterbody segments in the planning unit. Waterbodies represented by these data include Deerfield Beach Pier, Hillsboro Inlet Park, ICWW above Pompano, ICWW above Royal Palm Bridge, Intracoastal Ocean 1, Intracoastal 2, Intracoastal Ocean 3, Lake Worth Beach, Lake Worth Lagoon Central Segment, Lake Worth Lagoon North Segment, Lake Worth Lagoon South Segment, Loggerhead Park, NE 16th Street Pompano, Ocean Inlet Park, Ocean Reef Park, Peanut Island, Phil Foster Park, Phipps Park, Red Reef Park, Riviera Municipal Beach, Sandoway Park, and South Inlet Park.

The table and figure show that four waterbody segments in the planning unit are impaired. The ICWW above Pompano has sufficient data to be listed as impaired for copper, Hillsboro Inlet Park is listed for exceedances of historical chlorophyll values under the IWR, and Phil Foster and Intracoastal 2 are impaired for mercury.

Permitted Discharges and Land Uses

Point Sources. Twenty-eight wastewater treatment facilities in the Intracoastal Planning Unit are included in the Department's database of regulated facilities. Of these, 9 are permitted for surface water discharge, and most are small. The 2 domestic wastewater facilities, Wellington Arms Condominiums and Ocean Maisonettes, have package plants that provide advanced treatment to wastewater and discharge directly to surface waters of the LWL. There are 5 facilities discharging cooling water, 1 (soon to be discontinued) discharging stormwater, and 1 with a permit to discharge on an emergency basis to surface water. Department records show there are 10 permitted solid waste facilities, only 1 of which is operational (a C&D landfill). There are 2 state and federal hazardous waste sites, Trans Circuit and BMI-Textron, both of which are on the federal NPL site list. There are no brownfield sites or delineated ground water contamination areas.

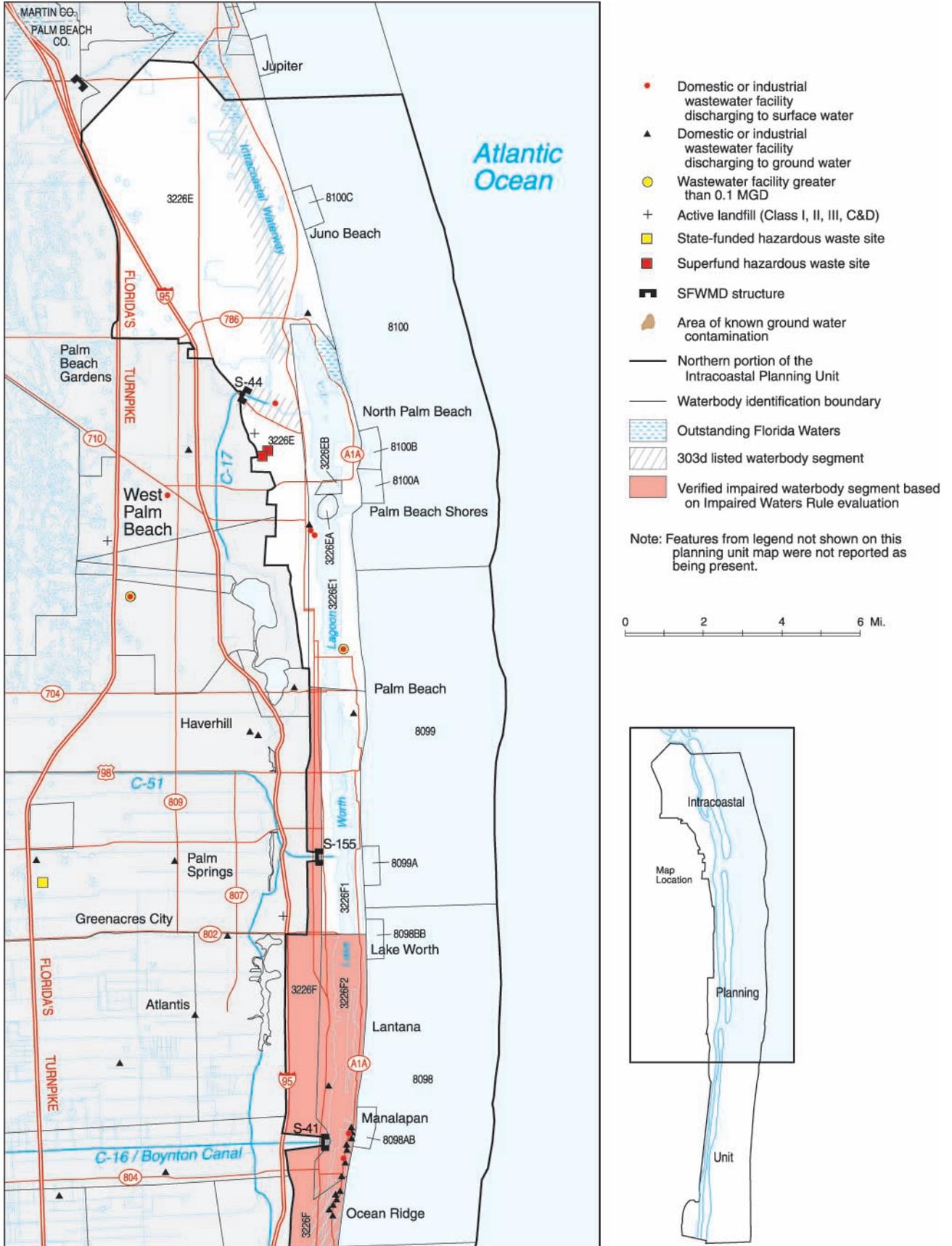


Figure 3.8: Composite Map of the Northern Portion of the Intracoastal Planning Unit, Including the 1998 303(d) List, Planning List and Verified List Waters, and Potential Pollution Sources

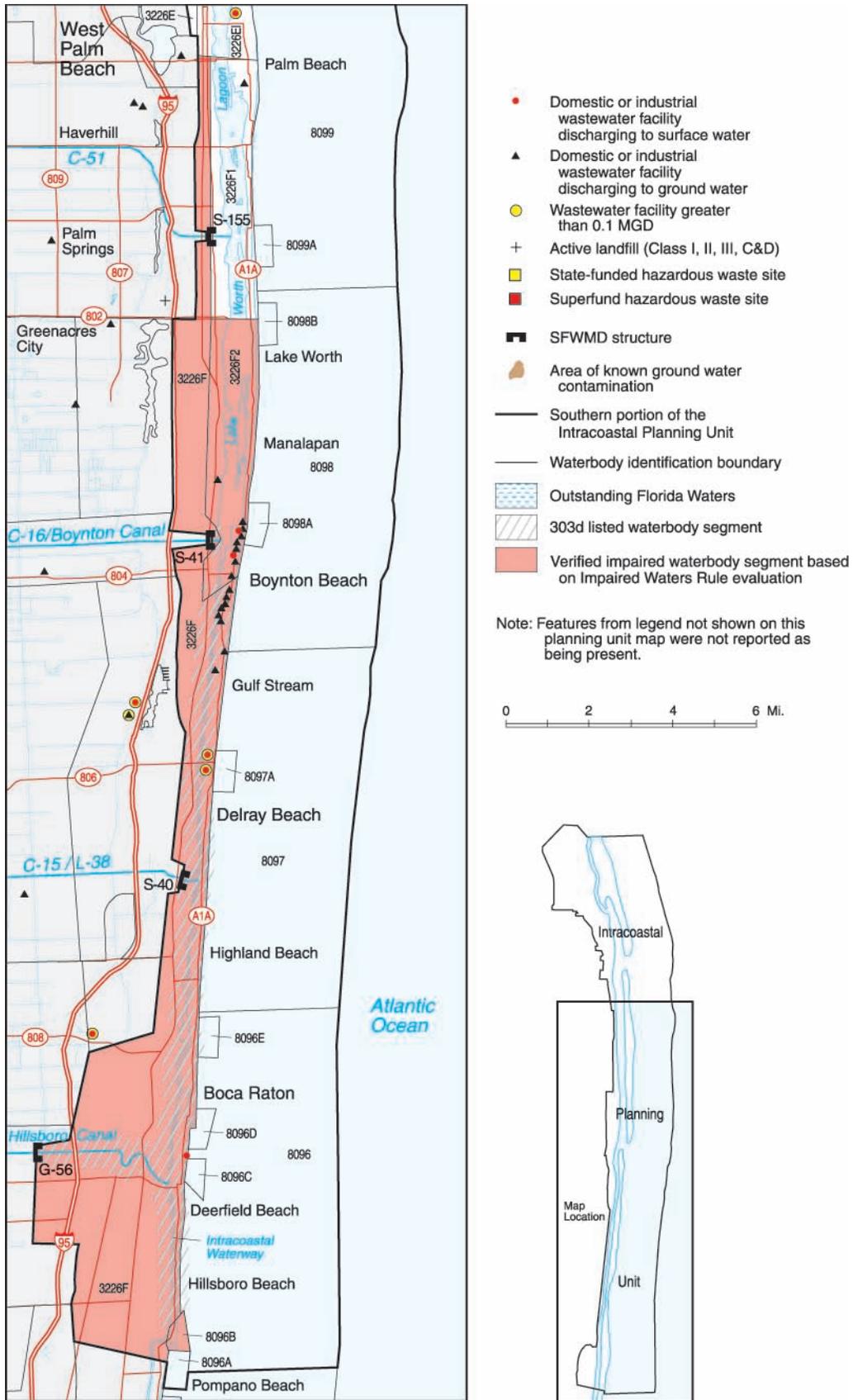


Figure 3.9: Composite Map of the Southern Portion of the Intracoastal Planning Unit, Including the 1998 303(d) List, Planning List and Verified List Waters, and Potential Pollution Sources

Table 3.11: Integrated Water Quality Assessment Summary for the Intracoastal Planning Unit

WBID	Waterbody Segment	Waterbody Type ¹	Class ²	1998 303(d) List Parameters of Concern	Data Evaluation under the Impaired Surface Waters Rule Criteria ³			
					Potentially Impaired (Cat. 3c) for Listed Parameters ⁴	Verified Impaired (Cat. 4a, 4b, 4c, or 5) for Listed Parameters ⁵	Not Impaired (Cat. 2) for Listed Parameters	EPA's 305(b)/303(d) Integrated Report Assessment Category for WBID ⁶
3226E	ICWW Ab Royal Palm Bridge	Estuary	IIIM	DO, Coliforms	N/A	N/A	Nutrients, DO, Coliforms, Turbidity	2
3226E1	Lake Worth Lagoon North Segment	Estuary	IIIM		Lead	N/A	Nutrients, Copper, DO, Coliforms, Turbidity	3c
3226EA	Peanut Island	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
3226EB	Phil Foster Park	Coastal	IIIM		N/A	Mercury in Fish	N/A	5
3226F	ICWW Ab Pompano	Estuary	IIIM	Nutrients (Chlorophyll a), DO, Coliforms	N/A	Copper	Nutrients (Chlorophyll a), DO, Coliforms, Historical Chlorophyll, Turbidity	5
3226F1	Lake Worth Lagoon Central Segment	Estuary	IIIM		N/A	Biology, Sediments	Nutrients (Chlorophyll a), Copper, DO, Historical Chlorophyll, Turbidity	4c
3226F2	Lake Worth Lagoon South Segment	Estuary	IIIM		N/A	Biology	Nutrients, Copper, DO, Turbidity	4c
8096	Intracoastal Ocean 1	Coastal	IIIM		N/A	N/A	N/A	3b
8096A	NE 16th Street Pompano	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
8096B	Hillsboro Inlet Park	Coastal	IIIM		N/A	Historical Chlorophyll	Nutrients, DO, Coliform, Turbidity	5
8096C	Deerfield Beach Pier	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
8096D	South Inlet Park	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
8096E	Red Reef Park	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
8097	Intracoastal 2	Coastal	IIIM		N/A	Mercury in Fish	N/A	5
8097A	Sandoway Park	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
8098	Intracoastal 3	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
8098A	Ocean Inlet Park	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
8098B	Lake Worth Beach	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
8099A	Phipps Park	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2

Table 3.11 (continued)

WBID	Waterbody Segment	Waterbody Type ¹	Waterbody Class ²	1998 303(d) List Parameters of Concern	Data Evaluation under the Impaired Surface Waters Rule Criteria ³			
					Potentially Impaired (Cat. 3c) for Listed Parameters ⁴	Verified Impaired (Cat. 4a, 4b, 4c, or 5) for Listed Parameters ⁵	Not Impaired (Cat. 2) for Listed Parameters	EPA's 305(b)/303(d) Integrated Report Assessment Category for WBID ⁶
8100A	Riviera Municipal Beach	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
8100B	Ocean Reef Park	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2
8100C	Loggerhead Park	Coastal	IIIM		N/A	N/A	Fecal Coliforms	2

Notes:

¹The designation “stream” includes canals, rivers, and sloughs. The designation “lake” includes some marshes.

²The state’s surface water classifications are as follows:

Class I: Potable water supplies

Class II: Shellfish propagation or harvesting

Class III: Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife

Class IV: Agricultural water supplies

Class V: Navigation, utility, and industrial use (there are no state waters currently in this class)

³The EPA’s 305(b)/303(d) Integrated Report categories are as follows:

1—Attains all designated uses;

2—Attains some designated uses;

3a—No data and information are available to determine if any designated use is attained;

3b—Some data and information are available, but they are insufficient for determining if any designated use is attained;

3c—Meets Planning List criteria and is potentially impaired for one or more designated uses;

3d—Meets Verified List criteria and is potentially impaired for one or more designated uses;

4a—Impaired for one or more designated uses and the TMDL is complete;

4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future;

4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant; and

5—Water quality standards are not attained and a TMDL is required.

⁴Parameters in **bold** meet the Verified List evaluation criteria, Section 62-303.400, F.A.C.

⁵Parameters in *italics* are in Category 4 (a, b, or c) waters that do not require TMDL development.

⁶The assessment categories listed in this column represent the status of each WBID as a whole, **based on multiple parameters**. The hierarchy for assigning these categories is Category 5, then 4, then 3c, then 2, and then 3b, i.e., each WBID is assigned a category based on the highest category assigned to an individual parameter. For example, if WBID 9999 has total coliforms as Category 5, fecal coliforms as Category 3c, and coliforms-shellfish as Category 2, the single assessment call for the WBID is Category 5.

DO = Dissolved oxygen

M = Marine

Figures 3.8 and 3.9 show the locations of permitted wastewater treatment facilities, landfills, and hazardous waste sites in the planning unit.

Appendix E lists the basin’s domestic and industrial surface discharge facilities, along with their permitted flows, by planning unit. It also lists landfills or solid waste facilities, by planning unit.

Nonpoint Sources. More than 74 percent of the planning unit is in the urban/built-up land use category (according to the 1995 SFWMD land use coverage). Predominant land uses in this category include medium- and high-density residential (approximately 31 and 13 percent, respectively), commercial (16 percent), and recreational (7 percent, including golf courses, parks, and athletic fields). Transportation, including major roadways, accounts for approximately 6 percent of the total land cover.

All of these human land uses can be associated with nonpoint discharges of pollutants and eroded sediments. The most predominant natural land cover is upland forest (approximately 13 percent), most of which is identified as pine flatwoods (approximately 6 percent).

Appendix F provides summary information on Level I land uses in the basin, by planning unit.

Ecological Summary

The Lake Worth Lagoon, one of Florida's most valuable ecological resources, is over 20 miles in length, a half mile wide, and averages 8 feet in depth. By 1877, the first stable navigable inlet was in place and by 1910 the Intracoastal Waterway extended into Biscayne Bay. Early ecological problems due to poor circulation were noticeable by 1917 resulting in the construction of the South Lake Worth Inlet to improve flushing. The completion of the West Palm Beach Canal in 1925 brought freshwater inflows from the west discharging pollutants from urban runoff and raw sewage. By 1975, 87 percent of the mangrove wetlands were filled and 65 percent of the shoreline bulkheaded.

Combined sampling efforts by the Department, Palm Beach County Environmental Resource Management, LakeWatch, and the U.S. Geological Survey have shown that nutrient conditions have been improving, with TP and ammonia decreasing, most likely due to the removal of several direct wastewater dischargers. There has been significant concern about decreasing pH levels in the lagoon, which would suggest the quantity of fresh water the lagoon is receiving has been increasing (surface freshwater typically has a lower pH than marine saltwater). Recent water quality sampling data from the IWR database suggests that this trend is improving and pH values are increasing. DO is not an impairment in the lagoon without any long-term decreasing trends and is well above state standards.

Sediments from varying locations within the lagoon were found to contain elevated concentrations of lead (from leaded gas), zinc, copper, cadmium, and chromium (mostly from runoff, especially from paved roads), derivatives of petroleum (mostly from diesel fuel), and PCBs. Sediments are listed as an impairment by the Department, but will not be slated for TMDL development.

Sea grass beds provide habitat for a myriad of animals, including the juveniles of many commercially and recreationally valuable species. Like all plants, sea grasses require adequate sunlight, and this is a function of water clarity. Clearer water allows plants to grow in deeper water. A 1940 inventory found 4,271 acres of sea grass within the lagoon and 35 years later, a 1975 survey found a mere 161 acres. However, in 1990, some 2,010 acres were documented, indicating that water quality and clarity had improved.

Fish populations in the lagoon have remained steady with over 195 different species collected. Macroinvertebrates (small animals that live in bottom sediments) were sampled in a 1989 survey. The survey indicated that the lagoon species diversity (a measure of the numbers and types of animals) was comparable to other moderately polluted estuaries (Rudolph, 1989).



Ecosummary for the Lake Worth Lagoon

The Department's Lake Worth Lagoon Ecosummary is available at <http://www.dep.state.fl.us/southeast/ecosum/ecosummain.htm>.



Water Quality Improvement Plans and Projects

The Lake Worth Lagoon Management Plan (PBC/DERM and Department, 1998) includes projects being implemented by local municipalities, PBC/DERM, SFWMD, the Department, and other partners to restore the lagoon and improve water quality. Much of the completed and ongoing LWL project work has focused on the diversion and treatment of stormwater; restoration of shorelines; restoration and creation of habitat; and scientific research to understand better the ecological health (as measured in sea grass studies), hydrodynamic regime, and salinity distribution in the lagoon. CERP program elements under the North Palm Beach County–Part 1 Project and the Everglades Construction Project, STA-1 East will reduce freshwater inflows into the LWL and AICW, and with them their load of pollutants and sediment. Combined, the stormwater projects and restoration efforts directly affecting the lagoon, the reductions in freshwater discharges, and the reductions in pollutant loads transported by canals are expected to result in significant improvements in the LWL.

Waters will not be placed on the Verified List if the Department receives reasonable assurance that existing or proposed projects and/or programs are expected to result in the attainment of water quality standards or consistently improve water quality over time. Chapter 4 and **Appendix B** contain additional information on the requirements for reasonable assurance.

For this planning unit, no management plans or projects complying with the Department’s guidance for reasonable assurance have been provided for the list of impaired waters.

Chapter 4: The Verified List of Impaired Waters

Public Participation

The Florida Department of Environmental Protection (Department) has worked with a variety of stakeholders and held public meetings on developing and adopting the Verified Lists of impaired waters for the five Group 3 basins across the state. **Table 4.1** lists the statewide schedule for the development and adoption of the Group 3 Verified Lists, including the public meetings. The schedule for the Lake Worth Lagoon–Palm Beach Coast Basin is highlighted in boldface type. **Table 4.2** provides elements of what is needed for waterbodies to meet reasonable assurance requirements. Reasonable assurance provides documentation that the pollution control measure will be implemented and that it will be effective in attaining standards and restoring the designated use(s) of the waterbody in the future. **Appendix G** contains documentation provided during the public comment period.

Basin-specific draft Verified Lists of waters that met the requirements of the Impaired Surface Waters Rule (IWR) were made available to the public on June 23, 2004. The lists were placed on the Department's Total Maximum Daily Load (TMDL) Web site, at <http://www.dep.state.fl.us/water/tmdl>, and were also sent on request to interested parties by mail or via e-mail.

Citizens were given the opportunity to comment on the draft lists in person and/or in writing. A total of 6 public meetings were held across the state to encourage public participation on a basin-by-basin basis. The Department also accepted written comments for 45 days beginning June 23, 2004, and ending August 9, 2004.

Following the public meetings for the Group 3 basins, which took place between June 30, 2004, and July 21, 2004, revised draft lists were made available to the public on September 17, 2004. The public had the opportunity to comment on these revised lists either in writing and/or at a final public meeting in Tallahassee. Comments received by October 29, 2004, were considered in preparing the revised draft lists. Comments on any of the lists were accepted and considered throughout the full comment period.

The final basin-specific Verified Lists developed through the public participation process were adopted by Secretarial Order in mid-summer 2005, and were submitted to the U.S. Environmental Protection Agency (EPA) in early fall 2005 as the state's current 303(d) list of impaired waters.



Table 4.1: Schedule for Development and Adoption of the Group 3 Verified Lists

Date	Scheduled Activity
June 23, 2004	Publication of Draft Verified Lists for the Group 3 Basins and Beginning of Public Comment Period
June 28, 2004	Public Meeting at Sarasota on the Sarasota Bay–Peace River–Myakka River Basin
June 30, 2004	Public Meeting at Palm Bay on the Upper St. Johns River Basin
July 1, 2004	Public Meeting at Ft. Myers on the Caloosahatchee River Basin
July 20, 2004	Public Meeting at West Palm Beach on the Lake Worth Lagoon–Palm Beach Coast Basin
July 21, 2004	Public Meeting at Niceville on the Choctawhatchee–St. Andrew Bay Basin
July 21, 2004	Public Meeting at Panama City on the Choctawhatchee–St. Andrew Bay Basin
October 1, 2004	Public Meeting in Tallahassee on Revised Draft Verified Lists for All Basins, and Public Comments and Input from Prior Public Meetings
October 29, 2004	Final Deadline for Receiving Public Comments
Mid-Summer 2005	Adoption of Verified List by Secretarial Order
Early Fall 2005	Submittal to EPA as State’s 303(d) List of Impaired Waters

Identification of Impaired Waters

As discussed in Chapter 2, waters on the Verified and Planning Lists must meet specific thresholds and data sufficiency and data quality requirements in the IWR (Rule 62-303, Florida Administrative Code [F.A.C.]). **Appendix A** describes the legislative and regulatory background for the development of the Planning and Verified Lists. **Appendix C** contains a methodology that describes the criteria and thresholds required for both lists under the IWR.

Any waters that do not have sufficient data to be analyzed in accordance with the requirements of the IWR will remain on the 1998 303(d) list of impaired waters maintained by the EPA. These waters are not delisted, and they will be sampled during the next phases of the watershed management cycle so that their impairment status can be verified.

The Verified List of Impaired Waters

Table 4.3 contains the Verified List of impaired waters for the Lake Worth Lagoon–Palm Beach Coast Basin, based on the water quality assessment performed for the October 2002 update to the 303(d) list. **Figure 4.1** shows waters on the Verified List for the entire basin as of March 2, 2005, and the projected year for TMDL development. For presentation purposes, the entire watershed for the listed water is highlighted. However, only the main waterbody in the assessment unit has been assessed, and other waters in the watershed may not be impaired.

Since the October 2002 update of the 303(d) list, further data became available for assessment of the basin, and these data were used to update the listing status of waters. **Table D.1** in Appendix D contains the listing status of all assessed waters in the basin as of March 2, 2005. An order

Table 4.2: Elements of Reasonable Assurance

Descriptive
• 303(d) listed waterbody
• Water quality standards being violated or other criteria not met
• Pollutant(s) of concern
• Designated use classification
• Length (mi) or area (acres) of impairment or potential impairment
• Watershed/eight-digit cataloging unit code
• EPA Reach File Number
• Description of waterbody and watershed location
• Suspected or documented source(s) of impairment
Management Strategy
• Responsible entity
• Participating entities (government, agency, private, others)
• Summary of management strategy
• Supporting document(s)
• Pollutant(s) reduction goals/targets
• Assurance of participation (such as written agreements)
• Strategy for future growth and new sources
• Funding sources
• Implementation schedule
• Enforcement program if management strategy is not voluntary
Monitoring and Reporting Results
• Water quality monitoring program design and brief description
• Quality assurance/quality control elements
• Supporting document(s)
• Monitoring of implementation
• Reporting of monitoring and implementation results
• Expected response (time frame and degree of improvement)
• Responsible entity for reporting
• Frequency of reporting results
• Evaluating progress towards goals (water quality and implementation)
Corrective Actions/Strategy (if water quality does not improve after implementation)
• Description of strategy
• Supporting document(s)



Table 4.3: The Verified List of Impaired Waters

Planning Unit	WBID	Waterbody Segment	Waterbody Type	1998 303(d) Parameters of Concern	Parameters Identified Using the IWR	Current Status ¹	EPA's Integrated Report Category ²	Priority for TMDL Development ³	Projected Year for TMDL Development ³	Comments (# Exceedances/# Samples)
Intracoastal	3226F	ICWW Ab Pompano	Estuary		Copper	Impaired	5	Medium	2010	Planning period: 2/2 Insufficient data; verified period: 17/60 Impaired. Verified period data has been updated from IWR Run 20.0.
Intracoastal	3226F2	Lake Worth Lagoon South Segment	Estuary		Copper	Impaired	5	Medium	2010	Planning period: 5/6 Insufficient data; verified period: 6/28 Impaired. Verified period data has been updated from IWR Run 20.0.
L-8	3233	L-8	Stream	DO	DO	Impaired	5	High	2005	Planning period: 88/165 Potentially impaired; verified period: 62/136 Impaired. Linked to elevated TN level. TN above the screening level for both the planning period and verified period (TN during planning period median 1.826 mg/L and TN during verified period median 1.951 mg/L).
C-17	3242A	PB Stations/D Canals	Stream		DO	Impaired	5	Medium	2010	Planning period: 65/137 Potentially impaired; verified period: 37/99 Impaired. Linked to nutrients, co-limitation of nitrogen and phosphorus, TN during verified period = 1.016 mg/L, TP during verified period = 0.053 mg/L.
C-51	3245	C-51	Stream	DO	DO	Impaired	5	Medium	2010	Planning period: 455/757 Potentially impaired; verified period: 393/620 Impaired. Linked to elevated TN level. TN above the screening level for both the planning period and verified period (TN during planning period median 1.706 mg/L and TN during verified period median 1.89 mg/L).

Table 4.3 (continued)

Planning Unit	WBID	Waterbody Segment	Waterbody Type	1998 303(d) Parameters of Concern	Parameters Identified Using the IWR	Current Status ¹	EPA's Integrated Report Category ²	Priority for TMDL Development ³	Projected Year for TMDL Development ³	Comments (# Exceedances/# Samples)
C-51	3245B	Lake Clarke	Lake		DO	Impaired	5	Medium	2010	Planning period: 57/113 Potentially impaired; verified period: 40/86 Impaired. No BOD or Biological data available. Linked to nutrients, co-limiting of nitrogen and phosphorous. During planning period TN median = 1.336 mg/L, TP median = 0.079 mg/L, during verified period TN median = 1.379 mg/L, TP median = 0.081 mg/L.
Intracoastal	8096B	Hillsboro Inlet Park	Coastal		Nutrients (Historical Chlorophyll)	Impaired	5	Medium	2010	Planning period: Potentially impaired; verified period: Impaired. For the historical listing (1996-2000), annual average chlorophyll a) values in the verified period exceeded the minimum historical annual average value of 1.76 µg/L by more than 50% in 2000 (3.55 µg/L), 1999 (2.98 µg/L). Co-limiting of nitrogen and phosphorus based upon TN/TP ratios [TN median = 0.6968 mg/L and TP median = 0.058 mg/L. Planning period median TN/TP ratio = 19.086 (33 values), verified period median TN/TP ratio = 10.471 (15 values).
Southeast Coast	8998	Florida Atlantic Coast	Coastal		Mercury in Fish	Impaired	5	Low	2011	Data verified to be within the last 7.5 years. Confirmed recent data for coastal fish advisory for King Mackerel, Shark, Spotted Seatrout, Little Tunny, Cobia, Greater Amberjack, Bluefish, Crevalle Jack. WBIDs include: 3226EA, 3226EB, 3226E1, 8096, 8096A, 8096B, 8096C, 8096D, 8096E, 8097, 8097A, 8098, 8098A, 8098B, 8099, 8099A, 8100, 8100A, 8100B, 8100C.

Table 4.3 (continued)

Planning Unit	WBID	Waterbody Segment	Waterbody Type	1998 303(d) Parameters of Concern	Parameters Identified Using the IWR	Current Status ¹	EPA's Integrated Report Category ²	Priority for TMDL Development ³	Projected Year for TMDL Development ³	Comments (# Exceedances/# Samples)
C-17	3242A	PB Stations/D Canals	Stream		Nutrients (Chlorophyll <i>a</i>)	Impaired	5	Medium	2010	Planning period: Insufficient data; verified period: Impaired, with 1 annual mean chlorophyll <i>a</i> value above 20 µg/L in 2002, chlorophyll <i>a</i> mean = 24.571 µg/L. Co-limiting of nitrogen and phosphorus based upon TN/TP ratios [TN median = 1.106 mg/L and TP median = 0.053 mg/L. Planning period median TN/TP ratio = 18.603 (200 values), verified period median TN/TP ratio = 18.603 (114 values).
C-15	3262D	E-3 Canal	Stream	DO	DO	Impaired	5	Medium	2010	Planning period: 16/59 Planning list; verified period: 11/31 Impaired. Verified period data taken from IWR Run 20.0.
Hillsboro Canal	3264D	E-4 Canal	Stream	Nutrients	Nutrients (Chlorophyll <i>a</i>)	Impaired	5	Medium	2010	Planning period: Insufficient data; verified period: Impaired, with 1 annual mean chlorophyll <i>a</i> value above 20 µg/L in 2002, chlorophyll <i>a</i> mean = 27.825 µg/L. Co-limiting of nitrogen and phosphorus based upon TN/TP ratios [TN median = 0.95 mg/L and TP median = 0.1595 mg/L., verified period median TN/TP ratio = 5.87 (10 observations).
C-51	3245B	Lake Clarke	Lake		Nutrients (TSI)	Impaired	5	Medium	2010	Planning period: No data; verified period: Impaired. TSI mean of 62.45 during verified period, TN = 1.336 mg/L (190 values) and TP = 0.079 mg/L (191 values) in planning period; TN = 1.3785 mg/L (106 values) and TP 0.081 mg/L (106 values) in verified period.

Table 4.3 (continued)

Planning Unit	WBID	Waterbody Segment	Waterbody Type	1998 303(d) Parameters of Concern	Parameters Identified Using the IWR	Current Status ¹	EPA's Integrated Report Category ²	Priority for TMDL Development ³	Projected Year for TMDL Development ³	Comments (# Exceedances/# Samples)
C-15	3262A	Lake Ida	Lake		Nutrients (TSI)	Impaired	5	Medium	2010	Planning period: No data; verified period: Impaired. Limiting nutrient is phosphorus based on a TN/TP median of 11.43 (10 values) during the planning period and a median of 10.95 (17 values) during the verified period. Verified period: 1 TSI annual mean exceeded 60 (2002). 17 TN values, median 1.14 mg/L. 17 TP values, median 0.114 mg/L.

Notes:

¹ Impaired under the IWR Methodology

² The EPA's 305(b)/303(d) Integrated Report categories are as follows:

- 1—Attains all designated uses;
- 2—Attains some designated uses;
- 3a—No data and information are available to determine if any designated use is attained;
- 3b—Some data and information are available, but they are insufficient for determining if any designated use is attained;
- 3c—Meets Planning List criteria and is potentially impaired for one or more designated uses;
- 3d—Enough data and information are available to determine that one or more designated uses is not attained;
- 4a—Impaired for one or more designated uses and the TMDL is complete;
- 4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future;
- 4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant; and
- 5—Water quality standards are not attained and a TMDL is required.

³ Where a parameter was 1998 303(d) listed, the priority shown for that parameter in the 1998 303(d) list was retained (high or low). Where a parameter was only identified as impaired under the Impaired Surface Waters Rule, priorities of high, medium, or low were used. Dates and priorities in parentheses indicate that a TMDL is scheduled under the terms of the consent decree between EPA and Earthjustice, but insufficient data are available to assess the water according to the specifications of the IWR.

- BOD = Biological oxygen demand
- DO = Dissolved oxygen
- TN = Total nutrients
- TP = Total phosphorus
- TSI = Trophic State Index

containing the initial Verified List of Impaired Group 3 Waters (Verified List) was signed by the Department's Secretary in mid-Summer 2005. Errors and omissions to the list were corrected in Spring 2005.

