Municipal Separate Storm Sewer System
National Pollutant Discharge
Elimination System

Joint Annual Report

Cycle 4- Year 3

October 1, 2018 Thru
September 30, 2019

Submitted by
Northern Palm Beach County
Improvement District
as Lead Permittee

prepared by
MOCK•ROOS

NPDES

NPDES MS4
A Joint Program of Palm Beach County Permittees

Palm Beach County MS4
Permit No. FLS000018-004

Table of Contents

Report Certification **8**

1.0 Palm Beach County MS4 Program **9**

1.1 Introduction **9**

1.2 Permittees **9**

1.3 Steering Committee **9**

1.4 Interlocal Agreements **10**

2.0 Training Program **15**

The Palm Beach County Group training session conducted in 2018/2019 included: 17

3.0 Public Education Program **17**

Objective: 18

Topics: 18

Target Audience: 18

Activities and Materials: 18

Methods for Distribution: 20

Annual Schedule: 20

Documentation: 20

Responsible Entities: 20

Resources Allocated: 20

Assessment Method: 20

Public Reporting of Illicit Discharge: 21

4.0 Total Maximum Daily Load (TMDL) Program **21**

4.1 Description 21

4.2 Established and Adopted TMDLs – Cycle 4 22

4.3 FDEP Planning List 22

4.4 TMDL Activities 24

Southwest Fork Loxahatchee River 24

Lake Ida (WBID 3262A) 26

E-1 Canal (WBID 3364A) 27

5.0 Water Quality Monitoring Program 29

5.1 Description 29

5.2 Monitoring Sites 29

5.3 Water Quality Monitoring Results and Exceedances 31

Standards 31

Monitoring Results 31

Comments 32

Tabular Summaries 33

5.4 Short Terms Trends 33

5.5 Long Term Trends 34

5.6 Pollutant Loading Analyses 35

5.7 Program Modifications 36

Tables

Table 1-1	Permittee Contacts		11
Table 1-2	Palm Beach County MS4 Steering Committee		14
Table 4-1	Cycle 4 TMDLs in Palm Beach County		23
Table 4-2	Cycle 4 Prioritized TMDLs		23
Table 4-3	11/10/17 FDEP Planning List for TMDLs in Palm Beach County		24
Table 5-1	Water Quality Monitoring Site Locations		37
Table 5-2	Parameter Collection Schedule		38
Table 5-3	Numerical Surface Water Quality Standards by Waterbody (8 Pages)		39
Table 5-4	Monitoring Data		
	C-15 Watershed	Site 31E	46
		Site 31C	47
		Site 31B	48
	C-16 Watershed	Site 22	49
		Site 24	50
		Site 27B	51
		Site 27A	52
		Site 28	53
	C-17 Watershed	Site 12A	54
		Site C17S44	55
	C-18 Watershed	Site 16	56
		Site 15	57
		Site 92	58
		Site 81	59
	C-51 Watershed	Site 38B	60
		Site 37B	61
		Site C51S155	62
	Loxahatchee River	Site 69	63

	ICWW-N	Site 51	64
		Site 62	65
		Site 72	66
		Site 30	67
	Lake Worth Lagoon North	Site LWL-1	68
		Site 11	69
		Site 13	70
		Site LWL-4	71
	Lake Worth Lagoon Central	Site LWL-8	72
		Site 18C	73
		Site 18D	74
		Site LWL-11	75
	Lake Worth Lagoon South	Site LWL-13	76
		Site LWL-18	77
	Hillsboro	Site S39	78
		Site 1	79
		Site 2	80
		Site 3	81
	L-8	Site CULV10	82
	S-2-6-7	Site S-2	83
		Site 39	84
		Site 43	85
	WPBWS	M Canal	86
		Control 4	87
		Lake Magnonia	88
		Clear Lake	89
Table 5-5	Summary of Exceedances Per Site Parameters		90
Table 5-6	Monitoring Data Summary		
	C-15 Watershed for Sites 31E and 31C		91
	C-15 Watershed for Site 31B		92
	C-16 Watershed for Sites 22 and 24		93
	C-16 Watershed for Sites 27B and 27A		94

	C-16 Watershed for Sites 28	95
	C-17 Watershed for Sites 12A and C17S44	96
	C-18 Watershed for Sites 16 and 15	97
	C-18 Watershed for Sites 92 and 81	98
	C-51 Watershed for Sites 38B and 37B	99
	C-51 Watershed for Site C51S155	100
	Loxahatchee River Watershed for Sites 69 and 51	101
	Loxahatchee River Watershed for Sites 62 and 72	102
	Loxahatchee River Watershed for Sites 30	103
	Lake Worth Lagoon North Watershed for Sites LWL-1 and 11	104
	Lake Worth Lagoon North Watershed for Sites 13 and LWL-4	105
	Lake Worth Lagoon Central Watershed for Sites LWL-8 and 18C	106
	Lake Worth Lagoon Central Watershed for Sites 18D and LWL-11	107
	Lake Worth Lagoon Central Watershed for Site LWL-13	108
	Lake Worth Lagoon South Watershed for Site LWL-18	108
	Hillsboro Watershed for Sites 1 and 2	109
	Hillsboro Watershed for Sites 3 and S39	110
	L-8 Watershed for Site Culv10A	111
	S-2-6-7 Watershed for Sites S-2 and 39	112
	S-2-6-7 Watershed for Site 43	113
	WPB Watershed for Canal M and Control 4	114
	WPB Watershed for Lake Magnonia and Clear Lake	115
Table 5-7	Summary for Geometric Mean Values for TN, TP, Chl-a	116
Table 5-8	Total Nitrogen (of most recent 7-years)	117
Table 5-9	Total Phosphorus (of most recent 7-years)	121
Table 5-10	Total Chlorophyll-A (of most recent 7-years)	125
Table 5-11	Water Quality Trends	
	C-15 Watershed	129
	C-16 Watershed	130
	C-17 Watershed	131
	C-18 Watershed	132
	C-51 Watershed	133

Loxahatchee River Watershed 134
ICWW-N Watershed 135
Lake Worth North Watershed 136
Lake Worth Lagoon Center Watershed 137
Lake Worth Lagoon South Watershed 138
Hillsboro Watershed 139
L-8 Watershed 140
S-2-6-7 Watershed 141
WPB Watershed 142

Figures

Figure 5-1 PBC Watershed Boundaries & Water Quality Stations Map 143
(Eastern and Western) 144
Figure 5-2 Water Quality Trends by Watershed – Total Nitrogen 145
Figure 5-3 Water Quality Trends by Watershed – Total Phosphorus 146
Figure 5-4 Water Quality Trends by Watershed – Chlorophyll-A 147
Figure 5-5 Decreasing Trend Not Significant Example 148
Figure 5-6 Decreasing Trend Significant Example 149

Appendices

A. Loxahatchee River Pollutant Reduction Plan

B. Summary of Average Annual Pollutant Loading Model Activities

C. Permittee Individual Annual Reports

*(see MS4 website pbco-npdes.org-Annual Reporting for Cycle 4, Year 3)

1. Atlantis, City of
2. Belle Glade, City of
3. Boca Raton, City of
4. Boynton Beach, City of
5. Cloud Lake, Town of
6. Delray Beach, City of
7. FDOT – District Four
8. FDOT, Turnpike Enterprise
9. Glen Ridge, Town of
10. Greenacres, City of
11. Gulf Stream, Town of
12. Haverhill, Town of
13. Highland Beach, Town of
14. Hypoluxo, Town of
15. Indian Trail Improvement District
16. Juno Beach, Town of
17. Jupiter, Town of
18. Jupiter Inlet Colony, Town of
19. Lake Clarke Shores, Town of
20. Lake Park, Town of
21. Lake Worth, City of
22. Lantana, Town of
23. Manalapan, Town of
24. Mangonia Park, Town of
25. Northern Palm Beach County Improvement District
26. North Palm Beach, Village of
27. Ocean Ridge, Town of
28. Palm Beach, Town of
29. Palm Beach County
30. Palm Beach Gardens, City of
31. Palm Beach Shores, Town of
32. Palm Springs, Village of
33. Riviera Beach, City of
34. Royal Palm Beach, Village of
35. South Bay, City of
36. South Indian River Water Control District
37. South Palm Beach, Town of
38. Tequesta, Village of
39. Wellington, Village of
40. West Palm Beach, City of

Report Certification

Engineer's Certification

I hereby certify, as a Professional Engineer in the State of Florida, that this Cycle 4, 3rd Year, Joint Annual Report for the Florida Department of Environmental Protection National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Permit for Palm Beach County (Permit No. FLS000018-004) was assembled under by direct responsible charge. This certification is provided in accordance with Florida Board of professional Engineers Rule of Certification under Chapter 61G15-23.003.

Alan D. Wertepny, P.E.

Project Manager, Mock•Roos

Mock•Roos

5720 Corporate Way

West Palm Beach, FL 33407

Florida C.A. No. 48

(Reproductions are not valid unless signed, dated, and embossed with an Engineer's Seal)

Permittee Certifications

Certifications for the individual permittee annual reports are included in each individual annual report form, which are attached to this Joint Report as Appendices C.

1.0 Palm Beach County MS4 Program

1.1 Introduction

The Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) is a federal program designed to reduce stormwater pollutant discharges to receiving waters of the United States. In 1987, the United States Environmental Protection Agency (EPA) was required under Section 402 (p) of the Clean Water Act (N40CFR Part 112.26) to establish final regulations governing stormwater discharge permit application requirements. In 1990, the Federal Register indicated that Palm Beach County was to begin compliance with the program. In 1997, the first 5-year permit (No. FLS000018) was issued by EPA to Palm Beach County's permittees. In 2001, the Florida Department of Environmental Protection (Department) received delegation from EPA for the MS4 Programs. In November 2002, the Cycle 2 MS4 Permit was issued by the Department. The Cycle 3 permit was issued on March 2, 2011, and the Cycle 4 Permit was issued on September 8, 2016.

1.2 Permittees

There are 40 permittees identified in the Cycle 4 MS4 permit. *Table 1-1* is a list of the designated MS4 NPDES stormwater management program contacts for each of the permittees.

1.3 Steering Committee

To coordinate the joint activities in Palm Beach County's MS4 Program, the permittees established an MS4 Steering Committee in 1991. The seven-member Steering Committee is comprised of two representatives of large municipalities, two representatives of smaller municipalities, one representative from the lead permittee, one representative of special districts, and one representative from Palm Beach County. A list of the MS4 Steering Committee and administrative personnel is provided in *Table 1-2*. Minutes of all meetings and descriptions of programs overseen by the Steering Committee may be viewed on the Palm Beach County MS4 NPDES website at http://www.pbco-npdes.org. Since 2014 we have had 12,269 visitors.

During the reporting period, the Steering Committee met seven times. Permittee representation at the meetings averaged eighty-one percent. Major meeting agenda items included the following:

- Cycle 4, 2nd Year Annual Reports
- Income and Disbursement Reports
- 2019-2020 Program Budget Estimates
- FDEP Sedimentation & Erosion Control Training
- Refresher Training Session
- Water Quality Monitoring Program
- Public Education Program
- FDEP Interview/Presentation
- Cycle 4 – Total Maximum Daily Load Data Requirements
- MS4 Websites – pbco-npdes.org and StormwaterAndMe.org

1.4 Interlocal Agreements

Northern Palm Beach County Improvement District (Northern) acts as lead permittee for the Palm Beach coalition of permittees. As the lead permittee, Northern re-entered into Interlocal Agreements with each of the other permittees in 2017 for the purposes of identifying duties and responsibilities of the parties and fulfilling the conditions of the Palm Beach County Cycle 4 MS4 permit. Through these Interlocal Agreements, cost sharing for joint activities is provided by each of the permittees.

This joint annual report was reviewed by the permittees and approved by the Steering Committee.

Table 1-1
Permittee Contacts

Appendix No.	Permittee, Address	Name, Title, Telephone
1	Atlantis, City of 260 Orange Tree Drive Atlantis, FL 33462	Steven Mazuk Utilities/Public Works Director (561) 965-1744
2	Belle Glade, City of 110 Dr. Martin Luther King, Jr. Blvd. Belle Glade, FL 33430	Johnny Gooden Asst. Director of Public Works (561) 992-2216
3	Boca Raton, City of 201 West Palmetto Park road Boca Raton, FL 33432	Maurice Morel, P.E. City Civil Engineer (561)446-3425
4	Boynton Beach, City of 124 East Woolbright Road Boynton Beach, FL 33435	Angela A. Prymas, P.E. Stormwater Supervisor (561) 742-6241
5	Cloud Lake, Town of 100 Lang Road Cloud Lake, FL 33406-3222	Dorothy Gravelin Town Clerk (561) 686-2815
6	Delray Beach, City of 434 S. Swinton Avenue Delray Beach, FL 32444-2698	Joseph Williams Stormwater Administrator (561) 243-7000, Ext. 4716
7	FDOT – District Four 3400 West Commercial Boulevard Ft. Lauderdale, FL 33309-3421	Ivette Leiva NPDES Coordinator (954) 777-4221
8	FDOT- Turnpike Enterprise P.O. Box 9828 Ft. Lauderdale, FL 33310-9828	Troy Craig NPDES Coordinator (954) 934-1213
9	Glen Ridge, Town of 1501 Glen road West Palm Beach, FL 33406	John J. Deal Town Manager (561) 697-8868
10	Green Acres, City of 5750 Melaleuca Greenacres, FL 33463	Carlos Cedeno Public Works Director (561) 642-2074
11	Gulf Stream, Town of 100 Sea Road Gulf Stream, FL 33483-7427	Greg Dunham Town Manager (561) 276-5116
12	Haverhill, Town of 4585 Charlotte Street Haverhill, FL 33417-5911	Todd McLeod, P.E. Town Engineer (561) 689-9500
13	Highland Beach, Town of 3614 South Ocean Blvd. Highland Beach, FL 33487	Pat Roman Public Works Director (561) 243-2084

Appendix No.	Permittee, Address	Name, Title, Telephone
14	Hypoluxo, Town of 7580 S. Federal Highway Hypoluxo, FL 33462	Leonard G. Rubin, P.A. Town Attorney (561) 721-1683
15	Indian Trail Improvement District 13476 61st Street North West Palm Beach, FL 33412-1915	Greg Shafer Director of Stormwater (561) 793-0874
16	Juno Beach, Town of 340 Ocean Drive Juno Beach, FL 33408	Anthony R. Meriano Director of Public Works (561) 626-1122
17	Jupiter, Town of 210 Military Trail Jupiter, FL 33458	David J. Rotar Utility Services Manager (561) 741-2705
18	Jupiter Inlet Colony, Town of 1 Colony Road Jupiter Inlet Colony, FL 33469	John Pruitt Administrative Officer (561) 746-3787
19	Lake Clarke Shores, Town of 1701 Barbados Road West Palm Beach, FL 33406	Damon Gammons Utilities Superintendent (561) 642-7870
20	Lake Park, Town of 650 Old Dixie Highway Lake Park, FL 33403	Richard Scherle Public Works Director (561) 908-3874
21	Lake Worth, City of 7 North Dixie Highway Lake Worth, FL 33461	Brian Shields Water Utilities Director (561) 586-1675
22	Lantana, Town of 500 Greynolds Circle Lantana, FL 33462	Jerry Darr Assistant Utilities Director (561) 540-5758
23	Manalapan, Town of 600 S. Ocean Blvd. Manalapan, FL 33462-3398	Linda Stumpf Town Manager (561) 585-9477
24	Mangonia Park, Town of 1755 East Tiffany Drive Mangonia Park, FL 33407	Kenneth Metcalf Town Manager (561) 848-1235
25	Northern Palm Beach County Improvement District 359 Hiatt Drive Palm Beach Gardens, FL 33418	Jared Kneiss Program Administrator (561) 624-7830
26	North Palm Beach, Village of 501 U.S. Highway No. 1 North Palm Beach, FL 33408	Steven Hallock Director of Public Works (561) 691-3440

Appendix No.	Permittee, Address	Name, Title, Telephone
27	Ocean Ridge, Town of 6450 N. Ocean Blvd. Ocean Ridge, FL 33435	Tracey Stevens Town Manager/Finance Director (561) 732-2635
28	Palm Beach, Town of 260 S. County Road Palm Beach, FL 33480	Rob Weber Coastal Program Manager (561) 838-5440
29	Palm Beach County 2300 North Jog Road, 4th Floor West Palm Beach, FL 33411	Bonnie Finneran Environmental Director (561) 233-2400
30	Palm Beach Gardens, City of 10500 North Military Trail Palm Beach Gardens, FL 33410	Todd Engle, P.E. City Engineer (561) 804-7012
31	Palm Beach Shores, Town of 247 Edwards Lane Palm Beach Shores, FL 33404	Alan Welch Public Services Director (561) 844-3457
32	Palm Springs, Village of 226 Cypress Lane Palm Springs, FL 33461	Angela Thul Stormwater Program Coordinator (561) 434-5122
33	Riviera Beach, City of 2391 Avenue L Riviera Beach, FL 33404	Sedrick Clarke Stormwater Coordinator (561) 814-6492
34	Royal Palm Beach, Village of 10996 Okeechobee Blvd. Royal Palm Beach, FL 33411	Paul L. Webster, P.E. Director of Public Works (561) 790-5122
35	South Bay, City of 335 S.W. Second Avenue South Bay, FL 33493	Edgar Kerr Director of Public Works (561) 996-6751
36	South Indian River WCD 15600 Jupiter Farms Road Jupiter, FL 33478	Michael Dillon Manager of Operations (561) 747-0550
37	South Palm Beach, Town of 3577 S. Ocean Blvd. South Palm Beach, FL 33480	Robert Kellogg Town Manager (561) 588-8889
38	Tequesta, Village of 345 Tequesta Drive Tequesta, FL 33469	Matthew Hammond Utility Director (561) 768-0459
39	Wellington, Village of 12300 Forest Hill Boulevard Wellington, FL 33414	Thomas Lundeen, P.E. Village Engineer (561) 753-2454
40	West Palm Beach, City of P. O. Box 3368 West Palm Beach, FL 33402	Stephon Harris Director of Public Utilities (561) 822-2168

Table 1-2

Palm Beach County MS4 Steering Committee

Laurent Van Cott, P.E. Steering Committee Chair For Town of Mangonia Park Southern Design Group, Inc. Phone (561) 743-0501	**Karen Brandon, P.E.** Steering Committee Member For South Indian River Water Control District AECOM Phone (561) 684-3375
Jay Foy, P.E. Steering Committee Vice-Chair For City of Atlantis Stormwater J. Engineering, Inc. Phone (561) 242-0028	**Bonnie Finneran** Steering Committee Member Palm Beach County Phone (561) 233-2400
Joseph Williams Steering Committee Secretary City of Delray Beach Phone (561) 243-7000, x-4117	**Maurice Morel, P.E.** Steering Committee Member City of Boca Raton Phone (561) 416-3402
Dan Beatty, P.E. Steering Committee Member Northern Palm Beach County Improvement District Phone (561) 624-7830	

Administration – Northern Palm Beach County Improvement District as Lead Permittee	
Alan Wertepny, P.E. Mock Roos & Associates, Inc. Program Manager Phone (561) 683-3113, x-231	**Betsy S. Burden, Esq.** Caldwell Pacetti Edwards Schoech & Viator LLP Legal Counsel Phone (561) 655-0620
Anne Capelli Mock Roos & Associates, Inc. Public Education Coordinator Phone (561) 683-3113, x-287	**Laura Ham, CPA** Northern Palm Beach County Improvement District Budget Manager Phone (561) 624-7830
Brian Einkauf Mock Roos & Associates, Inc. Webmaster Phone (561) 683-3113, x-250	**Jane Hayes** Mock Roos & Associates, Inc. Administrative Assistant Phone (561) 683-3113, x-264
David Cowan, P.E. Mock Roos & Associates, Inc. TMDL Coordinator Phone (561) 683-3113, x-286	

2.0 Training Program

The Palm Beach County MS4 permit requires that permittees provide training on three topics. Annual follow-up (or "refresher") training is required for those that have received the initial training. The three topics are:

1. Identification & reporting procedures for a suspected illicit discharge or dumping in the MS4 for all appropriate permittee personnel (including field crews, fleet maintenance staff, and inspectors) and contractors. (Part III.A.7.c)
2. Spill prevention, containment & response procedures (including techniques for mitigating pollution from spills) for all appropriate permittee personnel (including field crews, firefighters, fleet maintenance staff, and inspectors). (Part III.A.7.d)
3. Stormwater management and erosion and sedimentation control BMPs for construction sites for site plan reviewers, site operators, and site inspectors. Construction site inspectors must be certified through the Florida Stormwater, Erosion, and Sedimentation Control Inspector Training programs, or equivalent. (Part III.A.9.c)

The Palm Beach County MS4 permittees carry out a joint training program that is available to all permittee personnel, as well as contractors and private individuals.

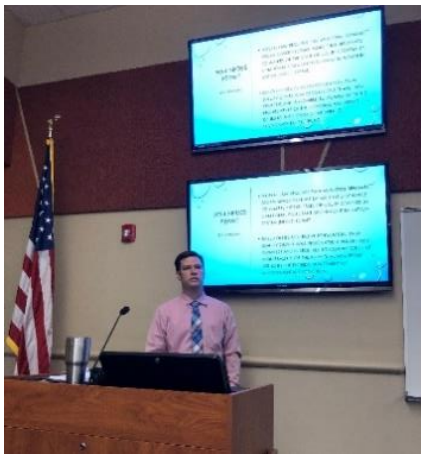
EXCAL Visual Video Training: The illicit discharge, spill prevention, and construction site BMP refresher training topics are covered by one or more EXCAL Visual (www.excalvisual.com) videos presented at a group training session, held at least once each year, typically in March. Attendance logs are maintained for each training session. In addition, the group maintains a lending library of videos for the permittees to borrow anytime for use at in-house training sessions.

EXCAL Visual videos may not be reproduced, but additional copies may be purchased from the vendor to assist in meeting training requirements.

Videos currently in our library at www.pbco-npdes.org (group/joint activities) include:

The Palm Beach County Group training session conducted in 2018/2019 included:

1. A PowerPoint presentation and videos (Ground Control, Spills & Skills and IDDE) covering the three required annual training topics (spill prevention and response, illicit discharge, and sediment and erosion control for construction sites) presented on March 20, 2019. Attendees for the training included 77 representatives from the Palm Beach County MS4 permittees. Thirty-two of the forty permittees were represented at this training session.



2. Florida Stormwater, Erosion and Sedimentation Control Inspector Training Program – Palm Beach County MS4 permittees again sponsored the FDEP course on May 22, & 23, 2019. The class, held at the Town of Jupiter Community Center, was taught by Cheryl Moore, a state certified instructor. A total of 86 individuals attended, including 30 private individuals, 19 municipal construction site inspectors, 16 municipal site plan reviewers, and 21 municipal construction site operators.

3.0 Public Education Program

The Palm Beach County MS4 permittees have undertaken a jointly-funded program to meet the public education requirements of the MS4 permit. In so doing, all permittees participate in conducting the program. The premise of a joint program is that a unified message, repeated throughout the County, will have more of an impact than 40 separate messages. The Stormwater and Me (SAM) program, as it is called, kicked off in 2009 and the website has had over 5,096 visitors.

Objective:

The objective of the public education program is to put relevant information in the hands of the residents of and visitors to the Palm Beach County geographic area, so they can make better decisions with respect to pesticides, herbicides, fertilizers, illicit discharges, illegal dumping, and the disposal of household hazardous waste. The intent is that this will result in less of these items ending up in our stormwater systems and, in turn, our water bodies.

Topics:

As prescribed by the MS4 permit, the following topics are covered by the public education program:

- Encourage citizens to reduce their use of pesticides, herbicides, and fertilizers. [Part III.A.6.]
- Promote, publicize and facilitate public reporting of the presence of illicit discharges and improper disposal of materials into the MS4. [Part III.A.7.e.]
- Encourage the proper use and disposal of used motor vehicles fluids, leftover hazardous household products, and lead acid batteries. [Part III.A.7.f.]

Target Audience:

The target audience of the program is residents (children and adults) of and visitors to Palm Beach County, Florida.

Activities and Materials:

This reporting period, the SAM public outreach program included three 30-second Public Service Announcements (PSAs) dealing with pet waste pickup, keeping grass clippings off the streets, and reducing the usage of pesticides, herbicides and fertilizers. The PSAs were aired on five commercial television networks (Discovery, Animal Planet, Weather Channel, HGTV, and CNN), broadcast by a local cable television provider (Comcast) from 6 a.m. to midnight during the months of January 2019 through March 2019 to all broadcast zones within Palm Beach County. A total of 4,476 PSAs were aired, an increase of 80% from the previous year. The PSAs were also aired by local/municipal TV stations

throughout the year and many permittees play the videos on their website. Copies of the PSAs can be found on the SAM website: StormwaterAndMe.org.

During the 2018-2019 reporting period, the Palm Beach County Extension Service reported that it distributed 25,933 brochures, conducted 5 neighborhood presentations reaching 137 participants, produced 31 displays, conducted 35 school presentations reaching 1,744 participants, conducted 147 workshops reaching 4,368 participants, conducted 24 special events reaching 471 participants and provided Green Industry BMP training to 199 participants. The County Extension Service has estimated that its outreach program reached about 8% of the population in Palm Beach County. Costs for these programs total about $113,194.

The Palm Beach County Solid Waste Authority (SWA) continued to carry out a public education/outreach program to educate Palm Beach County residents and visitors about proper disposal of household hazardous waste (HHW). Through the MS4 NPDES Interlocal Agreement between Palm Beach County and Northern Palm Beach County Improvement District, SWA continues its program, in part to fulfill the permit requirement that all permittees educate their residents on proper disposal of HHW. During the 2018-2019 reporting period, SWA reported that it distributed 137,000 brochures, collected 2,112 tons of HHW, conducted 184 neighborhood presentations reaching 6,727 participants, distributed 7 newsletters, produced 137 displays, aired 4,000 PSAs, conducted 220 school presentations

reaching 8,644 participants, conducted 5 workshops reaching 70 participants, and conducted 65 special events reaching 58,170 participants. SWA also hosts a public outreach website at http://www.swa.org/site/hhw/haz_waste_home/hazardous_waste_portal.htm. SWA has estimated that its outreach program reached 80% of the population in Palm Beach County. Costs for these programs total about $4.4 million.

Methods for Distribution:

The television PSAs allow the greatest opportunity for the distribution of information. In addition, the website, brochures, and meetings allow for the presentation of more in-depth information.

Annual Schedule:

Public education efforts are emphasized during the months of January through March, when residential population in the County is at its highest.

Documentation:

The Group's Public Education Coordinator, SWA and PBC Extension Services, respectively, maintain record information for all materials distributed.

Responsible Entities:

The program is coordinated by the Palm Beach County MS4 Steering Committee administrative staff. HHW outreach is carried out by the Palm Beach County Solid Waste Authority (SWA) for all permittees under the inter-local agreement with Palm Beach County.

Resources Allocated:

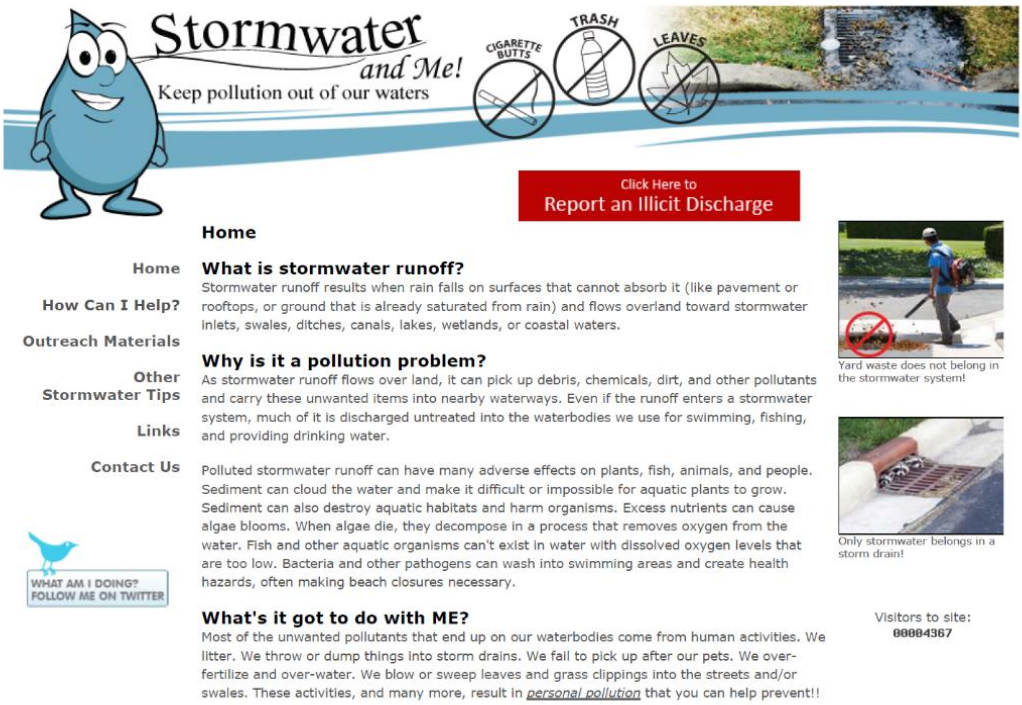
The 2018-2019 allocation for the public education program (not including Palm Beach County Programs) was $35,000.

Assessment Method:

The bottom line on the effectiveness of public education is if the receiving waters experience improved water quality. Therefore, the water quality monitoring is offered as a measure of the collective effectiveness of this and other MS4 permit programs.

Public Reporting of Illicit Discharge:

The StormwaterAndMe.org website contains information on stormwater pollution and illicit discharges. Included is a list of contacts for each of the 40 permittees to report an illicit discharge or spill.



4.0 Total Maximum Daily Load (TMDL) Program

4.1 Description

The PBC MS4 permit includes TMDL requirements and a schedule for developing an implementation plan to reduce the discharge of pollutants from each affected permittee's MS4 to the maximum extent practicable. No TMDLs were in place for the Palm Beach County Cycle 1 or Cycle 2 permits. For Cycle 3, there were seven EPA TMDLs that were evaluated and addressed by the applicable MS4s.

As of the issuance date of the Cycle 4 permit, both the Department and EPA had issued TMDLs that require action.

4.2 Established and Adopted TMDLs – Cycle 4

TMDLs established by EPA and verified by the Department or adopted by the Department as of the issuance date of the Cycle 4 permit (September 8, 2016), along with the respective potentially affected permittees, are listed in *Table 4-1*.

During Year 1 of this permit cycle the eight permittees identified as TMDL stakeholders submitted Prioritization Plans which were approved by the Department. The schedules for implementation activities are identified in *Table 4-2*.

4.3 FDEP Planning List

Although no action is required under the MS4 permit for TMDLs in the planning stage, this information is still tracked by the MS4 group. FDEP has a planning list for future development of TMDLs through 2022. As of January 2019, eight water bodies in Palm Beach County were on the Planning List. The Loxahatchee River Reasonable Assurance Plan (RAP), being coordinated by FDEP, addresses three of the water bodies on the planning list (North Fork WBID 3226D, NW Fork 3226A and SW Fork 3226C). The RAP effectively removes these three future TMDLs from the Planning List, resulting in just four Palm Beach County water bodies remaining on the Planning List – *See Table 4-3.*

As of January 2019, FDEP is in the process of developing TMDLs for Lake Ida, Lake Osborne and Pine Lake. On behalf of the potentially affected MS4s, Mock•Roos provided to FDEP Division of Environmental Assessment and Restoration GIS information from the 2019 Pollutant Loading Analyses which includes the watershed boundary, land uses, event mean concentrations, BMP coverage and efficiencies, septic coverage, and MS4 boundaries.

Table 4-1

Cycle 4 TMDLs in Palm Beach County

Agency	WBID	Segment Name	Basin	Constituent	TMDL	Percent Reduction	Date	MS4 Stakeholder
EPA	3226C	SW Fork Loxahatchee River	St. Lucie/ Loxahatchee	Fecal Coliform	<43 (counts/100 ml)	93	05/16/12	Jupiter, FDOT, PBC, SIRWCD, Turnpike, NPBCID
EPA	3262A	Lake Ida	Lake Worth Lagoon	Nutrients	TN=0.857 mg/l TP=0.062 mg/l	20 45	11/09/12	Delray, Boynton, FDOT, PBC
FDEP	3364A	E-1 Canal	Lake Worth Lagoon	Fecal Coliform	<400 (counts/100 ml)	940	08/31/11	FDOT, PBC

Table 4-2

Cycle 4 Prioritized TMDLs

MS4 Stakeholder	WBID-Waterbody-TMDL	Monitoring Summary Due	BPCP Due	Supplemental SWMP Due
Boynton Beach	3262A- Lake IDA – Nutrients (EPA)	03/31/20	N/A	03/31/21
Delray Beach	3262A- Lake IDA – Nutrients (EPA)	03/31/20	N/A	03/31/21
FDOT District 4	3264A – E-1 Canal – Bacteria	03/31/20	03/31/20	N/A
	Loxahatchee River Pollutant Reduction Plan (3226C)	N/A	N/A	N/A
FDOT Turnpike Enterprise	3226C – SW Loxahatchee River – Pollutant Reduction Plan	N/A	03/31/20	N/A
Jupiter	Loxahatchee River Pollutant Reduction Plan (3226C)	N/A	N/A	N/A
NPBCID	Loxahatchee River Pollutant Reduction Plan (3226C)	03/31/21	03/31/21	N/A
Palm Beach County	3264A – E-1 Canal Bacteria	N/A	03/31/20	N/A
	Loxahatchee River Pollutant Reduction Plan (3226C)	N/A	N/A	N/A
SIRWCD	Loxahatchee River Pollutant Reduction Plan (3226C)	N/A	N/A	N/A

Table 4-3

2019 FDEP Planning List for TMDLs in Palm Beach County

WBID	Segment Name	Basin	Parameter	MS4 Stakeholders
3262A	Lake Ida	Lake Worth Lagoon	TP and Chlorophyll-a	Palm Beach County, Delray Beach, Boynton Beach, FDOT-District IV
3245C4	Pine Lake	Lake Worth Lagoon	Chlorophyll-a	Palm Beach County, FDOT – District IV, West Palm Beach
3262B1	E-1	Lake Worth Lagoon	Chlorophyll-a	Palm Beach County, FDOT-District IV
3248	New River Canal (North Segment)	Everglades	Nutrient	South Bay
3256A	Lake Osborne	Lake Worth Lagoon	TP and Chlorophyll-a	Palm Beach County, Atlantis, FDOT District IV, Greenacres, Lake Worth Beach, Lantana, FDOT Turnpike

4.4 TMDL Activities

During Year 3, of the Cycle 4 Permit, the MS4 permittees actively participated in three programs to further address the identified impairments in the Loxahatchee River (nutrients/bacteria), Lake Ida (nutrients), and the E-1 Canal in the Hillsboro Basin (bacteria).

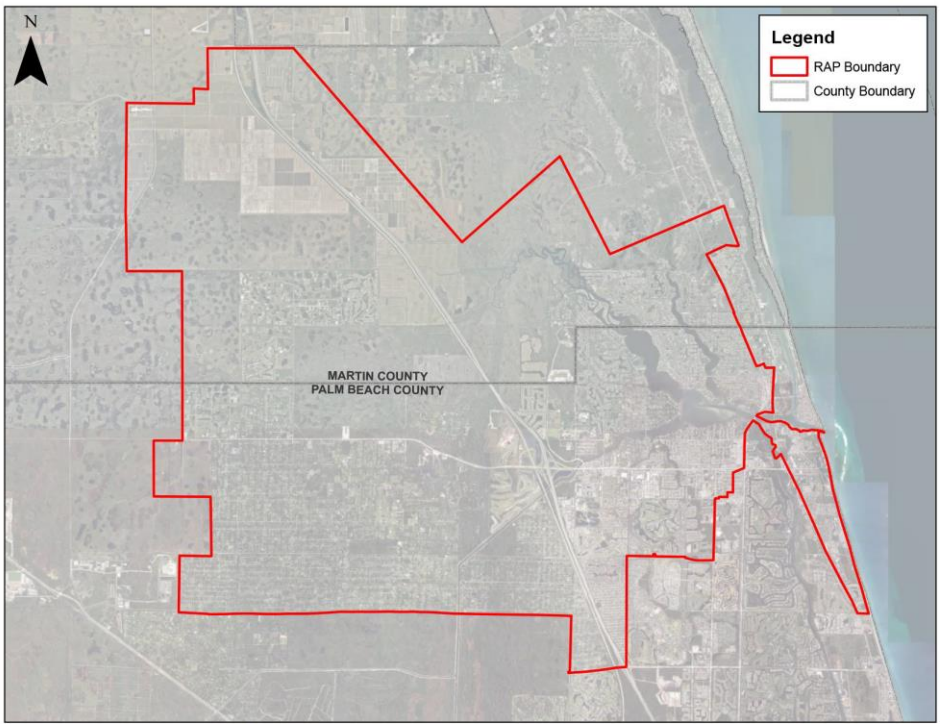
Southwest Fork Loxahatchee River

For the last three years, stakeholders in the **Loxahatchee River Basin** have met with the FDEPs Division of Environmental Assessment and Restoration (DEAR) and the Loxahatchee River Management Coordinating Council to develop and implement a Reasonable Assurance Plan to reduce nutrients and bacteria contributions and achieve attainment of water quality standards so that the Loxahatchee River is no longer impaired.

Activities have included:

1. Identification of the RAP Boundary
2. Evaluations of the existing water quality data and establishment of a surface water monitoring plan for future assessments
3. Development of a Pollutant Load Screening Model
4. Establishment of baseline and load reduction targets for total nitrogen and total phosphorous
5. Listing of projects that have or will reduce both nutrient and bacterial loadings
6. Stakeholder Involvement
7. Development of a Draft Loxahatchee River Pollutant Reduction Plan

Palm Beach County MS4 entities participating in this activity (PRP) and providing management actions time (projects) include Florida Department of Transportation District IV, Florida Turnpike Enterprise, Town of Jupiter, Palm Beach County, Northern Palm Beach County Improvement District, South Indian River Water Control District and Village of Tequesta.

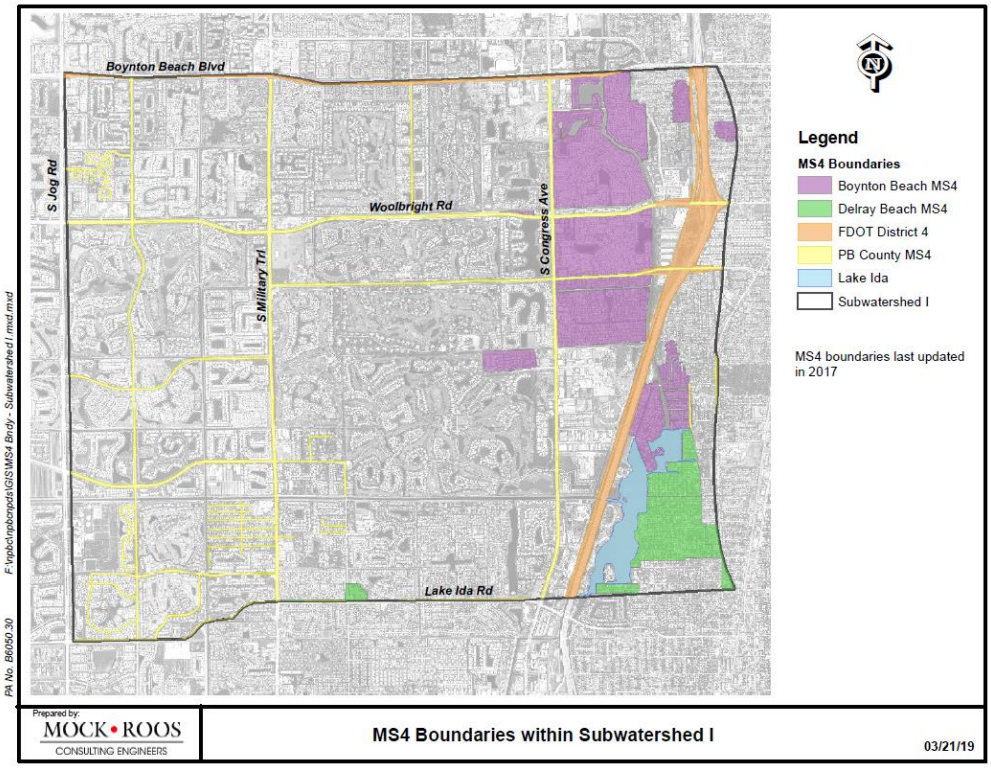


Proposed nutrient management activities through 2022 from the various stakeholders are estimated to achieve 87% of the total nitrogen reduction goal, and exceed the total phosphorus reduction goal. Consequently, the current pollutant plan developed into a pollutant reduction plan that will include progress updates every five years. The update will include water quality monitoring, analysis of the data, as well as any additional management activities that may be needed to meet the target reduction of loadings. After the five-year review, FDEP will work with stakeholders to either amend the pollutant reduction plan (Refer to Appendix A) or develop a reasonable assurance plan.

Lake Ida (WBID 3262A)

The National Oceanic and Atmospheric Administration (NOAA) completed a Watershed Management Plan (WMP) for the **Boynton Inlet** in June of 2018. The purpose of this Watershed Management Plan was to identify and evaluate various nutrient load reduction strategies (effectiveness and cost), to reduce nutrient loading to the Boynton Inlet and offshore reefs and to meet TMDL reduction goals. NOAA's Boynton Inlet Study covered both SFWMD C-15 and C-16 Basins (approximately 150 square mile area). One of the sub-watersheds included in this plan is Lake Ida. With the assistance of local stakeholders, the Boynton Inlet WMP included development of a land based nutrient pollutant loading model, a water budget assessment, stakeholder meetings, site visits, data sharing, best management practices to achieve load reduction goals, and a management tool to evaluate BMP implementation scenarios. For the benefit of the MS4 stakeholders, the WMP provided pollutant loading estimates for **Lake Ida**, stakeholder consensus on the Lake Ida contributing area and each MS4's contribution (area and pollutant load), review of current fertilizer ordinances, and potential BMPs to meet TMDL goals. It was estimated that the MS4s represent approximately 16% of the contributing area and 20% of the pollutant loading. Reduction of fertilizer usage appears to be the most potentially beneficial and cost-effective best management strategy.

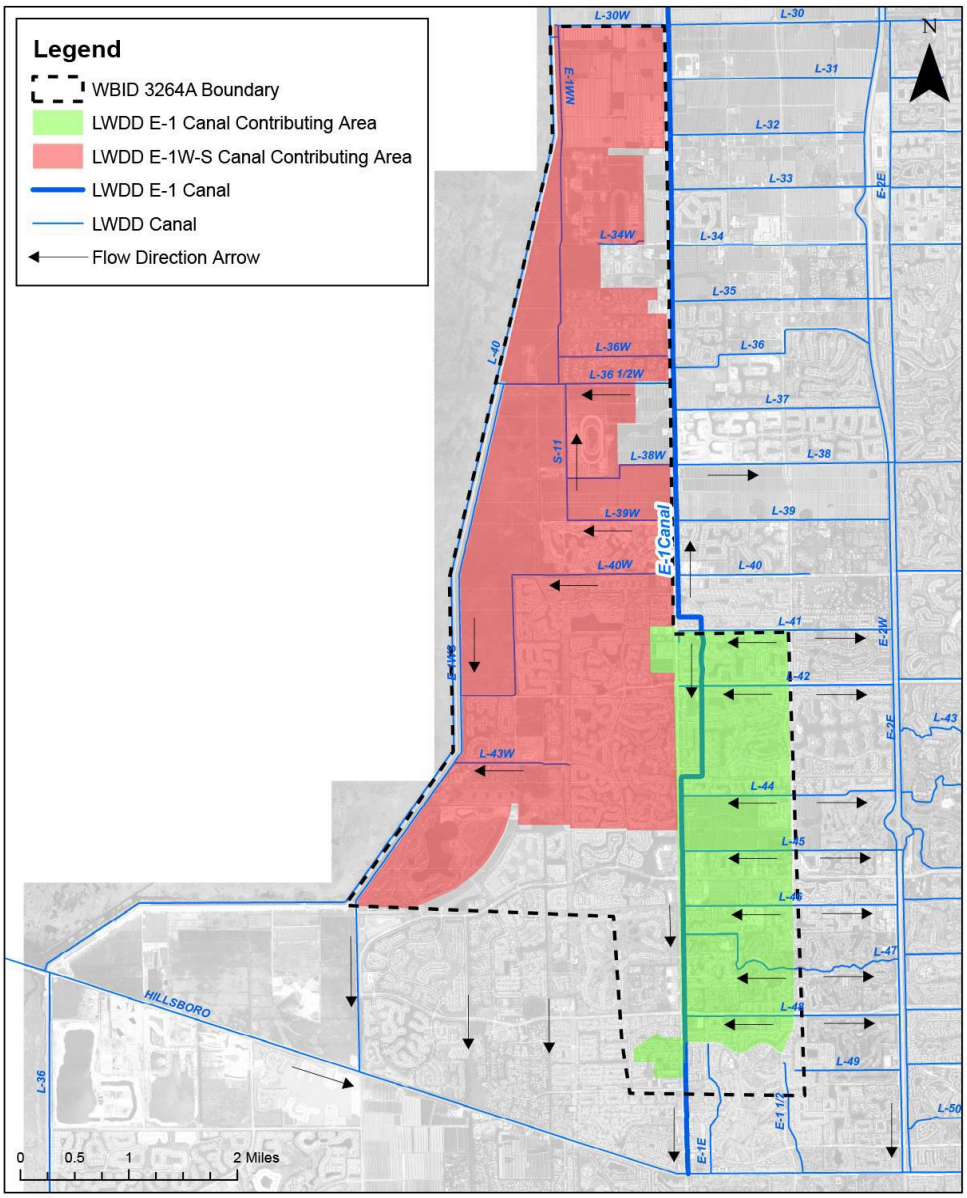
Boynton Beach and Delray Beach participated in a water quality sampling program. A summary report is included as an attachment to their individual Year 3 Annual Report Forms.



E-1 Canal (WBID 3264A)

To assist the MS4s in addressing the **E-1 Canal** TMDL, FDEP's watershed boundary was examined. Based on completed hydrologic studies, South Florida Water Management District (SFWMD) and Lake Worth Drainage District (LWDD) permits, as well as existing drainage canals and control elevations, most of the WBID 3364A boundary does not drain into the E-1 Canal. The graphic below, depicts the area (shown in green) that actually discharges into the canal. According to the TMDL report, WBID 3264A contains 12,982 acres, however, only 2,778 acres (or approximately 21% of the area) is estimated to drain into the E-1 Canal. The remaining area drains to either the LWDD E-1W-S or to the SFWMD Hillsboro Canal.

Both Florida Department of Transportation District IV and Palm Beach County jointly participated in development of a Bacteria Pollution Control Plan for the E-1 Canal. Details of this plan (ESciences, 2019) are included with their respective MS4 Annual Report Forms for Year 3. Based on the 2019 water quality monitoring and evaluation, the Bacteria TMDL percent reduction of 94% has been met and exceeded.



Prepared by: MOCK • ROOS CONSULTING ENGINEERS

Date: April 2018

LWDD E-1 Canal
Estimated Contributing Area

5.0 Water Quality Monitoring Program

5.1 Description

In order to provide water quality monitoring data to permittees, and to assist them with their required water quality assessment programs, the group made the decision to continue the +20-year joint ambient water quality monitoring program. The monitoring program includes the following components:

- ambient water quality sampling
- water quality data analyses
- trend analyses
- annual pollutant loading estimates in Year 3 of each permit cycle
- program modifications as needed

The Palm Beach County MS4 NPDES permit monitoring program now includes 44 ambient water quality monitoring sites which were selected after coordination among the South Florida Water Management District (SFWMD), Palm Beach County Environmental Resource Management (ERM), the Loxahatchee River District (LRD), Broward County (BC), and City of West Palm Beach (CWPB).

5.2 Monitoring Sites

Table 5-1 identifies each monitoring site location and provides the site designation, watershed name, the entity conducting the sampling, and the site location northing and easting coordinates. Note that site designations are unique within an individual agency but may be duplicated across agencies. Data for these sites are assigned a unique agency code and station identification in the State's database (dBHydro or WIN/STORET).

Figure 5-1 (two pages) depicts the water quality monitoring site locations and shows the boundaries of the associated watersheds. Sites monitored by ERM are shown as circles, those monitored by the LRD are shown as squares, those monitored by SFWMD are shown as triangles, those monitored by BC are shown as stars and those monitored by CWPB are shown as suns. White symbols signify marine or tidal sites and yellow symbols designate freshwater sites.

The LRD monitors four marine sites and three freshwater sites. ERM monitors ten marine sites and fifteen freshwater sites. The SFWMD monitors five freshwater sites, BC monitors one freshwater and two marine water sites and four CWPB freshwater sites were selected. All of Palm Beach County BC, ERM, LRD and WPB sampling results are in WIN/STORET and SFWMD data is in dBHydro.

The twenty-five sites monitored by ERM are sampled and initially analyzed in-situ by ERM staff using a multi-parameter water quality monitoring instrument. Water samples are collected, preserved and stored according to the Department Standard Operating Procedures. Quality assurance/quality control measures include pre-cleaned equipment blanks, field cleaned equipment blanks, field spikes, and the collection of duplicate samples.

Further analysis of samples of ERM's 10 Lake Worth Lagoon marine sites is handled by SFWMD. Analysis of the remaining 15 ERM sites is conducted by an independent laboratory under contract with ERM.

The water quality parameters and frequency being monitored by ERM, LRD, SFWMD, BC, and CWPB are listed in Table 5-2. For this reporting period some monitoring events were missed. The Lake Worth Lagoon monitoring routinely experiences missed monitoring events due to the monitoring protocol that requires tidal sites to be sampled "immediately at or prior to slack low tide." This allows only +/- 2 times per month when low tide is between 11:00 a.m. and 2:30 p.m., which may occur on weekends. The time on either side of this time frame is necessary for initial calibration, equipment decon, mobilization, travel, boat launch, boat recovery, travel, continuing calibration verification, and paper/tablet documentation work. Monitoring protocol prohibits monitoring during rain. Boating safety requirements prohibit monitoring during lightning events and winds exceeding 20 knots. Mechanical problems such as trailer lights malfunction, and engine problems also result in missed monitoring events.

Table 5-3 (8 pages) provides a list of the parameters and the Florida Surface Water Quality Standards (WQ Standards) as promulgated in Florida Administrative Code (F.A.C.) 62-302.530, 62-302.532, and 62-302.530 (47)(b).

The water quality sampling program in Palm Beach County is a cooperative effort designed to incorporate desirable elements of existing monitoring programs being administered by various agencies throughout the County. Attempts to coordinate sampling frequencies, parameters, and methodologies are ongoing, but not all sampling programs produce results that are compatible for a combined analysis.

Data for a given parameter, location, and event may be unavailable due to the specific goals of that agency's monitoring program or procedural variations, including event frequency, sample depth, methodology, and instrumentation.

5.3 Water Quality Monitoring Results and Exceedances

Standards

State water quality standards have become increasingly complicated in recent years, with differing types of water bodies having different established criteria, such as chlorophyll-a (corrected for pheophytin). Therefore, Table 5-3 has been prepared to provide a quick reference for determining exceedances in the water bodies being monitored in Palm Beach County. Furthermore, in Class I and Class III freshwater systems, the numeric limits for heavy metals are based on a logarithmic function of the water's total hardness measured at the time of the sampling. Thus, the last page of Table 5-3 provides the relationship of hardness to the calculated limit for cadmium, copper, lead and zinc.

Monitoring Results

The results of the monitoring conducted from October 2018 through September 2019 are provided in *Table 5-4* (44 pages). Analysis result values that were below the limits of detection ("BDL" or "non-detect") have been replaced in *Table 5-4* whenever possible with ½ of the respective minimum detection limit (MDL) value for more reasonable calculated statistics. MDLs were provided by Palm Beach County ERM for results that were reported as BDL within the data set. MDLs are determined by instrumentation and method of analysis. These substitutions in *Table 5-4* have been highlighted in blue. MDL values in excess of the WQ Standard were not counted as exceedances.

Exceedances of the WQ Standards are highlighted in yellow in *Table 5-4*.

For samples where a total hardness was not measured, an exceedance limit for metals could not be calculated, and therefore, no exceedance could be identified.

For those results which require an annual geometric mean (to compare to the standard), the annual geometric mean was calculated for the reporting period (October – September).

Table 5-5 provides a summary of the number of exceedances at each site. Each cell where there was an exceedance provides the number of exceedances and the total number of samples taken at that site during the reporting period. For example, at Site 31E within the C-15 watershed, two dissolved oxygen samples out of six taken were in exceedance of the WQ Standard.

Another summary of exceedances is provided below:

Parameter	Exceedance Location(s)
DO	C-15, C-16, C-17, C-18, C-51, Lox River, ICWW-N, L-8, S-2-6-7, Hillsboro
Fecal coliform	Loxahatchee River
Turbidity	C-51, L-8, S-2-6-7, WPBWS
pH	C-51, ICWW-S, WPBWS
Chl-a	Lox River, LWL-N, LWL-C, ICWW-S
TP	Lox River, LWL-C
TN	ICWW-N
Lead	LWL-N, LWL-C
Specific Conductivity	C51, L-8, S-2-6-7
Copper	LWL-N, LWL-C

Comments

The criterion for fecal coliform in the NW and SW Forks of the Loxahatchee River (a natural Class II water body) is extremely low (< 43 cfu/100 ml) compared to all other water body classifications (< 400 cfu/ 100 ml). Potential sources of bacteria are being investigated by the Town of Jupiter and the Loxahatchee River District.

Exceedances of the turbidity in the L-8, S-2-6-7, and C-51 Canals is very likely linked to discharges from Lake Okeechobee.

Exceedances for Specific Conductivity may be attributed to operational water supply releases from Lake Okeechobee and the L-8 Reservoir.

Tabular Summaries

A statistical summary of each monitoring site, grouped by watershed, is presented in *Table 5-6* (25 pages). The table includes approximately 22 water quality parameters (21 measured parameters plus calculated TN) and all sampling events for each site's period of record. The periods of record range from 3 year to 20 years.

Table 5-7 re-lists the geometric mean values for TN, TP, and Chl-a, at each site for the period of record. Historically, based on Chl-a, TN and/or TP, exceedances of the nutrient criteria have occurred in the C-15 Basin, Loxahatchee River, and all three watersheds of the Lake Worth Lagoon. This table highlights the individual monitoring sites where exceedances of water quality standards have occurred.

5.4 Short Terms Trends

To provide the Palm Beach County MS4 permittees with site specific, as well as basin-wide, water quality trend (last ten years) information, historical data charts were developed using a "traffic light" symbology – red for exceedance of the water quality criteria, green for no exceedance, and yellow where there is no numeric standard). Since nutrient impairment is a major concern in Palm Beach County water bodies, Chl-a, TP, and TN were selected for this summary. FDEP has established a state-wide Chl-a numeric standard for all water bodies. However, for TP and TN, there is no numeric criteria for the South Florida Region Canals, resulting in 20 of the 44 monitoring sites without numeric criteria.

Tables 5-8 through *5-10* provide the historic period (2010-2019) of annual geometric mean exceedance for each site for these three-nutrient based water quality parameters. The annual geometric mean calculation for each site is based on a calendar year, while the basin annual geometric mean is calculated using all the sample sites and data within the basin watershed.

The total nitrogen numeric standards (basin averaging of sites) are being met in all thirteen watersheds. Individual sites not meeting standards include Site 13 in the Lake Worth Lagoon North and Sites LWL-8, 18C and 18D in the Lake Worth Lagoon Central.

The total phosphorus numeric standards (basin averaging of sites) are being met for twelve of the thirteen watersheds. Only Lake Worth Lagoon Central is not meeting the standard. Individual sites not meeting the standards include Site 22 (C-16 - Lake Osborne), Sites 11 and 13 (Lake Worth Lagoon North) and Sites LWL-8, 18C, 18D and LWL- 11 (Lake Worth Lagoon Central), and site LWL-8 in Intercoastal Waterway South.

The Chl-a criterion (basin averaging of sites) is not being met in four watersheds: the C-15, Loxahatchee River (marine/tidal areas of the North, Northwest, and Southwest Forks), and the watersheds of the Lake Worth Lagoon (North and Central) and ICWW-S.

5.5 Long Term Trends

Surface water quality values can have variability driven by seasonal fluctuation, flow variation, changes in watershed, precipitation variation, and other independent variables. Statistical analysis can be used to determine if changes in water quality are part of this variability or if the changes represent a significant water quality trend. The Mann-Kendall Test has been accepted by many governmental agencies as a robust method to evaluate water quality data statistically for trends over time. In this report, the Mann-Kendall Test (M-K) is used to identify surface water quality trends in the nutrient data for each water quality monitoring site. The M-K works well with data that has seasonal variations, violates assumptions of normality required for other regressions, and is resistant to outliers. The M-K can detect monotonic trends that do not double back on itself. The analysis provides a Kendell Tau that is resistant to power-transforms. This is to say the Kendell Tau for a raw data set or the same data set transformed would result in the same value. The Mann-Kendall Test uses a ranked method of analysis. The M-K results contain a Kendell Tau value that is a measurement of the monotonic relationship between X and Y, in this analysis time and concentration. Kendell Tau is a ranked-based correlation measure therefore, the scale it is evaluated on differs from non-ranked-based correlation measures such as R. Tau will have lower values than other correlation measures such as R. A strong correlation similar to R = 0.9, would be equivalate to Tau = 0.7. Kendell Tau can be calculated by the following Formula:

$$\tau = \frac{S}{\frac{n(n-1)}{2}}$$

In the formula above, the Kendell (S) value is calculated by subtracting the number of “discordant pairs” M, or the pairs that have y(concentration) decreasing as x(time) increases (these is called “M”), from the number of “concordant pairs” where y increase with x (these are called “P”). Kendell S can be written in the for form S = P - M. It should be noted that due to the possible number of comparisons available to compare P and M if all comparisons are increasing Tau would equal 1 and if all comparisons are decreasing Tau would equal -1.

Sen’s Slope (also called Theil slope) estimator “$\hat{b}_1$“ is closely related to Kendall's S and τ. Sen’s Slope can be calculated by the following formula for x and y values:

$$\hat{b}_1 = \text{median}\ \frac{(Yj - Yi)}{(Xj - Xi)} \quad \text{for all } i < j \text{ and } i=1,2,\ldots(n-1)\ j=2,3,\ldots n.$$

Thus, Kendell Tau, Kendell S, and Sen's Slope all indicate the direction of the trend. To determine if a trend is significant a p-value must be tested against the null hypothesis "H_o" that Tau = 0. For small sample sized or data pairs, these values can be pulled from a table of p-values based on Kendell S, Kendell Tau, and the number of data pairs "n". When the n is greater than 10 it is more appropriate that the p-value be approximated by a normal distribution Z_s test statistic.

$$\sigma_s = \sqrt{\left(\frac{n}{18}\right) * (n-1) * (2n+5)} \quad , \quad Z_s = \begin{cases} S - 1/\sigma_s & if\ S > 0 \\ 0 & if\ S = 0 \\ S + 1/\sigma_s & if\ S < 0 \end{cases}$$

S was defined previously as the Kendell S value. Z_{crit} is the value of α/2, where α is the selected significance level. The H_o is rejected when $|Z_s| > Z_{crit}$. M-K analysis can be used to see the slope and direction of a trend regardless of significances. Though it may be useful to see this trend as a potential indicator of the direction of data. It must be emphasized that rejection of the H_o means there is not enough evidence available to conclude that there is a trend or no trend. An alternative statement of this would be there is not enough evidence to say that the trend is any different than the null hypothesis. For additional information on Kendell Tau, the USGS "Statistical Methods in Water Resources" By D.R. Helsel and R.M. Hirsch, provides examples and narrative on the topic.