Pollutants Causing Impairments

Of the 52 water segments in the Lake Worth Lagoon–Palm Beach Coast Basin, 9 waters are impaired for at least 1 parameter, and a TMDL is required for these waters. There are a total of 6 parameter listings for impairment following the methodology in **Appendix C**. The C-51 Planning Unit has the largest number of impaired parameter listings with 4, followed by the Intracoastal Planning Unit with 3 listings.

The most common parameter exhibiting impairment throughout the Lake Worth Lagoon–Palm Beach Coast Basin is DO with 4 listings,

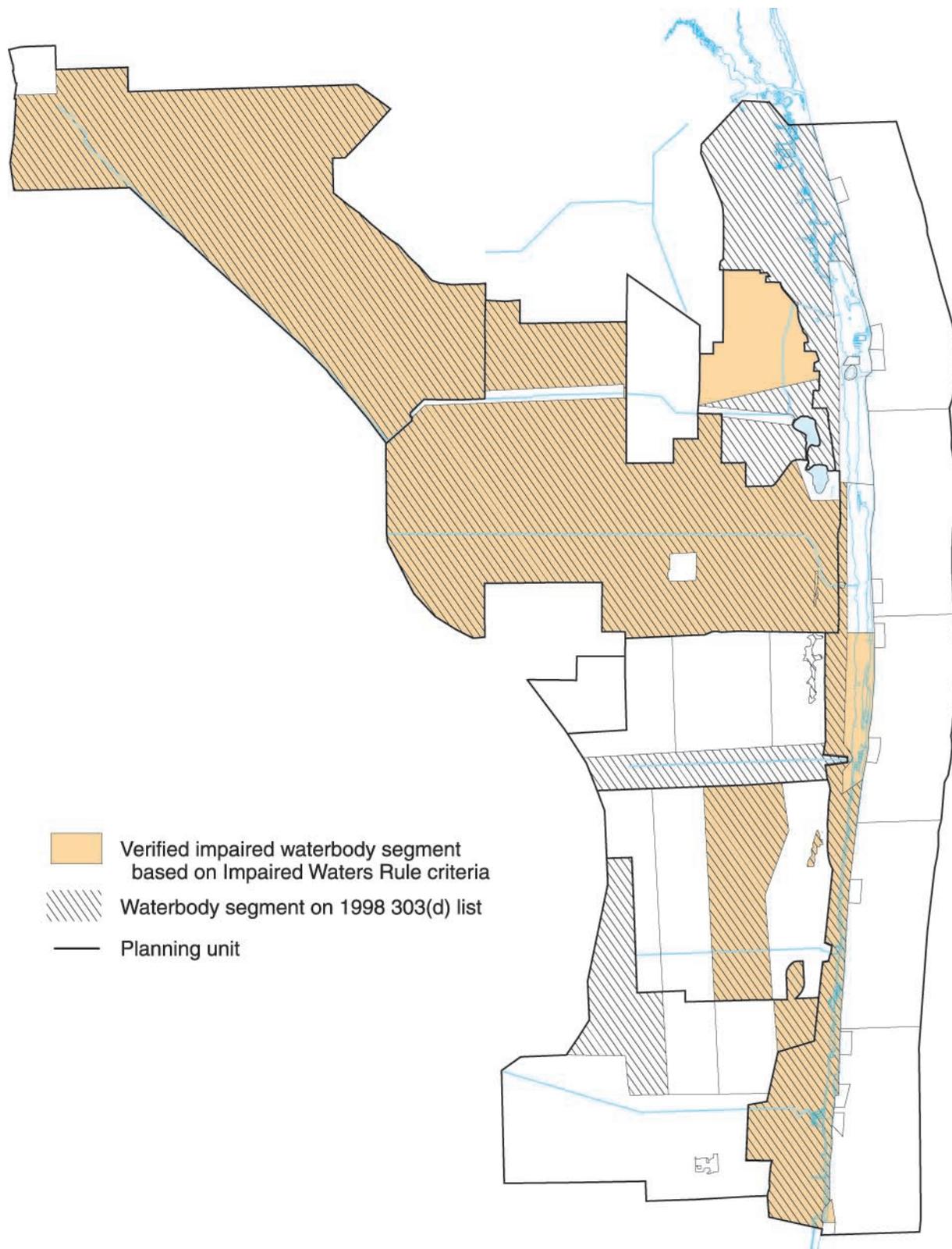


Figure 4.1: Waters on the Verified List, with Projected Year for TMDL Development

followed by nutrients (chlorophyll *a*) with 3 listings, and nutrients (Trophic State Index [TSI]) with 2 listings. There are 20 segments listed due to fish consumption advisories for mercury; this includes Lake Ida (3262A), Lake Osborne (3256A), Lake Worth Lagoon North (3226E1), Peanut Island (3226EA), Phil Foster Park (3226EB), and all Intracoastal WBIDs for largemouth bass, bowfin, and gar. The state has also issued limited consumption advisories for largemouth bass, bowfin, and gar in Shark River Slough, and Everglades Water Conservation Areas 2 and 3, which applies to fish species having mercury levels of 0.5 to 1.5 parts per million.

As required by the IWR, the Department must identify the pollutants causing or contributing to DO exceedances in order to place DO on the Verified List. If a water segment is on the Verified List for both DO and nutrients, nutrients is identified as a pollutant contributing to DO exceedances. The Department also applies the following analysis to identify the pollutant(s) contributing to DO exceedances:

1. The water segment median values for biological oxygen demand (BOD), total nitrogen (TN), and total phosphorus (TP) are determined for the verified period (i.e., January 1, 1997, to June 30, 2004).
2. The median values are then compared with the screening levels for the appropriate waterbody type. The screening levels represent the 70th percentile value of data collected from streams, lakes, or estuaries (Table 4.4).
3. If a water segment median value exceeds the screening level, the parameter is identified as a pollutant contributing to the exceedances.



Table 4.4: Screening Level Values (70th Percentile) Based on STORET Data from 1970 to 1987

	BOD (mg/L)	TN (mg/L)	TP (mg/L)
Streams	2.0	1.6	0.22
Lakes	2.9	1.7	0.11
Estuaries	2.1	1.0	0.19

Source: Friedemann and Hand, 1989.

Table 4.5 provides the median values for water segments where there is a sufficient number of DO exceedances to place the water on the Verified List. If a water has a sufficient number of exceedances for placement on the Verified List but the median values are less than the screening levels, the DO for that segment is included on the Planning List.

Additionally, to place a water segment on the Verified List for nutrients, the Department must identify the limiting nutrient or nutrients on the Verified List, as required by the IWR. The following method is used to identify the limiting nutrient(s) in streams and lakes:

Table 4.5: Lake Worth Lagoon–Palm Beach Coast Basin Median Values for the Verified Period

WBID	Waterbody Segment	Waterbody Type	BOD 5 Day (mg/L)	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)
3233	L-8	Stream	No Data	1.891 ^a	0.132
3242A	PB Stations/SD Canals	Stream	No Data	1.0175	0.053
3245	C-51	Stream	No Data	1.886 ^a	0.079
3245B	Lake Clarke	Lake	No Data	1.245	0.0795
3262A	Lake Ida	Lake	No Data	1.096	0.1065
3264D	E-4 Canal	Stream	No Data	0.951	0.1595

^aValue is higher than the screening level value.

- The ratios of TN to TP are calculated for each paired value of TN and TP (per sampling event) collected during the verified period.
- The individual ratios over the entire verified period are evaluated to determine the limiting nutrient(s). If all the sampling event ratios are less than 10, nitrogen is identified as the limiting nutrient, and if all the ratios are greater than 30, phosphorus is identified as the limiting nutrient. Both nitrogen and phosphorus are identified as limiting nutrients if the ratios are between 10 and 30.

Table 4.6 displays the nitrogen and phosphorus ratios for stream and lake segments potentially impaired by nutrients.

Adoption Process for the Verified List of Impaired Waters

The Verified List must be submitted in a specific format (Section 62-303.710, F.A.C.) before being approved by order of the Department’s Secretary. The list must specify the pollutant and concentration causing the impairment. If a waterbody segment is listed based on water quality criteria exceedances, then the list must provide the applicable criteria. However, if the listing is based on narrative or biological criteria, or impairment of other designated uses, and the water quality criteria are met, the Verified List is required to specify the concentration of the pollutant relative to the water quality criteria and explain why the numeric criterion is not adequate.

For waters with exceedances of the DO criteria, the Department must identify the pollutants causing or contributing to the exceedances and list both the pollutant and DO in the Verified List.

For waters impaired by nutrients, the Department is required to identify whether nitrogen or phosphorus, or both, are the limiting nutrients, and specify the limiting nutrient(s) in the Verified List.

The Verified List must also include the priority and schedule for TMDL development established for a waterbody segment and note any waters that are being removed from the current Planning List. In future watershed management cycles, the list must also note waters that are being removed from any previous Verified List for the basin.

In the Group 3 basins, which include the Lake Worth Lagoon–Palm Beach Coast Basin, the adoption of the Verified Lists took place in June 2005 by Secretarial Order.

Table 4.6: Lake Worth Lagoon–Palm Beach Coast Basin Nitrogen to Phosphorus Ratios for the Verified Period

WBID	Waterbody Segment	Waterbody Type	Total Nitrogen Median (mg/L)	Total Phosphorus Median (mg/L)	Nitrogen to Phosphorus Ratio Median	Nitrogen to Phosphorus Ratio Minimum	Nitrogen to Phosphorus Ratio Maximum
3226E	ICWW Ab Royal Palm Brg	Estuary	1.032	0.036	28.6	12.297297297	100.5
3226E1	Lake Worth Lagoon North Seg	Estuary	0.353	0.053	6.0169191919	0.23148148148	43.8125
3226EA	Peanut Island	Coastal	N/A	N/A	N/A	N/A	N/A
3226EB	Phil Foster Park	Coastal	N/A	N/A	N/A	N/A	N/A
3226F	ICWW Ab Pompano	Estuary	0.649	0.071	8.4262295082	0.30894308943	37.20754717
3226F1	Lake Worth Lagoon Central Seg	Estuary	0.572	0.076	8.1475409836	0.6875	22.727272727
3226F2	Lake Worth Lagoon South Seg	Estuary	0.487	0.061	8.6721311475	1.2038834951	19
3231	Basin 8	Stream	N/A	N/A	N/A	N/A	N/A
3233	L-8	Stream	1.891	0.132	15.506578947	5.2337398374	73.058823529
3242	C-17 Segment	Stream	1.355	0.121	11.1933333333	6.8074074074	15.495575221
3242A	PB Stations/D Canals	Stream	1.0175	0.053	18.603205128	6.9117647059	43.36
3242B	M Canal East	Stream	1.161	0.0445	22.157894737	17.826086957	31.03125
3243	W.P.B. Water	Stream	N/A	N/A	N/A	N/A	N/A
3245	C-51	Stream	1.886	0.079	24.820355951	1.5142857143	1443.0526316
3245A	Okeehetee Park	Lake	1.082	0.016	68.666666667	64.5	72.8333333333
3245B	Lake Clarke	Lake	1.245	0.0795	15.604166667	1.3466257669	94.962962963
3245C1	Lake Mangonia	Lake	0.898	0.0285	31.044560185	22.75462963	47.282051282
3245C2	Clear Lake	Lake	0.994	0.02	65	25.487179487	223.5
3245C3	Clear Lake Drain	Lake	N/A	N/A	N/A	N/A	N/A
3245C4	Pine Lake	Lake	0.942	0.06	17.127272727	4.5541401274	49.088495575
3245D	M Canal West	Stream	N/A	N/A	N/A	N/A	N/A
3256	C-16	Stream	0.404	0.026	15.538461538	15.538461538	15.538461538
3256A	Lake Osborne	Lake	1.191	0.0775	15.99537037	5.2664092664	87.814814815
3256B	Boyton Canal	Stream	1.2305	0.107	11.150684932	3.8455598456	32.585714286
3256C	L-14 Canal	Stream	N/A	N/A	N/A	N/A	N/A
3256D	Canal E-4	Stream	1.2305	0.11	11.314166667	9.9083333333	12.72
3257	C-16N	Stream	0.954	0.014	68.142857143	68.142857143	68.142857143
3262	E-4 Canal	Stream	1.245	0.1545	6.7615604615	3.6868932039	1170.8897638
3262A	Lake Ida	Lake	1.096	0.1065	10.694214876	0.78405122235	59.421052632
3262B	E-1 Canal	Stream	1.448	0.16	9.05	9.05	9.05
3262C	E-2 Canal	Stream	1.538	0.17	9.0470588235	9.0470588235	9.0470588235
3262D	E-3 Canal	Stream	1.444	0.142	10.044303797	1.2368421053	220
3264	Hillsboro Canal	Stream	1.526	0.0689999	21.861016177	0.26580188679	338.25
3264A	E-1 Canal	Stream	1.033	0.189	5.9571895425	4.3935185185	63.6
3264B	E-2 Canal	Stream	N/A	N/A	N/A	N/A	N/A
3264C	E-3 Canal	Stream	N/A	N/A	N/A	N/A	N/A

Table 4.6 (continued)

WBID	Waterbody Segment	Waterbody Type	Total Nitrogen Median (mg/L)	Total Phosphorus Median (mg/L)	Nitrogen to Phosphorus Ratio Median	Nitrogen to Phosphorus Ratio Minimum	Nitrogen to Phosphorus Ratio Maximum
3264D	E-4 Canal	Stream	0.951	0.1595	5.8706151414	1.572972973	8.4923076923
3264X	Lakeview Lakes	Lake	0.828	0.026	31.846153846	31.615384615	34.538461538
8096	Intracoastal Ocean 1	Coastal	1.23	0.143	8.5611274992	4.1592920354	12.962962963
8096A	NE 16th St Pompano	Coastal	N/A	N/A	N/A	N/A	N/A
8096B	Hillsboro Inlet Park	Coastal	0.665	0.051	11.2222222222	5.1774193548	37
8096C	Deerfield Beach Pier	Coastal	N/A	N/A	N/A	N/A	N/A
8096D	South Inlet Park	Coastal	N/A	N/A	N/A	N/A	N/A
8096E	Red Reef Park	Coastal	N/A	N/A	N/A	N/A	N/A
8097	Intracoastal Ocean 2	Coastal	N/A	N/A	N/A	N/A	N/A
8097A	Sandoway Park	Coastal	N/A	N/A	N/A	N/A	N/A
8098	Intracoastal Ocean 3	Coastal	N/A	N/A	N/A	N/A	N/A
8098A	Ocean Inlet Park	Coastal	N/A	N/A	N/A	N/A	N/A
8098B	Lake Worth Beach	Coastal	N/A	N/A	N/A	N/A	N/A
8099	Intracoastal Ocean 4	Coastal	N/A	N/A	N/A	N/A	N/A
8099A	Phipps Park	Coastal	N/A	N/A	N/A	N/A	N/A
8100	Intracoastal Ocean 5	Coastal	N/A	N/A	N/A	N/A	N/A
8100A	Riviera Municipal Beach	Coastal	N/A	N/A	N/A	N/A	N/A
8100B	Ocean Reef Park	Coastal	N/A	N/A	N/A	N/A	N/A
8100C	Loggerhead Park	Coastal	N/A	N/A	N/A	N/A	N/A

Chapter 5: TMDL Development, Allocation, and Implementation

Prioritization of Listed Waters

In the Lake Worth Lagoon–Palm Beach Coast Basin, the L-8 Canal (waterbody identification number [WBID] 3233) is the only WBID considered a high-priority area for total maximum daily load (TMDL) development. The L-8 canal is scheduled for a dissolved oxygen (DO) TMDL with a due date of 2005. There are seven waterbody segments considered medium-priority areas with TMDL development due dates of 2010. There is one parameter (mercury in fish) that will be addressed by TMDLs on a statewide basis, which has been given a low priority and a TMDL due date of 2011.



Following the identification of impaired waters on the 303(d) list, the Florida Department of Environmental Protection (Department) determines priorities for developing TMDLs in Phase 3 of the watershed management cycle. When TMDLs are established, general allocations of pollutant load reductions are identified, at least to the level of point and nonpoint source categories.

Because TMDLs cannot be developed for all listed waters during a single watershed management cycle, waterbodies will be prioritized using the criteria in the Impaired Surface Waters Rule (IWR) (Section 62-303.500, Florida Administrative Code). The rule states that when establishing the TMDL development schedule for waters on the Verified List, the Department will prioritize impaired waterbody segments according to the severity of the impairment and each waterbody's designated uses, taking into account the most serious water quality problems, the most valuable and threatened resources, and the risk to human health and aquatic life.

Under the IWR, the determination of high-, low-, and medium-priority waters is based on the following criteria.

High-priority waters:

- Waterbody segments where the impairment poses a threat to potable water supplies or human health;
- Waterbody segments where the impairment is due to a pollutant regulated by the Clean Water Act and the pollutant has contributed to the decline or extirpation of a federally listed threatened or endangered species, as indicated in the Federal Register listing the species; or
- Waterbody segments verified as impaired that are included on the U.S. Environmental Protection Agency's (EPA) 1998 303(d) list as high priority.



Low-priority waters:

- Waterbody segments that are listed before 2010 because of fish consumption advisories for mercury (due to the current insufficient understanding of how mercury cycles in the environment);
- Canals, urban drainage ditches, and other artificial waterbody segments that are listed only due to exceedances of DO criteria; or
- Waterbody segments that were not on the Planning List but were identified as impaired during Phase 2 of the watershed management cycle and were included on the Verified List, unless the segment meets the second high-priority criterion.
- The EPA has also proposed assigning to this category the list of additional waterbody segments that the agency developed using its own evaluation methodology, until the Department has had the opportunity to investigate these waterbodies further.

All segments not designated high or low priority are medium priority, and are prioritized based on the following factors:

- The presence of Outstanding Florida Waters;
- The presence of waterbody segments that fail to meet more than one designated use, i.e., aquatic life, primary contact and recreation, fish and shellfish consumption, drinking water, and the protection of human health;
- The presence of waterbody segments that exceed an applicable water quality criterion or alternative threshold with a frequency of greater than 25 percent at a minimum confidence level of 90 percent;
- The presence of waterbody segments that exceed more than one applicable water quality criterion; or
- Administrative needs of the TMDL program, including meeting a TMDL development schedule agreed to with the EPA, basin priorities related to the Department's watershed management approach, and the number of administratively continued permits in the basin.

The Department is adhering to the TMDL schedule established in the Consent Decree between the EPA and Earthjustice for waters on the 1998 303(d) list that are also identified as impaired under the IWR.

Table 5.1 lists the high-priority waters for TMDL development in the Lake Worth Lagoon–Palm Beach Coast Basin. **Figure 5.1** shows the locations of these waters and their watersheds. These waters are hydrologically connected to the other waters identified in **Table 5.1** and are a part of the watersheds shown in **Figure 5.1**. Some of these associated waters have been identified as impaired through the assessment and are medium and low priorities for TMDL development. The Department will assess and incorporate the associated waters into the development of TMDLs for the high-priority waters if necessary.

Table 5.1: Priorities for TMDL Development in the Lake Worth Lagoon-Palm Beach Coast Basin

Planning Unit	WBID	Water Segment Name	Waterbody Type	Waterbody Class	1998 303(d) Parameters of Concern	New Parameters of Concern from IWR	Priority for TMDL Development	Projected Year for TMDL Development
L-8	3233	L-8	Stream	IIIF	DO	DO	High	2005
Intracoastal	3226F	ICWW Ab Pompano	Estuary	IIIM		Copper	Medium	2010
C-17	3242A	PB Stations/ D Canals	Stream	IIIF		DO	Medium	2010
C-51	3245	C-51	Stream	IIIF	DO	DO	Medium	2010
C-51	3245B	Lake Clarke	Lake	IIIF		DO	Medium	2010
Hillsboro Canal	3264	Hillsboro Canal	Stream	IIIF		DO	Medium	2010
Hillsboro Canal	3264	Hillsboro Canal	Stream	IIIF		Historical Chlorophyll	Medium	2010
Intracoastal	8096B	Hillsboro Inlet Park	Coastal	IIIM		Historical Chlorophyll	Medium	2010
C-17	3242A	PB Stations/ D Canals	Stream	IIIF		Nutrients (Chlorophyll a)	Medium	2010
C-51	3245	C-51	Stream	IIIF	Nutrients	Nutrients (Chlorophyll a)	Medium	2010
Hillsboro Canal	3264D	E-4 Canal	Stream	IIIF	Nutrients	Nutrients (Chlorophyll a)	Medium	2010
C-51	3245B	Lake Clarke	Lake	IIIF		Nutrients (TSI)	Medium	2010
C-15	3262A	Lake Ida	Lake	IIIF		Nutrients (TSI)	Medium	2010

DO = Dissolved oxygen F = Fresh water M = Marine TSI = Trophic State Index

Total Maximum Daily Load Development

During Phase 3 of the watershed management cycle, TMDLs will be developed for both point and nonpoint sources of pollutants in impaired waterbodies and will be adopted by rule at the end of this phase.

TMDL development involves determining the maximum amount of a given pollutant that a waterbody can assimilate and still meet the applicable numeric or narrative water quality criterion for the pollutant. In most cases, this “assimilative” capacity will be determined using computer modeling (both hydrodynamic and water quality models) that predicts the fate and transport of pollutants in the receiving waters. Modeling for the typical TMDL will include model setup, calibration, and verification, followed by a variety of model runs that determine the assimilative capacity of the water under worst-case conditions.

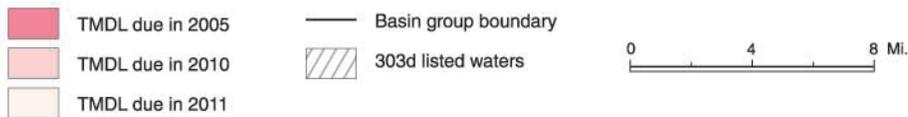
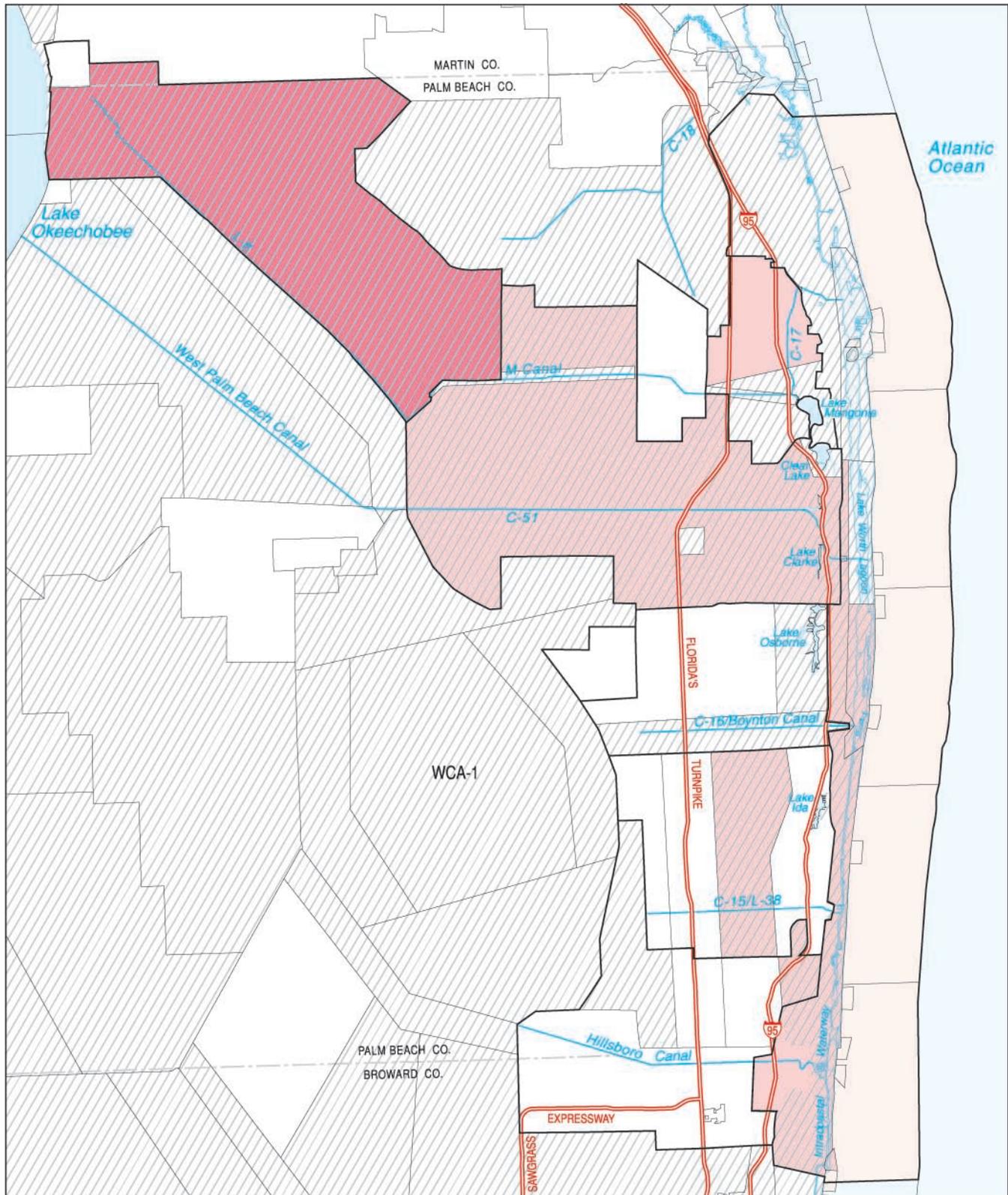


Figure 5.1: Lake Worth Lagoon–Palm Beach Coast Basin Priority TMDL Priority Watersheds for 2005

State law and federal regulations require that TMDLs include a margin of safety (MOS) that takes into account “any lack of knowledge concerning the relationship between effluent limitations and water quality.” The EPA has allowed states to establish either a specific MOS (typically some percentage of the assimilative capacity) or an implicit MOS based on conservative assumptions in the modeling. To date, the Department has elected to establish an implicit MOS based on predictive model runs that incorporate a variety of conservative assumptions (they examine worst-case ambient flow conditions and worst-case temperature, and assume that all permitted point sources discharge at their maximum permitted amount).

It is important to note that TMDLs will be developed only for the actual pollutants causing the impairment in the listed waterbody. These are called the “pollutants of concern.” In Florida, the most commonly listed pollutants of concern are nutrients, sediments, and coliforms. TMDLs will not be developed for impairments not due to pollutant discharges—for example, natural conditions, physical alterations such as dams and channelization, or changes in the flow of the water. In other cases, a waterbody may be deemed potentially impaired based on bioassessment data or toxicity data. In these cases, the Department must determine the actual pollutant causing the impairment before a TMDL can be developed.

Total Maximum Daily Load Allocation and Implementation

Initial Allocation of Pollutant Loadings

The Florida Watershed Restoration Act (FWRA) requires that a TMDL include the “establishment of reasonable and equitable allocations . . . among point and nonpoint sources . . .” The Department refers to this as the “initial allocation,” which is adopted by rule. For the purposes of allocating the required pollutant loadings, the term “point sources” primarily includes traditional sources such as domestic and industrial wastewater discharges.

Recent EPA guidance requires states to include as point sources those stormwater systems that are covered by a National Pollutant Discharge Elimination System (NPDES) stormwater permit. However, NPDES-permitted stormwater discharges are not subject to the same types of effluent limitations, cannot be centrally collected and treated, and typically have not invested in treatment controls to the same degree as traditional point sources. Nonpoint sources include intermittent, rainfall-driven, diffuse sources of pollutants associated with everyday human activities, including runoff from urban land uses, agriculture, silviculture, and mining; discharges from failing septic systems; and atmospheric deposition.

These point and nonpoint definitions do not directly relate to whether a source is regulated. Some nonpoint sources such as stormwater systems are permitted under the regulatory programs of the Department or water management districts, while others, such as agricultural stormwater discharges, are not. This distinction is important because the implementation of the allocations to nonpoint sources outside the authority of





regulatory programs will require cooperation from dischargers to implement best management practices (BMPs) voluntarily.

While a “detailed allocation” will ultimately be necessary to implement a TMDL fully, a key goal of the initial allocation is to assign responsibility for pollutant load reductions between point and nonpoint sources. For point sources, allocations will be implemented through the Department’s NPDES wastewater and stormwater permitting programs. The implementation of nonpoint source load reductions will be done through a combination of regulatory and nonregulatory processes.

Initial allocations of pollutant loadings will also be made to historical sources (e.g., the phosphorus-laden sediments at the bottom of a lake) and upstream sources (those entering into an impaired waterbody). Upstream sources include sources outside Florida, and these sources will receive reduced allocations similar to in-state sources.

The FWRA provided direction for the allocation of TMDLs and directed the Department to provide guidance on the allocation process by establishing an Allocation Technical Advisory Committee (ATAC) consisting of representatives of key stakeholder groups. The committee’s report recommended a three-step process for developing initial allocations and addressed detailed allocations for nonpoint sources, stakeholder involvement, the use of BMPs, and other TMDL implementation issues (Department, 2001b). A copy of the ATAC report can be found at <http://www.dep.state.fl.us/water/tmdl/docs/Allocation.pdf>.

Implementation Programs and Approaches

The FWRA designates the Department as the lead agency in coordinating the implementation of TMDLs. Existing programs and approaches through which TMDLs may be carried out include the following:

- Permitting and other existing regulatory programs, such as NPDES permits, domestic and industrial wastewater permits, and stormwater/Environmental Resource Permits. (**Table 5.2** lists the municipal NPDES stormwater permittees in the Lake Worth Lagoon–Palm Beach Coast Basin).
- Local land development codes;
- Nonregulatory and incentive-based programs, including BMPs, cost sharing, waste minimization, pollution prevention, new approaches to land use design and development, and public education;
- Basin Management Action Plans (B-MAPs) developed under the FWRA;
- Other water quality management and restoration activities, for example, Surface Water Improvement and Management plans approved under Section 373.456, Florida Statutes;
- Pollutant trading or other equitable economically-based agreements;
- Public works, including capital facilities; or
- Land acquisition.

Table 5.2: Municipal NPDES Stormwater Permittees in the Lake Worth Lagoon-Palm Beach Coast Basin

Facility ID	Name	Address	City	Facility Type	Status	NPDES	Design Capacity	Planning Unit
FL0035980	South Central Regional WWTP	1801 N. Congress Avenue	Delray Beach	DW	A	Y	24	C-15
FL0041360	East Central Regional WWTP	100 Bayan Blvd. Haverhill Road	West Palm Beach	DW	A	Y	55	C-17
FLG110154	Continental Concrete-Riviera Plant	Interpace Road	Riviera Beach	CBP	A	Y	0	C-17
FL0026344	City of Boca Raton WWTP	1501 W. Glades Road	Boca Raton	DW	A	Y	17.5	Hillsboro Canal
FLG110004	Central Concrete Supermix/Deerfield Beach (GP)	1817 S. Powerline Road	Deerfield Beach	CBP	A	Y	0.003	Hillsboro Canal
FL0186279	SFWM D Aquifer Storage and Recovery ASR Pilot Project	Multiple Well Sites in PB/Mar/Okee/GL Co	Various Counties	IW	A	Y	5.76	Hillsboro Canal
FL0028380	Ocean Maisonettes WWTP	6880 N. Ocean Blvd.	Ocean Ridge	DW	A	Y	0.01	Intra-coastal
FL0023396	Wellington Arms Condo WWTP	6530 N. Ocean Blvd.	Ocean Ridge	DW	A	Y	0.015	Intra-coastal
FL0001546	FPL Riviera Plant	200-300 Broadway	Riviera Beach	IW	A	Y	0	Intra-coastal
FL0035181	Whitehall Condominium Association, Inc.	2000 South Ocean Blvd.	Boca Raton	IW	A	Y	0	Intra-coastal
FL0042536	Bar Harbour Apartments, Inc.	86 MacFarlane Drive	Delray Beach	IW	A	Y	0.288	Intra-coastal
FL0037168	Biltmore Condominium Association, Inc	150 Bradley Place	Palm Beach	IW	A	Y	1	Intra-coastal
FL0187011	Florida Sugar Marketing and Terminal Assn., Inc.	Broadway	Riviera Beach	IW	X	Y	0	Intra-coastal
FL0029106	Seacoast Utilities North Palm Beach	603 Anchorage Drive	North Palm Beach	DW	T	Y	0	Intra-coastal
FL0001911	Seagate Towers Condominium Association	220 MacFarlane Drive	Delray Beach	IW	A	Y	1	Intra-coastal



These programs and approaches will be carried out at local, regional, state, and possibly federal levels. TMDL implementation will require extensive stakeholder involvement throughout the state and, in some cases, between Florida and other states. **Appendix A** provides additional details on the implementation programs and approaches listed here.

Development of Basin Management Action Plans

The FWRA authorizes the Department to develop B-MAPs for implementing TMDLs. These plans will be developed with extensive stakeholder input to build consensus on detailed allocations based on the initial general allocations to categories of discharges.

The B-MAPs would contain final allocations, strategies for meeting the allocations, schedules for implementation, funding mechanisms, applicable local ordinances, and other elements. In cases where stakeholder consensus could not be reached on detailed allocations and/or a B-MAP within a reasonable time, the Department would develop the allocations.

Once a B-MAP is developed, the Department will make it available for public review and comment. Guidance for the content and format of the B-MAPs is being developed; the plans are likely to include a description of both regulatory and nonregulatory approaches to meeting specific TMDLs.

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Appendix A: Legislative and Regulatory Background on the Watershed Management Approach and the Implementation of Total Maximum Daily Loads

Federal and State Legislation on Surface Water Quality and Total Maximum Daily Loads

Clean Water Act

Congress enacted the Clean Water Act in 1972 with the goal of restoring and maintaining the “chemical, physical, and biological integrity of the nation’s waters” (33 U.S.C. § 1251[a]). The ultimate goal of the act is to eliminate the “discharge of [all] pollutants into navigable waters” (33 U.S.C. § 1251[a][1]).

Section 305(b) of the Clean Water Act requires states to report biennially to the U.S. Environmental Protection Agency (EPA) on their water quality. The 305(b) assessment report provides information on the physical, chemical, biological, and cultural features of each river basin in Florida. This initial assessment provides a common factual basis for identifying information sources and major issues, and for determining the future changes, strategies, and actions needed to preserve, protect, and/or restore water quality. Understanding the physical framework of each basin allows the development of a science-based methodology for assessing water quality and an accurate picture of the waters that are most impaired or vulnerable to contamination.

Section 303(d) of the Clean Water Act requires states to submit to the EPA lists of surface waters that do not meet applicable water quality standards and establish total maximum daily loads (TMDLs) for each of these waters on a schedule. A pollution limit is then allocated to each pollutant source in an individual river basin.

A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and meet all of its designated uses (see **Noteworthy** on Florida’s surface water quality classifications for a listing of these classifications). A waterbody that does not meet its designated use is defined as *impaired*.

NOTEWORTHY: FLORIDA’S SURFACE WATER QUALITY CLASSIFICATIONS

Florida’s water quality standards program, the foundation of the state’s program of water quality management, designates the “present and future most beneficial uses” of the waters of the state (Subsection 403.061[10], Florida Statutes [F.S.]). Water quality criteria, expressed as numeric or narrative limits for specific parameters, describe the water quality necessary to maintain these uses for surface water and ground water. Florida’s surface water is protected for five designated use classifications, as follows:

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

Florida Watershed Restoration Act

In 1998, the EPA settled a lawsuit with the environmental group Earthjustice over Florida's TMDL Program. The Consent Decree resulting from the lawsuit requires all TMDLs on the state's 1998 Section 303(d) list of impaired waters to be developed in thirteen years. If the state fails to develop the TMDLs, the EPA is required to do so.

In response to concerns about the TMDL lawsuit and in recognition of the important role that TMDLs play in restoring state waters, the 1999 Florida legislature enacted the Florida Watershed Restoration Act (Chapter 99-223, Laws of Florida). The act clarified the Florida Department of Environmental Protection's (Department) statutory authority to establish TMDLs, required the Department to develop a methodology for identifying impaired waters, specified that the Department could develop TMDLs only for waters on a future state list of impaired waters developed using this new methodology, and directed the Department to establish an Allocation Technical Advisory Committee to address the allocation process for TMDLs. The act also declared Lake Okeechobee impaired and, as required under the TMDL Consent Decree, allowed the state to develop a TMDL for the lake (see **Noteworthy** for a description of the legislation's major provisions).

NOTEWORTHY: THE FLORIDA WATERSHED RESTORATION ACT

The Florida Watershed Restoration Act contains the following major provisions:

- *Establishes that the 303(d) list submitted to the EPA in 1998 is for planning purposes only.*
- *Requires the Department to adopt 303(d) listing criteria (that is, the methodology used to define impaired waters) by rule.*
- *Requires the Department to verify impairment and then establish a Verified List for each basin. The Department must also evaluate whether proposed pollution control programs are sufficient to meet water quality standards, list the specific pollutant(s) and concentration(s) causing impairment, and adopt the basin-specific 303(d) list by Secretarial Order.*
- *Requires the Department's Secretary to adopt TMDL allocations by rule. The legislation requires the Department to establish "reasonable and equitable" allocations of TMDLs, but does not mandate how allocations will be made among individual sources.*
- *Requires that TMDL allocations consider existing treatment levels and management practices; the differing impacts that pollutant sources may have; the availability of treatment technologies, best management practices (BMPs), or other pollutant reduction measures; the feasibility, costs, and benefits of achieving the allocation; reasonable time frames for implementation; the potential applicability of moderating provisions; and the extent that nonattainment is caused by pollutants from outside Florida, discharges that have ceased, or alteration to a waterbody.*
- *Required a report to the legislature by February 2001 addressing the allocation process.*

- *Authorizes the Department to develop basin plans to implement TMDLs, coordinating with the water management districts, the Florida Department of Agriculture and Consumer Services (DACS), the Soil and Water Conservation Districts, regulated parties, and environmental groups in assessing waterbodies for impairment, collecting data for TMDLs, developing TMDLs, and conducting at least one public meeting in the watershed. Implementation is voluntary if not covered by regulatory programs.*
- *Authorizes the Department and DACS to develop interim measures and BMPs to address nonpoint sources. While BMPs would be adopted by rule, they will be voluntary if not covered by regulatory programs. If they are adopted by rule and the Department verifies their effectiveness, then implementation will provide a presumption of compliance with water quality standards.*
- *Directs the Department to document the effectiveness of the combined regulatory/voluntary approach and report to the legislature by January 1, 2005. The report will include participation rates and recommendations for statutory changes.*

Determining Impairment Based on the State’s Impaired Surface Waters Rule

Section 303(d) of the federal Clean Water Act and the Florida Watershed Restoration Act describe impaired waters as those waterbodies or waterbody segments that do not meet applicable water quality standards. “Impairment” is a broad term that includes designated uses, water quality criteria, the Florida antidegradation policy, and moderating provisions (see **Noteworthy** for explanations of these terms).

The state’s Identification of Impaired Surface Waters Rule (Rule 62-303, Florida Administrative Code [F.A.C.]) was developed in cooperation with a Technical Advisory Committee and adopted by the Florida Environmental Regulation Commission on April 26, 2001. It provides a science-based methodology for evaluating water quality data in order to identify impaired waters, and it establishes specific criteria for impairment based on chemical parameters, the interpretation of narrative nutrient criteria, biological impairment, fish consumption advisories, and ecological impairment. The complete text of the rule is available at <http://www.dep.state.fl.us/water/tmdl/docs/AmendedIWR.pdf>.

The Impaired Surface Waters Rule also establishes thresholds for data sufficiency and data quality, including the minimum sample size required and the number of exceedances of the applicable water quality standard for a given sample size that identify a waterbody as impaired. The number of exceedances is based on a statistical approach designed to provide greater confidence that the outcome of the water quality assessment is correct. **Waters that are identified as impaired through the Impaired Surface Waters Rule are prioritized for TMDL development and implementation.**

NOTEWORTHY: EXPLANATION OF TERMS

- **Designated uses**, discussed in an earlier sidebar, comprise the five classifications applied to each of the state's surface waterbodies.
- **Water quality criteria** comprise numeric or narrative limits of pollutants.
- **The Florida Antidegradation Policy** (Sections 62-302.300 and 62-4.242, F.A.C.) recognizes that pollution that causes or contributes to new violations of water quality standards or to the continuation of existing violations is harmful to the waters of the state. Under this policy, the permitting of new or previously unpermitted existing discharges is prohibited where the discharge is expected to reduce the quality of a receiving water below the **classification** established for it. Any lowering of water quality caused by a new or expanded discharge to surface waters must be in the public interest (that is, the benefits of the discharge to public health, safety, and welfare must outweigh any adverse impacts on fish and wildlife or recreation). Further, the permittee must demonstrate that other disposal alternatives (for example, reuse) or pollution prevention are not economically and technologically reasonable alternatives to the surface water discharge.
- **Moderating provisions** (provided in Subsection 62-302.300[10] and Rules 62-4 and 62-6, F.A.C., and described in Sections 62-302.300, 62-4.244, 62-302.800, 62-4.243, F.A.C., and Sections 403.201 and 373.414, F.S.) include mixing zones, zones of discharge, site-specific alternative criteria, exemptions, and variances. These provisions are intended to moderate the **applicability** of water quality standards where it has been determined that, under certain special circumstances, the social, economic, and environmental costs of such **applicability** outweigh the benefits.

Determining impairment in individual waterbodies takes place in two phases. First, in each river basin the Department evaluates the existing water quality data, using the methodology prescribed in the Impaired Surface Waters Rule, to determine whether waters are potentially impaired. Waters found to be potentially impaired are included on a *Planning List* for further assessment under Subsections 403.067(2) and (3), F.S. As required by Subsection 403.067(2), F.S., the Planning List is not used to administer or implement any regulatory program. It is submitted to the EPA for informational purposes only.

The second step is to assess waters on the Planning List under Subsection 403.067(3), F.S., as part of the Department's watershed management approach (described in the following section). The Department carries out additional data gathering and strategic monitoring, focusing on these potentially impaired waters, and determines—using the methodology in Part III, Section 62-303.400, F.A.C.—if a waterbody is, in fact, impaired and if the impairment is caused by pollutant discharges.

A Water Quality Assessment Report is produced containing the results of this updated evaluation and a *Verified List* of impaired waters. The criteria for the Verified List are more stringent than those for the Planning List. The Department is required to develop TMDLs for waters on the Verified List under Subsection 403.067(4), F.S. A watershed management plan (called a Basin Management Action Plan, or BMAP) to

reduce the amount of pollutants that cause impairments must also be produced and implemented.

The Verified List is adopted by Secretarial Order in accordance with the Florida Watershed Restoration Act. Once adopted, the list is submitted to the EPA for approval as the state's Section 303(d) list of impaired waters for the basin.

Implementing Total Maximum Daily Loads

The Watershed Management Approach

The Department's statewide approach to water resource management, called the watershed management approach, is the framework for implementing TMDLs as required by the federal and state governments. The approach does not focus on individual causes of pollution. Instead, each basin is assessed as an entire functioning system, and aquatic resources are evaluated from a basinwide perspective that considers the cumulative effects of human activities. Water resources are managed on the basis of natural boundaries, such as river basins, rather than political or regulatory boundaries. Federal, state, regional, tribal, and local governments identify watersheds not meeting clean water or other natural resource goals and work cooperatively to focus resources and implement effective strategies to restore water quality. Extensive public participation in the decision-making process is crucial.

The watershed management approach is not new, nor does it compete with or replace existing programs. Rather than relying on single solutions to water resource issues, it is intended to improve the health of surface water and ground water resources by strengthening coordination among such activities as monitoring, stormwater management, wastewater treatment, wetland restoration, land acquisition, and public involvement.

By promoting the management of entire natural systems and addressing the cumulative effects of human activities on a watershed basis, this approach is intended to protect and enhance the ecological structure, function, and integrity of Florida's watersheds. It provides a framework for setting priorities and focusing the Department's resources on protecting and restoring water quality, and aims to increase cooperation among state, regional, local, and federal interests. By emphasizing public involvement, the approach encourages stewardship by all Floridians to preserve water resources for future generations.

The watershed approach is intended to speed up projects by focusing funding and other resources on priority water quality problems, strengthening public support, establishing agreements, and funding multiagency projects. It avoids duplication by building on existing assessments and restoration activities and promotes cooperative monitoring programs. It encourages accountability for achieving water quality improvements through improved monitoring and the establishment of TMDLs.

The Watershed Management Cycle

As part of the Department's watershed management approach, TMDLs will be developed, and the corresponding pollutant loadings allocated, as part of a watershed management cycle that rotates through the state's 52 river basins over a 9-year period. The cycle's 5 phases are as follows:

- **Phase 1: Preliminary Watershed Evaluation.** For each river basin, a **Basin Status Report** is developed, containing a *Planning List* of potentially impaired waters that may require the establishment of TMDLs. The report characterizes each basin's hydrologic, ecological, and socioeconomic setting as well as historical, current, and proposed watershed management issues and activities. It also contains a preliminary evaluation of major water quality parameters, water quality issues by planning unit, ecological resources, and basinwide pollutant loading trends related to land uses. At the end of Phase 1, a **Strategic Monitoring Plan** is developed.
- **Phase 2: Strategic Monitoring and Assessment.** Additional data are collected through strategic monitoring and uploaded to STORET. The data are used to verify whether potentially impaired waters in each basin are impaired and to calibrate and verify models for TMDL development. At the end of Phase 2, a **Water Quality Assessment Report** is produced for each basin that contains a *Verified List* of impaired waters. The report also provides an updated and more thorough evaluation of water quality, associated biological resources, and current management plans. The Department will adopt the *Verified List* through a Secretarial Order and submit it to the EPA as the state's Section 303(d) list of impaired waters.
- **Phase 3: Development and Adoption of TMDLs.** TMDLs for priority impaired waters in the basin will be developed and adopted by rule. Because TMDLs cannot be developed for all listed waters during a single watershed management cycle due to fiscal and technical limitations, waterbodies will be prioritized using the criteria in the Identification of Impaired Surface Waters Rule (Rule 62-303, F.A.C.).
- **Phase 4: Development of a Basin Management Action Plan.** A BMAP will be developed for each basin to specify how pollutant loadings from point and nonpoint sources will be allocated and reduced in order to meet TMDL requirements. The plans will include regulatory and nonregulatory (i.e., voluntary) and structural and nonstructural strategies, and existing management plans will be used where feasible. The involvement and support of affected stakeholders in this phase will be especially critical.
- **Phase 5: Implementation of a Basin Management Action Plan.** Implementation of the activities specified in the BMAP will begin. This includes carrying out rule development as needed, securing funding, informing stakeholders and the public, and monitoring and evaluating the implementation of the plan.

To implement the watershed cycle, the state’s river basins have been divided into five groups within each of the Department’s six districts statewide, and each district will assess one basin each year. **Table A.1** shows the basin groups for implementing the cycle in the Department’s districts, and **Figure A.1** shows these groups and the rotating cycle in the districts. **Table A.2**, which lists the basin rotation schedule for TMDL development and implementation, shows that it will take nine years to complete one full cycle of the state.

The watershed management cycle is an iterative, or repeated, process. One of its key components is that the effectiveness of management activities (TMDL implementation) will be monitored in successive cycles. Monitoring conducted in Phase 2 of subsequent cycles will be targeted at evaluating whether water quality objectives are being met and whether individual waters are no longer impaired. The Department also will track the implementation of scheduled restoration activities, whether required or voluntary, to ensure continued progress towards meeting the TMDLs.

Table A.1: Basin Groups for Implementing the Watershed Management Cycle, by Department District Office

District	Group 1 Basins	Group 2 Basins	Group 3 Basins	Group 4 Basins	Group 5 Basins
Northwest	Ochlockonee–St. Marks Rivers	Apalachicola–Chipola Rivers	Choctawhatchee River and Bay and St. Andrews Bay	Pensacola Bay	Perdido River and Bay
Northeast	Suwannee River	Lower St. Johns River		St. Marys–Nassau Rivers	Northeast Coast Lagoons
Central	Ocklawaha River	Middle St. Johns River	Upper St. Johns River	Kissimmee River	Indian River Lagoon
Southwest	Tampa Bay	Tampa Bay Tributaries	Sarasota Bay and Peace–Myakka Rivers	Withlacoochee River	Springs Coast
South	Everglades West Coast	Charlotte Harbor	Caloosahatchee River	Fisheating Creek	Florida Keys
Southeast	Lake Okeechobee	St.Lucie–Loxahatchee Rivers	Lake Worth Lagoon/Palm Beach Coast	Southeast Urban Coast	Everglades

Table A.2: Basin Rotation Schedule for TMDL Development and Implementation

Year	00	01	01	02	02	03	03	04	04	05	05	06	06	07	07	08	08	09	09	10
Group 1	PHASE 1		PHASE 2		PHASE 3		PHASE 4		PHASE 5		PHASE 1		PHASE 2		PHASE 3		PHASE 4		PHASE 5	
Group 2			PHASE 1		PHASE 2		PHASE 3		PHASE 4		PHASE 5		PHASE 1		PHASE 2		PHASE 3		PHASE 4	
Group 3					PHASE 1		PHASE 2		PHASE 3		PHASE 4		PHASE 5		PHASE 1		PHASE 2		PHASE 3	
Group 4							PHASE 1		PHASE 2		PHASE 3		PHASE 4		PHASE 5		PHASE 1		PHASE 2	
Group 5									PHASE 1		PHASE 2		PHASE 3		PHASE 4		PHASE 5		PHASE 1	
	1 st Five-Year Cycle—High-Priority Waters										2 nd Five-Year Cycle—Medium-Priority Waters									

Note: Projected years for Phases 3, 4, and 5 may change due to accelerated local activities, length of plan development, legal challenges, etc.

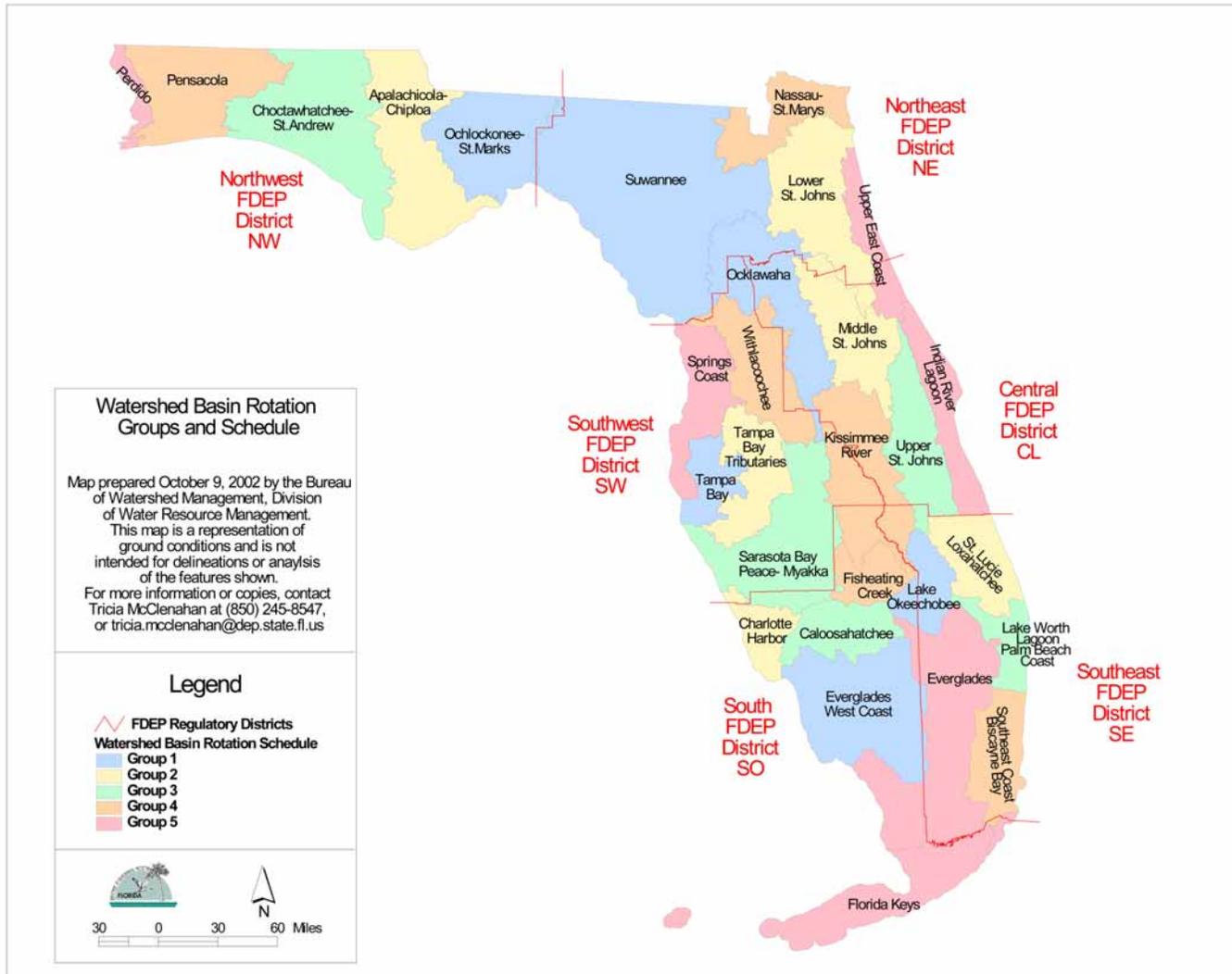


Figure A.1: Five-Year Rotating Basin Cycle in the Department's Six Districts

Pollutants can enter a waterbody through point source discharges (generally from a specific facility) or nonpoint discharges (e.g., stormwater runoff, septic tanks). Government agencies, businesses, organizations, and individuals who contribute to these discharges will be asked to share the responsibility of attaining TMDLs through load allocations (the amount of a specified pollutant allotted for discharge) that are based on an established TMDL. **Table A.3** summarizes these potentially affected stakeholders, and the actions they may be asked to take to help achieve a TMDL.

Table A.3: Potentially Affected Stakeholders and Actions To Achieve TMDLs

Potentially Affected Stakeholders	Actions To Achieve TMDL
Municipal stormwater/wastewater programs	Reduce and treat urban stormwater runoff through stormwater retrofits, replacement of septic tanks
Commercial developers, homebuilders, individual homeowners	Improve development design and construction, enhance best management practices (BMPs), replace septic tanks
Municipal and industrial wastewater treatment facilities, National Pollutant Discharge Elimination System (NPDES) permitted facilities	Reduce pollutant loadings from permitted discharges
Farming and silviculture operations	Reduce and treat runoff through BMPs
Federal, regional, state agencies; regional and local water quality coalitions	Carry out waterbody restoration projects

Permitting and Other Approaches

NPDES PERMITS

All point sources that discharge to surface waterbodies require a National Pollutant Discharge Elimination System (NPDES) permit. These permits can be classified into two types: domestic or industrial wastewater discharge permits, and stormwater permits. NPDES-permitted point sources may be affected by the development and implementation of a TMDL. All NPDES permits include “reopener clauses” that allow the Department to incorporate new discharge limits when a TMDL is established. These new limitations may be incorporated into a permit when a TMDL is implemented or at the next permit renewal, depending on the timing of the permit renewal and workload. For NPDES municipal stormwater permits, the Department intends to insert the following statement once a BMAP is completed:

“The permittee shall undertake those activities specified in the (Name of Waterbody) Basin Management Action Plan in accordance with the approved schedule set forth in the BMAP.”

DOMESTIC AND INDUSTRIAL WASTEWATER PERMITS

In addition to NPDES-permitted facilities, all of which discharge to surface waters, Florida also regulates domestic and industrial wastewater discharges to ground water via land application. Since ground water and surface water are so intimately linked in much of the state, reductions in loadings from these facilities may be needed to meet TMDL limitations for pollutants in surface waters. If such reductions are identified in the BMAP, they would be implemented through modifications of the existing state permits.

FLORIDA STORMWATER/ENVIRONMENTAL RESOURCE PERMITS

With the implementation of the state’s stormwater treatment rule in 1982, Florida became the first state to require the treatment of stormwater from all new development. Today, except in the area served by the Northwest Florida Water Management District, new development projects receive an Environmental Resource Permit that combines stormwater flood protection, stormwater treatment, and wetland protection/mitigation into a single permit. These permits are designed to obtain 80 percent average annual load reduction of total suspended solids. This level of treatment may need to be increased, depending on the allocation of load reductions, especially for nutrients. For example, the St. Johns River Water Management District recently adopted basin-specific criteria for the Lake Apopka Basin that require the phosphorus loading from new development not to exceed predevelopment phosphorus loading.

LOCAL LAND DEVELOPMENT CODES

Since structural stormwater treatment practices can only achieve certain levels of load reductions, and because the hydrologic changes accompanying urban development often cause ecological impacts to aquatic systems, local land development codes that promote “low-impact development” are an important component of restoring impaired waters. Local codes may need to be reviewed to determine how to promote developments that minimize impervious surfaces (such as reduced street widths or the use of pervious pavements), promote the protection of vegetation, promote the protection and restoration of riparian buffers along streams and lakes, and adopt the principles of the Florida Yards and Neighborhoods Program in local landscaping codes.

BEST MANAGEMENT PRACTICES

Typically, BMPs refer to a practice or combination of practices that, based on sound science and best professional judgment, are determined to be the most effective and practicable means of reducing nonpoint source pollutant discharges and improving water quality. Both economic and technological considerations are included in the evaluation of what is practicable. BMPs may include structural controls (such as retention areas or detention ponds) or nonstructural controls (such as street sweeping or public education). Many BMPs have been developed for urban stormwater to reduce pollutant loadings and peak flows. These BMPs accommodate site-specific conditions, including soil type, slope, depth to groundwater, and the designation of receiving waters.

The passage of the Florida Watershed Restoration Act increased the emphasis on implementing BMPs to reduce nonpoint source pollutant discharges from agricultural operations. Recognizing that the development and adoption of BMPs might take several years, the legislature authorized the use of Interim Measures (IMs) during the BMP development process for agricultural operations. In essence, IMs are a set of logical conservation practices designed to reduce agricultural nonpoint pollutant discharges based on current knowledge and best professional judgment. These practices will evolve into more formal BMPs as better scientific data on their effectiveness is obtained.

Once the Florida Department of Agriculture and Consumer Services adopts BMPs, the Department is charged with verifying their effectiveness in reducing agricultural nonpoint sources. Once verified, agricultural operations that have implemented BMPs will receive a waiver of liability and presumption of compliance similar to that granted a developer who obtains an Environmental Resource Permit.

OTHER STRATEGIES

The success of implementing nonpoint source TMDL load allocations will require variety, creativity, stakeholder commitment to watershed management, and personal stewardship. In addition to BMPs, other possible strategies for meeting TMDLs, restoring water quality, and preventing the further degradation of Florida's watersheds include cost sharing, waste minimization, pollution prevention, new approaches to land use design and development, and pollutant trading. The Department will assemble a Technical Advisory Committee to help develop a pollutant-trading rule, which must be reviewed by the legislature prior to its adoption. The Department will also continue to work with local stakeholders on TMDL allocation issues and implementation plans.

Sources of Information

For additional information on the Department's Watershed Management Program and TMDLs, please contact the following basin coordinators:

- Southwest Florida and Lake Okeechobee, Pat Fricano (850) 245-8559
- Southeast Florida, Kevin O'Donnell (850) 245-7607
- Northwest, Central Florida, and Ochlockonee-St. Marks Basins, Mary Paulic, (850) 245-8560
- Northeast Florida and Suwannee Basin, Jennifer Gihring (850) 245-8418
- West Central Florida and Tampa Bay Region, Tom Singleton (850) 245-8561

For information on establishing and implementing TMDLs, contact Jan Mandrup-Poulsen at (850) 245-8448. Additional information is available on the Department's Web site at www.dep.state.fl.us/water/watersheds/index.htm.

Appendix B: Information on Reasonable Assurance

TO: Interested Parties

**FROM: Mimi Drew, Director
Division of Water Facilities**

DATE: September 2002

SUBJECT: Guidance for Development of Documentation To Provide Reasonable Assurance that Proposed Pollution Control Mechanisms Will Result in the Restoration of Designated Uses in Impaired Waters

The purpose of this memo is to describe the types of information that should be considered, and subsequently documented, when evaluating whether there is sufficient reasonable assurance that:

1. Proposed pollution control mechanisms (typically described in watershed management or restoration plans) addressing impaired waters will result in the attainment of applicable water quality standards (designated uses) at a clearly defined point in the future, and
2. Reasonable progress towards restoration of designated uses will be made by the time the next 303(d) list of impaired waters is due to be submitted to the EPA.

There are many site-specific issues related to determining whether reasonable assurance has been provided. Accordingly, this document describes the elements or issues that should be considered when evaluating a submittal or when documenting the basis for the Department's decision, rather than attempting to establish specific criteria on what constitutes reasonable assurance.

It should be noted that the term "reasonable assurance" is used throughout many Department programs and rules, and this guidance specifically addresses the issues related to the "reasonable assurance" provided by proposed pollution control mechanisms. This guidance should not be used to evaluate the meaning of reasonable assurance in other contexts, particularly in permitting decisions.

Background

The Impaired Surface Waters Rule (IWR), Rule 62-303, F.A.C. (Identification of Impaired Surface Waters), establishes a formal mechanism for identifying surface waters in Florida that are impaired (do not meet applicable water quality standards) by pollutants. Most waters that are verified as being impaired by a pollutant will be listed on the state's 303(d) list pursuant to the Florida Watershed Restoration Act (FWRA) and

Section 303(d) of the Clean Water Act. Once listed, total maximum daily loads (TMDLs) will be developed for the pollutants causing the impairment of the listed waters. However, as required by the FWRA, the Department will evaluate whether existing or proposed pollution control mechanisms will effectively address the impairment before placing a water on the state's Verified List. If the Department can document there is reasonable assurance that the impairment will be effectively addressed by the control measure, then the water will not be listed on the final Verified List (other impaired waters that will not be listed include waters with TMDLs and waters impaired by pollution).

Current Rule Text Relating to Evaluation of Pollution Control Mechanisms

The rule text addressing the evaluation of proposed pollution control mechanisms is as follows:

Section 62-303.600, Evaluation of Pollution Control Mechanisms

1. Upon determining that a waterbody is impaired, the Department shall evaluate whether existing or proposed technology-based effluent limitations and other pollution control programs under local, state, or federal authority are sufficient to result in the attainment of applicable water quality standards.
2. If, as a result of the factors set forth in (1), the waterbody segment is expected to attain water quality standards in the future and is expected to make reasonable progress towards attainment of water quality standards by the time the next 303(d) list is scheduled to be submitted to EPA, the segment shall not be listed on the Verified List. The Department shall document the basis for its decision, noting any proposed pollution control mechanisms and expected improvements in water quality that provide reasonable assurance that the waterbody segment will attain applicable water quality standards.

Responsible Parties for Reasonable Assurance Demonstration

It is ultimately the Department's responsibility to assure adequate documentation in the administrative record whenever the Department decides to not list an impaired waterbody segment for a given pollutant. This documentation will be very important because the Verified Lists will be adopted by Order of the Secretary and third parties will be provided an opportunity to challenge, via an administrative hearing, all listing decisions (both those listing a water and those to not list a water for a given pollutant). However, the Department expects that local stakeholders will often offer to prepare the necessary documentation to demonstrate reasonable assurance that proposed control mechanisms will restore a given waterbody. The Department will provide guidance to stakeholders on what information is needed and how it should be submitted.

Time Frame for Development of Documentation

The Department plans to prepare basin-specific Verified Lists as part of its watershed management cycle, which rotates through all of the state's basins over a five-year, five-phased cycle¹. During the first phase of the cycle, the Department will assess water quality in the basin and prepare a draft Planning List of potentially impaired waters. The Department and interested parties will then have approximately one year (Phase 2) to monitor waters on the planning list and prepare documentation, as appropriate, to provide reasonable assurance that impaired waters will be restored. The Department will review submittals from interested parties during Phase 2, before adopting the Verified List for the basin containing the waterbody segment in question.

What It Means To Be Under Local, State, or Federal Authority

Both the FWRA and the IWR require that the pollution control programs under consideration be “under local, state, or federal authority.” A pollution control program will be considered "under local, state, or federal authority" if the program is subject to or required by a local ordinance, state statute or rule, or federal statute or regulation.

Programs will also be considered under local, state, or federal authority if they are subject to a written agreement, signed by both local stakeholders and at least one governmental entity, that includes measurable goals, performance criteria, benchmarks, and back-up corrective actions to assure the further progress of the program. It is important to note that these written agreements do not need to be enforceable for nonregulated nonpoint sources.

Many nonpoint sources are currently outside of the regulatory programs of EPA, the Department, and the water management districts, and reductions at these nonpoint sources will be voluntary. In fact, pollution control mechanisms for these nonpoint sources would be voluntary even if a TMDL were developed. As such, these agreements may provide the same level of reasonable assurance that can be provided for a TMDL implementation plan as long as they maintain the Department's enforcement capability over all point sources involved.

Time Frame for Attaining Water Quality Standards

The FWRA and the IWR do not establish a specific time limit by which waters must attain applicable water quality standards or designated uses. However, the pollution control mechanisms or watershed restoration plan must provide reasonable assurance that designated uses will be met at some time **in the future**. As such, the documentation submitted to the Department must provide a specific date by which time designated uses are expected to be restored. In cases where designated uses will not be met for many years, the documentation should also provide justification as to why the specified time is needed to restore designated uses.