Table 5-11 (14 pages), summarizes the results for TN, TP and Chl-a for the period of historical record. Note that while the trends maybe statically significant, they may not be ecologically significant. Out of the 44 sites, twenty-four showed statistically significant decreasing trends for TN concentration; eight showed a significant decreasing trend for TP, four showed a statistically significant increasing trend for TP; and five showed a statistically significant deceasing trend for Chl-a. Figures 5-2, 5-3 and 5-4 show the statistical trends, for TN, TP and Chlorophyll-a. Figures 5-5 shows a general example of a decreasing and not significant result while, Figures 5-6 shows an example of decreasing and significant result.

5.6 Pollutant Loading Analyses

The Cycle 4 permit requires each permittee to provide estimates of the average annual pollutant loading for six water quality parameters for each major outfall or major watershed into which they discharge. Each permittee is required to compare the current cycle pollutant loading estimates with the previous cycle pollutant loading estimates. Palm Beach County permittees have elected to provide the pollutant loading estimates on a watershed basis. For consistency, this permit requirement is one of the activities performed by the Group. Permittees provide the needed data and are given the opportunity to

review the model inputs and results. Thirteen major watersheds are included in this analysis. The Lake Worth Lagoon (North and Central) and the northern portion of ICWWS were combined as one watershed and identified as the Lake Worth Lagoon (LWL). The 2018 MS4 annual pollutant load estimates were lower than the 2013 estimates for all six water quality parameters, in all thirteen watersheds. Appendix B provides the Summary of Average Annual Pollutant Loading Model Activities.

5.7 Program Modifications

During this report period for new freshwater sites were added with data provided by the City of West Palm Beach for the city's water supply canal and water supply lakes. Data for these sites cover 2011 through 2019 (9 years).

Generally, the water quality monitoring data and assessments (annual exceedances, historical statistical data, more recent data, trends) show an improvement in the water quality of the receiving water bodies. Consequently, the stormwater management programs implemented by the permittees, as required by the MS4 permit, appear to be effective.

No program modifications are proposed with this year's report.

Table 5-1
Water Quality Monitoring Site Locations

Watershed	Surface Water Classification	Site Designation	Agency	Marine/ Freshwater	Northing	Easting
C-15	III (Fresh)	31E	ERM	Freshwater	760549.91	916736.89
		31C	ERM	Freshwater	760879.83	943443.02
		31B	ERM	Freshwater	802772.09	964368.10
C-16	III (Fresh)	22	ERM	Freshwater	828280.34	957602.68
		24	ERM	Freshwater	820399.97	957270.70
		27B	ERM	Freshwater	802276.58	916052.08
		27A	ERM	Freshwater	802545.25	942880.04
		28	ERM	Freshwater	760234.13	959303.11
C-17	III (Fresh)	12A	ERM	Freshwater	882520.57	953672.56
		C17S44	SFWMD	Freshwater	903830.19	955552.70
C-18	I (Fresh)	16	ERM	Freshwater	923477.26	902076.42
		15	ERM	Freshwater	901986.07	931378.31
		92	LRD	Freshwater	924685.07	937805.48
		81	LRD	Freshwater	946081.68	935811.57
C-51	III (Fresh)	38B	ERM	Freshwater	854963.27	867962.99
		37B	ERM	Freshwater	853637.29	916592.84
		C51S155	SFWMD	Freshwater	841132.85	964349.43
Lox	III (Fresh)	69	LRD	Freshwater	947071.77	924822.40
	II (Marine)	51	LRD	Marine	954939.97	948224.55
		62	LRD	Marine	938898.36	961525.58
		72	LRD	Marine	946223.78	954573.37
ICWW-N	III (Marine)	30	LRD	Freshwater	961625.76	961625.76
LWL-N	III (Marine)	LWL-1	ERM	Marine	913398.12	964095.22
		11	ERM	Marine	908969.28	962655.71
		13	ERM	Marine	900706.79	964049.58
		LWL-4	ERM	Marine	898346.67	970040.36
LWL-C	III (Marine)	LWL-8	ERM	Marine	856238.64	968284.93
		18C	ERM	Marine	839740.15	969747.03
		18D	ERM	Marine	835593.23	967942.19
		LWL-11	ERM	Marine	830580.53	967926.64
ICWW-S	III (Marine)	LWL-13	ERM	Marine	819086.28	968516.09
		LWL-18	ERM	Marine	798402.11	965585.04
Hillsboro	III (Marine)	1	BC	Marine	724863.71	953909.23
		2	BC	Marine	725864.04	940799.29
	III (Fresh)	3	BC	Freshwater	725348.47	917217.65
		S39	SFWMD	Freshwater	734632.99	888668.58
L-8	III (Fresh)	Culv10	SFWMD	Freshwater	938859.59	778727.09
S-2-6-7	III (Fresh)	S-2	SFWMD	Freshwater	860426.94	748850.27
		39	ERM	Freshwater	855232.20	764581.68
		43	ERM	Freshwater	847294.87	750036.29
WPBWS	II (Fresh)	M-Canal	CWPB	Freshwater	884890.58	908925.59
		Control 4	CWPB	Freshwater	879672.31	943612.31
		Lake Mangonia	CWPB	Freshwater	875721.42	957872.24
		Clear Lake	CWPB	Freshwater	866387.08	959660.53

Table 5-2
Parameter Sample Collection Schedule

Parameter	ERM		SFWMD	LRD	BC	CWPB
	Freshwater	Marine				
Alkalinity*	--	--	--	M	--	--
Arsenic	BM	Q	--	--	--	--
Cadmium	BM	Q	--	--	--	--
Chlorophyll-a (corrected)	BM	M	--	M	Q	M
Copper	BM	Q	--	--		--
Dissolved Oxygen	BM	M	M	M	Q	M
Fecal Coliform	--	--	--	M	--	--
Lead	BM	Q	--	--	--	--
Nitrogen, Ammonia	BM	M	M	M	Q	--
Nitrogen, Nitrate-Nitrite	BM	M	M	M	Q	M
Nitrogen, Total Kjeldahl	BM	M	M	M	Q	M
Nitrogen, Total	BM	M	M	M	Q	M
pH	BM	M	M	M	Q	M
Phosphorus, Orthophosphate	BM	M	M	M		M
Phosphorus, Total	BM	M	M	M		M
Salinity	--	M	--	M	Q	--
Specific Conductivity	BM	M	M	M	Q	M
Temperature	BM	M	M	M	Q	M
Total Hardness (as CaCO3)*	BM	--	--	--		--
Total Suspended Solids*	BM	M	M	M		--
Turbidity	BM	M	M	M	Q	M
Zinc*	BM	Q	--	--		--

Notes: 1. Not all parameters are sampled at every site.
2. LRD - Loxahatchee River District Sites 62, 69, and 72, are sampled monthly. Sites 30, 51, 81, and 92 bi-monthly.
3. ERM – Palm Beach County Environmental Resource Management
4. SFWMD – South Florida Water Management District
5. BC – Broward County
6. CWPB – City of West Palm Beach

BM (Bi-Monthly)
M (Monthly)
Q (Quarterly)
-- (Not Sampled)

Table 5-3

Numeric Surface Water Quality Standards by Waterbody

(Page 1 of 7)

Applicable Class I - Freshwater Canal Peninsula Region Water Quality Criteria		
Site(s):	**C-18** (16, 15, 92, 81)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.01
Cadmium	mg/L	≤ $[e^{(0.7409\ [lnH]\ -4.719)}]\ 10^{-3}$
Chlorophyll-a (corrected)	ug/L	≤ 20 AGM
Copper	mg/L	≤ $[e^{(0.8545\ [lnH]\ -1.702)}]\ 10^{-3}$
Dissolved Oxygen	% Saturation	> 38
Lead	mg/L	≤ $[e^{(1.273\ (lnH]\ -4.705}]\ 10^{-3}$
Nitrogen, Total	mg/L	≤ 1.54 AGM
pH	None	6.0 to 8.5
Phosphorus, Total	mg/L	≤ 0.12 mg/l AGM
Specific Conductivity	umho/cm	≤ 1275
Turbidity	NTU	≤ 29
Zinc	mg/L	≤ $[e^{(0.8473\ [lnH]\ +\ 0.884)}]\ 10^{-3}$

Applicable Class III - Freshwater Lakes Water Quality Criteria		
Site(s):	**C-16** (22 and 24 in Lake Osborne)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.05
Cadmium	mg/L	≤ $[e^{(0.7409\ [lnH]\ -4.719)}]\ 10^{-3}$
Chlorophyll-a (corrected)	ug/L	≤ 20 AGM
Copper	mg/L	≤ $[e^{(0.8545\ [lnH]\ -1.702)}]\ 10^{-3}$
Dissolved Oxygen	% Saturation	> 38
Lead	mg/L	≤ $[e^{(1.273\ (lnH]\ -4.705}]\ 10^{-3}$
Nitrogen, Total	mg/L	1.27 to 2.23 AGM
pH	None	6.0 to 8.5
Phosphorus, Total	mg/L	0.05 to 0.16 AGM
Specific Conductivity	umho/cm	≤ 1275
Turbidity	NTU	≤ 29
Zinc	mg/L	≤ $[e^{(0.8473\ [lnH]\ +\ 0.884)}]\ 10^{-3}$

Notes:

(1) InH means the natural logarithm of total hardness expressed as milligrams/L of $CaCo_3$.

(2) For Freshwater Lakes the Total Nitrogen and Total Phosphorus Minimum Value applies if Chlorophyll-a is > 20 ug/l, Maximum Value also applies if Chlorophyll-a is ≤20 ug/l.

(3) AMG - Annual Geometric Mean

(4) Per Palm Beach County Chain-of-Lakes December 2015 Water Quality Report, Lake Osborne Color >40 Platinum Colbat Units

Table 5-3

Numeric Surface Water Quality Standards by Waterbody

(Page 2 of 7)

Applicable Class I - Freshwater Canal Peninsula Region Water Quality Criteria		
Site(s):	**C-15** (31E, 31C, 31B), **C-16** (27B, 27A, 28), **C-17** (12A, C17S44) **C-51** (38B, 37B, C51S155), **Lox** (69), **Hillsboro** (3, S39) **L-8** (Culv10), **S-2-6-7** (S-2, 39, 43)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.05
Cadmium	mg/L	$\leq [e^{(0.7409\ [lnH]\ -4.719)}]\ 10^{-3}$
Chlorophyll-a (corrected)	ug/L	≤ 20 AGM
Copper	mg/L	$\leq [e^{(0.8545\ [lnH]\ -1.702)}]\ 10^{-3}$
Dissolved Oxygen	% Saturation	> 38
Lead	mg/L	$\leq [e^{(1.273\ [lnH]\ -4.705)}]\ 10^{-3}$
Nitrogen, Total	mg/L	Narrative
pH	None	6.0 to 8.5
Phosphorus, Total	mg/L	Narrative
Specific Conductivity	umho/cm	≤ 1275
Turbidity	NTU	≤ 29
Zinc	mg/L	$\leq [e^{(0.8473\ [lnH]\ +\ 0.884)}]\ 10^{-3}$

Applicable Class III - Freshwater Lakes Water Quality Criteria		
Site(s):	**Loxahatchee River (51)**	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.05
Cadmium	mg/L	≤ 0.0088
Chlorophyll-a (corrected)	ug/L	≤ 4.0 AGM
Copper	mg/L	≤ 0.0037
Dissolved Oxygen	% Saturation	> 42
Fecal	cfu/100 ml	≤ 43
Lead	mg/L	≤ 0.0085
Nitrogen, Total	mg/L	0.80 AGM
pH	None	6.5 to 8.5
Phosphorus, Total	mg/L	0.030 AGM
Specific Conductivity	umho/cm	None
Turbidity	NTU	≤ 29
Zinc	mg/L	≤ 0.086

Notes:

(1) InH means the natural logarithm of total hardness expressed as milligrams/L of $CaCo_3$.

(2) For Freshwater Lakes the Total Nitrogen and Total Phosphorus Minimum Value applies if Chlorophyll-a is > 20 ug/l, Maximum Value also applies of Chlorophyll-a is ≤20 ug/l.

(3) AMG - Annual Geometric Mean

(4) Per Palm Beach County Chain-of-Lakes December 2015 Water Quality Report, Lake Osborne Color >40 Platinum Colbat Units

Table 5-3

Numeric Surface Water Quality Standards by Waterbody

(Page 3 of 7)

Applicable Class II - Marine Northwest Fork Water Quality Criteria		
Site(s):	**Loxahatchee River** (62)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.05
Cadmium	mg/L	≤ 0.0088
Chlorophyll-a (corrected)	ug/L	≤ 5.5 AGM
Copper	mg/L	≤ 0.0037
Dissolved Oxygen	% Saturation	> 42
Fecal	cfu/100 ml	≤ 43
Lead	mg/L	≤ 0.0085
Nitrogen, Total	mg/L	< 1.26 AGM
pH	None	6.5 to 8.5
Phosphorus, Total	mg/L	< 0.075 AGM
Specific Conductivity	umho/cm	None
Turbidity	NTU	≤ 29
Zinc	mg/L	≤ 0.086

Applicable Class II - Marine Southwest Fork Water Quality Criteria		
Site(s):	**Loxahatchee River** (72)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.05
Cadmium	mg/L	≤ 0.0088
Chlorophyll-a (corrected)	ug/L	≤ 5.5 AGM
Copper	mg/L	≤ 0.0037
Dissolved Oxygen	% Saturation	> 42
Fecal	cfu/100 ml	≤ 43
Lead	mg/L	≤ 0.0085
Nitrogen, Total	mg/L	≤ 1.26 AGM
pH	None	6.5 to 8.5
Phosphorus, Total	mg/L	≤ 0.075 AGM
Specific Conductivity	umho/cm	None
Turbidity	NTU	≤ 29
Zinc	mg/L	≤ 0.086

Notes:

(1) AGM - Annual Geometric Mean

Table 5-3

Numeric Surface Water Quality Standards by Waterbody

(Page 4 of 7)

Applicable Class III - Marine Water Quality Criteria		
Sites:	**Hillsboro** (1 and 2)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.05
Cadmium	mg/L	≤ 0.0088
Chlorophyll-a (corrected)	ug/L	≤ 11 AGM
Copper	mg/L	≤ 0.0037
Dissolved Oxygen	% Saturation	> 42
Lead	mg/L	≤ 0.0085
Nitrogen, Total	mg/L	Narrative
pH	None	6.5 to 8.5
Phosphorus, Total	mg/L	Narrative
Specific Conductivity	umho/cm	None
Turbidity	NTU	≤ 29
Zinc	mg/L	≤ 0.086

Applicable Class III - Marine Water Quality Criteria		
Site(s):	**ICWW-N** (30)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.05
Cadmium	mg/L	≤ 0.0088
Chlorophyll-a (corrected)	ug/L	≤ 4.7 AGM
Copper	mg/L	<0.0037
Dissolved Oxygen	% Saturation	> 42
Enterococci Bacteria	cfu/100mL	≤ 130 Count TPTV
Lead	mg/L	≤ 0.0085
Nitrogen, Total	mg/L	≤ 0.66 AGM
pH	None	6.5 to 8.5
Phosphorus, Total	mg/L	≤ 0.035 AGM
Specific Conductivity	umho/cm	None
Turbidity	NTU	≤ 29
Zinc	mg/L	≤ 0.086

Notes:
(1) AGM - Annual Geometric Mean
(2) TPTV - Ten Percent Threshold Value shall not be exceeded in more than 10% of the measurement
(3) Narrative - Shall not cause an imbalance in flora and fauna

Table 5-3

Numeric Surface Water Quality Standards by Waterbody

(Page 5 of 7)

Applicable Class III - Marine Water Quality Criteria		
Site(s):	**Lake Worth Lagoon North** (LWL-1, 11, 13, LWL-4)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.05
Cadmium	mg/L	≤ 0.0088
Chlorophyll-a (corrected)	ug/L	≤ 2.9 AGM
Copper	mg/L	≤ 0.0037
Dissolved Oxygen	% Saturation	> 42
Lead	mg/L	≤ 0.0085
Nitrogen, Total	mg/L	≤ 0.54 AGM
pH	None	6.5 to 8.5
Phosphorus, Total	mg/L	≤ 0.044 AGM
Specific Conductivity	umho/cm	None
Turbidity	NTU	≤ 29
Zinc	mg/L	≤ 0.086

Applicable Class III - Marine Water Quality Criteria		
Site(s):	**Lake Worth Lagoon Central** (LWL-8, 18C, 18D, LWL-11)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.05
Cadmium	mg/L	≤ 0.0088
Chlorophyll-a (corrected)	ug/L	≤ 10.2 TPTV
Copper	mg/L	≤ 0.0037
Dissolved Oxygen	% Saturation	> 42
Lead	mg/L	≤ 0.0085
Nitrogen, Total	mg/L	≤ 0.66 AGM
pH	None	6.5 to 8.5
Phosphorus, Total	mg/L	≤ 0.049 AGM
Specific Conductivity	umho/cm	None
Turbidity	NTU	≤ 29
Zinc	mg/L	≤ 0.086

Notes:
(1) AGM - Annual Geometric Mean
(2) TPTV - Ten Percent Threshold Value shall not be exceeded in more than 10% of the measurement

Table 5-3

Numeric Surface Water Quality Standards by Waterbody

(Page 6 of 7)

Applicable Class III - Marine Water Quality Criteria		
Site(s):	**ICWW-S** (LWL-13 and LWL-18)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.05
Cadmium	mg/L	≤ 0.0088
Chlorophyll-a (corrected)	ug/L	≤ 5.7 AGM
Copper	mg/L	≤ 0.0037
Dissolved Oxygen	% Saturation	> 42
Lead	mg/L	≤ 0.0085
Nitrogen, Total	mg/L	≤ 0.59 AGM
pH	None	6.5 to 8.5
Phosphorus, Total	mg/L	≤ 0.050 AGM
Specific Conductivity	umho/cm	None
Turbidity	NTU	≤ 29
Zinc	mg/L	≤ 0.086

Applicable Class I - Freshwater Canal South Florida Region Water Quality Criteria		
Site(s):	**City of West Palm Beach Water Supply Canals** (M-Canal, Control 4)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.01
Cadmium	mg/L	$\leq [e^{(0.7409\ [\ln H]\ -4.719)}]\ 10^{-3}$
Chlorophyll-a (corrected)	ug/L	≤ 20 AGM
Copper	mg/L	$\leq [e^{(0.8545\ [\ln H]\ -1.702)}]\ 10^{-3}$
Dissolved Oxygen	% Saturation	> 38
Lead	mg/L	$\leq [e^{(1.273\ [\ln H]\ -4.705)}]\ 10^{-3}$
Nitrogen, Total	mg/L	Narrative
pH	None	6.0 to 8.5
Phosphorus, Total	mg/L	Narrative
Specific Conductivity	umho/cm	≤ 1275
Turbidity	NTU	≤ 29
Zinc	mg/L	$\leq [e^{(0.8473\ [\ln H]\ +\ 0.884)}]\ 10^{-3}$

Notes:
(1) AGM - Annual Geometric Mean
(2) Narrative - Shall not cause an imbalance in flora and fauna

Table 5-3

Numeric Surface Water Quality Standards by Waterbody

(Page 7 of 7)

Applicable Class II - Freshwater Lakes Water Quality Criteria		
Site(s):	**City of West Palm Beach Water Supply Canals** (Lake Mangonia and Clear Lake)	
Parameter	Units	Criteria
Arsenic	mg/L	≤ 0.01
Cadmium	mg/L	$\leq [e^{(0.7409\ [\ln H]\ -4.719)}]\ 10^{-3}$
Chlorophyll-a (corrected)	ug/L	≤ 20 AGM
Copper	mg/L	$\leq [e^{(0.8545\ [\ln H]\ -1.702)}]\ 10^{-3}$
Dissolved Oxygen	% Saturation	> 38
Lead	mg/L	$\leq [e^{(1.273\ (\ln H]\ -4.705}]\ 10^{-3}$
Nitrogen, Total	mg/L	1.05 to 1.91 AGM
pH	None	6.0 to 8.5
Phosphorus, Total	mg/L	0.03 to 0.09 AGM
Specific Conductivity	umho/cm	≤ 1275
Turbidity	NTU	≤ 29
Zinc	mg/L	$\leq [e^{(0.8473\ [\ln H]\ +\ 0.884)}]\ 10^{-3}$

Notes:

(1) AGM - Annual Geometric Mean

(2) For Freshwater Lakes the Total Nitrogen and Total Phosphorus Minimum Value applies if Chlorphyll-a is >20ug/l, Maximum Value applies if Chlorophyll-a is ≤20ug/l.

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-15 Watershed Monitoring Events

SITE 31E	SAMPLE DATE	11/13/18	1/25/19	3/14/19	5/20/19	7/16/19	9/12/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L	1.1	26.3	17.5	14.6	1.6	24.1							8.1	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0043	0.0062	0.0013	0.0013								See Table 5-3, page 2
Dissolved Oxygen	% Saturation	51.8	60.9	69.4	55.6	7.7	31.2								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.018	0.240	0.018	0.041	0.220	0.053								
Nitrogen, nitrate + nitrite	mg/L	0.013	0.130	0.013	0.0125	0.013	0.0125								
Nitrogen, Total	mg/L	1.01	1.53	1.21	1.21	1.71	1.41							1.33	Narrative
Nitrogen, Total Kjeldahl	mg/L	1	1.4	1.2	1.2	1.7	1.4								
pH	None	7.64	7.60		7.60	7.55	8.01								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0700		0.280	0.48	0.410	0.12								
Phosphorus, Total	mg/L	0.1500	0.2500	0.4000	0.58	0.5900	0.22							0.323	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	551	628	604	583	564	746								≤ 1275
Temperature	deg C	26.9	19.7	24.2	29.1	30.8	29.3								
Total Hardness	mg/L	219	242	230	214	217	235								
Total Suspended Solids	mg/L	8.0	2.5	7.5	2.5	8.9	2.5								
Turbidity	NTU	0.3	0.9	0.3	4	4.7	3.6								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 2

• Metal exceedences are based on hardness

• Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.

• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.

•AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019
(Page 2 of 44)

C-15 Watershed Monitoring Events

SITE 31C	SAMPLE DATE	11/13/18	1/25/19	3/14/19	5/20/19	7/16/19	9/12/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L	3.6	17.6	14.4	21	34.0	8.8							13.4	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0013	0.0062	0.0039	0.0013								See Table 5-3, page 2
Dissolved Oxygen	% Saturation	97.6	57.8	67.7	115.0	74.1	69.5								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.060	0.160	0.064	0.018	0.018	0.098								
Nitrogen, nitrate + nitrite	mg/L	0.063	0.180	0.032	0.0125	0.013	0.14								
Nitrogen, Total	mg/L	0.86	1.09	0.92	1.11	1.31	0.76							0.99	Narrative
Nitrogen, Total Kjeldahl	mg/L	0.8	0.91	0.89	1.1	1.3	0.62								
pH	None	7.45	7.42		7.51	7.75	7.80								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0440		0.040	0.073	0.087	0.077								
Phosphorus, Total	mg/L	0.1000	0.1300	0.0960	0.16	0.1900	0.12							0.129	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	505	506	506	495	503	497								≤ 1275
Temperature	deg C	28.2	21.8	25.2	29.0	30.6	29.2								
Total Hardness	mg/L	206	204	187	173	198	197								
Total Suspended Solids	mg/L	2.5	5.8	2.5	2.5	6.8	2.5								
Turbidity	NTU	0.3	2.0	0.2	2	3.6	2								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 2

• Metal exceedences are based on hardness

• Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.

• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.

•AGM - Annual Geometric Mean

Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-15 Watershed Monitoring Events

SITE 31B	SAMPLE DATE	11/13/18	1/25/19	3/14/19	5/20/19	7/16/19	9/12/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L	1.1	12.9	12.0	7.7	12.7	20.9							8.4	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0047	0.0061	0.0040	0.0013								See Table 5-3, page 2
Dissolved Oxygen	% Saturation	101.0	94.8	75.8	104.6	84.8	59.8								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.018	0.018	0.018	0.018	0.018	0.220								
Nitrogen, nitrate + nitrite	mg/L	0.013	0.013	0.013	0.0125	0.013	0.083								
Nitrogen, Total	mg/L	0.88	0.74	0.06	0.85	1.01	0.96							0.56	Narrative
Nitrogen, Total Kjeldahl	mg/L	0.87	0.73	0.043	0.84	1	0.88								
pH	None	8.03	8.08		7.88	7.99	7.80								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0370		0.002	0.11	0.094	0.14								
Phosphorus, Total	mg/L	0.0910	0.0670	0.0045	0.17	0.1600	0.21							0.073	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	444	466	466	480	491	486								≤ 1275
Temperature	deg C	27.4	20.3	23.7	28.7	30.6	28.8								
Total Hardness	mg/L	186	180	169	165	189	194								
Total Suspended Solids	mg/L	2.5	2.5	2.5	2.5	2.5	2.5								
Turbidity	NTU	0.3	1.9	0.3	2	3.2	3								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 2

• Metal exceedences are based on hardness

• Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.

• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.

•AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-16 Watershed Monitoring Events

SITE 22	SAMPLE DATE	11/16/18	1/22/19	3/12/19	5/20/19	7/15/19	9/10/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 1
Chlorophyll-a (corrected)	ug/L	1.1	24.7	8.9	20.4	28.3	21.1							12.0	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0013	0.0044	0.0013	0.0013								See Table 5-3, page 8
Dissolved Oxygen	% Saturation	64.5	18.6	103.9	137.5	113.7	96.1								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 1
Nitrogen, Ammonia	mg/L	0.084	0.018	0.018	0.018	0.018	0.018								
Nitrogen, nitrate + nitrite	mg/L	0.059	0.046	0.013	0.0125	0.013	0.0125								
Nitrogen, Total	mg/L	0.90	0.96	0.74	0.92	1.11	0.92							0.92	≤ 2.23 AGM
Nitrogen, Total Kjeldahl	mg/L	0.84	0.91	0.73	0.91	1.1	0.91								
pH	None	7.83			8.47	8.33	8.47								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0210	0.015	0.012	0.0019	0.004	0.0019								
Phosphorus, Total	mg/L	0.0900	0.0570	0.0540	0.068	0.0640	0.069							0.066	≤ 0.16 AGM
Salinity	ppth														
Specific Conductivity	umho/cm	512	536	424	405	410	418.1								≤ 1275
Temperature	deg C	25.7	19.4	25.6	29.5	31.5	30.4								
Total Hardness	mg/L	176	190	152	153	155	167								
Total Suspended Solids	mg/L	7.0	2.5	2.5	2.5	8.8	6.9								
Turbidity	NTU	2.4	3.9	2.7	3.5	3.8	3.4								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 1

• Metal exceedences are based on hardness
• Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.
• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.
• AGM - Annual Geometric Mean
• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-16 Watershed Monitoring Events

SITE 24	SAMPLE DATE	11/16/18	1/22/19	3/12/19	5/20/19	7/15/19	9/10/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 1
Chlorophyll-a (corrected)	ug/L	1.6	16.1	5.8	17.7	12.7	1.1							5.8	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0028	0.0013	0.0013	0.0013								See Table 5-3, page 1
Dissolved Oxygen	% Saturation	100.6	107.3	104.3	128.5	107.4	91.7								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 1
Nitrogen, Ammonia	mg/L	0.018	0.018	0.018	0.018	0.018	0.018								
Nitrogen, nitrate + nitrite	mg/L	0.013	0.013	0.013	0.0125	0.013	0.0125								
Nitrogen, Total	mg/L	0.06	0.06	0.06	0.87	0.06	0.06							0.09	≤ 2.23 AGM
Nitrogen, Total Kjeldahl	mg/L	0.043	0.043	0.043	0.86	0.043	0.043								
pH	None	8.19			8.28	8.02	8.25								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0019	0.002	0.002	0.0019	0.002	0.0019								
Phosphorus, Total	mg/L	0.0014	0.0014	0.0052	0.054	0.0014	0.0014							0.003	≤ 0.16 AGM
Salinity	ppth														
Specific Conductivity	umho/cm	493	541	446	408	380	387								≤ 1275
Temperature	deg C	25.6	19.3	26.0	28.9	31.1	30.3								
Total Hardness	mg/L	169	193	155	158	128	147								
Total Suspended Solids	mg/L	7.5	2.5	2.5	2.5	2.5	2.5								
Turbidity	NTU	6.1	4.9	2.4	4.1	2.0	1.4								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 1

• Metal exceedences are based on hardness

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• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.

• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-16 Watershed Monitoring Events

SITE 27B	SAMPLE DATE	11/13/18	1/25/19	3/14/19	5/20/19	7/16/19	9/12/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 1
Chlorophyll-a (corrected)	ug/L	1.1	28.1	9.4	14.1	25.2	28.4							12.0	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0013	0.004	0.0031	0.0013								See Table 5-3, page 1
Dissolved Oxygen	% Saturation	36.7	80.0	39.2	13.3	62.4	12.1								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 1
Nitrogen, Ammonia	mg/L	0.018	0.018	0.054	0.018	0.078	0.062								
Nitrogen, nitrate + nitrite	mg/L	0.460	0.390	0.013	0.0125	0.013	0.0125								
Nitrogen, Total	mg/L	1.56	1.39	1.31	1.01	1.31	1.51							1.34	Narrative
Nitrogen, Total Kjeldahl	mg/L	1.1	1	1.3	1	1.3	1.5								
pH	None	7.62	8.14		7.32	7.88	7.50								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0500		0.039	0.081	0.250	0.23								
Phosphorus, Total	mg/L	0.0830	0.1300	0.0920	0.16	0.3700	0.35							0.166	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	556	434	727	504	563	888								≤ 1275
Temperature	deg C	26.9	19.3	23.4	28.2	31.1	29.0								
Total Hardness	mg/L	214	159	207	201	239	308								
Total Suspended Solids	mg/L	2.5	7.4	2.5	2.5	8.2	2.5								
Turbidity	NTU	0.3	13.0	0.3	2.2	4.7	3.1								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 1

• Metal exceedences are based on hardness

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• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.

• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-16 Watershed Monitoring Events

SITE 27A	SAMPLE DATE	11/13/18	1/25/19	3/14/19	5/20/19	7/16/19	9/12/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 1
Chlorophyll-a (corrected)	ug/L	1.1	4.9	1.2	7.8	4.7	14							3.9	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0041	0.0063	0.0031	0.0013								See Table 5-3, page 1
Dissolved Oxygen	% Saturation	82.5	100.2	103.0	78.0	77.6	69.8								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 1
Nitrogen, Ammonia	mg/L	0.018	0.018	0.018	0.018	0.018	0.062								
Nitrogen, nitrate + nitrite	mg/L	0.065	0.033	0.013	0.0125	0.013	0.068								
Nitrogen, Total	mg/L	0.74	0.73	0.68	0.06	0.76	1.07							0.51	Narrative
Nitrogen, Total Kjeldahl	mg/L	0.67	0.7	0.67	0.043	0.75	1								
pH	None	7.92	8.31		7.81	8.03	8.17								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0140		0.014	0.0019	0.017	0.11								
Phosphorus, Total	mg/L	0.0360	0.0270	0.0400	0.0014	0.0610	0.17							0.029	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	608	491	427	469	370	659								≤ 1275
Temperature	deg C	27.3	20.0	24.3	29.2	31.2	28.9								
Total Hardness	mg/L	231	175	141	162	148	238								
Total Suspended Solids	mg/L	2.5	2.5	2.5	2.5	2.5	2.5								
Turbidity	NTU	0.1	1.2	0.3	1.2	1.7	2.3								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 1

• Metal exceedences are based on hardness

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• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-16 Watershed Monitoring Events

SITE 28	SAMPLE DATE	11/13/18	1/25/19	3/14/19	5/20/19	7/16/19	9/12/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0089	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 1
Chlorophyll-a (corrected)	ug/L	1.1	17.1	14.8	11.3	1.1	11.3							5.8	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0013	0.0049	0.0013	0.0013								See Table 5-3, page 1
Dissolved Oxygen	% Saturation	96.1	100.7	74.5	90.6	89.2	50.5								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 1
Nitrogen, Ammonia	mg/L	0.018	0.018	0.018	0.018	0.018	0.018								
Nitrogen, nitrate + nitrite	mg/L	0.013	0.013	0.013	0.0125	0.013	0.0125								
Nitrogen, Total	mg/L	0.89	0.69	0.62	0.75	0.06	0.06							0.31	Narrative
Nitrogen, Total Kjeldahl	mg/L	0.88	0.68	0.61	0.74	0.043	0.043								
pH	None	8.07	8.24		7.82	8.08	7.85								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0019		0.025	0.004	0.002	0.0019								
Phosphorus, Total	mg/L	0.0560	0.0360	0.0890	0.063	0.0033	0.0014							0.019	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	433	460	454	417	414	424								≤ 1275
Temperature	deg C	26.4	20.1	23.5	29.3	30.3	28.6								
Total Hardness	mg/L	179	176	168	150	156	170								
Total Suspended Solids	mg/L	6.5	2.5	2.5	2.5	5.4	2.5								
Turbidity	NTU	0.3	2.5	0.1	2.8	3.1	1.3								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 1

• Metal exceedences are based on hardness

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• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-17 Watershed Monitoring Events

SITE 12A	SAMPLE DATE	11/16/18	1/22/19	3/12/19	5/20/19	7/15/19	9/10/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L	1.1	5.6	8.0	15	18.5	14.2							7.6	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0013	0.0057	0.0013	0.0013								See Table 5-3, page 2
Dissolved Oxygen	% Saturation	62.4	83.6	53.3	48.3	87.3	27.9								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.082	0.018	0.018	0.018	0.018	0.290								
Nitrogen, nitrate + nitrite	mg/L	0.130	0.140	0.080	0.034	0.013	0.078								
Nitrogen, Total	mg/L	0.98	0.94	0.88	0.85	1.01	1.28							0.98	Narrative
Nitrogen, Total Kjeldahl	mg/L	0.85	0.8	0.8	0.82	1	1.2								
pH	None	7.68			7.45	7.88	7.75								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0180	0.011	0.013	0.011	0.005	0.0095								
Phosphorus, Total	mg/L	0.0650	0.0470	0.0650	0.078	0.0820	0.11							0.072	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	477	542	464	422	487	441.1								≤ 1275
Temperature	deg C	24.8	18.3	25.5	28.7	31.7	29.9								
Total Hardness	mg/L	173	182	165	149	171	164								
Total Suspended Solids	mg/L	2.5	2.5	2.5	2.5	9.4	2.5								
Turbidity	NTU	3.8	2.1	2.6	2.4	3.5	3.3								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055							0.0055	See Table 5-3, page 2

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- AGM - Annual Geometric Mean
- Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-17 Watershed Monitoring Events

SITE C17S44	SAMPLE DATE	10/11/18	11/15/18	1/10/19	2/14/19	3/14/19	4/11/19	5/9/19	6/13/19	7/11/19	8/8/19	9/12/19		Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L														≤ 20 AGM
Copper	mg/L														See Table 5-3, page 2
Dissolved Oxygen	% Saturation	62.8	57.9	84.9	60.0	73.4	87.8	69.9	64.3	73.0	63.9	73.2			> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L														See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.029	0.033	0.026	0.158	0.024	0.008	0.013	0.012	0.003	0.057	0.042			
Nitrogen, nitrate + nitrite	mg/L	0.005	0.021	0.036	0.162	0.011	0.013	0.005	0.0025	0.003	0.104	0.027			
Nitrogen, Total	mg/L	0.83	0.77	0.72	1.00	0.69	0.72	0.78	0.75	0.74	0.98	0.68		0.78	Narrative
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.80	7.90	7.50	7.70	7.80	7.90	7.70	7.60	7.70	7.50	7.60			6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0040	0.003	0.002	0.03	0.004	0.003	0.008	0.011	0.010	0.012	0.018			
Phosphorus, Total	mg/L	0.0440	0.0440	0.0240	0.068	0.0300	0.031	0.0540	0.055	0.0470	0.076	0.0780		0.047	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	471	468	481	513	459	468	435	432	473	373	467			≤ 1275
Temperature	deg C	28.3	27.2	20.7	22.1	23.4	26.4	27.9	29.8	30.3	29.2	29.2			
Total Hardness	mg/L														
Total Suspended Solids	mg/L	6.0	3.0	1.5	3	4.0	3	3.0	1.5	1.5	4	5.0			
Turbidity	NTU	2.2	1.9	0.9	2.2	1.2	1	2.1	2.3	1.3	2.3	3.4			≤ 29
Zinc	mg/L														See Table 5-3, page 2

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• AGM - Annual Geometric Mean
• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2017 - September 2018

C-18 Watershed Monitoring Events

SITE 16	SAMPLE DATE	11/16/18	1/22/19	3/12/19	5/20/19	7/15/19	9/10/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.01
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 1
Chlorophyll-a (corrected)	ug/L	1.1	1.1	1.1	3.9	17.5	4.4							2.7	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0013	0.0027	0.0013	0.0013								See Table 5-3, page 1
Dissolved Oxygen	% Saturation	22.8	70.3	29.5	30.0	38.7	43.5								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 1
Nitrogen, Ammonia	mg/L	0.065	0.018	0.018	0.018	0.018	0.018								
Nitrogen, nitrate + nitrite	mg/L	0.044	0.013	0.048	0.0125	0.013	0.0125								
Nitrogen, Total	mg/L	0.92	0.70	0.88	0.88	1.31	1.21							0.96	≤ 1.54 AGM
Nitrogen, Total Kjeldahl	mg/L	0.88	0.69	0.83	0.87	1.3	1.2								
pH	None	7.80			7.45	7.56	7.88								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0160	0.002	0.006	0.0047	0.002	0.0039								
Phosphorus, Total	mg/L	0.0160	0.0100	0.0290	0.032	0.0610	0.056							0.028	≤ 0.12 mg/l AGM
Salinity	ppth														
Specific Conductivity	umho/cm	499	584	980	486	282	150.1								≤ 1275
Temperature	deg C	23.5	17.3	23.1	27.4	30.5	30.5								
Total Hardness	mg/L	210	222	214	172	113	53.5								
Total Suspended Solids	mg/L	2.5	2.5	2.5	2.5	2.5	2.5								
Turbidity	NTU	0.8	1.7	1.0	1.5	2.8	2								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 1

• Metal exceedences are based on hardness

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• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-18 Watershed Monitoring Events

SITE 15	SAMPLE DATE	11/16/18	1/22/19	3/12/19	5/20/19	7/15/19	9/10/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.01
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 1
Chlorophyll-a (corrected)	ug/L	1.1	1.1	1.1	3	7.4	2.3							2.0	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013								See Table 5-3, page 1
Dissolved Oxygen	% Saturation	29.0	62.8	24.5	29.3	21.2	35.2								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 1
Nitrogen, Ammonia	mg/L	0.043	0.018	0.038	0.039	0.018	0.018								
Nitrogen, nitrate + nitrite	mg/L	0.013	0.013	0.013	0.0125	0.013	0.0125								
Nitrogen, Total	mg/L	0.71	0.72	0.78	0.78	0.74	0.69							0.74	≤ 1.54 AGM
Nitrogen, Total Kjeldahl	mg/L	0.7	0.71	0.77	0.77	0.73	0.68								
pH	None	7.81			7.20	7.41	7.75								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0130	0.002	0.002	0.0019	0.005	0.0019								
Phosphorus, Total	mg/L	0.0100	0.0160	0.0160	0.015	0.0180	0.011							0.014	≤ 0.12 mg/l AGM
Salinity	ppth														
Specific Conductivity	umho/cm	309	345	355	383	387	182.2								≤ 1275
Temperature	deg C	22.4	17.5	23.8	28.4	29.8	29.6								
Total Hardness	mg/L	128	102	133	134	136	68.7								
Total Suspended Solids	mg/L	2.5	2.5	2.5	2.5	2.5	2.5								
Turbidity	NTU	0.6	1.1	0.8	0.9	0.7	0.57								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 1

• Metal exceedences are based on hardness
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• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.
• AGM - Annual Geometric Mean
• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019
(Page 13 of 44)

C-18 Watershed Monitoring Events

Site 92	SAMPLE DATE	11/13/18	2/12/19	5/21/19	8/13/19									Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L	190	262	138	114										
Arsenic	mg/L														≤ 0.01
Cadmium	mg/L														See Table 5-3, page 1
Chlorophyll-a (corrected)	ug/L	7.7	2.6	3.1	10.4									5.0	≤ 20 AGM
Copper	mg/L														See Table 5-3, page 1
Dissolved Oxygen	% Saturation														> 38
Fecal Coliform	cfu/100mL	31	98	10	10										
Lead	mg/L														See Table 5-3, page 1
Nitrogen, Ammonia	mg/L	0.040	0.140	0.080	0.120										
Nitrogen, nitrate + nitrite	mg/L	0.039	0.109	0.006	0.009										
Nitrogen, Total	mg/L	0.94	0.81	0.71	0.91									0.84	≤ 1.54 AGM
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.28	7.31	7.49	7.51										6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0080	0.028	0.007	0.008										
Phosphorus, Total	mg/L	0.0240	0.0480	0.0200	0.032									0.029	≤ 0.12 mg/l AGM
Salinity	ppth	0.3	0.3	0.2	0.2										
Specific Conductivity	umho/cm	627	718	474	365.4										≤ 1275
Temperature	deg C	27.2	23.3	29.5	30.9										
Total Hardness	mg/L														
Total Suspended Solids	mg/L														
Turbidity	NTU	2.0	3.2	1.5	2.5										≤ 29
Zinc	mg/L														See Table 5-3, page 1

• Metal exceedences are based on hardness
• Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.
• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.
• AGM - Annual Geometric Mean
• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-18 Watershed Monitoring Events

Site 81	SAMPLE DATE	3/12/19	6/11/19	9/9/19										Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L	153	162	70											
Arsenic	mg/L														≤ 0.01
Cadmium	mg/L														See Table 5-3, page 1
Chlorophyll-a (corrected)	ug/L	2.5	11.9	15.8										7.8	≤ 20 AGM
Copper	mg/L														See Table 5-3, page 1
Dissolved Oxygen	% Saturation														> 38
Fecal Coliform	cfu/100mL	10	10	31											
Lead	mg/L														See Table 5-3, page 1
Nitrogen, Ammonia	mg/L	0.030	0.030	0.060											
Nitrogen, nitrate + nitrite	mg/L	0.021	0.005	0.010											
Nitrogen, Total	mg/L	0.82	0.81	1.01										0.87	≤ 1.54 AGM
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.96	8.08	7.28											6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0050	0.011	0.005											
Phosphorus, Total	mg/L	0.0160	0.0320	0.0290										0.025	≤ 0.12 mg/l AGM
Salinity	ppth	0.3	0.3	0.1											
Specific Conductivity	umho/cm	675	537	243											≤ 1275
Temperature	deg C	24.7	31.6	32.1											
Total Hardness	mg/L														
Total Suspended Solids	mg/L														
Turbidity	NTU	0.9	1.6	1.7											≤ 29
Zinc	mg/L														See Table 5-3, page 1

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• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.
• AGM - Annual Geometric Mean
• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-51 Watershed Monitoring Events

SITE 38B	SAMPLE DATE	11/20/18	1/23/19	3/13/19	5/21/19	7/17/19	9/11/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L	1.1	3.7	4.2	8.3	2.1	12.1							3.9	≤ 20 AGM
Copper	mg/L	0.0013	0.0027	0.0013	0.0013	0.0013	0.0013								See Table 5-3, page 2
Dissolved Oxygen	% Saturation	63.7	89.1	89.1	70.4	57.8	75.0								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.018	0.040	0.018	0.018	0.018	0.018								
Nitrogen, nitrate + nitrite	mg/L	0.260	0.300	0.330	0.0125	0.013	0.0125								
Nitrogen, Total	mg/L	1.26	1.40	1.33	0.06	1.61	0.06							0.5	Narrative
Nitrogen, Total Kjeldahl	mg/L	1	1.1	1	0.043	1.6	0.043								
pH	None	7.90	8.11		7.92	8.08	8.12								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0620		0.072	0.0019	0.005	0.0019								
Phosphorus, Total	mg/L	0.0980	0.1300	0.1600	0.0033	0.0920	0.0056							0.039	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	459.4	465	412	902	1837	452								≤ 1275
Temperature	deg C	24.9	18.2	24.0	29.3	30.3	30.8								
Total Hardness	mg/L	169	171	165	314	379									
Total Suspended Solids	mg/L	8.3	15.5	26.6	19.3	2.5									
Turbidity	NTU	18.6	28.7	36.6	15.5	14.3	50								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								

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- AGM - Annual Geometric Mean
- Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-51 Watershed Monitoring Events

SITE 37B	SAMPLE DATE	11/20/18	1/23/19	3/13/19	5/21/19	7/17/19	9/11/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L	1.1	1.1	1.2	10.2	1.1	10.9							2.4	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013								See Table 5-3, page 2
Dissolved Oxygen	% Saturation	42.6	87.2	83.7	95.3	77.8	94.9								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.018	0.018	0.018	0.018	0.018	0.018								
Nitrogen, nitrate + nitrite	mg/L	0.013	0.013	0.013	0.12	0.013	0.15								
Nitrogen, Total	mg/L	0.06	0.06	0.06	0.78	0.06	0.87							0.1	Narrative
Nitrogen, Total Kjeldahl	mg/L	0.043	0.043	0.043	0.66	0.043	0.72								
pH	None	7.73	8.62		7.72	8.02	8.06								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0820		0.002	0.0019	0.002	0.0019								
Phosphorus, Total	mg/L	0.0014	0.0014	0.0046	0.034	0.0034	0.054							0.006	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	553	431	432	634	559	647								≤ 1275
Temperature	deg C	25.8	18.4	23.8	28.9	31.7	30.6								
Total Hardness	mg/L	205	157	171	242	233									
Total Suspended Solids	mg/L	2.5	3.4	28.6	2.5	2.5									
Turbidity	NTU	7.7	0.1	35.7	1.5	2.9	2.2								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 2

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- AGM - Annual Geometric Mean
- Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

C-51 Watershed Monitoring Events

SITE C51S155	SAMPLE DATE	10/11/18	11/15/18	1/10/19	2/14/19	3/14/19	4/11/19	5/9/19	6/13/19	7/11/19	8/8/19	9/12/19		Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L														≤ 20 AGM
Copper	mg/L														See Table 5-3, page 2
Dissolved Oxygen	% Saturation	56.0	51.9	85.3	58.2	82.7	83.8	60.7	65.9	30.3	53.4	74.9			> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L														See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.094	0.076	0.028	0.104	0.039	0.019	0.053	0.019	0.088	0.144	0.063			
Nitrogen, nitrate + nitrite	mg/L	0.209	0.116	0.171	0.26	0.374	0.017	0.048	0.018	0.014	0.118	0.022			
Nitrogen, Total	mg/L	1.10	0.89	0.95	1.19	1.31	1.02	0.80	0.93	0.90	0.95	0.67		1.0	Narrative
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.50	8.10	7.50	7.60	7.70	7.90	7.60	7.40	7.50	7.40	7.60			6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0480	0.050	0.013	0.018	0.065	0.03	0.014	0.002	0.010	0.008	0.006			
Phosphorus, Total	mg/L	0.0720	0.0770	0.0490	0.053	0.1180	0.092	0.0520	0.059	0.0580	0.073	0.0840		0.069	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	692	556	545	1045	439	459	528	653	470	316	454			≤ 1275
Temperature	deg C	28.2	26.2	21.4	21.7	23.1	26.5	27.9	29.8	29.4	28.4	29.6			
Total Hardness	mg/L														
Total Suspended Solids	mg/L	3.0	1.5	3.0	1.5	8.0	6	5.0	6	5.0	5	6.0			
Turbidity	NTU	3.2	1.6	2.1	3	17.8	3.2	5.5	3.8	2.8	5.2	4.2			≤ 29
Zinc	mg/L														See Table 5-3, page 2

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- AGM - Annual Geometric Mean
- Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Loxahatchee River Watershed Monitoring Events

SITE 69 (Lox)	SAMPLE DATE	10/9/18	11/13/18	1/14/19	2/12/19	3/12/19	4/10/19	5/21/19	6/11/19	7/16/19	8/13/19	9/9/19		Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L	152	205	185	165	195	209	170	201	160	138	106			
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L	3.5	2.6	8.4	3.9	1.6	1.3	2.6	2.7	7.5	8.3	6.5		3.7	≤ 20 AGM
Copper	mg/L														See Table 5-3, page 2
Dissolved Oxygen	% Saturation	42.0	57.9	66.8		51.7	51.4	57.4	52.9	46.6	45.3	39.6			> 38
Fecal Coliform	cfu/100mL	10	74	41	52	10	20	20	31	41	10	10			
Lead	mg/L														See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.030	0.060	0.030	0.080	0.060	0.050	0.070	0.060	0.080	0.180	0.180			
Nitrogen, nitrate + nitrite	mg/L	0.072	0.081	0.033	0.058	0.058	0.048	0.030	0.028	0.049	0.042	0.061			
Nitrogen, Total	mg/L	0.77	0.78	0.93	0.96	1.26	0.65	0.73	0.73	0.85	0.94	1.16		0.9	Narrative
Nitrogen, Total Kjeldahl	mg/L	0.7	0.7	0.9	0.9	1.2	0.6	0.7	0.7	0.8	0.9	1.1			
pH	None	7.08	7.29	6.89	7.48	7.46	7.57	7.52	7.45	7.19	7.40	6.98			6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0220	0.010	0.008	0.012	0.015	0.018	0.013	0.019	0.011	0.008	0.023			
Phosphorus, Total	mg/L	0.0340	0.0290	0.0240	0.03	0.0260	0.027	0.0300	0.026	0.0350	0.048	0.0730		0.033	Narrative
Salinity	ppth	0.2	0.3	0.3	0.3	0.5	0.5	0.3	0.3	0.3	0.2	0.2			
Specific Conductivity	umho/cm	479	677	561.6	453	1033	1009	561	701	540	446.6	363			≤ 1275
Temperature	deg C	27.9	26.3	20.6	22.7	24.0	25.5	28.5	29.2	31.3	30.1	30.8			
Total Hardness	mg/L														
Total Suspended Solids	mg/L	1.4	1.3	2.1	1.6	1.0	1.5	1.2	1.1	2.0	4.9	4.6			
Turbidity	NTU	2.1	1.8	1.8	1.6	1.6	1.5	1.5	1.2	1.8	5.5	3.7			≤ 29
Zinc	mg/L														See Table 5-3, page 2

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• AGM - Annual Geometric Mean

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Loxahatchee River Watershed Monitoring Events

SITE 51 (Lox)	SAMPLE DATE	10/8/18	1/15/19	4/9/19	7/15/19									Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L	118	138	135	129										
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	5.4	2.8	3.6	3.5									3.7	≤ 4 AGM
Copper	mg/L														≤ 0.0037
Dissolved Oxygen	% Saturation	96.1	89.0	88.0	89.7										> 42
Fecal Coliform	cfu/100mL	10	10	10	10										
Lead	mg/L														See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.080	0.030	0.030	0.030										
Nitrogen, nitrate + nitrite	mg/L	0.005	0.006	0.005	0.005										
Nitrogen, Total	mg/L	0.31	0.21	0.21	0.40									0.27	≤ .8 AGM
Nitrogen, Total Kjeldahl	mg/L	0.3	0.2	0.2	0.4										
pH	None	7.87	7.75	7.81	7.67										6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0080	0.006	0.005	0.006										
Phosphorus, Total	mg/L	0.0250	0.0220	0.0230	0.02									0.022	≤ .03 AGM
Salinity	ppth	27.9	33.5	32.3	30.9										
Specific Conductivity	umho/cm	53518.7	50997.9	49378.7	47682.9										None
Temperature	deg C	27.9	20.8	26.2	30.7										
Total Hardness	mg/L														
Total Suspended Solids	mg/L	12.9	14.7	7.6	5.1										
Turbidity	NTU	4.4	5.7	5.8	2.6										≤ 29
Zinc	mg/L														See Table 5-3, page 2

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• AGM - Annual Geometric Mean

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Loxahatchee River Watershed Monitoring Events (Marine)

SITE 62 (Lox)	SAMPLE DATE	10/9/18	11/19/18	1/14/19	2/12/19	3/12/19	4/10/19	5/21/19	6/11/19	7/16/19	8/13/19	9/9/19		Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L	135	163	176	158	165	173	146	169	151	125	89			
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	7.9	5.3	10.4	5.8	8.6	5.9	5.4	6	8.0	4.2	2.2		5.9	≤ 5.5 AGM
Copper	mg/L														<0.0037
Dissolved Oxygen	% Saturation	84.0	58.7	76.1	77.7	77.1	74.9	68.9	62.4	71.5	48.4	43.3			> 42
Fecal Coliform	cfu/100mL	10	134	96	52	41	63	41	86	120	201	97			≤ 43 cfu/100ml
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L	0.050	0.030	0.030	0.070	0.030	0.030	0.050	0.050	0.050	0.100	0.090			
Nitrogen, nitrate + nitrite	mg/L	0.005	0.111	0.042	0.075	0.040	0.012	0.014	0.064	0.033	0.086	0.092			
Nitrogen, Total	mg/L	0.61	0.81	0.44	0.58	0.74	0.41	0.41	0.96	0.73	1.19	1.19		0.69	≤ 1.26 AGM
Nitrogen, Total Kjeldahl	mg/L	0.6	0.7	0.4	0.5	0.7	0.4	0.4	0.9	0.7	1.1	1.1			
pH	None	7.67	7.25	7.77	7.70	7.68	7.71	7.71	7.42	7.69	7.32	7.29			6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0270	0.034	0.025	0.027	0.029	0.03	0.025	0.05	0.028	0.046	0.050			
Phosphorus, Total	mg/L	0.0460	0.0520	0.0410	0.045	0.0460	0.045	0.0440	0.066	0.0530	0.078	0.0920		0.053	≤ 0.075 AGM
Salinity	ppth	18.7	13.4	14.9	6.1	15.1	15.1	14.7	8.1	10.8	3.1	0.3			
Specific Conductivity	umho/cm	30343.1	22367	24377.5	10722	24775.8	24859	24352.1	14081.6	18411.2	5705.1	611.7			None
Temperature	deg C	27.5	24.9	20.1	23.1	24.3	25.5	28.8	29.3	31.7	29.8	29.8			
Total Hardness	mg/L														
Total Suspended Solids	mg/L	5.6	7.4	6.8	4	4.4	4.8	7.1	5.1	3.4	2.9	2.9			
Turbidity	NTU	3.4	3.8	3.1	3.1	2.8	3.6	4.6	4.1	3.0	3.1	2.9			≤ 29
Zinc	mg/L														≤ 0.086

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• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.
• AGM - Annual Geometric Mean

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019
(Page 21 of 44)

Loxahatchee River Watershed Monitoring Events (Marine)

SITE 72	SAMPLE DATE	10/9/18	11/13/18	1/14/19	2/12/19	3/12/19	4/10/19	5/21/19	6/11/19	7/15/19	8/13/19	9/9/19		Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L	131	128	132	144	141	131	142	124	141	123	95			
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	10.6	5.4	8.9	13.2	11.9	5.3	13.0	27.1	9.7	12.4	3.0		9.5	≤ 5.5 AGM
Copper	mg/L														<0.0037
Dissolved Oxygen	% Saturation	81.7	60.5	83.5	89.7	95.3	70.3	81.3	104.1	84.6	63.6	66.5			> 42
Fecal Coliform	cfu/100mL	84	556	203	789	160	74	84	122	135	122	41			≤ 43 cfu/100ml
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L	0.030	0.220	0.320	0.070	0.040	0.140	0.340	0.060	0.030	0.080	0.200			
Nitrogen, nitrate + nitrite	mg/L	0.006	0.033	0.041	0.038	0.016	0.013	0.005	0.009	0.005	0.026	0.024			
Nitrogen, Total	mg/L	0.41	0.53	0.54	0.54	0.62	0.51	0.51	0.71	0.60	0.63	0.92		0.58	≤ 1.26 AGM
Nitrogen, Total Kjeldahl	mg/L	0.4	0.5	0.5	0.5	0.6	0.5	0.5	0.7	0.6	0.6	0.9			
pH	None	7.70	7.55	7.83	7.80	7.82	7.77	7.90	7.63	7.72	7.82	7.70			6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0140	0.007	0.012	0.009	0.005	0.015	0.008	0.009	0.011	0.011	0.017			
Phosphorus, Total	mg/L	0.0420	0.0440	0.0280	0.033	0.0290	0.034	0.0380	0.042	0.0310	0.04	0.0360		0.036	≤ 0.075 AGM
Salinity	ppth	26.7	29.7	32.5	13.7	29.4	32	25.9	31.3	20.7	29.6	21.5			
Specific Conductivity	umho/cm	41714.6	45904.7	49567.3	22710.9	45369.8	48938.4	40671.2	48176.8	33304.2	45954	34478.1			None
Temperature	deg C	27.3	26.5	21.0	23.7	25.2	25.1	29.2	29.6	31.1	30.3	30.0			
Total Hardness	mg/L														
Total Suspended Solids	mg/L	9.8	5.8	12.3	11.1	5.1	5.2	4.9	17.1	4.5	4.8	5.1			
Turbidity	NTU	3.1	2.9	4.0	2.8	3.0	3	2.8	3.2	2.7	2.4	3.6			≤ 29
Zinc	mg/L														≤ 0.086

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• AGM - Annual Geometric Mean • Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

ICWW-N Watershed Monitoring Events

SITE 30 (Lox)	SAMPLE DATE	10/16/18	11/7/18	1/15/19	4/9/19	7/15/19								Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L	126		128	128	130									
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	4.2	2.8	2.9	3.9	5.6								3.8	≤ 4.7 AGM
Copper	mg/L														<0.0037
Dissolved Oxygen	% Saturation	76.2		91.7	85.2	81.4									> 42
Fecal Coliform	cfu/100mL	20		10	10	10									≤ 130 cfu/100ml
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L														
Nitrogen, nitrate + nitrite	mg/L	0.026		0.014	0.009	0.005									
Nitrogen, Total	mg/L	0.33		0.21	0.31	0.30								0.28	≤ 0.66 AGM
Nitrogen, Total Kjeldahl	mg/L	0.3		0.2	0.3	0.3									
pH	None	7.56		7.87	7.70	7.48									6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0160		0.006	0.005	0.006									
Phosphorus, Total	mg/L	0.0360		0.0190	0.021	0.0260								0.025	≤ 0.035 AGM
Salinity	ppth	28.4		34.9	31.3	31									
Specific Conductivity	umho/cm	50358.1		52836.3	48135.1	47902.7									None
Temperature	deg C	28.4		21.2	26.3	31.7									
Total Hardness	mg/L														
Total Suspended Solids	mg/L	10.0		13.7	5.5	6.1									
Turbidity	NTU	4.8		3.8	3.3	2.2									≤ 29
Zinc	mg/L														≤ 0.086

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Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Lake Worth Lagoon North Watershed Monitoring Events (Marine)

SITE LWL-1	SAMPLE DATE	10/24/18	11/8/18	3/7/19	4/4/19	5/30/19	6/26/19	7/25/19						Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	9.6	4.6	14.5	3.53	2.4	1.78	3.2						4.4	≤ 2.9 AGM
Copper	mg/L														≤ 0.0037
Dissolved Oxygen	% Saturation	100.3	85.7	119.0	107.1	106.0	100.6	89.5							> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L			0.005	0.003	0.005	0.005	0.011							
Nitrogen, nitrate + nitrite	mg/L	0.003	0.019	0.003	0.0025	0.003	0.005	0.003							
Nitrogen, Total	mg/L	0.39	0.32	0.33	0.26	0.39	0.28	0.36						0.33	≤ 0.54 AGM
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.80	7.70	7.70	8.00	8.10	8.10	8.00							6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0110	0.019	0.010	0.001	0.011	0.004	0.010							
Phosphorus, Total	mg/L	0.0450	0.0390	0.0420	0.023	0.0370	0.021	0.0330						0.033	≤ 0.044 AGM
Salinity	ppth	31.4	32.5	29.7	29.8	32.6	31	33.6							
Specific Conductivity	umho/cm	48319	49731	45797	45958	49951	47842	51427							None
Temperature	deg C	28.7	27.4	24.4	24.9	30.2	32.0	30.9							
Total Hardness	mg/L														
Total Suspended Solids	mg/L	7.0	8.0	7.0	8	4.0	10	5.0							
Turbidity	NTU	1.9	0.8	1.6	1.2	0.8	0.8	0.9							≤ 29
Zinc	mg/L														≤ 0.086

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Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Lake Worth Lagoon North Watershed Monitoring Events (Marine)

SITE 11	SAMPLE DATE	10/24/18	11/8/18	3/7/19	4/4/19	5/30/19	6/26/19	7/25/19						Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L				0.0036	0.0071	0.0036	0.0036							≤ 0.05
Cadmium	mg/L				0.0002	0.0002	0.0002	0.0002							≤ 0.0088
Chlorophyll-a (corrected)	ug/L	1.1	1.1	1.1	8.2	3.5	1.1	1.1						1.729	≤ 2.9 AGM
Copper	mg/L				0.0054	0.0013	0.0038	0.0013							≤ 0.0037
Dissolved Oxygen	% Saturation	90.0	85.0	97.8	89.6	97.8	100.4	91.5							> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L				0.0046	0.0046	0.0023	0.0023							≤ 0.0085
Nitrogen, Ammonia	mg/L	0.018	0.018	0.018	0.018	0.018	0.018	0.018							
Nitrogen, nitrate + nitrite	mg/L	0.013	0.041	0.013	0.0125	0.013	0.0125	0.013							
Nitrogen, Total	mg/L	0.38	0.35	0.22	0.36	0.25	0.31	0.18						0.29	≤ 0.54 AGM
Nitrogen, Total Kjeldahl	mg/L	0.37	0.31	0.21	0.35	0.24	0.3	0.17							
pH	None	7.73	7.73	7.67	7.85	7.87	8.14	8.23							6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0320	0.038	0.028	0.026	0.032	0.024	0.040							
Phosphorus, Total	mg/L	0.0690	0.0540	0.0480	0.045		0.047	0.0520						0.052	≤ 0.044 AGM
Salinity	ppth						31.26	33.91							
Specific Conductivity	umho/cm	49664	50368	47050	46471	52243	48245	51799							None
Temperature	deg C	27.8	27.5	23.5	24.8	29.2	31.6	30.1							
Total Hardness	mg/L				4680										
Total Suspended Solids	mg/L														
Turbidity	NTU	4.6	4.7	1.5	2.2	1.0	1	1.6							≤ 29
Zinc	mg/L				0.0110	0.0055	0.0055	0.0055							≤ 0.086

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Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Lake Worth Lagoon North Watershed Monitoring Events (Marine)

SITE 13	SAMPLE DATE	10/24/18	11/8/18	3/7/19	4/4/19	5/30/19	6/26/19	7/25/19						Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L				0.0036	0.0071	0.0036	0.0036							≤ 0.05
Cadmium	mg/L				0.0002	0.0002	0.0002	0.0002							≤ 0.0088
Chlorophyll-a (corrected)	ug/L	4.5	1.1	5.7	4.4	3.4	4.1	1.1						2.9	≤ 2.9 AGM
Copper	mg/L				0.0058	0.0013	0.0044	0.0013							≤ 0.0037
Dissolved Oxygen	% Saturation	86.4	90.8	105.3	99.4	93.5	103.5	88.5							> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L				0.0183	0.0046	0.0050	0.0023							≤ 0.0085
Nitrogen, Ammonia	mg/L	0.018	0.018	0.018	0.018	0.018	0.085	0.018							
Nitrogen, nitrate + nitrite	mg/L	0.026	0.013	0.013	0.0125	0.013	0.0125	0.013							
Nitrogen, Total	mg/L	0.41	0.29	0.30	0.28	0.36	0.36	0.20						0.31	≤ 0.54 AGM
Nitrogen, Total Kjeldahl	mg/L	0.38	0.28	0.29	0.27	0.35	0.35	0.19							
pH	None	7.80	7.79	8.13	8.12	8.04	8.07	8.28							6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0280	0.030	0.022	0.028	0.031	0.029	0.040							
Phosphorus, Total	mg/L	0.0400	0.0490	0.0480	0.046		0.046	0.0490						0.046	≤ 0.044 AGM
Salinity	ppth						31.29	33.65							
Specific Conductivity	umho/cm	43904	47470	41831	40245	49511	48294	51420							None
Temperature	deg C	28.4	27.7	24.3	25.3	29.4	31.7	29.8							
Total Hardness	mg/L				5840										
Total Suspended Solids	mg/L														
Turbidity	NTU	5.0	5.6	2.2	1.7	1.4	1.2	7.1							≤ 29
Zinc	mg/L				0.0110	0.0055	0.0055	0.0055							≤ 0.086

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Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Lake Worth Lagoon North Watershed Monitoring Events (Marine)

SITE LWL-4	SAMPLE DATE	10/24/18	11/8/18	3/7/19	4/4/19	5/30/19	6/26/19	7/25/19						Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	3.4	2.0	1.5	2.13	1.1	2.02	1.3						1.8	≤ 2.9 AGM
Copper	mg/L														≤ 0.0037
Dissolved Oxygen	% Saturation	110.2	105.4	102.0	105.3	105.8	104.0	72.5						99.9	> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L	0.005	0.008	0.006	0.003	0.005	0.003	0.025						0.006	
Nitrogen, nitrate + nitrite	mg/L	0.005	0.005	0.005	0.0025	0.005	0.0025	0.005						0.004	
Nitrogen, Total	mg/L	0.24	0.23	0.22	0.21	0.22	0.31	0.29						0.24	≤ 0.54 AGM
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.90	7.90	8.30	8.10	8.10	8.20	7.90						8.06	6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0020	0.004	0.002	0.002	0.002	0.001	0.005						0.002	
Phosphorus, Total	mg/L	0.0210	0.0200	0.0160	0.017	0.0140	0.02	0.0210						0.018	≤ 0.044 AGM
Salinity	ppth	33.6	34.4	32	33	36	33.1	34.5						33.78	
Specific Conductivity	umho/cm	51318	52392	48841	50297	54612	50717	52504						51497	None
Temperature	deg C	27.6	27.9	21.6	24.5	29.2	30.6	29.1						27.0	
Total Hardness	mg/L														
Total Suspended Solids	mg/L	4.0	8.0	9.0	8	7.0	6	7.0						6.8	
Turbidity	NTU	1.6	1.8	1.0	2.3	1.0	1.6	1.3						1.5	≤ 29
Zinc	mg/L														≤ 0.086

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Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Lake Worth Lagoon Central Watershed Monitoring Events (Marine)

SITE LWL-8	SAMPLE DATE	10/23/18	11/7/18	1/30/19	4/3/19	5/29/19	6/26/19	7/24/19	8/28/19					AGM or %>TPTV	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	9.3	5.4	5.2	7	3.8	3.28	5.2	10.9					13%	≤ 10.2 TPTV
Copper	mg/L														≤ 0.0037
Dissolved Oxygen	% Saturation	99.5	94.1	97.8	97.8	101.6	87.8	75.6	100.3						> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L	0.008	0.020	0.022	0.009	0.013	0.008	0.025	0.024						
Nitrogen, nitrate + nitrite	mg/L	0.007	0.022	0.058	0.005	0.005	0.005	0.005	0.031						
Nitrogen, Total	mg/L	0.44	0.40	0.42	0.41	0.38	0.32	0.53	0.47					0.42	≤ 0.66 AGM
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.80	7.80	7.90	8.20	8.00	8.20	8.10	7.90						6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0180	0.016	0.012	0.008	0.008	0.01	0.008	0.016						
Phosphorus, Total	mg/L	0.0450	0.0560	0.0360	0.039	0.0360	0.035	0.0550	0.053					0.044	≤ 0.049 AGM
Salinity	ppth	29.5	33.3	31.8	25.7	29.9	26.8	27.7	24.2						
Specific Conductivity	umho/cm	45695	50836	48952	40274	46320	42028	43229	38338						None
Temperature	deg C	27.5	27.9	18.2	24.7	29.2	31.8	30.3	31.7						
Total Hardness	mg/L														
Total Suspended Solids	mg/L	9.0	17.0	8.0	10	8.0	10	12.0	19						
Turbidity	NTU	3.9	9.3	5.3	5.5	2.0	3	7.6	5.9						≤ 29
Zinc	mg/L														≤ 0.086

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• TPTV - Ten Percent Threshold Value
• AGM - Annual Geometric Mean • Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Lake Worth Lagoon Central Watershed Monitoring Events (Marine)

SITE 18C	SAMPLE DATE	10/23/18	11/7/18	1/30/19	4/3/19	5/29/19	6/26/19	7/24/19	8/28/19					AGM or %>TPTV	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L				0.0036	0.0071	0.0076	0.0036	0.0036						≤ 0.05
Cadmium	mg/L				0.0002	0.0002	0.0002	0.0002	0.0002						≤ 0.0088
Chlorophyll-a (corrected)	ug/L	5.6	1.1	1.1	8	8.3	1.1	1.1	11.7					13%	≤ 10.2 TPTV
Copper	mg/L				0.0013	0.0013	0.0013	0.0013	0.0123						≤ 0.0037
Dissolved Oxygen	% Saturation	90.8	85.0	99.9	96.8	80.0	93.1	73.5	77.1						> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L				0.0023	0.0095	0.0023	0.0046	0.0023						≤ 0.0085
Nitrogen, Ammonia	mg/L	0.018	0.018	0.018	0.018	0.018	0.018	0.036	0.051						
Nitrogen, nitrate + nitrite	mg/L	0.013	0.041	0.072	0.0125	0.013	0.0125	0.013	0.033						
Nitrogen, Total	mg/L	0.48	0.44	0.65	0.70	0.51	0.57	0.56	0.08					0.432	≤ 0.66 AGM
Nitrogen, Total Kjeldahl	mg/L	0.47	0.4	0.58	0.69	0.5	0.56	0.55	0.043						
pH	None	7.60	7.73	7.67	8.26	7.77	8.14	7.90	7.63						6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0510	0.053	0.042	0.027	0.035	0.028	0.040	0.044						
Phosphorus, Total	mg/L	0.0590	0.0840	0.0740	0.068		0.082	0.1200	0.14					0.086	≤ 0.049 AGM
Salinity	ppth						24.72	28.05	21.36						
Specific Conductivity	umho/cm	45716	49344	46074	37936	48350	39186	43756	38977						None
Temperature	deg C	27.7	27.9	19.2	25.1	28.3	31.6	30.8	32.8						
Total Hardness	mg/L				4590			4800							
Total Suspended Solids	mg/L														
Turbidity	NTU	15.4	18.7	0.2	7.2	10.2	6.5	19.5	21.6						≤ 29
Zinc	mg/L				0.0055	0.0055	0.0055	0.0055	0.0055						≤ 0.086

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• TPTV - Ten Percent Threshold Value

• AGM - Annual Geometric Mean

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Lake Worth Lagoon Central Watershed Monitoring Events (Marine)

SITE 18D	SAMPLE DATE	10/23/18	11/7/18	1/30/19	4/3/19	5/29/19	6/26/19	7/24/19	8/28/19					AGM or %>TPTV	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L				0.0036	0.0178	0.0078	0.0036	0.0036						≤ 0.05
Cadmium	mg/L				0.0002	0.0002	0.0002	0.0002	0.0002						≤ 0.0088
Chlorophyll-a (corrected)	ug/L	1.1	1.1	1.1	6.5	7.7	5.9	1.1	15.9					13%	≤ 10.2 TPTV
Copper	mg/L				0.0013	0.0013	0.0013	0.0013	0.0088						≤ 0.0037
Dissolved Oxygen	% Saturation	99.4	86.7	98.3	96.0	84.3	95.7	84.0	92.8						> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L				0.0023	0.0097	0.0047	0.0046	0.0023						≤ 0.0085
Nitrogen, Ammonia	mg/L	0.018	0.044	0.018	0.018	0.018	0.018	0.018	0.018						
Nitrogen, nitrate + nitrite	mg/L	0.013	0.035	0.070	0.0125	0.013	0.0125	0.013	0.0125						
Nitrogen, Total	mg/L	0.46	0.49	0.62	0.39	0.47	0.40	0.30	0.32					0.422	≤ 0.66 AGM
Nitrogen, Total Kjeldahl	mg/L	0.45	0.45	0.55	0.38	0.46	0.39	0.29	0.31						
pH	None	7.73	7.72	7.77	8.19	7.88	8.06	8.20	7.83						6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0440	0.046	0.037	0.041	0.030	0.024	0.034	0.027						
Phosphorus, Total	mg/L	0.0600	0.0770	0.0650	0.041		0.061	0.0710	0.073					0.063	≤ 0.049 AGM
Salinity	ppth						24.24	30.15	24.88						
Specific Conductivity	umho/cm	46264	49150	45848	37074	48644	38456	46667	44320						None
Temperature	deg C	27.8	27.5	18.6	25.6	28.2	31.8	30.7	31.6						
Total Hardness	mg/L				4340			5440							
Total Suspended Solids	mg/L														
Turbidity	NTU	12.5	18.6	3.9	9.1	6.2	5.2	7.6	7.5						≤ 29
Zinc	mg/L				0.0055	0.0055	0.0055	0.0055	0.0055						≤ 0.086

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• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Lake Worth Lagoon Central Watershed Monitoring Events (Marine)

SITE LWL-11	SAMPLE DATE	10/23/18	11/7/18	1/30/19	4/3/19	5/29/19	6/26/19	7/24/19	8/28/19					AGM or %>TPTV	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	10.0	9.4	5.9	9.18	4.7	5.21	4.8	14.2					13%	≤ 10.2 TPTV
Copper	mg/L														≤ 0.0037
Dissolved Oxygen	% Saturation	97.1	93.7	98.8	96.5	94.3	80.8	89.6	115.0						> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L					0.005	0.003	0.005	0.006						
Nitrogen, nitrate + nitrite	mg/L	0.003	0.029	0.064	0.0025	0.003	0.0025	0.005	0.005						
Nitrogen, Total	mg/L	0.39	0.49	0.45	0.46	0.38	0.46	0.34	0.46					0.43	≤ 0.66 AGM
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.80	7.80	7.70	8.10	7.90	8.10	8.00	8.00						6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0120	0.016	0.014	0.009	0.004	0.005	0.002	0.008						
Phosphorus, Total	mg/L	0.0420	0.0560	0.0390	0.042	0.0380	0.036	0.0370	0.048					0.042	≤ 0.049 AGM
Salinity	ppth	31	32.1	29.7	26.7	33.2	26.4	31.8	23.7						
Specific Conductivity	umho/cm	47690	49202	45782	41706	50718	41466	48877	37590						None
Temperature	deg C	27.5	27.6	18.5	25.1	29.1	31.4	30.3	31.6						
Total Hardness	mg/L														
Total Suspended Solids	mg/L	11.0	13.0	12.0	13	14.0	7	8.0	8						
Turbidity	NTU	5.0	7.5	6.3	5.9	6.9	3.7	4.1	0.1						≤ 29
Zinc	mg/L														≤ 0.086

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• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.

• AGM - Annual Geometric Mean

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

ICWW-S Watershed Monitoring Events (Marine)

SITE LWL-13	SAMPLE DATE	11/6/18	1/29/19	3/5/19	4/2/19	5/28/19	6/25/19	8/27/19						AGM	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	8.0	3.2	14.3	2.72	2.5	2.85	6.1						4.6	≤ 5.7 AGM
Copper	mg/L														≤ 0.0037
Dissolved Oxygen	% Saturation	83.9	96.9	134.7	101.2	97.9	88.0	95.0							> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L	0.030	0.054	0.007	0.003	0.005	0.005	0.003							
Nitrogen, nitrate + nitrite	mg/L	0.020	0.055	0.005	0.0025	0.005	0.005	0.003							
Nitrogen, Total	mg/L	0.40	0.38	0.43	0.24	0.26	0.32	0.43						0.34	≤ 0.59 AGM
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.80	7.80	8.70	8.20	8.00	8.10	8.10							6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0110	0.012	0.002	0.004	0.002	0.002	0.009							
Phosphorus, Total	mg/L	0.0420	0.0320	0.0300	0.021	0.0250	0.03	0.0440						0.031	≤ 0.050 AGM
Salinity	ppth	32.5	29.6	18.3	31.5	32.8	28.8	26.2							
Specific Conductivity	umho/cm	49744	45561	29583	48304	50246	44726	41141							None
Temperature	deg C	26.7	17.8	26.7	25.7	28.7	30.7	30.6							
Total Hardness	mg/L														
Total Suspended Solids	mg/L	14.0	10.0	6.0	7	11.0	19	8.0							
Turbidity	NTU	3.8	4.0	2.6	2.4	1.5	2.4	3.3							≤ 29
Zinc	mg/L														≤ 0.086

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• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

ICWW-S Watershed Monitoring Events (Marine)

SITE LWL-18	SAMPLE DATE	11/6/18	1/29/19	3/5/19	4/2/19	5/28/19	6/25/19	8/27/19						Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	5.2	2.2	23.8	10.1	9.8	6.58	9.2						7.7	≤ 5.7 AGM
Copper	mg/L														≤ 0.0037
Dissolved Oxygen	% Saturation	83.1	93.9	120.4	89.1	82.9	74.4	117.6							> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L	0.027	0.034	0.013	0.015	0.018	0.010	0.006							
Nitrogen, nitrate + nitrite	mg/L	0.042	0.032	0.016	0.021	0.003	0.0025	0.016							
Nitrogen, Total	mg/L	0.35	0.33	0.48	0.40	0.42	0.62	0.15						0.36	≤ 0.59 AGM
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.80	7.90	8.50	7.90	7.70	8.00	8.20							6.5 to 8.5
Phosphorus, orthophosphate	mg/L	0.0130	0.009	0.011	0.014	0.014	0.02	0.031							
Phosphorus, Total	mg/L	0.0400	0.0220	0.0530	0.047	0.0510	0.069	0.0850						0.049	≤ 0.050 AGM
Salinity	ppth	33.5	31.2	24.2	29.2	28.7	33	24.4							
Specific Conductivity	umho/cm	51180	48046	38217	45052	44644	50562	38669							None
Temperature	deg C	28.3	20.7	26.7	26.0	29.3	29.5	31.0							
Total Hardness	mg/L														
Total Suspended Solids	mg/L	15.0	4.0	9.0	9	11.0	9	13.0							
Turbidity	NTU	4.2	2.0	3.3	5.5	4.1	3.1	4.0							≤ 29
Zinc	mg/L														≤ 0.086

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• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.

• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Hillsboro Watershed Monitoring Events

SITE 1	SAMPLE DATE	11/7/18	3/6/19	5/23/19	9/11/19									Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	7.0	7.7	8.0	7.65									7.6	≤ 11 AGM
Copper	mg/L														≤ 0.0037
Dissolved Oxygen	% Saturation	41.0	78.8	72.0	64.8										> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L		0.087	0.036	0.086										
Nitrogen, nitrate + nitrite	mg/L		0.057	0.022	0.082										
Nitrogen, Total	mg/L	0.45	0.64	0.51	0.89									0.6	Narrative
Nitrogen, Total Kjeldahl	mg/L		0.583	0.483	0.808										
pH	None														6.5 to 8.5
Phosphorus, orthophosphate	mg/L		0.059	0.061	0.054										
Phosphorus, Total	mg/L	0.1670	0.1270	0.1280	0.104									0.130	Narrative
Salinity	ppth	25.7	17	16.8	8.93										
Specific Conductivity	umho/cm	40400	24400	27500	15300										None
Temperature	deg C		24.1	28.4	29.7										
Total Hardness	mg/L														
Total Suspended Solids	mg/L														
Turbidity	NTU		3.9	2.2	1.8										≤ 29
Zinc	mg/L														≤ 0.086

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• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Hillsboro Watershed Monitoring Events

SITE 2	SAMPLE DATE	11/6/18	3/11/19	5/28/19	9/9/19									Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														≤ 0.0088
Chlorophyll-a (corrected)	ug/L	8.2	6.8	8.4	15									9.1	≤ 11 AGM
Copper	mg/L														≤ 0.0037
Dissolved Oxygen	% Saturation	48.0	63.5	79.9	82.5									66.9	> 42
Fecal Coliform	cfu/100mL														
Lead	mg/L														≤ 0.0085
Nitrogen, Ammonia	mg/L		0.043	0.004	0.077									0.024	
Nitrogen, nitrate + nitrite	mg/L		0.072	0.004	0.129									0.033	
Nitrogen, Total	mg/L	1.24	1.12	0.97	1.18									1.1	Narrative
Nitrogen, Total Kjeldahl	mg/L		1.05	0.97	1.05									1.02	
pH	None														6.5 to 8.5
Phosphorus, orthophosphate	mg/L		0.110	0.105	0.047									0.082	
Phosphorus, Total	mg/L	0.0730	0.1420	0.1240	0.081									0.101	Narrative
Salinity	ppth	0.3	0.29	0.31	0.29									0.30	
Specific Conductivity	umho/cm	626	591	642	598									614	None
Temperature	deg C		23.7	27.8	30.3									27.1	
Total Hardness	mg/L														
Total Suspended Solids	mg/L														
Turbidity	NTU		2.0	1.4	1.8									1.7	≤ 29
Zinc	mg/L														≤ 0.086

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• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Hillsboro Watershed Monitoring Events

SITE 3	SAMPLE DATE	11/6/18	3/11/19	5/28/19	9/9/19									Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L	4.9	22.9	19.1	9.77									12.0	≤ 20 AGM
Copper	mg/L														See Table 5-3, page 2
Dissolved Oxygen	% Saturation	17.6	47.9	70.8	27.2										> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L														See Table 5-3, page 2
Nitrogen, Ammonia	mg/L		0.125	0.012	0.282										
Nitrogen, nitrate + nitrite	mg/L		0.087	0.004	0.154										
Nitrogen, Total	mg/L	1.55	1.73	1.21	1.35									1.4	Narrative
Nitrogen, Total Kjeldahl	mg/L		1.64	1.21	1.2										
pH	None														6.0 to 8.5
Phosphorus, orthophosphate	mg/L		0.098	0.128	0.03										
Phosphorus, Total	mg/L	0.0550	0.1620	0.1710	0.068									0.101	Narrative
Salinity	ppth	0.36	0.32	0.34	0.29										
Specific Conductivity	umho/cm	752	666	697	605										≤ 1275
Temperature	deg C		24.2	28.6	29.4										
Total Hardness	mg/L														
Total Suspended Solids	mg/L														
Turbidity	NTU		4.2	3.0	1.4										≤ 29
Zinc	mg/L														See Table 5-3, page 2

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• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.

• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

Hillsboro Watershed Monitoring Events

SITE S39	SAMPLE DATE	10/9/18	11/6/18	1/29/19	2/12/19	3/12/19	4/9/19	5/7/19	6/4/19	7/30/19	8/13/19	9/10/19		Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L		1	153	182					159					
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L														≤ 20 AGM
Copper	mg/L														See Table 5-3, page 2
Dissolved Oxygen	% Saturation	68.1	71.0	93.7	70.5	68.4	76.9	77.8	79.9	69.4	59.8	73.1			> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L														See Table 5-3, page 2
Nitrogen, Ammonia	mg/L		0.005	0.021	0.053					0.020					
Nitrogen, nitrate + nitrite	mg/L	0.055	0.003	0.016	0.437	0.005	0.011	0.028	0.005	0.005	0.018	0.011			
Nitrogen, Total	mg/L														Narrative
Nitrogen, Total Kjeldahl	mg/L														
pH	None	7.70	7.70	8.00	7.80	7.80	7.80	7.70	7.80	7.90	7.60	7.70			6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0020	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002			
Phosphorus, Total	mg/L	0.0160	0.0200	0.0090	0.016	0.0140	0.012	0.0160	0.017	0.0140	0.015	0.0120		0.014	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	781	842	833	821	708	452	418	514	834	899	565			≤ 1275
Temperature	deg C	27.8	26.4	17.5	24.6	25.5	26.3	28.3	30.9	30.5	30.9	30.1			
Total Hardness	mg/L		1	218.4	234.2					204.5					
Total Suspended Solids	mg/L		1.5	3.0	3					3.0					
Turbidity	NTU	1.1	1.0	0.4	0.7	0.7	0.6			0.7		0.8			≤ 29
Zinc	mg/L														See Table 5-3, page 2

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• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019
(Page 37 of 44)

L-8 Watershed Monitoring Events

Culv10	SAMPLE DATE	10/22/18	11/19/18	1/28/19	2/25/19	3/25/19	4/22/19	5/20/19	6/17/19	7/29/19	8/26/19	9/9/19		Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L	84	104	153	118	127	118	185	311	183	57	306			
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L				10.3										≤ 20 AGM
Copper	mg/L														See Table 5-3, page 2
Dissolved Oxygen	% Saturation	94.0	87.4	86.2	74.9	83.6	76.6	51.9	53.5	45.2	6.0	17.0			> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L														See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.022	0.046	0.231	0.090	0.172	0.190	0.475	0.257	0.167	0.157	0.760			
Nitrogen, nitrate + nitrite	mg/L	0.780	0.263	1.476	0.336	0.443	0.615	0.796	0.256	0.085	0.028	0.085			
Nitrogen, Total	mg/L	1.60	1.61	3.86	1.78	1.71	1.95	2.81	3.71	1.59	2.06	3.05		2.2	Narrative
Nitrogen, Total Kjeldahl	mg/L														
pH	None	8.50	7.90	7.70	8.40	7.80	7.80	7.60	7.60	7.60	7.10	7.60			6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0550	0.047	0.056	0.06	0.066	0.069	0.071	0.044	0.033	0.027	0.105			
Phosphorus, Total	mg/L	0.1760	0.1800	0.2520	0.19	0.1480	0.17	0.1590	0.176	0.0970	0.087	0.1590		0.157	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	345	369	604	475	483	496	1074	2672	740	190	2194			≤ 1275
Temperature	deg C	27.0	22.9	15.8	24.1	21.3	22.9	26.8	28.0	30.9	30.1	29.8			
Total Hardness	mg/L		115.2		128.3		160			300.3					
Total Suspended Solids	mg/L	36.0	44.0	95.0	61	26.0	30	27.0	46	8.0	9	4.0			
Turbidity	NTU	28.6	67.2	85.8	73.3	35.7	51.9	31.7	25.6	10.4	4.4	5.9			≤ 29
Zinc	mg/L														See Table 5-3, page 2

• Metal exceedences are based on hardness

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• AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

S-2-6-7 Watershed Monitoring Events

SITE S2	SAMPLE DATE	10/22/18	11/19/18	1/14/19	2/25/19	3/11/19	4/8/19	5/6/19	6/3/19	7/29/19	8/26/19	9/5/19		Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L	94	107	123	107	123	109	124	110	275	351				
Arsenic	mg/L														≤ 0.05
Cadmium	mg/L														See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L														≤ 20 AGM
Copper	mg/L														See Table 5-3, page 2
Dissolved Oxygen	% Saturation	70.6	78.8	90.8	77.9	73.5	84.3	77.4	72.4	76.3	46.1				> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L														See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.134	0.137	0.066	0.064	0.066	0.053	0.029	0.048	0.151	0.436				
Nitrogen, nitrate + nitrite	mg/L	0.020	0.147	0.063	0.351	0.258	0.188	0.222	0.215	1.369	0.448				
Nitrogen, Total	mg/L	2.09		1.28	1.36	1.42	1.31	1.19	1.32	3.92	3.25	2.45		1.8	Narrative
Nitrogen, Total Kjeldahl	mg/L														
pH	None	8.50	7.80	8.00	8.40	7.70	7.90	7.90	8.10	7.50	7.50				6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0020	0.005	0.018	0.065	0.050	0.037	0.048	0.053	0.021	0.067				
Phosphorus, Total	mg/L	0.0760	0.1030	0.0810	0.136	0.1050	0.091	0.0890	0.119	0.1080	0.112	0.1100		0.101	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	373	403	436	420	412	433	479	434	1100	1462				≤ 1275
Temperature	deg C	27.9	23.4	19.4	24.3	23.7	26.0	27.7	30.4	30.0	30.2				
Total Hardness	mg/L		131.2		128.5		144.1			276.6					
Total Suspended Solids	mg/L	14.0	14.0	11.0	18	12.0	12	9.0	18	8.0	6				
Turbidity	NTU	18.9	12.5	9.9	23.4	15.5	13.8	10.9	22.9	5.8	2.6				≤ 29
Zinc	mg/L														See Table 5-3, page 2

• Metal exceedences are based on hardness

Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.

Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

S-2-6-7 Watershed Monitoring Events

SITE 39	SAMPLE DATE	11/20/18	1/23/19	3/13/19	5/21/19	7/17/19	9/11/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L	1.1	4.6	7.6	8.9	1.1	11.3							4.0	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013								See Table 5-3, page 2
Dissolved Oxygen	% Saturation	61.0	65.6	73.1	37.6	62.4	63.3								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.097	0.230	0.053	0.240	0.140	0.018								
Nitrogen, nitrate + nitrite	mg/L	0.170	0.530	0.280	1.4	0.490	0.038								
Nitrogen, Total	mg/L	1.37	2.13	1.98	3.60	2.49	1.24							2.0	Narrative
Nitrogen, Total Kjeldahl	mg/L	1.2	1.6	1.7	2.2	2	1.2								
pH	None	8.03	8.00		7.72	8.04	8.09								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0220		0.063	0.12	0.022	0.03								
Phosphorus, Total	mg/L	0.0700	0.1100	0.1700	0.15	0.0650	0.11							0.106	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	762.9	766	417	993	984	435								≤ 1275
Temperature	deg C	23.3	18.0	23.9	28.4	30.9	30.7								
Total Hardness	mg/L	147	271	164	374	381									
Total Suspended Solids	mg/L	6.3	2.5	43.6	8.4	2.5									
Turbidity	NTU	16.6	6.3	33.1	3.5	2.5	13.9								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0202	0.0055	0.0055	0.0055								See Table 5-3, page 2

• Metal exceedences are based on hardness

Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.

AGM - Annual Geometric Mean

• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

S-2-6-7 Watershed Monitoring Events

SITE 43	SAMPLE DATE	11/20/18	1/23/19	3/13/19	5/21/19	7/17/19	9/11/19							Geometric Mean	Numeric Surface Water Quality Standard Criteria
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036								≤ 0.05
Cadmium	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002								See Table 5-3, page 2
Chlorophyll-a (corrected)	ug/L	1.4	9.6	9.2	61.2	3.4	11.5							8.2	≤ 20 AGM
Copper	mg/L	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013								See Table 5-3, page 2
Dissolved Oxygen	% Saturation	65.3	70.5	79.5	160.0	63.8	64.7								> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023								See Table 5-3, page 2
Nitrogen, Ammonia	mg/L	0.110	0.150	0.018	0.040	0.098	0.018								
Nitrogen, nitrate + nitrite	mg/L	0.140	0.420	0.260	1.4	0.250	0.0125								
Nitrogen, Total	mg/L	1.44	2.02	1.46	4.10	2.65	1.11							1.9	Narrative
Nitrogen, Total Kjeldahl	mg/L	1.3	1.6	1.2	2.7	2.4	1.1								
pH	None	7.82	8.25		8.14	7.83	8.09								6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.0170		0.057	0.029	0.006	0.038								
Phosphorus, Total	mg/L	0.0830	0.0730	0.1400	0.17	0.0710	0.1							0.100	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	394.7	714	434	1038	920	455								≤ 1275
Temperature	deg C	23.3	18.6	24.7	29.2	30.5	30.4								
Total Hardness	mg/L	147	301	160	404	401									
Total Suspended Solids	mg/L	2.5	2.5	17.0	2.5	2.5									
Turbidity	NTU	22.3	6.0	21.0	5.9	2.6	9.2								≤ 29
Zinc	mg/L	0.0055	0.0055	0.0055	0.0055	0.0055	0.0055								See Table 5-3, page 2

• Metal exceedences are based on hardness
Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.
Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.
• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019
(Page 41 of 44)

WPBWS Watershed Monitoring Events

M Canal	SAMPLE DATE	10/16/18	11/27/18	1/22/19	2/12/19	3/25/19	4/23/19	5/28/19	6/18/19	7/16/19	8/21/19	9/24/19		Geometric Mean	
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.01
Cadmium	mg/L														See Table 5-3, page 6
Chlorophyll-a (corrected)	ug/L	1.1	1.9	1.9	7.3	9.8	3.6	15.1	7.2	4.3	6.8	7.6		4.7	≤ 20 AGM
Copper	mg/L														See Table 5-3, page 6
Dissolved Oxygen	% Saturation	61.9	78.6	96.6	101.5	88.7	87.0	123.4	118.5	92.4	101.8	78.0			> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L														See Table 5-3, page 6
Nitrogen, Ammonia	mg/L														
Nitrogen, nitrate + nitrite	mg/L	0.38	0.37	0.39	0.084	0.140	0.29	0.23	0.0125	0.01	0.01	0.46			
Nitrogen, Total	mg/L	1.8	1.6	1.6	1.1	0.92	1.4	2	1.10	1.4	0.87	1.9		1.4	Narrative
Nitrogen, Total Kjeldahl	mg/L	1.4	1.3	1.2	1	0.78	1.1	1.7	1.1	1.4	0.87	1.4			
pH	None	7.6	7.9	8	7.9	7.9	7.7	8.3	8.50	7.9	7.7	7.7			6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.063	0.06	0.05	0.015	0.034	0.058	0.034	0.075	0.042	0.016	0.015			
Phosphorus, Total	mg/L	0.1	0.15	0.14	0.058	0.082	0.11		0.14	0.12		0.09		0.106	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	611	404	429	442	583	571	862	482	389	622	555			≤ 1275
Temperature	deg C	29.5	24.2	19	23.5	22.6	25.1	30.5	30.3	30.9	31.8	27.6			
Total Hardness	mg/L														
Total Suspended Solids	mg/L														
Turbidity	NTU	11.5	42.4	34	5.7	12	16	16	7	9.1	5.1	21			≤ 29
Zinc	mg/L														See Table 5-3, page 6

• Metal exceedences are based on hardness

• Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.

• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.

• AGM - Annual Geometric Mean

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

WPBWS Watershed Monitoring Events

Control 4	SAMPLE DATE	10/16/18	11/27/18	1/22/19	2/12/19	3/25/19	4/23/19	5/28/19	6/18/19	7/16/19	8/21/19	9/24/19		Geometric Mean	
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.01
Cadmium	mg/L														See Table 5-3, page 6
Chlorophyll-a (corrected)	ug/L	1.1	1.3	1.5	1.1	11.3	5.7	5.2	5.6	1.50	1.10	12		2.8	≤ 20 AGM
Copper	mg/L														See Table 5-3, page 6
Dissolved Oxygen	% Saturation	61.0	72.8	94.7	71.7	106.1	86.4	94.8	67.3	77.3	70.1	54.9			> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L														See Table 5-3, page 6
Nitrogen, Ammonia	mg/L														
Nitrogen, nitrate + nitrite	mg/L	0.43	0.34	0.31	0.058	0.046	0.3	0.025	0.0125	0.01	0.01	0.061			
Nitrogen, Total	mg/L	1.5	1.3	1.2	0.79	0.81	1.1	1	0.99	1.3	1	1.7		1.1	Narrative
Nitrogen, Total Kjeldahl	mg/L	1.1	0.98	0.87	0.73	0.76	0.85	1	0.98	1.3	1	1.7			
pH	None	7.6	7.8	8	7.3	8.4	7.7	7.5	7.40	7.6	7.4	7.4			6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.066	0.048	0.045	0.014	0.01	0.048	0.0066	0.0063	0.0057	0.00	0.0044			
Phosphorus, Total	mg/L	0.1	0.097	0.092	0.053	0.0460	0.1		0.048	0.056		0.07		0.070	Narrative
Salinity	ppth														
Specific Conductivity	umho/cm	591	432	406	380	443	473	545	341	322	313	319			≤ 1275
Temperature	deg C	28.7	23.5	19.3	24	23	24.9	29.2	27.3	31	30	26			
Total Hardness	mg/L														
Total Suspended Solids	mg/L														
Turbidity	NTU	4.53	15.6	15	2	4.4	14	5.7	2.8	5.4	5.5	6.3			≤ 29
Zinc	mg/L														See Table 5-3, page 6

• Metal exceedences are based on hardness
• Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.
• Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.
• AGM - Annual Geometric Mean
• Narrative - Shall not cause an imbalance in flora and fauna

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

WPBWS Watershed Monitoring Events

Lake Mangonia	SAMPLE DATE	10/16/18	2/12/19	4/23/19	6/18/19	8/21/19								Geometric Mean	
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.01
Cadmium	mg/L														$\leq [e^{(0.7409\ [lnH]\ -4.719)}]\ 10^{-3}$
Chlorophyll-a (corrected)	ug/L	1.55	3.70	13.90	7.80	1.10								3.7	≤ 20 AGM
Copper	mg/L														$\leq [e^{(0.8545\ [lnH]\ -1.702)}]\ 10^{-3}$
Dissolved Oxygen	% Saturation	93.8	64.0	88.1	89.5	79.9									> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L														$\leq [e^{(1.273\ (lnH]\ -4.705}]\ 10^{-3}$
Nitrogen, Ammonia	mg/L														
Nitrogen, nitrate + nitrite	mg/L	0.01	0.01	0.07	0.01	0.01									
Nitrogen, Total	mg/L	0.66	0.71	1.10	0.75	0.84								0.80	1.05 to 1.91 AGM
Nitrogen, Total Kjeldahl	mg/L	0.66	0.70	1.00	0.75	0.83									
pH	None	8.3	8.3	8.6	8.0	7.9									6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.013	0.006	0.002	0.039	0.002									
Phosphorus, Total	mg/L	0.017	0.027	0.026	0.031									0.025	0.03 to 0.09 AGM
Salinity	ppth														
Specific Conductivity	umho/cm	307.00	399.10	512.00	444.00	380.00									≤ 1275
Temperature	deg C	28.90	24.40	25.30	28.10	30.00									
Total Hardness	mg/L														
Total Suspended Solids	mg/L														
Turbidity	NTU	1.86	1.50	4.60	2.70	2.30									
Zinc	mg/L														$\leq [e^{(0.8473\ [lnH]\ +\ 0.884)}]\ 10^{-3}$

- Metal exceedences are based on hardness
- Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.
- Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.
- AGM - Annual Geometric Mean
- For Freshwater Lakes the Total Nitrogen and Total Phosphorus Minimum Values applies if Chlorophyll-a is >20 ug/l, Maximum Values applies if Chlorophyll-a is ≤20 ug/l.

Table 5-4
Monitoring Data
Reporting Period October 2018 - September 2019

WPBWS Watershed Monitoring Events

Clear Lake	SAMPLE DATE	10/16/18	2/12/19	4/23/19	6/18/19	8/21/19								Geometric Mean	
PARAMETER	UNITS														
Alkalinity	mg/L														
Arsenic	mg/L														≤ 0.01
Cadmium	mg/L														$\leq [e^{(0.7409 [\ln H] - 4.719)}] 10^{-3}$
Chlorophyll-a (corrected)	ug/L	1.10	1.10	27.40	7.20	1.10								3.0	≤ 20 AGM
Copper	mg/L														$\leq [e^{(0.8545 [\ln H] - 1.702)}] 10^{-3}$
Dissolved Oxygen	% Saturation	96.6	64.9	108.4	91.8	85.9									> 38
Fecal Coliform	cfu/100mL														
Lead	mg/L														$\leq [e^{(1.273 [\ln H] - 4.705}] 10^{-3}$
Nitrogen, Ammonia	mg/L														
Nitrogen, nitrate + nitrite	mg/L	0.01	0.01	0.01	0.01	0.01									
Nitrogen, Total	mg/L	0.60	0.67	1.10	0.69	0.77								0.75	1.05 to 1.91 AGM
Nitrogen, Total Kjeldahl	mg/L	0.60	0.66	1.10	0.69	0.76									
pH	None	8.5	8.3	9.0	8.1	8.8									6.0 to 8.5
Phosphorus, orthophosphate	mg/L	0.010	0.009	0.002	0.012	0.002									
Phosphorus, Total	mg/L	0.016	0.022	0.026	0.022									0.021	0.03 to 0.09 AGM
Salinity	ppth														
Specific Conductivity	umho/cm	355.00	375.90	465.00	424.00	389.00									≤ 1275
Temperature	deg C	29.50	24.20	26.50	28.90	29.90									
Total Hardness	mg/L														
Total Suspended Solids	mg/L														
Turbidity	NTU	1.24	1.00	4.90	2.60	2.50									
Zinc	mg/L														$\leq [e^{(0.8473 [\ln H] + 0.884)}] 10^{-3}$

- Metal exceedences are based on hardness
- Highlighted in "blue" are substituted values that were below the limits of detection. The value shown is the method detection limit provided with the data.
- Highlighted in "yellow" are sample values that exceed either the State Water Quality Standards for a specific parameter or Florida'a Impaired Waters Rule criteria for chlorophyll-a.
- AGM - Annual Geometric Mean
- For Freshwater Lakes the Total Nitrogen and Total Phosphorus Minimum Values applies if Chlorophyll-a is >20 ug/l, Maximum Values applies if Chlorophyll-a is ≤20 ug/l.

TABLE 5-5
Summary of Exceedances per Site by Parameter
October 1, 2017 - September 30, 2018

Watershed	Site	Dissolved Oxygen	Turbidity	Fecal Coliform	PH	Chlorophyll-a* (Annual Geometric Mean)	Total Phosphorus (Annual Geometric Mean)	Total Nitrogen (Annual Geometric Mean)
C-15	31E							
	31C							
	31B							
C-16	22							
	24							
	27B	1/3			1/3			
	27A				1/4			
	28					20.7		
C-17	12A							
	C17S44							
C-18	16	2/4			1/3			
	15				1/3			
	92							
	81							
C-51	38B		3/5		01/04			
	37B	2/4			01/03			
	C51S155							
Loxahatchee River	69	2/12						
	30							
	51	1/4		4/5		6.0	0.034	
	62			11/12				
	72			12/12				
Lake Worth Lagoon North	LWL-1				1/4	3.0		
	11							
	13					4.3		
	LWL-4	2/8				5.8		
Lake Worth Lagoon Central	LWL-8	3/4				22%	0.066	0.74
	18C	1/3				24%	0.070	
	18D	1/3				25%	0.064	0.70
	LWL-11					30%		
Lake Worth Lagoon South Watershed	LWL-13	3/8				8.8		
	LWL-18							
Hillsboro	1							
	2	1/3						
	3	1/3						
	S-39	1/12						
L-8	CULV10	1/7	3/7					
S-2-6-7	S2	1/11						
	39							
	43	2.5	1.4					

*** Chlorophyll-a criteria for Lake Worth Lagoon Central and South Watershed is based on ten percent of the measurements exceeding the standard.**

Table 5-6 Monitoring Data Summary

C-15 Watershed

SITE 31E		Date Range: 03/24/99 - 09/12/19 Samples: 98						
		Count	Exceedances	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	26	-	165	164	210	123	22
Arsenic	mg/L	81	0	0.0026	0.0025	0.0098	0.0005	0.0015
Cadmium	mg/L	95	0	0.0005	0.0003	0.0050	0.0001	0.0016
Chlorophyll-a (corrected)	ug/L	86	0	19.9	22.8	120.0	1.1	23.1
Copper	mg/L	94	0	0.0045	0.0046	0.0200	0.0010	0.0035
Dissolved Oxygen	% Saturation	24	25	56.8	64.9	127.8	7.7	26.6
Fecal Coliform	cfu/100mL	33	5	67	50	5000	1	875
Lead	mg/L	84	0	0.0021	0.0023	0.0050	0.0005	0.0014
Nitrogen, Ammonia	mg/L	91	-	0.052	0.050	0.820	0.003	0.122
Nitrogen, nitrate + nitrite	mg/L	85	-	0.044	0.040	0.785	0.001	0.175
Nitrogen, Total	mg/L	84	-	1.53	1.51	3.87	0.39	0.63
Nitrogen, Total Kjeldahl	mg/L	89	-	1.45	1.43	3.84	0.37	0.63
pH	None	94	4	7.6	7.6	8.9	6.3	0.4
osphorus, orthophosphate	mg/L	90	-	0.129	0.138	1.330	0.003	0.216
Phosphorus, Total	mg/L	87	-	0.247	0.240	1.490	0.020	0.256
Salinity	ppth	0	-	None	None	None	None	None
Specific Conductivity	umho/cm	96	0	551	557	833	227	109
Temperature	deg C	96	-	25.5	26.3	32.0	16.7	3.9
Total Hardness	mg/L	93	-	198	198	390	99	37
Total Suspended Solids	mg/L	93	-	6.2	7.0	18.0	1.0	3.5
Turbidity	NTU	94	0	4.2	4.6	15.9	0.2	2.7
Zinc	mg/L	95	0	0.0057	0.0050	0.0140	0.0018	0.0029

SITE 31C		Date Range: 01/28/99 - 09/12/19 Samples: 99						
		Count	Exceedances	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	23	-	151	152	188	123	16
Arsenic	mg/L	79	1	0.0029	0.0025	2.2350	0.0005	0.2511
Cadmium	mg/L	96	0	0.0005	0.0003	0.0050	0.0001	0.0017
Chlorophyll-a (corrected)	ug/L	84	0	15.6	17.8	93.0	0.1	17.5
Copper	mg/L	96	0	0.0039	0.0043	0.0295	0.0003	0.0041
Dissolved Oxygen	% Saturation	24	15	77.4	73.3	137.5	33.1	27.9
Fecal Coliform	cfu/100mL	33	3	69	70	5000	3	886
Lead	mg/L	84	0	0.0021	0.0023	0.0070	0.0005	0.0014
Nitrogen, Ammonia	mg/L	93	-	0.044	0.040	0.456	0.001	0.078
Nitrogen, nitrate + nitrite	mg/L	85	-	0.066	0.064	1.300	0.006	0.181
Nitrogen, Total	mg/L	86	-	1.22	1.15	3.09	0.62	0.55
Nitrogen, Total Kjeldahl	mg/L	96	-	1.09	1.06	3.07	0.11	0.52
pH	None	96	1	7.5	7.5	8.5	6.3	0.4
osphorus, orthophosphate	mg/L	92	-	0.045	0.050	0.440	0.003	0.075
Phosphorus, Total	mg/L	89	-	0.125	0.120	0.560	0.020	0.091
Salinity	ppth	0	-	None	None	None	None	None
Specific Conductivity	umho/cm	98	1	534	508	11188	391	1081
Temperature	deg C	96	-	26.1	26.2	32.0	19.2	3.3
Total Hardness	mg/L	95	-	181	186	260	16	25
Total Suspended Solids	mg/L	88	-	4.1	4.0	15.7	1.0	3.2
Turbidity	NTU	94	0	2.6	2.8	13.3	0.1	2.0
Zinc	mg/L	96	0	0.0058	0.0050	0.1030	0.0016	0.0106

Table 5-6 Monitoring Data Summary

C-15 Watershed

SITE 31B		Date Range: 06/15/00 - 09/12/19 Samples: 133						
		Count	Exceedences	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	91	-	149	152	207	32	19
Arsenic	mg/L	44	0	0.0024	0.0025	0.0070	0.0005	0.0013
Cadmium	mg/L	56	0	0.0005	0.0003	0.0050	0.0001	0.0017
Chlorophyll-a (corrected)	ug/L	50	0	12.9	14.7	52.0	1.1	13.2
Copper	mg/L	56	0	0.0042	0.0039	0.0200	0.0013	0.0036
Dissolved Oxygen	% Saturation	21	17	99.8	101.0	141.5	59.8	23.0
Fecal Coliform	cfu/100mL	25	1	85	110	420	1	100
Lead	mg/L	56	0	0.0021	0.0025	0.0260	0.0003	0.0035
Nitrogen, Ammonia	mg/L	122	-	0.019	0.017	0.305	0.003	0.054
Nitrogen, nitrate + nitrite	mg/L	127	-	0.019	0.013	0.470	0.001	0.100
Nitrogen, Total	mg/L	127	-	0.99	0.98	4.23	0.06	0.40
Nitrogen, Total Kjeldahl	mg/L	131	-	0.93	0.93	4.18	0.04	0.37
pH	None	130	4	7.8	7.8	9.1	6.7	0.4
osphorus, orthophosphate	mg/L	127	-	0.052	0.070	0.344	0.001	0.069
Phosphorus, Total	mg/L	115	-	0.104	0.107	0.702	0.003	0.091
Salinity	ppth	0	-	None	None	None	None	None
Specific Conductivity	umho/cm	133	0	493	494	787	392	51
Temperature	deg C	133	-	25.1	26.3	32.5	15.0	4.0
Total Hardness	mg/L	63	-	177	177	230	138	18
Total Suspended Solids	mg/L	129	-	2.9	2.8	43.7	1.0	4.4
Turbidity	NTU	133	0	2.4	2.7	17.8	0.1	2.2
Zinc	mg/L	56	0	0.0061	0.0053	0.0492	0.0027	0.0062

Table 5-6 Monitoring Data Summary

C-16 Watershed

SITE 22		Date Range: 01/29/04 - 09/10/19 Samples: 80					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	25	142	141	185	110	16
Arsenic	mg/L	77	0.0026	0.0025	0.0300	0.0005	0.0033
Cadmium	mg/L	77	0.0003	0.0003	0.0026	0.0002	0.0005
Chlorophyll-a (corrected)	ug/L	77	12.1	16.0	62.7	0.8	13.4
Copper	mg/L	77	0.0029	0.0027	0.0180	0.0010	0.0037
Dissolved Oxygen	% Saturation	22	69.8	103.4	149.5	9.4	45.0
Fecal Coliform	cfu/100mL	16	42	39	600	2	210
Lead	mg/L	65	0.0017	0.0021	0.0050	0.0005	0.0009
Nitrogen, Ammonia	mg/L	73	0.026	0.030	1.010	0.002	0.118
Nitrogen, nitrate + nitrite	mg/L	72	0.049	0.030	1.990	0.003	0.269
Nitrogen, Total	mg/L	72	1.02	1.00	3.07	0.53	0.38
Nitrogen, Total Kjeldahl	mg/L	78	0.88	0.89	2.19	0.27	0.28
pH	None	73	8.0	8.1	8.9	6.5	0.4
Phosphorus, orthophosphate	mg/L	73	0.012	0.018	0.086	0.001	0.020
Phosphorus, Total	mg/L	78	0.054	0.059	0.840	0.003	0.099
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	76	494	494	1008	7	138
Temperature	deg C	78	25.7	26.0	36.3	17.1	4.3
Total Hardness	mg/L	77	179	179	239	139	22
Total Suspended Solids	mg/L	77	4.0	4.4	33.8	1.0	4.1
Turbidity	NTU	77	2.5	2.7	6.6	0.1	1.4
Zinc	mg/L	77	0.0052	0.0050	0.0600	0.0013	0.0087

SITE 24		Date Range: 01/25/99 - 09/10/19 Samples: 95					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	19	113	150	177	3	38
Arsenic	mg/L	72	0.0027	0.0025	0.0071	0.0005	0.0012
CFdmium	mg/L	87	0.0005	0.0003	0.0050	0.0002	0.0016
Chlorophyll-a (corrected)	ug/L	83	11.8	13.9	49.0	1.1	11.2
Copper	mg/L	87	0.0031	0.0033	0.0113	0.0007	0.0030
Dissolved Oxygen	% Saturation	22	110.2	107.4	145.6	74.5	21.5
FeCFl Coliform	cfu/100mL	30	67	95	2300	1	491
Lead	mg/L	80	0.0022	0.0024	0.0050	0.0007	0.0013
Nitrogen, Ammonia	mg/L	86	0.026	0.030	0.105	0.007	0.023
Nitrogen, nitrate + nitrite	mg/L	85	0.037	0.029	0.940	0.001	0.149
Nitrogen, Total	mg/L	85	0.84	0.96	2.67	0.06	0.47
Nitrogen, Total Kjeldahl	mg/L	86	0.75	0.87	2.61	0.04	0.44
pH	None	89	8.0	8.0	8.8	7.1	0.4
Phosphorus, orthophosphate	mg/L	88	0.010	0.012	0.230	0.001	0.031
Phosphorus, Total	mg/L	90	0.050	0.056	3.053	0.001	0.319
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	93	515	480	4220	348	403
Temperature	deg C	92	25.1	26.1	33.1	2.8	4.8
Total Hardness	mg/L	85	175	177	233	111	25
Total Suspended Solids	mg/L	89	4.3	5.0	16.5	1.0	3.2
Turbidity	NTU	92	3.1	3.2	11.4	0.6	1.9
Zinc	mg/L	87	0.0057	0.0050	0.0360	0.0013	0.0054

Table 5-6 Monitoring Data Summary

C-16 Watershed

SITE 27B		Date Range: 01/28/99 - 09/12/19 Samples: 86					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	22	178	178	222	121	28
Arsenic	mg/L	67	0.0027	0.0025	0.0120	0.0005	0.0017
Cadmium	mg/L	84	0.0005	0.0003	0.0050	0.0001	0.0018
Chlorophyll-a (corrected)	ug/L	72	13.5	16.4	76.4	0.5	15.9
Copper	mg/L	84	0.0042	0.0043	0.0975	0.0007	0.0108
Dissolved Oxygen	% Saturation	19	50.6	62.4	139.7	12.1	33.7
Fecal Coliform	cfu/100mL	29	139	100	6000	7	1526
Lead	mg/L	78	0.0022	0.0024	0.0067	0.0005	0.0014
Nitrogen, Ammonia	mg/L	80	0.049	0.049	0.740	0.007	0.094
Nitrogen, nitrate + nitrite	mg/L	77	0.070	0.050	0.785	0.006	0.162
Nitrogen, Total	mg/L	76	1.48	1.50	3.42	0.75	0.48
Nitrogen, Total Kjeldahl	mg/L	82	1.33	1.33	3.37	0.68	0.49
pH	None	83	7.6	7.6	8.7	6.7	0.4
Phosphorus, orthophosphate	mg/L	79	0.069	0.070	0.680	0.001	0.156
Phosphorus, Total	mg/L	82	0.164	0.158	0.770	0.030	0.175
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	85	559	563	10481	8	1085
Temperature	deg C	85	25.3	26.6	32.4	16.5	4.0
Total Hardness	mg/L	84	197	202	308	113	37
Total Suspended Solids	mg/L	82	5.4	5.9	20.0	1.0	3.9
Turbidity	NTU	84	3.8	4.0	14.9	0.3	2.7
Zinc	mg/L	83	0.0061	0.0053	0.0350	0.0016	0.0054

SITE 27A		Date Range: 01/28/99 - 09/12/19 Samples: 98					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	25	152	150	191	128	15
Arsenic	mg/L	79	0.0026	0.0025	0.0078	0.0005	0.0014
Cadmium	mg/L	96	0.0005	0.0003	0.0050	0.0001	0.0017
Chlorophyll-a (correEDed)	ug/L	82	12.8	14.0	66.0	1.1	14.8
Copper	mg/L	96	0.0042	0.0044	0.0200	0.0013	0.0032
Dissolved Oxygen	% Saturation	0	None	None	None	None	None
Fecal Coliform	cfu/100mL	32	52	54	1200	4	255
Lead	mg/L	90	0.0022	0.0024	0.0150	0.0005	0.0020
Nitrogen, Ammonia	mg/L	93	0.035	None	2.060	0.002	0.214
Nitrogen, nitrate + nitrite	mg/L	89	0.046	0.050	0.750	0.006	0.130
Nitrogen, Total	mg/L	89	1.08	None	4.32	0.02	0.59
Nitrogen, Total Kjeldahl	mg/L	94	1.05	1.14	3.96	0.04	0.53
pH	None	94	7.8	7.9	9.0	6.5	0.4
Phosphorus, orthophosphate	mg/L	86	0.033	0.039	0.440	0.001	0.091
Phosphorus, Total	mg/L	92	0.106	0.112	1.580	0.001	0.199
Salinity	ppth	1	7.9200	7.9200	7.9200	7.9200	None
Specific Conductivity	umho/cm	96	518	513	939	219	114
Temperature	deg C	94	25.6	26.3	32.6	18.5	4.0
Total Hardness	mg/L	96	181	180	258	117	26
Total Suspended Solids	mg/L	87	3.8	5.0	38.0	0.5	4.7
Turbidity	NTU	95	2.8	3.1	71.5	0.1	7.7
Zinc	mg/L	94	0.0058	0.0050	0.0690	0.0013	0.0087

Table 5-6 Monitoring Data Summary

C-16 Watershed

SITE 28		Date Range: 01/28/99 - 09/12/19 Samples: 137					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	90	147	147	210	119	15
Arsenic	mg/L	43	0.0023	0.0025	0.0071	0.0003	0.0014
Cadmium	mg/L	60	0.0006	0.0003	0.0050	0.0002	0.0020
Chlorophyll-a (corrected)	ug/L	49	8.4	9.5	50.0	1.1	10.6
Copper	mg/L	60	0.0033	0.0032	0.0200	0.0007	0.0038
Dissolved Oxygen	% Saturation	21	68.4	86.0	147.0	12.1	34.9
Fecal Coliform	cfu/100mL	28	104	92	2600	10	663
Lead	mg/L	60	0.0024	0.0025	0.0261	0.0003	0.0034
Nitrogen, Ammonia	mg/L	130	0.026	0.033	2.760	0.001	0.242
Nitrogen, nitrate + nitrite	mg/L	132	0.037	0.047	13.000	0.001	1.131
Nitrogen, Total	mg/L	131	1.04	1.00	13.71	0.11	1.22
Nitrogen, Total Kjeldahl	mg/L	135	0.91	0.89	5.81	0.08	0.50
pH	None	134	7.7	7.8	8.6	6.2	0.4
Phosphorus, orthophosphate	mg/L	134	0.021	0.031	0.250	0.001	0.051
Phosphorus, Total	mg/L	123	0.076	0.068	0.877	0.020	0.095
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	137	452	475	946	5	126
Temperature	deg C	137	25.2	25.9	56.8	13.1	4.9
Total Hardness	mg/L	67	177	178	308	120	28
Total Suspended Solids	mg/L	131	3.1	3.0	24.9	1.0	3.3
Turbidity	NTU	137	2.4	2.5	13.0	0.1	2.1
Zinc	mg/L	60	0.0062	0.0054	0.1180	0.0024	0.0146