¹Federal regulations currently call for state 303(d) lists every two years, but Florida plans to submit annual updates based on the basin-specific Verified Lists.

Parameter-Specific Nature of Demonstration

For the Department not to place an impaired waterbody segment on the Verified List, reasonable assurance must be provided for each pollutant that has been documented to be causing impairment of the waterbody segment. However, some entities, including the Department, may want to provide reasonable assurance addressing only selected pollutants, which could result in the Department not listing the waterbody segment for those pollutants, but still listing it for others. In this event, TMDLs will only be developed for the remaining listed pollutants.

Information To Consider and Document when Assessing Reasonable Assurance in the IWR

To provide reasonable assurance that existing or proposed pollution control mechanisms will restore designated uses, the following information should be evaluated and documented for the Administrative Record:

1. **A Description of the Impaired Water**—name of the water listed on the Verified List, the location of the waterbody and watershed, the watershed/8-digit cataloging unit code, the NHD identifier (when they become available), the type (lake, stream, or estuary) of water, the water use classification, the designated use not being attained, the length (miles) or area (acres) of impaired area, the pollutant(s) of concern (those identified as causing or contributing to the impairment), and the suspected or documented source(s) of the pollutant(s) of concern.
2. **A Description of the Water Quality or Aquatic Ecological Goals**—a description of the water quality–based targets or aquatic ecological goals (both interim and final) that have been established for the pollutant(s) of concern, the averaging period for any numeric water quality goals, a discussion of how these goals will result in the restoration of the waterbody’s impaired designated uses, a schedule indicating when interim and final targets are expected to be met, and a description of procedures (with thresholds) to determine whether additional (backup) corrective actions are needed.
3. **A Description of the Proposed Management Actions To Be Undertaken**—names of the responsible participating entities (government, private, others), a summary and list of existing or proposed management activities designed to restore water quality, the geographic scope of any proposed management activities, documentation of the estimated pollutant load reduction and other benefits anticipated from implementation of individual management actions, copies of written agreements committing participants to the management actions, a discussion on how future growth and new sources will be addressed, confirmed sources of funding, an implementation schedule (including interim milestones and

the date by which designated uses will be restored), and any enforcement programs or local ordinances, if the management strategy is not voluntary.

4. **A Description of Procedures for Monitoring and Reporting Results**—a description of the water quality monitoring program to be implemented (including station locations, parameters sampled, and sampling frequencies) to demonstrate reasonable progress; quality assurance/quality control elements that demonstrate the monitoring will comply with Rule 62-160, F.A.C.; procedures for entering all appropriate data into STORET; the responsible monitoring and reporting entity; the frequency and format for reporting results; the frequency and format for reporting on the implementation of all proposed management activities; and methods for evaluating progress towards goals.
5. **A Description of Proposed Corrective Actions**—a description of proposed corrective actions (and any supporting document[s]) that will be undertaken if water quality does not improve after implementation of the management actions or if management actions are not completed on schedule, and a process for notifying the Department that these corrective actions are being implemented.

Water Quality–Based Targets and Aquatic Ecological Goals

Some of the most important elements listed above are the requirements to provide water quality–based targets or aquatic ecological goals and a discussion on how resultant pollutant(s) reduction targets/goals will result in restoration of designated uses. Some people have expressed concern about these targets because they equate a water quality–based restoration target with a TMDL (thus assuming a “Catch 22” that a TMDL is needed to make a demonstration that a TMDL is not needed). However, as is also the case for TMDLs, water quality–based targets can take many forms, and need not be a result of a complex hydrodynamic/water quality model.

In some cases, there may be sufficient historical data (paleolimnological data, loadings from periods predating the impairment, or baseline data for Outstanding Florida Waters², for example) that could be used to determine an appropriate water quality target. In other cases, simplified modeling (including regression analysis) may allow for conservative estimates of the assimilative capacity that could then be used as the basis for restoration goals. And, finally, a water quality target may have been developed that would be scientifically equivalent to (or act as the basis for) a TMDL, but the target has not been administratively adopted as a TMDL. In each of these cases, a sound water quality target could be used to evaluate whether the proposed pollution control mechanisms will sufficiently reduce loadings to meet the assimilative capacity of the water in question and result in attainment of designated uses.

²Baseline data would be data for the year prior to designation of the OFW.

Interim Targets

Because it will usually take many years to restore fully the designated uses of an impaired water, interim water quality targets will often be needed to measure whether reasonable progress is being made towards the restoration of designated uses. Examples of such interim targets are provided in the last section of this document, but site-specific measures are also encouraged.

Averaging Periods for Water Quality Targets

While the averaging period for water quality–based targets should be consistent with how the underlying standard is expressed, they can often be expressed in a variety of ways and need not be expressed as “daily loads.” Annual averages or medians are often appropriate for some parameters, but shorter-term (seasonal, for example) averages may be necessary if the impairment is limited to specific seasons or parts of the year. Multi-year averages may be appropriate in limited circumstances where there is naturally high variation of the water quality target.

Estimates of Pollutant Reductions from Restoration Actions

It will often be difficult to estimate precisely the pollutant reductions that will result from specific restoration activities. This is particularly true for the implementation of best management practices (BMPs). However, to provide reasonable assurance that a BMP or other restoration action will reduce loadings of the pollutant of concern to a level that will restore the water’s designated uses, documentation should address how the reductions were calculated, including providing documented values from the scientific literature for reductions attributed to similar management actions. If the expected reductions are expressed as a range, the midpoint of the range should be used as the basis for estimating reductions, unless documentation is provided supporting the use of different removal efficiencies in this specific application.

New Sources/Growth

Another key element is the discussion on how future growth and new sources will be addressed. Restoration goals must address possible increased loadings of the pollutant of concern that are anticipated due to population growth or land use changes in contributing watersheds, both from point and nonpoint sources. This will be particularly important for waters impaired by nutrients, given that so many Florida watersheds are faced with continuing urban, residential, and agricultural development that results in increased nutrient loading from stormwater, septic tanks, and wastewater discharges.

Examples of Reasonable Progress

The determination of whether there will be reasonable progress towards attainment of water quality standards will be very site- and pollutant-specific. Documentation should be provided supporting specific progress towards restoration of the designated uses of the impaired water. Possible examples of reasonable progress include, but are not limited to the following:

- A written commitment to implement controls reducing loadings within a specified time frame from watershed stakeholders representing at least 50 percent of the anthropogenic load of the pollutant(s) of concern;
- Evidence of at least a 10 percent reduction (or alternatively, a percent reduction consistent with meeting the water quality target by the specified date) in annual anthropogenic loading of the pollutant(s) of concern;
- Evidence of at least a 10 percent decrease (or alternatively, a percent decrease consistent with meeting the water quality target by the specified date) in the annual average concentration of the pollutant(s) of concern in the water;
- Bioassessment results showing there has been an improvement in the health of the biological community of the water, as measured by bioassessment procedures similar to those used to determine impairment and conducted in similar conditions; or
- Adoption of a local ordinance that specifically provides water quality goals, restricts growth or loads tied to the pollutant(s) of concern, and provides an enforcement option if the proposed management measure(s) are not implemented as required.

Reasonable progress must be made by the time the next 303(d) list is due to be submitted to EPA, which is currently every two years. EPA has contemplated changing the listing cycle to every four or five years, and the IWR was specifically worded to allow a longer time frame for requiring reasonable progress in the event that the listing cycle changes.

Long-Term Requirements

If at any time the Department determines that reasonable assurance and reasonable progress are not being met, the order adopting the Verified List will be amended to include the waterbody on the Verified List for the pollutant(s) in question. Additional reasonable progress must be made each time a waterbody is considered for listing under Rule 62-303, F.A.C. (every five years).

If you have any questions about this guidance memo, contact Daryll Joyner of the Department's Bureau of Watershed Management in Tallahassee at 850-245-8431.

Appendix C: Methodology for Determining Impairment Based on the Impaired Surface Waters Rule

The Impaired Surface Waters Rule

To identify impaired waters in each of the state's river basins, the Florida Department of Environmental Protection (Department) evaluates water quality data using the science-based methodology in the Identification of Impaired Surface Waters Rule (Rule 62-303, Florida Administrative Code [F.A.C.]). The rule establishes specific criteria and thresholds for impairment, in addition to data sufficiency and data quality requirements. The methodology described in the rule is based on a statistical approach designed to provide greater confidence that the outcome of the water quality assessment is correct. The complete text of the Impaired Surface Waters Rule is available at <http://www.dep.state.fl.us/water/tmdl/docs/AmendedIWR.pdf>.

As part of the watershed management approach, for each river basin in the state the Department will follow the methodology in Section 62-303.300, F.A.C., to develop a Planning List of potentially impaired waters to be assessed under Subsections 403.067(2) and (3), Florida Statutes [F.S.]. The methodology for developing the Planning List includes an evaluation of aquatic life use support, primary contact and recreational use support, fish and shellfish consumption use support, drinking water use support, and protection of human health. Data older than 10 years cannot be used to evaluate water quality criteria exceedances for the Planning List. As required by Subsection 403.067(2), F.S., the Planning List will not be used to administer or implement any regulatory program, and is submitted to the U.S. Environmental Protection Agency (EPA) for informational purposes only.

After further assessment, using the methodology in Part III, Section 62-303.400, F.A.C., the Department will determine if waters on the Planning List are, in fact, impaired and if the impairment is caused by pollutant discharges. These waters are placed on a Verified List. The criteria for the Verified List are more stringent than those for the Planning List. Data older than 7.5 years should not be used to verify impairment. The Verified List will be adopted by Secretarial Order and forwarded to the EPA for approval as Florida's Section 303(d) list of impaired waters. The Department will develop TMDLs for these waters under Subsection 403.067(4), F.S.

Attainment of Designated Use(s)

While the designated uses of a given waterbody are established using the surface water quality classification system described previously, it is important to note that the EPA uses slightly different terminology in its description of designated uses. Because the Department is required to provide use attainment status for both the state's 305(b) report and the state's 303(d) list of impaired waters, the Department uses EPA terminology when assessing waters for use attainment. The water quality evaluations and decision processes for listing impaired waters that are defined in Florida's Impaired Surface Waters Rule are based on the following designated use attainment categories:

**Aquatic Life Use Support-Based Attainment
 Primary Contact and Recreation Attainment
 Fish and Shellfish Consumption Attainment
 Drinking Water Use Attainment
 Protection of Human Health**

Table C.1 summarizes the designated uses assigned to Florida’s various surface water classifications.

Table C.1: Designated Use Attainment Categories for Surface Waters in Florida

Designated Use Attainment Category Used in Impaired Surface Waters Rule Evaluation	Applicable Florida Surface Water Classification
Aquatic Life Use Support-Based Attainment	Class I, II, and III
Primary Contact and Recreation Attainment	Class I, II, and III
Fish and Shellfish Consumption Attainment	Class II
Drinking Water Use Attainment	Class I
Protection of Human Health	Class I, II, and III

Sources of Data

The Department’s assessment of water quality for each basin statewide includes an analysis of quantitative data from a variety of sources, many of which are readily available to the public. These sources include the EPA’s Legacy and modernized **STORage** and **RETRetrieval** (STORET) databases, the U.S. Geological Survey (USGS), the Department, the Florida Department of Health (DOH), the water management districts, local governments, and volunteer monitoring groups.

Historically, the Department carried out statewide water quality assessments using data available in the EPA’s Legacy STORET Database; STORET makes up approximately 60 percent of the statewide data used in the Impaired Surface Waters Rule assessment. The Legacy STORET dataset is a repository of data collected and uploaded by numerous organizations through 1999. The Legacy STORET Database can be accessed at <http://www.dep.state.fl.us/water/storet/index.htm>.

In 2000, the EPA created a modernized version of STORET that included new features designed to address data quality assurance/quality control concerns (see the new STORET Web site at <http://www.epa.gov/storet/>). However, because of software difficulties associated with batch uploading of data to the modernized STORET, the data being uploaded to the national repository decreased dramatically, and lingering problems have temporarily reduced STORET’s importance as a statewide data source. It houses only about 5 percent of the statewide Impaired Surface Waters Rule Database.

Approximately 35 percent of the data used in the Impaired Surface Waters Rule assessment was provided by individual organizations that for various reasons, such as time constraints or resource limitations, were not able to enter their data into the national database. The organizations providing the largest datasets include the South Florida, Southwest Florida, and St. Johns River Water Management Districts; the USGS; and the

University of Florida LakeWatch volunteer monitoring group. Several of these databases are readily available to the public via the Internet: the South Florida Water Management District at <http://www.envirobase.usgs.gov/>, the USGS at <http://water.usgs.gov/>, and LakeWatch at <http://lakewatch.ifas.ufl.edu/>.

The Department created the Impaired Surface Waters Rule Database in 2002 to evaluate data simultaneously in accordance with the Impaired Surface Waters Rule methodology for every basin in the state, based on the appropriate data “window.” For the Verified List assessment, the window is 7.5 years (for the Impaired Surface Waters Rule Database), and the Planning List assessment window is 10 years. **Table C.2** shows the periods of record for the Verified and Planning Lists for the five basin groups.

The evaluation of water quality in the state’s basins also includes some qualitative information. These sources are described in the Basin Status Reports and Water Quality Assessment Reports for each basin.

Table C.2: Data Used in Developing the Planning and Verified Lists, First Basin Rotation Cycle

Basin Group	Reporting	Period of Data Record Used in Impaired Surface Waters Rule Evaluation
Group 1	Planning List	January 1, 1989–December 31, 1998
	Verified List	January 1, 1995–June 30, 2002
Group 2	Planning List	January 1, 1991–December 31, 2000
	Verified List	January 1, 1996–June 30, 2003
Group 3	Planning List	January 1, 1992–December 31, 2001
	Verified List	January 1, 1997–June 30, 2004
Group 4	Planning List	January 1, 1993–December 31, 2002
	Verified List	January 1, 1998–June 30, 2005
Group 5	Planning List	January 1, 1994–December 31, 2003
	Verified List	January 1, 1999–June 30, 2006

Note: Typically, a 10-year data record is used for the development of the Planning Lists, and a 7.5-year record is used for the Verified Lists.

Methodology

To determine the status of surface water quality in individual river basins in Florida, three categories of data—chemistry data, biological data, and fish consumption advisories—were evaluated to determine potential impairments for the four designated use attainment categories discussed earlier: aquatic life, primary contact and recreation, fish and shellfish consumption, drinking water use, and protection of human health.

Aquatic Life Based Attainment

The Impaired Surface Waters Rule follows the principle of independent applicability. A waterbody is listed for potential impairment of aquatic life use support based on

exceedances of any one of four types of water quality indicators (numeric water quality criteria, nutrient thresholds, biological thresholds, and toxicity data).

EXCEEDANCES OF NUMERIC WATER QUALITY CRITERIA

The chemistry data from STORET used in evaluating impairment were also used for preparing the state’s 305(b) report. Only ambient surface water quality stations were included in the assessment of impairment. Water quality information from point sources or wells was excluded. Monitoring stations were classified as one of five waterbody types—spring, stream, lake, estuary, or blackwater—based on criteria described in the latest 305(b) report. The assessments included the following parameters:

Metals	Arsenic, aluminum, cadmium, chromium VI, chromium III, copper, iron, lead, mercury, nickel, selenium, silver, thallium, and zinc
Nutrients	Chlorophyll <i>a</i> for streams and estuaries, and Trophic State Index (TSI) (chlorophyll <i>a</i> , total nitrogen, and total phosphorus) for lakes
Conventional	Dissolved oxygen (DO), fecal coliforms, total coliforms, pH, unionized ammonia

The requirements for placing waters on the Planning List included a minimum of 10 temporally independent samples from the 10-year period of record shown in **Table C.2**, unless there were 3 exceedances of water quality or 1 exceedance of an acute toxicity criterion in a three-year period. The screening methodology for the Verified List requires at least 20 samples from the last 5 years preceding the Planning List assessment. An exceedance, meaning that water quality criteria or standards are not met, is recorded any time the criterion is exceeded by any amount. An exceedance for DO, however, means that a waterbody does not meet the DO criterion, rather than an actual exceedance of the criterion.

To determine if a water should be placed on the Planning List for each parameter, the chemical data were analyzed using a computer program written to assess the data, based on criteria established in the Impaired Surface Waters Rule, with two exceptions. First, unionized ammonia data were not analyzed by the program, but rather with an Excel spreadsheet. Second, because the full complexity of the pH criterion could not be programmed, the incomplete listings for pH are not included. They will be further examined while additional data are collected during Phase 2 of the watershed management cycle. Data analysis and statistical summaries of waterbody identification numbers (WBIDs), waterbody types, and parameters obtained from the STORET Database were conducted using Access, SAS statistical software, and ArcView geographic information system (GIS) applications

The data for metals and conventional parameters were compared with the state surface water quality criteria in Section 62-302.530, F.A.C. (Identification of Impaired

Surface Waters Rule). The rule contains a table of sample numbers versus exceedances. A waterbody was placed on the Planning List if there was at least 80 percent confidence that the actual criteria exceedance rate was greater than or equal to 10 percent. To be placed on the Verified List, at least a 90 percent confidence rate was required.

EXCEEDANCES OF NUTRIENT THRESHOLDS

The state currently has a narrative nutrient criterion instead of a numeric value for nutrient thresholds. The narrative criterion states, “In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.” The Impaired Surface Waters Rule provides an interpretation of the narrative nutrient criterion. In general, the Trophic State Index (TSI) and the annual mean chlorophyll *a* values are the primary means for assessing whether a waterbody should be assessed further for nutrient impairment.

The rule also considers other information that might indicate an imbalance in flora or fauna due to nutrient enrichment, such as algal blooms, excessive macrophyte growth, a decrease in the distribution (either in density or aerial coverage) of sea grasses or other submerged aquatic vegetation, changes in algal species richness, and excessive diel oxygen swings.

Potential nutrient impairment was evaluated by calculating annual mean chlorophyll *a* values for estuaries and streams and the TSI for lakes. For lakes, the TSI was calculated using chlorophyll *a*, total phosphorus, and total nitrogen measurements. Direct evidence of imbalances of flora and fauna in waterbodies was also considered in the evaluation of nutrient impairments.

In estuarine areas, a water was considered nutrient enriched if the annual mean chlorophyll *a* values were greater than 11 micrograms per liter ($\mu\text{g/L}$) or if annual mean chlorophyll *a* values increased by more than 50 percent over historical values for at least two consecutive years. For streams, a water was considered nutrient enriched if the annual mean chlorophyll *a* values were greater than 20 $\mu\text{g/L}$ or if the annual mean increased by more than 50 percent over historical values for at least two consecutive years.

A lake with a mean color greater than 40 platinum cobalt units (PCUs) was considered nutrient enriched if the annual mean TSI exceeded 60. A lake with a mean color less than or equal to 40 PCUs was considered nutrient enriched if the annual mean TSI exceeded 40. In addition, a lake was considered nutrient enriched if there was an increase in TSI over the 1989 to 2000 period or if TSI measurements were 10 units higher than historical values.

EXCEEDANCES OF BIOLOGICAL THRESHOLDS

Bioassessments were carried out for streams, lakes, canals, and rivers using the Impaired Surface Waters Rule as guidance and following the Department’s standard operating procedures, which provide definitions and specific methods for the generation and analysis of bioassessment data. These are referenced in the individual bioassessment data tables contained in the Basin Status Reports. The purpose behind using a bioassessment methodology in surface water characterizations is that biological

components of the environment manifest long-term water quality conditions and thus provide a better indication of a waterbody's true health than discrete chemical or physical measurements alone. Similar to water quality criteria, bioassessment methods involve the identification of a biological reference condition, based on data from unimpaired or least impacted waters in a given region.

For the Planning and Verified List assessments, the reference condition data were used to establish expected scores, ranging from best to worst, for various measures of community structure and function, such as numbers or percentages of particular species or feeding groups. Data on community structure and function from waters of unknown quality in the same region as reference waters were compared with the expected scores of metrics to evaluate their biological integrity.

Metrics (e.g., number of taxa, percent Diptera, percent filter feeders) were used independently and as an aggregated group called an index. Indices have advantages over individual metrics in that they can integrate several related metrics into one score that reflects a wider range of biological variables. A number of bioassessment metrics and indices exist for assessing populations of plant and animal life, including fish, diatoms (e.g., microscopic algae and unicellular plankton), and macroinvertebrates (e.g., insects, crayfish, snails, and mussels).

Only macroinvertebrate data from ambient sites in state surface waters were used in the bioassessments analyzed for the Planning and Verified Lists. The data included sites designated as test and background sites for NPDES fifth-year inspections, but excluded data from effluent outfalls from discharging facilities or data from monitoring sites not clearly established to collect ambient water quality data. Because site-specific habitat and physicochemical assessment information (e.g., percent suitable macroinvertebrate habitat, water velocities, extent of sand or silt smothering, and riparian [*Definition: Of, on, or relating to the banks of a natural course of water.*] buffer zone widths) was not available at the time of reporting, it was not included. However, this information is instrumental in pinpointing the causes for failed bioassessment metrics and will be included in future reporting.

The data used to develop the Planning and Verified Lists were obtained from the Department's Biological Database (SBIO) and the EPA's STORET Water Quality Database, where it could be substantiated that the data were generated in compliance with the bioassessment standard operating procedures referenced in the Impaired Surface Waters Rule (Section 62-303.330, F.A.C.).

The data from these databases are used without regard to the randomness of sample site selection. For the purposes of the Basin Status Reports, the seasons are defined as follows: winter (1/1–3/31), spring (4/1–6/30), summer (7/1–9/30), and fall (10/1–12/31). Wet seasons are generally spring and summer, and dry seasons are fall and winter, although conditions can vary in the state as a whole.

LAKE CONDITION INDEX

The scoring of the individual metrics of the Lake Condition Index (LCI), except percent Diptera, was performed according to the following formula:

$100(B/A)$ where A = the 95 percentile of the reference population and B = observed value

For percent Diptera, the following formula was used:

$100(100-B)/(100-A)$ where A = the 95 percentile of the reference population and B = observed value

An average LCI score was calculated by averaging the scores of the six metrics in the method: total number of taxa; total number of taxa belonging to the orders Ephemeroptera, Odonata, and Trichoptera (EOT taxa); percent EOT taxa; Shannon-Wiener Diversity Index score; Hulbert Index score; and percent Dipteran individuals. LCI calculations were only provided for clear lakes (≤ 20 platinum cobalt units [PCUs]). As macroinvertebrate-based indices have not been shown to assess colored lakes in Florida accurately (> 20 PCUs), they have been excluded from bioassessments. A poor or very poor rating based on the average score constituted a failed bioassessment, based on the Impaired Surface Waters Rule.

STREAM CONDITION INDEX

A total Stream Condition Index (SCI) score was calculated by adding the scores of the seven metrics in the method: total number of taxa; total number of taxa belonging to the orders Ephemeroptera, Plecoptera, and Trichoptera (EPT taxa); percent Chironomid taxa; percent dominant taxa; percent Diptera; percent filter feeders; and Florida Index. A poor or very poor rating based on the total score constituted a failed bioassessment, based on the Impaired Surface Waters Rule. The Basin Status Reports contain definitions and specific methods for the generation and analysis of bioassessment data.

BIORECON

To establish an impairment rating based on BioRecon data, three metrics were used: the Florida Index score, total number of taxa, and total number of EPT taxa. If all three metrics failed to meet thresholds, the water was deemed “impaired” based on the Impaired Surface Waters Rule.

BIOLOGICAL INTEGRITY STANDARD

Quantitative data, generated through the use of Hester-Dendy artificial substrate samplers, were used to calculate Shannon-Wiener Diversity Index scores for paired background and test sites, as specified in the Biological Integrity Standard of Subsection 62-302.530(11), F.A.C. One failure of the standard meant that a waterbody segment was listed as potentially impaired.

EVALUATION OF TOXICITY DATA

Although the Impaired Surface Waters Rule describes the use of toxicity data for the assessment of aquatic life-based attainment, no ambient toxicity data are available for assessment and this metric was not used.

Primary Contact and Recreation Attainment

For Class I, II, or III waters, a waterbody was potentially impaired if the following criteria were met:

- The waterbody segment did not meet the applicable water quality criteria for bacteriological quality,
- The waterbody segment included a bathing area that was closed by a local health department or county government for more than 1 week or more than once during a calendar year based on bacteriological data,
- The waterbody segment included a bathing area for which a local health department or county government issued closures, advisories, or warnings totaling 21 days or more during a calendar year based on bacteriological data, or
- The waterbody segment included a bathing area that was closed or had advisories or warnings for more than 12 weeks during a calendar year based on previous bacteriological data or on derived relationships between bacteria levels and rainfall or flow.

Fish and Shellfish Consumption Attainment

For Class I, II, or III waters, a waterbody was potentially impaired if it did not meet the applicable Class II water quality criteria for bacteriological quality, or if a fish consumption advisory had been issued. Fish consumption advisories were based on the Florida Department of Health’s “limited consumption” or “no consumption” advisories for surface waters because of high levels of mercury in fish tissue. In addition, for Class II waters, waterbody segments that had been approved for shellfish harvesting but were downgraded to a more restrictive classification were listed as potentially impaired.

Drinking Water Attainment and Protection of Human Health

For Class I waters, a waterbody was potentially impaired if it did not meet the applicable Class I water quality criteria.

Appendix D: Integrated Assessment (Master List) for the Lake Worth Lagoon–Palm Beach Coast Basin

Data collected since the June 2003 update of the 303(d) list were used to update the listing status of waters. **Table D.1** contains the listing status of all assessed waters in the basin as of March 2, 2005. All of the waters in the table are Class III fresh water. It should be noted that subsequent to the update of the 303(d) list, some waterbody segments were further subdivided to produce separate segments for lakes versus their surrounding watersheds. Therefore, **Table D.1** shows the waterbody identification numbers (WBIDs) under which these segments were designated in the 1998 303(d) list, as well as the new or currently recognized WBIDs for them.

Information in this appendix was obtained from an inventory of the Legacy and modernized STORET databases, as well as data contributed directly to the Florida Department of Environmental Protection (Department) by individual data providers. **Table D.2** includes only stations with data from the Planning and Verified assessment periods.

Table D.1: Integrated Water Quality Report (Master List) for the Lake Worth Lagoon–Palm Beach Coast Basin, by Planning Unit

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
L-8 PLANNING UNIT								
3231	BASIN 8	STREAM		No Data	3a			PP = No Data; VP = No Data
3233	L-8	STREAM	Biology	No Data	3c	(High)	2005	PP = No Biology; VP = No Biology Moved to Category 3C per Rule 62-303.300(2).
3233	L-8	STREAM	Mercury	Planning	3c	(High)	2005	PP = 6 / 34 Potentially Impaired; VP = 1 / 17 Insufficient Data. Flaws in analysis of samples not using clean technique.
3233	L-8	STREAM	Nutrients (Chl-a)	Not impaired	2			PP = Insufficient Data; VP = Not Impaired The annual average Chla concentration in 2002 was 5.65 ug/L. Individual Chla observations range from 1.0 to 10.76 ug/L.
3233	L-8	STREAM	Copper	Not impaired	2			PP = 0 / 37 Not impaired; VP = 0 / 21 Not impaired

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3233	L-8	STREAM	Dissolved Oxygen	Impaired	5	High	2005	PP = 88 / 165 Potentially Impaired; VP = 62 / 136 Impaired Linked to elevated TN level. TN above the screening level for both the PP and VP. (TN during PP median 1.826 mg/l and; TN during VP median 1.951 mg/l).potentially included within Lake Okeechobee project/ CERP Rock pit storage Project. Requires comment from Daryll.
3233	L-8	STREAM	Iron	Planning	3c			PP = 31 / 37 Potentially Impaired; VP = 13 / 18 Insufficient Data
3233	L-8	STREAM	Lead	Not impaired	2			PP = 1 / 37 Not impaired; VP = 2 / 19 Insufficient Data
3233	L-8	STREAM	Turbidity	Planning	3c	(High)	2005	PP = 59 / 168 Potentially Impaired; VP = 59 / 131 Impaired
C-15 PLANNING UNIT								

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3262	E-4 CANAL	STREAM	Nutrients (Chl-a)	Not impaired	2			PP = Insufficient Data; VP = Impaired, with one annual mean chl a value above 20 ug/l in 2002, chl-a mean = 39.976. Chl-a data indicates impaired, however, biological information provided in fisheries report indicated aquatic life use support is being met. See Fisheries Report in footnote T.
3262	E-4 CANAL	STREAM	Copper	Insufficient Data	3b			PP = 2 / 18 Insufficient Data; VP = 2 / 10 Insufficient Data
3262	E-4 CANAL	STREAM	Dissolved Oxygen	Not impaired	2			PP = 47 / 140 Potentially Impaired; VP = 23 / 99 Impaired. DO data indicates impaired, however, biological information provided in fisheries report indicated aquatic life use support is being met. See Fisheries Report in footnote T.
3262	E-4 CANAL	STREAM	Fecal Coliform	Insufficient Data	3b			PP = 2 / 24 Not impaired; VP = 1 / 8 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3262	E-4 CANAL	STREAM	Iron	Planning	3c			PP = 25 / 40 Potentially Impaired; VP = 8 / 25 Impaired. Verification pending evaluation of potential duplicate data and possible natural site conditions. See Fisheries Report in footnote T.
3262	E-4 CANAL	STREAM	Mercury	Insufficient Data	3b			PP = 1 / 15 Not impaired; VP = 0 / 5 Insufficient Data
3262	E-4 CANAL	STREAM	Lead	Insufficient Data	3b			PP = 0 / 18 Not impaired; VP = 0 / 10 Insufficient Data
3262	E-4 CANAL	STREAM	Total Coliform	Insufficient Data	3b			PP = 1 / 16 Not impaired; VP = No data
3262	E-4 CANAL	STREAM	Turbidity	Not impaired	2			PP = 0 / 143 Not impaired; VP = 0 / 99 Not impaired
3262A	LAKE IDA	LAKE	Nutrients (Chl-a)	Insufficient Data	3b			PP = No Data; VP = Insufficient Data
3262A	LAKE IDA	LAKE	Copper	Insufficient Data	3b			PP = No Data; VP = 0 / 1 Insufficient Data
3262A	LAKE IDA	LAKE	Dissolved Oxygen	Not impaired	2			PP = 2 / 15 Not impaired; VP = 4 / 22 Not impaired
3262A	LAKE IDA	LAKE	Fecal Coliform	Insufficient Data	3b			PP = 0 / 9 Insufficient Data; VP = 0 / 1 Insufficient Data
3262A	LAKE IDA	LAKE	Lead	Insufficient Data	3b			PP = No Data; VP = 0 / 2 Insufficient Data
3262A	LAKE IDA	LAKE	Total Coliform	Insufficient Data	3b			PP = 0 / 9 Insufficient Data; VP = No data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3262A	LAKE IDA	LAKE	Nutrients (TSI)	Impaired	5	Medium	2010	PP = No data; VP = Impaired Limiting nutrient is phosphorus based on a TN/TP median of 11.43 (10 values) during the PP and a median of 10.95 (17 values) during the VP. VP - 1 TSI annual mean exceeded 60 (2002). 17 TN values, median 1.14 mg/L. 17 TP values, median 0.114 mg/L.
3262A	LAKE IDA	LAKE	Turbidity	Insufficient Data	3b			PP = 0 / 10 Not impaired; VP = 0 / 12 Insufficient Data
3262B	E-1 CANAL	STREAM	Copper	Insufficient Data	3b			PP = 0 / 11 Insufficient Data; VP = No Data
3262B	E-1 CANAL	STREAM	Dissolved Oxygen	Insufficient Data	3b			PP = 2 / 12 Not impaired; VP = 0 / 1 Insufficient Data
3262B	E-1 CANAL	STREAM	Fecal Coliform	Insufficient Data	3b			PP = 1 / 1 Insufficient Data; VP = No Data
3262B	E-1 CANAL	STREAM	Total Coliform	Insufficient Data	3b			PP = 0 / 12 Not impaired; VP = 0/1 Insufficient Data
3262B	E-1 CANAL	STREAM	Turbidity	Insufficient Data	3b			PP = 0 / 12 Not impaired; VP = 0 / 1 Insufficient Data
3262C	E-2 CANAL	STREAM		No Data	3a			PP = No Data; VP = No Data
3262D	E-3 CANAL	STREAM	Nutrients (Chl-a)	Insufficient Data	3b			PP = Insufficient Data; VP = Insufficient Data 2002 mean value 59.689 ug/l.