Table 5-6 Monitoring Data Summary

C-17 Watershed

SITE 12A		Date Range: 01/19/99 - 09/10/19 Samples: 102						
		Count	Exceedances	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	29	-	147	148	186	87	20
Arsenic	mg/L	83	0	0.0027	0.0025	0.0071	0.0005	0.0015
Cadmium	mg/L	100	0	0.0005	0.0003	0.0050	0.0001	0.0016
Chlorophyll-a (corrected)	ug/L	88	0	12.3	15.0	74.8	1.1	11.6
Copper	mg/L	100	0	0.0034	0.0030	0.0500	0.0010	0.0056
Dissolved Oxygen	% Saturation	24	15	71.0	83.2	108.9	27.9	21.1
Fecal Coliform	CKu/100mL	35	4	138	110	4000	23	660
Lead	mg/L	94	0	0.0020	0.0023	0.0076	0.0004	0.0015
Nitrogen, Ammonia	mg/L	97	-	0.064	0.053	2.260	0.008	0.254
Nitrogen, nitrate + nitrite	mg/L	92	-	0.076	0.080	1.590	0.006	0.182
Nitrogen, Total	mg/L	94	-	1.36	1.13	9.08	0.03	2.23
Nitrogen, Total Kjeldahl	mg/L	99	-	1.06	1.07	3.10	0.38	0.41
pH	None	97	6	7.6	7.7	9.4	6.2	0.5
Phosphorus, orthophosphate	mg/L	90	-	0.008	0.010	0.058	0.001	0.013
Phosphorus, Total	mg/L	96	-	0.053	0.065	0.340	0.003	0.040
Salinity	ppth	0	-	None	None	None	None	None
Specific Conductivity	umho/cm	100	0	452	464	831	231	72
Temperature	deg C	100	-	25.2	25.7	31.7	16.3	3.8
Total Hardness	mg/L	95	-	163	171	216	86	25
Total Suspended Solids	mg/L	89	-	4.4	5.0	15.5	1.0	3.1
Turbidity	NTU	89	0	3.4	3.6	6.3	0.3	1.3
Zinc	mg/L	100	0	0.0066	0.0055	0.0614	0.0013	0.0080

SITE C17S44		Date Range: 01/19/99 - 09/12/19 Samples: 171						
		Count	Exceedancs	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	78	-	158	163	192	112	19
Arsenic	mg/L	14	0	0.0017	0.0019	0.0049	0.0005	0.0011
Cadmium	mg/L	31	0	0.0014	0.0008	0.0050	0.0002	0.0022
Chlorophyll-a (corrected)	ug/L	23	0	9.2	9.1	40.0	1.7	9.7
Copper	mg/L	31	0	0.0042	0.0050	0.0500	0.0007	0.0089
Dissolved Oxygen	% Saturation	21	28	68.6	73.0	98.5	44.9	15.6
Fecal Coliform	cfu/100mL	31	4	96	100	730	5	215
Lead	mg/L	31	0	0.0021	0.0019	0.0250	0.0003	0.0045
Nitrogen, Ammonia	mg/L	167	-	0.033	0.038	1.500	0.003	0.126
Nitrogen, nitrate + nitrite	mg/L	168	-	0.033	0.041	0.374	0.001	0.091
Nitrogen, Total	mg/L	165	-	0.87	0.90	1.51	0.02	0.22
Nitrogen, Total Kjeldahl	mg/L	117	-	0.87	0.87	1.33	0.20	0.16
pH	None	169	0	7.7	7.7	8.3	6.6	0.3
Phosphorus, orthophosphate	mg/L	167	-	0.006	0.006	0.095	0.001	0.017
Phosphorus, Total	mg/L	160	-	0.041	0.046	0.126	0.002	0.021
Salinity	ppth	0	-	None	None	None	None	None
Specific Conductivity	umho/cm	171	0	460	466	728	313	49
Temperature	deg C	171	-	25.5	26.1	90.0	15.7	6.3
Total Hardness	mg/L	40	-	174	185	233	90	30
Total Suspended Solids	mg/L	167	-	2.7	3.0	26.0	0.1	3.4
Turbidity	NTU	170	0	2.5	2.5	18.1	0.9	1.7
Zinc	mg/L	31	0	0.0080	0.0100	0.0954	0.0032	0.0161

Table 5-6 Monitoring Data Summary
C-18 Watershed

SITE 16		Date Range: 01/19/99 - 09/10/19 Samples: 100					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	30	120	139	216	31	51
Arsenic	mg/L	81	0.0022	0.0025	0.0071	0.0005	0.0012
Cadmium	mg/L	98	0.0005	0.0003	0.0050	0.0001	0.0016
Chlorophyll-a (corrected)	ug/L	84	3.9	3.7	43.0	0.6	6.9
Copper	mg/L	96	0.0020	0.0015	0.0100	0.0003	0.0032
Dissolved Oxygen	% Saturation	24	44.9	43.7	147.1	22.8	30.4
Fecal Coliform	cfu/100mL	34	33	20	1400	2	249
Lead	mg/L	96	0.0021	0.0024	0.0125	0.0005	0.0018
Nitrogen, Ammonia	mg/L	93	0.040	0.040	0.498	0.008	0.074
Nitrogen, nitrate + nitrite	mg/L	91	0.038	0.041	1.210	0.006	0.158
Nitrogen, Total	mg/L	91	0.99	0.99	2.35	0.21	0.41
Nitrogen, Total Kjeldahl	mg/L	98	0.93	0.93	2.30	0.16	0.40
pH	None	89	7.4	7.3	9.7	6.0	0.5
Phosphorus, orthophosphate	mg/L	92	0.007	0.008	0.560	0.001	0.059
Phosphorus, Total	mg/L	93	0.032	0.032	1.500	0.001	0.157
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	92	343	385	980	105	151
Temperature	deg C	92	24.6	25.4	33.4	15.8	3.9
Total Hardness	mg/L	89	129	147	734	30	85
Total Suspended Solids	mg/L	94	2.3	2.1	29.7	1.0	3.8
Turbidity	NTU	96	1.7	1.6	10.2	0.5	1.3
Zinc	mg/L	97	0.0061	0.0050	0.0500	0.0012	0.0111

SITE 15		Date Range: 01/19/99 - 09/10/19 Samples: 97					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	26	110	99	244	41	65
Arsenic	mg/L	78	0.0022	0.0025	0.0071	0.0005	0.0013
Cadmium	mg/L	95	0.0005	0.0003	0.0050	0.0001	0.0017
Chlorophyll-a (corrected)	ug/L	82	2.2	2.3	19.0	0.1	2.4
Copper	mg/L	94	0.0026	0.0017	49.5000	0.0003	6.9458
Dissolved Oxygen	% Saturation	21	38.2	40.1	62.8	21.2	11.2
Fecal Coliform	cfu/100mL	34	48	35	1100	1	230
Lead	mg/L	95	0.0020	0.0025	0.0060	0.0005	0.0014
Nitrogen, Ammonia	mg/L	93	0.043	0.040	8.167	0.007	0.843
Nitrogen, nitrate + nitrite	mg/L	88	0.025	0.025	0.480	0.006	0.085
Nitrogen, Total	mg/L	80	0.88	0.91	4.51	0.01	0.55
Nitrogen, Total Kjeldahl	mg/L	88	0.87	0.86	4.50	0.29	0.52
pH	None	86	7.3	7.3	9.4	2.8	0.7
Phosphorus, orthophosphate	mg/L	88	0.005	0.003	0.071	0.001	0.013
Phosphorus, Total	mg/L	89	0.020	0.018	1.500	0.001	0.270
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	89	311	345	632	91	128
Temperature	deg C	89	23.7	24.0	30.9	15.8	4.0
Total Hardness	mg/L	82	104	103	260	38	54
Total Suspended Solids	mg/L	91	1.8	1.8	15.0	0.5	2.0
Turbidity	NTU	93	0.8	0.7	18.3	0.1	1.9
Zinc	mg/L	95	0.0054	0.0050	0.0300	0.0012	0.0042

Table 5-6 Monitoring Data Summary
C-18 Watershed

SITE 92		Date Range: 01/19/99 - 08/13/19 Samples: 163					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	107	141	139	268	61	52
Arsenic	mg/L	16	0.0011	0.0009	0.0024	0.0005	0.0007
Cadmium	mg/L	33	0.0013	0.0008	0.0050	0.0002	0.0022
Chlorophyll-a (corrected)	ug/L	42	3.7	3.6	15.3	1.0	3.0
Copper	mg/L	33	0.0033	0.0027	0.0100	0.0003	0.0042
Dissolved Oxygen	% Saturation	15	46.3	56.2	78.9	5.7	20.6
Fecal Coliform	cfu/100mL	41	15	12	730	1	143
Lead	mg/L	32	0.0020	0.0013	0.0236	0.0003	0.0042
Nitrogen, Ammonia	mg/L	159	0.031	0.035	1.500	0.003	0.121
Nitrogen, nitrate + nitrite	mg/L	158	0.023	0.032	0.520	0.001	0.062
Nitrogen, Total	mg/L	161	0.82	0.89	1.65	0.00	0.21
Nitrogen, Total Kjeldahl	mg/L	142	0.86	0.87	1.40	0.22	0.16
pH	None	161	7.4	7.5	8.2	6.2	0.3
Phosphorus, orthophosphate	mg/L	162	0.004	0.003	0.500	0.001	0.041
Phosphorus, Total	mg/L	150	0.024	0.023	23.000	0.002	1.876
Salinity	ppth	19	0.2457	0.2000	0.4000	0.2000	0.0812
Specific Conductivity	umho/cm	163	416	413	909	148	168
Temperature	deg C	161	26.4	26.6	3001.0	15.8	234.5
Total Hardness	mg/L	40	158	172	298	60	61
Total Suspended Solids	mg/L	155	1.3	1.5	153.0	0.0	12.2
Turbidity	NTU	162	1.6	1.6	6.9	0.4	1.1
Zinc	mg/L	33	0.0075	0.0100	0.1580	0.0027	0.0270

SITE 81		Date Range: 01/19/99 - 09/09/19 Samples: 162					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	105	133	138	247	59	46
Arsenic	mg/L	16	0.0012	0.0011	0.0024	0.0005	0.0007
Cadmium	mg/L	33	0.0013	0.0008	0.0050	0.0002	0.0022
Chlorophyll-a (correEDed)	ug/L	40	4.8	4.8	15.8	1.0	4.4
Copper	mg/L	33	0.0033	0.0033	0.0100	0.0003	0.0042
Dissolved Oxygen	% Saturation	15	71.4	71.1	109.1	25.0	18.7
Fecal Coliform	cfu/100mL	41	56	50	1600	3	366
Lead	mg/L	33	0.0020	0.0013	0.0236	0.0003	0.0042
Nitrogen, Ammonia	mg/L	156	0.026	None	0.140	0.003	0.029
Nitrogen, nitrate + nitrite	mg/L	159	0.017	0.021	0.244	0.002	0.039
Nitrogen, Total	mg/L	160	0.77	None	1.32	0.00	0.19
Nitrogen, Total Kjeldahl	mg/L	141	0.81	0.82	1.30	0.26	0.15
pH	None	148	7.6	7.7	8.3	6.5	0.4
Phosphorus, orthophosphate	mg/L	159	0.003	0.002	0.082	0.001	0.012
Phosphorus, Total	mg/L	148	0.021	0.021	0.210	0.002	0.022
Salinity	ppth	13	0.1980	0.2000	1.0000	0.1000	0.2363
Specific Conductivity	umho/cm	158	402	408	1588	151	220
Temperature	deg C	159	25.3	26.2	33.2	15.8	4.0
Total Hardness	mg/L	42	156	173	311	60	60
Total Suspended Solids	mg/L	142	1.6	1.5	6.0	0.3	1.0
Turbidity	NTU	162	1.4	1.4	8.7	0.3	0.9
Zinc	mg/L	33	0.0070	0.0080	0.0429	0.0018	0.0075

• Sites C18G92 and C18S46 were substitued by Sites 81 and 92 for the September 2015- October 2016 permit cycle

Table 5-6 Monitoring Data Summary

C-51 Watershed

SITE 38B		Date Range: 01/21/99 - 09/11/19 Samples: 102					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	28	138	135	291	62	55
Arsenic	mg/L	82	0.0025	0.0025	0.0160	0.0005	0.0024
Cadmium	mg/L	99	0.0005	0.0003	0.0050	0.0001	0.0016
Chlorophyll-a (corrected)	ug/L	89	6.1	6.8	70.7	1.0	11.0
Copper	mg/L	97	0.0026	0.0018	0.0100	0.0005	0.0030
Dissolved Oxygen	% Saturation	19	68.2	75.0	137.8	31.6	26.1
Fecal Coliform	cfu/100mL	34	66	80	1090	2	211
Lead	mg/L	99	0.0021	0.0024	0.0152	0.0003	0.0019
Nitrogen, Ammonia	mg/L	98	0.065	0.065	0.830	0.008	0.167
Nitrogen, nitrate + nitrite	mg/L	92	0.175	0.225	1.400	0.006	0.246
Nitrogen, Total	mg/L	88	1.51	1.54	4.05	0.06	0.77
Nitrogen, Total Kjeldahl	mg/L	100	1.29	1.30	4.00	0.04	0.77
pH	None	93	7.6	7.6	14.0	6.6	0.8
Phosphorus, orthophosphate	mg/L	94	0.037	0.049	0.540	0.002	0.066
Phosphorus, Total	mg/L	90	0.097	0.112	0.891	0.003	0.135
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	92	690	713	1837	2	415
Temperature	deg C	95	24.8	25.3	33.4	16.7	4.2
Total Hardness	mg/L	94	209	203	412	59	86
Total Suspended Solids	mg/L	96	9.9	10.6	60.0	1.0	11.6
Turbidity	NTU	98	10.6	11.4	69.9	0.6	14.1
Zinc	mg/L	97	0.0063	0.0050	0.0894	0.0013	0.0112

SITE 37B		Date Range: 01/21/99 - 09/11/19 Samples: 99					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	30	159	167	238	103	36
Arsenic	mg/L	80	0.0023	0.0025	0.0071	0.0002	0.0012
Cadmium	mg/L	96	0.0005	0.0003	0.0050	0.0001	0.0016
Chlorophyll-a (corrected)	ug/L	86	4.1	4.3	22.3	0.4	4.4
Copper	mg/L	96	0.0025	0.0022	0.0100	0.0005	0.0029
Dissolved Oxygen	% Saturation	18	69.2	77.4	97.1	31.0	20.6
Fecal Coliform	cfu/100mL	32	48	44	300	10	88
Lead	mg/L	96	0.0021	0.0024	0.0155	0.0005	0.0019
Nitrogen, Ammonia	mg/L	98	0.060	0.063	0.332	0.008	0.063
Nitrogen, nitrate + nitrite	mg/L	87	0.155	0.190	1.320	0.010	0.215
Nitrogen, Total	mg/L	88	1.05	1.18	6.89	0.06	0.86
Nitrogen, Total Kjeldahl	mg/L	97	0.91	0.93	6.70	0.04	0.79
pH	None	90	7.5	7.5	9.6	2.8	0.6
Phosphorus, orthophosphate	mg/L	93	0.025	0.036	0.193	0.001	0.036
Phosphorus, Total	mg/L	86	0.062	0.079	1.540	0.001	0.183
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	92	666	684	1198	163	176
Temperature	deg C	92	25.3	26.1	32.2	16.8	3.9
Total Hardness	mg/L	92	213	218	305	124	42
Total Suspended Solids	mg/L	95	4.9	5.3	43.3	1.0	7.8
Turbidity	NTU	96	5.2	5.6	87.0	0.1	13.4
Zinc	mg/L	95	0.0061	0.0050	0.1100	0.0013	0.0128

Table 5-6 Monitoring Data Summary

C-51 Watershed

SITE C51S155		Date Range: 01/21/99 - 09/12/19 Samples: 179					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	86	161	163	216	100	24
Arsenic	mg/L	14	0.0014	0.0016	0.0029	0.0005	0.0008
Cadmium	mg/L	30	0.0015	0.0008	0.0050	0.0002	0.0022
Chlorophyll-a (corrected)	ug/L	31	1.7	3.3	45.0	0.0	8.6
Copper	mg/L	29	0.0051	0.0064	0.0230	0.0017	0.0047
Dissolved Oxygen	% Saturation	21	65.5	70.4	109.4	30.2	21.7
Fecal Coliform	cfu/100mL	29	148	150	2000	2	388
Lead	mg/L	30	0.0022	0.0039	0.0152	0.0005	0.0030
Nitrogen, Ammonia	mg/L	174	0.048	0.062	0.520	0.003	0.067
Nitrogen, nitrate + nitrite	mg/L	172	0.106	0.192	20.900	0.003	1.588
Nitrogen, Total	mg/L	173	1.13	1.13	21.79	0.15	1.62
Nitrogen, Total Kjeldahl	mg/L	127	0.96	0.94	3.87	0.41	0.37
pH	None	176	7.6	7.6	8.5	6.2	0.3
Phosphorus, orthophosphate	mg/L	177	0.022	0.031	0.279	0.001	0.040
Phosphorus, Total	mg/L	166	0.065	0.067	0.200	0.003	0.033
Salinity	ppth	1	0.3300	0.3300	0.3300	0.3300	None
Specific Conductivity	umho/cm	178	586	607	1681	6	186
Temperature	ECg C	178	25.3	26.0	56.3	15.3	4.5
Total Hardness	mg/L	40	172	199	337	1	53
Total SuspenECd Solids	mg/L	175	3.7	4.0	47.0	1.0	5.9
Turbidity	NTU	179	4.7	4.2	59.4	1.1	8.3
Zinc	mg/L	30	0.0079	0.0100	0.0310	0.0032	0.0056

Table 5-6 Monitoring Data Summary

Loxahatchee River Watershed

SITE 69		Date Range: 11/20/03 - 09/09/19 Samples: 162					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	152	151	153	245	74	36
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	0	None	None	None	None	None
Chlorophyll-a (corrected)	ug/L	150	3.0	3.0	19.5	0.1	3.6
Copper	mg/L	0	None	None	None	None	None
Dissolved Oxygen	% Saturation	69	44.5	46.6	69.6	12.0	12.8
Fecal Coliform	cfu/100mL	152	30	25	13800	3	1122
Lead	mg/L	0	None	None	None	None	None
Nitrogen, Ammonia	mg/L	148	0.084	0.090	0.471	0.025	0.060
Nitrogen, nitrate + nitrite	mg/L	152	0.060	0.059	0.262	0.007	0.047
Nitrogen, Total	mg/L	152	0.99	0.95	38.00	0.52	3.01
Nitrogen, Total Kjeldahl	mg/L	135	0.88	0.90	2.52	0.50	0.29
pH	None	158	7.2	7.3	8.1	6.3	0.3
Phosphorus, orthophosphate	mg/L	152	0.011	0.012	0.104	0.001	0.014
Phosphorus, Total	mg/L	152	0.038	0.034	0.246	0.003	0.031
Salinity	ppth	124	0.2921	0.2350	11.4000	0.1000	1.6304
Specific Conductivity	umho/cm	122	587	487	19200	218	2811
Temperature	deg C	153	25.0	25.2	31.3	17.0	3.7
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	152	2.1	2.0	21.8	0.5	2.3
Turbidity	NTU	89	3.2	3.2	7.2	1.5	1.1
Zinc	mg/L	8	0.0080	0.0100	0.0100	0.0050	0.0024

SITE 51		Date Range: 05/11/00 - 07/15/19 Samples: 94					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	81	119	123	163	62	16
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	8	0.0033	0.0050	0.0440	0.0008	0.0146
Chlorophyll-a (corrected)	ug/L	79	4.0	4.0	62.0	0.5	7.4
Copper	mg/L	7	0.0088	0.0050	0.0700	0.0014	0.0296
Dissolved Oxygen	% Saturation	27	83.2	86.8	98.5	41.3	13.2
Fecal Coliform	cfu/100mL	88	15	14	420	1	63
Lead	mg/L	7	0.0034	0.0050	0.0340	0.0011	0.0119
Nitrogen, Ammonia	mg/L	57	0.031	0.030	0.140	0.002	0.028
Nitrogen, nitrate + nitrite	mg/L	89	0.008	0.006	0.068	0.002	0.016
Nitrogen, Total	mg/L	86	0.35	0.30	2.29	0.10	0.45
Nitrogen, Total Kjeldahl	mg/L	78	0.35	0.30	2.23	0.10	0.46
pH	None	90	7.8	7.9	8.4	6.7	0.3
Phosphorus, orthophosphate	mg/L	86	0.006	0.006	0.177	0.001	0.020
Phosphorus, Total	mg/L	89	0.025	0.025	0.222	0.006	0.025
Salinity	ppth	71	23.9211	31.1000	37.5000	0.6000	9.2724
Specific Conductivity	umho/cm	72	37460	47750	56271	1118	13459
Temperature	deg C	88	24.7	25.2	31.1	15.9	3.8
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	89	5.5	5.3	43.5	0.8	6.4
Turbidity	NTU	89	3.2	3.2	7.2	1.5	1.1
Zinc	mg/L	8	0.0080	0.0100	0.0100	0.0050	0.0024

Table 5-6 Monitoring Data Summary
Loxahatchee River Watershed

SITE 62		Date Range: 05/31/00 - 09/09/19 Samples: 163					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	155	133	136	226	64	28
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	8	0.0027	0.0050	0.0080	0.0008	0.0027
Chlorophyll-a (corrected)	ug/L	146	5.4	5.9	61.9	0.5	5.9
Copper	mg/L	7	0.0071	0.0100	0.0500	0.0017	0.0184
Dissolved Oxygen	% Saturation	59	66.5	69.5	93.9	37.3	12.8
Fecal Coliform	cfu/100mL	162	62	64	2300	1	222
Lead	mg/L	7	0.0030	0.0050	0.0130	0.0011	0.0042
Nitrogen, Ammonia	mg/L	153	0.053	0.050	0.650	0.010	0.077
Nitrogen, nitrate + nitrite	mg/L	163	0.033	0.047	0.182	0.003	0.040
Nitrogen, Total	mg/L	163	0.78	0.76	3.93	0.23	0.56
Nitrogen, Total Kjeldahl	mg/L	152	0.72	0.70	3.93	0.20	0.57
pH	None	163	7.6	7.6	73.8	7.0	5.2
Phosphorus, orthophosphate	mg/L	161	0.021	0.025	0.121	0.002	0.017
Phosphorus, Total	mg/L	151	0.046	0.047	0.480	0.006	0.042
Salinity	ppth	148	6.9709	10.7000	35.7000	0.2000	9.4842
Specific Conductivity	umho/cm	133	12785	18800	53860	316	15010
Temperature	deg C	158	25.1	25.4	32.8	16.1	3.9
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	151	4.2	4.0	23.2	1.0	3.0
Turbidity	NTU	163	2.9	2.8	22.0	1.2	2.0
Zinc	mg/L	8	0.0124	0.0100	0.0480	0.0050	0.0185

SITE 72		Date Range: 05/11/00 - 09/09/19 Samples: 170					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	161	123	128	178	28	20
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	8	0.0035	0.0050	0.0720	0.0008	0.0244
Chlorophyll-a (corrected)	ug/L	164	8.4	9.3	97.9	0.5	11.5
Copper	mg/L	7	0.0076	0.0100	0.0600	0.0010	0.0246
Dissolved Oxygen	% Saturation	71	77.1	81.7	128.1	27.2	16.6
Fecal Coliform	cfu/100mL	168	83	93	1336	1	216
Lead	mg/L	7	0.0044	0.0050	0.0640	0.0011	0.0229
Nitrogen, Ammonia	mg/L	158	0.091	0.099	3.000	0.015	0.246
Nitrogen, nitrate + nitrite	mg/L	169	0.019	0.025	0.172	0.000	0.029
Nitrogen, Total	mg/L	168	0.61	0.63	2.88	0.10	0.37
Nitrogen, Total Kjeldahl	mg/L	151	0.58	0.60	2.85	0.10	0.37
pH	None	170	7.7	7.8	8.2	6.8	0.2
Phosphorus, orthophosphate	mg/L	167	0.009	0.009	0.100	0.001	0.012
Phosphorus, Total	mg/L	169	0.036	0.036	0.640	0.006	0.048
Salinity	ppth	149	18.1597	27.7000	37.9800	0.0400	10.1333
Specific Conductivity	umho/cm	134	27796	42198	63745	500	15707
Temperature	deg C	165	25.9	27.2	32.5	16.0	3.6
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	168	4.9	4.7	22.4	0.5	4.2
Turbidity	NTU	169	3.0	3.1	8.7	0.3	1.3
Zinc	mg/L	8	0.0164	0.0100	0.2780	0.0050	0.0941

Table 5-6 Monitoring Data Summary

ICWW-N River Watershed

SITE 30		Date Range: 05/10/00 - 07/15/19 Samples: 95					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	86	122	125	137	79	9
Arsenic	mg/L	6	0.0035	0.0042	0.0047	0.0021	0.0011
Cadmium	mg/L	8	0.0027	0.0050	0.0080	0.0008	0.0027
Chlorophyll-a (corrected)	ug/L	83	4.0	4.4	36.3	0.5	4.4
Copper	mg/L	7	0.0116	0.0100	0.0900	0.0017	0.0319
Dissolved Oxygen	% Saturation	31	77.8	83.5	92.9	15.6	13.8
Fecal Coliform	cfu/100mL	92	13	12	616	1	93
Lead	mg/L	7	0.0040	0.0050	0.1020	0.0011	0.0375
Nitrogen, Ammonia	mg/L	59	0.049	0.040	0.300	0.010	0.088
Nitrogen, nitrate + nitrite	mg/L	94	0.011	0.010	0.146	0.003	0.027
Nitrogen, Total	mg/L	93	0.29	0.31	2.04	0.02	0.40
Nitrogen, Total Kjeldahl	mg/L	83	0.34	0.30	2.02	0.10	0.39
pH	None	94	7.8	7.8	8.3	7.1	0.2
Phosphorus, orthophosphate	mg/L	86	0.006	0.006	0.100	0.001	0.013
Phosphorus, Total	mg/L	94	0.026	0.024	0.130	0.010	0.017
Salinity	ppth	71	30.0866	31.9000	37.9000	15.6000	5.0520
Specific Conductivity	umho/cm	82	36435	48446	56789	281	12143
Temperature	deg C	92	25.7	26.3	32.3	17.7	3.7
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	94	5.5	5.4	15.6	2.0	3.2
Turbidity	NTU	94	2.9	2.9	7.6	1.1	1.3
Zinc	mg/L	8	0.0182	0.0100	0.1210	0.0016	0.0470

Table 5-6 Monitoring Data Summary

Lake Worth Lagoon North Watershed

SITE LWL-1		Date Range: 01/26/99 - 07/25/19 Samples: 136					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	7	0.0039	0.0025	0.0089	0.0023	0.0029
Cadmium	mg/L	7	0.0009	0.0006	0.0025	0.0002	0.0011
DAlorophyll-a (corrected)	ug/L	109	5.0	5.0	19.7	0.0	3.5
Copper	mg/L	31	0.0029	0.0030	0.0048	0.0017	0.0008
Dissolved Oxygen	mg/L	14	99.1	99.8	119.0	85.7	8.4
Fecal Coliform	cfu/100mL	2	14	26	47	4	30
Lead	mg/L	7	0.0031	0.0025	0.0246	0.0013	0.0085
Nitrogen, Ammonia	mg/L	125	0.010	0.010	0.260	0.001	0.030
Nitrogen, nitrate + nitrite	mg/L	107	0.006	0.004	0.120	0.003	0.020
Nitrogen, Total	mg/L	104	0.35	0.36	0.96	0.00	0.17
Nitrogen, Total Kjeldahl	mg/L	96	0.36	0.35	0.92	0.09	0.17
pH	None	133	7.9	7.9	8.9	7.2	0.2
Phosphorus, orthophosphate	mg/L	120	0.007	0.008	0.104	0.001	0.013
Phosphorus, Total	mg/L	118	0.032	0.033	0.120	0.002	0.017
Salinity	ppth	96	30.5484	31.4000	36.1000	21.1000	3.1814
Specific Conductivity	umho/cm	135	45682	47775	67154	4184	6661
Temperature	deg C	135	25.9	26.6	32.8	14.6	4.5
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	102	4.3	4.5	33.0	1.5	5.9
Turbidity	NTU	133	1.7	2.0	6.0	0.1	0.8
Zinc	mg/L	6	0.0041	0.0042	0.0050	0.0034	0.0009

SITE 11		Date Range: 01/26/99 - 07/25/19 Samples: 159					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	1	130	130	130	130	None
Arsenic	mg/L	15	0.0170	0.0056	2.5000	0.0028	1.0328
Cadmium	mg/L	28	0.0017	0.0008	0.2500	0.0001	0.0780
Chlorophyll-a (corrected)	ug/L	140	3.2	3.0	29.9	0.1	4.5
Copper	mg/L	26	0.0121	0.0057	6.2500	0.0013	1.3948
Dissolved Oxygen	mg/L	22	94.4	95.4	111.0	73.0	8.5
Fecal Coliform	DZu/100mL	39	16	15	170	2	38
Lead	mg/L	27	0.0077	0.0046	2.5000	0.0002	0.7974
Nitrogen, Ammonia	mg/L	150	0.038	0.040	0.250	0.007	0.044
Nitrogen, nitrate + nitrite	mg/L	130	0.048	0.047	1.200	0.007	0.170
Nitrogen, Total	mg/L	130	0.42	0.48	1.87	0.04	0.33
Nitrogen, Total Kjeldahl	mg/L	150	0.36	0.38	1.86	0.04	0.30
pH	None	150	7.8	7.9	8.7	6.6	0.3
Phosphorus, orthophosphate	mg/L	145	0.013	0.025	0.650	0.001	0.058
Phosphorus, Total	mg/L	149	0.035	0.038	1.110	0.003	0.098
Salinity	ppth	125	30.5082	31.7300	35.9200	9.5400	4.1329
Specific Conductivity	umho/cm	150	43090	48472	54441	425	8800
Temperature	deg C	138	25.7	25.8	32.4	16.5	3.7
Total Hardness	mg/L	1	4680	4680	4680	4680	None
Total Suspended Solids	mg/L	15	16.7	25.0	59.0	1.0	16.3
Turbidity	NTU	154	1.7	2.0	12.4	0.1	1.5
Zinc	mg/L	23	0.0242	0.0100	5.0000	0.0034	1.7160

Table 5-6 Monitoring Data Summary
Lake Worth Lagoon North Watershed

SITE 13		Date Range: 05/11/00 - 07/25/19 Samples: 153					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	1	140	140	140	140	None
Arsenic	mg/L	17	0.0125	0.0036	2.5000	0.0026	0.9806
Cadmium	mg/L	24	0.0013	0.0006	0.2500	0.0001	0.0840
Chlorophyll-a (corrected)	ug/L	139	4.0	4.0	24.1	0.1	4.4
Copper	mg/L	22	0.0111	0.0043	12.9000	0.0013	2.9143
Dissolved Oxygen	mg/L	22	92.2	93.3	109.5	70.5	11.0
Fecal Coliform	cfu/100mL	36	53	51	3200	6	533
Lead	mg/L	23	0.0075	0.0050	2.5000	0.0002	0.8593
Nitrogen, Ammonia	mg/L	148	0.047	0.043	13.000	0.007	1.065
Nitrogen, nitrate + nitrite	mg/L	134	0.052	0.050	1.517	0.003	0.220
Nitrogen, Total	mg/L	137	0.49	0.54	2.14	0.06	0.38
Nitrogen, Total Kjeldahl	mg/L	150	0.43	0.47	1.83	0.04	0.32
pH	None	144	7.8	7.8	8.4	6.4	0.2
Phosphorus, orthophosphate	mg/L	142	0.016	0.023	0.650	0.001	0.060
Phosphorus, Total	mg/L	144	0.040	0.042	1.400	0.003	0.131
Salinity	ppth	124	25.2181	30.1550	38.3000	0.6300	7.5506
Specific Conductivity	umho/cm	142	37583	46708	59740	531	11803
Temperature	deg C	142	25.9	26.2	32.8	16.0	3.8
Total Hardness	mg/L	1	5840	5840	5840	5840	None
Total Suspended Solids	mg/L	11	24.9	32.0	56.0	4.0	17.1
Turbidity	NTU	146	2.0	2.2	13.0	0.1	1.5
Zinc	mg/L	18	0.0307	0.0100	5.0000	0.0034	1.9098

SITE LWL-4		Date Range: 04/05/04 - 07/25/19 Samples: 133					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	7	0.0041	0.0025	0.0090	0.0023	0.0033
Cadmium	mg/L	7	0.0004	0.0003	0.0017	0.0003	0.0005
Chlorophyll-a (corrected)	ug/L	110	2.6	2.1	226.0	0.1	21.4
Copper	mg/L	30	0.0019	0.0018	0.0031	0.0009	0.0006
Dissolved Oxygen	mg/L	14	102.0	104.7	132.3	72.5	13.0
Fecal Coliform	cfu/100mL	0	None	None	None	None	None
Lead	mg/L	7	0.0025	0.0025	0.0157	0.0005	0.0052
Nitrogen, Ammonia	mg/L	125	0.008	0.009	0.390	0.003	0.036
Nitrogen, nitrate + nitrite	mg/L	114	0.004	0.003	0.050	0.003	0.008
Nitrogen, Total	mg/L	113	0.28	0.27	0.74	0.00	0.14
Nitrogen, Total Kjeldahl	mg/L	94	0.29	0.27	0.73	0.13	0.15
pH	None	130	8.0	8.0	9.0	7.5	0.2
Phosphorus, orthophosphate	mg/L	115	0.004	0.003	0.183	0.001	0.018
Phosphorus, Total	mg/L	113	0.023	0.021	0.064	0.011	0.010
Salinity	ppth	97	32.5313	33.2000	36.4000	24.7000	2.7643
Specific Conductivity	umho/cm	132	48520	50355	68870	4594	6157
Temperature	deg C	132	25.4	26.1	32.2	15.2	4.3
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	102	6.7	7.0	52.0	1.5	7.7
Turbidity	NTU	131	2.5	2.6	10.3	0.9	1.6
Zinc	mg/L	6	0.0051	0.0042	0.0197	0.0034	0.0065

Table 5-6 Monitoring Data Summary

Lake Worth Lagoon Central Watershed

SITE LWL-8		Date Range: 01/26/99 - 09/09/19 Samples: 167					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	4	120	124	141	95	19
Arsenic	mg/L	6	0.0043	0.0045	0.0098	0.0023	0.0032
Cadmium	mg/L	18	0.0016	0.0035	0.0060	0.0003	0.0023
Chlorophyll-a (corrected)	ug/L	132	5.6	5.4	41.2	0.5	7.3
Copper	mg/L	38	0.0029	0.0017	0.0500	0.0012	0.0110
Dissolved Oxygen	mg/L	33	94.0	97.8	135.8	61.2	12.6
Fecal Coliform	cfu/100mL	16	30	36	700	2	169
Lead	mg/L	17	0.0041	0.0050	0.0530	0.0011	0.0121
Nitrogen, Ammonia	mg/L	154	0.026	0.026	3.046	0.001	0.258
Nitrogen, nitrate + nitrite	mg/L	146	0.026	0.038	0.430	0.003	0.059
Nitrogen, Total	mg/L	135	0.52	0.51	1.67	0.02	0.31
Nitrogen, Total Kjeldahl	mg/L	102	0.45	0.47	1.50	0.13	0.31
pH	None	164	7.8	7.9	10.6	1.9	0.6
Phosphorus, orthophosphate	mg/L	148	0.015	0.016	0.130	0.001	0.016
Phosphorus, Total	mg/L	146	0.048	0.047	0.270	0.012	0.031
Salinity	ppth	115	25.2283	28.6000	36.4000	9.3200	7.0852
Specific Conductivity	umho/cm	167	37693	43020	63187	2762	11058
Temperature	deg C	166	25.5	26.7	34.1	12.1	4.4
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	134	9.0	9.0	82.0	1.0	11.9
Turbidity	NTU	166	5.0	5.4	14.7	1.2	2.7
Zinc	mg/L	18	0.0088	0.0100	0.1200	0.0034	0.0271

SITE 18C		Date Range: 01/30/04 - 08/28/19 Samples: 138					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	1	140	140	140	140	None
Arsenic	mg/L	17	0.0123	0.0036	2.5000	0.0023	0.9806
Cadmium	mg/L	16	0.0009	0.0004	0.2500	0.0001	0.1007
Chlorophyll-a (corrected)	ug/L	128	5.4	5.8	32.0	0.1	5.7
Copper	mg/L	16	0.0086	0.0021	4.8000	0.0013	1.3541
Dissolved Oxygen	mg/L	22	92.4	93.2	156.6	62.4	18.5
Fecal Coliform	cfu/100mL	25	26	20	300	2	75
Lead	mg/L	16	0.0108	0.0026	2.5000	0.0009	1.0059
Nitrogen, Ammonia	mg/L	124	0.049	0.052	0.310	0.009	0.056
Nitrogen, nitrate + nitrite	mg/L	123	0.093	0.101	1.677	0.006	0.266
Nitrogen, Total	mg/L	119	0.77	0.87	20.80	0.03	1.91
Nitrogen, Total Kjeldahl	mg/L	126	0.64	0.68	20.70	0.04	1.85
pH	None	121	7.8	7.8	9.4	7.1	0.3
Phosphorus, orthophosphate	mg/L	128	0.024	0.036	0.156	0.001	0.024
Phosphorus, Total	mg/L	122	0.066	0.072	1.280	0.001	0.121
Salinity	ppth	92	22.3063	27.9100	3388.0000	4.7400	350.8845
Specific Conductivity	umho/cm	109	32404	43756	55098	537	14775
Temperature	deg C	119	26.6	27.9	33.9	14.1	4.5
Total Hardness	mg/L	2	4694	4695	4800	4590	148
Total Suspended Solids	mg/L	2	42.0	42.0	42.0	42.0	0.0
Turbidity	NTU	132	9.0	11.2	222.0	0.1	19.9
Zinc	mg/L	12	0.0348	0.0063	5.0000	0.0034	2.2579

Table 5-6 Monitoring Data Summary

Lake Worth Lagoon Central Watershed

SITE 18D		Date Range: 07/28/05 - 08/28/19 Samples: 124					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	16	0.0140	0.0042	2.5000	0.0023	1.0057
Cadmium	mg/L	16	0.0011	0.0004	0.2500	0.0001	0.1006
Chlorophyll-a (corrected)	ug/L	115	5.3	5.9	41.1	0.1	8.3
Copper	mg/L	16	0.0078	0.0021	3.0000	0.0013	0.8249
Dissolved Oxygen	mg/L	22	100.4	100.3	132.8	77.3	14.3
Fecal Coliform	CRu/100mL	15	18	20	400	1	101
Lead	mg/L	16	0.0104	0.0026	2.5000	0.0002	1.0059
Nitrogen, Ammonia	mg/L	118	0.044	0.045	0.400	0.007	0.060
Nitrogen, nitrate + nitrite	mg/L	104	0.063	0.064	1.477	0.006	0.245
Nitrogen, Total	mg/L	96	0.57	0.63	3.87	0.03	0.51
Nitrogen, Total Kjeldahl	mg/L	114	0.48	0.51	3.86	0.04	0.43
pH	mg/L	95	7.9	7.9	9.3	7.3	0.2
Phosphorus, orthophosphate	mg/L	114	0.015	0.025	0.500	0.000	0.053
Phosphorus, Total	mg/L	117	0.061	0.061	1.620	0.004	0.175
Salinity	mg/L	85	26.4066	30.1500	352.2000	9.3600	36.1009
SpeCRfic Conductivity	mg/L	92	38912	46109	54782	3311	11687
Temperature	mg/L	107	26.8	27.1	263.7	16.6	23.3
Total Hardness	mg/L	2	4859	4890	5440	4340	778
Total Suspended Solids	mg/L	0	None	None	None	None	None
Turbidity	mg/L	121	4.8	6.5	72.2	0.1	7.0
Zinc	mg/L	11	0.0330	0.0055	5.0000	0.0034	2.3331

SITE LWL-11		Date Range: 01/26/99 - 08/28/19 Samples: 145					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	6	0.0040	0.0025	0.0173	0.0023	0.0060
Cadmium	mg/L	6	0.0004	0.0004	0.0006	0.0003	0.0002
Chlorophyll-a (corrected)	ug/L	113	5.7	6.0	59.2	0.0	7.7
Copper	mg/L	29	0.0019	0.0017	0.0160	0.0008	0.0035
Dissolved Oxygen	mg/L	15	96.2	96.5	123.3	68.3	13.1
Fecal Coliform	cfu/100mL	3	12	20	63	1	32
Lead	mg/L	6	0.0035	0.0025	0.0198	0.0024	0.0071
Nitrogen, Ammonia	mg/L	131	0.018	0.013	0.410	0.001	0.050
Nitrogen, nitrate + nitrite	mg/L	125	0.015	0.015	0.190	0.003	0.046
Nitrogen, Total	mg/L	119	0.48	0.51	1.54	0.00	0.28
Nitrogen, Total Kjeldahl	mg/L	92	0.47	0.49	1.40	0.05	0.27
pH	None	144	7.9	8.0	10.7	1.8	0.6
Phosphorus, orthophosphate	mg/L	129	0.009	0.011	0.086	0.001	0.013
Phosphorus, Total	mg/L	125	0.045	0.046	0.180	0.002	0.023
Salinity	ppth	103	27.0905	29.6000	36.4000	11.3000	6.1160
Specific Conductivity	umho/cm	145	40313	44711	65170	3117	10008
Temperature	deg C	145	25.9	26.7	233.0	13.0	17.8
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	111	8.6	8.0	65.0	1.0	8.3
Turbidity	NTU	145	4.8	4.8	29.5	0.1	3.5

Table 5-6 Monitoring Data Summary
ICWW-S Watershed
(Page 18 of 25)

SITE LWL-13		Date Range: 04/05/04 - 08/27/19 Samples: 139					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	7	0.0041	0.0025	0.0095	0.0023	0.0033
Cadmium	mg/L	7	0.0004	0.0003	0.0006	0.0003	0.0002
Chlorophyll-a (corrected)	ug/L	116	5.0	4.3	39.5	1.6	5.9
Copper	mg/L	31	0.0017	0.0017	0.0039	0.0009	0.0007
Dissolved Oxygen	mg/L	14	98.6	99.9	134.7	78.1	13.3
Fecal Coliform	CZu/100mL	3	100	100	100	100	0
Lead	mg/L	7	0.0028	0.0025	0.0229	0.0005	0.0078
Nitrogen, Ammonia	mg/L	134	0.013	0.011	0.500	0.002	0.058
Nitrogen, nitrate + nitrite	mg/L	123	0.010	0.006	0.200	0.003	0.045
Nitrogen, Total	mg/L	115	0.38	0.39	1.42	0.00	0.27
Nitrogen, Total Kjeldahl	mg/L	95	0.39	0.35	1.40	0.16	0.26
pH	None	138	8.0	8.0	9.2	7.0	0.2
Phosphorus, orthophosphate	mg/L	129	0.006	0.007	0.067	0.001	0.012
Phosphorus, Total	mg/L	121	0.034	0.032	0.170	0.013	0.022
Salinity	ppth	102	29.0133	31.5500	37.2000	14.4000	5.6159
Specific Conductivity	umho/cm	139	43921	47430	385822	3532	30363
Temperature	deg C	139	25.5	26.7	33.3	11.7	4.3
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	106	6.1	6.0	28.0	1.0	5.4
Turbidity	NTU	129	2.9	2.8	12.0	0.7	1.8
Zinc	mg/L	6	0.0041	0.0042	0.0050	0.0034	0.0009

SITE LWL-18		Date Range: 05/11/00 - 08/27/19 Samples: 145					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	7	0.0033	0.0025	0.0087	0.0023	0.0024
Cadmium	mg/L	15	0.0020	0.0008	0.0050	0.0002	0.0022
Chlorophyll-a (corrected)	ug/L	117	8.4	5.2	58.1	1.6	8.8
Copper	mg/L	37	0.0053	0.0033	0.0500	0.0017	0.0080
Dissolved Oxygen	mg/L	19	93.0	89.0	131.9	62.4	17.7
Fecal Coliform	cfu/100mL	8	40	17	180	4	59
Lead	mg/L	14	0.0056	0.0025	0.0250	0.0008	0.0070
Nitrogen, Ammonia	mg/L	137	0.035	0.022	0.410	0.003	0.046
Nitrogen, nitrate + nitrite	mg/L	129	0.034	0.019	0.210	-0.005	0.042
Nitrogen, Total	mg/L	120	0.51	0.43	1.51	0.00	0.27
Nitrogen, Total Kjeldahl	mg/L	106	0.86	0.44	39.00	0.07	3.75
pH	None	144	7.9	7.9	9.1	6.5	0.3
Phosphorus, orthophosphate	mg/L	135	0.023	0.015	0.160	0.001	0.025
Phosphorus, Total	mg/L	129	0.052	0.044	0.230	0.001	0.034
Salinity	ppth	101	28.4997	30.3000	36.7000	9.3700	6.2290
Specific Conductivity	umho/cm	145	43256	45691	64472	3790	9816
Temperature	deg C	144	26.6	27.0	33.6	16.3	4.1
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	113	10.7	8.0	56.0	1.0	8.6
Turbidity	NTU	134	4.1	3.9	17.0	0.7	2.2
Zinc	mg/L	14	0.0204	0.0100	0.1160	0.0019	0.0297

Table 5-6 Monitoring Data Summary

Hillsboro Watershed

SITE 1		Date Range: 02/22/06 - 09/09/19 Samples: 53					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	0	None	None	None	None	None
Chlorophyll-a (corrected)	ug/L	45	5.6	6.2	27.1	1.2	4.4
Copper	mg/L	0	None	None	None	None	None
Dissolved Oxygen	mg/L	14	65.4	68.8	83.9	41.0	13.2
Fecal Coliform	cfu/100mL	0	None	None	None	None	None
Lead	mg/L	0	None	None	None	None	None
Nitrogen, Ammonia	mg/L	9	0.068	0.071	0.143	0.036	0.033
Nitrogen, nitrate + nitrite	mg/L	11	0.042	0.057	0.488	0.001	0.136
Nitrogen, Total	mg/L	39	0.79	0.80	1.75	0.25	0.39
Nitrogen, Total Kjeldahl	mg/L	11	0.82	1.02	1.65	0.28	0.46
pH	None	10	7.5	7.6	7.7	7.4	0.1
Phosphorus, orthophosphate	mg/L	3	0.058	0.059	0.061	0.054	0.004
Phosphorus, Total	mg/L	38	0.099	0.099	0.542	0.045	0.078
Salinity	ppth	52	10.8594	17.9000	33.7000	0.1810	9.5276
Specific Conductivity	umho/cm	53	19196	28600	49200	659	14248
Temperature	deg C	13	26.9	28.4	31.6	20.1	3.7
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	0	None	None	None	None	None
Turbidity	NTU	13	2.0	1.9	4.4	1.2	1.0
Zinc	mg/L	0	None	None	None	None	None

SITE 2		Date Range: 02/22/06 - 09/09/19 Samples: 53					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	0	None	None	None	None	None
Chlorophyll-a (corrected)	ug/L	51	6.8	6.8	37.2	0.8	8.4
Copper	mg/L	0	None	None	None	None	None
Dissolved Oxygen	mg/L	14	69.7	79.2	95.8	40.3	19.7
Fecal Coliform	DZu/100mL	0	None	None	None	None	None
Lead	mg/L	0	None	None	None	None	None
Nitrogen, Ammonia	mg/L	9	0.044	0.051	0.102	0.004	0.029
Nitrogen, nitrate + nitrite	mg/L	11	0.053	0.042	0.315	0.004	0.096
Nitrogen, Total	mg/L	40	1.24	1.27	1.68	0.67	0.21
Nitrogen, Total Kjeldahl	mg/L	11	1.09	1.07	1.53	0.59	0.29
pH	None	10	7.6	7.6	7.9	7.3	0.2
Phosphorus, orthophosphate	mg/L	3	0.082	0.105	0.110	0.047	0.035
Phosphorus, Total	mg/L	36	0.086	0.098	0.270	0.025	0.049
Salinity	ppth	24	0.3008	0.3100	0.3800	0.2100	0.0449
Specific Conductivity	umho/cm	53	588	630	806	66	118
Temperature	deg C	13	26.7	27.8	31.7	20.6	3.6
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	0	None	None	None	None	None
Turbidity	NTU	13	1.3	1.4	3.1	0.6	0.7
Zinc	mg/L	0	None	None	None	None	None

Table 5-6 Monitoring Data Summary

Hillsboro Watershed

SITE 3		Date Range: 02/22/06 - 09/09/19 Samples: 54					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	0	None	None	None	None	None
Chlorophyll-a (corrected)	ug/L	40	7.1	10.4	33.2	0.8	8.6
Copper	mg/L	0	None	None	None	None	None
Dissolved Oxygen	mg/L	4	61.7	66.3	83.3	39.6	18.1
Fecal Coliform	cfu/100mL	0	None	None	None	None	None
Lead	mg/L	0	None	None	None	None	None
Nitrogen, Ammonia	mg/L	4	0.087	0.083	0.210	0.042	0.075
Nitrogen, nitrate + nitrite	mg/L	4	0.039	0.027	0.156	0.022	0.066
Nitrogen, Total	mg/L	31	1.42	1.42	1.68	1.04	0.15
Nitrogen, Total Kjeldahl	mg/L	3	1.30	1.37	1.53	1.06	0.24
pH	None	4	7.6	7.6	7.8	7.5	0.1
Phosphorus, orthophosphate	mg/L	0	None	None	None	None	None
Phosphorus, Total	mg/L	27	0.098	0.103	0.257	0.039	0.055
Salinity	ppth	15	0.3125	0.3100	0.3800	0.2100	0.0515
Specific Conductivity	umho/cm	44	647	668	834	413	100
Temperature	deg C	4	26.1	27.0	31.6	20.4	4.9
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	0	None	None	None	None	None
Turbidity	NTU	4	0.8	0.9	1.2	0.5	0.3
Zinc	mg/L	0	None	None	None	None	None

SITE S39		Date Range: 01/03/00 - 09/10/19 Samples: 235					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	213	72	120	347	1	62
Arsenic	mg/L	2	2.9626	3.1535	4.2340	2.0730	1.5281
Cadmium	mg/L	2	0.1500	0.1500	0.1500	0.1500	0.0000
Chlorophyll-a (corrected)	ug/L	0	None	None	None	None	None
Copper	mg/L	0	None	None	None	None	None
Dissolved Oxygen	mg/L	23	71.7	76.9	93.7	29.2	14.8
Fecal Coliform	cfu/100mL	0	None	None	None	None	None
Lead	mg/L	2	0.4000	0.4000	0.4000	0.4000	0.0000
Nitrogen, Ammonia	mg/L	217	0.015	0.017	0.167	0.003	0.021
Nitrogen, nitrate + nitrite	mg/L	234	0.010	0.009	0.875	0.002	0.086
Nitrogen, Total	mg/L	28	0.13	0.94	1.62	0.01	0.63
Nitrogen, Total Kjeldahl	mg/L	224	1.14	1.32	2.71	0.03	0.44
pH	None	235	7.7	7.7	8.5	6.8	0.3
Phosphorus, orthophosphate	mg/L	0	None	None	None	None	None
Phosphorus, Total	mg/L	235	0.018	0.018	0.169	0.001	0.019
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	0	None	None	None	None	None
Temperature	deg C	235	25.3	26.3	31.5	13.7	4.0
Total Hardness	mg/L	149	98	141	354	0	65
Total Suspended Solids	mg/L	101	1.9	1.5	11.0	0.5	1.6
Turbidity	NTU	230	1.2	1.1	11.3	0.1	1.5
Zinc	mg/L	2	2.0000	2.0000	2.0000	2.0000	0.0000

Table 5-6 Monitoring Data Summary
L-8 Watershed

SITE Culv10a		Date Range: 01/10/00 - 09/09/19 Samples: 230					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	230	116	114	362	1	50
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	0	None	None	None	None	None
Chlorophyll-a (corrected)	ug/L	12	2.3	3.1	10.3	0.5	3.5
Copper	mg/L	5	2.3733	3.0270	4.5710	0.6000	1.4254
Dissolved Oxygen	mg/L	222	7.3	6.9	99.8	0.5	21.7
Fecal Coliform	cfu/100mL	0	None	None	None	None	None
Lead	mg/L	5	0.8600	0.4000	4.7300	0.4000	1.8752
Nitrogen, Ammonia	mg/L	230	0.041	0.034	3.074	0.005	0.318
Nitrogen, nitrate + nitrite	mg/L	230	0.194	0.291	6.557	0.002	0.498
Nitrogen, Total	mg/L	23	2.16	1.83	4.95	1.57	0.92
Nitrogen, Total Kjeldahl	mg/L	209	1.52	1.48	4.78	0.03	0.70
pH	None	229	7.8	7.9	9.2	6.4	0.4
Phosphorus, orthophosphate	mg/L	230	0.048	0.053	0.177	0.002	0.026
Phosphorus, Total	mg/L	230	0.143	0.146	0.669	0.002	0.097
Salinity	ppth	3	0.1598	0.1600	0.1700	0.1500	0.0100
Specific Conductivity	umho/cm	229	508	468	3390	83	361
Temperature	deg C	229	24.1	25.7	31.7	9.0	4.6
Total Hardness	mg/L	76	160	147	774	46	98
Total Suspended Solids	mg/L	230	24.6	24.5	360.0	0.5	55.2
Turbidity	NTU	230	27.3	28.4	284.0	0.1	47.1
Zinc	mg/L	5	3.1486	2.0000	8.2950	2.0000	2.7690

Table 5-6 Monitoring Data Summary

S-2-6-7 Watershed

SITE S-2		Date Range: 01/25/99 - 09/05/19 Samples: 248						
		Count	Exceedances	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	21	-	153	123	381	94	96
Arsenic	mg/L	13	0	0.0027	0.0040	0.0076	0.0008	0.0023
Cadmium	mg/L	12	0	0.0002	0.0002	0.0005	0.0002	0.0001
Chlorophyll-a (corrected)	ug/L	7	0	2.6	3.1	52.1	0.5	18.8
Copper	mg/L	13	0	0.0012	0.0012	0.0030	0.0006	0.0010
Dissolved Oxygen	% Saturation	10	0	73.8	76.9	90.8	46.1	11.7
Fecal Coliform	cfu/100mL	0	0	None	None	None	None	None
Lead	mg/L	13	0	0.0004	0.0004	0.0004	0.0004	0.0000
Nitrogen, Ammonia	mg/L	242	-	0.105	0.109	2.057	0.003	0.376
Nitrogen, nitrate + nitrite	mg/L	242	-	0.175	0.225	2.726	0.002	0.511
Nitrogen, Total	mg/L	19	-	1.78	1.43	3.92	1.17	0.90
Nitrogen, Total Kjeldahl	mg/L	218	-	1.62	1.60	12.81	0.03	1.65
pH	None	240	2	7.7	7.7	8.7	6.8	0.3
Phosphorus, orthophosphate	mg/L	242	-	0.032	0.041	0.232	0.001	0.047
Phosphorus, Total	mg/L	243	-	0.090	0.103	1.653	0.001	0.156
Salinity	ppth	2	-	0.7200	0.7500	0.9600	0.5400	0.2970
Specific Conductivity	umho/cm	240	46	735	631	2079	145	422
Temperature	deg C	240	-	24.7	25.4	32.2	13.0	4.3
Total Hardness	mg/L	7	-	188	144	496	127	136
Total Suspended Solids	mg/L	242	-	6.5	6.0	131.2	0.5	13.3
Turbidity	NTU	242	14	6.1	6.6	70.4	0.1	10.6
Zinc	mg/L	13	0	0.0022	0.0020	0.0066	0.0020	0.0013

SITE 39		Date Range: 04/18/17 - 09/11/19 Samples: 14						
		Count	Exceedances	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	1	-	151	151	151	151	None
Arsenic	mg/L	12	2	0.0105	0.0036	2.2350	0.0007	0.8684
Cadmium	mg/L	12	0	0.0006	0.0002	0.1950	0.0001	0.0758
Chlorophyll-a (corrected)	ug/L	14	0	5.0	6.3	12.9	1.1	3.8
Copper	mg/L	12	0	0.0041	0.0013	0.9750	0.0003	0.3789
Dissolved Oxygen	% Saturation	14	0	52.1	61.7	84.6	9.8	20.3
Fecal Coliform	cfu/100mL	0	0	None	None	None	None	None
Lead	mg/L	12	0	0.0078	0.0023	2.1000	0.0007	0.8163
Nitrogen, Ammonia	mg/L	14	-	0.125	0.123	0.880	0.018	0.238
Nitrogen, nitrate + nitrite	mg/L	11	-	0.262	0.280	1.400	0.038	0.377
Nitrogen, Total	mg/L	11	-	1.82	1.81	3.60	0.96	0.80
Nitrogen, Total Kjeldahl	mg/L	14	-	0.81	1.20	2.50	0.03	0.76
pH	None	12	1	7.9	7.9	9.2	7.4	0.5
Phosphorus, orthophosphate	mg/L	13	-	0.061	0.069	0.204	0.022	0.058
Phosphorus, Total	mg/L	14	-	0.117	0.110	0.260	0.058	0.063
Salinity	ppth	0	-	None	None	None	None	None
Specific Conductivity	umho/cm	14	0	619	674	993	374	240
Temperature	deg C	14	-	25.4	27.1	34.1	17.3	5.3
Total Hardness	mg/L	11	-	234	255	381	129	88
Total Suspended Solids	mg/L	12	-	6.3	5.0	43.6	2.5	11.6
Turbidity	NTU	14	1	7.5	6.7	33.1	2.5	9.6
Zinc	mg/L	12	0	0.0065	0.0055	0.0202	0.0015	0.0049

Table 5-6 Monitoring Data Summary

S-2-6-7 Watershed

SITE 43		Date Range: 04/18/17 - 09/11/19 Samples: 14						
		Count		Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0		None	None	None	None	None
Arsenic	mg/L	12		0.0062	0.0036	2.2350	0.0007	0.6440
Cadmium	mg/L	12		0.0004	0.0002	0.1950	0.0001	0.0562
Chlorophyll-a (corrected)	ug/L	14		7.4	8.2	61.2	1.4	15.3
Copper	mg/L	12		0.0024	0.0013	0.9750	0.0003	0.2810
Dissolved Oxygen	% Saturation	14		57.1	65.0	160.0	19.0	34.8
Fecal Coliform	cfu/100mL	0		None	None	None	None	None
Lead	mg/L	12		0.0078	0.0023	2.1000	0.0007	0.8163
Nitrogen, Ammonia	mg/L	14		0.090	0.108	0.580	0.018	0.145
Nitrogen, nitrate + nitrite	mg/L	14		0.170	0.193	1.400	0.013	0.428
Nitrogen, Total	mg/L	14		1.71	1.46	4.10	1.08	0.97
Nitrogen, Total Kjeldahl	mg/L	14		1.46	1.25	2.70	1.00	0.62
pH	None	12		8.1	8.0	9.1	7.1	0.6
Phosphorus, orthophosphate	mg/L	13		0.038	0.044	0.200	0.003	0.058
Phosphorus, Total	mg/L	14		0.107	0.100	0.220	0.036	0.055
Salinity	ppth	0		None	None	None	None	None
Specific Conductivity	umho/cm	14		591	545	1038	395	238
Temperature	ECg C	14		25.5	27.0	32.6	17.6	5.0
Total Hardness	mg/L	11		246	262	404	147	104
Total SuspenECd Solids	mg/L	12		5.0	5.0	17.0	2.5	4.1
Turbidity	NTU	14		8.4	7.5	35.0	2.6	9.2
Zinc	mg/L	12		0.0063	0.0055	0.0200	0.0015	0.0054

Table 5-6 Monitoring Data Summary
WPBWS Watershed

SITE M Canal		Date Range: 03/15/11 - 09/24/19 Samples: 69					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	0	None	None	None	None	None
Chlorophyll-a (corrected)	ug/L	57	3.6	4.4	24.3	0.5	4.8
Copper	mg/L	0	None	None	None	None	None
Dissolved Oxygen	mg/L	4	96.6	97.1	118.5	78.0	17.0
Fecal Coliform	cfu/100mL	0	None	None	None	None	None
Lead	mg/L	0	None	None	None	None	None
Nitrogen, Ammonia	mg/L	0	None	None	None	None	None
Nitrogen, nitrate + nitrite	mg/L	64	0.119	0.180	3.600	0.005	0.586
Nitrogen, Total	mg/L	67	1.33	1.29	5.20	0.66	0.84
Nitrogen, Total Kjeldahl	mg/L	64	1.09	1.10	3.00	0.30	0.47
pH	None	68	7.8	7.8	8.6	6.8	0.3
Phosphorus, orthophosphate	mg/L	0	None	None	None	None	None
Phosphorus, Total	mg/L	65	0.092	0.093	0.600	0.018	0.094
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	0	None	None	None	None	None
Temperature	deg C	68	26.7	27.6	33.2	18.4	3.8
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	0	None	None	None	None	None
Turbidity	NTU	68	13.7	12.1	152.0	2.5	26.9
Zinc	mg/L	0	None	None	None	None	None

SITE Control 4		Date Range: 04/15/11 - 09/24/19 Samples: 100					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	0	None	None	None	None	None
Chlorophyll-a (corrected)	ug/L	36	3.0	2.3	18.7	1.1	4.6
Copper	mg/L	0	None	None	None	None	None
Dissolved Oxygen	mg/L	99	6.3	5.1	106.1	0.1	24.2
Fecal Coliform	cfu/100mL	1	12	12	12	12	None
Lead	mg/L	0	None	None	None	None	None
Nitrogen, Ammonia	mg/L	0	None	None	None	None	None
Nitrogen, nitrate + nitrite	mg/L	46	0.067	0.054	0.530	0.013	0.174
Nitrogen, Total	mg/L	46	1.11	1.05	1.70	0.68	0.26
Nitrogen, Total Kjeldahl	mg/L	46	0.97	0.98	1.70	0.60	0.19
pH	None	100	7.4	7.4	8.7	6.2	0.4
Phosphorus, orthophosphate	mg/L	32	0.016	0.014	0.082	0.002	0.025
Phosphorus, Total	mg/L	48	0.056	0.058	0.160	0.017	0.037
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	55	429	412	1697	128	285
Temperature	deg C	100	25.7	25.9	34.1	18.3	3.6
Total Hardness	mg/L	67	141	142	252	76	40
Total Suspended Solids	mg/L	0	None	None	None	None	None
Turbidity	NTU	98	6.0	5.7	48.4	0.9	9.3
Zinc	mg/L	0	None	None	None	None	None

Table 5-6 Monitoring Data Summary

WPBWS Watershed

SITE Lake Mangonia		Date Range: 03/15/11 - 08/21/19 Samples: 51					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	0	None	None	None	None	None
Chlorophyll-a (corrected)	ug/L	41	5.4	7.8	34.6	0.5	7.4
Copper	mg/L	0	None	None	None	None	None
Dissolved Oxygen	mg/L	51	7.4	7.4	11.8	5.1	1.3
Fecal Coliform	DZu/100mL	0	None	None	None	None	None
Lead	mg/L	0	None	None	None	None	None
Nitrogen, Ammonia	mg/L	0	None	None	None	None	None
Nitrogen, nitrate + nitrite	mg/L	48	0.028	0.013	1.300	0.005	0.214
Nitrogen, Total	mg/L	51	0.87	0.82	2.40	0.60	0.30
Nitrogen, Total Kjeldahl	mg/L	48	0.81	0.80	1.20	0.56	0.15
pH	None	51	8.2	8.2	8.7	7.2	0.3
Phosphorus, orthophosphate	mg/L	16	0.007	0.009	0.039	0.002	0.011
Phosphorus, Total	mg/L	50	0.024	0.025	0.200	0.003	0.026
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	51	483	468	970	274	162
Temperature	deg C	51	25.9	25.8	31.8	19.3	3.5
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	0	None	None	None	None	None
Turbidity	NTU	51	2.6	2.6	8.9	0.6	1.8
Zinc	mg/L	0	None	None	None	None	None

SITE Clear Lake		Date Range: 03/15/11 - 08/21/19 Samples: 51					
		Count	Geometric Mean	Median	Max	Min	Standard Deviation
Alkalinity	mg/L	0	None	None	None	None	None
Arsenic	mg/L	0	None	None	None	None	None
Cadmium	mg/L	0	None	None	None	None	None
Chlorophyll-a (corrected)	ug/L	11	1.9	1.4	8.8	0.5	3.4
Copper	mg/L	0	None	None	None	None	None
Dissolved Oxygen	mg/L	21	7.9	7.8	10.0	6.6	0.8
Fecal Coliform	cfu/100mL	0	None	None	None	None	None
Lead	mg/L	0	None	None	None	None	None
Nitrogen, Ammonia	mg/L	0	None	None	None	None	None
Nitrogen, nitrate + nitrite	mg/L	18	0.053	0.061	1.800	0.013	0.439
Nitrogen, Total	mg/L	21	0.80	0.74	2.30	0.21	0.47
Nitrogen, Total Kjeldahl	mg/L	18	0.66	0.66	1.50	0.18	0.29
pH	None	21	8.3	8.3	8.7	7.9	0.2
Phosphorus, orthophosphate	mg/L	0	None	None	None	None	None
Phosphorus, Total	mg/L	21	0.012	0.012	0.025	0.001	0.009
Salinity	ppth	0	None	None	None	None	None
Specific Conductivity	umho/cm	21	495	496	850	304	152
Temperature	deg C	21	25.9	27.3	30.8	21.0	3.4
Total Hardness	mg/L	0	None	None	None	None	None
Total Suspended Solids	mg/L	0	None	None	None	None	None
Turbidity	NTU	21	1.3	1.3	2.5	0.6	0.5
Zinc	mg/L	0	None	None	None	None	None

TABLE 5-7

Summary of Geometric Mean Values for TN, TP, Chl-a

January 1999 - September 2019

Watershed	Site	Total Nitrogen mg/L	Total Phosphorus mg/L	Chlorophyll-a ug/L
C-15	31E	1.53	0.25	19.94
	31C	1.22	0.13	15.59
	31B	0.99	0.10	12.94
C-16	22	1.02	0.05	12.11
	24	0.84	0.05	11.81
	27B	1.48	0.16	13.53
	27A	1.08	0.11	12.80
	28	1.04	0.08	8.43
C-17	12A	1.36	0.05	12.29
	C17S44	0.87	0.04	9.16
C-18	16	0.99	0.03	3.91
	15	0.88	0.02	2.25
	92	0.82	0.02	3.68
	81	0.77	0.02	4.80
C-51	38B	1.51	0.10	6.12
	37B	1.05	0.06	4.07
	C51S155	1.13	0.07	1.67
Lox	69	0.99	0.04	2.95
	51	0.35	0.03	4.00
	62	0.78	0.05	5.41
	72	0.61	0.04	8.40
ICWW-N	30	0.29	0.03	3.98
LWL-N	LWL-1	0.35	0.03	5.03
	11	0.42	0.04	3.16
	13	0.49	0.04	3.95
	LWL-4	0.28	0.02	2.57
LWL-C	LWL-8	0.52	0.05	5.57
	18C	0.77	0.07	5.36
	18D	0.57	0.06	5.30
	LWL-11	0.48	0.05	5.70
ICWW-S	LWL-13	0.38	0.03	5.00
	LWL-18	0.51	0.05	8.40
Hillsboro	1	0.79	0.10	5.63
	2	1.24	0.09	6.76
	3	1.42	0.10	7.10
	S39	0.10	0.02	-
L-8	Culv10a	2.16	0.14	1.53
S-2-6-7	S-2	1.78	0.09	2.65
	39	1.82	0.12	5.00
	43	1.71	0.11	7.43
WPBWS	M Canal	1.33	0.09	3.64
	Control 4	1.11	0.06	3.01
	Lake Mangonia	0.87	0.02	5.42
	Clear Lake	0.80	0.01	1.90

- C-15, a Class III Freshwater has a minimum level of chlorophyll-a (corrected) AGM of 20 µg/L
- Northern Lake Worth Lagoon has a minimum level of chlorophyll-a (corrected) AGM of 2.9 µg/L
- Northern Lake Worth Lagoon has a minimum level of Total Nitrogen AGM of .54 mg/L
- Northern Lake Worth Lagoon has a minimum level of Total Phosphorus AGM of .044 mg/L
- Central Lake Worth Lagoon has a minimum level of Total Nitrogen AGM of .66 mg/L
- Central Lake Worth Lagoon has a minimum level of Total Phosphorus AGM of .049 mg/L

Table 5-8
Total Nitrogen (Annual Geometric Mean)
(Page 1 of 4)

	C-15				C-16						C-17		
	31E	31C	31B	Basin	22	24	27B	27A	28	Basin	12A	C17S44	Basin
2010	●	●	●	●	●	●	●	●	●	●	●	●	●
2011	●	●	●	●	●	●	●	●	●	●	●	●	●
2012	●	●	●	●	●	●	●	●	●	●	●	●	●
2013	●	●	●	●	●	●	●	●	●	●	●	●	●
2014	●	●	●	●	●	●	●	●	●	●	●	●	●
2015	●	●	●	●	●	●	●	●	●	●	●	●	●
2016	●	●	●	●	●	●	●	●	●	●	●	●	●
2017	●	●	●	●	●	●	●	●	●	●	●	●	●
2018	●	●	●	●	●	●	●	●	●	●	●	●	●
2019	●	●	●	●	●	●	●	●	●	●	●	●	●
FDEP Criteria	No Criteria	No Criteria	No Criteria	No Criteria	Varies	Varies	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria

● Meeting criteria
● Not meeting criteria
● No numeric criteria

Values Used (mg/l)

2010	2.13	1.58	0.88	1.44	1.29	1.29	1.96	1.53	0.89	1.35	1.67	0.93	1.25
2011	1.56	1.01	1.09	1.20	1.10	1.32	1.44	1.09	0.88	1.15	1.31	0.91	1.09
2012	1.30	1.08	0.97	1.11	1.01	1.00	1.44	1.16	1.01	1.11	1.16	0.91	1.02
2013	1.20	1.00	0.97	1.05	0.80	0.76	1.18	0.92	1.01	0.92	0.92	0.89	0.91
2014	1.30	0.84	0.76	0.94	0.82	0.72	1.14	0.86	0.74	0.85	0.93	0.39	0.60
2015	1.21	0.76	0.88	0.93	0.91	0.83	1.31	0.80	1.46	1.03	1.07	0.77	0.91
2016	1.61	1.09	1.02	1.21	0.96	0.85	1.33	1.22	0.82	1.02	0.98	0.88	0.93
2017	1.19	1.09	1.07	1.12	0.84	1.05	1.43	1.22	0.57	0.97	1.03	0.69	0.84
2018	1.19	1.00	0.92	1.03	1.13	0.90	1.29	0.39	0.80	0.84	0.39	0.86	0.58
2019	1.33	0.99	0.56	0.90	0.92	0.09	1.34	0.51	0.31	0.44	0.98	0.78	0.88

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Table 5-8
Total Nitrogen (Annual Geometric Mean)
(Page 2 of 4)

	C-18					C-51				Lox	Lox			
	16	15	92	81	Basin	38B	37B	C51S155	Basin	69	51	62	72	Basin
2010	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2011	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2012	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2013	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2014	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2015	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2016	Meeting criteria		Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2017	Meeting criteria		Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2018	Meeting criteria		Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2019	Meeting criteria		Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
FDEP Criteria	<=1.54	<=1.54	<=1.54	<=1.54	<=1.54	No Criteria	No Criteria	No Criteria	No Criteria	<=1.54	<=0.8	<=1.26	<=1.26	No Criteria

Meeting criteria
Not meeting criteria
No numeric criteria

Values Used (mg/l)

2010	1.32	1.30	0.87	0.86	1.06	1.83	1.60	1.25	1.54	0.94	0.15	0.72	0.50	0.38
2011	1.27	1.27	0.93	0.86	1.07	2.13	1.26	0.88	1.33	0.67	0.87	0.76	0.38	0.63
2012	1.08	0.93	0.95	0.90	0.96	1.40	0.76	0.95	1.00	1.30	0.22	0.57	0.51	0.40
2013	0.87	0.64	0.88	0.82	0.79	1.15	1.26	1.96	1.42	0.81	0.15	0.62	0.41	0.33
2014	0.66	0.66	0.23	0.25	0.39	1.39	1.16	0.73	1.06	0.91	0.35	0.79	0.57	0.54
2015	0.77	0.76	0.80	0.74	0.77	1.19	1.09	0.97	1.08	0.85	0.20	0.58	0.52	0.39
2016	0.94		0.97	0.91	0.94	1.37	1.02	1.14	1.17	0.91	0.25	0.72	0.70	0.50
2017	0.88		0.87	0.97	0.91	1.14	0.80	0.79	0.90	1.01	0.22	0.57	0.69	0.44
2018	1.08	0.27	1.13	0.83	0.72	2.22	1.65	1.34	1.70	0.95	0.52	0.71	0.79	0.66
2019	0.96	0.74	0.84	0.87	0.85	0.48	0.14	0.96	0.40	0.87	0.27	0.69	0.58	

Table 5-8
Total Nitrogen (Annual Geometric Mean)
(Page 3 of 4)

	ICWW-N	LWL-N					LWL-C					ICWW-S		
	30	LWL-1	11	13	LWL-4	Basin	LWL-8	18C	18D	LWL-11	Basin	LWL-13	LWL-18	Basin
2010	🟢	🟢	🟢	🟢		🟢	🟢	🔴	🟢	🟢	🟢	🟢	🟢	🟢
2011	🟢	🟢	🟢	🟢		🟢	🟢	🔴	🟢	🟢	🟢	🟢	🟢	🟢
2012	🟢	🟢	🔴	🔴		🔴	🟢	🔴	🔴	🟢	🟢	🟢	🟢	🟢
2013	🟢	🟢	🟢	🔴	🟢	🟢	🟢	🔴	🔴	🟢	🔴	🟢	🟢	🟢
2014	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
2015	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
2016	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
2017	🟢	🟢	🟢	🟢	🟢	🟢	🔴	🟢	🟢	🔴	🟢	🔴	🟢	🔴
2018	🟢	🟢	🟢	🟢	🟢	🟢	🔴	🟢	🔴	🟢	🟢	🟢	🟢	🟢
2019	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
FDEP Criteria	<=0.66	<=0.54	<=0.54	<=0.54	<=0.54	<=0.54	<=0.66	<=0.66	<=0.66	<=0.66	<=0.66	<=0.59	<=0.59	<=0.59

🟢 Meeting criteria
🔴 Not meeting criteria
🟡 No numeric criteria

Values Used (mg/l)

2010	0.21	0.32	0.45	0.52		0.42	0.48	0.99	0.65	0.45	0.61	0.37	0.40	0.3841
2011	0.34	0.22	0.45	0.50		0.36	0.14	0.83	0.52	0.26	0.35	0.22	0.24	0.2303
2012	0.21	0.33	0.72	0.81		0.58	0.42	0.94	0.84	0.42	0.61	0.35	0.42	0.3854
2013	0.15	0.28	0.53	0.59	0.23	0.38	0.54	0.93	0.90	0.48	0.68	0.41	0.44	0.4217
2014	0.24	0.19	0.25	0.33	0.14	0.22	0.32	0.65	0.52	0.16	0.37	0.14	0.15	0.1442
2015	0.20	0.32	0.22	0.25	0.21	0.25	0.39	0.62	0.30	0.39	0.41	0.30	0.46	0.3718
2016	0.25	0.33	0.23	0.37	0.31	0.31	0.55	0.45	0.30	0.53	0.45	0.32	0.46	0.3882
2017	0.25	0.34	0.13	0.14	0.25	0.20	0.67	0.21	0.15	0.66	0.35	0.99	0.56	0.7437
2018	0.37	0.41	0.20	0.40	0.31	0.32	0.74		0.70	0.47	0.62	0.44	0.27	0.34
2019	0.28	0.33	0.29	0.31	0.24	0.29	0.42	0.43	0.42	0.43	0.42	0.34	0.36	0.35

Table 5-8
Total Nitrogen (Annual Geometric Mean)
(Page 4 of 4)

	Hillsboro					L-8	S-2-6-7				WPBWS				
	1	2	3	S39	Basin	Culv10A	S-2	39	43	Basin	M Canal	Control 4	Lake Mangonia	Clear Lake	Basin
2010	●	●	●		●										
2011	●	●	●		●						●		●	●	●
2012	●	●	●		●						●		●	●	●
2013	●	●	●		●						●		●	●	●
2014											●	●	●	●	●
2015											●	●	●	●	●
2016	●	●	●		●						●	●	●	●	●
2017	●	●	●		●			●	●	●	●	●	●	●	●
2018	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2019	●	●	●		●	●	●	●	●	●	●	●	●	●	●
FDEP Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	1.05 to 1.91	1.05 to 1.91	1.05 to 1.91

● No numeric criteria

Values Used (mg/l)

2010	0.65	1.14	1.46		1.03										
2011	0.54	1.11	1.37		0.94						1.26		0.92	0.86	1.00
2012	0.75	1.36	1.42		1.13						1.14		0.88	0.75	0.91
2013	0.67	1.30	1.38		1.06						1.30		0.79	0.67	0.88
2014											1.40	1.12	0.89	1.00	1.09
2015											1.25	0.94	0.95	0.91	1.00
2016	1.19	1.25	1.42		1.28						1.34	1.11	0.84	0.89	1.03
2017	0.59	1.38	1.38		1.04			4.23	5.22	4.70	1.61	1.19	0.95	0.82	1.11
2018	1.41	1.47	1.52	0.03	0.56	2.23	1.77	1.62	1.57	1.65	1.24	1.08	0.85	0.80	0.98
2019	0.60	1.13	1.45		0.99	2.21	1.79	2.00	1.93	1.90	1.38	1.12	0.80	0.75	0.98

Varies for Lake Magnonia and Clear Lake TN ≤ 1.27 AGM when Chlorophyll-a >20 mg/l
TN ≤ 2.23 AGM when Chlorophyll-a ≤20 mg/l

Table 5-9
Total Phosphorus (Annual Geometric Mean)
(Page 1 of 4)

	C-15				C-16						C-17		
	31E	31C	31B	Basin	22	24	27B	27A	28	Basin	12A	C17S44	Basin
2010	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Not meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria
2011	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Not meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria
2012	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria
2013	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Not meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria
2014	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Not meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria
2015	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria
2016	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Not meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria
2017	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria
2018	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria
2019	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria
FDEP Criteria	No Criteria	No Criteria	No Criteria	No Criteria	Varies	Varies	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria

- Meeting criteria
- Not meeting criteria
- No numeric criteria

Values Used (mg/l)

2010	0.39	0.12	0.11	0.17	0.06	0.07	0.19	0.14	0.06	0.09	0.01	0.05	0.02
2011	0.19	0.08	0.09	0.11	0.03	0.09	0.13	0.08	0.04	0.07	0.06	0.05	0.05
2012	0.24	0.12	0.09	0.14	0.05	0.05	0.14	0.12	0.06	0.08	0.06	0.05	0.05
2013	0.25	0.15	0.09	0.15	0.06	0.07	0.07	0.10	0.06	0.07	0.06	0.05	0.05
2014	0.28	0.12	0.10	0.15	0.12	0.06	0.18	0.11	0.07	0.10	0.05	0.04	0.05
2015	0.16	0.07	0.05	0.08	0.05	0.07	0.16	0.05	0.05	0.07	0.04	0.04	0.04
2016	0.30	0.16	0.13	0.19	0.06	0.05	0.33	0.14	0.14	0.11	0.06	0.04	0.05
2017	0.18	0.12	0.02	0.08	0.01	0.02	0.11	0.07	0.03	0.03	0.05	0.03	0.04
2018	0.16	0.12		0.13	0.07	0.06	0.14	0.03	0.08	0.07	0.06	0.05	0.06
2019	0.32	0.13	0.07	0.15	0.07	0.00	0.17	0.03	0.02		0.07	0.05	

Table 5-9
Total Phosphorus (Annual Geometric Mean)
(Page 2 of 4)

	C-18					C-51				Lox	Lox			
	16	15	92	81	Basin	38B	37B	C51S155	Basin	69	51	62	72	Basin
2010	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2011	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2012	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2013	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2014	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2015	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2016	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2017	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2018	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2019	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	No numeric criteria	No numeric criteria	No numeric criteria	No numeric criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
FDEP Criteria	<=0.12	<=0.12	<=0.12	<=0.12	<=0.12	No Criteria	No Criteria	No Criteria	No Criteria	<=0.12	<=0.03	<=0.075	<=0.075	<=0.1

Meeting criteria
Not meeting criteria
No numeric criteria

Values Used (mg/l)

2010	0.05	0.04	0.02	0.02	0.03	0.11	0.11	0.07	0.09	0.04	0.02	0.05	0.04	0.04
2011	0.03	0.02	0.02	0.02	0.02	0.07	0.06	0.04	0.05	0.06	0.06	0.02	0.03	0.03
2012	0.03	0.01	0.02	0.02	0.02	0.13	0.04	0.03	0.06	0.04	0.03	0.04	0.04	0.03
2013	0.03	0.00	0.02	0.02	0.02	0.09	0.08	0.06	0.08	0.03	0.03	0.06	0.04	0.04
2014	0.01	0.01	0.04	0.02	0.02	0.11	0.14	0.06	0.10	0.04	0.03	0.06	0.04	0.04
2015	0.02	0.01	0.02	0.02	0.02	0.11	0.08	0.08	0.09	0.03	0.02	0.05	0.04	0.03
2016	0.02	0.01	0.03	0.03	0.02	0.08	0.09	0.06	0.08	0.03	0.02	0.05	0.05	0.04
2017	0.03	0.15	0.04	0.02	0.04	0.18	0.05	0.06	0.08	0.04	0.02	0.04	0.03	0.03
2018	0.02	0.01	0.06	0.03	0.02	0.16	0.11	0.09	0.11	0.06	0.03		0.04	0.03
2019	0.03	0.01	0.03	0.02		0.04	0.01	0.07		0.03	0.02	0.05	0.04	0.03

Table 5-9
Total Phosphorus (Annual Geometric Mean)
(Page 3 of 4)

	ICWW-N	LWL-N					LWL-C					ICWW-S		
	30	LWL-1	11	13	LWL-4	Basin	LWL-8	18C	18D	LWL-11	Basin	LWL-13	LWL-18	Basin
2010	🟢	🟢	🟢	🟢		🟢	🟢	🔴	🔴	🟢	🟢	🟢	🟢	🟢
2011	🟢	🟢	🔴	🔴		🟢	🟢	🔴	🔴	🟢	🟢	🟢	🟢	🟢
2012	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
2013	🟢	🟢	🔴	🔴	🟢	🟢	🔴	🔴	🔴	🔴	🔴	🟢	🟢	🟢
2014	🟢	🟢	🔴	🟢	🟢	🟢	🟢	🔴	🔴	🔴	🔴	🟢	🟢	🟢
2015	🟢	🟢	🔴	🔴	🟢	🟢	🟢	🔴	🔴	🟢	🔴	🟢	🔴	🟢
2016	🟢	🟢	🟢	🟢	🟢	🟢	🔴	🔴	🔴	🟢	🔴	🟢	🔴	🟢
2017	🟢	🟢	🟢	🟢	🟢	🟢	🔴	🔴	🟢	🔴	🟢	🔴	🔴	🔴
2018	🟢	🟢	🟢	🟢	🟢	🟢	🔴	🔴	🔴	🟢	🔴	🟢	🟢	🟢
2019	🟢	🟢	🔴	🔴	🟢	🟢	🟢	🔴	🔴	🟢	🔴	🟢	🟢	🟢
FDEP Criteria	<=0.035	<=0.044	<=0.044	<=0.044	<=0.044	<=0.044	<=0.049	<=0.049	<=0.049	<=0.049	<=0.049	<=0.05	<=0.05	<=0.05

🟢 Meeting criteria
🔴 Not meeting criteria
🟡 No numeric criteria

Values Used (mg/l)

2010	0.03	0.03	0.03	0.03		0.03	0.04	0.06	0.06	0.04	0.05	0.03	0.04	0.0346
2011	0.05	0.02	0.05	0.06		0.04	0.01	0.07	0.07	0.03	0.04	0.03	0.03	0.0269
2012	0.03	0.04	0.03	0.04		0.04	0.04	0.01	0.04	0.04	0.03	0.03	0.04	0.037
2013	0.02	0.03	0.07	0.06	0.02	0.04	0.05	0.08	0.08	0.06	0.07	0.04	0.05	0.0436
2014	0.02	0.03	0.06	0.04	0.02	0.03	0.05	0.07	0.06	0.05	0.06	0.03	0.04	0.0368
2015	0.02	0.03	0.06	0.06	0.02	0.04	0.04	0.08	0.07	0.04	0.05	0.02	0.05	0.034
2016	0.02	0.03	0.04	0.04	0.02	0.03	0.05	0.08	0.06	0.04	0.06	0.03	0.05	0.0369
2017	0.02	0.03	0.01	0.01	0.02	0.01	0.06	0.05	0.02	0.06	0.04	0.07	0.07	0.0725
2018	0.03	0.04	0.03	0.04	0.02	0.03	0.07	0.07	0.06	0.03	0.06	0.03	0.03	0.03
2019	0.02	0.03	0.05	0.05	0.02	0.03	0.04	0.09	0.06	0.04	0.06	0.03	0.05	0.04

Table 5-9
Total Phosphorus (Annual Geometric Mean)
(Page 4 of 4)

	Hillsboro					L-8	S-2-6-7				WPBWS				
	1	2	3	S39	Basin	Culv10a	S-2	39	43	Basin	M Canal	Control 4	Lake Mangonia	Clear Lake	Basin
2010	●	●	●	●	●	●									
2011	●	●	●	●	●	●					●		●	●	●
2012	●	●	●	●	●	●					●		●	●	●
2013	●	●	●	●	●	●					●	●	●	●	●
2014	●	●	●	●	●	●					●	●	●	●	●
2015				●	●	●					●	●	●	●	●
2016	●	●	●	●	●	●					●	●	●	●	●
2017	●	●	●	●	●	●	●	●	●		●	●	●	●	●
2018	●	●	●	●	●	●	●	●	●		●	●	●	●	●
2019	●	●	●	●	●	●	●	●	●		●	●	●	●	●
FDEP Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	No Criteria	0.03 to 0.09	0.03 to 0.10	0.03 to 0.11

● No numeric criteria

Values Used (mg/l)

2010	0.10	0.08	0.09	0.01	0.06	0.15									
2011	0.08	0.06	0.07	0.01	0.04	0.12					0.04		0.01	0.01	0.02
2012	0.10	0.09	0.14	0.02	0.07	0.10					0.05		0.03	0.02	0.03
2013	0.08	0.08	0.07	0.02	0.05	0.14					0.10	0.07	0.02	0.01	0.03
2014	0.11	0.10	0.07	0.01	0.06	0.16					0.09	0.08	0.02	0.01	0.03
2015				0.01	0.01	0.15					0.12	0.06	0.04	0.02	0.05
2016	0.18	0.10	0.13	0.01	0.08	0.15					0.11	0.04	0.03	0.02	0.04
2017	0.11	0.05	0.06	0.01	0.04	0.19	0.11	0.12	0.09	0.11	0.12	0.05	0.03	0.02	0.04
2018	0.07	0.06	0.06	0.02	0.04	0.17	0.13	0.13	0.13	0.13	0.10	0.06	0.02	0.01	0.03
2019	0.13	0.10	0.10	0.01	0.07	0.16	0.10	0.11	0.10	0.10	0.11	0.07	0.02	0.02	0.04

Varies for sites Lake and Clear Lake TP ≤0.03 AGM when Chlorophyll-a >20 mg/
TP ≤ 0.09 AGM when Chlorophyll-a ≤20 mg/l

Table 5-10
Chlorophyll-A (Annual Geometric Mean)
(Page 1 of 4)

	C-15				C-16						C-17		
	31E	31C	31B	Basin	22	24	27B	27A	28	Basin	12A	C17S44	Basin
2010	Not meeting criteria	Meeting criteria		Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria		Meeting criteria	Meeting criteria		Meeting criteria
2011	Not meeting criteria	Not meeting criteria		Not meeting criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Not meeting criteria		Meeting criteria	Meeting criteria		Meeting criteria
2012	Not meeting criteria	Meeting criteria		Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria		Meeting criteria	Meeting criteria		Meeting criteria
2013	Not meeting criteria	Not meeting criteria		Not meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria	Meeting criteria		Meeting criteria
2014	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria		Not meeting criteria
2015	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria
2016	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria
2017	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria
2018	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria
2019	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria
FDEP Criteria	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20

Meeting criteria
Not meeting criteria
No numeric criteria

Values Used (ug/l)

2010	33.53	7.63		15.99	21.80	13.51	19.74	24.55		19.43	17.26		17.26
2011	28.22	23.48		25.74	17.83	20.25	15.35	20.92		18.45	12.41		12.41
2012	24.95	16.18		20.09	17.67	18.51	18.54	20.44		18.76	17.74		17.74
2013	43.87	24.19		32.57	28.64	15.83	7.38	17.32		15.51	12.50		12.50
2014	39.23	28.66	27.53	31.39	22.70	17.75	35.79	18.36	15.53	21.03	20.44		20.44
2015	16.28	9.10	18.72	14.05	9.86	13.62	26.83	8.03	8.27	11.91	12.94		12.94
2016	9.72	8.42	17.18	11.20	12.73	20.70	7.45	8.11	5.56	9.76	11.78		11.78
2017	16.15	15.39	19.16	16.82	18.04	6.14	9.60	8.04	4.57	8.29	8.10		8.10
2018	14.58	9.63	16.84	13.32	9.52	4.58	3.39	10.83	20.68	8.02	5.98		5.98
2019	8.11	13.38	8.39	9.69	11.97	5.77	11.96	3.86	5.83	7.14	7.61		7.61

Table 5-10
Chlorophyll-A (Annual Geometric Mean)
(Page 2 of 4)

	C-18					C-51				Lox	Lox				ICWW-N
	16	15	92	81	Basin	38B	37B	C51S155	Basin	69	51	62	72	Basin	30
2010	Meeting criteria	Meeting criteria			Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria
2011	Meeting criteria	Meeting criteria			Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria	Meeting criteria			Meeting criteria	Meeting criteria	Meeting criteria
2012	Meeting criteria	Meeting criteria			Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria
2013	Meeting criteria	Meeting criteria			Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria
2014	Meeting criteria	Meeting criteria			Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria
2015	Meeting criteria	Meeting criteria			Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria
2016	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria
2017	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria
2018	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria
2019	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria		Meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria
FDEP Criteria	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=4	<=5.5	<=5.5	<=4.9	<=4.7

Meeting criteria
Not meeting criteria
No numeric criteria

Values Used (ug/l)

2010	5.62	2.99			4.10	7.97	8.25		8.11	5.67	4.19	6.58	11.53	6.61	
2011	6.44	1.52			3.13	19.35	4.84		9.68	2.94			3.48	3.48	
2012	6.17	1.52			3.06	8.64	4.21		6.03	2.01	4.17	4.64	9.86	5.04	
2013	5.65	2.09			3.44	5.16	4.36		4.75	2.36	4.28	6.10	8.66	5.30	
2014	2.14	2.14			2.14	4.07	2.79	0.03	0.66	3.00	4.49	5.50	11.23	5.82	
2015	2.54	1.26			1.79	5.64	2.06		3.41	1.92	4.07	5.94	10.83	5.70	
2016	5.63	2.34	6.51	8.05	5.13	10.17	3.93		6.32	2.47	2.95	4.76	7.07	4.33	
2017	4.80	2.02	3.44	6.71	3.87	3.16	3.98		3.55	2.09	2.29	5.33	7.71	4.29	
2018	2.57	2.58	3.09	5.52	3.26	4.22	4.99		4.59	3.30	5.96	4.83	4.90	4.63	
2019	2.71	2.02	5.04	7.80	3.83	3.90	2.35		3.03	3.70	3.72	5.91	9.45	5.92	3.75

Table 5-10
Chlorophyll-A (Annual Geometric Mean)
(Page 3 of 4)

	LWL-N					LWL-C					ICWW-S		
	LWL-1	11	13	LWL-4	Basin	LWL-8	18C	18D	LWL-11	Basin	LWL-13	LWL-18	Basin
2010	Not meeting criteria	Meeting criteria	Not meeting criteria		Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria
2011	Not meeting criteria	Meeting criteria	Not meeting criteria		Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2012	Not meeting criteria	Meeting criteria	Not meeting criteria		Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2013		Not meeting criteria	Not meeting criteria		Not meeting criteria		Not meeting criteria	Not meeting criteria		Not meeting criteria			
2014		Not meeting criteria	Not meeting criteria		Not meeting criteria		Not meeting criteria	Not meeting criteria		Not meeting criteria			
2015	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria	Meeting criteria	Meeting criteria
2016		Not meeting criteria	Not meeting criteria		Not meeting criteria		Not meeting criteria	Not meeting criteria		Not meeting criteria			
2017		Meeting criteria	Not meeting criteria		Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria
2018		Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria
2019		Meeting criteria	Not meeting criteria		Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Not meeting criteria	Meeting criteria	Not meeting criteria	Not meeting criteria
FDEP Criteria	<=2.9	<=2.9	<=2.9	<=2.9	<=2.9	<=10.2	<=10.2	<=10.2	<=10.2	<=10.2	<=5.7	<=5.7	<=5.7

- Meeting criteria
- Not meeting criteria
- No numeric criteria

Values Used (ug/l)

2010	4.51	2.16	4.08		3.41	1/12	1/12	1/12	3/12	7/60	4.8	6.7	5.8
2011	3.48	2.89	4.05		3.44	0/2	1/11	1/11	0/2	2/28	3	3	3
2012	4.73	2.85	4.12		3.81	1/11	1/12	1/12	1/10	5/47	4.3	5.5	4.9
2013		3.90	4.55		4.22		4/12	5/12		9/12			
2014		5.23	7.51		6.26		6/9	8/9		14/18			
2015	5.10	3.28	3.41	1.81	3.19	1/10	2/7	1/7	2/10	6/44	4.08	5.11	4.6
2016		7.06	3.82		5.19		1/5	1/5		2/5			
2017		2.81	3.92		3.32	1/7	1/6	1/6	2/7	5/26	5.4	7.9	6.7
2018	6.92	3.12	4.26	5.79	4.81	9/10	5/6	5/6	9/10	28/32	11.11	5.73	7.98
2019	4.37	1.73	2.94	1.81	2.52	2/9	1/9	1/9	1/9	5/36	4.60	7.72	5.96

Note: Chlorophyll-a criteria for LWL-S shall not be exceeded in more than 10 percent of the measurements

Table 5-10
Chlorophyll-A (Annual Geometric Mean)
(Page 4 of 4)

	Hillsboro					L-8	S-2-6-7				WPBWS				
	1	2	3	S39	Basin	Culv10a	S-2	39	43	Basin	M Canal	Control 4	Lake Mangonia	Clear Lake	Basin
2010	●	●	●		●										
2011	●	●	●		●										
2012	●	●	●		●						●		●	●	●
2013	●	●	●		●						●		●	●	●
2014	●	●	●		●						●		●	●	●
2015	●	●	●		●						●		●	●	●
2016	●	●	●		●						●	●	●	●	●
2017	●	●	●		●			●	●	●	●	●	●	●	●
2018	●	●	●		●	●		●	●	●	●	●	●	●	●
2019	●	●	●		●			●	●	●	●	●	●	●	●
FDEP Criteria	<=11	<=11	<=20	<=20	<=15.5	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20	<=20

● Meeting criteria
● Not meeting criteria
● No numeric criteria

2010	4.00	5.80	13.00		6.71										
2011	4.14	4.54	8.76		5.48										
2012	3.71	10.50	8.86		7.01						1.48		3.92	1.22	1.92
2013	7.00	5.27	4.58		5.52						3.97		1.48	0.82	1.69
2014	6.85	4.62	7.26		6.13						3.31		10.84	3.98	5.23
2015	4.33	4.61	3.61		4.16						5.33		7.78	3.69	5.35
2016	3.55	2.76	3.10		3.12						4.54	3.39	9.04	8.40	5.85
2017	3.13	2.22	0.85		1.81			4.23	5.22	4.70	4.49	5.45	6.61	4.63	5.23
2018	6.14	4.34	5.17		5.16	2.23		7.17	8.20	7.67	2.13	1.90	3.37	3.17	2.56
2019	7.56	9.13	12.05		9.41			4.03	8.16	5.73	4.70	2.80	3.69	3.05	3.49

Table 5-11 Water Quality Trends
C-15 Watershed

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
31C	1999 - 2019	-0.357016	-0.000118	< 0.0001	Significant Decreasing Trend
31E	1999 - 2019	-0.290063	-0.000101	< 0.0001	Significant Decreasing Trend
31B	2000 - 2019	-0.229576	-0.000048	0.000132	Significant Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
31C	1999 - 2019	-0.114478	-0.000005	0.114661	Decreasing Trend
31E	1999 - 2019	-0.043676	-0.000006	0.552520	Decreasing Trend
31B	2000 - 2019	-0.187892	-0.000010	0.002992	Significant Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
31C	1999 - 2019	-0.132146	-0.001498	0.076178	Decreasing Trend
31E	1999 - 2019	-0.057229	-0.000823	0.437841	Decreasing Trend
31B	2000 - 2019	0.038430	0.000271	0.700358	Increasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
C-16 Watershed

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
22	2004 - 2019	-0.238590	-0.000060	0.003118	Significant Decreasing Trend
24	1999 - 2019	-0.326457	-0.000077	< 0.0001	Significant Decreasing Trend
27B	1999 - 2019	-0.197787	-0.000058	0.011712	Significant Decreasing Trend
27A	1999 - 2019	-0.406646	-0.000118	< 0.0001	Significant Decreasing Trend
28	1999 - 2019	-0.167577	-0.000041	0.004578	Significant Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
22	2004 - 2019	-0.002005	0.000000	0.982785	Decreasing Trend
24	1999 - 2019	-0.150391	-0.000004	0.037080	Significant Decreasing Trend
27B	1999 - 2019	-0.039861	-0.000003	0.599807	Decreasing Trend
27A	1999 - 2019	-0.301928	-0.000018	< 0.0001	Significant Decreasing Trend
28	1999 - 2019	-0.104553	-0.000003	0.088101	Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
22	2004 - 2019	0.203970	0.002045	0.008865	Significant Increasing Trend
24	1999 - 2019	0.031181	0.000270	0.679638	Increasing Trend
27B	1999 - 2019	0.013312	0.000101	0.872543	Increasing Trend
27A	1999 - 2019	-0.184644	-0.001603	0.014401	Significant Decreasing Trend
28	1999 - 2019	0.166312	0.000924	0.094382	Increasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
C-17 Watershed
(Page 3 of 14)

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
12A	1999 - 2019	-0.269583	-0.000072	0.000122	Significant Decreasing Trend
C17S44	1999 - 2019	-0.359972	-0.000049	< 0.0001	Significant Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
12A	1999 - 2019	-0.049234	-0.000001	0.482051	Decreasing Trend
C17S44	1999 - 2019	-0.021714	-0.0000003	0.686982	Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
12A	1999 - 2019	-0.056574	-0.000399	0.438333	Decreasing Trend
C17S44	1999 - 2019	-0.019921	-0.000200	0.915730	Decreasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
C-18 Watershed
(Page 4 of 14)

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
16	1999 - 2019	-0.085564	-0.000023	0.231490	Decreasing Trend
15	1999 - 2019	-0.265610	-0.000059	0.000506	Significant Decreasing Trend
92	1999 - 2019	-0.079646	-0.000012	0.134413	Decreasing Trend
81	1999 - 2019	-0.059051	-0.000008	0.269074	Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
16	1999 - 2019	-0.170921	-0.000003	0.015934	Significant Decreasing Trend
15	1999 - 2019	-0.237020	-0.000003	0.001130	Significant Decreasing Trend
92	1999 - 2019	0.153241	0.000001	0.006072	Significant Increasing Trend
81	1999 - 2019	-0.001308	0.000000	0.982786	Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
16	1999 - 2019	0.009514	0.000000	0.901574	Increasing Trend
15	1999 - 2019	-0.163168	-0.000166	0.030859	Significant Decreasing Trend
92	1999 - 2019	0.113320	0.000153	0.297837	Increasing Trend
81	1999 - 2019	0.240206	0.000513	0.030194	Significant Increasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
C-51 Watershed
(Page 5 of 14)

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
38B	1999 - 2019	-0.342880	-0.000138	< 0.0001	Significant Decreasing Trend
37B	1999 - 2019	-0.274428	-0.000099	0.000158	Significant Decreasing Trend
C51S155	1999 - 2019	-0.182454	-0.000048	0.000372	Significant Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
38B	1999 - 2019	0.101354	0.000004	0.161852	Increasing Trend
37B	1999 - 2019	0.031629	0.000001	0.670577	Increasing Trend
C51S155	1999 - 2019	0.034328	0.000001	0.514242	Increasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
38B	1999 - 2019	-0.051177	-0.000173	0.480619	Decreasing Trend
37B	1999 - 2019	-0.072134	-0.000164	0.328393	Decreasing Trend
C51S155	1999 - 2019	-0.411713	-0.001171	0.001300	Significant Decreasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends

Loxahatchee Watershed

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
69	2003 - 2019	-0.202183	-0.000047	0.000226	Significant Decreasing Trend
51	2000 - 2019	-0.271794	-0.000060	0.000185	Significant Decreasing Trend
62	2000 - 2019	-0.236781	-0.000081	< 0.0001	Significant Decreasing Trend
72	2000 - 2019	-0.088738	-0.000027	0.088438	Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
69	2003 - 2019	0.001408	0.000000	0.980925	Increasing Trend
51	2000 - 2019	-0.044970	0.000000	0.531945	Decreasing Trend
62	2000 - 2019	0.106161	0.000002	0.055036	Increasing Trend
72	2000 - 2019	-0.031604	-0.0000002	0.547609	Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
69	2003 - 2019	-0.083343	-0.000186	0.133099	Decreasing Trend
51	2000 - 2019	-0.105373	-0.000211	0.161379	Decreasing Trend
62	2000 - 2019	-0.008340	-0.000019	0.882957	Decreasing Trend
72	2000 - 2019	-0.058912	-0.000327	0.264281	Decreasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
ICWW-N Watershed

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
30	2000 - 2019	-0.248461	-0.000073	0.000511	Significant Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
30	2000 - 2019	-0.106852	-0.000001	0.133347	Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
30	2000 - 2019	-0.137618	-0.000340	0.067902	Decreasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
Lake Worth Lagoon North Watershed

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
LWL-1	1999 - 2019	-0.274928	-0.000040	< 0.0001	Significant Decreasing Trend
11	1999 - 2019	-0.321853	-0.000088	< 0.0001	Significant Decreasing Trend
13	2000 - 2019	-0.268795	-0.000077	< 0.0001	Significant Decreasing Trend
LWL-4	2004 - 2019	-0.251979	-0.000027	< 0.0001	Significant Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
LWL-1	1999 - 2019	-0.149496	-0.000002	0.017599	Significant Decreasing Trend
11	1999 - 2019	0.166250	0.000003	0.002915	Significant Increasing Trend
13	2000 - 2019	0.092850	0.000002	0.102227	Increasing Trend
LWL-4	2004 - 2019	-0.263436	-0.000002	< 0.0001	Significant Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
LWL-1	1999 - 2019	-0.119752	-0.000261	0.067732	Decreasing Trend
11	1999 - 2019	0.036487	0.000051	0.524745	Increasing Trend
13	2000 - 2019	0.071769	0.000174	0.212188	Increasing Trend
LWL-4	2004 - 2019	-0.090768	-0.000090	0.166572	Decreasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
Lake Worth Lagoon Center Watershed
(Page 9 of 14)

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
LWL-8	1999 - 2019	-0.032099	-0.000006	0.582489	Decreasing Trend
18C	2004 - 2019	-0.290909	-0.000111	< 0.0001	Significant Decreasing Trend
18D	2005 - 2019	-0.349841	-0.000132	< 0.0001	Significant Decreasing Trend
LWL-11	1999 - 2019	-0.142654	-0.000036	0.021629	Significant Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
LWL-8	1999 - 2019	-0.019232	-0.0000003	0.733689	Decreasing Trend
18C	2004 - 2019	-0.022724	-0.000001	0.713299	Decreasing Trend
18D	2005 - 2019	-0.024282	-0.000001	0.700918	Decreasing Trend
LWL-11	1999 - 2019	-0.107212	-0.000002	0.078906	Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
LWL-8	1999 - 2019	0.173407	0.000471	0.003439	Significant Increasing Trend
18C	2004 - 2019	0.035485	0.000174	0.554402	Increasing Trend
18D	2005 - 2019	0.132936	0.000700	0.035670	Significant Increasing Trend
LWL-11	1999 - 2019	0.025619	0.000072	0.691168	Increasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
ICWW-S Watershed
(Page 10 of 14)

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
LWL-13	2004 - 2019	-0.233130	-0.000045	0.000225	Significant Decreasing Trend
LWL-18	2000 - 2019	-0.221880	-0.000045	0.000333	Significant Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
LWL-13	2004 - 2019	-0.222143	-0.000003	0.000352	Significant Decreasing Trend
LWL-18	2000 - 2019	-0.048443	-0.000001	0.419942	Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
LWL-13	2004 - 2019	-0.078114	-0.000156	0.218619	Decreasing Trend
LWL-18	2000 - 2019	0.107137	0.000283	0.088861	Increasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
Hillsboro Watershed
(Page 11 of 14)

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
1	2006 - 2019	-0.060555	-0.000024	0.619118	Decreasing Trend
2	2006 - 2019	0.065339	0.000018	0.585669	Increasing Trend
3	2006 - 2019	-0.111414	-0.000022	0.365331	Decreasing Trend
S39	2000 - 2019	-0.481070	-0.001007	0.000774	Significant Decreasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
1	2006 - 2019	-0.187500	-0.000006	0.123054	Decreasing Trend
2	2006 - 2019	-0.184400	-0.000009	0.144169	Decreasing Trend
3	2006 - 2019	-0.161616	-0.000008	0.200040	Decreasing Trend
S39	2000 - 2019	-0.374838	-0.000003	< 0.0001	Significant Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
1	2006 - 2019	-0.203783	-0.000777	0.062235	Decreasing Trend
2	2006 - 2019	-0.423878	-0.002557	< 0.0001	Significant Decreasing Trend
3	2006 - 2019	-0.363461	-0.002727	0.000384	Significant Decreasing Trend
S39	No Data	No Data	No Data	No Data	

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
L-8 Watershed
(Page 12 of 14)

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
Culv10a	2000 - 2019	0.142575	0.000283	0.355128	Increasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
Culv10a	2000 - 2019	-0.004262	-0.0000002	0.924185	Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
Culv10a	2000 - 2019	0.496780	0.001145	0.035240	Significant Increasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends

S-2-6-7 Watershed

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
S-2	1999 - 2019	-0.046921	-0.000089	0.806418	Decreasing Trend
39	2017 - 2019	0.146795	0.001245	0.584648	Increasing Trend
43	2017 - 2019	0.076923	0.000000	0.742557	Increasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
S-2	1999 - 2019	0.028419	0.000001	0.511202	Increasing Trend
39	2017 - 2019	-0.102332	-0.000017	0.657216	Decreasing Trend
43	2017 - 2019	-0.055559	-0.000032	0.826152	Decreasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
S-2	1999 - 2019	0.000000	0.000000	1.000000	Increasing Trend
39	2017 - 2019	0.067049	0.000758	0.783344	Increasing Trend
43	2017 - 2019	0.098901	0.000000	0.661416	Increasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

[2] Results contain serial correlation (as per autocorrelation analysis results) used the p-value adjusted for serial correlation.

[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.

Table 5-11 Water Quality Trends
WPBWS Watershed
(Page 14 of 14)

Total Nitrogen

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
M Canal	2011 - 2019	0.035000	0.000019	0.680756	Increasing Trend
Control 4	2011 - 2019	-0.011831	0.000000	0.916794	Decreasing Trend
Lake Mangonia	2011 - 2019	-0.031736	-0.000005	0.751122	Decreasing Trend
Clear Lake	2011 - 2019	0.010269	0.000000	0.922305	Increasing Trend

Total Phosphorus

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
M Canal	2011 - 2019	0.197244	0.000015	0.021443	Significant Increasing Trend
Control 4	2011 - 2019	-0.022515	0.000000	0.830733	Decreasing Trend
Lake Mangonia	2011 - 2019	0.214406	0.000001	0.035146	Significant Increasing Trend
Clear Lake	2011 - 2019	0.046279	0.000000	0.649624	Increasing Trend

Total Chlorophyll-a (corrected)

Site	Date Range	Tau	Slope[1]	Selected P-Value[2]	Statistical Trend Interpretation[3]
M Canal	2011 - 2019	-0.002560	0.000000	0.983454	Decreasing Trend
Control 4	2011 - 2019	-0.086472	0.000000	0.480427	Decreasing Trend
Lake Mangonia	2011 - 2019	-0.050339	-0.000632	0.652938	Decreasing Trend
Clear Lake	2011 - 2019	0.114889	0.000389	0.304627	Increasing Trend

[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) and the concentration is low in the water, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. A negative slope is an indication of a decreasing trend, while a positive slope is an indication of an increasing trend.

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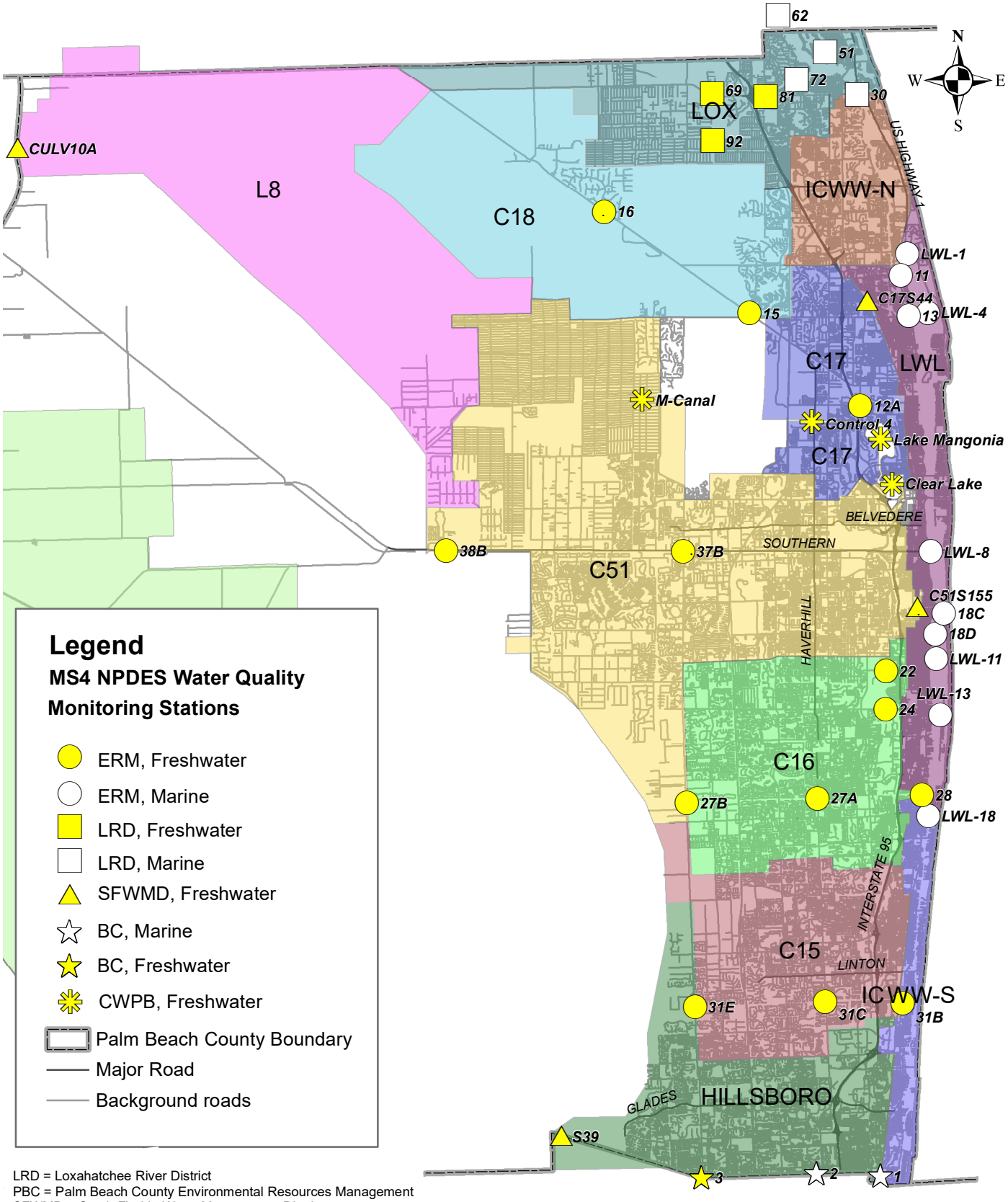
[3] If the p-value is less than 0.05, then a decreasing trend may suggest an improvement in water quality, and an increasing trend may suggest a decline in water quality.