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3262D	E-3 CANAL	STREAM	Copper	Insufficient Data	3b			PP = 1 / 29 Not impaired; VP = 0 / 3 Insufficient Data.
3262D	E-3 CANAL	STREAM	Dissolved Oxygen	Planning	3c	Medium	2010	PP = 16 / 59 Planning list; VP = 7 / 17 Insufficient Data .
3262D	E-3 CANAL	STREAM	Fecal Coliform	Planning	3c	Medium	2010	PP = 6 / 34 Potentially Impaired; VP = 1 / 11 Insufficient Data
3262D	E-3 CANAL	STREAM	Lead	Insufficient Data	3b			PP = 0 / 9 Insufficient Data; VP = No data
3262D	E-3 CANAL	STREAM	Iron	Planning	3c			PP = 12 / 13 Potentially Impaired; VP = No Data. Potential duplication of data.
3262D	E-3 CANAL	STREAM	Mercury	Insufficient Data	3b			PP = 0 / 7 Insufficient Data; VP = No Data
3262D	E-3 CANAL	STREAM	Total Coliform	Insufficient Data	3b			PP = 2 / 33 Not impaired; VP = 3 / 11 Insufficient Data
3262D	E-3 CANAL	STREAM	Turbidity	Insufficient Data	3b			PP = 0 / 61 Not impaired; VP = 0 / 17 Insufficient Data
C-16 and C-16 NORTH PLANNING UNIT								
3256	C-16	STREAM		No Data	3a			PP = No Data; VP = No Data
3256A	LAKE OSBORNE	LAKE	Nutrients (Chl-a)	No Data	3a			PP = No Data; VP = No Data
3256A	LAKE OSBORNE	LAKE	Copper	Insufficient Data	3b			PP = No data; VP = 0 / 4 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3256A	LAKE OSBORNE	LAKE	Dissolved Oxygen	Not impaired	4c			PP = 3 / 29 Not impaired; VP = 11 / 35 Impaired Total nitrogen and total phosphorus did not exceed the 70th percentile thresholds (TN median = 0.96 mg/L, TP median = 0.07 mg/L).
3256A	LAKE OSBORNE	LAKE	Fecal Coliform	Insufficient Data	3b			PP = 4 / 24 Not impaired; VP = 2 / 12 Insufficient Data
3256A	LAKE OSBORNE	LAKE	Lead	Insufficient Data	3b			PP = No Data; VP = 0 / 3 Insufficient Data
3256A	LAKE OSBORNE	LAKE	Total Coliform	Planning	3c	Medium	2010	PP = 4 / 24 Potentially Impaired; VP = 4 / 11 Insufficient Data
3256A	LAKE OSBORNE	LAKE	Nutrients (TSI)	Not impaired	2			PP = Insufficient Data; VP = Not Impaired
3256A	LAKE OSBORNE	LAKE	Turbidity	Not impaired	2			PP = 0 / 28 Not impaired; VP = 0 / 24 Not impaired

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3256B	BOYNTON CANAL	STREAM	Nutrients (Chl-a)	Not impaired	2			PP = Insufficient Data; VP = Impaired, with one annual mean chl-a value above 20 ug/L in 2002, chl-a mean = 25.495 ug/L. Chl-a data indicates impaired, however, biological information provided in fisheries report indicated aquatic life use support is being met. See Fisheries Report in footnote T.
3256B	BOYNTON CANAL	STREAM	Copper	Insufficient Data	3b			PP = 0 / 42 Not impaired; VP = 0 / 17 Insufficient Data
3256B	BOYNTON CANAL	STREAM	BOD 5Day	Planning	3c	Medium	2010	PP = Potentially Impaired; VP = No Data
3256B	BOYNTON CANAL	STREAM	Dissolved Oxygen	Not impaired	2			PP = 73 / 182 Potentially Impaired; VP = 30 / 104 Impaired DO data indicates impaired, however, biological information provided in fisheries report indicated aquatic life use support is being met. See Fisheries Report in footnote T.

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WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3256B	BOYNTON CANAL	STREAM	Fecal Coliform	Not impaired	2			PP = 3 / 30 Not impaired; VP = 3 / 17 Insufficient Data This WBID is being delisted based on data from the planning period.
3256B	BOYNTON CANAL	STREAM	Iron	Planning	3c			PP = 39 / 53 Potentially Impaired; VP = 8 / 25 Impaired. Verification pending evaluation of potential duplicate of data and possible natural site conditions. See Fisheries Report in footnoteT.
3256B	BOYNTON CANAL	STREAM	Mercury	Insufficient Data	3b			PP = 1 / 22 Not impaired; VP = 0 / 5 Insufficient Data
3256B	BOYNTON CANAL	STREAM	Lead	Insufficient Data	3b			PP = 0 / 27 Not Impaired; VP = 0 / 11 Insufficient Data
3256B	BOYNTON CANAL	STREAM	Total Coliform	Not impaired	2			PP = 5 / 41 Not impaired; VP = 2 / 17 Insufficient Data This WBID is being delisted based on data from the planning period.
3256B	BOYNTON CANAL	STREAM	Turbidity	Not impaired	2			PP = 0 / 187 Not impaired; VP = 0 / 104 Not impaired
3256C	L-14 CANAL	STREAM		No Data	3a			PP = No Data; VP = No Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3256D	CANAL E-4	STREAM	Nutrients (Chl-a)	Not impaired	2			PP = Insufficient Data; VP = Not impaired The annual average Chla concentration for 2002 was 19.80 ug/L. Individual Chla observations range from 2.0 to 115.0 ug/L.
3256D	CANAL E-4	STREAM	Dissolved Oxygen	Insufficient Data	3b			PP = 0 / 9 Insufficient Data; VP = No data
3256D	CANAL E-4	STREAM	Fecal Coliform	Insufficient Data	3b			PP = 1 / 9 Insufficient Data; VP = No data
3256D	CANAL E-4	STREAM	Total Coliform	Insufficient Data	3b			PP = 1 / 9 Insufficient Data; VP = No data
3256D	CANAL E-4	STREAM	Turbidity	Insufficient Data	3b			PP = 0 / 9 Insufficient Data; VP = No data
3257	C-16N	STREAM		No Data	3a			PP = No Data; VP = No Data
C-17 PLANNING UNIT								
3242	C-17 SEGMENT	STREAM	BOD 5Day	No Data	3c	Medium	2010	PP = No Data; VP = No Data Moved to Category 3C per Rule 62-303.300(2).
3242	C-17 SEGMENT	STREAM	Fecal Coliform	No Data	3c	Medium	2010	PP = No Data; VP = No Data Moved to Category 3C per Rule 62-303.300(2).
3242	C-17 SEGMENT	STREAM	Total Coliform	No Data	3c	Medium	2010	PP = No Data; VP = No Data Moved to Category 3C per Rule 62-303.300(2).
3242	C-17 SEGMENT	STREAM	Nutrients (Chl-a)	Not impaired	2			PP = No Data; VP = Not impaired

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WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3242	C-17 SEGMENT	STREAM	Copper	Insufficient Data	3b			PP = 0 / 7 Insufficient Data; VP = 0 / 1 Insufficient Data
3242	C-17 SEGMENT	STREAM	Dissolved Oxygen	Planning	3c	Medium	2010	PP = 33 / 45 Potentially Impaired; VP = 5 / 6 Insufficient Data
3242	C-17 SEGMENT	STREAM	Iron	Planning	3c			PP = 14 / 16 Potentially Impaired; VP = No Data
3242	C-17 SEGMENT	STREAM	Mercury	Insufficient Data	3b			PP = 1 / 7 Insufficient Data; VP = No Data
3242	C-17 SEGMENT	STREAM	Lead	Insufficient Data	3b			PP = 0 / 7 Insufficient Data; VP = 0 / 1 Insufficient Data
3242	C-17 SEGMENT	STREAM	Turbidity	Insufficient Data	3b			PP = 0 / 48 Not impaired; VP = 0 / 6 Insufficient Data
3242A	PB STATIONS/ D CANALS	STREAM	Nutrients (Chl-a)	Impaired	5	Medium	2010	PP = Insufficient Data; VP = Impaired, with one annual mean chl a value above 20 ug/l in 2002, chl-a mean = 24.571 ug/L. Co-limiting of nitrogen and phosphorus based upon TN/TP ratios [TN median = 1.106 mg/L and TP median = 0.053 mg/L. PP median TN/TP ratio = 18.603 (200 values), VP median TN/TP ratio = 18.603 (114 values).
3242A	PB STATIONS/ D CANALS	STREAM	Copper	Insufficient Data	3b			PP = 0 / 22 Not impaired; VP = 0 / 13 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3242A	PB STATIONS/D CANALS	STREAM	Dissolved Oxygen	Impaired	5	Medium	2010	PP = 65 / 137 Potentially Impaired; VP = 37 / 99 Impaired Linked to nutrients, co-limitation of nitrogen and phosphorus, TN during VP = 1.016 mg/L, TP during VP = 0.053 mg/L.
3242A	PB STATIONS/D CANALS	STREAM	Fecal Coliform	Insufficient Data	3b			PP = 1 / 16 insufficient; VP = 1 / 7 Insufficient Data
3242A	PB STATIONS/D CANALS	STREAM	Iron	Planning	3c			PP = 27 / 40 Potentially Impaired; VP = 8 / 25 Impaired. Verification pending evaluation of potential duplication of data and possible natural site conditions.
3242A	PB STATIONS/D CANALS	STREAM	Mercury	Insufficient Data	3b			PP = 2 / 16 Insufficient Data; VP = 0 / 6 Insufficient Data
3242A	PB STATIONS/D CANALS	STREAM	Lead	Insufficient Data	3b			PP = 0 / 18 Insufficient Data; VP = 0 / 9 Insufficient Data
3242A	PB STATIONS/D CANALS	STREAM	Total Coliform	Insufficient Data	3b			PP = 1 / 16 Not impaired; VP = 0 / 7 Insufficient Data
3242A	PB STATIONS/D CANALS	STREAM	Turbidity	Not impaired	2			PP = 0 / 137 Not impaired; VP = 0 / 96 Not impaired
3242B	M CANAL EAST	STREAM	Nutrients (Chl-a)	Not impaired	2			PP = No Data; VP = Not impaired

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WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3242B	M CANAL EAST	STREAM	Copper	Insufficient Data	3b			PP = No Data; VP = 0 / 1 Insufficient Data
3242B	M CANAL EAST	STREAM	Dissolved Oxygen	Insufficient Data	3b			PP = No Data; VP = 2 / 6 Insufficient Data
3242B	M CANAL EAST	STREAM	Lead	Insufficient Data	3b			PP = No Data; VP = 0 / 1 Insufficient Data
3242B	M CANAL EAST	STREAM	Turbidity	Insufficient Data	3b			PP = No Data; VP = 0 / 6 Insufficient Data
C-51 PLANNING UNIT								
3245	C-51	STREAM	Nutrients (Chl-a)	Impaired	5	Medium	2010	PP = Insufficient Data; VP = Impaired The annual average Chl-a concentration for 2002 was 10.91 ug/L. Individual Chl-a observations range from 4.33 to 26.51 ug/L, however, impaired for Chl-a based on additional data from ERD. PP TN median = 1.706 mg/L, TP median = 0.073 mg/L, VP TN median = 1.8895 mg/L, TP median = 0.079 mg/L.
3245	C-51	STREAM	Copper	Not impaired	2			PP = 0 / 74 Not impaired; VP = 0 / 60 Not impaired

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3245	C-51	STREAM	Dissolved Oxygen	Impaired	5	Medium	2010	PP = 455 / 757 Potentially Impaired; VP = 393 / 620 Impaired Linked to elevated TN level. TN above the screening level for both the PP and VP. (TN during PP median 1.706 mg/l and; TN during VP median 1.89 mg/l).
3245	C-51	STREAM	Fecal Coliform	Not impaired	2			PP = 5 / 90 Not impaired; VP = 2 / 17 Insufficient Data This WBID is being delisted based on data from the planning period.
3245	C-51	STREAM	Iron	Planning	3c	Medium	2010	PP = 53 / 92 Potentially Impaired; VP = 29 / 76 Potentially Impaired. Verification pending evaluation of potential duplication of data and possible natural site conditions.
3245	C-51	STREAM	Mercury	Insufficient Data	3b			PP = 3 / 22 Not impaired; VP = 0 / 17 Insufficient Data
3245	C-51	STREAM	Total Coliform	Not impaired	2			PP = 10 / 101 Not impaired; VP = 2 / 17 Insufficient Data This WBID is being delisted based on data from the planning period.

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3245	C-51	STREAM	Lead	Not impaired	2			PP = 0 / 26 Not impaired; VP = 0 / 26 Not impaired
3245	C-51	STREAM	Turbidity	Not impaired	2			PP = 20 / 398 Not impaired; VP = 16 / 247 Not impaired
3245A	OKEEHEE LEE PARK	LAKE	Nutrients (Chl-a)	No data	3a			PP = No data; VP = No Data
3245A	OKEEHEE LEE PARK	LAKE	Dissolved Oxygen	Insufficient Data	3b			PP = 0 / 4 Insufficient Data; VP = No Data
3245A	OKEEHEE LEE PARK	LAKE	Iron	Planning	3c			PP = 0 / 8 Insufficient Data; VP = No Data. Verification pending evaluation of potential duplication of data and possible natural site conditions. See Fisheries Report in footnote.
3245A	OKEEHEE LEE PARK	LAKE	Nutrients (TSI)	Insufficient Data	3b			PP = Insufficient Data; VP = No Data
3245A	OKEEHEE LEE PARK	LAKE	Turbidity	Insufficient Data	3b			PP = 0 / 11 Not impaired; VP = 0 / 1 Insufficient Data
3245B	LAKE CLARKE	LAKE	Nutrients (Chl-a)	No Data	3a			PP = No Data; VP = no data
3245B	LAKE CLARKE	LAKE	Copper	Insufficient Data	3b			PP = 0 / 16 Not Impaired; VP = 0 / 9 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3245B	LAKE CLARKE	LAKE	Dissolved Oxygen	Impaired	5			PP = 57 / 113 Potentially Impaired; VP = 40 / 86 Impaired No BOD or Biological data available. Linked to nutrients, co-limiting of nitrogen and phosphorous. During PP TN median = 1.336 mg/L, TP median = 0.079 mg/L, during VP TN median = 1.379 mg/L, TP median = 0.081 mg/L.
3245B	LAKE CLARKE	LAKE	Fecal Coliform	Insufficient Data	3b			PP = No Data; VP = 0 / 1 Insufficient Data
3245B	LAKE CLARKE	LAKE	Iron	Planning	3c			PP = 11 / 16 Potentially Impaired; VP = 18 / 19 Insufficient Data.
3245B	LAKE CLARKE	LAKE	Mercury	Insufficient Data	3b			PP = 1 / 13 Insufficient Data; VP = 0 / 5 Insufficient Data
3245B	LAKE CLARKE	LAKE	Lead	Insufficient Data	3b			PP = 0 / 16 Insufficient Data; VP = 0 / 9 Insufficient Data.
3245B	LAKE CLARKE	LAKE	Nutrients (TSI)	Impaired	5	Medium	2010	PP = No Data; VP = Impaired TSI mean of 62.45 during VP, TN = 1.336 mg/L (190 values) and TP = 0.079 mg/L (191 values) in PP; TN = 1.3785 mg/L (106 values) and TP 0.081 mg/L (106 values) in VP.

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3245B	LAKE CLARKE	LAKE	Turbidity	Not impaired	2			PP = 0 / 114 Not impaired; VP = 0 / 83 Not impaired
3245C1	LAKE MAGONIA	LAKE	Nutrients (Chl-a)	Insufficient Data	3b			PP = No Data; VP = Insufficient Data
3245C1	LAKE MAGONIA	LAKE	Copper	Insufficient Data	3b			PP = No Data; VP = 0 / 1 Insufficient Data
3245C1	LAKE MAGONIA	LAKE	Dissolved Oxygen	Insufficient Data	3b			PP = 0 / 2 Insufficient Data; VP = 1 / 8 Insufficient Data
3245C1	LAKE MAGONIA	LAKE	Fecal Coliform	Insufficient Data	3b			PP = No data; VP = 0/1 Insufficient Data
3245C1	LAKE MAGONIA	LAKE	Lead	Insufficient Data	3b			PP = No Data; VP = 0 / 1 Insufficient Data
3245C1	LAKE MAGONIA	LAKE	Nutrients (TSI)	Insufficient Data	3b			PP = No Data; VP = Insufficient Data
3245C1	LAKE MAGONIA	LAKE	Turbidity	Insufficient Data	3b			PP = No Data; VP = 0 / 6 Insufficient Data
3245C2	CLEAR LAKE	LAKE	Nutrients (Chl-a)	Insufficient Data	3b			PP = No Data; VP = Insufficient Data
3245C2	CLEAR LAKE	LAKE	Copper	Insufficient Data	3b			PP = No Data; VP = 0 / 1 Insufficient Data
3245C2	CLEAR LAKE	LAKE	Dissolved Oxygen	Insufficient Data	3b			PP = 0 / 1 Insufficient Data; VP = 0 / 7 Insufficient Data
3245C2	CLEAR LAKE	LAKE	Fecal Coliform	No Data	3a			PP = No data; VP = No data
3245C2	CLEAR LAKE	LAKE	Total Coliform	No Data	3a			PP = No data; VP = No data
3245C2	CLEAR LAKE	LAKE	Nutrients (TSI)	Insufficient Data	3b			PP = No Data; VP = Insufficient Data
3245C2	CLEAR LAKE	LAKE	Turbidity	Insufficient Data	3b			PP = No Data; VP = 0 / 6 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3245C2	CLEAR LAKE	LAKE	Lead	Insufficient Data	3b			PP = No Data; VP = 0 / 1 Insufficient Data
3245C3	CLEAR LAKE DRAIN	LAKE		No Data	3a			PP = No Data; VP = No Data
3245D	M CANAL WEST	STREAM		No Data	3a			PP = No Data; VP = No Data
HILLSBORO CANAL PLANNING UNIT								
3264	HILLSBORO CANAL	STREAM	Nutrients (Chl-a)	Not impaired	2			PP = Not impaired; VP = Not impaired
3264	HILLSBORO CANAL	STREAM	Copper	Insufficient Data	3b			PP = 0 / 12 Not impaired; VP = 0/3 Insufficient Data
3264	HILLSBORO CANAL	STREAM	Dissolved Oxygen	Not impaired	2			PP = 118 / 183 Potentially Impaired; VP = 90 / 144 Impaired. No BOD data, linked to nutrients, co-limiting of nitrogen and phosphorous. During PP TN median = 1.465 mg/L, TP median = 0.079 mg/L, during VP TN median = 1.5162 mg/L, TP median = 0.0695 mg/L.
3264	HILLSBORO CANAL	STREAM	Fecal Coliform	Not impaired	2			PP = 15 / 168 Not impaired; VP = 8 / 140 Not impaired
3264	HILLSBORO CANAL	STREAM	Iron	Insufficient Data	3b			PP = 0 / 12 Not impaired; VP = 0 / 6 Insufficient Data
3264	HILLSBORO CANAL	STREAM	Mercury	Insufficient Data	3b			PP = No data; VP = 1 / 3 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3264	HILLSBORO CANAL	STREAM	Historic Chlorophyll	Not impaired	2	Medium	2010	PP = Potentially Impaired; VP = Impaired For the historical listing (1997-2001), annual average Chl(a) values in the verified period exceeded the minimum historical annual average value of 8.159 ug/l by more than 50% in 1997 (14.831 ug/l), 2000 (13.2 ug/l), 2001 (15.1 ug/l). Co-limiting of nitrogen and phosphorus based upon TN/TP ratios [TN median = 1.52 mg/L and TP median = 0.067 mg/L. PP median TN/TP ratio = 19.25 (180 values), VP median TN/TP ratio = 21.55 (143 values).
3264	HILLSBORO CANAL	STREAM	Lead	Insufficient Data	3b			PP = 1 / 1 Insufficient Data; VP = 1 / 4 Insufficient Data
3264	HILLSBORO CANAL	STREAM	Total Coliform	Not impaired	2			PP = 8 / 146 Not impaired; VP = 3 / 85 Not impaired
3264	HILLSBORO CANAL	STREAM	Turbidity	Not impaired	2			PP = 0 / 178 Not impaired; VP = 0 / 141 Not impaired

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3264A	E-1 CANAL	STREAM	Nutrients (Chl-a)	Not impaired	2			PP = No Data; VP = Potentially impaired, with one annual mean chl-a value above 20 ug/L in 2003, chl-a mean = 32.144 ug/L. Chl-a data indicates impaired, however, biological information provided in fisheries report indicated aquatic life use support is being met. See Fisheries Report in footnote T.
3264A	E-1 CANAL	STREAM	Copper	Insufficient Data	3b			PP = No Data; VP = 3 / 6 Insufficient Data
3264A	E-1 CANAL	STREAM	Dissolved Oxygen	Not impaired	2			PP = 7 / 10 Potentially Impaired; VP = 9 / 18 Insufficient Data. DO data indicates impaired, however, biological information provided in fisheries report indicated aquatic life use support is being met. See Fisheries Report in footnote T.
3264A	E-1 CANAL	STREAM	Fecal Coliform	Insufficient Data	3b			PP = 0 / 9 Insufficient Data; VP = No data
3264A	E-1 CANAL	STREAM	Total Coliform	Insufficient Data	3b			PP = 0 / 9 Insufficient Data; VP = No data
3264A	E-1 CANAL	STREAM	Turbidity	Insufficient Data	3b			PP = 1 / 10 Not impaired; VP = 0 / 15 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3264B	E-2 CANAL	STREAM	Copper	Insufficient Data	3b			PP = 0 / 11 Not impaired; VP = No Data
3264B	E-2 CANAL	STREAM	Dissolved Oxygen	Insufficient Data	3b			PP = 2 / 11 Not impaired; VP = No Data
3264B	E-2 CANAL	STREAM	Total Coliform	Insufficient Data	3b			PP = 0 / 11 Not Impaired; VP = No Data
3264B	E-2 CANAL	STREAM	Turbidity	Insufficient Data	3b			PP = 0 / 11 Not impaired; VP = No Data
3264C	E-3 CANAL	STREAM	Conductance	Insufficient Data	3b			PP = 0 / 3 Insufficient Data; VP = No data
3264D	E-4 CANAL	STREAM	Fecal Coliform	No Data	3c	Medium	2010	PP = No Data; VP = No Data Moved to Cat 3c per Rule 62-303.300(2).
3264D	E-4 CANAL	STREAM	Nutrients (Chl-a)	Impaired	5	Medium	2010	PP = Insufficient Data; VP = Impaired, with one annual mean chl a value above 20 ug/L in 2002, chl-a mean = 27.825 ug/L. Co-limiting of nitrogen and phosphorus based upon TN/TP ratios [TN median = 0.95 mg/L and TP median = 0.1595 mg/L., VP median TN/TP ratio = 5.87 (10 obs)].
3264D	E-4 CANAL	STREAM	Copper	Insufficient Data	3b			PP = 0 / 10 Not impaired; VP = 0 / 1 Insufficient Data
3264D	E-4 CANAL	STREAM	Dissolved Oxygen	Planning	3c	Medium	2010	PP = 3 / 10 Potentially Impaired; VP = 8 / 12 Insufficient Data
3264D	E-4 CANAL	STREAM	Lead	Insufficient Data	3b			PP = No data; VP = 0 / 1 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3264D	E-4 CANAL	STREAM	Total Coliform	Insufficient Data	3b			PP = 0 / 10 Not impaired; VP = No Data
3264D	E-4 CANAL	STREAM	Turbidity	Insufficient Data	3b			PP = 0 / 10 Not impaired; VP = 0 / 12 Insufficient Data
3264X	LAKEVIEW LAKES	LAKE	Nutrients (Chl-a)	Insufficient Data	3b			PP = Insufficient Data; VP = Insufficient Data
3264X	LAKEVIEW LAKES	LAKE	Dissolved Oxygen	Insufficient Data	3b			PP = 0 / 3 Insufficient Data; VP = 0 / 3 Insufficient Data
3264X	LAKEVIEW LAKES	LAKE	Nutrients (TSI)	Insufficient Data	3b			PP = Insufficient Data; VP = Insufficient Data
3264X	LAKEVIEW LAKES	LAKE	Turbidity	Insufficient Data	3b			PP = 0 / 2 Insufficient Data; VP = 0 / 2 Insufficient Data
INTRACOASTAL PLANNING UNIT								
3226E	ICCW AB ROYAL PALM BRG	ESTUARY	Nutrients (Chl-a)	Not impaired	2			PP = Not impaired; VP = Not Impaired
3226E	ICCW AB ROYAL PALM BRG	ESTUARY	Copper	Insufficient Data	3b			PP = 5 / 5 Potentially Impaired; VP = 5 / 8 Insufficient Data
3226E	ICCW AB ROYAL PALM BRG	ESTUARY	Dissolved Oxygen	Not impaired	2			PP = 2 / 105 Not impaired ; VP = 2 / 56 Not impaired
3226E	ICCW AB ROYAL PALM BRG	ESTUARY	Fecal Coliform	Not impaired	2			PP = 8 / 96 Not impaired; VP = 1 / 50 Not impaired
3226E	ICCW AB ROYAL PALM BRG	ESTUARY	Lead	Insufficient Data	3b			PP = 2 / 2 Insufficient Data; VP = 2 / 2 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3226E	ICCW AB ROYAL PALM BRG	ESTUARY	Total Coliform	Not impaired	2			PP = 0 / 49 Not impaired; VP = 1 / 33 Not impaired
3226E	ICCW AB ROYAL PALM BRG	ESTUARY	Turbidity	Not impaired	2			PP = 0 / 101 Not impaired; VP = 0 / 55 Not impaired
3226E1	LAKE WORTH LAGOON NORTH SEG	ESTUARY	Nutrients (Chl-a)	Not impaired	2	Medium	2010	PP = Not impaired; VP = Not Impaired
3226E1	LAKE WORTH LAGOON NORTH SEG	ESTUARY	Copper	Not impaired	2			PP = 8 / 10 Potentially Impaired; VP = 7 / 52 Not Impaired
3226E1	LAKE WORTH LAGOON NORTH SEG	ESTUARY	Dissolved Oxygen	Not impaired	2			PP = 2 / 61 Not impaired; VP = 3 / 86 Not impaired
3226E1	LAKE WORTH LAGOON NORTH SEG	ESTUARY	Fecal Coliform	Not impaired	2			PP = 4 / 42 Not impaired; VP = 2 / 21 Not Impaired
3226E1	LAKE WORTH LAGOON NORTH SEG	ESTUARY	Lead	Planning	3c			PP = 4 / 5 Potentially Impaired; VP = 4 / 10 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3226E1	LAKE WORTH LAGOON NORTH SEG	ESTUARY	Total Coliform	Not impaired	2			PP = 3 / 42 Not impaired; VP = 1 / 21 Not impaired
3226E1	LAKE WORTH LAGOON NORTH SEG	ESTUARY	Turbidity	Not impaired	2			PP = 1 / 55 Not impaired; VP = 1 / 84 Not impaired
3226EA	PEANUT ISLAND	COASTAL	Fecal Coliform	Not impaired	2			PP = 0 / 76 Not impaired; VP = 0 / 249 Not impaired
3226EB	PHIL FOSTER PARK	COASTAL	Mercury					
3226F	ICCW AB POMPANO	ESTUARY	Nutrients (Chl-a)	Not impaired	2			PP = Not impaired; VP = Not Impaired The annual average Chla concentration in 2003 was 5.4011 ug/L, in 2002 was 4.92 ug/L, and in 2001 was 5.535 ug/L. Individual Chla observations range from 1.0 ug/L to 28.35 ug/L.
3226F	ICCW AB POMPANO	ESTUARY	Copper	Impaired	5	Medium	2010	PP = 2 / 2 Insufficient Data; VP = 17 / 60 Impaired
3226F	ICCW AB POMPANO	ESTUARY	Dissolved Oxygen	Not impaired	2			PP = 17 / 131 Potentially Impaired; VP = 9 / 115 Not impaired

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3226F	ICCW AB POMPANO	ESTUARY	Fecal Coliform	Not impaired	2			PP = 15 / 126 Not impaired; VP = 5 / 72 Not impaired
3226F	ICCW AB POMPANO	ESTUARY	Iron	Insufficient Data	3b			PP = 0 / 8 Insufficient Data; VP = 0 / 2 Insufficient Data.
3226F	ICCW AB POMPANO	ESTUARY	Historic Chlorophyll	Not impaired	2			PP = Not impaired; VP = Not Impaired
3226F	ICCW AB POMPANO	ESTUARY	Total Coliform	Not impaired	2			PP = 4 / 119 Not impaired; VP = 0 / 42 Not impaired
3226F	ICCW AB POMPANO	ESTUARY	Turbidity	Not impaired	2			PP = 0 / 131 Not impaired; VP = 0 / 122 Not impaired
3226F1	LAKE WORTH LAGOON CENTRAL SEG	ESTUARY	Nutrients (Chl-a)	Not impaired	2			PP = Insufficient Data; VP = Not impaired Include TN/TP median values
3226F1	LAKE WORTH LAGOON CENTRAL SEG	ESTUARY	Copper	Not impaired	2			PP = No data; VP = 2 / 36 Not Impaired
3226F1	LAKE WORTH LAGOON CENTRAL SEG	ESTUARY	Dissolved Oxygen	Not impaired	2			PP = 0 / 7 Insufficient Data; VP = 2 / 53 Not impaired
3226F1	LAKE WORTH LAGOON CENTRAL SEG	ESTUARY	Biology	Impaired	4c			Impaired based on impacts to benthic community. However, impairment is due to hydrological modifications.