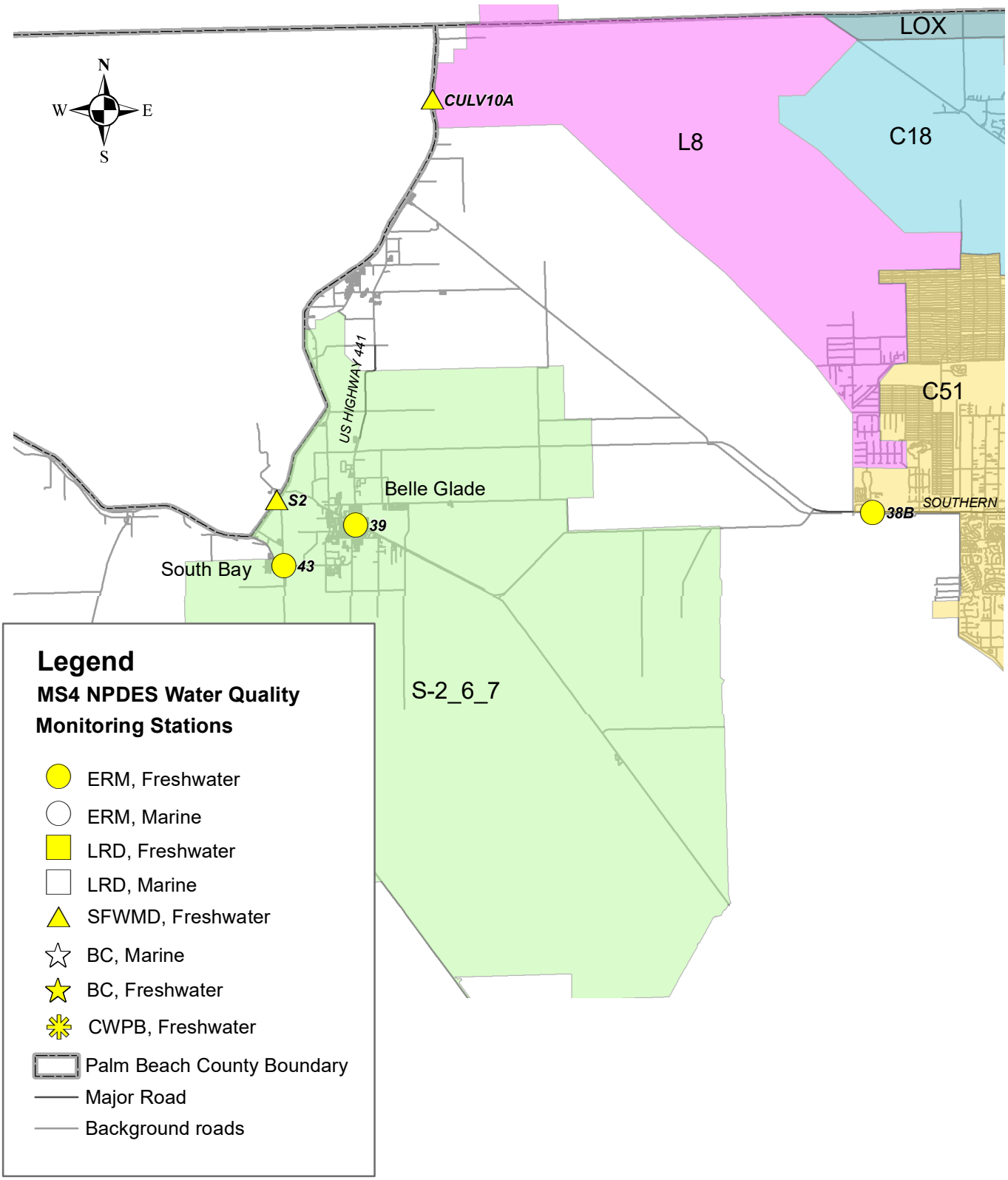
LRD = Loxahatchee River District
PBC = Palm Beach County Environmental Resources Management
SFWMD = South Florida Water Management District
BC = Broward County
LWL = Lake Worth Lagoon
CWPB = City of West Palm Beach

F:\npbc\npbcnpds\WQmonitoring\2018-2019\WQ_Stations.mxd

P.A. No.: B6050.90

Palm Beach County (Eastern Area) Watershed Boundaries and Water Quality Monitoring Stations

Figure 5-1



LRD = Loxahatchee River District
PBC = Palm Beach County Environmental Resources Management
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CWPB = City of West Palm Beach

F:\npbc\npbcnpds\WQmonitoring\2018-2019\WQ_Stations.mxd

P.A. No.: B6050.90

Palm Beach County (Western Area) Watershed Boundaries and Water Quality Monitoring Stations

Figure 5-1

Figure 5-2 Total Phosphorous Trend

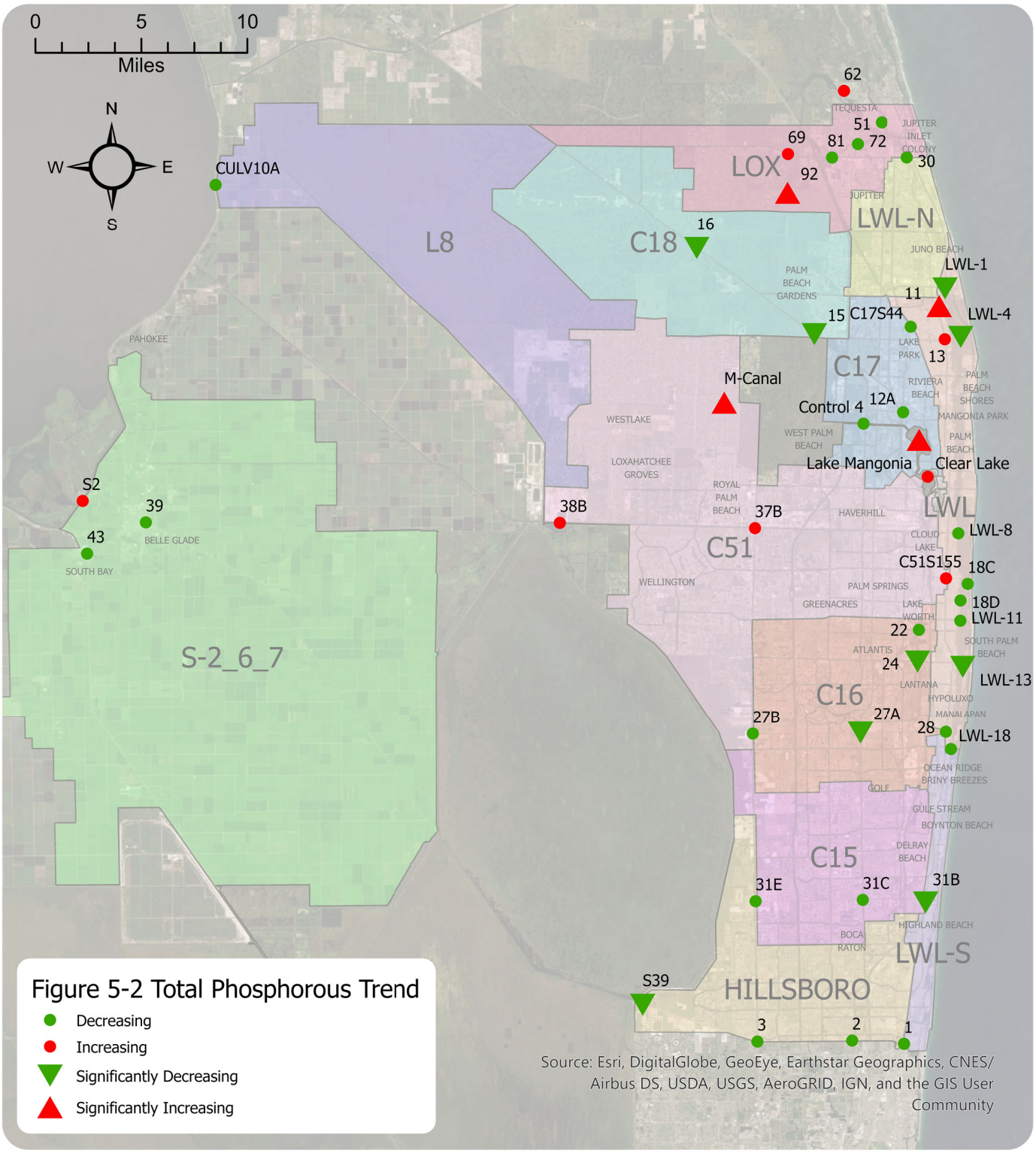


Figure 5-3 Total Nitrogen Trend

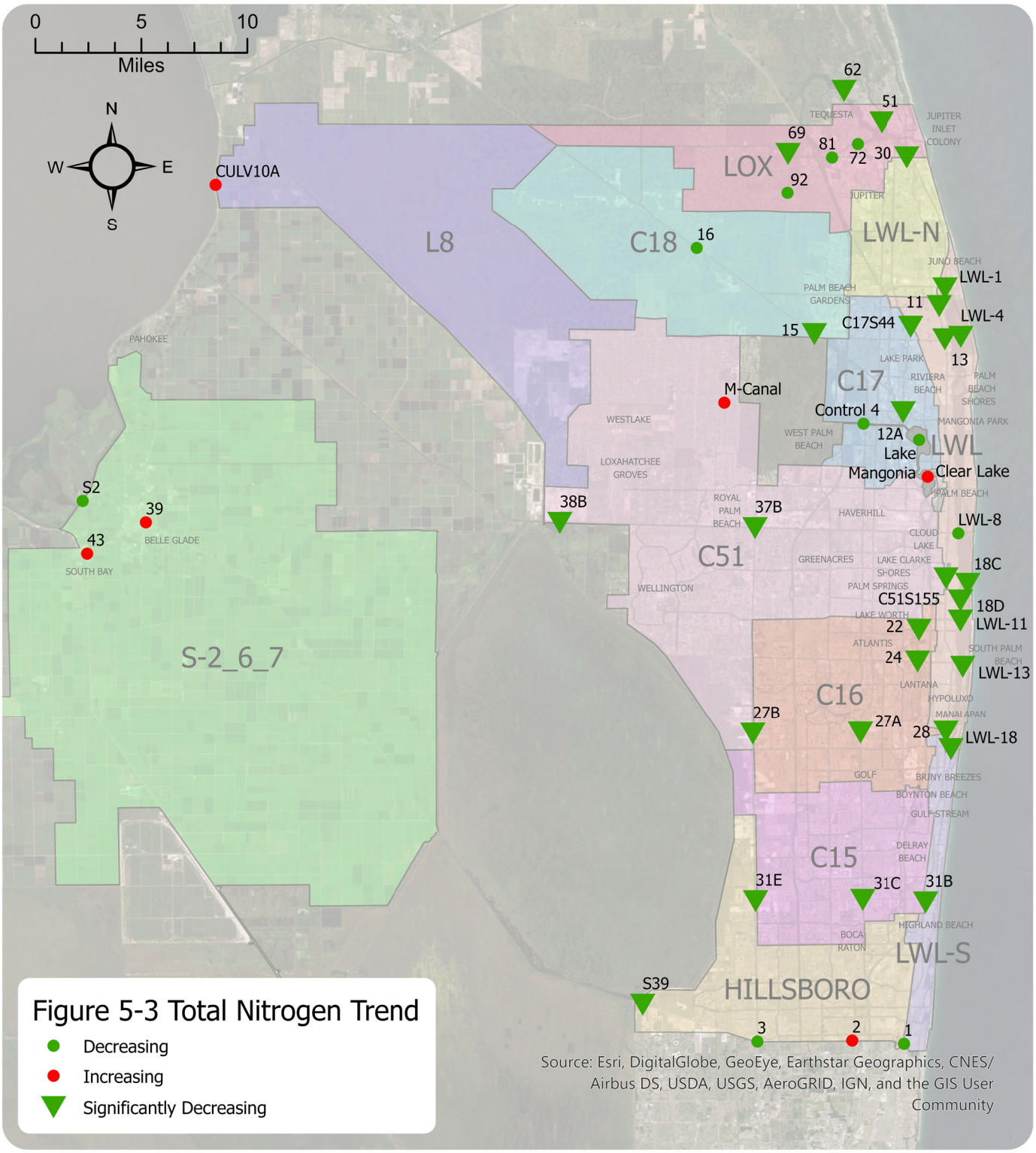


Figure 5-4 Chlorophyll-a (corrected) Trend

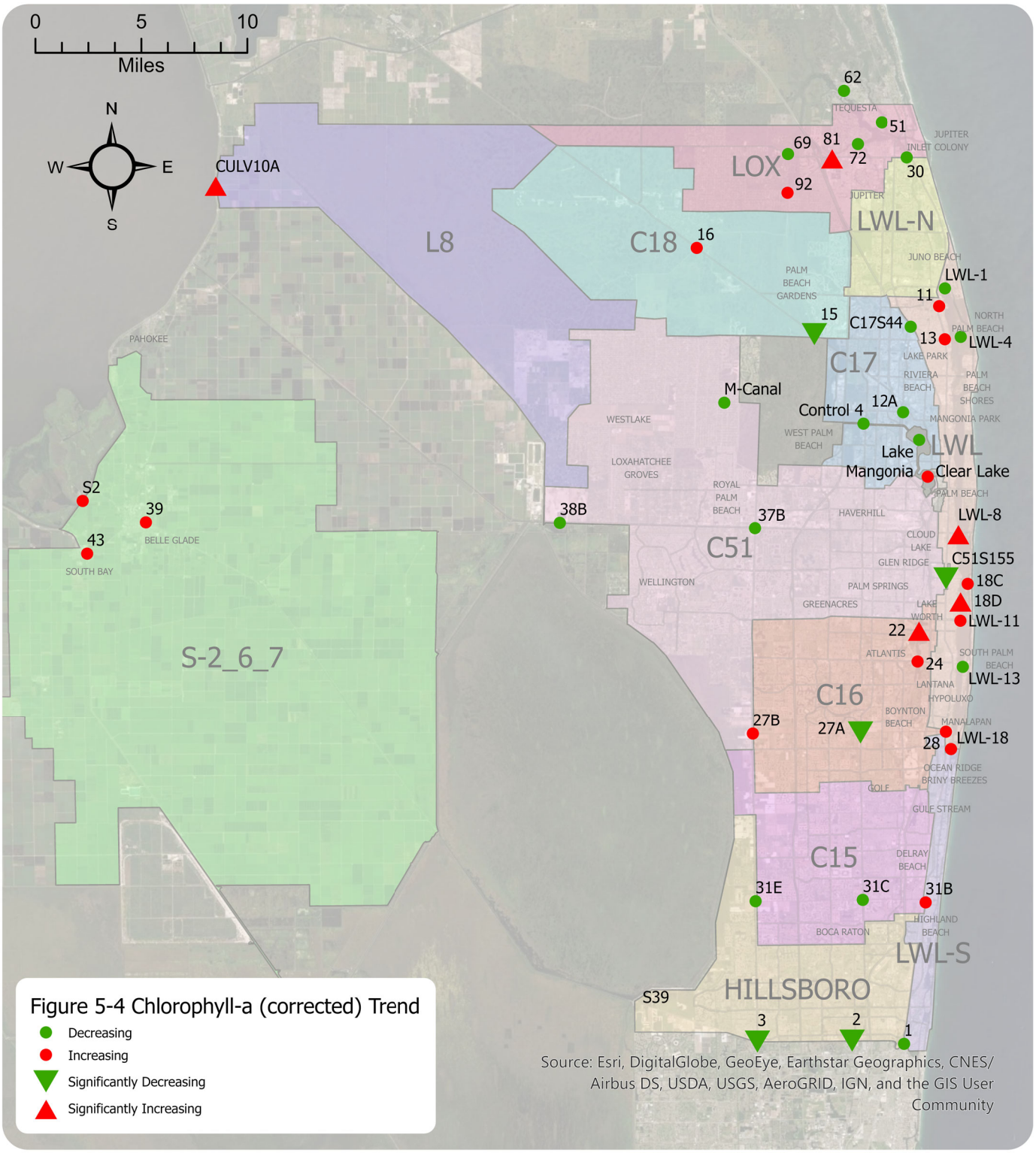


Figure 5-5 Decreasing Trend Not Significant Example

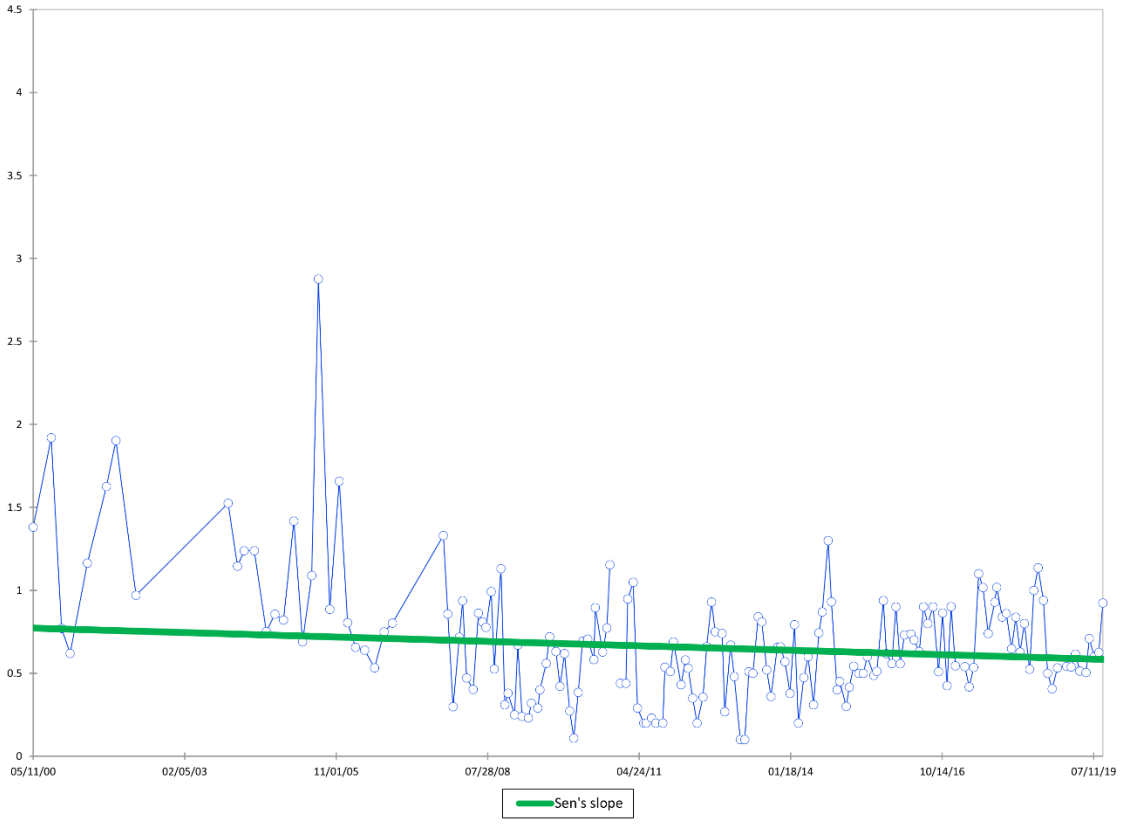
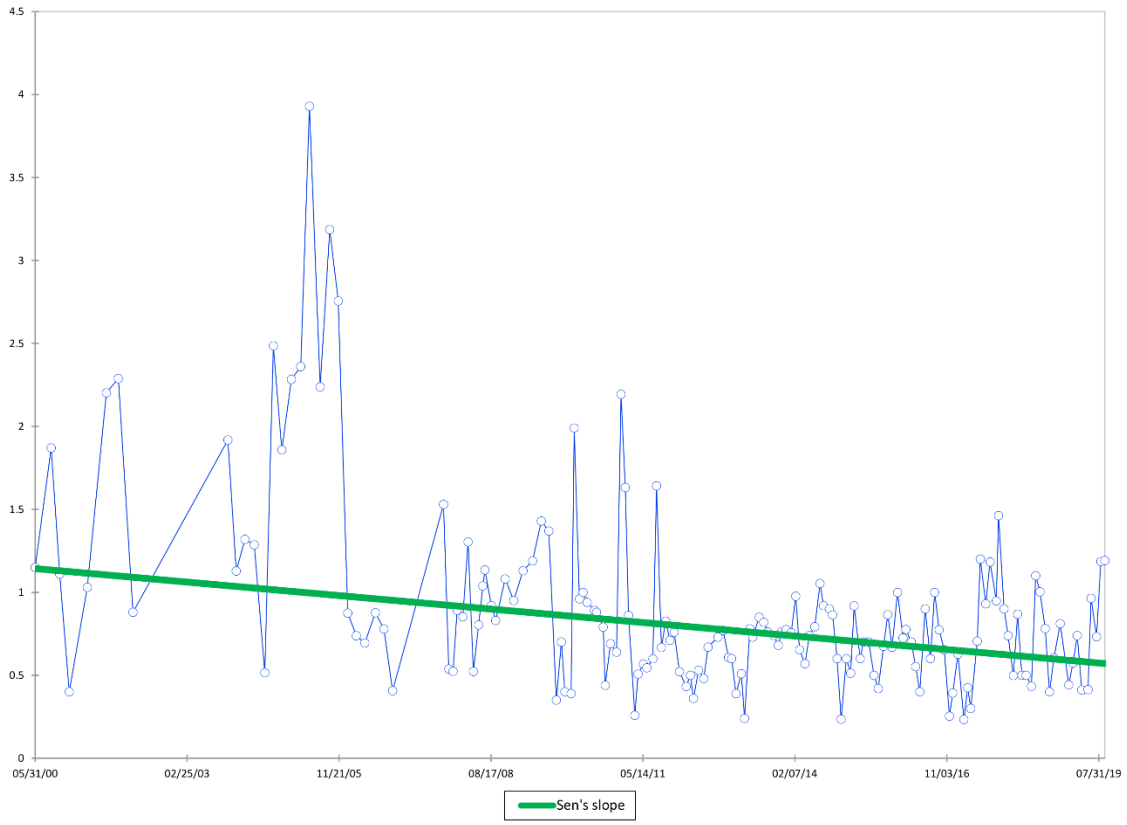


Figure 5-6 Decreasing Trend Significant Example



APPENDIX A

Loxahatchee River
Pollutant Reduction Plan

Loxahatchee River Pollutant Reduction Plan

developed by the
Stakeholders in the Loxahatchee River Basin

with support from the
Division of Environmental Assessment and Restoration
Water Quality Assessment Program
Florida Department of Environmental Protection

February 2020

Acknowledgments

The plan was developed by the stakeholders from within the Loxahatchee River basin identified below (**Table A-1**), with support from the Florida Department of Environmental Protection (DEP) and Wildwood Consulting. The Loxahatchee River Management Coordinating Council (LRMCC) provided a public forum for collaboration during the development of this plan.

Table A-1. Loxahatchee River stakeholders

Type of Entity	Name
Local Government	Martin County Palm Beach County Town of Jupiter Village of Tequesta City of Palm Beach Gardens
Agencies	Florida Department of Agriculture and Consumer Services Florida Department of Environmental Protection Florida Department of Transportation Florida Fish and Wildlife Conservation Commission South Florida Water Management District Treasure Coast Regional Planning Council U.S. Army Corps of Engineers U.S. Department of Interior, Bureau of Land Management U.S. Fish and Wildlife Service
Special Districts	Jupiter Inlet District Loxahatchee River Environmental Control District Northern Palm Beach County Improvement District South Indian River Water Control District
Other Interested Stakeholders	Citizens Florida Farm Bureau Indian River Keeper Landowner Representatives Local River User Groups Loxahatchee River Management Coordinating Council Martin County Conservation Alliance Palm Beach County Florida Native Plant Society Chapter

Table of Contents

Acknowledgments 2
Table of Contents 3
List of Figures 4
List of Tables 5
List of Acronyms and Abbreviations 6
Section 1 . Executive Summary 8
Section 2 : Background 9
2.1 Purpose of the Plan 9
2.2 Pollutant Reduction Planning Process 10
2.3 Geographic Boundaries of the Plan 10
2.4 Stakeholder Involvement 11
Section 3 : Impaired Waterbodies 12
3.1 Description of the Impaired Waterbodies 12
3.2 Pollutants of Concern 14
Section 4 : Water Quality and Aquatic Ecological Goals 15
4.1 Water Quality Criteria 15
4.2 Use of PLSM for Watershed Loading Estimates 19
4.3 Schedule to Meet Targets and Restoration Goals 23
Section 5 : Proposed Management Activities 26
5.1 Responsible Participating Entities 26
5.2 Management Activities for Nutrients 26
5.3 Management Activities for FIB 33
5.4 Commitment to Implementation 38
Section 6 : Monitoring, Reporting Results, and Adaptive Management 39
6.1 Water Quality Monitoring 39
5.1.1 Objectives 39
5.1.2 Water Quality Parameters, Frequency, and Network 40
6.2 Data Management and Assessment 48
6.3 QA/QC 48
6.4 Frequency and Reporting Format for Implementation of Management Actions 49
5.5 Adaptive Management Actions 49

Section 7 : References 51

List of Figures

Figure 1. Loxahatchee River Pollutant Reduction Plan Boundary 11
Figure 2. Loxahatchee River WBIDs 13
Figure 3. Least Squares Regression Analysis Between AGM and AAM Within the Loxahatchee Estuary 16
Figure 4. Monitoring Stations Used in Regression Analysis 17
Figure 5. Rainfall Over the Plan Boundary from 2006 through 2014 18
Figure 6. Annual Mean Chlorophyll-a Concentration Compared to Simulated Nutrient Loads for TN and TP 18
Figure 7. Treated Areas Within the Pollutant Reduction Plan Boundary 21
Figure 8. Former Dairy Land Uses Now Attributed to Residential Land Uses Based on FSAID 5 . 22
Figure 9. Estimated TN Reduction Schedule Based on Project Completion Dates 24
Figure 10. Estimated TP Reduction Schedule Based on Project Completion Dates 24
Figure 11. Water Quality Stations Monitored Monthly and Semi-annually Within the Loxahatchee River Pollutant Reduction Plan Boundary for Nutrients 41
Figure 12. Water Quality Stations Monitored Quarterly Within the Loxahatchee River Pollutant Reduction Plan Boundary for Nutrients 42
Figure 13. Water Quality Stations Within the Loxahatchee River Pollutant Reduction Plan Boundary for Bacteria 46

List of Tables

Table A-1. Loxahatchee River stakeholders 2
Table 1. List of WBIDs and Impairments 14
Table 2. NNC Water Quality Criteria 15
Table 3. Rainfall Averages Within the Pollutant Reduction Plan Boundary Per NEXRAD 20
Table 4. Estimated Reductions from Management Activities Completed Between 2008 and 2018 . 23
Table 5. Estimated Reductions from All Management Activities Through 2022 23
Table 6. Nutrient Management Activities 27
Table 7. FIB Efforts in the Loxahatchee River Pollutant Reduction Plan 34
Table 8. Water Quality Monitoring Parameters for Nutrients 40
Table 9. Water Quality Monitoring Stations Within the Loxahatchee River Pollutant Reduction Plan Boundary for Nutrients 43
Table 10. Water Quality Monitoring Parameters for Bacteria 45
Table 11. Water Quality Monitoring Stations Within the Loxahatchee River Pollutant Reduction Plan Boundary for Bacteria 47

List of Acronyms and Abbreviations

μg/L	Micrograms Per Liter
AHRES	Aquatic Habitat Restoration Enhancement Section
AAM	Annual Arithmetic Mean
AGM	Annual Geometric Mean
BMAP	Basin Management Action Plan
BMP	Best Management Practice
CERP	Comprehensive Everglades Restoration Plan
DEP	Florida Department of Environmental Protection
EMC	Event Mean Concentration
ENR	Estuary Nutrient Region
EPA	(U.S.) Environmental Protection Agency
ERP	Environmental Resource Permit
F.A.C.	Florida Administrative Code
FAR	Florida Administrative Register
FDACS	Florida Department of Agriculture and Consumer Services
FDOT	Florida Department of Transportation
FIB	Fecal Indicator Bacteria
FLUCCS	Florida Land Use and Cover Classification System
FSAID	Florida Statewide Agricultural Irrigation Demand
FWC	Florida Fish and Wildlife Conservation Commission
FWRA	Florida Watershed Restoration Act
FYN	Florida Yards & Neighborhoods (Program)
GIS	Geographic Information System
HOA	Homeowners Association
IWR	Impaired Waters Rule
kg/yr	Kilogram Per year
lbs/yr	Pounds Per Year
LF	Linear Feet
LRD	Loxahatchee River Environmental Control District
LRMCC	Loxahatchee River Management Coordinating Council
LRPI	Loxahatchee River Preservation Initiative
MGD	Million Gallons Per Day
mg/L	Milligrams Per Liter
NELAC	National Environmental Laboratory Accreditation Conference
NELAP	National Environmental Laboratory Accreditation Program
NEXRAD	Next Generation Weather Radar
NNC	Numeric Nutrient Criteria
NPDES	National Pollutant Discharge Elimination System
OSTDS	Onsite Sewage Treatment and Disposal System
PLSM	Pollutant Load Screening Model
PSA	Public Service Announcement
QA/QC	Quality Assurance/Quality Control
RAP	Reasonable Assurance Plan
ROC	Runoff Coefficient
SFWMD	South Florida Water Management District

SOP	Standard Operating Procedure
STORET	Storage and Retrieval (Database)
SWET	Soil and Water Engineering and Technology
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
WBID	Waterbody Identification (Number)
WIN	Watershed Information Network

Section 1. Executive Summary

The purpose of this document is to provide information on implementing a voluntary pollutant reduction (4e) plan in which stakeholders in the Loxahatchee River area have provided nutrient management activities, either in place or planned, to make progress toward achieving the area's water quality criteria set for nutrients. For example, the Northwest Fork and Southwest Fork are impaired for chlorophyll-a because they do not meet the water quality criteria. The Loxahatchee River Above Cypress Creek is impaired for nutrients based on the presence of algal mats. Pollutants of concern include total nitrogen (TN) and total phosphorus (TP), which are contributing to elevated chlorophyll-a levels. Local stakeholders devoted to restoring the river and estuary have initiated this plan to proactively remedy water quality impairments without a state prescribed total maximum daily load (TMDL) or a basin management action plan (BMAP). This plan is focused on restoring water quality in the Loxahatchee River through local, cooperative efforts.

These proactive efforts are voluntary and are undertaken, in part, to postpone the development of a TMDL as well as to start restoration activities sooner and more cost effectively. In the future, it is possible that a revised plan could be prepared and adopted as a reasonable assurance plan (RAP), which would replace the need for a TMDL. Alternatively, if stakeholders are unable to reach the water quality targets with voluntary efforts, DEP could develop and adopt a TMDL.

Additionally, the stakeholders have included information on fecal indicator bacteria (FIB) and efforts to reduce bacteriological pollution in the Loxahatchee River. The information on FIB and management activities provided in this plan express the desire of the stakeholders to proactively address bacteriological impairments and assess the causes of FIB exceedances in segments of the Loxahatchee River. Stakeholders intend to work through the processes designed by DEP to assist in identifying FIB sources and, where feasible, implement management activities that have the potential to reduce FIB either on their own or in conjunction with nutrient management activities.

The efforts of the Loxahatchee River stakeholders to address the nutrient and FIB issues and to measure the response to these management activities are presented as a 4e pollutant reduction plan and are described in this report. Section 4 includes two tables of management activities—one that describes recently completed, underway, or planned to address nutrients and another that lists FIB-related efforts. Section 5 describes the monitoring program and the data management approach.

With these local efforts, water quality improvements are expected, but there is uncertainty in whether water quality targets will be met. It is expected that more projects will be added to this plan each year as new budgets are approved. For planned management activities listed in this report, funding will be needed. Additional projects, policies, and funding should be pursued to address nutrient loads while more data are collected to better understand the watershed dynamics.

Section 2: Background

2.1 Purpose of the Plan

The purpose of this document is to provide information on implementing a voluntary pollutant reduction plan in which stakeholders in the Loxahatchee River area have provided nutrient management activities, either in place or planned, to make progress toward achieving the area's water quality criteria set for nutrients. Local stakeholders devoted to restoring the river and estuary have initiated this plan to proactively remedy water quality impairments without a state prescribed TMDL or a BMAP. This plan is focused on restoring water quality in the Loxahatchee River through local, cooperative efforts.

These proactive efforts are voluntary and are undertaken, in part, to postpone the development of a TMDL as well as to start restoration activities sooner and more cost effectively. In the future, it is possible that a revised plan could be prepared and adopted as a RAP, which would replace the need for a TMDL. Alternatively, if stakeholders are unable to reach the water quality targets with voluntary efforts, DEP could develop and adopt a TMDL. DEP does not plan to pursue a TMDL without first reviewing the results of the voluntary efforts outlined in this plan, considering any adaptive management adjustments to the plan, and conferring with local stakeholders.

Additionally, the stakeholders have included information on FIB and efforts to reduce bacteriological pollution in the Loxahatchee River. The information on FIB and management activities provided in this plan express the desire of the stakeholders to proactively address bacteriological impairments and assess the causes of FIB exceedances in segments of the Loxahatchee River. Stakeholders intend to work through the processes designed by DEP to assist in identifying FIB sources and, where feasible, implement management activities that have the potential to reduce FIB either on their own or in conjunction with nutrient management activities.

The efforts of the Loxahatchee River stakeholders to address the nutrient and FIB issues and to measure the response to these management activities are presented as a 4e pollutant reduction plan and are described in this report.

The Impaired Waters Rule (IWR), Chapter 62-303, of the Florida Administrative Code (Identification of Impaired Surface Waters) establishes a formal mechanism for identifying surface waters in Florida that are impaired (do not meet the applicable water quality standards) by pollutants. Most waters that are verified by DEP as impaired by a pollutant will be listed on the state's 303(d) list submitted to EPA pursuant to the Florida Watershed Restoration Act (FWRA) and section 303(d) of the Clean Water Act. Once listed, TMDLs will be developed for the pollutants causing the impairment of the listed waters. However, as required by the FWRA, DEP evaluates whether existing or proposed pollution control mechanisms will effectively address the impairment before placing a water body on the state's verified list. If there is a pollutant reduction plan for the impairment that will be addressed by control measure(s), then the waters will be included on the study list. This pollutant reduction plan for nutrients and FIB provides the documentation that the chlorophyll-a and FIB impairments are being addressed. If during future reviews of this plan stakeholders are able to provide documentation that the nutrient impairments are being addressed to

an extent that there is reasonable assurance that the water quality targets will be met, DEP will work with stakeholders to amend the pollutant reduction plan to become a reasonable assurance plan (4b).

2.2 Pollutant Reduction Planning Process

To provide documentation that the pollution management activities described in this Loxahatchee River Pollutant Reduction Plan will contribute to the restoration of designated uses, the following information is provided:

Section two provides a description of the impaired water including waterbody identification (WBID) number, type of waterbody, water use classification, designated uses not being attained, area of impaired water, the pollutants of concern, and the potential sources of concern.

Section three provides water quality-based targets, aquatic ecological goals, a discussion of how these goals will result in the improvement of water quality, and a schedule to meet the targets and restoration goals (both interim and final).

Section four provides information on the proposed management activities, including responsible participating entities, existing and proposed management strategies, estimated pollutant load reduction expected to occur from implementation of management activities, future growth considerations, implementation schedule, funding opportunities and deficiencies, enforcement programs and ordinances, and stakeholder commitment to plan implementation.

Section five details the existing water quality monitoring network including: stations, parameters, and sampling frequency that will be used to demonstrate progress. This section also details quality assurance/quality control (QA/QC) compliance, data entry requirements, reporting frequency and format for implementation of management activities, methodology for evaluating progress towards goals, and adaptive management actions.

Section six includes the references cited in the body of the report.

2.3 Geographic Boundaries of the Plan

The Loxahatchee River watershed included in the loading model for this plan **(Figure 1**) covers an area of approximately 51,834 acres which includes the lands surrounding the three main tributaries (or forks) within the Loxahatchee River watershed. The modeled area and acreage listed excludes most open waters within the boundary (about 1,300 acres of ponds and creeks are included in the model) as they do not contribute to nutrient loading. The plan area includes both the northern portion of Palm Beach County and the southern portion of Martin County. Major population centers within the Loxahatchee River Pollutant Reduction Plan (4e) boundary include the Town of Jupiter and the Village of Tequesta.

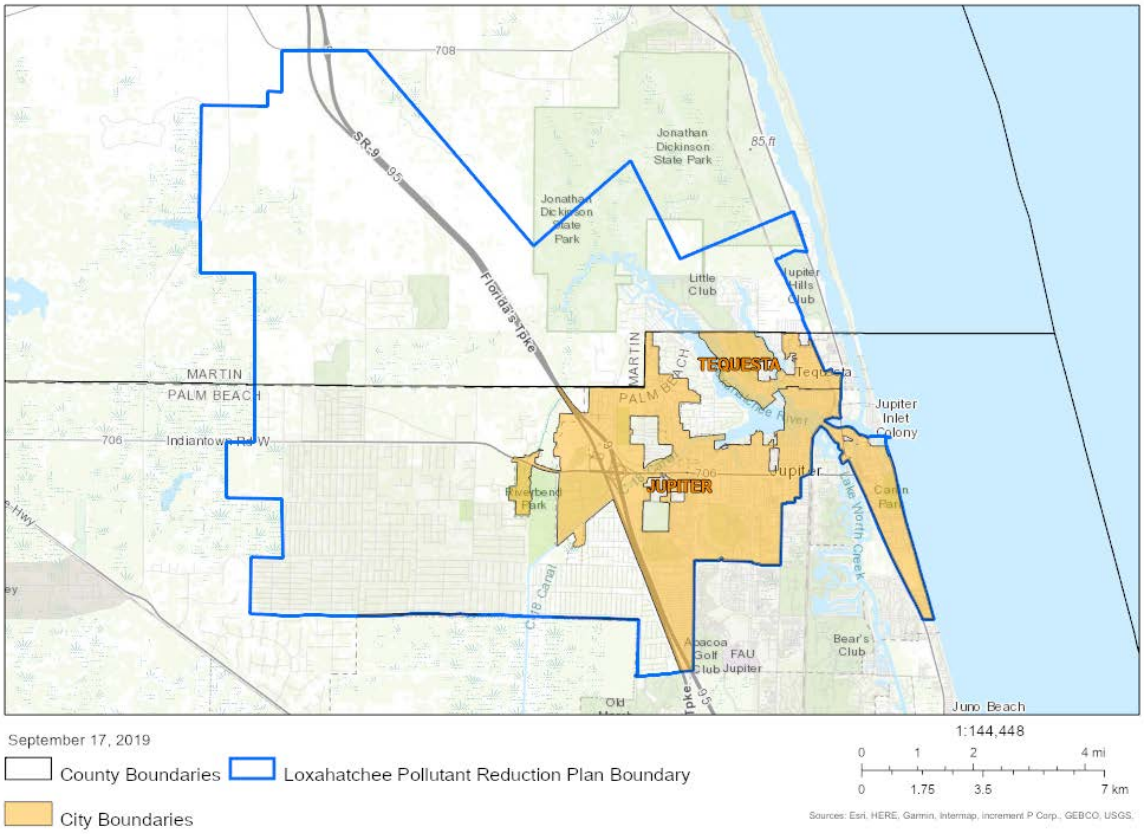


Figure 1. Loxahatchee River Pollutant Reduction Plan Boundary

2.4 Stakeholder Involvement

The Loxahatchee River Pollutant Reduction Plan was a result of stakeholder interest in addressing water quality impairments. The LRMCC provided the initial forum for stakeholder engagement to develop the pollutant reduction plan. The collaborative process to develop the pollutant reduction plan began in 2016 and provided an opportunity for local, regional, state, and federal government, environmental groups, business interests, and citizens to actively engage in the development of the plan. Public meetings were noticed in the Florida Administrative Register (FAR) and held throughout the development of the plan to solicit feedback and information from stakeholders. Participants in the process provided data, research, technical expertise, and local knowledge which informed the development of the Pollutant Load Screening Model (PLSM), monitoring plan, and management activities to achieve nutrient load reductions. The PLSM was developed by DEP with significant input from local sources. Adjustments to the model based on alternate data provided by local entities included the model boundary, rainfall, event mean concentrations (EMCs), and runoff coefficients. Stakeholders assisted in recruiting relevant members to participate in the efforts set forth in this plan and provided each listed organization's commitment to the management activities and monitoring as prescribed in the pollutant reduction plan.

Section 3: Impaired Waterbodies

3.1 Description of the Impaired Waterbodies

This pollutant reduction plan was initiated by stakeholders to address impairments listed on the 303(d) verified impairment list in which waterbodies were assessed as impaired under the IWR Group 2 St. Lucie – Loxahatchee Basin using data from January 1, 2007 to June 30, 2014. Waterbodies within each basin in Florida are divided into watershed areas with unique WBID numbers. The Clean Water Act requires surface waters to be classified by their designated uses. An impairment indicates that a waterbody is not meeting the criteria of its designated use based on its waterbody classification. The Loxahatchee River includes Class II waters, which are designated for shellfish propagation or harvesting, as well as Class III waters designated for fish consumption, recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The Loxahatchee River estuarine system is complex and dynamic due to the variable tidal flow, salinity, precipitation, seasonal variability, land use characteristics, stormwater inflows, and mixing of fresh and marine water.

There are over 10 WBIDs wholly within the Loxahatchee River Pollutant Reduction Plan area, 7 of which are verified as impaired (**Figure 2**) under the IWR.. **Table 1** provides a comprehensive list of the WBIDs in the plan including, as applicable, the WBID number, estuary nutrient region (ENR), waterbody name, impairment type, status, and waterbody classification. Numeric nutrient criteria (NNC) covering the Loxahatchee River Estuary were adopted in June 2013 (62-302.532 (1)(q), Florida Administrative Code [F.A.C.]) and discussed in more detail in Section 3.1.

The DEP derived the nutrient standards for predominantly marine waters by evaluating water quality data for individual, homogeneous estuary segments (i.e., ENRs). The estuary waterbodies listed in Chapter 62-302.532(1) are delineated by the ENRs.

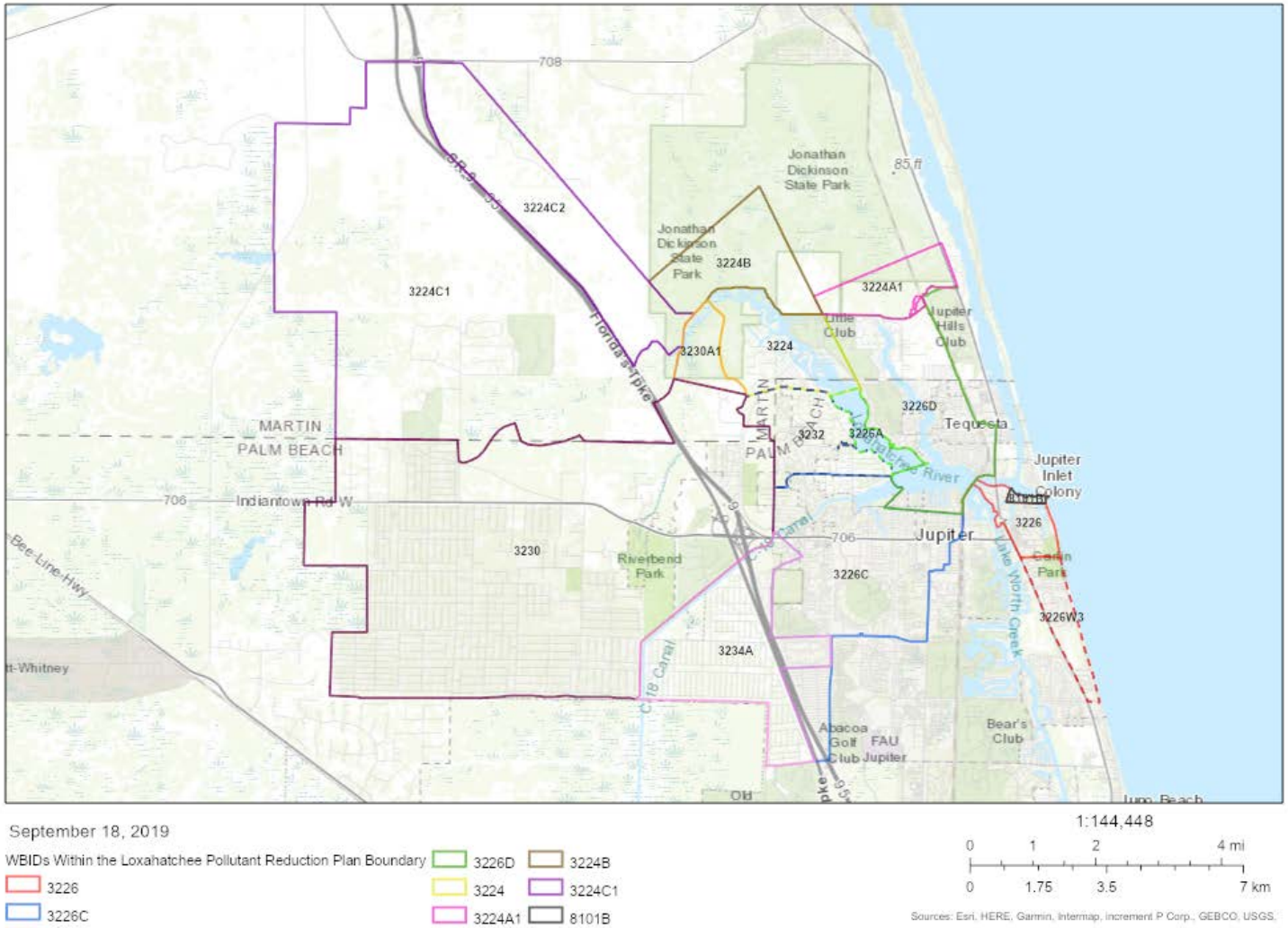


Figure 2. Loxahatchee River WBIDs

Table 1. List of WBIDs and Impairments

WBID Number	ENR Number	Name	Impaired Parameters	Status	Waterbody Classification (M=Marine and F=Freshwater)
3224	ENRQ3	Loxahatchee River (Jonathan Dickinson State Park)	Fecal Coliform Dissolved Oxygen (Percent Saturation)	303(d) List	2
3224A1	N/A	Loxahatchee River (North Fork Lower)	Fecal Coliform	303(d) List	2
3224A2	N/A	Machine Gun Lake	None	N/A	3F
3224B	N/A	Kitchings Creek	None	N/A	3F
3224C1	N/A	Cypress Creek	None	N/A	3F
3224C2	N/A	Moonshine Creek	None	N/A	3F
3226A	ENRQ2	Loxahatchee River (Northwest Fork)	Chlorophyll-a, Fecal Coliform	303(d) List	2
3226C	ENRQ4	Loxahatchee River (Southwest Fork)	Chlorophyll-a	303(d) List	2
3226C			Fecal Coliform	TMDL	
3226D	ENRQ2	North Fork Loxahatchee River (Marine Segment)	Fecal Coliform	303(d) List	2
3226	ENRQ1	Jupiter Inlet	None	N/A	3M
3230	N/A	Loxahatchee River Above Cypress Creek	Nutrients (Algal Mats)	303(d) List	3F
3230A1	N/A	Loxahatchee River (Northwest Fork)	None	N/A	3F
3232	N/A	Unnamed drain to Loxahatchee River	None	N/A	3F
3232A	N/A	Tidal Creek to Loxahatchee River	None	N/A	3M

3.2 Pollutants of Concern

The Northwest Fork and Southwest Fork have been determined to be impaired for chlorophyll-a because they do not meet the site-specific NNC. Pollutants of concern include TN and TP, which are contributing to elevated chlorophyll-a levels. A regression analysis was performed and suggested that 67 % of the variability in chlorophyll-a could be explained by nutrient loads (TN and TP) **(Section 3.1).**

Additionally, as demonstrated in the listings of impaired waterbodies, FIB has become a pollutant of concern in the Loxahatchee River. There are fecal coliform impairments for several of the WBIDs within the pollutant reduction plan boundary. The Loxahatchee River Pollutant Reduction Plan is a voluntary plan which seeks to reduce pollutants of concern and delays the development of a TMDL for nutrient loads. As described in **Section 1.1**, if this plan is unsuccessful, adaptive management approaches could be used to adjust the estimated load reductions necessary as well as the project list. Or, if voluntary efforts fail, a TMDL could be developed in the future to address the nutrient impairments.

Section 4: Water Quality and Aquatic Ecological Goals

4.1 Water Quality Criteria

The Loxahatchee River Pollutant Reduction Plan water quality targets were developed focusing on three Loxahatchee River segments: WBID 3226A, 3226C and 3226D. **Table 2** lists the water quality standards, i.e., the NNC, as adopted in Chapter 62-302.532(1), F.A.C. for each of these WBIDs, the ENR and the NNC Estuary Waterbody Name. NNC water quality criteria are set for chlorophyll-a, TN, and TP for each ENR and are based on an annual geometric mean (AGM). Chlorophyll-a is measured in micrograms per liter (µg/L) while TN and TP are measured in milligrams per liter (mg/L). Although not explicitly stated in this plan, the water quality criteria to be attained for the remaining impaired parameters (fecal coliform and nutrients [algal mats]) within the pollutant reduction plan boundary, and as listed in **Table 1**, are adopted in Chapter 62.302 F.A.C.

Table 2. NNC Water Quality Criteria

Waterbody Information		Water Quality Targets (AGM Criterion)		
ENR (NNC Estuary Name)	**WBID included in ENR (WBID Name)**	**Chlorophyll-a**	**TN**	**TP**
ENRQ2 (Middle Loxahatchee)	3226A (Loxahatchee River [Northwest Fork])	≤ 4.0 µg/L	≤ 0.8 mg/L	≤ 0.030 mg/L
ENRQ4 (Loxahatchee River Estuary [Southwest Fork])	3226C (Loxahatchee River [Southwest Fork])	≤ 5.5 µg/L	≤ 1.26 mg/L	≤ 0.075 mg/L
ENRQ2 (Middle Loxahatchee)	3226D (North Fork Loxahatchee River [Marine Segment])	≤ 4.0 µg/L	≤ 0.8 mg/L	≤ 0.030 mg/L

The goal of the pollutant reduction plan is to attain the NNC chlorophyll-a criterion in the Loxahatchee River segments. The water quality targets in **Table 2** are expressed as the AGM; however, the PLSM model used to determine the watershed loading provides results as an annual arithmetic mean (AAM) rather than an AGM. To provide required reductions that were based on the modeled loading attaining the NNC, there was a need to convert the NNC AGM concentrations to an equivalent AAM value. The conversion from AGM to AAM was done through a regression analysis where in the chlorophyll-a AGMs were regressed against the chlorophyll-a AAMs for the three nutrient-impaired WBIDs for the baseline period of 2006 through 2015. DEP has previously used this approach to convert AGM-based criteria in similar technical analyses. The regression analysis resulted in a robust and significant relationship between AGM and AAM for chlorophyll-a in the Loxahatchee River (**Figure 3**).

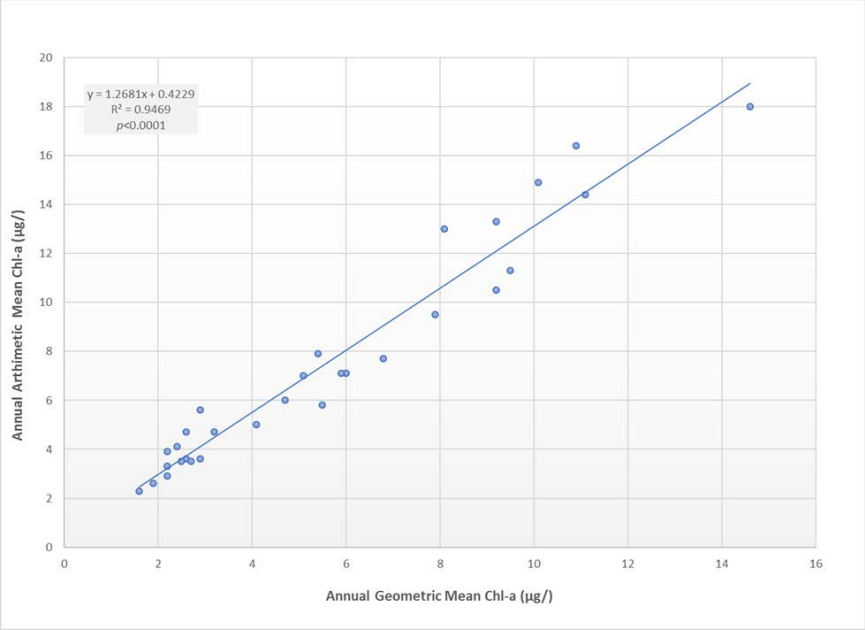


Figure 3. Least Squares Regression Analysis Between AGM and AAM Within the Loxahatchee Estuary

To convert the NNC to water quality targets based on the AAM, an analysis was conducted on data from the three nutrient-impaired waterbodies listed in **Table** 2 that drain into the estuary. Impairments existed for chlorophyll-a in WBIDs 3226A and 3226C and for nutrients (algal mats) in 3230. There are no impairments in 3226D. DEP utilized the NNC for TP, TN, and chlorophyll-a in the analysis. The regression relationships for measured data under varying conditions at primary data stations (**Figure 4**) within the three WBIDs for the time period of 2006 through 2014 were analyzed for relationships among TP, TN, color, salinity, and temperature to chlorophyll-a. The analysis used the land use and annual precipitation (**Figure 5**) to estimate the TN and TP loading in the PLSM.

February 7, 2020

Loxahatchee River Pollutant Reduction Plan Boundary

DEP Stations Used in Regression

1:18,056

0 0.13 0.25 0.5 mi

0 0.2 0.4 0.8 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Figure 4. Monitoring Stations Used in Regression Analysis

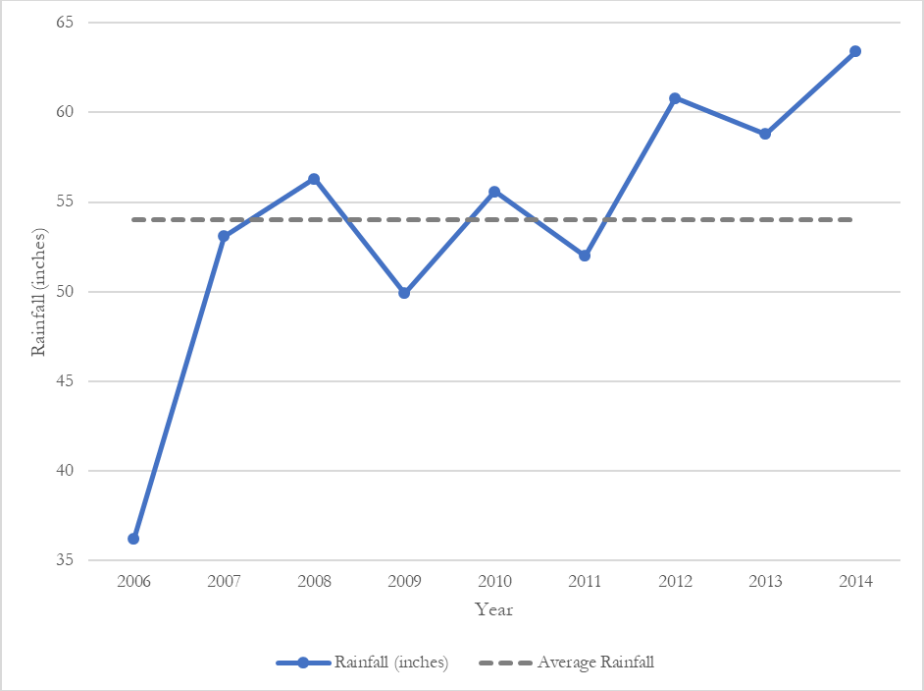


Figure 5. Rainfall Over the Plan Boundary from 2006 through 2014

DEP compared the in-estuary annual mean chlorophyll-a concentrations to the simulated nutrient loads from the PLSM (**Figure 6**) and the resulting regression suggested that 67 % of the variability in chlorophyll-a could be explained by nutrient loads. The chlorophyll-a criterion was adjusted based on the average difference between the AAM and the AGM for the 10-year period. DEP added the difference between the AAM and AGM to the chlorophyll-a criterion for WBIDs 3226A and 3226D to be protective of the main estuary.

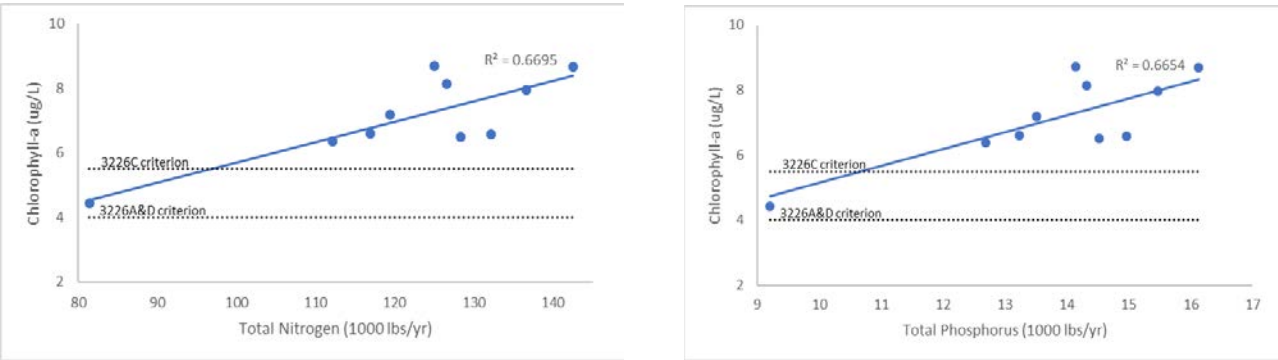


Figure 6. Annual Mean Chlorophyll-a Concentration Compared to Simulated Nutrient Loads for TN and TP

For a consistent and appropriate level of protection, the duration and frequency components of the criteria must be consistent with the derivation of the magnitude component; however, the magnitude component is derived based on the long-term geometric mean concentration. The long-

term geometric mean cannot be applied as an annual mean since it would be expected that at least 50 % of the annual means would exceed the long-term mean. As it is not practical to assess compliance with the criteria based on a long-term duration, a statistical analysis is used to apply the criteria on an annual average basis. Estuaries are assessed on an annual basis, as opposed to a short-term (e.g., 1 to 30 day) basis, as this timeframe demonstrates a much more robust relationship between nutrients and chlorophyll-a responses. An annual target concentration for a given frequency can be derived by appropriately accounting for the annual variability above the mean. This annual target concentration can be derived as an upper percentile of the distribution of the AGM concentrations. Previous proposals by the U.S. Environmental Protection Agency (EPA) have used three-year assessment periods to express the magnitude and duration criteria components. Assuming a three-year period, it can be statistically determined that using the 80th percentile of the AGMs from the long-term dataset with a frequency and duration of no more than once during the three-year period would be protective of the estuary.

DEP calculated the starting load as the 80th percentile of nutrient loading (133,093 pounds per year [lbs/yr] TN and 15,060 lbs/yr TP) and identified the target load of 96,603 lbs/yr TN and 10,931 lbs/yr TP that would bring the 80th percentile of loads to the adjusted chlorophyll-a criterion. Consistent with the expression of the NNC, chlorophyll-a not to be exceeded more than once in a 3-year period and using the 80th percentile for loads allows for some exceedances while demonstrating that the estuary will be in compliance with the NNC. Through this analysis, DEP determined that the estimated target watershed reduction is 27 % for TN and TP. This relationship should be re-evaluated over time with the additional of new data and information. The TN and TP reductions needed to meet the chlorophyll-a criteria are 36,489 lbs/yr TN and 4,129 lbs/yr TP. Watershed load reductions should be focused on anthropogenic land uses, as natural land uses and atmospheric deposition are not controllable.

4.2 Use of PLSM for Watershed Loading Estimates

The PLSM was developed to estimate the watershed loading and the changes in watershed loads that would result in the restoration of the estuarine waters of the Loxahatchee River. The PLSM is a spreadsheet model that considers loading contributed by overland flow based on various land uses and rainfall. The PLSM utilizes EMCs to represent land use and runoff coefficients (ROCs) to represent rainfall. It looks at the relationship between land use and runoff and produces load calculations that are a product of those inputs. The rainfall input consisted of precipitation estimates from the Next Generation Weather Radar (NEXRAD) system, provided by the South Florida Water Management District (SFWMD), which provided an average rainfall in inches within the Loxahatchee River Pollutant Reduction Plan boundary (**Table 3**).

Table 3. Rainfall Averages Within the Pollutant Reduction Plan Boundary Per NEXRAD

Year	Inches of Rainfall on Average
2006	36.2
2007	53.1
2008	56.3
2009	49.9
2010	55.6
2011	52
2012	60.8
2013	58.8
2014	63.4
2015	57.1

Land cover and land use inputs are based on the Florida Land Use and Cover Classification System (FLUCCS) and the 2008 to 2009 SFWMD land cover/ land use coverage. EMCs used in the PLSM originated from the St. Lucie River BMAP and the Soil and Water Engineering and Technology (SWET) studies (SWET 2008) and were adjusted with stakeholder input. The Florida Department of Agriculture and Consumer Services (FDACS) provided detailed land use categories for agricultural land uses based on the Florida Statewide Agricultural Irrigation Demand (FSAID) 4, SFWMD 2007/ 2008 data, and aerial photography. The associated EMCs for agriculture were based on the SWET 2008 study cited previously. The Florida Department of Transportation (FDOT) provided revised transportation EMCs based on studies and literature. The area of various land uses was also refined during this stakeholder engagement process. Existing treatment was estimated as a percent reduction of the EMCs for the acreages already receiving treatment based on the implementation of best management practices by local governments (**Figure 7**). Areas with existing treatment were provided by Palm Beach County and Martin County by utilizing environmental resource permit (ERP) information to estimate treated areas by treatment type. Existing treatment for agricultural areas is provided by FDACS, however these best management practices (BMPs) are credited in the management activities rather than in the model.