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3226F1	LAKE WORTH LAGOON CENTRAL SEG	ESTUARY	Historic Chlorophyll	Not impaired	2			PP = Insufficient Data; VP = Not impaired
3226F1	LAKE WORTH LAGOON CENTRAL SEG	ESTUARY	Lead	Insufficient Data	3b			PP = No data; VP = 0 / 5 Insufficient Data
3226F1	LAKE WORTH LAGOON CENTRAL SEG	ESTUARY	Turbidity	Not impaired	2			PP = 1 / 4 Insufficient Data; VP = 1 / 55 Not impaired
3226F2	LAKE WORTH LAGOON SOUTH SEG	ESTUARY	Nutrients (Chl-a)	Not impaired	2			PP = Insufficient Data; VP = Not impaired
3226F2	LAKE WORTH LAGOON SOUTH SEG	ESTUARY	Copper	Not impaired	2			PP = 1 / 6 Insufficient data; VP = 2 / 26 Not Impaired
3226F2	LAKE WORTH LAGOON SOUTH SEG	ESTUARY	Dissolved Oxygen	Not impaired	2			PP = 0 / 21 Not impaired; VP = 1 / 39 Not impaired

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3226F2	LAKE WORTH LAGOON SOUTH SEG	ESTUARY	Biology	Impaired	4c			Impaired based on impacts to benthic community. However, impairment is due to hydrological modifications.
3226F2	LAKE WORTH LAGOON SOUTH SEG	ESTUARY	Fecal Coliform	Insufficient Data	3b			PP = 1 / 14 Not impaired; VP = 0 / 9 Insufficient Data
3226F2	LAKE WORTH LAGOON SOUTH SEG	ESTUARY	Lead	Insufficient Data	3b			PP = 2 / 3 Insufficient Data; VP = 2 / 5 Insufficient Data
3226F2	LAKE WORTH LAGOON SOUTH SEG	ESTUARY	Total Coliform	Insufficient Data	3b			PP = 0 / 14 Not impaired; VP = 0 / 9 Insufficient Data
3226F2	LAKE WORTH LAGOON SOUTH SEG	ESTUARY	Turbidity	Not impaired	2			PP = 0 / 21 Not impaired; VP = 0 / 38 Not impaired
8096	INTRACOA STAL OCEAN 1	COASTAL	Nutrients (Chl-a)	Insufficient Data	3b			PP = Insufficient Data; VP = Insufficient Data
8096	INTRACOA STAL OCEAN 1	COASTAL	Copper	Insufficient Data	3b			PP = 2 / 2 Insufficient Data; VP = 2 / 2 Insufficient Data

WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
8096	INTRACOA STAL OCEAN 1	COASTAL	Dissolved Oxygen	Insufficient Data	3b			PP = 1 / 16 Not impaired; VP = 0 / 7 Insufficient Data
8096	INTRACOA STAL OCEAN 1	COASTAL	Fecal Coliform	Insufficient Data	3b			PP = 3 / 15 Not impaired; VP = 1 / 6 Insufficient Data
8096	INTRACOA STAL OCEAN 1	COASTAL	Total Coliform	Insufficient Data	3b			PP = 1 / 15 Not impaired; VP = 0 / 6 Insufficient Data
8096	INTRACOA STAL OCEAN 1	COASTAL	Turbidity	Insufficient Data	3b			PP = 0 / 17 Not impaired; VP = 0 / 7 Insufficient Data
8096A	NE 16TH ST POMPANO	COASTAL	Fecal Coliform	Not impaired	2			PP = 1 / 36 Not impaired; VP = 3 / 124 Not impaired
8096B	HILLSBOR O INLET PARK	COASTAL	Nutrients (Chl- a)	Not impaired	2			PP = Not impaired; VP = Not impaired
8096B	HILLSBOR O INLET PARK	COASTAL	Copper	Insufficient Data	3b			PP = 1 / 1 Insufficient Data; VP = No Data
8096B	HILLSBOR O INLET PARK	COASTAL	Dissolved Oxygen	Not impaired	2			PP = 0 / 41 Not impaired; VP = 0 / 29 Not impaired
8096B	HILLSBOR O INLET PARK	COASTAL	Fecal Coliform	Not impaired	2			PP = 0 / 72 Not impaired; VP = 3 / 146 Not impaired
8096B	HILLSBOR O INLET PARK	COASTAL	Iron	Insufficient Data	3b			PP = 0 / 4 Insufficient Data; VP = 0 / 1 Insufficient Data

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WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
8096B	HILLSBORO INLET PARK	COASTAL	Historic Chlorophyll	Impaired	5	Medium	2010	PP = Potentially Impaired; VP = Impaired. For the historical listing (1996-2000), annual average Chl(a) values in the verified period exceeded the minimum historical annual average value of 1.76 ug/l by more than 50% in 2000 (3.55 ug/l), 1999 (2.98 ug/l). Co-limiting of nitrogen and phosphorus based upon TN/TP ratios [TN median = 0.6968 mg/L and TP median = 0.058 mg/L. PP median TN/TP ratio = 19.086 (33 values), VP median TN/TP ratio = 10.471 (15 values).
8096B	HILLSBORO INLET PARK	COASTAL	Total Coliform	Not impaired	2			PP = 0 / 38 Not impaired; VP = 0 / 22 Not impaired
8096B	HILLSBORO INLET PARK	COASTAL	Turbidity	Not impaired	2			PP = 0 / 39 Not impaired; VP = 0 / 26 Not impaired
8096C	DEERFIELD BEACH PIER	COASTAL	Fecal Coliform	Not impaired	2			PP = 0 / 36 Not impaired; VP = 0 / 124 Not impaired
8096D	SOUTH INLET PARK	COASTAL	Fecal Coliform	Not impaired	2			PP = 0 / 38 Not impaired; VP = 0 / 124 Not impaired

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WBID	Waterbody Segment	Waterbody Type ¹	Parameters Assessed	1998 303(d) List	EPA's Integrated Report Category ²	Priority for TMDL Development	Projected Year for TMDL Development	Comments
				Proposed Status: NI = Not Impaired; VL = Verified List; PL = Planning List; RA = Reasonable Assurance; NP = No Pollutant; ID = Insufficient Data; ND = No Data; NA = Not Applicable				
3243	W.P.B. WATER	STREAM		No Data	3a			PP = No Data; VP = No Data
SOUTHEAST COAST								
8998	FLORIDA ATLANTIC COAST	COASTAL	Mercury (in Fish Tissue)	Impaired	5	Low	2011	Data verified to be within the last 7.5 years. Confirmed recent data for coastal fish advisory for King Mackerel, Shark, Spotted Seatrout, Little Tunny, Cobia, Greater Amberjack, Bluefish, Crevalle Jack. WBIDs include: 3226EA, 3226EB, 3226E1, 8096, 8096A, 8096B, 8096C, 8096D, 8096E, 8097, 8097A, 8098, 8098A, 8098B, 8099, 8099A, 8100, 8100A, 8100B, 8100C.

¹The designation "stream" includes canals, rivers, and sloughs. The designation "lake" includes some marshes.

²The EPA's 305(b)/303(d) Integrated Report categories are as follows:

1—Attains all designated uses;

2—Attains some designated uses;

3a—No data and information are available to determine if any designated use is attained;

3b—Some data and information are available, but they are insufficient for determining if any designated use is attained;

3c—Meets Planning List criteria and is potentially impaired for one or more designated uses;

4a—Impaired for one or more designated uses and the TMDL is complete;

4b—Impaired for one or more designated uses, but no TMDL is required because an existing or proposed pollutant control mechanism provides reasonable assurance that the water will attain standards in the future;

4c—Impaired for one or more designated uses but no TMDL is required because the impairment is not caused by a pollutant; and

5—Water quality standards are not attained and a TMDL is required.

Table D.2: Water Quality Monitoring Stations Used in the Assessment for the Lake Worth Lagoon–Palm Beach Coast Basin, by Planning Unit

Planning Unit	WBID	Waterbody Segment	Type	Storet Station ID	Station Description	BD	ED	# of Obs.
L-8	3233	L-8	Stream	21FLSFWMCULV10A	Intersection Levee-8 and	1992	2001	4518
	3233	L-8	Stream	21FLSFWML823.3TN	Private Pump Station on North	1992	1992	7
	3233	L-8	Stream	21FLSFWML823.8TN	Private Pump Station on North	1992	1992	3
	3233	L-8	Stream	21FLSFWML824.6TS	Private Pump Station on South	1992	1992	3
C-51	3245	C-51	Stream	11COEJAX3ENP10009	W Palm Beach Canal Above S-5A	1993	1993	135
	3245	C-51	Stream	11COEJAX3ENP10010	W Palm Beach Canal 1 M Below	1993	1993	135
	3245	C-51	Stream	21FLLWDD4	E-2 at Pioneer Road	1992	1992	265
	3245	C-51	Stream	21FLPBCH19	WP Beach Canal at Summit Blvd	1992	1999	131
	3245	C-51	Stream	21FLPBCH20	WP Canal at Dixie Highway Bridge	1992	2001	207
	3245	C-51	Stream	21FLPBCH25	Canal L-17 at Lantana at SR 807	1992	1999	119
	3245	C-51	Stream	21FLPBCH36	Canal E-3 Nr W. Palm Bch at SR 8	1992	1999	134
	3245	C-51	Stream	21FLPBCH37	Canal E-1 Nr Royal Palm Beach	1992	1999	132
	3245	C-51	Stream	21FLPBCH37A	M-1 Canal North of SR 80 and	1992	1999	134
	3245	C-51	Stream	21FLPBCH38	WP Canal (C-51) Nr Royal Palm Bc	1992	1999	118
	3245	C-51	Stream	21FLPBCH38A	West Palm Beach Canal, 4 Mi E of	1992	1999	134
	3245	C-51	Stream	21FLPBCH38B	West Palm Beach Canal, 1 Mi E of	1992	2001	229
	3245	C-51	Stream	21FLSFWMC51SR7	State Road 7 Bridge over West	1997	2001	1993
	3245	C-51	Stream	21FLSFWMPB-100M	S.W. Site on Canal C51	1995	1995	43
	3245	C-51	Stream	21FLSFWMPB-800M	S.W. Site on Canal C51	1995	1995	17

Planning Unit	WBID	Waterbody Segment	Type	Storet Station ID	Station Description	BD	ED	# of Obs.
	3245	C-51	Stream	21FLSFWMS5AE	Western Point of C-51 Where L-8	1992	2001	2574
	3245	C-51	Stream	21FLSFWMS5AS	Where WCA1 Intersects L-8 North	1992	2001	2076
	3245	C-51	Stream	21FLSFWMS5AW	No Description Available For This	1992	2001	1319
	3245	C-51	Stream	21FLWPB 28010530	C51 Canal Group 3 Station 34 H	2001	2001	13
	3245A	Okeehееlee Park	Lake	21FLGFWF03090202-OP-01	Okeehееlee Station 1	1996	2000	19
	3245A	Okeehееlee Park	Lake	21FLGFWFGFCER0137	Okeehееlee West Shore	1992	1996	163
	3245B	Lake Clarke	Lake	21FLSFWMC51S155	Upstream of S155 on C-51 Near	1992	2001	2985
	3245B	Lake Clarke	Lake	21FLWPB 28010355	Lake Clarke @ PinetreeLane	2001	2001	17
	3245C1	Lake Mangonia	Lake	21FLWPB 28010372	Lake Mangonia@Australian Ave.	2001	2001	15
	3245C1	Lake Mangonia	Lake	21FLWPB 28010373	Canal Between Lake Mangonia	2001	2001	19
	3245C2	Clear Lake	Lake	21FLWPB 28010896	Clear Lake at Okeechobee Rd	2001	2001	19
C-17								
	3242	C-17 Segment	Stream	21FLSFWMC17SR702	At C-17 Where It Passes under SR	1992	1996	1358
	3242A	PB Stations/D Canals	Stream	21FLPBCH12	Canal C-17 at Alt A1A Bridge	1992	2001	210
	3242A	PB Stations/D Canals	Stream	21FLSFWMC17S44	Upstream of S44 on C-17 About	1992	2001	3113
	3242A	PB Stations/D Canals	Stream	21FLWPB 28010726	Canal C-17 at Alt A1A Bridge	2001	2001	36
C-16								
	3256A	Lake Osborne	Lake	21FLKWATOSBORNE1	Osborne Lake in Palm Beach	1993	2001	24
	3256A	Lake Osborne	Lake	21FLKWATOSBORNE2	Osborne Lake in Palm Beach	1993	2001	23
	3256A	Lake Osborne	Lake	21FLKWATOSBORNE3	Osborne Lake in Palm Beach	1993	2001	24
	3256A	Lake Osborne	Lake	21FLPBCH23	Canal L-14 and L Osborne in L. W	1992	1999	134
	3256A	Lake Osborne	Lake	21FLPBCH24	Lk Osborne at Lantana at SR 812	1992	2001	220
	3256A	Lake Osborne	Lake	21FLWPB 28010469	Lake Osborne Site 1.	2001	2001	20

Planning Unit	WBID	Waterbody Segment	Type	Storet Station ID	Station Description	BD	ED	# of Obs.
	3256A	Lake Osborne	Lake	21FLWBPB 28010470	Lake Osborne Site 2	2001	2001	21
	3256A	Lake Osborne	Lake	21FLWBPB 28010471	Lake Osborne Site 3	2001	2001	12
	3256B	Boynton Canal	Stream	21FLLWDD3	Boynton Canal at Congress	1992	1992	265
	3256B	Boynton Canal	Stream	21FLPBCH27A	Boynton Cnt at SR 809 (Mmltry)	1992	2001	224
	3256B	Boynton Canal	Stream	21FLPBCH28	Canal C-16 at Boynton Bch at	1992	2001	206
	3256B	Boynton Canal	Stream	21FLSFWMC16S41	Upstream of S41 on C-16 160 Feet	1992	2001	3057
	3256B	Boynton Canal	Stream	21FLSFWMC16SR809	C-16 at the Point Where It Passes	1992	1996	774
	3256B	Boynton Canal	Stream	21FLWBPB 28010741	Canal C-16 at Boynton Bch at	2001	2001	41
	3256D	Canal E-4	Stream	21FLKWATOSBORNECANALE		2001	2001	3
	3256D	Canal E-4	Stream	21FLKWATOSBORNECANALE		2001	2001	6
	3256D	Canal E-4	Stream	21FLKWATOSBORNECANALE		2001	2001	6
	3256D	Canal E-4	Stream	21FLKWATOSBORNECANALMI		2001	2001	6
	3256D	Canal E-4	Stream	21FLKWATOSBORNECANALMI		2001	2001	6
	3256D	Canal E-4	Stream	21FLKWATOSBORNECANALMI		2001	2001	6
	3256D	Canal E-4	Stream	21FLKWATOSBORNECANALW		2001	2001	6
	3256D	Canal E-4	Stream	21FLKWATOSBORNECANALW		2001	2001	6
	3256D	Canal E-4	Stream	21FLKWATOSBORNECANALW		2001	2001	6
C-15	3256D	Canal E-4	Stream	21FLPBCH26	Canal E-4 at Lantana at	1992	1999	131
	3262	E-4 Canal	Stream	21FLPBCH29	Canal E-4 at Boynton Bch at 23 A	1992	1999	134
	3262	E-4 Canal	Stream	21FLPBCH31	E-4 Canal	1992	1995	98
	3262	E-4 Canal	Stream	21FLSFWMC15S40	Upstream of S40 on C-15 About	1992	2001	3076
	3262A	Lake Ida	Lake	21FLPBCH29A	Lake Ida at Eden Lake Dr., Delray	1992	1999	130

Planning Unit	WBID	Waterbody Segment	Type	Storet Station ID	Station Description	BD	ED	# of Obs.
	3262A	Lake Ida	Lake	21FLWPB 28010464	Lake Ida site 2	2001	2001	19
	3262A	Lake Ida	Lake	21FLWPB 28010465	Lake Ida Site 3	2001	2001	21
	3262B	E-1 Canal	Stream	21FLLWDD1	Control 1 West Side L-30	1992	1992	265
	3262C	E-2 Canal	Stream	21FLGW 263012080103099	WMD Site ID PVSU3	1992	1994	124
	3262C	E-2 Canal	Stream	21FLGW 263012080104699	WMD Site ID PVSU2	1992	1994	124
	3262D	E-3 Canal	Stream	21FLLWDD7	L-30 at Shop Area	1992	1992	257
	3262D	E-3 Canal	Stream	21FLLWDD8	L-30 at El Clair Road Bridge	1992	1992	258
	3262D	E-3 Canal	Stream	21FLPBCH31C	Lateral Canal No. 38 at SR 809	1992	2001	224
	3262D	E-3 Canal	Stream	21FLSFWMC15SR809	C-15 at the Point Where It Passes	1992	1996	703
Hillsboro Canal								
	3264	Hillsboro Canal	Stream	21FLA 28030500	Hills Cnl at Control Strut Drfld	1992	1994	252
	3264	Hillsboro Canal	Stream	21FLBROW3	State Rd. 7 (US 441) - Hillsboro	1992	2001	685
	3264	Hillsboro Canal	Stream	21FLBROW4	Southeast Growers' Association	1992	2001	685
	3264	Hillsboro Canal	Stream	21FLBROW92	Canal @ NW 39 Ave & Adios Golf	1997	1997	32
	3264	Hillsboro Canal	Stream	21FLBROW93	Canal at SW 15 St and SW 30 Ave;	1997	1997	32
	3264	Hillsboro Canal	Stream	21FLBROW94	Hillsboro Canal in Deer Creek CC;	1997	1997	32
	3264	Hillsboro Canal	Stream	21FLBROW99	Hillsboro Canal at NW 51 Ave;	1997	1997	32
	3264	Hillsboro Canal	Stream	21FLGW 3559	Hillscan	1998	2001	1231
	3264	Hillsboro Canal	Stream	21FLLWDD5	E-3 at SW 18th St	1992	1992	249
	3264	Hillsboro Canal	Stream	21FLWPB 28010151	Hills Cnl W Sal Str Deerfield Beach	2001	2001	40
	3264	Hillsboro Canal	Stream	21FLWPB 28010153	Hills Cnl US 441 Deerfield Beach	2001	2001	39
	3264A	E-1 Canal	Stream	21FLPBCH35A	E1 Canal 1 Mi South of SR 808	1992	1995	126
	3264B	E-2 Canal	Stream	21FLLWDD2	E-2 at Boca Raton Road	1992	1992	265

Planning Unit	WBID	Waterbody Segment	Type	Storet Station ID	Station Description	BD	ED	# of Obs.
	3264D	E-4 Canal	Stream	21FLLWDD6	E-4 at NW 20th Street	1992	1992	258
Intracoastal	3226E	ICWW Ab Royal Palm Brg	Estuary	21FLLOX 35	Sandbar off NE Side of Don Ross	1992	1999	765
	3226E	ICWW Ab Royal Palm Brg	Estuary	21FLLOX B35	Sandbar off NE Side of Don Ross	1992	1998	94
	3226E	ICWW Ab Royal Palm Brg	Estuary	21FLPBCH10	Little Lake Worth at PGA Blvd Br	1992	1999	145
	3226E	ICWW Ab Royal Palm Brg	Estuary	21FLPBCH11	ICW at US 1 Bridge	1992	2001	240
	3226E	ICWW Ab Royal Palm Brg	Estuary	21FLPBCH8	Intracoastal Wwy Nr Juno	1992	1995	140
	3226E1	Lake Worth Lagoon North	Estuary	21FLKWATWORTH1	Worth Lake in Palm Beach Co.	1993	1995	34
	3226E1	Lake Worth Lagoon North	Estuary	21FLKWATWORTH2	Worth Lake in Palm Beach Co.	1993	1995	34
	3226E1	Lake Worth Lagoon North	Estuary	21FLKWATWORTH3	Worth Lake in Palm Beach Co.	1993	1995	34
	3226E1	Lake Worth Lagoon North	Estuary	21FLPBCH13	Earman River at US 1 Bridge	1992	2001	246
	3226E1	Lake Worth Lagoon North	Estuary	21FLPBCH14	Lake Worth at Blue Heron Blvd	1992	2001	237
	3226E1	Lake Worth Lagoon North	Estuary	21FLPBCH17A	Flagler Bridge and ICWW	1992	1999	144
	3226EA	Peanut Island	Coastal	21FLDOH PALM BEACH214	Peanut Island	2000	2001	38
	3226EA	Peanut Island	Coastal	21FLDOH PALM BEACH327	Phil Foster Park	2000	2001	39
	3226F	ICWW Ab Pompano	Estuary	21FLBROW1	Federal Highway (US 1)	1992	2001	714
	3226F	ICWW Ab Pompano	Estuary	21FLBROW2	Salinity Control Structure	1992	2001	733
	3226F	ICWW Ab Pompano	Estuary	21FLBROW33	Hillsboro Blvd Bridge Over ICW	1992	2001	741
	3226F	ICWW Ab Pompano	Estuary	21FLPBCH31A	ICWW and SR 806 Delray	1992	1999	138
	3226F	ICWW Ab Pompano	Estuary	21FLPBCH32	Canal E-4 at Boca Raton	1992	1999	119
	3226F	ICWW Ab Pompano	Estuary	21FLPBCH32A	ICW at Palmetto Park, Boca	1992	1999	140
	3226F	ICWW Ab Pompano	Estuary	21FLPBCH33	Canal E-4 at Boca Raton	1992	1999	140
	3226F	ICWW Ab Pompano	Estuary	21FLPBCH34	Hillsboro Canal Nr Boca Raton	1992	1999	140

Planning Unit	WBID	Waterbody Segment	Type	Storet Station ID	Station Description	BD	ED	# of Obs.
	3226F2	Lake Worth Lagoon South	Estuary	21FLPBCH28A	ICW at Ocean Ave Boynton	1992	2001	223
	8096A	NE 16 th St Pompano	Coastal	21FLDOH BROWARD26	NE 16 th St Pompano	2000	2001	36
	8096B	Hillsboro Inlet Park	Coastal	21FLBROW34	ICW at Hillsboro Inlet	1992	2001	706
	8096B	Hillsboro Inlet Park	Coastal	21FLDOH BROWARD25	Hillsboro Inlet Park	2000	2001	37
	8096C	Deerfield Beach Pier	Coastal	21FLDOH BROWARD24	Deerfield Beach Pier	2000	2001	36
	8096D	South Inlet Park	Coastal	21FLDOH PALM BEACH218	South Inlet Park	2000	2001	39
	8096E	Red Reef Park	Coastal	21FLDOH PALM BEACH330	Red Reef Park	2000	2001	39
	8097A	Sandoway Park	Coastal	21FLDOH PALM BEACH216	Sandoway Park	2000	2001	38
	8098A	Ocean Inlet Park	Coastal	21FLDOH PALM BEACH329	Ocean Inlet Park	2000	2001	42
	8098B	Lake Worth Beach	Coastal	21FLDOH PALM BEACH328	Lake Worth Beach	2000	2001	40
	8099A	Phipps Park	Coastal	21FLDOH PALM BEACH215	Phipps Park	2000	2001	44
	8100A	Riviera Municipal Beach	Coastal	21FLDOH PALM BEACH212	Riviera Municipal Beach	2000	2001	38
	8100B	Ocean Reef Park	Coastal	21FLDOH PALM BEACH211	Ocean Reef Park	2000	2001	39
	8100C	Loggerhead Park	Coastal	21FLDOH PALM BEACH210	Loggerhead Park	2000	2001	38

Appendix E: Permitted Facilities with Discharges to Surface Water and Ground Water in the Lake Worth Lagoon–Palm Beach Coast Basin, by Planning Unit

Table E.1: Permitted Nonsurface Water Wastewater Treatment Facilities in the Lake Worth Lagoon–Palm Beach Coast Basin

Name	Facility	Facility Type	Business	Status	Discharge	Lat_DD	Lat_MM	Lat_SS	Long_DD	Long_MM	Long_SS
C-51 Planning Unit											
Florida Dept. of Transportation Tricounty Commuter Rail	FL0040762	Industrial Wastewater	Maintenance Station for Tri-rail Trains	Active – permit not required		26	42	23	80	3	44
Acreage Pine Elementary School	FLA013665	Domestic WWTP		Active	Effluent Abs Fields (2) Acreage Pine School	26	46	45	80	16	2
Palm Beach Co. Sheriff Canine Training	FLA013667	Industrial Wastewater		Active – permit not required		26	38	43	80	10	22
Vicky Sirak Kennels	FLA013668	Industrial Wastewater		Active – permit not required		26	43	11	80	16	22
Loxahatchee Grove School STP	FLA013700	Domestic WWTP		Active	Effluent to drainfield, Loxahatchee Grove Elementary School	26	42	12	80	17	58
Delta Air Lines, Inc.	FLA013709	Industrial Wastewater		Active – permit not required		26	41	26	80	4	52
Banyan Golf Club Inc.	FLA013718	Domestic WWTP		Active	Effluent to open sand filter, Banyan Golf Club	26	39	17	80	11	32
Gail's (Clock) Restaurant	FLA013728	Domestic WWTP		Active		26	38	37	80	6	50
Lion Country Safari	FLA013736	Domestic WWTP		Active	Effluent to percolation ponds, Lion Country Safari	26	43	19	80	18	52
Royal Palm Beach Village Util DIW	FLA013749	Domestic WWTP		Active	Reuse sample point, prior to on-site irrigation	26	43	55	80	13	59
Royal Palm Beach Village Util DIW	FLA013749	Domestic WWTP		Active	Reuse sample point, prior to on-site nonjuris-dictional wetland	26	43	55	80	13	59

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Name	Facility	Facility Type	Business	Status	Discharge	Lat_DD	Lat_MM	Lat_SS	Long_DD	Long_MM	Long_SS
Ranger Construction Industries (CLRS)	FLA013754	Industrial Wastewater	Asphalt batch plant	Active		26	41	6	80	11	49
Sunspport Gardens	FLA013767	Domestic WWTP		Active	Effluent to percolation pond, Sunspport Gardens	26	44	13	80	15	55
SFWMD Field Station Vehicle Wash WASH (CLRS)	FLA013773	Industrial Wastewater	SFWMD regulatory agency field station	Active		26	41	20	80	11	9
Callery Judge Grove Packing Plant (CLRS)	FLA016595	Industrial Wastewater	Citrus packing house	Active		26	44	46	80	18	24
Palm Beach County Palm Tran Depot (Airport Site)	FLA177971	Industrial Wastewater	Fleet washing of public transit buses	Active – permit not required		26	41	21	80	4	40
C-17 Planning Unit											
East Central Regional WWTP	FL0041360	Domestic WWTP		Active	0.15 mgd Wetlands (Demonstration Project)	26	44	32	80	7	44
Garden Walk, A	FLA013735	Domestic WWTP		Active	Effluent to percolation ponds, Garden Walk	26	47	44	80	6	10
C-16 and C-16 North Planning Units											
Boynton Beach Potable Water Treatment Plant	FLA013681	Other		Active		26	31	43	80	7	18
Sherbrooke Golf & Country Club	FLA013688	Domestic WWTP		Active	Effluent to absorption bed, Sherbrooke	26	34	58	80	11	21
Arrowhead Village MHP	FLA013698	Domestic WWTP		Active	Effluent to percolation ponds, Arrowhead	26	35	11	80	6	27
Mar Mak MHP	FLA013708	Domestic WWTP		Active	Effluent to percolation pond, Mar Mak	26	36	55	80	5	35
Faith Farm of Palm Beach	FLA013722	Domestic WWTP		Active	Effluent to percolation pond, Faith Farm	26	31	60	80	12	1
A Cobb & Son, Inc. (GP)	FLA013744	Industrial Wastewater		Active – permit not required		26	34	10	80	8	21

Name	Facility	Facility Type	Business	Status	Discharge	Lat DD	Lat MM	Lat SS	Long DD	Long MM	Long SS
South Florida Trotting Center	FLA013733	Domestic WWTP		Active	Effluent to drainfield, South Florida Trotting Center	26	33	41	80	12	53
C-15 Planning Unit											
South Central Regional WWTP	FL0035980	Domestic WWTP		Active	Effluent to reuse	26	28	56	80	5	19
Hagen Road Elementary School	FLA013679	Domestic WWTP		Active		26	31	16	80	9	57
Royal Palm Polo Club	FLA013690	Domestic WWTP		Active	Effluent to percolation pond, Royal Palm Polo	26	25	0	80	8	0
In the Pines STP	FLA013691	Domestic WWTP	Labor Camp	Active	Effluent to percolation pond, In the Pines	26	26	15	80	11	48
West Side Farms, Inc. (GP)	FLA013743	Industrial Wastewater	Fruits/vegetables washing and packing; tomato wash at 4,500 gpd; all other washwater goes to county sewer (see letter from Dick Mills received 4/7/98)	Active – permit not required		26	24	36	80	12	9
Palm Beach Co. Southern Regional WWTP	FLA041424	Domestic WWTP		Active	Reuse R00-1	26	29	12	80	10	16
Palm Beach Co. Southern Regional WWTP	FLA041424	Domestic WWTP		Active	Man-Made Wetlands @ Sys.#3 R00-2	26	29	12	80	10	16
Chevron Car Wash (GP)	FLA176001	Industrial Wastewater	gas station/recycle car wash	Active		26	27	15	80	9	50
Hillsboro Canal Planning Unit											
International Processing Systems	FLA013590	Domestic WWTP		Active		26	17	16	80	9	27
Sunshine Meadows	FLA013715	Domestic WWTP		Active	Effluent to confined wetland, Sunshine Meadow	26	25	40	80	12	46
Wheelabrator North Broward Inc. Resource Recovery	FLA016116	Industrial Wastewater	Resource recovery – solid waste disposal facility	Active – permit not required		26	17	15	80	9	31
Central Sanitary Landfill (EPA Site)	FLA039730	Industrial Wastewater	Note: EPA retains jurisdiction based on a 7/28/95 letter	Active – permit not required		26	17	1	80	9	50

Name	Facility	Facility Type	Business	Status	Discharge	Lat_DD	Lat_MM	Lat_SS	Long_DD	Long_MM	Long_SS
Intracoastal Planning Unit											
Boynton Beach Park	FLA013683	Domestic WWTP		Active	Effluent to absorption bed, Boynton B. Park	26	31	48	80	2	51
6767 North Ocean Blvd	FLA013689	Domestic WWTP	Condominium	Active	Effluent to drainfield, 6767	26	32	12	80	2	48
Villas of Ocean Ridge	FLA013692	Domestic WWTP		Active	Effluent to drainfield, Villas Ocean Ridge	26	31	6	80	2	60
Turtle Beach	FLA013696	Domestic WWTP		Active	Effluent to absorption bed, Turtle Beach	26	30	38	80	3	12
Colonial Crown Manor STP	FLA013702	Domestic WWTP		Active		26	30	46	80	3	17
Ocean Ridge Yacht Club	FLA013710	Domestic WWTP		Active	Effluent to drainfield, Ocean Ridge Yacht Club	26	30	52	80	3	11
Ocean House North	FLA013711	Domestic WWTP	Condominium	Active	Effluent to absorption field, Ocean House North	26	32	30	80	2	42
Somerset Condominium	FLA013725	Domestic WWTP		Active	Effluent to drainfield, Somerset	26	29	33	80	3	24
Lost Tree Village Club, Inc.	FLA013732	Domestic WWTP		Active		26	50	41	80	3	6
Pelican Cove	FLA013734	Domestic WWTP		Active	Effluent to drainfield, Pelican Cove	26	31	30	80	2	57
Dunes of Ocean Ridge	FLA013748	Domestic WWTP		Active	Effluent to drainfield, Dunes of Ocean Ridge	26	32	7	80	2	49
Gulfstream Shores Owners Association, Inc.	FLA013750	Domestic WWTP		Active	Effluent to drainfield, Gulfstream Shores	26	29	56	80	3	10
Hypoluxo Harbor Club, Inc.	FLA013752	Domestic WWTP		Active		26	33	31	80	3	12
Everglades Club RO Concentrate	FLA013763	Industrial Wastewater	Country club/ golf course irrigation	Active	Percolation ponds – GC Lakes #9 & #18	26	41	46	80	2	17
Ocean Walk	FLA013766	Domestic WWTP		Active	Effluent to drainfield, Ocean Walk	26	31	0	80	3	4
Inlet Plaza Condo Association, Inc.	FLA013768	Domestic WWTP		Active	Effluent to drainfield, Inlet Plaza	26	32	31	80	2	41
M S Utilities, Inc.	FLA137243	Domestic WWTP	47 Unit Apartment Complex	Active	Effluent to Drainfield, Maisonette So.	26	32	24	80	2	37

Name	Facility	Facility Type	Business	Status	Discharge	Lat DD	Lat MM	Lat SS	Long DD	Long MM	Long SS
Lafarge Corporation, Inc.	FLA160521	Industrial Wastewater	Portland cement distribution center at Port of Palm Beach	Active – permit not required		26	45	59	80	3	14
Ocean Harbour @ Ocean Ridge	FLA176524	Domestic WWTP		Active		26	31	4	80	3	5

Table E.2: Permitted Water Wastewater Treatment Facilities Discharging to Surface Water in the Lake Worth Lagoon–Palm Beach Coast Basin

Facility ID	Name	Address	City	Facility Type ¹	Status ²	National Pollutant Discharge Elimination System (NPDES)	Design Capacity (millions of gallons per day)
C-17 Planning Unit							
FL0041360	East Central Regional WWTP	100 Bayan BI Haverhill Road	West Palm Beach	DW	A	Yes	55.0000
FLG110154	Continental Concrete – Riviera Plant	Interpace Road	Riviera Beach	CBP	A	Yes	
C-15 Planning Unit							
FL0035980	South Central Regional WWTP	1801 N. Congress Avenue	Delray Beach	DW	A	Yes	24.0000
Hillsboro Canal Planning Unit							
FL0026344	City of Boca Raton WWTP	1501 W. Glades Road	Boca Raton	DW	A	Yes	17.5000
FLG110004	Central Concrete Supermix/Deerfield Beach (GP)	1817 S. Powerline Road	Deerfield Beach	CBP	A	Yes	0.0030
FL0186279	SFWMD Aquifer Storage & Recovery ASR Pilot Project	Multiple Well Sites in Palm Bay, Martin, Okeechobee, Glades Counties	Various Counties	IW	A	Yes	5.7600
Intracoastal Planning Unit							
FL0028380	Ocean Maisonettes WWTP	6880 N Ocean Blvd.	Ocean Ridge	DW	A	Yes	0.0100
FL0023396	Wellington Arms Condo WWTP	6530 N. Ocean Blvd.	Ocean Ridge	DW	A	Yes	0.0150
FL0001546	FPL Riviera Plant	200 - 300 Broadway	Riviera Beach	IW	A	Yes	
FL0035181	Whitehall Condominium Association, Inc.	2000 South Ocean Blvd..	Boca Raton	IW	A	Yes	
FL0042536	Bar Harbour Apartments, Inc.	86 Macfarlane Drive	Delray Beach	IW	A	Yes	0.2880
FL0037168	Biltmore Condominium Association, Inc.	150 Bradley Place	Palm Beach	IW	A	Yes	1.0000
FL0187011	Florida Sugar Marketing and Terminal Association, Inc.	Broadway	Riviera Beach	IW	X	Yes	
FL0029106	Seacoast Utilities North Palm Beach	603 Anchorage Drive	North Palm Beach	DW	T	Yes	
FL0001911	Seagate Towers Condominium Association	220 Macfarlane Drive	Delray Beach	IW	A	Yes	1.0000

¹ DW = Domestic Wastewater Treatment Plant, IW = Industrial Wastewater Treatment Plant, CBP = Concrete Batch Plant.

² A = Active, X = Active Unpermitted Discharge, T = Permitted, But Not Operating.