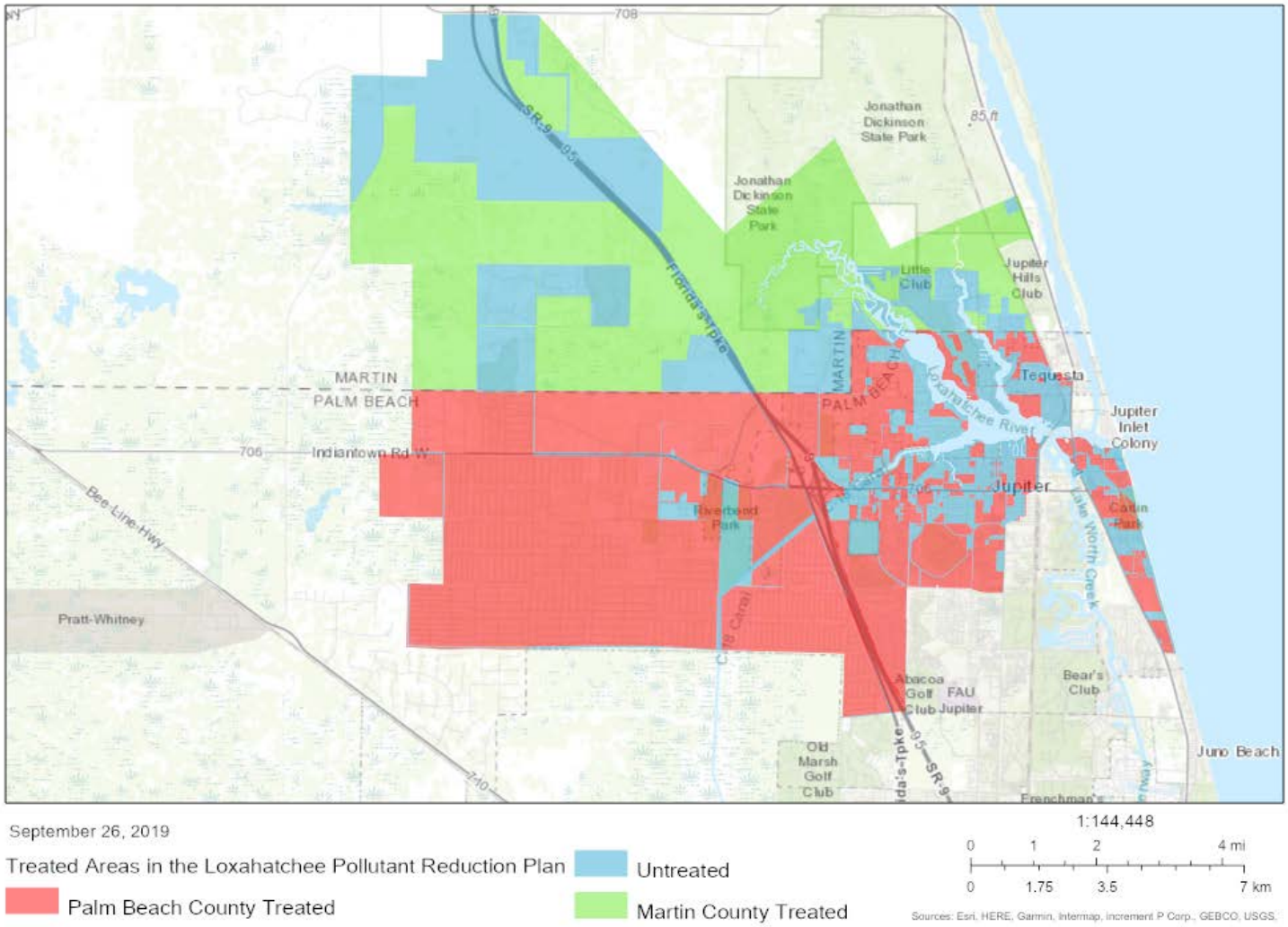


Figure 7. Treated Areas Within the Pollutant Reduction Plan Boundary

Stakeholders also provided feedback on the ROCs utilized in the PLSM. The initial ROCs were based on estimates of impervious surface according to land use types utilizing the Schueler formula (Schueler 1987). To increase the accuracy of the ROC estimates, the original methodology was supplemented with raster-weighted percentages of impervious surface for various land use types. To ascertain this information, raster data from the 2011 National Land Cover dataset was used to estimate the percentage of impervious surface in each 30-meter by 30-meter cell. Those estimations were performed by the Multi-Resolution Land Characteristics Consortium which utilized aerial photography to geo-rectify the cells and assign a weighted average based on both land use and percentage of impervious surface.

FDACS has noted that based on their FSAID 5 database, there are some lands (approximately 75 acres or 0.14 % of the total acres in the basin) designated as dairies in the 2008 SFWMD Land Cover Land Use coverage that have been converted to residential land uses. A map of these areas is shown below in **Figure 8**. In addition, there are 239 acres of lands classified as other agricultural uses that have recently been converted to urban land uses per aerial imagery and Florida Department of Revenue (FDOR) parcel data but have not been captured in available land use coverages. Until the land uses in the model and watershed loading estimates are updated across all land uses, these sites have not been identified as non-agricultural land uses. Future iterations of the model for this basin are likely to capture these changes. FDACS considers these converted acres as non-enrollable in the FDACS BMP Program.

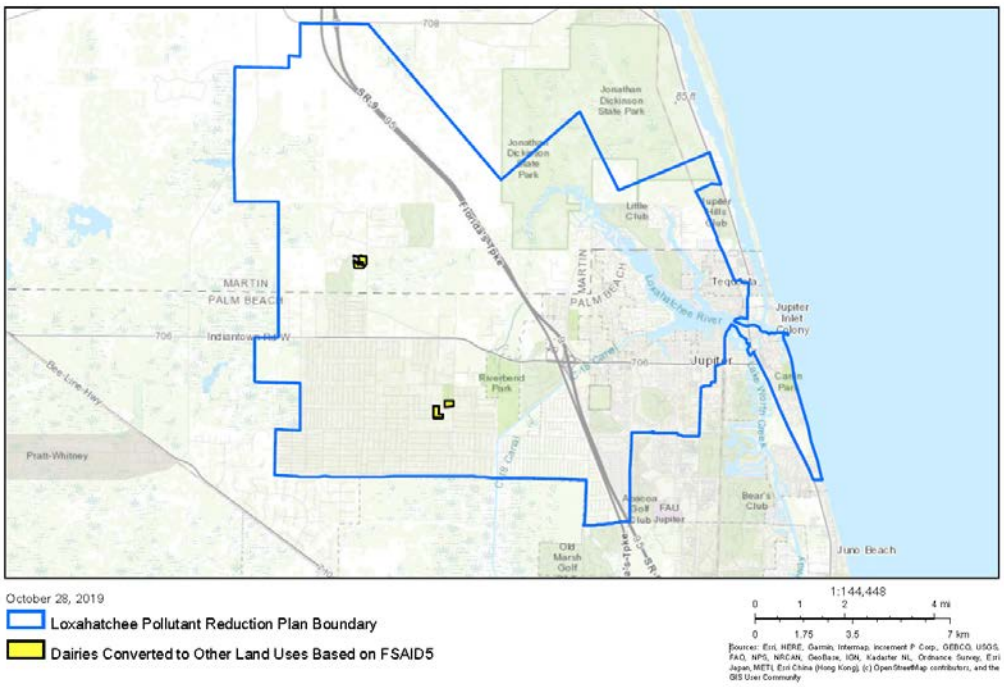


Figure 8. Former Dairy Land Uses Now Attributed to Residential Land Uses Based on FSAID 5

4.3 Schedule to Meet Targets and Restoration Goals

This plan is designed to be updated as more information is known about both water quality and the relationship of loads to chlorophyll-a concentrations in the Loxahatchee Estuary. This version of the plan includes management activities completed from 2008 through 2018, as well as planned management activities through 2022. The starting date for management activities was established based on the 2008 land use data that was used in the PLSM to estimate watershed loads. The end date of 2022 was the furthest completion date for the management activities submitted by the local entities. The 2022 date for projects does not indicate that the water quality targets are expected to be met at that time. It is expected that additional management activities will be provided in future years, to make further progress towards water quality targets.as new efforts are identified, and more information is available to estimate their associated water quality benefits.

Based on the management activities completed since 2008, the estimated load reductions achieved to meet the NNC chlorophyll-a concentrations are summarized in **Table 4**.

Table 4. Estimated Reductions from Management Activities Completed Between 2008 and 2018

Description	TN (lb/yr)	TP (lb/yr)
Revised PLSM Reduction Estimate	36,489	4,129
Reductions from Management Activities Completed	31,859	5,286
Reductions Remaining	4,630	(1,157)
Percentage of Reductions Achieved	87%	128%

When all management activities are included—completed, planned, and underway the estimated reductions increase, as described in **Table 5**.

Table 5. Estimated Reductions from All Management Activities Through 2022

Description	TN (lb/yr)	TP (lb/yr)
Revised PLSM Reduction Estimate	36,489	4,129
Reductions from All Management Activities	34,198	5,385
Reductions Remaining	2,291	(1,256)
Percentage of Reductions Achieved	94%	130%

It should be noted that there are significant credits included for on-going activities such as public education, source control ordinances (e.g., fertilizer ordinance), and agricultural BMPs. These credits are shown to be completed in the first year of the project period—in 2008, regardless of their actual start date. The reason for this approach is that many ongoing activities do not have a distinct starting date as they were phased in or the level of effort changed over time. Rather than trying to assign a specific start date to on-going activities, it seems more practical to list them all in the project database as starting in the initial project year to make it more transparent and straightforward when they are represented in the timeline. This means that the year 2008 reductions may be overestimated or underestimated because the efforts may have begun at an earlier or later date.

Based on the completion date of the nutrient management activities, the implementation schedule for the reductions are shown below for TN and TP, respectively. While efforts were made to apply conservative estimates of project reductions based on each project's characteristics and the estimated load treated based on the PLSM model, there is uncertainty in the results.

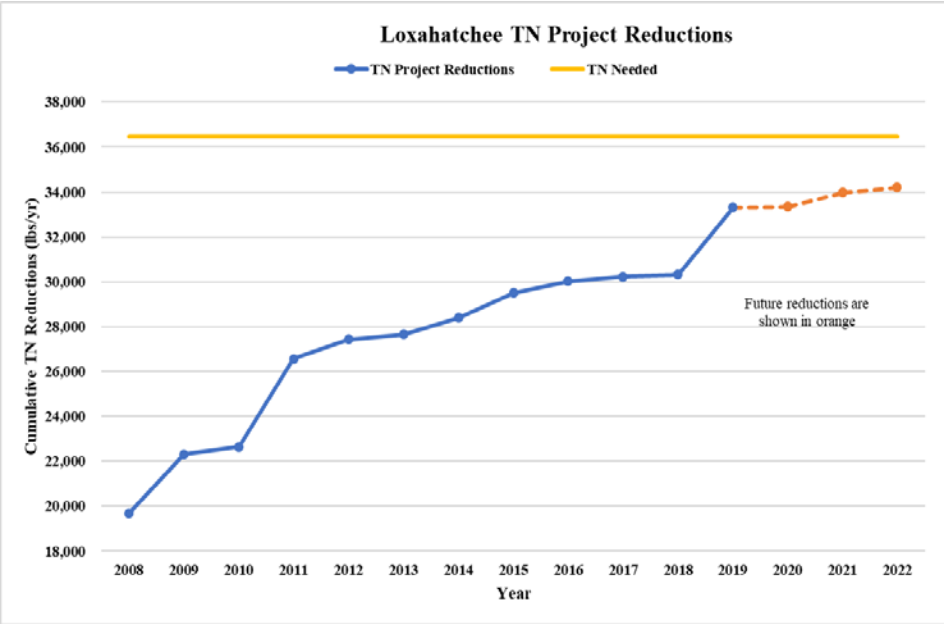


Figure 9. Estimated TN Reduction Schedule Based on Project Completion Dates

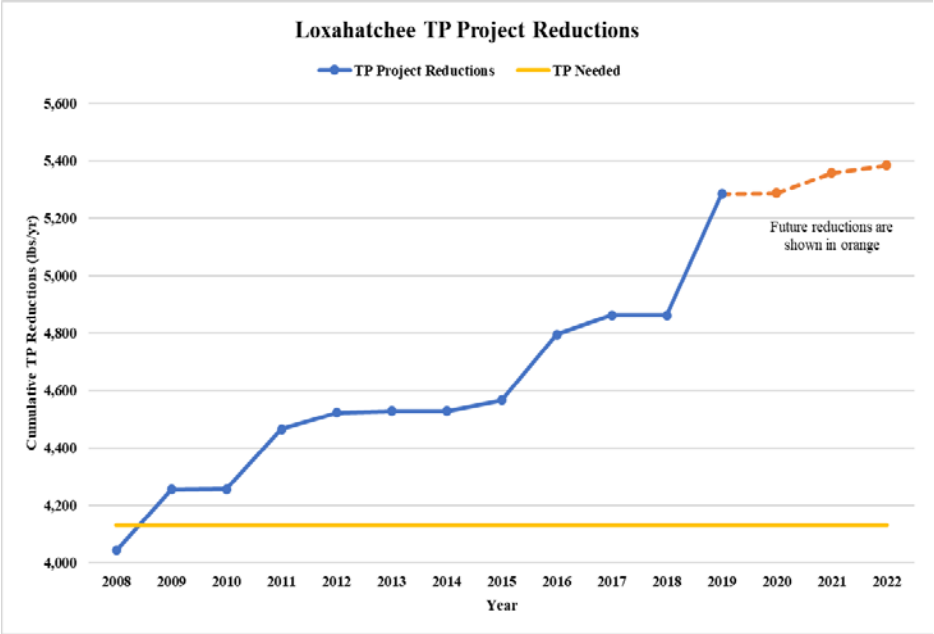


Figure 10. Estimated TP Reduction Schedule Based on Project Completion Dates

While the graphs above indicate that the estimated reductions are close to meeting the necessary TN reductions and exceeding the necessary TP reductions, recent water quality data are less positive. For

TP the ambient water quality data indicate that the AGMs for the TP concentrations in 2017 and 2018 exceeded the water quality target in WBID 3226A. Therefore, while the Loxahatchee Estuary has benefited from the many management activities that have been implemented, more efforts are needed. This plan provides a process to document and track additional management activities as well as to monitor the response of chlorophyll-a to those reductions. With more management activities and additional water quality data, a better understanding of the relationship among TN, TP, and chlorophyll-a will hopefully be realized and the plan can be adjusted as a result of that information. This approach is referred to as "adaptive management" and is necessary when there are so many variables that make it challenging to quantify the watershed loads, the biological response of chlorophyll-a to TN and TP reductions, and the project credits. Adaptive management allows the plan to be updated and calculations adjusted as new data and management activities are put into place along with accounting for land use changes that occur over time.

Section 5: Proposed Management Activities

5.1 Responsible Participating Entities

Entities responsible for the development and implementation of the Loxahatchee River Pollutant Reduction Plan are listed in **Table A-1**. As a measure of expected reductions and support of this document, the stakeholders in the Loxahatchee River Pollutant Reduction Plan have provided the management activities identified below and have confirmed that the activities provided reflect the commitment of the stakeholders.

5.2 Management Activities for Nutrients

The activities listed in the Loxahatchee River Pollutant Reduction Plan represent structural and non-structural activities designed to restore water quality and were proactively initiated by the local stakeholders. **Table 6** details the management activities voluntarily submitted by stakeholders and their associated reductions. Management activities eligible for credit towards pollutant reduction goals were those non-structural activities that are ongoing, such as street sweeping and education efforts that contribute to controlling sources of nutrients, and structural activities completed on or after January 2008 that treat runoff and reduce nutrient loading from nonpoint sources. These structural activities provide treatment not accounted for in the model and represent nutrient load reductions. Future management activities are given only the portion of the credit that is over and above permit requirements since permit conditions require mitigation of new loads, but not treatment of the already existing loads contributing to the impairments. See **Table 1** for a list of nutrient impairments. The activities listed in **Table 6** represent the structural and non-structural activities which stakeholders have contributed. The project credits are calculated from applying the appropriate BMP efficiency to the starting load based on the model described in **Section 3.2**. The calculation procedures for crediting the various types of management actions are outlined in the DEP document dated July 2018 called, "*Statewide Best Management Practice Efficiencies for Nonpoint Source Management of Surface Waters.* "

Table 6. Nutrient Management Activities

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Estimated Completion Date	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
FDOT District 4	FDOT4-01A	I-95 From South of Donald Ross Rd to South of Indiantown Rd	Construction and operation of a surface water management system for this roadway widening project.	Grass swales with swale blocks or raised culverts	Completed	2012	351	24	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT4-01B	I-95 From South of Donald Ross Rd to South of Indiantown Rd	Construction and operation of a surface water management system for this roadway widening project.	Dry Detention Pond	Completed	2012	197	14	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT4-01C	I-95 From South of Donald Ross Rd to South of Indiantown Rd	Construction and operation of a surface water management system for this roadway widening project.	Dry Detention Pond	Completed	2012	10	1	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT4-02	US 1/SR 5 Bridges – Jupiter	Construction and operation of a surface water management system (French drains) for this bridge replacement project.	Off-line Retention BMPs	Completed	2013	32	5	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT4-03	Tequesta Drive Bridge Replacement Project	Construction and operation of a surface water management system for this bridge replacement project.	Grass swales with swale blocks or raised culverts	Completed	2010	7	1	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT4-04	I-95 Weigh-in-Motion Station	Construction and operation of a surface water management system.	Wet Detention Pond	Completed	2009	112	11	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT4-05	Street Sweeping	Estimated 1,648,053 kilograms per year (kg/yr) collected	Street Sweeping	Completed	N/A	2,046	1,312	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT4-06	Catch Basin Cleanout	Weight of material collected not provided.	BMP Cleanout	Completed	N/A	TBD	TBD	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT4-06	Public Education	Provided education outreach with joint National Pollutant Discharge Elimination System (NPDES) group. Actions included public service announcements, FYN brochure, public information, and outreach.	Education Efforts	Completed	N/A	N/A	N/A	Not provided	Florida Legislature	Not provided
Town of Jupiter	TOJ-01	Surface Water Recharge System Improvements II	Complete system to capture and retain up to 10 million gallons per day (MGD) of excess stormwater runoff from the C-18 basin in lieu of discharging to tide.	Dispersed Water Management (DWM)	Planned	2021	TBD	TBD	$1,937,926	Town	Town - $1,937,926
Town of Jupiter	TOJ-02	Pine Gardens South Water Quality Improvements	Installation of exfiltration trenches to provide an average of 0.41 inches of treatment in the project area.	Exfiltration Trench	Completed	2015	18	2	$328,552	Town/ Loxahatchee River Preservation Initiative (LRPI)	Town - $200,000/ LRPI - $128,552

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Estimated Completion Date	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
Town of Jupiter	TOJ-03	Public Education	Includes fertilizer (adopted June 18, 2013), landscape, pet waste and irrigation ordinances. Florida Yards & Neighborhoods (FYN) Program. Includes public service announcements (PSAs), information pamphlets, website, and inspection program (6 % credit). Items include the annual Jupiter Jubilee (stormwater festival), annual soil and sediment control training, annual distribution of hurricane preparedness information including information on stormwater management and drainage maintenance. Provided education outreach with joint NPDES group. Actions included public service announcements, FYN brochure, public information, and outreach.	Education Efforts	Completed	N/A	2,742	282	Not provided	Town	Not provided
Town of Jupiter	TOJ-04	Maintenance Dredging	Dredging in Rio Vista Waterway.	Muck Removal/Restoration Dredging	Completed	2012	74.1	18.6	$70,500	Town	$70,500
Town of Jupiter	TOJ-05	Street Sweeping	Periodic street sweeping to enhance water quality.	Street Sweeping	Completed	N/A	142	91	Not provided	Town	$49,586
Town of Jupiter	TOJ-06	Cinquez Park Drainage Improvements I	Construction of drainage system, swales and roadways (existing roads were shell rock).	BMP Treatment Train	Completed	2011	36.20	2.58	$569,518	Town	$569,518
Town of Jupiter	TOJ-07	Cinquez Park Drainage Improvements II	Construction of new park stormwater management system to retain runoff.	On-line Retention BMPs	Completed	2018	14.22	0.65	$329,400	Town	$329,400
Town of Jupiter	TOJ-08	Water Plant Detention Pond Cleanout	Silt removal from wet detention pond located at the water plant.	Muck Removal/Restoration Dredging	Completed	2017	165	67	$10,620	Town	$10,620
Town of Jupiter	TOJ-09	Stormwater Quality Improvement Grants (Homeowners Association [HOA] Residential Grants)	Town cost-share program (50/50) with property owner and homeowner associations for storm water quality enhancements within their private systems. 28 grants awarded since 2008. Annual appropriation.	Stormwater System Rehabilitation	Underway	N/A	N/A	N/A	$998,229	Town	$998,229
Town of Jupiter	TOJ-09a	Indian Creek Exfiltration Trench	Indian Creek exfiltration trench funded as a part of the Town of Jupiter cost-share program (TOJ-09).	Exfiltration Trench	Completed	2017	5.52	0.55	Not provided	Town	Not provided
Town of Jupiter	TOJ-09b	Boyd Medical Retention	Boyd Medical on-line retention BMPs funded as a part of the Town of Jupiter cost-share program (TOJ-09).	On-line Retention BMPs	Completed	2016	2	0	Not provided	Town	Not provided

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Estimated Completion Date	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
Town of Jupiter	TOJ-10	Seminole Avenue Drainage Basin Improvements	Construct additional outfall and pump station to reroute discharge to FEC canal.	Stormwater System Rehabilitation	Planned	2022	65	6	$2,174,461	Town	$2,174,461
Town of Jupiter	TOJ-11	Pine Gardens North Water Quality Improvements	Construct exfiltration trenches within existing right-of-way.	Exfiltration Trench	Planned	2021	628	69	$719,782	Town	$719,782
Town of Jupiter	TOJ-12	Stormwater System Redevelopment Grants	Renewal or improvement of existing privately-owned stormwater systems under site redevelopment to ensure continued or enhanced functionality. Annual appropriation.	Stormwater System Rehabilitation	Completed	N/A	N/A	N/A	$432,368	Town	$432,368
Town of Jupiter	TOJ-13	Pennock Industrial Park Drainage Improvements	Improvements to include additional exfiltration systems to enhance runoff water quality.	Exfiltration Trench	Planned	2022	166	23	$463,710	Town	$463,710
Town of Jupiter	TOJ-14	Sonoma Isles Stormwater Harvesting	Removal and replacement of existing Town-owned stormwater systems to ensure continued functionality. Annual appropriation.	Stormwater System Rehabilitation	Completed	2016	124	221	Not provided	Private Owner	N/A
Town of Jupiter	TOJ-15	Evernia Street Alley Improvements	Construction of drainage system, which will include 100 linear feet (LF) of exfiltration trench	Exfiltration Trench	Planned	2020	13	1	Not provided	Not provided	Not provided
DEP FPS	FPS-01	Jonathan Dickinson State Park - Ditch Filling - FY 15/16	In the plan area, backfilled 177 acres of ditches which were ultimately discharging to the Loxahatchee River. Filling of the ditches restores the natural floodplain and retains runoff in the wetlands.	Wetland Restoration	Completed	2016	151	7	$265,000	LRPI/ Florida Fish and Wildlife Conservation Commission (FWC) Aquatic Habitat Restoration Enhancement Section(AHRES)	$265,000
DEP FPS	FPS-02	Jonathan Dickinson State Park - Wilson Creek	Ditch work to restore approximately 90 acres of pristine depression marshes.	Wetland Restoration	Completed	2019	36	1	$150,000	North American Wetlands Conservation Act Grants	$150,000
DEP FPS	FPS-03	Jonathan Dickinson State Park - Education Activities	Information pamphlets and website.	Education Efforts	Completed	N/A	N/A	N/A	N/A	N/A	N/A
Martin County	MC-01	Cypress Creek Restoration - Culpepper Ranch Wetland Restoration	Ditch plugs and fill berm breaches.	Hydrologic Restoration	Completed	2011	1,234	207	198811	County/ LRPI	County - $99,406/ LRPI - $99,405

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Estimated Completion Date	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
Martin County	MC-02	Pal Mar East	Plug ditches throughout property that drain wetland areas.	Hydrologic Restoration	Completed	2009	2,128	202	74497	County/ NRCS	Not provided
Martin County	MC-03	Education Program	FYN; landscaping, irrigation, fertilizer, and pet waste ordinances; PSAs, pamphlets, website, illicit discharge program.	Education Efforts	Completed	N/A	2,786	372	Not provided	County	60000
Martin County	MC-04	Cypress Creek Weir Project	Weir replacement.	Control Structure	Completed	2019	1,132	423	975000	County/ LRPI/ SFWMD	County - $725,000/ LRPI - $100,000/ SFWMD - $150,000
Loxahatchee River District	LRD-01	Loxahatchee River Oyster Reef Enhancement	Installed substrate for oyster attachment to promote oyster reef development.	Creating/ Enhancing Oyster Reefs	Completed	2010	N/A	N/A	$75,000	LRD/ LRPI	LRD - $37,500/ LRPI - $37,500
Loxahatchee River District	LRD-02	Loxahatchee River Neighborhood Sewering Phase 1	Convert 55 septic systems to sewer.	Onsite Sewage Treatment and Disposal System (OSTDS) Phase Out	Completed	2008	359	N/A	$196,053	LRD/ LRPI	LRD - $200,000/ LRPI - $200,000
Loxahatchee River District	LRD-03	Loxahatchee River Neighborhood Sewering Phase 2	Convert 197 septic systems to sewer.	OSTDS Phase Out	Completed	2009	391	N/A	$1,890,579	LRD/ LRPI	LRD - $223,500/ LRPI - $223,500
Loxahatchee River District	LRD-04	Loxahatchee River Neighborhood Sewering Phase 3	Convert 188 septic systems to sewer.	OSTDS Phase Out	Completed	2010	329	N/A	$952,623	Not provided	Not provided
Loxahatchee River District	LRD-05	Loxahatchee River Neighborhood Sewering Phase 4	Convert 251 septic systems to sewer.	OSTDS Phase Out	Completed	2011	2646	N/A	$1,397,227	Not provided	Not provided
Loxahatchee River District	LRD-06	Loxahatchee River Neighborhood Sewering Phase 5	Convert 57 septic systems to sewer.	OSTDS Phase Out	Completed	2012	242	N/A	$320,830	LRD/ LRPI	LRD - $498,000/ LRPI - $498,000
Loxahatchee River District	LRD-07	Loxahatchee River Neighborhood Sewering Phase 6	Convert 155 septic systems to sewer.	OSTDS Phase Out	Completed	2013	189	N/A	$1,477,526	LRD/ LRPI	LRD - $896,000/ LRPI - $100,000
Loxahatchee River District	LRD-08	Loxahatchee River Neighborhood Sewering Phase 7	Convert 112 septic systems to sewer.	OSTDS Phase Out	Completed	2014	740	N/A	$2,143,261	LRD/ LRPI	LRD - $2,343,000/ LRPI - $200,000
Loxahatchee River District	LRD-09	Loxahatchee River Neighborhood Sewering Phase 8	Convert 105 septic systems to sewer.	OSTDS Phase Out	Completed	2015	37	N/A	550981	Not provided	Not provided

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Estimated Completion Date	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
Loxahatchee River District	LRD-10	Loxahatchee River Neighborhood Sewering Phase 9	Convert 120 septic systems to sewer.	OSTDS Phase Out	Completed	2016	234	N/A	1800728	Not provided	Not provided
Loxahatchee River District	LRD-11	Loxahatchee River Neighborhood Sewering Phase 10	Convert 104 septic systems to sewer.	OSTDS Phase Out	Completed	2017	32	N/A	1087211	Not provided	Not provided
Loxahatchee River District	LRD-12	Loxahatchee River Neighborhood Sewering Phase 11	Convert 74 septic systems to sewer.	OSTDS Phase Out	Completed	2018	92	N/A	977726	Not provided	Not provided
Loxahatchee River District	LRD-13	Loxahatchee River Neighborhood Sewering Phase 12	Convert 232 septic systems to sewer.	OSTDS Phase Out	Underway	2019	1453	N/A	TBD	Not provided	Not provided
Loxahatchee River District	LRD-14	Loxahatchee River Neighborhood Sewering Phase 13	Convert 56 septic systems to sewer.	OSTDS Phase Out	Planned	2020	15	N/A	TBD	Not provided	Not provided
Loxahatchee River District	LRD-15	Loxahatchee River Neighborhood Sewering Remnant Parcels	Convert 117 septic systems to sewer.	OSTDS Phase Out	Completed	2019	371	N/A	Not provided	Not provided	Not provided
Palm Beach County	PBC-01	Cypress Creek Phases I-II; Cypress Creek Habitat Restoration	Exotic vegetation control, habitat restoration, and hydrologic restoration through increased retention.	Hydrologic Restoration	Completed	2015	1,044	37	$950,000	County/ LRPI	County - $475,000/ LRPI - $475,000
Palm Beach County	PBC-02	Palm Beach County Street Sweeping	Street sweeping program.	Street Sweeping	Completed	N/A	640	410	Not provided	Not provided	Not provided
Palm Beach County	PBC-03	Palm Beach County Public Education	Public education program that includes FYN Program; landscaping, irrigation, and fertilizer ordinances; PSAs; pamphlets; website; and inspection program.	Education Efforts	Completed	N/A	3,066	284	Not provided	Not provided	Not provided
FDACS	FDACS-01	Agricultural Best Management Practices	Enrollment in FDACS BMP manuals for owner implemented BMPs as of April 2019.	Agricultural BMPs	Completed	N/A	1,020	239	Not provided	Not provided	Not provided
FDACS	FDACS-02	Agricultural Land Use Change	Land use change from citrus to sugar cane resulting in lower fertilizer use.	Land Use Change	Completed	N/A	194	493	Not provided	Not provided	Not provided
Florida Turnpike Enterprise	FTE-01	Street Sweeping	Routine maintenance roadway street sweeping (12 months) 17 cycles, 46.5 curb or lane miles, approximately 146,567.0 lbs. dry weight.	Street Sweeping	Completed	N/A	83	53	Not provided	Florida Legislature	Not provided

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Estimated Completion Date	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
Florida Turnpike Enterprise	FTE-02	Catch Basin Clean Out	53 catch basins cleaned (12-month period). Contractor has been requested to collect information on weight of materials for calculations.	Catch Basin Inserts/Inlet Filter Cleanout	Completed	N/A	TBD	TBD	Not provided	Florida Legislature	Not provided
Village of Tequesta	VOT-01	Education Program	FYN; landscaping, irrigation, and fertilizer ordinances; PSAs, pamphlets, website, illicit discharge program. FYN and PSAs through Palm Beach County.	Education Efforts	Completed	N/A	386	47	Not provided	Not provided	Not provided
Village of Tequesta	VOT-02	Street Sweeping	Street sweeping program.	Street Sweeping	Completed	N/A	3	2	N/A	Villages of Tequesta	$3,555
SIRWCD	SIRWCD-01	Lateral Canal Improvements	Installation of 5 operable gates to increase detention, increase the groundwater elevation, and assist in pre-storm draw down when needed.	Wet Detention Pond	Completed	2008	6,218	456	$1,488,675	SFWMD/ SIRWCD	Not provided

5.3 Management Activities for FIB

The bacteria reduction activities below were voluntarily submitted by stakeholders and represent bacteria-related efforts that have the potential to reduce bacteriological loading (**Table 7**). Reduction estimates are not performed for bacteria-related activities and efforts. The stakeholders in the Loxahatchee River Pollutant Reduction Plan will be working on systematic programs to help in the identification of bacteria sources to address root causes of FIB impairments. See **Table 1** for a list of impairments. The below information is listed by stakeholder, however collaborative efforts in the identification of sources would be beneficial to addressing bacteria.

Table 7. FIB Efforts in the Loxahatchee River Pollutant Reduction Plan

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Estimated Completion Date	Location	Cost Estimate	Funding Source	Funding Amount
FDOT District 4	FDOT-FIB-01	Geographic Information Systems (GIS) Data Collection and Mapping	GIS collection and mapping of stormwater assets and infrastructure.	FIB-Stormwater	Completed	N/A	State roads throughout RAP boundary	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT-FIB-02	Litter Control	Routine maintenance roadway litter collection.	FIB- Trash Cleanup of Impaired Waterbody	Completed	N/A	State roads throughout RAP boundary	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT-FIB-03	Street Sweeping	Routine maintenance roadway street sweeping.	FIB-Stormwater	Completed	N/A	State roads throughout RAP boundary	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT-FIB-04	Illicit Detection Program (Inspections, Reporting, Investigations and Elimination)	All FDOT maintenance personnel and roadway contractors complete IDDE training (see training video link).	FIB-Stormwater	Completed	N/A	State roads throughout RAP boundary	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT-FIB-05	Walk the Waterbody/ Right Of Way	Walk the right of way to look for illicit discharges and sources of fecal bacteria such as wildlife, accumulated trash and homeless populations.	FIB- Source Identification Activities	Underway	2020	WBID 3226C	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT-FIB-06	Catch Basin Cleanout	TBD catch basins cleaned (12-month period).	FIB-Stormwater	Completed	N/A	State roads throughout RAP boundary	Not provided	Florida Legislature	Not provided
FDOT District 4	FDOT-FIB-07	Desilting of Stormwater Pipes	TBD LF cleaned (12-month period).	FIB-Stormwater	Completed	N/A	State roads throughout RAP boundary	Not provided	Florida Legislature	Not provided
Florida Turnpike Enterprise	FTE-FIB-01	GIS Data Collection and Mapping	GIS collection and mapping of stormwater assets & infrastructure.	FIB-Stormwater	Completed	N/A	FTP MP 112-125	Not provided	Florida Legislature	Not provided
Florida Turnpike Enterprise	FTE-FIB-02	Street sweeping	Routine maintenance roadway street sweeping (12 months) 17 cycles, 46.5 curb or lane miles, approximately 146,567.0 lbs. dry weight.	FIB-Stormwater	Completed	N/A	FTP MP 112-125	Not provided	Florida Legislature	Not provided
Florida Turnpike Enterprise	FTE-FIB-03	Pet/Animal Management	West Palm Beach & Ft. Pierce Service plazas have pet waste areas with bags and waste receptacles.	FIB-Stormwater	Completed	N/A	West Palm Beach Service Plaza MP 94 & Ft. Pierce Service Plaza MP 145	Not provided	Florida Legislature	Not provided
Florida Turnpike Enterprise	FTE-FIB-04	Illicit Detection Program (Inspections, Reporting, Investigations and Elimination)	All roadway contractors must complete IDDE training.	FIB-Stormwater	Completed	N/A	FTP MP 112-125	Not provided	Florida Legislature	Not provided
Florida Turnpike Enterprise	FTE-FIB-05	Walk the Waterbody/Rights-Of-Way	Walk the rights-of-way to look for illicit discharges and sources of fecal bacteria such as wildlife, accumulated trash, and homeless populations.	FIB- Source Identification Activities	Underway	2019	FTP MP 112-125	Not provided	Florida Legislature	Not provided
Florida Turnpike Enterprise	FTE-FIB-06	Catch Basin Cleanout	53 catch basins cleaned (12-month period).	FIB-Stormwater	Completed	N/A	FTP MP 112-125	Not provided	Florida Legislature	Not provided

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Estimated Completion Date	Location	Cost Estimate	Funding Source	Funding Amount
Florida Turnpike Enterprise	FTE-FIB-07	Desilting of Stormwater Pipes	2,460 linear feet of stormwater pipe cleaned (12-month period).	FIB-Stormwater	Completed	N/A	FTP MP 112-125	Not provided	Florida Legislature	Not provided
Florida Turnpike Enterprise	FTE-FIB-08	Education and Outreach	All service plazas have an E-poster on video screens.	FIB-Stormwater	Completed	N/A	West Palm Beach Service Plaza MP 94 & Ft. Pierce Service Plaza MP 145	Not provided	Florida Legislature	Not provided
Florida Turnpike Enterprise	FTE-FIB-09	GIS Data Collection and Mapping	GIS collection and mapping of stormwater assets & infrastructure. Capturing maintenance activity and inspections.	FIB-Stormwater	Underway	2020	FTP MP 112-125	Not provided	Florida Legislature	Not provided
Loxahatchee River District	LRD-FIB-01	Weekly Bacteria Sampling and Mapping	Weekly sampling of recreational waterways.	FIB- Source Identification Activities	Completed	N/A	3226C, 3226, 3226D, 3226A	Not provided	LRD	Not provided
Loxahatchee River District	LRD-FIB-02	Short-term Source ID Partnership	Source identification sampling conducted in partnership with DEP on priority areas.	FIB- Source Identification Activities	Completed	N/A	3226C, 3226	Not provided	Not provided	Not provided
Loxahatchee River District	LRD-FIB-03	Wrack Study	Study of FIB in wrack sediments and surface water in the Loxahatchee River.	FIB- Source Identification Activities	Completed	2018	3226C, 3226D, 3226	Not provided	Not provided	Not provided
North Palm Beach County Improvement District	NPBC-FIB-01	Develop BPCP for The Shores (Unit 23)	The district will develop a BPCP for 7 Units of Development within the plan boundary by March 2021.	FIB- Source Identification Activities	Planned	2021	WBID 3232	Not provided	Not provided	Not provided
North Palm Beach County Improvement District	NPBC-FIB-02	Develop BPCP for North Fork (Unit 29)	The district will develop a BPCP for 7 Units of Development within the plan boundary by March 2021.	FIB- Source Identification Activities	Planned	2021	WBIDs 3232A and 3224	Not provided	Not provided	Not provided
North Palm Beach County Improvement District	NPBC-FIB-03	Develop BPCP for Palm Cove (Unit 32)	The district will develop a BPCP for 7 Units of Development within the plan boundary by March 2021.	FIB- Source Identification Activities	Planned	2021	WBID 3232	Not provided	Not provided	Not provided
North Palm Beach County Improvement District	NPBC-FIB-04	Develop BPCP for Cypress Cove (Unit 33)	The district will develop a BPCP for 7 Units of Development within the plan boundary by March 2021.	FIB- Source Identification Activities	Planned	2021	WBID 3232	Not provided	Not provided	Not provided
North Palm Beach County Improvement District	NPBC-FIB-05	Develop BPCP for Mystic Cove (Unit 41)	The district will develop a BPCP for 7 Units of Development within the plan boundary by March 2021.	FIB- Source Identification Activities	Planned	2021	WBID 3232	Not provided	Not provided	Not provided
North Palm Beach County Improvement District	NPBC-FIB-06	Develop BPCP for Paseos (Unit 45)	The district will develop a BPCP for 7 Units of Development within the plan boundary by March 2021.	FIB- Source Identification Activities	Planned	2021	WBID 3226C	Not provided	Not provided	Not provided
North Palm Beach County Improvement District	NPBC-FIB-07	Develop BPCP for Jupiter Isles (Unit 47)	The district will develop a BPCP for 7 Units of Development within the plan boundary by March 2021.	FIB- Source Identification Activities	Planned	2021	WBID 3230	Not provided	Not provided	Not provided

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Estimated Completion Date	Location	Cost Estimate	Funding Source	Funding Amount
Palm Beach County	PBC-FIB-01	Public Education	Public education program that includes FY&N Program; landscaping, irrigation, and fertilizer ordinances; PSAs; pamphlets; website; and inspection program.	FIB-Stormwater	Completed	N/A		Not provided	Not provided	Not provided
Town of Jupiter	TOJ-FIB-01	Jones and Sims Creek Water Quality Master Plan	Master water quality plan to identify fecal bacteria contamination sources.	FIB- Source Identification Activities	Completed	2015	WBID 3226C	$57,070	Town/ LRPI	$28,535
Town of Jupiter	TOJ-FIB-02	Pine Gardens South Water Quality Improvements	Installation of exfiltration trenches to provide an average of 0.41 inches of treatment in the project area.	FIB-Stormwater	Completed	2015	WBID 3226W1	$328,552	Town/ LRPI	Town - $200,000/ LRPI - $128,552
Town of Jupiter	TOJ-FIB-03	Public Education	Public education efforts related to actions such as proper pet waste management.	FIB-Stormwater	Completed	N/A	Town of Jupiter	Not provided	Town	Not provided
Town of Jupiter	TOJ-FIB-04	Street Sweeping	Periodic street sweeping to enhance water quality.	FIB-Stormwater	Completed	N/A	Town of Jupiter	Not provided	Town	$49,586
Town of Jupiter	TOJ-FIB-05	Indian Creek Outfall Replacement and Canal Stabilization	Canal stabilization to reduced/prevent erosion of the canal banks.	FIB-Stormwater	Completed	2013	WBID 3234	$199,922	Town	$199,922
Town of Jupiter	TOJ-FIB-06	Cinquez Residential Area	Construction of drainage system to retain volume above what was required to offset the increase in impervious area.	FIB-Stormwater	Completed	2011	WBID 3226C	$569,518	Town	$569,518
Town of Jupiter	TOJ-FIB-07	Cinquez Park Drainage Improvements	Construction of new park stormwater management system to retain runoff.	FIB-Stormwater	Underway	2018	WBID 3226C	$329,400	Town	$329,400
Town of Jupiter	TOJ-FIB-08	Stormwater Quality Improvement Grants	Town cost-share program (50/50) with property owner and homeowner associations for storm water quality enhancements within their private systems. 28 grants awarded since 2008. Annual appropriation.	FIB-Stormwater	Completed	N/A	Town of Jupiter	$432,368	Town	$998,229
Town of Jupiter	TOJ-FIB-09	Pennock Industrial Park Drainage Improvements	Improvements to include additional exfiltration systems to enhance runoff water quality.	FIB-Stormwater	Planned	2022	WBID 3226C	$463,710	Town	$463,710
Town of Jupiter	TOJ-FIB-10	Sonoma Isles Stormwater Harvesting	Retention of excess stormwater runoff from the Sonoma Isles community for use for irrigation purposes.	FIB-Stormwater	Completed	2016	WBID 3230	Not provided	Privately Funded	Not provided
Town of Jupiter	TOJ-FIB-11	Water Quality Monitoring in Jones and Sims Creeks	Surface water sampling of nutrients, chlorophyll a, and FIB to characterize conditions and identify trends in Jones and Sims Creeks tributaries.	FIB- Source Identification Activities	Underway	N/A	WBID 3226C	Not provided	Town	Not provided
Town of Jupiter	TOJ-FIB-12	Datasonde Monitoring in Jones and Sims Creeks	Automated water quality equipment established at 3 stations to record water temperature, salinity, water depth, and dissolved oxygen.	FIB- Source Identification Activities	Underway	N/A	WBID 3226C	$47,176	Town	Not provided
Town of Jupiter	TOJ-FIB-13	Jupiter River Estates Community Clean-up	Clean-up and trash removal from Jones Creek tributary by volunteer residents in Jupiter River Estates Community.	FIB- Trash Cleanup of Impaired Waterbody	Underway	N/A	WBID 3226C	Not provided	Not provided	Not provided

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Estimated Completion Date	Location	Cost Estimate	Funding Source	Funding Amount
Town of Jupiter	TOJ-FIB-14	Urban Stormwater Management System Rehabilitation - Phase III	Rehabilitation of swale systems within Maplewood Drive and North Palm Beach Heights.	FIB-Stormwater	Completed	2008	WBID 3226C	$259,250	Town/ LRPI	Town - $129,625/ LRPI - $129,625
Town of Jupiter	TOJ-FIB-15	Urban Stormwater Management System Rehabilitation - Phase IV	Rehabilitation of swale systems within Jupiter River Estates.	FIB-Stormwater	Completed	2009	WBID 3226C	$377,486	Town/ LRPI	Town - $188,743/ LRPI - $188,743
Town of Jupiter	TOJ-FIB-16	Urban Stormwater Management System Rehabilitation - Phase V	Rehabilitation of swale systems within North Palm Beach Heights.	FIB-Stormwater	Completed	2010	WBID 3226C	$355,300	Town/ LRPI	Town - $177,650/ LRPI - $177,650
Town of Jupiter	TOJ-FIB-17	Urban Stormwater Management System Rehabilitation - Phase VI	Rehabilitation of swale systems within Maplewood Drive and Toney Penna.	FIB-Stormwater	Completed	2014	WBID 3226C	$337,170	Town/ LRPI	Town - $168,585/ LRPI - $168,585
Town of Jupiter	TOJ-FIB-18	Maintenance Dredging in Rio Vista Waterway	Dredging and muck removal to restore Rio Vista Waterway.	FIB-Stormwater	Completed	2012	WBID 3226D	$70,500	Town	$70,500
Town of Jupiter	TOJ-FIB-19	Water Plant Detention Pond Cleanout	Silt removal from wet detention pond located at the water plant.	FIB-Stormwater	Completed	2017	WBID 3226C	$10,620	Town	$10,620
Town of Jupiter	TOJ-FIB-20	Pine Gardens North Water Quality Improvements	Construct exfiltration trenches within existing right-of-way.	FIB-Stormwater	Planned	2021	WBID 3226C	$719,782	Town	$719,782

5.4 Commitment to Implementation

Successful implementation of the Loxahatchee Pollutant Reduction Plan requires the commitment to management activities, monitoring, and adaptive planning. The goals of the Loxahatchee Pollutant Reduction Plan are to implement nutrient reduction activities targeted at reducing loading from anthropogenic sources, continuing to monitor the response of chlorophyll-a, and identifying the sources of bacteriological impairments. As a measure of pollutant reduction and in support of this document, the responsible stakeholders in the Loxahatchee River Pollutant Reduction Plan have demonstrated their willingness to address the impairments within the pollutant reduction plan boundary. Stakeholders have provided project submissions for management activities identified in **Section 4.2** of this document.

Section 6: Monitoring, Reporting Results, and Adaptive Management

6.1 Water Quality Monitoring

The Loxahatchee River Environmental Control District (LRD) routinely collects water quality samples at approximately 28 sites located within the Loxahatchee River Pollutant Control Plan boundary. Eighteen (18) of the sites are sampled bi-monthly (every other month) or quarterly, while ten stations are sampled monthly. Additionally, the Town of Jupiter conducts water quality monitoring in the Southwest Fork associated with its discharge of reverse osmosis concentrate into the Southwest Fork, and also for ambient monitoring. The Town of Jupiter monitors a total of 7 sites. The data associated with the town's wastewater reporting are submitted to DEP through discharge monitoring reports. Additional data may be uploaded together with the LRD data to DEP. Specifically, for this pollutant reduction plan, the Town of Jupiter has added an additional sampling site at a location downstream of the S-46 structure. Samples are collected at this site each month.

5.1.1 Objectives

Focused objectives are critical for a monitoring strategy to provide the information needed to evaluate implementation success. Since the pollutant reduction plan implementation involves a stakeholder driven, iterative process, the monitoring efforts are related to primary and secondary objectives. The primary objectives focus on achieving water quality targets, while the secondary objectives focus on water quality parameters that can be used to provide information for future refinements. The monitoring strategy may be updated as needed.

Primary Objectives

- Measure the water quality in the Loxahatchee River and estuary before and during implementation.
- Document changes and trends in nutrient and bacteria concentrations in the Loxahatchee River.
- Focus BMP efforts by using water quality results combined with appropriate project information, land use data, and statistical and spatial analysis tools.

Secondary Objectives

- Identify areas where additional monitoring might help in understanding the impairments and trends.
- Identify and implement more effective nutrient reduction strategies.
- Utilize bacteriological indicators to assist in identifying potential sources and solutions to address FIB impairments.
- Monitor the effects of other restoration activities in the Loxahatchee River (e.g., Comprehensive Everglades Restoration Plan [CERP]).

5.1.2 Water Quality Parameters, Frequency, and Network

To achieve the objectives listed above, the monitoring strategy focuses on collecting water quality data to track improvements in water quality for nutrients and FIB. Nutrients and FIB are considered separately and, as such, the parameters and monitoring for these two categories are monitored and assessed separately. Each category is addressed individually in the sections below. For each of these categories, core and supplemental indicators are listed. The core indicators are directly related to the parameters causing impairment or concern in the river while the supplemental indicators are monitored primarily to support the interpretation of core water quality parameters. The monitoring network consists of existing and proposed stations which were established for a variety of monitoring reasons and are supported by various agencies and entities with an interest in the Loxahatchee River.

5.1.2.1 Monitoring for Nutrients

For nutrients, chlorophyll-a is considered the key core parameter measured, to track progress in decreasing concentrations in phosphorus and nitrogen. The other parameters are considered supplementary parameters for the pollutant reduction plan, as they build information about the overall water quality. At a minimum, the core parameters will be tracked to determine progress towards achieving pollutant reductions. Parameters are listed in **Table 8**.

Table 8. Water Quality Monitoring Parameters for Nutrients

Core Parameters	Supplemental Parameters	Field Parameters
Nitrate + Nitrite (as N)	Alkalinity	Water Temperature
Total Kjeldahl Nitrogen	Color	pH
Chlorophyll-a	Turbidity	Specific Conductance
Total Phosphorus	Total Suspended Solids	Salinity
Ortho-Phosphorus	Ammonia (as N)	Sample Depth
Dissolved Oxygen	Total Organic Carbon	Tide Stage
	Organic Nitrogen	Secchi Depth

Figure 11 and **Figure 12** show the water quality monitoring stations for nutrients within the Loxahatchee River Pollutant Reduction Plan boundary and **Table 9** provides the station description and sampling frequency. At a minimum, these sites will be monitored for the core parameters listed in **Table 8**. However, it should be noted that not all parameters are measured at each of the sites. The monitoring network for this plan builds on existing efforts in the basin.

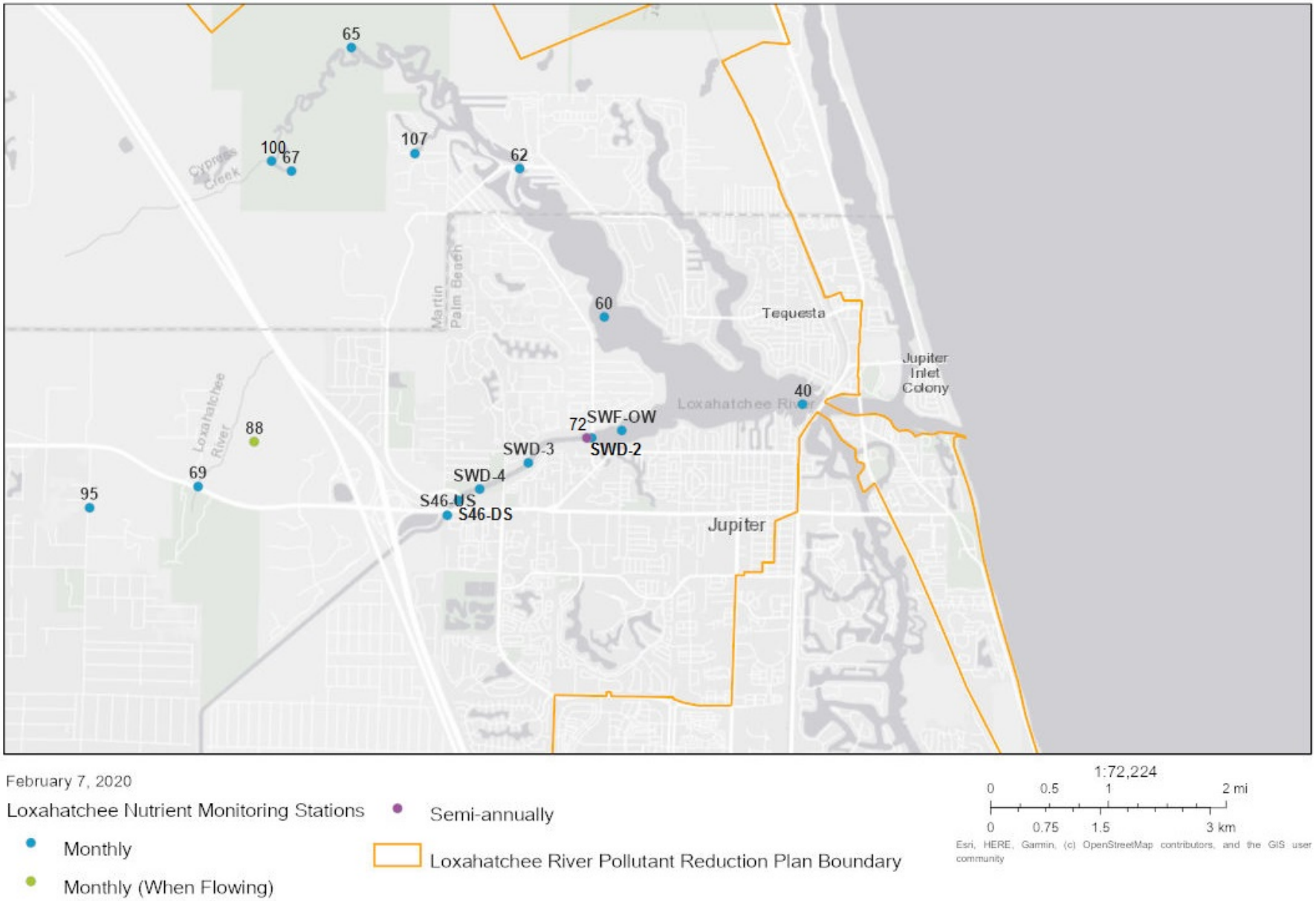


Figure 11. Water Quality Stations Monitored Monthly and Semi-annually Within the Loxahatchee River Pollutant Reduction Plan Boundary for Nutrients

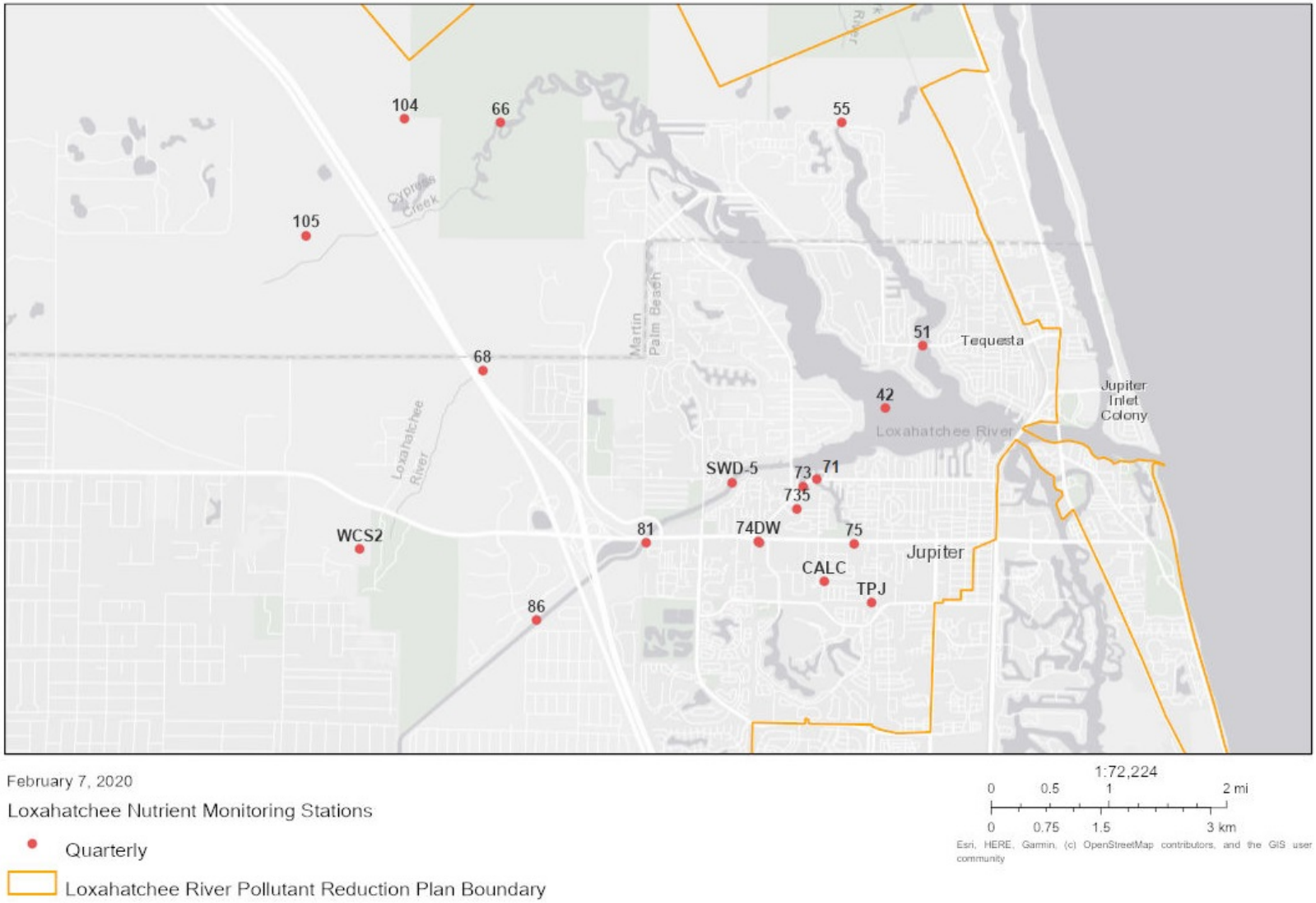


Figure 12. Water Quality Stations Monitored Quarterly Within the Loxahatchee River Pollutant Reduction Plan Boundary for Nutrients

Table 9. Water Quality Monitoring Stations Within the Loxahatchee River Pollutant Reduction Plan Boundary for Nutrients

Sampling Entity	Station Number or Name	Station Description	Sampling Frequency
Loxahatchee River District	100	Cypress Creek – Northwest Fork	Monthly
Loxahatchee River District	107	River's Edge Slough	Monthly
Loxahatchee River District	40	River Railroad Track	Monthly
Loxahatchee River District	60	Northwest Fork – Bay	Monthly
Loxahatchee River District	62	Northwest Fork – Islandway	Monthly
Loxahatchee River District	65	Northwest Fork – Kitching Creek	Monthly
Loxahatchee River District	67	Northwest Fork - Trapper's	Monthly
Loxahatchee River District	69	Northwest Fork - S.R. 706	Monthly
Loxahatchee River District	72	Southwest Fork - Loxahatchee River Road	Monthly
Loxahatchee River District	95	Canal 1 Jupiter Farms	Monthly
Loxahatchee River District	88	Jupiter Country Club Outfall 3 NORTH	Monthly (If Flowing)
Loxahatchee River District	104	Hobe Grove Canal	Quarterly
Loxahatchee River District	105	Cypress Grove Canal	Quarterly
Loxahatchee River District	42	Pennock Point	Quarterly
Loxahatchee River District	51	North Fork - Tequesta Drive	Quarterly
Loxahatchee River District	55	North Fork - Countyline Road	Quarterly
Loxahatchee River District	66	Northwest Fork - Hobe Groves	Quarterly
Loxahatchee River District	68	Northwest Fork - Interstate 95	Quarterly

Sampling Entity	Station Number or Name	Station Description	Sampling Frequency
Loxahatchee River District	71	Southwest Fork - Jones Creek	Quarterly
Loxahatchee River District	73	Southwest Fork - Sim's Creek	Quarterly
Loxahatchee River District	735	Sim's Creek midway between 73 and 74	Quarterly
Loxahatchee River District	74	State Road (SR) 706 - Sim's Creek	Quarterly
Loxahatchee River District	74DW	Sim's Creek downstream of weir at Indiantown Road	Quarterly
Loxahatchee River District	75	SR 706 - Jones Creek	Quarterly
Loxahatchee River District	81	C18 Canal - S.R. 706	Quarterly
Loxahatchee River District	86	Jupiter Country Club Outfall 1 EAST	Quarterly
Loxahatchee River District	CALC	Caloosahatchee Culvert	Quarterly
Loxahatchee River District	TPJ	Toney Penna - Jones Creek	Quarterly
Loxahatchee River District	WCS2	SIRWCD # 2	Quarterly
Town of Jupiter	S46-DS	Downstream of S46 structure	Monthly
Town of Jupiter	S46-US	Upstream of S46 structure	Monthly
Town of Jupiter	SWD-3	400-m east of Outfall	Monthly
Town of Jupiter	SWD-4	400-m west of Outfall	Monthly
Town of Jupiter	SWF-OW	500-m east of Loxahatchee River Road Bridge in open water of Southwest Fork	Monthly
Town of Jupiter	SWD-5	500-m east of Outfall	Quarterly
Town of Jupiter	SWD-2	Loxahatchee River Road Bridge	Semi-annually

5.1.2.2 Monitoring for Bacteria

The suggested parameters for bacteria are listed below in **Table 10**. The core parameters are directly related to the bacteriological concerns in the Loxahatchee River. Supplemental parameters and field parameters are monitored primarily to support the interpretation of core water quality parameters. At a minimum, the core parameters will be tracked to determine changes in the bacteriological results. LRD collects and tests water quality samples for fecal coliform and enterococcus bacteria each week at sites in the Loxahatchee River estuary in popular recreational areas. In order to represent the "worst case" conditions with regard to human health exposure, staff try to sample during outgoing (ebb) tide. Additional sampling and specialized testing are periodically conducted in select drainage basins to improve the understanding of water quality issues and guide restoration efforts.