Table E.3: Landfills in the Lake Worth Lagoon–Palm Beach Coast Basin

Facility ID	Facility Name	Address	City	Status ¹	Facility Type ²
C-51 Planning Unit					
65680	Palm Beach County LF #2 (Cross State)	Pike Rd.	West Palm Beach	K	100
65860	City of Lake Worth Rubbish LF North	22 nd Ave. N, W of 'A' St.	Lake Worth	K	300
66213	Cross State Landfill	Pike Road	West Palm Beach	I	200
65855	Davis Road Dump	Between David Rd. & Elizabeth	Lake Worth	K	200
65770	Downtown/Uptown Demolition Debris	Sansbury Way & Okeechobee Blvd.	West Palm Beach	I	540
65677	Dreher Park LF	S of Summit Blvd.	West Palm Beach	K	100
66455	D.S. Eakins Const. Co. (Lake Worth)	502 Rinker Way	Lake Worth	A	540
C-17 Planning Unit					
65682	Dyer Blvd. Class III Landfill	Dyer Blvd. and Haverhill Road	West Palm Beach	K	300
65767	City of Riviera Beach	1 Mile West on Dyer Blvd. & Hav.	Riviera Beach	I	200
65676	P.B.C. West Lake Park Blvd. Dump	NE Jct T N Lake Blvd. & Turnpike	Palm Beach Gardens	K	100
65851	Riviera Beach, City of, Trash Dump	Haverhill Rd & 49 th Terrace	Riviera Beach	K	300
65551	PBCSWA RRF Site #7	45 Street & Fla. Turnpike	Riviera Beach	A	300
65551	PBCSWA RRF Site #7	45 Street & Fla. Turnpike	Riviera Beach	A	100
65659	West Lake Park Road Landfill	Northlake Blvd.	Palm Beach Gardens	K	100
65681	Palm Beach County LF #3 (Dyer Rd.)	Dyer Blvd. & Haverhill Road	West Palm Beach	I	100
C-16 Planning Unit					
65678	Lantana County Trash Dump	W of Congress & S of Lantana Rd.	Lantana	K	300
65679	Palm Beach County LF #1 (Lantana)	Lantana Rd., W of Florida Turnpike	Lantana	K	100
C-15 Planning Unit					
67783	Gulfstream Trash Dump	SW 12 th St. & Fecrr	Delray Beach	I	300
65764	Delray Beach Landfill	Linton Blvd & S.W. 4 th W of T	Delray Beach	I	100
Hillsboro Canal Planning Unit					
65853	Boca Raton Garbage Dump	SW 18 th St., W of Old Dixie Hwy.	Boca Raton	K	100
65854	Boca Raton Trash Dump	.8 Mi S of W Boca Raton Rd.	Boca Raton	K	300

Facility ID	Facility Name	Address	City	Status ¹	Facility Type ²
55093	Central Sanitary Landfill & Recycling Center	3000 NW 48 th St. (Hilton Rd.)	Pompano Beach	A	540
54302	Lacentra Trucking Inc. (C & D)	1951 NW 44 th St.	Pompano Beach	I	540
53368	Deerfield Bch, City of/Old City L/F	Natura Avenue	Deerfield Beach	I	200
55093	Central Sanitary Landfill & Recycling Center	3000 NW 48 th St. (Hilton Rd.)	Pompano Beach	A	100
54192	MCS, Inc. (C & D Debrus)	6550 N.W. 83 rd Terrace	Parkland	I	540
Intracoastal Planning Unit					
67769	Salhaven Dump (Jonathan's Landing)	E Alt A1A, W Intracoastal Waterway	Jupiter	K	200
67771	Juno Beach Dump	Ellison Wilson Rd.	Juno Beach	K	300
66454	D.S. Eakins Const. Co. (Lake Park)	800 Railroad Avenue	Lake Park	A	540
65856	Lake Park Dump	Off Old Dixie Across from 1169	Lake Park	K	100
65857	Lantana City Trash Dump	.2 Mi W of A1A & Lantana Rd.	South Palm Beach	K	300
65766	Ocean Ridge Rubbish Dump	150 Feet West of A1A S. of S.	Ocean Ridge	I	300
66378	Gulfstream Rubbish Dump	.5 Miles of 12 th St. SW & Old.	Gulfstream	I	300
65852	Ocean Ridge Trash Dump	Intracoastal Waterway, 150' W A1A	Ocean Ridge	K	300
65859	City of Lake Worth SLF – South	End of S 'E' St	Lake Worth	I	100
65765	City of Lantana Rubbish Dump	.2 Miles from A1A & Lantana Rd.	Lantana	I	100

¹Status: A = Active, I = Inactive, K = Closed, Monitored.

²Facility Type : 100 = Class I Landfill, 200 = Class II Landfill, 300 = Class III Landfill, 400 = Sludge Disposal Facility, 540 = Construction/Demolition Debris.

Appendix F: Level 1 Land Use in the Lake Worth Lagoon–Palm Beach Coast Basin, by Planning Unit

Planning Unit	Total Area Square Miles	Percent Estimated for Land Use/Land Cover Type (based on 1995 land use coverage provided by the South Florida Water Management District)							
		Urban and Built-Up	Agriculture	Rangeland	Upland Forests	Water	Wetlands	Barren Land	Transportation and Utilities
L-8	142.35	6.1	20.9	0.1	23.4	0.8	45.5	0.9	2.3
C-51	168.87	58.6	16.7	0.4	10.2	4.2	4.9	0.8	4.2
WPB Water Catchment	19.83	0.1	0	0	8	1.6	89.3	0.3	0.8
C-17	33.12	66.2	1.5	0.6	11.9	5	5.1	2.6	7.2
C-16	57.6	55.8	21.4	1.4	5.2	7.1	4.7	0.9	3.6
C-16N	9.23	29.8	8.2	1.1	18.5	3.4	36.8	0.8	1.5
C-15	74.62	53.5	30.9	0.2	3.6	6	2.4	0.5	2.9
Hillsboro Canal	102.54	58.8	14.5	1	5.9	5.6	5.6	3	5.6
Intracoastal	84.75	74.4	1	0.6	13	1.4	3.6	0	6

Appendix G: Documentation Provided during Public Comment Period

August 9, 2004

Mr. Jay G. Foy, P.E.
President
Stormwater Engineering, Inc.
1489 N Military Trail, Suite 217
West Palm Beach, FL. 33409

Dear Mr. Foy,

Thank you for your July 2 letter to Secretary Castille regarding the verified list of impaired waters for the Lake Worth Lagoon – Palm Beach Coast Basins. In your letter, you requested that we remove dissolved oxygen (DO) as a listing criteria for canals, questioned the listing for turbidity for the L-8 Canal, and stated that it is inappropriate to list area canals as impaired due to iron because iron is a natural component of Palm Beach County groundwater. I have forwarded your letter on to the appropriate staff, and they will investigate your comments further, but I wanted to give you some initial feedback on your comments.

- 1) *We agree that the canals in Palm Beach County would not be expected to meet the Class III DO criteria (5.0 mg/L) and, moreover, should not be expected to provide the same level of use as Class III waters. In fact, the Department has initiated a monitoring project that will lead to a restructuring of the classification system to allow for more refined designated uses and a more appropriate DO criterion for south Florida canals. However, these efforts will take time (probably at least two years), and as we are required to implement Florida’s current water quality standards, including these canals current classification as a Class III waterbodies, we must make our listing decisions based on the current Class III criteria. The only alternative would be to develop a site-specific alternative criterion (SSAC) for DO for the canals, but we would need a very extensive database, including continuous DO recordings in minimally impacted canals, to establish the SSAC value. We would very much appreciate any information you could provide about available DO data for these canal systems.*
- 2) As noted in our Draft Verified List, the turbidity listing for the L-8 Canal is contingent on the determination of the natural background turbidity for the canal. For our initial assessment, we treated all turbidity values above 29 as possible exceedances. However, the criterion states that values must be less than or equal to 29 above “natural background conditions.” As part of our verification process, we will review available historical turbidity data for the L-8 Canal, including the document you mentioned (Water Quality Assessment of the Southern L-8 Basin) to determine the

natural background, and then re-evaluate the data against the natural background value.

- 3) We agree that iron is a natural component of the groundwater in Palm Beach County and that groundwater concentrations range well above the State Class III iron criterion (1.0 mg/L). Based on the data in our groundwater database, 63 of 77 wells in the area had at least one value above the criterion, with 83 out of 220 samples exceeding the criterion. Values ranged above 20 ug/L, and the mean iron value for groundwater in the Palm Beach Coast Basin was 2.2 ug/L. Given these high values and the ready exchange between surface and groundwaters, we may be able to establish a SSAC for iron for the area based on the groundwater data, and then re-assess the surface water data against this SSAC value. However, our groundwater database is fairly limited in the basin, and we would appreciate any information you may have on the groundwater quality in the basin.

In closing, I would like to thank you for your letter and comments. We recognize that we need local input to ensure that the lists are as accurate as possible, and would like to encourage you to continue to participate in this important process. If you have any questions about this response, please contact our TMDL Program Administrator, Daryll Joyner, at 850-245-8431.

Sincerely,

Jerry Brooks
Deputy Director
Division of Water Resource Management

Richard E. Walesky, Director
Environmental Resources Management Department
3323 Belvedere Road, Building 502
West Palm Beach, Florida 33406-1548

September 15, 2004

Dear Mr. Walesky,

Thank you for August 9 letter regarding the draft verified list of impaired waters for the Lake Worth Lagoon – Palm Beach Coast Basins. In your letter, you requested that we: 1) list Lake Worth Lagoon Central Segment (WBID 3226F1) as impaired for nutrients based on chlorophyll *a* data; 2) list the central (3226F1) and southern (WBID 3226F2) segments of Lake Worth Lagoon as impaired for nutrients based on impacts to the benthic community; 3) expand the WBID boundary of the Lake Worth Lagoon North Segment (WBID 3226E1) to include Little Lake Worth Lagoon; 4) include Lake Osborne, Lake Pine, and Lake Clarke on the verified list as impaired for nutrients based on their Trophic State Indices (TSI); 5) check the data entry for iron concentrations in five WBIDs; 6) revise an incorrect station location; 7) and not develop TMDLs for iron in this region because iron is naturally elevated due to the interrelationship of groundwater and surface water. Our responses to your comments are as follows:

1. You requested that we include the Lake Worth Lagoon Central Segment (WBID 3226F1) as impaired for nutrients based on your calculated annual average chlorophyll *a* value of 11.66 ug/L for 2002 (which exceeds the IWR threshold for nutrient impairment in estuaries of 11 ug/L). However, it would appear that you used uncorrected chlorophyll *a* values for your calculations of the mean chlorophyll *a*. It has been the Department's practice to use only corrected chlorophyll *a* values if they are available. Using the corrected chlorophyll values, the mean chlorophyll value for 2002 was 9.3966 ug/L and the mean for 2003 was 6.8965 ug/L. Based on the data that we currently have in our database, we stand by our original assessment that the WBID is not impaired. If you have any additional chlorophyll *a* data or information about the trophic status of the lagoon, it would be very much appreciated.
2. You requested that we list the central (3226F1) and southern (WBID 3226F2) segments of Lake Worth Lagoon as impaired for nutrients based on impacts to the benthic community, and provided a map showing the sea grass and muck deposits in Lake Worth Lagoon. While we agree that the lagoon is impaired, we listed the central segment of the lagoon (WBID 3226F1) in category 4c (Impaired for one or more designated uses, but no TMDL is required because the impairment is not caused by a pollutant) because the impairment is due to hydrologic modifications to the system (the discharges from C-51). We recognize that the discharges from C-51 contain "pollutants," but believe that the impacts of the freshwater discharged (both in terms of salinity changes and transport of sediment load) dominates any potential eutrophication impacts of nutrients in the releases from the canal system.

Your letter mentions a master's thesis study by Mr. John Reed and another ongoing study of sediment loading to the lagoon via the C-51 canal (by USGS), both of which we would very much like to see to further assess the Lagoon with all possible

data. If you could provide copies of these two studies it would be very much appreciated.

3. You requested that we expand the WBID boundary of the Lake Worth Lagoon North Segment (WBID 3226E1) to include Little Lake Worth Lagoon. We agree that the WBID boundary of Lake Worth Lagoon North Segment should be expanded to include Little Lake Worth Lagoon, and will redraw the WBID line as requested. We appreciate your attention to detail in redrawing the WBID lines to better assess the hydrology of the Lake Worth Lagoon North Segment.
4. Regarding your request to include Lake Osborne, Lake Pine, and Lake Clarke on the verified list as impaired for nutrients, Lake Pine/C-51 (WBID 3245) and Lake Clarke (WBID 3245B) were not included on the verified list as impaired for nutrients because there were insufficient data available at the time the basin was assessed. However, we recently received data on the Palm Beach County Chain-of-Lakes prepared by Environmental Research & Design, Inc. (ERD), and the calculated TSI values for the new data exceed the IWR threshold for nutrient impairment for lakes. The data points have been loaded into the STORET database, and both lakes will be re-assessed with the new data. Please note that Lake Pine/C-51 (WBID 3245) was already listed as impaired for DO, with nutrients (elevated total nitrogen) as the causative pollutant.

As for Lake Osborne, there were sufficient data for the lake and it was assessed as not impaired. However, it will be re-assessed given the additional data from ERD.

5. Regarding the comment that the data entry for iron concentrations may be incorrect in five WBIDs, we agree that flawed data may have been used to assess WBIDs 3242A, 3245, 3245B, 3256B, and 3262 as impaired for iron. We plan to further evaluate the data, remove all duplicates, and re-assess the impairment calls.
6. We agree that station 21FLSFWMD C51S155 is outside of WBID 3245B and should be relocated to its correct WBID location, which is in WBID 3245, the C-51 Basin.
7. And finally, regarding the comment that TMDLs for iron should not be developed in this region because it is naturally elevated due ground water, our preliminary evaluation of ground water quality and canal inflows from water conservation areas (WCAs) to the west seem to support your position. Our assessment indicates that iron is a natural component of the ground water in Palm Beach County and that ground water concentrations range well above the State Class III iron criterion (1.0 mg/L) in more than half of the well samples. Surface water coming from the Everglades and WCAs via lateral canals are even higher than within the Palm Beach Coast Basin or in area ground water. Almost all samples from the various segments of WCA #1 had extremely high iron concentrations.

Given these high values and the ready exchange between surface and ground waters in the basin, we may be able to establish a site-specific alternative criterion (SSAC) for iron for the area based on the ground water and WCA data, and then reassess the surface water data against this SSAC value. However, our ground water database is fairly limited in the basin, and we would appreciate any information you may have on the ground water quality in the region.

In closing, I would like to thank you for your letter and comments. We recognize that we need local input to ensure that the lists are as accurate as possible, and would like to encourage you to continue to participate in this important process. If you have any questions about this response, please contact me, at 850-245-8431, or Kevin O'Donnell at 850-245-7607.

Sincerely,

Daryll Joyner, TMDL Program Administrator
Bureau of Watershed Management

Patrick A. Martin, P.E.
Director of Engineering
Lake Worth Drainage District
13081 Military Trail
Delray Beach, Florida 33484-1105

September 24, 2004

Re: Response to LWDD Comments on the Draft Impaired Waters List

Dear Mr. Martin:

Thank you for your July 20th letter providing comments and information on the Lake Worth Lagoon – Palm Beach Coast draft impaired waters list. We met with Bill Winters and Terry Lewis on August 24 to further discuss these comments. This letter is in response to your request to remove canals within the LWDD jurisdiction from the draft impaired waters list, and follows up on the meeting discussions, as well.

LWDD Request to Not List Portions of the Boynton Canal (WBID 3256B), E-4 Canal (WBID 3262), and E-1 Canal (WBID 3264A) as Impaired for Nutrients

We reviewed the Florida Fish and Wildlife Conservation Commission Fisheries Report that you submitted as evidence of a healthy fishery in these canals. Also, following our conversation with Bill Winters and Terry Lewis, we obtained more recent FFWCC fisheries surveys pertaining to the Boynton and E-1 Canals. These later surveys were conducted in 1997, which is within the 1/1/97 to 6/30/04 verified impaired waters evaluation period. Both earlier and later surveys indicated that the catch rate of harvestable largemouth bass from these canals was higher than the statewide catch average for this species.

In the August 24 meeting, and as noted by Terry Lewis in his August 26 letter to Bill Winters, we discussed that the surveys indicate a healthy fishery conducive to supporting Class III waters designated uses, but that additional water quality data is needed to complete the evaluation under the “Identification of Impaired Surface Waters Rule” (Ch. 62-303, F.A.C.). However, at this time neither we nor the LWDD have located such additional data, and we are continuing to evaluate the applicability of the fisheries surveys. Also, we appreciate your submittal of the papers on water quality and water chemistry by Hoyer, Brown, and Canfield, and the letter by Jay G. Foy, P.E. of Stormwater Engineering, Inc., and are reviewing these documents for applicability to the assessment of impaired waters on the verified list.

As you mentioned in your letter, the Department, assisted by the Numeric Nutrient Criteria Technical Advisory Committee, is reviewing current nutrient standards in light of their use in Florida’s highly variable waters. However, pending the final results of this effort, we are conducting impaired waters assessments under the present rules.

LWDD Request to Not List Portions of the Boynton Canal (WBID 3256B), E-4 Canal (WBID 3262) as Impaired for Iron

In the August 24 meeting, and as noted by Terry Lewis in his August 26 letter to Bill Winters, DEP agrees that iron is a natural component of the groundwater in Palm Beach County and that groundwater concentrations range well above the State Class III iron criterion (1.0 mg/L). Based on the data in our groundwater database, 63 of 77 wells in the area had at least one value above the criterion, with 83 out of 220 samples exceeding the criterion. Values ranged above 20 ug/L, and the mean iron value for groundwater in the Palm Beach Coast Basin was 2.2 ug/L. Given these high values and the ready exchange between surface and ground waters, we may be able to establish a SSAC for iron for the area based on the groundwater data, and then re-assess the surface water data against this SSAC value. However, our groundwater database is fairly limited in the basin, and we would appreciate any information you may have on the groundwater quality in the basin.

Following the August meeting, the LWDD and the Department discussed follow-up actions to determine anthropogenic influences on the presence of iron in the canals. Currently we are looking into possible outside basin influences from Canal C-51 and Water Conservation Area 1 that may influence iron concentrations. Also, the Department is reviewing surface water iron data for duplicate data points and possible incorrect station locations.

In closing, I would like to thank you for your letter and comments. The Department recognizes that we need local input to ensure that the water quality assessments are as accurate as possible, and encourage you to continue participating in this important process. If you would like to further discuss this response, please contact me at 850-245- 8430 or our TMDL Program Administrator, Daryll Joyner, at 850-245-8431.

Sincerely,

Eric H. Livingston
Chief, Bureau of Watershed Management

Cc: William G. Winters, LWDD
 Terry E. Lewis, Lewis, Longman & Walker, P.A.
 Danna Ackerman-White, LWDD
 Daryll Joyner, DEP
 Jan Mandrup-Poulsen, DEP
 T. S. Wu, DEP
 Kimberly Shugar, DEP

Broward County Environmental Protection Department's Comments on Revised Draft lists of Impaired Waters for Group 3 Basins: Lake Worth Lagoon/Palm Beach Coast
10/29/04

WBID for Comments: WBID 3264, Hillsboro Canal (Freshwater)
Parameter Listed: Historic Chlorophyll (i.e., Nutrients)

A. Main Recommendation:

The Broward County Environmental Protection Department recommends the impairment for historic chlorophyll a (i.e., nutrients) should either be classified as low priority for total maximum daily load (TMDL) implementation or dropped from the impaired list and assessed again during the next 5-year rotating basin schedule.

B. Findings for Recommendation:

1. Comprehensive Everglades Restoration Plan's Site 1 Impoundment Construction.

The construction of the Comprehensive Everglades Restoration Plan's Site 1 Impoundment was originally due for completion in December 2009 with the potential for Aquifer and Storage Recovery Wells technology being applied at a later date. The recent ACCELER8 memorandum of agreement should allow for construction to occur before this date, possibly by 2007 (<http://www.evergladesnow.org/index.shtml>). This CERP component will directly influence the physical nature and hydrological regime of the canal (please see http://www.evergladesplan.org/pm/projects/proj_40_site_1_impoundment.cfm) which will influence its loading capacity characteristics. If the Impaired Waters Rule (IWR) listing process cannot take into account such physical and hydrological changes then we suggest, as discussed at the public meeting (July 20, 2004, FDEP SE District West Palm Beach), modeling scenarios be incorporated (as technologically feasible) to provide alternative hydrological regimes during the TMDL calculation process.

2. Status of Dissolved Oxygen Listing.

We are requesting verification of the status of dissolved oxygen for the Hillsboro Canal. The freshwater Hillsboro Canal (WBID 3264) has no listing for dissolved oxygen (DO) although it was listed as impaired in the June 2004 draft master list. In addition, we have reviewed FDEP's Assessment runs 17.0 and 18.0 and found the verified report card also has the canal listed impaired for DO. If listed for low DO, groundwater and surface water interactions should be taken into consideration with any potential pollutant loading issues.

3. Aquatic Life Use Support.

During our review of this Group 3 Basin, we have also noted a major tributary canal (E-1) to the Hillsboro Canal was delisted for chlorophyll a (i.e., nutrients) and dissolved oxygen based on fisheries data from Florida Fish and Wildlife Conservation Commission 2001 [reference in background information below]. As the Hillsboro Canal is listed for nutrient impairment and potentially dissolved oxygen impairment, we request the same level of consistency be observed by FDEP when assessing canal systems for aquatic life use support. We suggest the Hillsboro Canal also falls under the same category for aquatic life use support as the E-1 Canal if this Page 1 of 3, Broward County's comments WBID 3264, 10/29/04 approach (i.e., fishery report) is used by the FDEP. Please note the Hillsboro Canal had one of the best largemouth bass populations based on Table 4 and 5 of the same fisheries report.

Overall, we applaud the progressive action of linking fishery populations with water quality within the context of the canal system in South Florida. However, we are not aware of any study that directly correlates nutrient levels in canals with canal fish populations or helps define impairment. Thus, we

consider the use of fishery data at this point in time as a suitable ‘Best Professional Judgement’ tool in determining current nutrient and dissolved oxygen concentrations are providing aquatic life use support. We would suggest studies be performed over the next assessment period throughout the canal watershed to determine more comprehensively the relationship between water quality and successful canal fisheries. This would also assist in understanding canal nutrient levels suitable to sustain healthy fish populations within rules such as the anti-degradation mechanisms in the Florida Administrative Code (e.g., 62-302).

4. Mercury in Fish.

As fishery population data gets applied to the Impaired Waters Rule, we would suggest coordinating closely with the newest Fish Advisories listed by the Florida Department of Health in the canals as FDEP has done with other water bodies in the IWR (e.g., coastal systems). The current Hillsboro Canal mercury advisory is 1 largemouth bass meal a month (<http://www.doh.state.fl.us/environment/hsee/fishconsumptionadvisories/FWFGuide.htm#L>).

C. Background Information:

1. Comprehensive Everglades Restoration Plan’s Site 1 Impoundment Construction.

The CERP Site 1 Impoundment was due for construction by 2009 (please see http://www.evergladesplan.org/pm/pm_docs/misp/misp_r13_constr_by_band.pdf) and may occur earlier with the advent of ACCELER8. According to the FDEP Group 3 listing document, the TMDL is projected for 2010. Thus, a year or two before a TMDL is to be implemented on this waterway (2010, a major water preserve feature (total storage capacity of approximately 13,280 acre-feet with two compartments totaling 1,660 acres) will change the hydrological footprint of the canal used in the development of the TMDL. In addition, structural improvements are planned for the canal that will change its conveyance capacity. While many of

CERP’s features will have indirect regional influences on canals throughout South Florida, this particular feature directly modifies the hydrological regime of the Hillsboro Canal. Beyond the CERP project, Broward County, thru its Integrated Water Resources Plan, will continue permitted withdrawals from the Hillsboro Canal in order to optimize local water management within the regional context (<http://www.broward.org/wti01200.htm>) and influence the modified hydrology of the canal.

2. Aquatic Life Use Support.

The fishery report cited in the de-listing of the E-1 Canal is “The Fisheries of Metropolitan Southeast Florida Canals with Special Reference to Exotic Fishes” by Paul L. Shafland, Kelly Gestring and Murray S. Stanford (Florida Fish and Game Conservation Commission, 2001, Non-Native Fish Laboratory, Boca Raton, Florida). This urban fishery report has been very beneficial in the process of integrating all aquatic uses within water management objectives. In addition, Page 2 of 3, Broward County’s comments WBID 3264, 10/29/04 one of the best byproducts of the IWR rotating basin process is that South Florida water managers are looking at their resource within the very critical context of flood protection and water supply, as well as, the designated Class III use of ‘Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife’ (Florida Administrative Code 62-302).

Nonetheless, this report should be used with some caution in linking water quality characteristics and fish populations. We quote the author’s own statement on page 4 of the introduction “These data are subject to large amounts of variability and, unlike data generated from experiments, they do not lend themselves to definitive interpretations based on extensive statistical analyses.” Thus, any correlative analysis with water quality at this time would seem preliminary and exploratory in nature. We do believe the data is of good quality and meets the author’s monitoring objectives well. Furthermore, the data represents, to our knowledge, the only available information to determine canal aquatic life use support in

most of the study area. This is one of the main reasons we suggest the term ‘Best Professional Judgement’ in describing the application of the report to the IWR listing process.

We have reviewed this fishery report as thoroughly as possible and noted the data shows the Hillsboro Canal as having an excellent fishery based on catch per unit, particularly for largemouth bass. We did not find any E-1 Canal fishery specific catch rate data listed in the report to compare with the Hillsboro Canal but it was sampled during the study based on the monitoring map (Figure 1, Page 65) and there is likely data available but not listed in the report

which is similar to the other canals. From a water quality comparison, both water bodies exhibited several single event chlorophyll a values that would constitute algal bloom conditions (greater than 40 ug/l) in other Florida aquatic systems (e.g., Lake Okeechobee; please see following web site http://www.sfwmd.gov/org/wrp/wrp_okee/2_wrp_okee_inlake/ab/index.htm).

In addition, annual mean chlorophyll a levels in the Hillsboro Canal (maximum value 15.1 ug/l, observed in 2001, source Revised IWR Draft List) were lower than the annual mean value observed for E-1 Canal in 2003 (32.144 ug/l, source Revised IWR Draft Delist). Unfortunately, we are not aware of chlorophyll a thresholds necessary to sustain canal fisheries. We do suggest the E-1 Canal should continued to be monitored over the next assessment period, in particular, if the downstream Hillsboro Canal is retained on the verified list for historic chlorophyll a. The Hillsboro Canal will continued to be monitored by Broward County’s thru its ambient monitoring network whether the waterway is listed or not.

Page 3 of 3, Broward County’s comments WBID 3264, 10/29/04

Broward County Environmental Protection Department’s Comments on Revised Draft lists of Impaired Waters for Group 3 Basins: Lake Worth Lagoon/Palm Beach Coast
10/29/04

WBID for Comments: WBID 3226F ICCW above Pompano
Parameter Listed: Copper

A. Main Recommendation:

Broward County Environmental Protection Department’s recommends the impairment for copper should either be classified as low priority for total maximum daily load (TMDL) implementation or dropped from the impaired list and assessed again during the next 5-year rotating basin schedule.

B. Findings for Recommendation:

1. Relative spatial extent of monitoring data within WBID.

Approximately 1/3rd (southern reach) of the relatively long WBID (approximately 20 miles) is not covered by monitoring data. In addition, it appears one station provided 75% of the exceedances of the standard. Furthermore, a site providing 12.5% of the exceedances may need to be placed in the WBID to the north (3226F2). The southern 1/3rd of the WBID without copper data in this assessment includes the Boca Raton Inlet to the Hillsboro Inlet. Future loading discussions, modeling, etc. should strongly consider more monitoring to populate this hydrological distinct subsection of the WBID in order to better understand whether it has similar copper concentrations as the upper portion of the WBID.

2. Relative levels of exceedance within WBID.

The relatively low levels of the copper exceedances (median value = 4.74 ug/L, maximum value = 6.0 ug/L, n = 16) observed within the WBID suggest further sampling may be justified to understand the extent of impairment throughout the entire area. We are not questioning the 3.7 ug/L standard but instead call attention to the relative value of the exceedances observed in the WBID as compared to other WBIDs in the state.

C. Background Information:

1. Relative spatial extent of monitoring data within WBID.

Based on our review of the data, the following three stations within Palm Beach County have placed WBID 3226F ICCW above Pompano on the list:

FDEP Station Number Description

21FLWPB28010771 ICW AT OCEAN AVE, BOYNTON
21FLWPB28010789 ICW AT LINTON BLVD. LK WRTH
ICW AT SR800 BRIDGE, LK. WRTH
21FLWPB28010791 BA

Page 1 of 2, Broward County’s comments WBID 3226F, 10/29/04

We greatly appreciate the time and effort of the FDEP Southeast District Office (West Palm/ Port St. Lucie) in obtaining these copper samples and investigating a potential water quality challenge for our estuarine reaches in South Florida. We had begun monitoring discussions with FDEP and have begun preliminary copper sampling in the lower 1/3 of the WBID but the current Impaired Waters Rule milestone for Group 3 Basins has arrived before we have been able to populate the data set as defined by the IWR process. The southern most site listed above (21FLWPB28010791) is approximately 9 miles from the northern extent of the WBID 3226F. The remaining distance from the SR 800 Bridge to the Hillsboro Inlet is approximately 10 miles. Thus, the data collected for this assessment is primarily focused on the upper half to 2/3rds of the WBID, all above the Boca Raton Inlet. We have noted 12 of the 16 exceedances of the copper standard were observed at the Linton Boulevard site (21FLWPB28010789) which represents areas to the north of the C-15 Canal and south of the C-16 Canal/Boynton Inlet area (i.e., north portion of WBID

3226F). The SR800 and Linton Blvd sites are clearly within the WBID 3226F, however the site called ICW at Ocean Avenue (21FLWPB28010771) may be within two WBIDs because it is at a border area. WBID 3226F2 also has a site listed for ICW at Ocean Ave, Boynton (21FLPBCH28A). This inconsistency may or may not influence copper listings for either WBID but it appears on the map in the Basin report that Ocean Avenue is within 3226F2. This observation may be related to our recent review of the WBID 3226F2 and may have been covered by other entities more familiar with the local area. We would suggest defaulting the site to a specific WBID based on their local knowledge.

2. Relative levels of exceedances within WBID.

We have performed a quick review of other verified listed waters in the state and have observed some values exceeding 10 ug/l (e.g., WBID 3211, Bessey Creek), 20 ug/l (e.g., WBID 5003A, South Indian River) and even some areas with values over 50 ug/l (e.g., WBID 3210, Tidal St. Lucie). As we continue the assessment of the Group 3 and Group 4 basins over the next year, we should increase our understanding of the magnitude of this WBID's (3226F) copper impairment when compared statewide. We will be discussing over the next few months with the FDEP our metal observations in general for the IWR. We believe these discussions will be productive in the better determination of copper impairment throughout the state and provide another reason for delaying a TMDL for this WBID until overall surface water metal impairment is better understood.

Palm Beach County
Comments

August 9, 2004

Daryll Joyner, Program Administrator
Bureau of Watershed Management
Florida Department of Environmental Protection
2600 Blair Stone Road (MS 3510)
Tallahassee, FL 32399-2400

Dear Mr. Joyner,

SUBJECT: TMDL DRAFT VERIFIED LIST FOR LAKE WORTH
LAGOON, PALM BEACH COAST, GROUP 3 BASIN

Provided below are comments on the subject TMDL draft verified list. Department of Environmental Resources Management (ERM) staff appreciate the extensive effort by Department of Environmental Protection (DEP) staff to explain the TMDL process.

1. Lake Worth Lagoon Central Segment

Chlorophyll-a

PP = IO
VP = NI
2002, 2003
9.3966, 6.8965

The Lake Worth Lagoon Central Segment (WBID 3226F1) is not currently included on the Lake Worth Lagoon – Palm Beach Coast Group 3 Basin Draft Verified List as a Category 5 waterbody. Based on data from the 2002 IWR Data Retrieval Tool (Run ID 16_3), the 2002 average chlorophyll-a concentration is 11.66 ug/L. The Florida Administrative Code (F.A.C.) Chapter 62-303.353 - Nutrients in Estuaries states that "estuaries or estuary segments shall be included on the planning list for nutrients if their annual mean chlorophyll-a for any year is greater than 11 ug/l..." We believe that, based on the average 2002 chlorophyll-a of 11.66 ug/l, there is justification to include the central portion of Lake Worth Lagoon on the Lake Worth Lagoon, Palm Beach Coast Group 3 Basin Draft Verified List.

2. Lake Worth Lagoon Central and Southern Segments

Narrative Nutrient Criteria - Imbalance in Flora or Fauna

Not listed
for Biology
Ask Nancy

The central (WBID 3226F1) and southern (WBID 3226F2) segments of the Lake Worth Lagoon have been omitted from the verified list of impaired waterbodies for the Narrative Nutrient Criteria – Imbalance in Flora or Fauna. There is significant evidence that the benthic community, both flora and fauna, in these segments are significantly impacted in the lagoon. The causative pollutants are nutrients and sediment discharged from the C-51 Canal which results in the accumulation of organic-rich silty deposits (i.e., muck) and in the reduction of light penetrating the water column through

Daryll Joyner
August 9, 2004
Page 2 of 4

the release of nutrients causing periodic algal blooms. The suspended sediments also directly block light from penetrating the water column. These phenomena result directly in inhibiting the recruitment of seagrass and have affected other biological resources in the estuary.

These sediments form an organic-rich "muck" layer blanketing portions of the lagoon's natural substrate. In some areas, the layer has been documented to exceed eight feet in depth. In addition, wind, wave action and boat wakes disturb the uppermost portion of the muck layer which, when re-suspended, degrades water quality and reduces the penetration of light in the water column. Seagrasses and other healthy submerged flora and fauna are unable to establish and maintain a presence under these conditions, as evidenced by a lack of seagrasses in the central and southern segments.

Currently, there are 192 acres of seagrass in the central segment; however, based on an analysis of depth, there are approximately 879 acres of potential seagrass habitat. If it were not for the sediment inflow which affects the depth of the photic zone and alters substrate characteristics, seagrass could cover more than 1,000 acres of the central segment. Similarly, 774 potential acres of seagrass habitat in the Lake Worth Lagoon South segment are affected by sediment inflow. Attachment A presents seagrass and muck deposits in Lake Worth Lagoon.

In another study, Mr. John Reed, in his Master's thesis Benthic Macrofaunal Associations in Lake Worth Lagoon, Florida, and Their Use as Indicators of Water Quality (1975), indicated that the benthic community associated with "mud" stations [located in the central portion of the lagoon, just south of the C-51 Canal], appeared stressed and had reduced diversity and species richness. In a re-evaluation of the lagoon's benthos (Tropical Ecosystems, Inc. 1983), it was reported that the same dominant species collected were identical to those found in the Reed (1975) study. A benthic study by Harvey Rudolph (1989) found a reduction in benthic diversity when compared to the 1983 study.

An ongoing study of sediment loading to the Lagoon via the C-51 canal (USGS) indicates the severity of the problem. Preliminary results indicate that an average of 12 tons per day of suspended solids is entering the central segment during the dry season. Wet season results are not yet available.

DEP staff have explained that while the central and southern segments of Lake Worth Lagoon appear impaired, they cannot be listed on the verified list unless a causative pollutant, for which a surface water quality standard exists, is identified. DEP staff have also explained that the discharge of suspended solids are viewed as previous hydraulic modifications, and surface water quality standards do not include suspended solids. However, surface water quality standards do include nutrients. The primary headwaters of the central segment of Lake Worth Lagoon, the C-51 water segment, is listed as impaired for dissolved oxygen with nutrients identified as the causative pollutant. Since

hydrologic

Daryll Joyner
 August 9, 2004
 Page 3 of 4

the impaired C-51 water segment discharges to the central segment of Lake Worth Lagoon the causative pollutant for the impairment of the central segment of Lake Worth Lagoon is clear. This justification also applies to the southern segment of Lake Worth Lagoon, since the Boynton Canal water segment, verified as impaired for nutrients, discharges to the southern segment of Lake Worth Lagoon.

While we recognize that the central segment is listed as a "4c" waterbody segment, we believe that, based on the information detailed above, there is clear justification to include the central and southern segments of Lake Worth Lagoon on the Verified List for the Narrative Nutrient Criteria - Imbalance in Flora or Fauna.

3. WBID Boundary

The WBID boundary for Lake Worth Lagoon North Segment (WBID 322E1) should be expanded to include Little Lake Worth Lagoon. Little Lake Worth Lagoon is currently included in 3226E.

5720 #1
 [] *WBID Boundary*

4. Chain-of Lakes

The Chain-of-Lakes are not currently included on the Lake Worth Lagoon – Palm Beach Coast Group 3 Basin Draft Verified List for nutrients except for Lake Ida, which includes Lake Eden. The annual mean TSIs for Lake Ida/Lake Eden, Lake Osborne, Lake Pine, and Lake Clarke all exceed 60 for the time period from September 2000 to August 2001, as presented in the following table:

WBID	Water Body	TSI
3262A	Lake Ida/Lake Eden	66
3256A	Lake Osborne	62
3245	Lake Pine → <i>New WBID</i>	64
3245B	Lake Clarke	64

DO

See aerial map

Source: Palm Beach County Chain-of-Lakes Water Quality Monitoring and Pollutant Loading Evaluation, Environmental Research and Design, 2002.
 Note: Results reflect monthly sampling regime; TSI calculation from 1996 Water Quality Assessment for the State of Florida Section 305(b) Main Report.

The Florida Administrative Code (F.A.C.) Chapter 62-303.352 - Nutrients in Lakes states that "lakes or lake segments be included on the planning list for nutrients if: (1) For lakes with a mean color greater than 40 platinum cobalt units, the annual TSI for the lake exceeds 60..." We believe that, based on the information detailed above, there is justification to include Lake Osborne and Lake Clarke on the Lake Worth Lagoon – Palm Beach Coast Group 3 Basin Draft Verified List for the nutrient criteria. Although Lake Pine appears to be impaired, we acknowledge that Lake Pine is part of the C-51 water segment and will not require separate TMDL development.

Daryll Joyner
August 9, 2004
Page 4 of 4

Additionally, knowing that the lakes are impaired for nutrients and possibly for other parameters, these upstream waterbodies, especially Lake Clarke, Lake Pine, and Lake Osborne are directly loading Lake Worth Lagoon with nutrient enriched waters via the C-51 and C-16 Canals. As previously discussed, this supports the justification for concluding the central and southern segments of the Lake Worth Lagoon are impaired and should require TMDL development.

5. Water Segments verified as impaired for iron

Flawed data may have been used to assess 5 WBIDs; 3242A, 3245, 3245B, 3256B and 3262 as impaired for iron. The iron data collected by the South Florida Water Management District (SFWMD) within the IWR Raw Data Report appears to conflict with the SFWMD DBHYDRO database. The IWR Raw Data Report frequently lists duplicate iron data points for the same monitoring event with one value greater than the other by a factor of one thousand. This results in exceedences of the water quality standard for iron, and likely the subsequent assessment as impaired.

Duplicate Data

b) Also, the data used to assess Lake Clarke (WBID 3245B) as impaired for iron appears to emanate from a site outside of WBID 3245B (Site 21FLSFWMD C51S155). Other parameter assessments conducted for this WBID, based on this site, may be conducted improperly.

*Station Location
Tide w/ Red first*

Should be in 3245

In addition, TMDLs should not be developed for iron in this region. ERM staff are unaware of direct anthropogenic inputs of iron, such as groundwater routinely pumped into the surface waters. Locally, it has been recognized that the interrelationship between groundwater and canals results in the transport of iron to surface waters via groundwater contributions. Thus, the detection of iron should be considered a natural condition.

Should you have any questions regarding the above comments, please contact Brian Gentry at (561) 233-2485, or Rod Braun at (561) 233-2536.

Sincerely,

Richard E. Walesky, Director
Environmental Resources Management Department

Enclosure
cc: Ken Todd, P.E., Water Resource Manager
Palm Beach County Administration

Attachment A

Lake Worth Lagoon Seagrass, Potential Seagrass and Sediment Characteristics*

Brian Henry



*Based on LWL Natural Resource Inventory and Resource Enhancement Study, 1990 and 2003 Morgan & Ekund Study (Central Portion).
 ©Palm Beach County Florida, 2006, All Rights Reserved - Subject to a License Agreement
 D:\Sediment Chart\Seagrass TMDL Map.mxd

October 27, 2004

Daryll Joyner, Program Administrator
Bureau of Watershed Management
Florida Department of Environmental Protection
2600 Blair Stone Road (MS 3510)
Tallahassee, FL 32399-2400

Dear Mr. Joyner:

SUBJECT: TMDL DRAFT VERIFIED LIST FOR LAKE WORTH
LAGOON, PALM BEACH COAST, GROUP 3 BASIN

Provided below are comments on the subject TMDL draft verified list dated September 27, 2004.

1. **L-8 Basin**

Dissolved Oxygen.

Based on a review of the raw data in Run 17, the only monitoring station representing the L-8 Basin is the South Florida Water Management District monitoring station CULV10A, until March 2003. Monitoring station CULV10A does not appear appropriate to provide representative water quality data for the L-8 Basin.

The L-8 Basin is 171 square miles in area, and the L-8 Canal is approximately 26 miles in length. Monitoring station CULV10A is 20 feet east of the structures regulating flow into and out of Lake Okeechobee. The structures also serve as the WIBD boundary. During water quality monitoring events at CULV10A for the period of record for the data within Run 17, flow from Lake Okeechobee to the L-8 Canal was recorded 37% of those events. During monitoring events for the period of record for the Verified List, flow from Lake Okeechobee to the L-8 increased to 39%. Considering the frequent flow from an adjacent WIBD (Lake Okeechobee) during the subject monitoring and the station location within the L-8 Basin, monitoring station CULV10A does not appear appropriate to provide representative water quality data for the L-8 Basin.

Daryll Joyner
October 27, 2004
Page 2 of 2

Since monitoring station CULV10A does not appear appropriate to provide representative water quality data for the L-8 Basin, subsequent listing on 1998 303d List and its high priority TMDL development ranking should not have occurred, due to the assessment not based on good science. The monitoring conducted by DEP since March 2003 is located at stations providing better representation of the L-8 Basin. While this data appears to provide similar results as CULV10A for dissolved oxygen, total nitrogen concentrations appear less than the concentrations listed in the comments section of the draft verified list. However, only 6 monitoring events at 2 stations during the warmer months of the year, when lower dissolved oxygen within South Florida canals are expected, were conducted.

The primary concern is that this station is not representative of the L-8 Basin, therefore, the data should not be part of the TMDL Model for the L-8 Basin. Additional monitoring at the more representative stations during all season is recommended, since the DEP dissolved oxygen results provides only sufficient data for the Planning List and not the Verified List.

Since the L-8 Basin should not have been listed on the 1998 303d list and dissolved oxygen is the only potential impairment, it is recommended that the high priority ranking and schedule of 2005 for the TMDL Development be reassigned a low priority with a 2010 projected year for TMDL Development. This will provide consistency with the Impaired Water Rule, Chapter 62-303.500(3)(b), Florida Administrative Code, and time to obtain sufficient data for assessment and allow the FDEP to complete their monitoring project for restructuring of the classification system for canals in Palm Beach County.

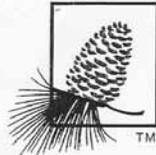
Should you have any questions regarding the above comments, please contact Brian Gentry at (561) 233-2485.

Sincerely,

Richard E. Walesky, Director
Environmental Resources Management Department

Enclosure

cc: Alan Wertepny, P.E.
Mock Roos & Associates
Jay G. Foy, P.E., President
SJF Stormwater Engineering, Inc.



LEWIS, LONGMAN & WALKER, P.A.
ATTORNEYS AT LAW

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*Free part - re Lake Worth
DO TMDLs
634*

Reply To: West Palm Beach

July 22, 2004

Mr. Eric Livingston, Bureau Chief
Bureau of Watershed Management
Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399

RE: Lake Worth Drainage District/TMDL Meeting

Dear Eric:

As a follow-up to our discussions at Tuesday's TMDL meeting, this confirms I will plan on meeting with you and your staff in Tallahassee on August 24th. If it is acceptable to you, I and Bill Winters, the District's General Manager, will meet with you at your office in Tallahassee at 11:00 a.m. on the 24th.

As always, thank you and your staff for your cooperation in this matter.

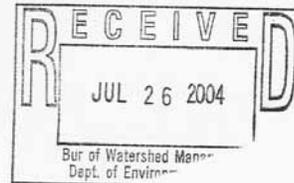
Sincerely yours,

Terry E. Lewis

TEL/sps

c: Mr. William G. Winters
Ms. Kimberly Shugar

I:\Client Documents\LAKE WORTH DD\379-000\CORR\Livingston Ltr.doc



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13081 MILITARY TRAIL
 DELRAY BEACH, FLORIDA 33484 -1105
 July 20, 2004

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 Bureau Chief
 Bureau of Watershed Management
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 Tallahassee, FL 32399-2400

Board of Supervisors
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 John I. Whitworth III
 Murray R. Kalish
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 James M. Alderman
 Secretary/Manager
 William G. Winters
 Assistant Manager
 Ronald L. Crone
 Attorney
 Perry & Kern, P.A.

Re: LWDD Participation in the Impaired Water Bodies List, TMDL Program

Dear Mr. Livingston:

This letter is Lake Worth Drainage District's opinion on the current TMDL program and the Group 3 proposed Impaired Waters List.

First, some LWDD history. LWDD was created in 1915. The District operates under Florida Statute 298, Special District. As a result, the District is a single purpose District providing flood protection and water supply to its taxpayers. LWDD does not have an authority over land use. That responsibility belongs to Palm Beach County or the municipality a property resides. Further, while LWDD monitors discharge quantity to the canal system, we do not have any water quality authority. It consists of 511 miles of canals. The canals were excavated to divert stormwater runoff west to east and ultimately to tide. The canal system is integrated in such a manner that the water quality in one location will vary little if any from another. Six north-south canals connect 50 east-west canals. The results are numerous open channel connections. This helps balance flood protection when required. It, of course, also mixes the waters from one area to another, such that the identity of any source water would be lost in a half mile.

As stated, the canals were constructed to collect and convey runoff (ultimately to tide). LWDD does not own or operate any water quality treatment areas.

The LWDD canals and their parameters on the proposed Impaired Water Bodies are listed below:

<u>WBID</u>	<u>Water Segment Name</u>	<u>Parameter of Concern</u>
3256B	Boynton Canal	Nutrients (Chl-a)
3256B	Boynton Canal	Iron
3262	E-4 Canal	Nutrients
3262	E-4 Canal	Dissolved Oxygen
3262	E-4 Canal	Iron
3264A	E-1 Canal	Nutrients (Chl-a)

DeLray Beach & Boca Raton (561) 498-5363 • Boynton Beach & West Palm Beach (561) 737-3835 • Fax (561) 495-9694
 Website: www.LWDD.net

LAKE WORTH DRAINAGE DISTRICT

Page Two
TMDL Program
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As can be seen, all the water bodies of concern to LWDD are on the list for nutrients, dissolved oxygen or iron.

For the purposes of this document and our desired outcome, LWDD assumes the data the department has compiled is accurate. This assumption is only valid for this paper. If the conclusions from the department are less than our expectations, LWDD will require further data quality control and assessment methodology evaluation. This in and of itself is an entirely different and lengthy discussion.

LWDD, through this letter and attachments, are making a formal request to remove all canals that are under our jurisdiction from the proposed list. Our reasons for such request follows:

To preface our rationale, it should be noted that the State is currently reviewing numeric criteria for canals, specifically through the "Numeric Nutrient Criteria Technical Advisory Committee". LWDD has attended these meetings and provided written comments (see attached). It appears this committee will surely affect the Class III Recreational Water Classification. In doing so, it may "sub class" canals such as the ones LWDD owns, operates and maintains. Having stated this, it appears premature to cite parts of the LWDD System (as well as other systems) with an impaired designation. The "sub classification" may allow for greater nutrients and lower dissolved oxygen concentrations in south Florida canals. The TMDL Program resources would be better spent on other parts of the state.

Nutrients and Dissolved Oxygen:

Attached is a Fisheries Report performed by the Florida Fish and Wildlife Conservation Commission. The test areas were conducted in water of the same quality as the waters in which you have data. A map is attached connecting the "Line of Stream" from the water quality sites to the fish test areas. In short, the fishery in the LWDD system is listed as excellent. This is further validated by the local fishing boat traffic within the system. Fishing tournaments are frequently held in the system.

One of the reasons for such an excellent fishery is the presence of nutrients (as presented to the Numeric Nutrient TAC, February 19, 2004). Nutrients in the in-situ concentrations provide a very beneficial recreational activity. There is no reason to assume the in-situ concentration will increase to a point of becoming undesirable as the majority of the service area is "built out". Another way of stating this is, currently there is excellent fishery in the LWDD system under the current conditions. Therefore, the current ranges (nutrient and dissolved oxygen concentrations) appear to be acceptable for this type of recreational activity.

To repeat what has been documented numerous times, the dissolved oxygen concentration in south Florida canals cannot meet the state standard, save on rare instances only. Again, the in-situ concentrations do however support an excellent recreational fishery. Attached are cross sections of the canals in the locations the data collection occurred. As can be seen, the geometry of the sections, coupled with the climate of a subtropical environment, does not support the higher dissolved oxygen standard.

Iron:

The surface water elevations in south Florida are merely the level of the groundwater. They are one in the same. Groundwater is high in iron and it infiltrates to the surface water. This is a simple but true explanation.

LAKE WORTH DRAINAGE DISTRICT

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There are two additionally attached papers, "Relations between Water Chemistry and Water Quality as Defined by Lake Users in Florida, by Mark V. Hoyer, Claude D. Brown and Daniel E. Canfield, Jr. and NPDES/TMDL/Draft Verified List, by Jay G. Foy, P.E. The first document mentioned what is a public perception of recreational facilities. This is a very interesting concept. Since the canal systems cannot support high clarity swimming conditions, they do support an anglers point of view, conducive to good fishing without harm to other environmental factors.

For the water bodies listed as nutrient impaired, the District questions the comments portion of the list. If the database used to derive the statistical ranges of what is "good or impaired" use only, pristine or healthy lake bodies, it should not be compared to south Florida canals. This type of analysis should be performed for south Florida canals as a separate category and determine impairment among canals.

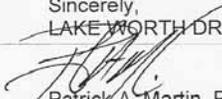
Mr. Foy's comments are more specific to the local area. His points should be considered strongly, to further accept that these proposed impairments are in fact normal for south Florida.

Eastward Ho, An Opportunity:

As stated above, most of the 218 square mile LWDD service area is developed. Redevelopment of the eastern areas is becoming more popular. These areas, for the most part, were developed prior to the 1972 Clean Water Act and therefore do not possess any water quality treatment. It is anticipated that with the help of the FDEP and SFWMD, regulations can be put in place for this redevelopment, to meet today's water quality standards. This is far more important to the receiving waters than any program currently proposed. Requiring quality retrofitting can have a major positive impact to the receiving water, (ie., Class III Waters).

I hope this provides the necessary input to remove LWDD canals from the proposed impaired list. While LWDD desires to be dropped from the impaired list, we do wish to continue to participate in the program. We believe we bring a lot "to the table," (eg. local knowledge and conditions). Upon review, if you desire a meeting for clarification of any issues, please contact us. Otherwise we will contact you in a few weeks to see if you require any additional information.

Sincerely,
LAKE WORTH DRAINAGE DISTRICT



Patrick A. Martin, P.E.
Director of Engineering

PAM:kjr
Attachments

- C: Daryll Joyner, TMDL Administrator, FDEP, w/attachments
- Jan Mandrup-Paulsen, Watershed Assessment, FDEP, w/attachments
- Fred Calder, Watershed Planning Coordinator, FDEP, w/attachments
- Daniel Apt, Environmental Consultant, FDEP, w/attachments
- Jay Foy, P.E., Stormwater J, w/attachments
- Michelle Diffenderfer, Esq., Lewis, Longman & Walker, P.A., w/attachments
- Kenneth Todd, P.E., Palm Beach County Resource Engineer, PBC, w/attachments
- William G. Winters, Manager, LWDD
- Danna Ackerman-White, Director of Community Affairs, LWDD



1489 N Military Trail, Suite 217
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stormj@fdn.com

(561) 242-0028
Fax 242-0109

July 2, 2004

Colleen M. Castille
Secretary of the Florida
Department of Environmental Protection
3900 Commonwealth Boulevard M.S. 49
Tallahassee, FL 32399

RECEIVED

JUL 6 2004

LWDD

**RE: NPDES/TMDL/Draft Verified List
Impaired Water Quality,
Lake Worth Lagoon – Palm Beach Coasts Basins
SJE Project #'s 91084.015 & 04028**

Dear Ms. Castille:

This letter specifically addresses Palm Beach County although many of the comments are applicable for all of South Florida and throughout the rest of the state.

Listing of "waters with impaired water quality" in Palm Beach County using a standard for dissolved oxygen of 5.0 mg/l is inappropriate for canals. Specifically:

1. Canals are man-made deep and narrow ditches constructed for the specific purpose to drain lands for mans uses. Deep narrow ditches are not conducive to light penetration, littoral growth nor oxygen exchange.
2. Canals are typically maintained by man for water conveyance not for other beneficial uses. Some are secondarily used for recreation.
3. Palm Beach County is in the only subtropical region in the contiguous United States. As such our water temperatures are higher than most of the rest of the United States of America. The saturation level of oxygen in water for south Florida is at 8.0 or less for most canals in the summer. The saturation level of oxygen in water varies with temperature, see attached chart. The cooler the temperature the higher the potential oxygen in water. The Florida standard for Class III fresh water is greater than or equal to 5.0 mg/l. This was derived from a national value where oxygen saturation approaches 10.0 mg/l. While it is clearly understood that predatory fish are desirous of 5.0 mg/l or higher, it is not physically reasonable to expect a canal with a saturation value of 8.0 mg/l or less to maintain this high of a value.

JAY G FOY PE ATTACHMENT

Colleen M. Castille

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4. The subtropical climate in south Florida yields two seasons: a wet season and a dry season. While canals flow in the wet season, the flow helps oxygen exchange. During the dry season canals become stagnant. Oxygen exchange is limited to the surface contact area with air. Due to the physical shape of canals, i.e., little surface area with deep cuts and wind exchange limited due to the depressed narrow water surfaces, oxygen exchange is inhibited. With little flow, the highest temperatures in the contiguous United States, and physical constraints, D.O. in canals can not be expected to be at or above 5.0 mg/l all of the time unless artificially aerated.
5. Another contributing factor to canals not being able to physically meet 5.0 mg/l D.O. all the time is the constant exchange with groundwater. In Palm Beach County the surficial aquifer and surface waters are in constant contact and constantly interchange. Groundwater D.O. typically approaches 0.0 mg/l.
6. Additionally the diurnal variation in D.O. typically reduces dissolved oxygen at night. Another variable is D.O. typically is lower with depth in the water column. According to where and when the D.O. reading is taken the results can vary substantially.
7. This situation is further exacerbated with borrow canals such as the L-8 Canal. This canal was not built with its primary purpose as surface water conveyance. It was dug to use the fill for flood protection by construction of the L-8 Levee.
8. The conclusion that an elevated total nitrogen level in the L-8 Canal is the cause of D.O. impairment is bad science. These D.O. levels are natural for the given conditions.

Recommendation: remove D.O. as a listing criteria in canals. If this is not desirous then revise the criteria for south Florida and have yet another criteria for south Florida canals. Should FDEP believe 5.0 mg/l D.O. is appropriate, I respectfully suggest you fund aeration units throughout the Central and Southern Florida Flood Control Project as maintained by the COE and SFWMD.

Specific comment relevant to L-8: the most comprehensive study completed to date on the L-8 Canal to my knowledge was done for the SFWMD, contract No. C-7103, submitted by the City of West Palm Beach, prepared by CH2MHill, titled "Water Quality Assessment of the Southern L-8 Basin". This was a 4 year program and resulted in an average turbidity of 3.6 to 3.8 NTU's in the L-8 Canal. It is extremely difficult to believe the L-8 Basin is water quality impaired due to turbidity. If high turbidity is being measured I would look toward Lake Okeechobee discharges as the source. This discharge should diminish in the near future. I therefore believe turbidity is not an appropriate water quality parameter to justify listing of the L-8 Canal/Basin as impaired.

-Gat
Lynn

Colleen M. Castille

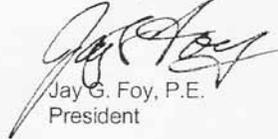
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July 2, 2004

One last observation; iron is a natural component of Palm Beach County groundwater. For the same reasons as listed above regarding groundwater and surface water exchange, it is inappropriate to list a canal as impaired due to the naturally high values of iron found in south Florida canals.

Please receive these comments as intended, i.e., these comments are intended to provide input as to what water quality standards are appropriate in south Florida canals relative to physical and natural conditions. It is counterproductive and leads to regulatory problems when criteria are inappropriate.

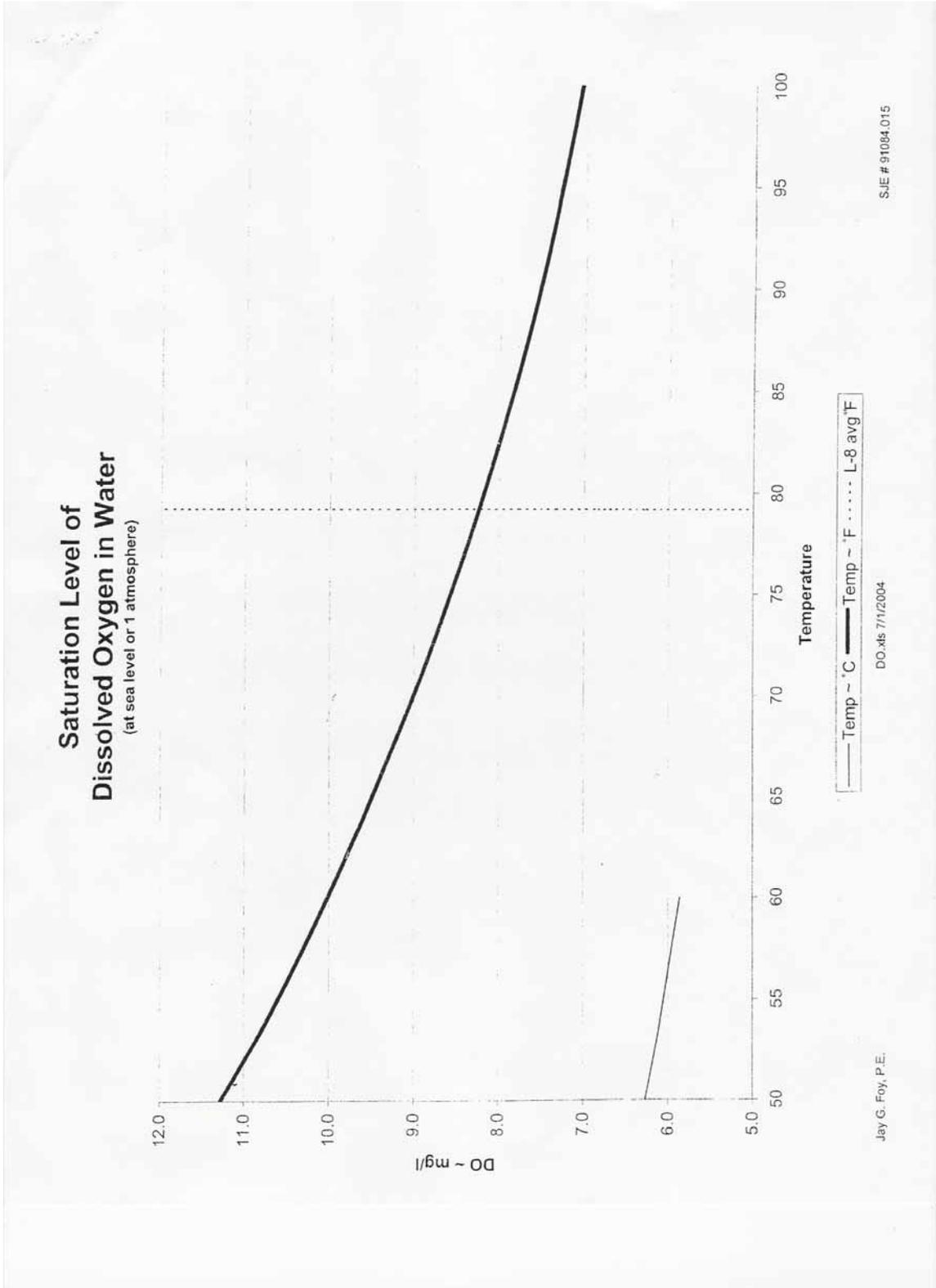
Very Truly Yours,



Jay G. Foy, P.E.
President

JGF/lam
Enclosure

c: B. Aaronson R. DeSantis J. Negron L. Tropepe
D. Apt C. Domino W. Newell L. Van Cott
D. Aronberg G. English E. Opper S. Vana
J. Atwater A. Gannon K. Pruitt P. Walker
E. Bogdanoff R. Graydon K. Rearden G. Ward
M. Brandenburg A. Greene N. Roberts A. Wertepny
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L. Bullard A. Hasner C. Schoech K. Wright
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A. Clemente J. Koons D. Shalloway
G. Clough R. Machek I. Slosberg
M. Craig K. Marcus M. Thorton
M. Dawson A. Masilotti M. Tjoflat
H. Dean M. McCarty K. Todd



Colleen M. Castille

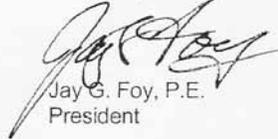
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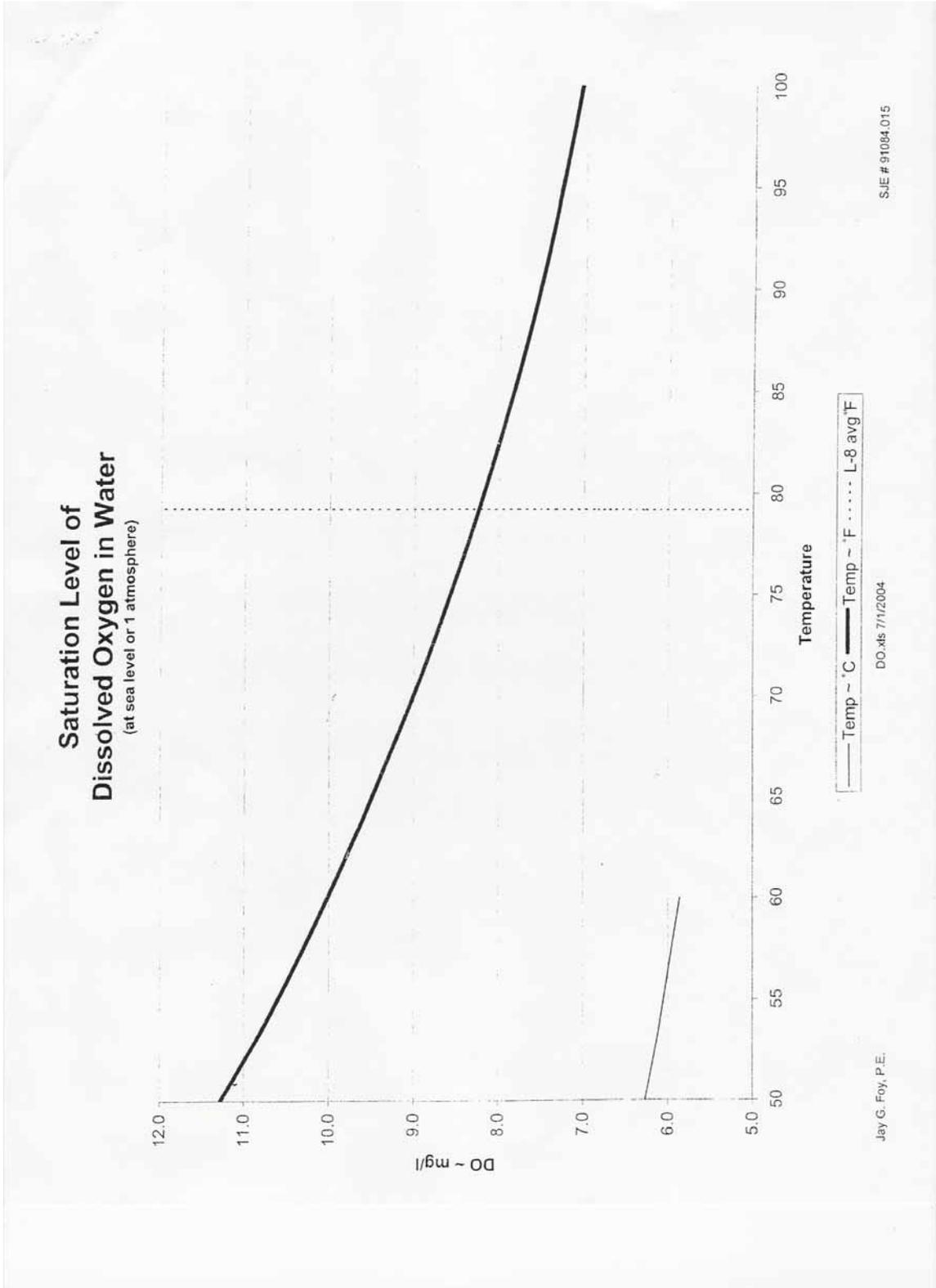
Very Truly Yours,



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