Table 10. Water Quality Monitoring Parameters for Bacteria

Core Parameters	Supplemental Parameters	Field Parameters
E. coli (freshwater) Enterococcus (estuarine) Fecal Coliform	Alkalinity Color Sucralose Acetaminophen Turbidity Total Suspended Solids	Water Temperature pH Specific Conductance Salinity Dissolved Oxygen Sample Depth Tide Stage Secchi Depth

Figure 13 shows the water quality monitoring stations for bacteria within the Loxahatchee River Pollutant Reduction Plan boundary, and **Table 11** provides the station description and sampling frequency. At a minimum, the sites will be monitored for the core parameters. However, it should be noted that not all parameters are measured at each of the sites. The monitoring network for this plan builds on existing efforts in the basin.

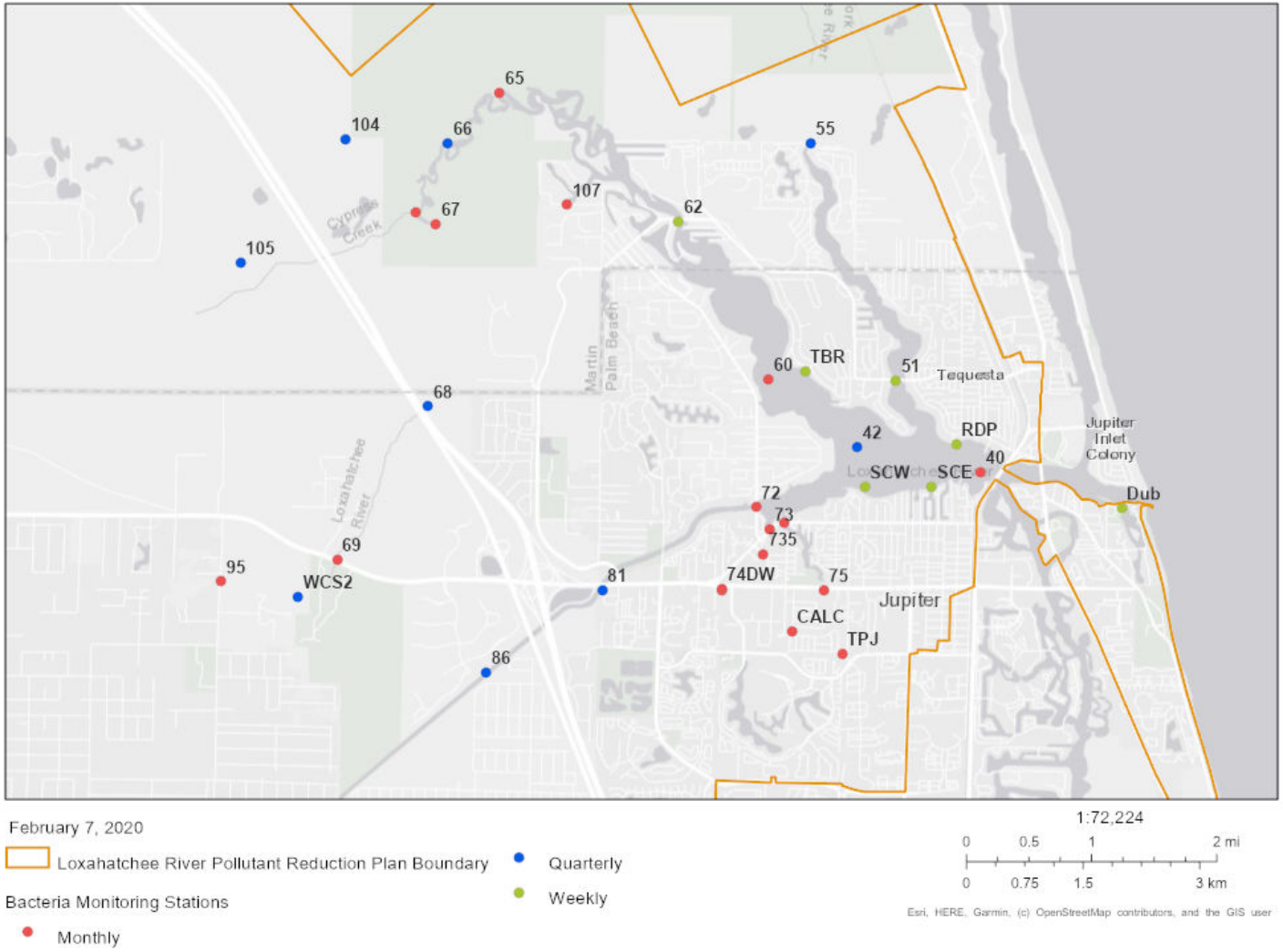


Figure 13. Water Quality Stations Within the Loxahatchee River Pollutant Reduction Plan Boundary for Bacteria

Table 11. Water Quality Monitoring Stations Within the Loxahatchee River Pollutant Reduction Plan Boundary for Bacteria

Sampling Entity	Station Number or Name	Station Description	Sampling Frequency
Loxahatchee River District	Dub	Dubois Swim Area	Weekly
Loxahatchee River District	RDP	Riverside Drive Park	Weekly
Loxahatchee River District	SCE	South Channel East Pompano Drive	Weekly
Loxahatchee River District	SCW	South Channel West Jupiter Plantation	Weekly
Loxahatchee River District	TBR	Tequesta Boat Ramp	Weekly
Loxahatchee River District	51	North Fork - Tequesta Drive	Weekly
Loxahatchee River District	62	Northwest Fork - Islandway	Weekly
Loxahatchee River District	CALC	Caloosahatchee Culvert	Monthly
Loxahatchee River District	TPJ	Toney Penna - Jones Creek	Monthly
Loxahatchee River District	40	River RR Track	Monthly
Loxahatchee River District	60	NW Fork - Bay	Monthly
Loxahatchee River District	65	NW Fork - Kitching Cr.	Monthly
Loxahatchee River District	67	NW Fork - Trapper's	Monthly
Loxahatchee River District	69	NW Fork - S.R. 706	Monthly
Loxahatchee River District	71	SW Fork - Jones Cr.	Monthly
Loxahatchee River District	72	SW Fork - Lox. Riv. Rd.	Monthly
Loxahatchee River District	73	SW Fork - Sim's Cr.	Monthly
Loxahatchee River District	74	SR 706 - Sim's Creek	Monthly
Loxahatchee River District	74DW	Sim's Creek Downstream of weir at Indiantown Road	Monthly
Loxahatchee River District	75	SR 706 - Jones Creek	Monthly
Loxahatchee River District	95	Canal 1 Jupiter Farms	Monthly
Loxahatchee River District	100	Cypress - NWF	Monthly
Loxahatchee River District	107	River's Edge Slough	Monthly
Loxahatchee River District	735	Sim's Creek midway between 73 and 74	Monthly

Sampling Entity	Station Number or Name	Station Description	Sampling Frequency
Loxahatchee River District	88	Jupiter Country Club Outfall 3 NORTH	Monthly (If Flowing)
Loxahatchee River District	WCS2	SIRWCD # 2	Quarterly
Loxahatchee River District	42	Pennock Point	Quarterly
Loxahatchee River District	55	N Fork - Countyline Rd.	Quarterly
Loxahatchee River District	66	NW Fork - Hobe Groves	Quarterly
Loxahatchee River District	68	NW Fork - I - 95	Quarterly
Loxahatchee River District	81	C18 - S.R. 706	Quarterly
Loxahatchee River District	86	Jupiter CC Outfall 1 EAST	Quarterly
Loxahatchee River District	104	Hobe Grove Canal	Quarterly
Loxahatchee River District	105	Cypress -Grove Canal	Quarterly

6.2 Data Management and Assessment

As of June 30, 2017, water quality data in Florida are entered by the entity collecting the data into the Florida Watershed Information Network (WIN) Database, which has replaced the Florida Storage and Retrieval (STORET) System. WIN serves as the primary repository of ambient water quality data for the state. DEP pulls water quality data used for impaired waters evaluations and TMDL development directly from this database. The Loxahatchee River stakeholders will upload water quality data collected as part of the pollutant reduction plan into WIN each quarter for long-term storage and availability. In addition, the LRD provides data review and visualization tools of all water quality data as it is released from their QA/QC process on their website (www.loxahatcheeriver.org/river/).

The water quality data will be analyzed during the pollutant reduction plan implementation to determine changes in water quality. At a minimum the data will be assessed applying the data sufficiency requirements and assessment methods contained in the Impaired Water Rule. For FIB, progress will be measured based on the FIB water quality standards which reference the number of exceedances. Also, evidence of nonanthropogenic sources will be considered. Other methods may be applied, as appropriate, but the goal of the plan is to achieve attainment of water quality standards and no longer be impaired.

6.3 QA/QC

Stakeholders participating in the monitoring and reporting plan will collect water quality data in a manner consistent with the DEP standard operating procedures (SOPs) for QA/QC. The most current version of these procedures is available on the DEP website. Consistent with the SOPs, waters quality samples should be analyzed by the National Environmental Laboratory Accreditation

Conference (NELAC) Institute, National Environmental Laboratory Accreditation Program (NELAP) certified laboratories, or other labs that meet the certification and other requirements outlined in the SOPs. The LRD, as the responsible laboratory and reporting entity, is certified through NELAP and compliant in the examination of samples for microbiology and general chemistry analyses. The laboratory certification number is ES6026.

6.4 Frequency and Reporting Format for Implementation of Management Actions

Monitoring and reporting on the proposed management activities will provide an opportunity for adaptive management of restoration activities. Reporting will be utilized to assess improvements in water quality, progress on achieving load reductions and compliance with the plan. The LRMCC will request an update from individual stakeholders on their implementation of management activities annually in advance of their January meeting. LRMCC will provide updates to DEP, which will address concerns with progress or changes with individual entities as needed. A project update will be prepared by the LRMCC periodically that will outline the progress of the pollutant reduction plan. The project update may also include results of any water quality data analysis, any shortfalls in achieving anticipated reductions or milestones, any changes in the monitoring network, updates on project implementation, and estimates of the load reductions made to date. Periodic stakeholder meetings will be held to support the collaborative nature of the plan and provide updates on needs and accomplishments.

Every five years, a pollutant reduction plan update will be completed. The update will include results of water quality data assessments, updated annual pollutant loads, any progress in achieving reductions, any monitoring changes, the status of project implementation, estimated load reductions, percentage of load reduction targets achieved, and additional management activities needed, if any, to meet the water quality criteria.

5.5 Adaptive Management Actions

Adaptive management involves setting up a mechanism for making course corrections in the pollutant load reduction plan when circumstances change, or feedback mechanisms indicate that a more effective strategy is needed. As a pollutant reduction plan, there is less certainty about whether the water quality targets will be attained. For this reason, DEP will delay TMDL development and the impaired waterbodies stay on the list of waters that may need a TMDL. The expectation is that the activities included in this plan will make progress toward or will achieve water quality standards. If the water quality standards are not eventually achieved, a TMDL would be developed or the local stakeholders could develop a reasonable assurance plan.

At a minimum, the pollutant reduction plan will be reviewed every five years and will include an analysis of the data and progress, as well as any additional management activities that may be needed to meet the target loading. At the five-year update, if water quality trends indicate that the target loading will not be met by the deadline set in **Section 3.3**, stakeholders will work with DEP to determine the appropriate action, which may include assessing any new sources and identifying potential further actions needed to achieve the target loading, determining if more time is needed to

implement the plan, or development of a TMDL. The five-year review will be considered the DEP notification process for adaptive management and implementation.

Section 7: References

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Schueler, T., 1987, Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments. Washington, DC.

Soil and Water Engineering Technology, 2008, Final Report, Tasks 1, 2, and 3, For the Project Entitled Nutrient Loading Rates, Reduction Factors and Implementation Costs Associated with BMPs and Technologies, Prepared for the South Florida Water Management District, West Palm Beach, Florida.

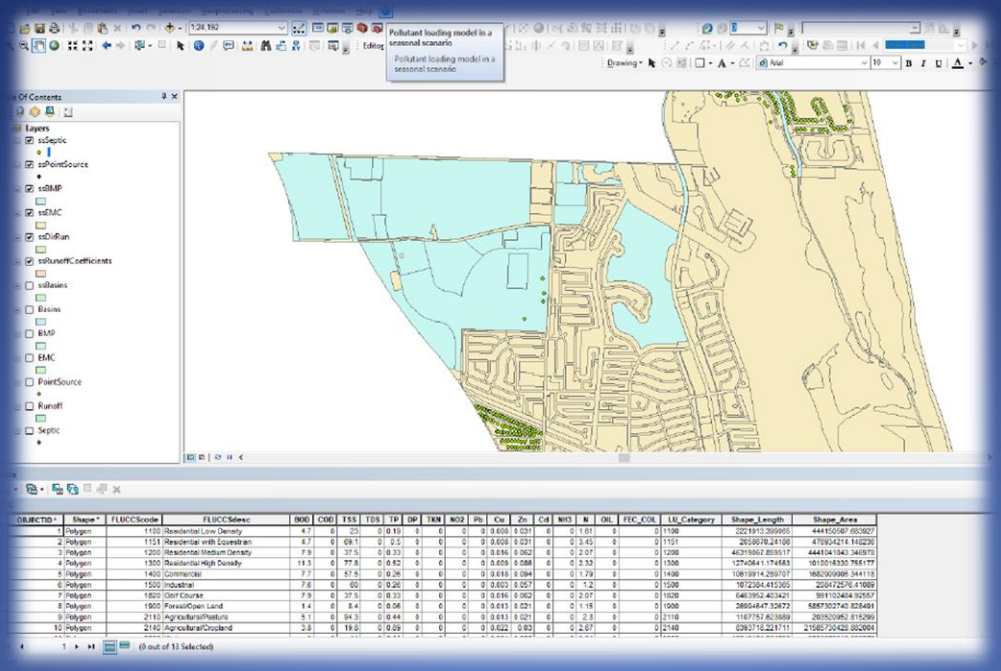
South Florida Water Management District, South Florida Water Management District Land Use/Land Cover 2008 - 2009, at https://www.fgdl.org/metadata/fgdc_html/lu_sfwmd_2008.fgdc.htm, November 1, 2019.

**Note that the websites listed are accurate as of February 6, 2020 but are subject to change over time.*

APPENDIX B

Summary of Average Annual
Pollutant Loading Model Activities

2019



Summary of Average Annual Pollutant Loading Model Activities

CYCLE 4/YEAR 3

MOCK•ROOS

Table of Contents

Report Certification ***1***

1. Water Quality Model ***2***

1.1. Background 2

1.2 Pollutant Loading Estimating 4

1.3 Conclusions 23

List of Figures: Page

Figure 1 Map of Palm Beach County 3
Figure 2 Example of NEXRAD data available from SFWMD 12
Figure 3 Annual Loading with BMP Controls: 5-Day Biochemical Oxygen Demand 20
Figure 4 Annual Loading with BMP Controls: Total Suspended Solids 21
Figure 5 Annual Loading with BMP Controls: Total Phosphorus 21
Figure 6 Annual Loading with BMP Controls: Total Nitrogen 22
Figure 7 Annual Loading with BMP Controls: Total Copper 22
Figure 8 Annual Loading with BMP Controls: Total Zinc 23
Appendix A: Figure 9 Watershed Flow Directions and Watershed Direction 25

List of Tables: Appendix B: Page

Table 1 Land Use Totals Cycle 3 and Cycle 4 with Percent Change 6
Table 2 DCIA, Percent Impervious and NDCIA per Soil Type by Land Use 7
Table 2 Mean Annual Runoff Coefficients (C Values) Part 1 8
Table 3 Mean Annual Runoff Coefficients (C Values) Part 2 9
Table 5 Event Mean Concentration for Parameters by Land Use (mg/l) 10
Table 6 Estimated Average Annual Rainfall for Palm Beach County 2008-2013 13
Table 7 Estimated Average Annual Rainfall for Palm Beach County 2014-2018 13
Table 8 Median Base Flow Concentrations (mg/l) 14
Table 9 Summary by Watershed in acres of BMP Types 2013 17
Table 10 Summary by Watershed in acres of BMP Types 2018 18
Table 11 BMP Removal Efficiencies in Percent 19
Table 12 Loading Estimates Cycle 3 Year 3 in mg/L 19
Table 13 Loading Estimates Cycle 4 Year 3 in mg/L 20
Table 14 Pollutant Loading Results Watershed C-15 27
Table 15 Pollutant Loading Results Watershed C-16 28
Table 16 Pollutant Loading Results Watershed C-17 29
Table 17 Pollutant Loading Results Watershed C-18 30
Table 18 Pollutant Loading Results Watershed C-51 1 of 2 31
Table 19 Pollutant Loading Results Watershed C-51 2 of 2 32
Table 20 Pollutant Loading Results Watershed L-8 33
Table 21 Pollutant Loading Results Watershed S-2-6-7 34
Table 22 Pollutant Loading Results Watershed Hillsboro 35
Table 23 Pollutant Loading Results Watershed Inter-coastal Waterway North 36
Table 24 Pollutant Loading Results Watershed Inter-coastal Waterway South 37
Table 25 Pollutant Loading Results Watershed Loxahatchee 38
Table 26 Pollutant Loading Results Watershed Lake Worth Lagoon 1 of 2 39
Table 27 Pollutant Loading Results Watershed Lake Worth Lagoon 2 of 2 40
Table 28 Pollutant Loading Results Watershed WPBWS 41

List of Permittee Included in this report a table of watersheds each MS4 is in can be found in Appendix C

Atlantis, City of
Belle Glade, City of
Boca Raton, City of
Boynton Beach, City of
Cloud Lake, Town of
Delray Beach, City of
FDOT - District Four
FDOT - Turnpike Enterprises
Glen Ridge, Town of
Greenacres, City of
Gulf Stream, Town of
Haverhill, Town of
Highland Beach, Town of
Hypoluxo, Town of
Indian Trail Improvement District
Juno Beach, Town of
Jupiter, Town of
Jupiter Inlet Colony, Town of
Lake Clarke Shores, Town of
Lake Park, Town of
Lake Worth, City of
Lantana, Town of
Manalapan, Town of
Mangonia Park, Town of
Northern Palm Beach County Improvement District
North Palm Beach, Village of
Ocean Ridge, Town of
Palm Beach, Town of
Palm Beach County
Palm Beach Gardens, City of
Palm Beach Shores, Town of
Palm Springs, Village of
Riviera Beach, City of
Royal Palm Beach, Village of
South Bay, City of
South Indian River WCD
South Palm Beach, Town of
Tequesta, Village of
Wellington, Village of
West Palm Beach, City of

Report Certification

Engineer's Certification

I hereby certify, as a Professional Engineer in the State of Florida, that this Appendix of the Cycle 4, Year 3, Summary of Average Annual Pollutant Loading Model Activities as an appendix for the Joint Annual Report for the Florida Department of Environmental Protection National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Permit for Palm Beach County (Permit No. FLS000018-004) was assembled under my direct responsible charge. This certification is provided in accordance with Florida Board of Professional Engineers Rule of Certification under Chapter 61G15-23.003.

DAVID JAMES COWAN JR. LICENSE No. 85285 STATE OF FLORIDA PROFESSIONAL ENGINEER

David J Cowan Jr. P.E.
Project Manager, Mock•Roos
FBPE. No. 85285

10/15/2019
Date

Mock•Roos
5720 Corporate Way
West Palm Beach, FL 33407
Florida CA No. 48

(Reproductions are not valid unless signed, dated and embossed with an Engineer's Seal)

1. Water Quality Model

1.1. Background

The municipal separate storm sewer system (MS4) National Pollutant Discharge Elimination System (NPDES) Cycle 4 permit, issued September 8, 2016 requires in (PART V. Monitoring Requirements) that average annual pollutant loading, and event mean concentration (EMC) estimates be provided for six parameters. The six parameters identified are five-day biochemical oxygen demand (BOD_5), total copper (Cu), total nitrogen (as N) (TN), total phosphorus (TP), total suspended solids (TSS), and total zinc (Zn), all in the unit of (mg/L). It is assumed by the Florida Department of Environmental Protection (FDEP) that pollutant loading generated within a watershed flows through MS4 outfalls and directly affects the receiving water bodies. It should be noted that, due to fate and transport processes, the loading estimates with this computer model do not give the resulting pollutant concentration in the receiving water, only indications of mass transport. Pollutant loading models do provide a tool to compare varying contributing area conditions over a time interval. The option in the permit was given to provide the average annual pollutant loading estimates based on major outfalls or watersheds. Since the pollutant loading estimates for permit Cycles 1 through 3 were provided on a watershed basis, it was agreed with the FDEP that the Cycle 4 loading estimates would also be provided on a watershed basis. In additional to meeting the requirements of the permit, modeling the average annual pollutant loading generated by a watershed or a MS4's watershed can assist in planning for future improvements in stormwater quality treatment, regulations or stormwater management. Local municipalities can identify areas of their MS4 that appear to be contributing higher pollutant loading and/or evaluate the effect of development or stormwater improvement projects.

A total of thirteen majors watersheds are represented in Palm Beach County and are depicted in Figure 1, They include: L-8, West Palm Beach Water Supply (WPBWS), Loxahatchee, C15, C16, C17, C18, C51, Hillsboro, Lake Worth Lagoon, and S-2_6_7, Intracoastal Waterway North (ICWWN), Intracoastal Waterway South (ICWWS). Previous permit cycles broke up the C-51 basin into East and West, but grouped ICWWN, ICWWS and LWL into one watershed as LWL. Note that the Water Conservation Areas and the Stormwater Treatment Areas (STAs) are excluded from the modeled watersheds. The STAs are water quality treatment systems implemented by the SFWMD. The MS4s do not discharge directly to the STAs; these systems function to reduce pollutant loading to the Everglades.

There are four major receiving waters for the thirteen watersheds: The Everglades, Lake Worth Lagoon, Intracoastal Waterway, and the Loxahatchee River as shown in Figure 1

or as a full size map, Appendix A: Figure 9. For the purposes of meeting the requirements of the permit, the pollutant loading estimation model was run on a watershed and MS4 watershed basis using the same input parameters for both. This was done to allow for comparison at both a watershed and MS4 per watershed basis.

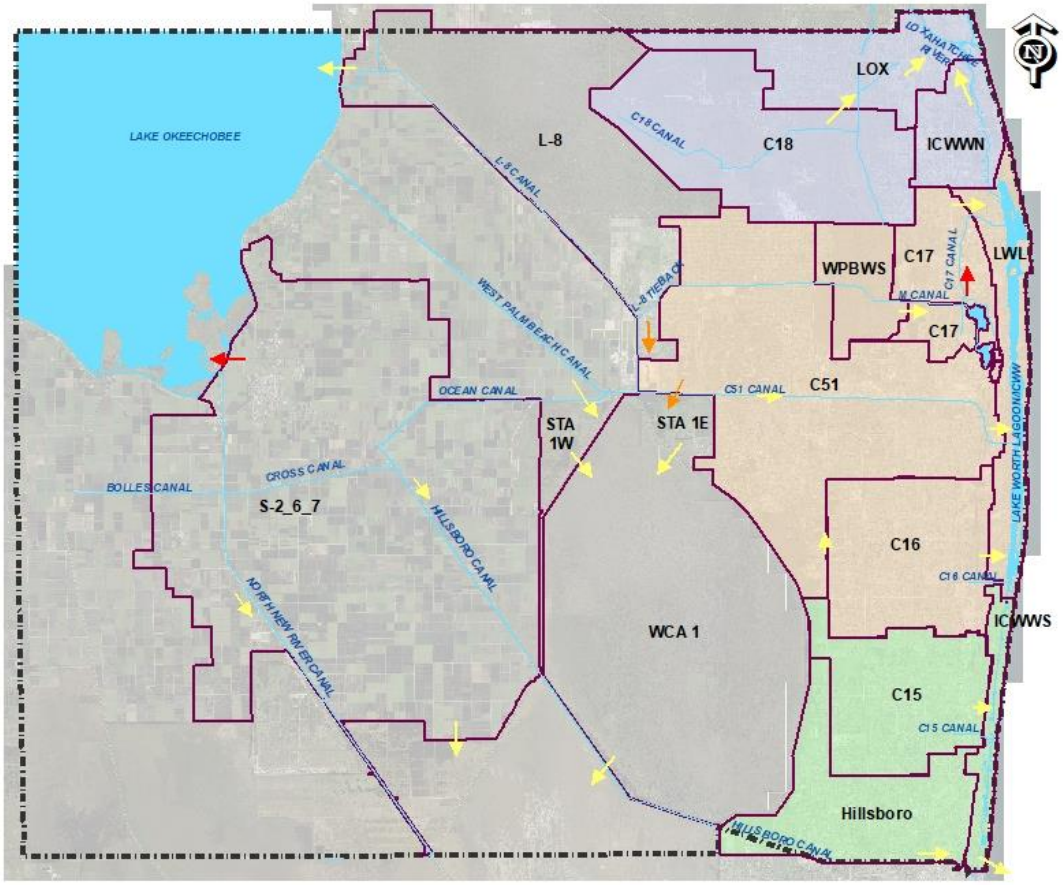


Figure 1 Map of Palm Beach County

1.2 Pollutant Loading Estimating

A. Loading Model Overview

The Palm Beach County permittees completed EMC and pollutant loading estimates during Permit Cycles 1 through 3. Those efforts were completed using the Watershed Management Model (WMM) developed by Camp Dresser & McKee (CDM). This model was a basic spreadsheet tool, good at the time for the task. The WMM was used in Cycle 3 for consistency with previous estimates, even though other estimating models had started to be introduced around 2011, specifically the Spatially Integrated Model for Pollutant Loading Estimates (SIMPLE). One of the major benefits of SIMPLE is its use of the GIS platform for the input of data and output of the estimated loadings. This allows for better spatial comparison of the input parameters.

SIMPLE uses the same basic method of estimating pollutant loading as does the WMM as well as incorporating work done by Environmental Research and Design, Inc. (ERD). The GIS functionality was developed by Jones, Edmunds, and Associates Inc. Edmunds. Estimates of average annual pollutant loading for each watershed are based on land use, EMCs, rainfall, soil type, base flow, septic system impact and best management practices (BMPs). The core of the calculation in the model is based on the premise that the average concentration of pollutants in stormwater runoff over a storm event is characteristic of each type of land use. For example, the runoff from agriculture/pasture lands in one area will contain similar concentrations of TN and other pollutants, as other agriculture/pasture lands. The EMCs represent each of these lands use-specific pollutant loading factors.

SIMPLE incorporates a geographic coverage-based approach to estimate annual and seasonal non-point source loads from stormwater runoff. Input coverages include land use and soil type, baseflow and are applied to basins. The model generates an array of unique runoff value and EMC value combinations, based on the spatial overlap of the geographic coverages input into the model. Some of the input information contributes to determining the runoff values, while other input information affects the concentration of pollutants. The following section will summarize the major input data of SIMPLE, and how it was derived for use in this estimation.

B. Land Use

Land use is a major factor for pollutant loading estimation and consequently, a significant input value for SIMPLE. Many of the other input values are based on the land use type in some way. The Florida Land Use and Cover Classification System (FLUCCS) is a unified coding system of land use that was created by the Florida Fish and Wildlife Conservation Commission and several Water Management Districts, with the help of many other stakeholders. The FLUCCS is the basis of the land use for Palm Beach County. Land use data was provided by Palm Beach County and the other permittees in 2013. The information was reviewed and classified in the thirteen land use categories identified for pollutant loading estimates. The 2013 data was sent back out to the permittees in 2018 to be updated. In non-MS4 areas, county wide data bases were used to for updating.

The input data was checked using recent aerial photographs and information obtained from the Palm Beach County Property Appraiser's website. A set of new land uses that were added to the previous estimating efforts included Golf Course, Parks with Equestrian Usage, and properties throughout the county that have an Equestrian Zoning Authorization. In addition, South Florida Water Management District and Palm Beach County maintain several GIS data sets online for public access. This information was used to improve the data where possible. Land use totals within each watershed are shown in Table 1.

Geographic Information System (GIS) data from the permittees have continued to improve over time. As a result, the total area in some categories has increased or decreased significantly from Cycle 3. The Low, Medium and High Residential categories in all the watersheds have also had considerable adjustments with a large portion of the previously categorized Low Density Residential land uses reclassified as either Medium, High Density Residential, or Residential with Equestrian. The designation of Light Industrial and Heavy Industrial and Commercial have been reevaluated; the designations Industrial and Commercial have been used and land uses have been adjusted appropriately. Lastly, in some areas private roads had been isolated in residential areas, causing planned developments to overestimate impervious areas, this was corrected.

In order to allow comparison of the Cycle 4 estimations to the Cycle 3 estimations, adjustments were made to the Cycle 3 input data to include new land uses not previously included, such as Golf Course, Residential with Equestrian.

Table 1 Land Use Totals Cycle 3 and Cycle 4 with Percent Change

	Area (acres)		
Land Use (FLUCCS code)	**Cycle 3**	**Cycle 4**	**Changes in Percent***
Agricultural/Cropland (2140)	499,832	495,510	(0.86%)
Agricultural/Pasture (2140)	4,694	4,651	(0.91%)
Commercial (1400)	38,270	38,014	(0.67%)
Forest/Open Land (1900)	134,423	134,593	0.13%
Golf Course (1820)	22,496	22,653	0.69%
Industrial (1500)	4,605	4,782	3.69%
Major Highways (8000)	49,472	48,536	(1.89%)
Residential High Density (1300)	23,088	23,223	0.58%
Residential Low Density (1100)	8,240	10,241	19.54%
Residential Medium Density (1200)	97,991	100,663	2.65%
Residential with Equestrian (1151)	10,979	10,979	(0.0%)
Water (5000)	205,251	207,202	0.94%
Wetlands (6000)	327,045	325,490	(0.48%)
Total	1,426,386	1,426,506	0.01%

***Changes in percent are parentheses if decreasing**

C. Runoff and Hydrologic Input

The amount of stormwater that runs off from any given storm event is based on the amount of imperviousness, the type of land use contributing to the runoff, and the underlying soils. For a given land use, the percent of directly connected impervious area (DCIA) is relatively consistent regardless of location. The DCIA represents all the impervious surfaces that are directly connected to the stormwater system, providing an unobstructed means for pollutants to enter the stormwater runoff. Based on methods developed initially by United States Department of Agriculture Natural Resources Conservation Service and refined for Florida by ERD in 2015, DCIA, percent impervious, and soil type can be used to calculate the curve number (CN) for the non-directly connected impervious area (NDCIA). The NDCIA value can be paired with a land use code per soil type, to estimate mean annual runoff coefficients (C Values).

In 2012, CDM Smith reviewed land uses and DCIA percentages in the City of Lake Worth (now the City of Lake Worth Beach). These land use percentages were reviewed and are assumed to be more representative of Palm Beach County than the national data available. The DCIA and NDCIA percentages used in the model are

listed in Table 2. The resulting C Values are shown in Table 2 and Table 4. The land use component will be discussed in further detail in the next section.

Table 2 DCIA, Percent Impervious and NDCIA per Soil Type by Land Use

			NDCIA per Soil Type			
Land Use	**% DCIA**	**% Imp.**	**A**	**B**	**C**	**D**
Agricultural/Crop Land	0	0	67.00	78.00	85.00	88.00
Agricultural / Improved Pasture	0	0	39.00	61.00	74.00	80.00
Commercial	75	83	91.88	93.92	95.28	95.96
Forest / Open	0	3	50.62	69.96	79.63	84.46
Golf Course	0	5	42.25	63.04	75.32	80.99
Highways / Major	50	50	83.00	89.00	92.00	93.00
Industrial	60	71	85.59	90.70	92.89	94.35
Residential / Low Density	5	15	51.47	68.47	79.21	83.68
Residential / Medium Density	25	44	65.89	77.84	85.31	89.04
Residential / High Density	50	67	83.80	89.21	92.59	93.94
Residential / Equestrian	5	15	51.47	68.47	79.21	83.68
Water	0	0	98.00	98.00	98.00	98.00
Wetland	0	0	98.00	98.00	98.00	98.00

Table 3 Mean Annual Runoff Coefficients (C Values) Part 1

Land Use	Land Use Code _Soil	NDCIA CN	Mean Annual Runoff Coefficients (C Values)
Residential, Low Density	1100_A	51.47	0.072
Residential, Low Density	1100_B	68.47	0.129
Residential, Low Density	1100_C	79.21	0.189
Residential, Low Density	1100_D	83.68	0.239
Residential, Medium Density	1200_A	65.89	0.257
Residential, Medium Density	1200_B	77.84	0.319
Residential, Medium Density	1200_C	85.31	0.359
Residential, Medium Density	1200_D	89.04	0.421
Residential, High Density	1300_A	83.80	0.509
Residential, High Density	1300_B	89.21	0.55
Residential, High Density	1300_C	92.59	0.627
Residential, High Density	1300_D	93.94	0.627
Residential, Equestrian	1151_A	51.47	0.072
Residential, Equestrian	1151_B	68.47	0.129
Residential, Equestrian	1151_C	79.21	0.189
Residential, Equestrian	1151_D	83.68	0.239
Commercial	1400_A	91.88	0.679
Commercial	1400_B	93.92	0.717
Commercial	1400_C	95.28	0.717
Commercial	1400_D	95.96	0.717
Industrial	1500_A	85.59	0.568
Industrial	1500_B	90.7	0.602
Industrial	1500_C	92.89	0.663
Industrial	1500_D	94.35	0.663
Golf Course	1820_A	42.25	0.018
Golf Course	1820_B	63.04	0.073
Golf Course	1820_C	75.32	0.12
Golf Course	1820_D	80.99	0.157

Table 4 Mean Annual Runoff Coefficients (C Values) Part 2

Land Use	Land Use Code _Soil	NDCIA CN	Mean Annual Runoff Coefficients (C Values)
Forest/Open Land	1900_A	50.62	0.034
Forest/Open Land	1900_B	69.96	0.093
Forest/Open Land	1900_C	79.63	0.157
Forest/Open Land	1900_D	84.46	0.209
Agricultural/Cropland	2140_A	67.00	0.073
Agricultural/Cropland	2140_B	78.00	0.157
Agricultural/Cropland	2140_C	85.00	0.209
Agricultural/Cropland	2140_D	88.00	0.292
Agricultural/Pasture	2110_A	39.00	0.018
Agricultural/Pasture	2110_B	61.00	0.057
Agricultural/Pasture	2110_C	74.00	0.12
Agricultural/Pasture	2110_D	80.00	0.157
Water	5000_A	98.00	0.614
Water	5000_B	98.00	0.614
Water	5000_C	98.00	0.614
Water	5000_D	98.00	0.614
Wetlands	6000_A	98.00	0.614
Wetlands	6000_B	98.00	0.614
Wetlands	6000_C	98.00	0.614
Wetlands	6000_D	98.00	0.614
Major Highways & Utilities	8000_A	83.00	0.509
Major Highways & Utilities	8000_B	89.00	0.55
Major Highways & Utilities	8000_C	92.00	0.55
Major Highways & Utilities	8000_D	93.00	0.627

D. Event Mean Concentration

The Event Mean Concentration EMC values are defined as the total load of a given pollutant divided by the total runoff volume for a storm event. These values are derived from monitoring watersheds, and sampling stormwater during rain events. When validated data is available, modelers will refer to this previously published data. The data EMC values used in the model for Cycle 4 and the regressive Cycle 3 is presented in Table 5.

Table 5 Event Mean Concentration for Parameters by Land Use (mg/l)

Land Use	TN	TP	TSS	BOD5	Cu	Zn
Agricultural/Crop Land	2.67	0.89	19.8	3.8	0.022	0.030
Agricultural / Improved Pasture	2.3	0.44	94.3	5.1	0.013	0.021
Commercial	1.79	0.26	57.5	7.7	0.018	0.094
Forest / Open	1.15	0.06	8.4	1.4	0.013	0.021
Golf Course	2.07	0.33	37.5	7.9	0.016	0.062
Highways / Major	1.2	0.2	37.3	5.2	0.032	0.126
Industrial	1.2	0.26	60.0	7.6	0.003	0.057
Residential / Low Density	1.61	0.19	23.0	4.7	0.008	0.031
Residential / Medium Density	2.07	0.33	37.5	7.9	0.016	0.062
Residential / High Density	2.32	0.52	77.8	11.3	0.009	0.086
Residential / with Equestrian	3.45	0.5	69.1	4.7	0.008	0.031
Water	0.84	0.11	11.0	3.0	0.001	0.006
Wetland	1.01	0.05	11.0	3.0	0.001	0.006

There are many datasets available for EMC values. The EMC values for this model for TN and TP are based on the recently-developed Loxahatchee Reasonable Assurance Plan PLSM Model. Golf Course EMC values were previously assumed to be equivalent to Medium Density Residential, by Harper 2015, in the report for TMDL modeling of the Indian River Lagoon, and this assumption was carried forward to this estimation. EMCs for TSS, BOD_5, Cu, and Zn come from Table 4-17 in the Evaluation of Current Stormwater Design Criteria within the State of Florida, 2007 prepared by Harvey Harper and David Baker. The EMC values for Residential with Equestrian land use are based on the South Florida Environmental Report Appendix 10-1, for St. Lucie Watershed by Del Bottcher and Joyce Zhang (2012) and are assumed to be equivalent to the values for Low Density Residential for the pollutants BOD_5, Cu, and Zn. Other values are

available in the literature; however, these values were chosen because they appeared to be representative of all of the Palm Beach County MS4s.
During a storm event, the concentration of pollutants in the runoff varies considerably over the time of the event (as does the rainfall intensity). The concentration of pollutants like oily substances on roadways is highest during the first part of the storm, and then declines as the majority of the material is washed off. This initial, high-concentration discharge is known as the "first-flush." The concentration in the first-flush of runoff is not representative of the entire storm. In order to estimate the loading from a storm, the flow-weighted average concentration (or EMC) is necessary.

E. Rainfall

Rainfall amounts for use in the model were obtained from the South Florida Water Management District (SFWMD) NEXRAD database. NEXRAD (Next Generation Weather Radar), also known as Weather Surveillance Doppler Radar (WSR-88D), is deployed by the National Weather Service and was first used in 1988. The technology allows the estimation of the spatial distribution of rainfall across an area. NEXRAD sends out a radio signal and measures the signal reflected from falling raindrops, to estimate the amount of rainfall (using calibrated algorithms). For the SFWMD area, five radar locations are used: Tampa, Melbourne, Jacksonville, Miami, Tallahassee and Key West. NEXRAD data are available with 2-km x 2-km grid resolution with data sets at every 15-minute increment. This data allows for more accurate data that is spatially tied to each water shed The ten-year average for each station was used to determine an annual rainfall average for each water shed across the entire County. The use of an average rainfall for each watershed, based on the prior 10-year period of record, was important to remove the effects of variable rainfall from year to year when comparing the two permit cycles. The use of the NEXRAD data in DBHYDRO in place of the previously used rain gauges allowed the distribution of rainfall across the County to be considered, rather than assuming the same rainfall everywhere.

To determine an average rainfall amount for each watershed for the 10-year period in both Cycle 3 and Cycle 4, a ten-year period of monthly data was downloaded from the SFWMD dbhydro NEXRAD database. Each 2-km by 2-km grid (pixel) in the NEXRAD data has an eight-digit identification number. This number was used to track data once out of the spatial database. Within each watershed the pixels were associated and summed for a total month of rainfall. Pixels that crossed the line between two watersheds were assigned to the watershed that most of the pixel fell into. The same rationale was used for a pixel that extended beyond the edge of a watershed. Rain fall data was downloaded for each pixel for each month. The

annual average rainfall per watershed was calculated. This value was averaged over the ten-year period and the average value was used as the rainfall for the watershed in the models for both Cycle 3 and Cycle 4.

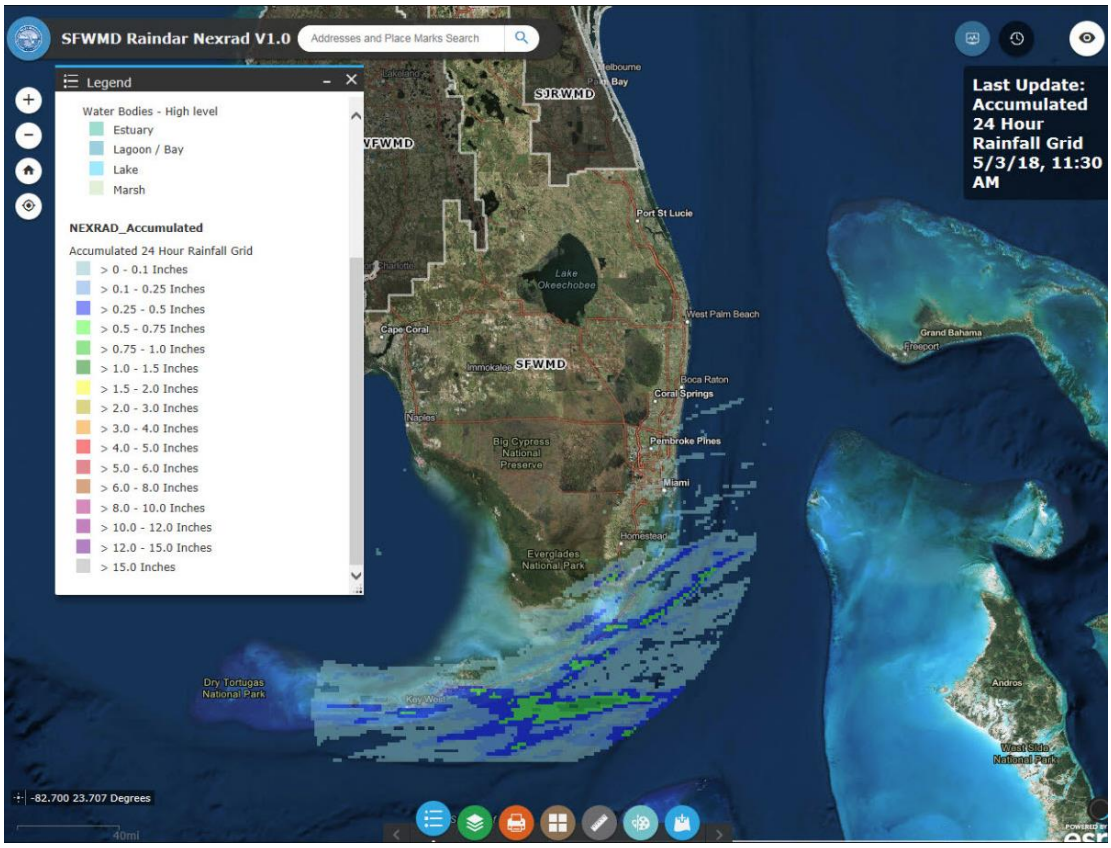


Figure 2 Example of NEXRAD data available from SFWMD

Table 6 Estimated Average Annual Rainfall for Palm Beach County 2008-2013

Watershed	2008	2009	2010	2011	2012	2013
C-15	65.8	59.8	44.7	45.5	59.5	57.5
C-16	63.5	62.4	48.8	43.4	66.7	60.8
C-17	60.6	55.1	57.0	51.6	62.9	62.4
C-18	55.3	49.3	53.2	49.4	56.7	56.9
C-51	62.0	55.5	55.8	47.9	62.9	58.2
L-8	57.4	51.9	50.3	46.6	53.9	54.6
S-2-6-7	61.9	53.7	50.6	47.4	51.1	52.9
Hillsboro	52.1	54.6	45.2	38.5	46.3	49.0
ICWWN	59.8	54.7	53.8	50.4	67.3	60.8
ICWWS	48.2	48.2	33.7	36.0	41.7	43.5
Loxahatchee	48.6	42.8	48.8	46.1	52.5	51.9
Lake Worth Lagoon	47.0	42.3	38.4	35.4	48.5	44.9
WCA-1	62.2	52.0	50.0	42.8	56.5	50.4
WPBWS	61.4	54.3	58.9	49.9	63.4	61.9

Table 7 Estimated Average Annual Rainfall for Palm Beach County 2014-2018

Watershed	2014	2015	2016	2017	2018	10-Year Average
C-15	60.9	45.2	53.5	69.6	53.3	55.9
C-16	56.3	49.3	53.8	69.2	52.7	57.0
C-17	55.6	46.0	53.0	59.7	56.6	56.4
C-18	57.7	46.7	55.5	65.1	60.2	55.1
C-51	53.8	47.5	54.3	62.8	56.9	56.1
L-8	53.2	42.1	54.1	63.0	55.0	52.9
S-2-6-7	46.1	37.9	52.4	64.1	42.7	51.0
Hillsboro	45.1	45.9	44.4	60.4	50.3	48.3
ICWWN	63.1	53.5	53.7	57.6	52.6	57.0
ICWWS	39.1	34.7	42.7	55.5	39.0	42.0
Loxahatchee	54.8	47.9	50.1	58.4	55.7	50.7
Lake Worth Lagoon	45.0	35.3	37.6	44.1	37.9	41.5
WCA-1	50.8	44.9	50.8	66.4	49.0	52.4
WPBWS	53.0	46.9	56.9	62.4	56.8	56.9

F. Base Flow

In addition to estimating stormwater runoff pollutant loading, SIMPLE calculates pollutant loadings associated with base flows. Base flow is defined as the rainfall which seeps into the soil and moves laterally underground to a nearby waterway. Base flow is typically estimated from canal flow during the lowest flow months, or by using hydrograph separation techniques. Base flow can also be estimated as a percentage of rainfall. Base flow was assigned as a fraction (0.25) of the rainfall.

Base flow concentrations are usually determined from a series of observations during the dry season. Median base flow concentrations from the 1993 MS4 permit application were used in the pollutant loading model. These values are shown in

Table 8.

Table 8 Median Base Flow Concentrations (mg/l)

Parameter	Concentration
BOD_5	2.66
TSS	5.9
TP	0.170
TN	1.5
Cu	0.0074
Zn	0.0279

G. OSTDS or Septic System Impact

Onsite sewage treatment and disposal systems (OSTDS) also known generally as septic systems are assumed to generate additional non-point source pollutant loading to a watershed. Florida Department of Health (FDOH) has been working on developing a database of parcels served by OSTDS. This data set still contains a high level of uncertainty. To indicate the level of uncertainty, qualitative words like “known, likely, somewhat likely” are used to describe the OSTDS data point. Review of this information against other municipal sewer systems and sanitary pump station zones resulted in using only the “known” data to augment the Cycle 4 data. Municipalities with areas served by OSTDS were sent maps of the previously identified septic areas to review and update. Significant work was done in 2009 through 2015 by Water Environment Research Foundation (WERF), Lowe, and FDOH to characterize the influent and effluent flows of OSTDS, as well as the impact of drainfields in the reduction of pollutants. For the model,

TN and TP were assumed to be conserved as the discharge transports from the drainfield to the discharge. In literature, concentrations of TN and TP were found to be 48.00 mg/L and 1.03 mg/L respectively, after abstraction from drainfield had occurred.

Flows from OSTDS were calculated based on the design process required by FDOH in Chapter 64E-6, F.A.C. Within that Chapter, Table 1, "Estimated Sewage Flows," residential flows are based on the square footage of the building area. This step function was used to estimate the flow. In addition, a report dated June 2018, prepared for National Oceanic and Atmospheric Administration (NOAA) Fisheries Service, titled Boynton Inlet Contributing Area Watershed Management Plan by Horsley Witten Group states that the septic return flow for non-consumptive use or the fraction of the wastewater flow that ultimately left the septic system was 48 (gallons/per person/per day) vs. the 100 (gallons/per person/per day) that is the influent design flow. Data was collected from Palm Beach County Property Appraisers on the square footage of structures built on parcels served by septic. This information was then used with the values from Table 1 referenced previously, to estimate the return flow. The benefit of this approach opposed to previous land area and census data interpolation, is that it accounts more accurately for areas served by septic but which are vacant or are very large parcels with relatively small houses. This methodology of estimating residential septic flows was applied to all parcels served by septic. Spot checks of parcels of different sizes throughout the county appeared to generate flows at reasonable magnitudes, based on aerial review.

H. Equestrian Land Use Impact

Per Florida Department of Agriculture and Consumer Services Water Quality/Quantity Best Management Practices for Florida Equine Operation, 2011 Edition, a 1,000 pound horse produces nearly 10 tons of manure and stall waste each year. A ton of manure and bedding material has an average nutrient content of 8 pounds of nitrogen and 2.5 pounds of phosphorous. Assuming that the bedding material waste does not contain nutrients approximately 80 pounds of nitrogen and 25 pounds of phosphorous are generated each year per horse. The Village of Wellington has the most population of both yearly and seasonal horses. Wellington also has a livestock waste ordinance which requires the waste to be hauled to an approved disposal site and haulers are required to submit annual reports in the amount of material removed. Based on load tickets covering a 12 month period (2017-2018) and Wellington equestrian area (Palm Beach County property appraiser's data base for equestrian parcels) the annual number of horse manure is approximately 0.64 horse per acre per year. Applying this amount county-wide the additional nutrient horse loading is estimated at 51 pounds of nitrogen per equestrian acre

per year and 16 pounds of phosphorous per equestrian acre per year. This load was redistributed across the watershed based on the average rainfall values. From a mass balance and volume calculations loads from equestrian areas were estimated to have an ECM 4.33 mg/L for nitrogen and 1.36 mg/L for phosphorous. Other EMC perimeters for Residential areas with Equestrian were based on South Florida Environmental Report Appendix 10-1, St. Lucie Watershed by Del Bottcher and Joyce Zhang (2012) assumed equivalent to Low Density for BOD5, CU, and ZN.

I. Best Management Practices Pollutant Reduction

Another component of the pollutant loading estimation equation is the incorporation of pollutant reduction/control practices that exist within the contributing area. SIMPLE allows stormwater pollution control strategies to be included. Non-structural controls (e.g., land use controls, buffer zones, etc.) and structural controls (e.g., onsite and regional detention and retention basins, lakes and ponds, swales, etc.) can be incorporated into the model to determine the effect on pollutant loads.

SIMPLE attributes a reduction in pollutant loading to systems that incorporate Best Managements Practices (BMPs) such as wet or dry retention/detention systems, exfiltration trenches, pollution control devices, and so on. The model only accounts for removal of pollutants by BMPs in the stormwater runoff, i.e., pollutant loads in the base flow are not reduced by the BMPs. Several sources of data were used to create the BMP coverage. Permit coverage from SFWMD GIS Data were used to supplement information provided by the County and municipalities. Removal efficiencies have been researched across the nation as well as here in South Florida. The stormwater practices listed in the table were assigned a pollution reduction coefficient based on literature research reported by (Horsley-Witten 2018). Additionally, Florida Department of Environmental Protection (2016) has provided values for TN, TP, and TSS reductions. Literature research for valves for BOD_5, Cu, and Zn are based on Harper Harvey studies circa 1999 and City of Lake Worth Stormwater Master Plan (CDM Smith 2012). When combination BMPs were not reported directly, an efficiency was calculated via the following equation:

$$\text{Treatment Train Efficiency} = Eff_1 + ((1-Eff_1) \times Eff_2)$$

A summary of the total area of each type of BMP found in each watershed (and used in the models) for the 2013 and 2018 estimations is presented in Table 9 and Table 10, respectively. In general, an increase of area treated by BMPs can be seen between the Cycle 3 and Cycle 4. The reductions of pollutant loading resulting from the areas treated by BMPs is presented in Table 11.

Table 9 Summary by Watershed in acres of BMP Types 2013

Watershed	Dry Detention Basin (Dry)	Exfiltration Basin (Exf)	Proprietary Control Device (PCD)	Wet Detention Basin (Wet)	Dry/PCD in Combination	Dry/Wet in Combination
C15	703.59	6.53	--	18,265.53	--	1,809.48
C16	1,406.31	0.90	--	25,248.62	--	1,415.65
C17	1,520.13	--	24.80	10,164.73	--	1,058.22
C18	434.08	--	--	18,126.24	--	75.12
C51	3,764.02	21.95	22.05	67,887.44	7.27	3,436.00
Hillsboro	2,245.14	--	--	12,746.84	--	2,954.85
ICWWN	402.47	--	--	8,431.66	--	1,880.25
ICWWS	956.13	4.54	--	230.22	--	141.59
L8	0.37	--	--	845.13	--	25.00
Loxahatchee	787.80	--	--	4,468.66	--	12,457.44
Lake Worth Lagoon	952.16	--	534.72	1,191.25	310.34	338.71
S-2-6-7	325.64	--	--	324.04	--	251.62
WPBWS	56.61	--	0.03	1,807.34	--	6.52

Watershed	Exf/Dry in Combination	Exf/PCD in Combination	Wet/Exf in Combination	Alum Injection	No discharge	Total
C15	--	0.23	--	--	--	20,785.36
C16	21.16	--	--	--	--	28,092.64
C17	5.77	--	--	--	1,255.74	14,029.40
C18	--	--	--	--	--	18,635.45
C51	30.03	0.19	17.60	9.72	3.38	75,199.65
Hillsboro	--	--	--	--	--	17,946.83
ICWWN	--	--	--	--	--	10,714.37
ICWWS	--	--	--	--	--	1,332.48
L8	--	--	--	--	--	870.50
Loxahatchee	--	--	--	--	--	17,713.89
Lake Worth Lagoon	231.45	37.71	--	0.54	7.59	3,604.47
S-2-6-7	--	--	--	--	--	901.31
WPBWS	--	--	--	450.62	7.31	2,328.42

Table 10 Summary by Watershed in acres of BMP Types 2018

Watershed	Dry Detention Basin (Dry)	Exfiltration Basin (Exf)	Proprietary Control Device (PCD)	Wet Detention Basin (Wet)	Dry/PCD in Combination	Dry/Wet in Combination
C15	1,208.87	384.00	0.58	18,073.86	--	2,815.53
C16	1,609.02	50.83	0.82	25,770.25	--	1,284.81
C17	2,513.78	114.03	27.98	10,321.19	--	1,044.73
C18	656.88	--	--	18,107.44	--	25.24
C51	4,631.75	33.32	25.92	68,240.22	21.50	3,539.79
Hillsboro	2,753.04	301.66	--	12,792.98	44.37	2,863.13
ICWWN	385.47	179.09	--	9,205.06	--	1,894.39
ICWWS	1,005.41	258.36	45.90	257.20	--	149.38
L8	26.56	--	--	845.13	--	25.00
Loxahatchee	714.76	391.98	--	7,199.10	--	12,358.74
Lake Worth Lagoon	974.99	148.26	609.85	1,431.93	312.26	350.26
S-2-6-7	552.18	--	--	329.82	41.20	250.67
WPBWS	74.47	--	--	1,808.99	--	4.71

Watershed	Exf/Dry in Combination	Exf/PCD in Combination	Wet/Exf in Combination	Wet/PCD in Combination	Alum Injection	Swales	No discharge	Total
C15	378.51	65.89	313.75	--	--	--	--	758.15
C16	447.30	--	--	--	--	--	--	447.30
C17	193.36	--	--	--	--	--	648.05	841.41
C18	--	--	--	--	--	--	--	0.00
C51	216.10	134.41	17.60	--	0.09	86.88	3.38	458.46
Hillsboro	51.85	--	36.65	--	--	--	--	88.50
ICWWN	290.90	--	13.97	--	--	--	--	304.87
ICWWS	49.54	--	71.76	5.16	--	--	--	126.46
L8	--	--	--	--	--	--	--	0.00
Loxahatchee	83.02	31.42	--	--	--	--	--	114.44
Lake Worth Lagoon	309.07	1.16	--	--	0.08	--	7.59	317.90
S-2-6-7	--	--	--	--	--	--	--	0.00
WPBWS	--	--	--	--	450.84	--	7.31	458.14

Table 11 BMP Removal Efficiencies in Percent

Types of Existing Stormwater Practices	TN	TP	TSS	BOD_5	Cu	ZN
Dry Detention Basin (Dry)	10	10	50	40	35	70
Exfiltration Basin (Exf)	45	65	90	75	80	80
Proprietary Control Device (PCD)	30	40	90	25	50	45
Wet Detention Basin (Wet)	50	80	90	40	70	50
Dry/PCD Combination	37	46	95	55	67	83
Dry/Wet in Combination	55	82	95	64	80	85
Exf/Dry in Combination	51	69	95	85	87	84
Exf/PCD in Combination	62	79	99	81	90	89
Alum Injection	50	90	90	75	80	80
Swales	20	20	15	20	35	25

J. Pollutant Loading Comparisons

Estimates of pollutant loading for the past two permit cycles are given in Table 12 and Table 13. A graphical comparison of the pollutant loadings for the two permit cycles, for the six pollutant parameters is shown in Figure 3 through Figure 8.

In terms of concentration estimates, using a percent change is a common method of comparison. A change of one percent or greater was used as a threshold to indicate significant change. Generally, the estimates indicate that BOD_5, TSS, Cu and Zn loading are decreasing in all the Watersheds except for C-17. In C-17, estimated loading of TP and TN appear to be increasing.

Table 12 Loading Estimates Cycle 3 Year 3 in mg/L

	BOD_5	TSS	TP	CU	ZN	TN
Watershed	Cycle 3 Year 3	Cycle 3 Year 3	Cycle 3 Year 3	Cycle 3 Year 3	Cycle 3 Year 3	Cycle 3 Year 3
C15	1,085,890	3,780,619	47,511	2,491	11,414	428,992
C16	1,319,230	4,294,861	55,301	2,817	13,229	613,163
C17	746,421	3,001,973	30,455	1,762	8,095	306,205
C18	1,795,960	5,281,837	55,081	2,234	9,914	716,469
C51	3,015,247	9,577,086	137,506	6,440	28,706	1,770,218
Hillsboro	954,749	3,768,384	44,540	2,341	10,028	349,585
ICWWN	441,016	1,365,455	17,839	1,002	4,522	195,209
ICWWS	278,171	1,471,489	13,128	683	2,986	108,085
L8	2,226,117	7,363,771	83,490	2,829	10,963	931,902
LOX	746,513	2,390,398	33,363	1,554	6,224	456,387
LWL	727,658	3,479,044	33,667	1,579	6,984	289,708
S-2_6_7	3,001,967	10,348,659	316,928	10,656	29,755	1,702,345
WPBWS	516,116	1,628,588	16,166	588	2,558	202,132

Table 13 Loading Estimates Cycle 4 Year 3 in mg/L

	BOD_5	TSS	TP	CU	ZN	TN
Watershed	Cycle 4 Year 3	Cycle 4 Year 3	Cycle 4 Year 3	Cycle 4 Year 3	Cycle 4 Year 3	Cycle 4 Year 3
C15	1,035,576	3,308,847	45,366	2,322	10,456	422,172
C16	1,314,644	4,201,904	54,807	2,756	13,003	612,669
C17	748,576	2,933,718	30,944	1,702	7,663	311,079
C18	1,747,703	5,093,882	54,145	2,204	9,693	693,855
C51	2,990,483	9,387,559	136,117	6,332	28,061	1,725,169
Hillsboro	943,216	3,640,819	44,011	2,246	9,554	348,386
ICWWN	429,380	1,229,472	17,269	928	4,241	193,500
ICWWS	267,863	1,367,076	12,758	644	2,794	106,657
L8	2,225,830	7,361,863	83,488	2,828	10,957	931,884
LOX	709,032	2,038,886	31,659	1,456	5,840	439,785
LWL	718,096	3,395,653	33,279	1,543	6,818	285,882
S-2_6_7	3,021,209	10,444,784	317,153	10,652	29,783	1,706,412
WPBWS	515,843	1,626,169	16,161	586	2,545	202,125

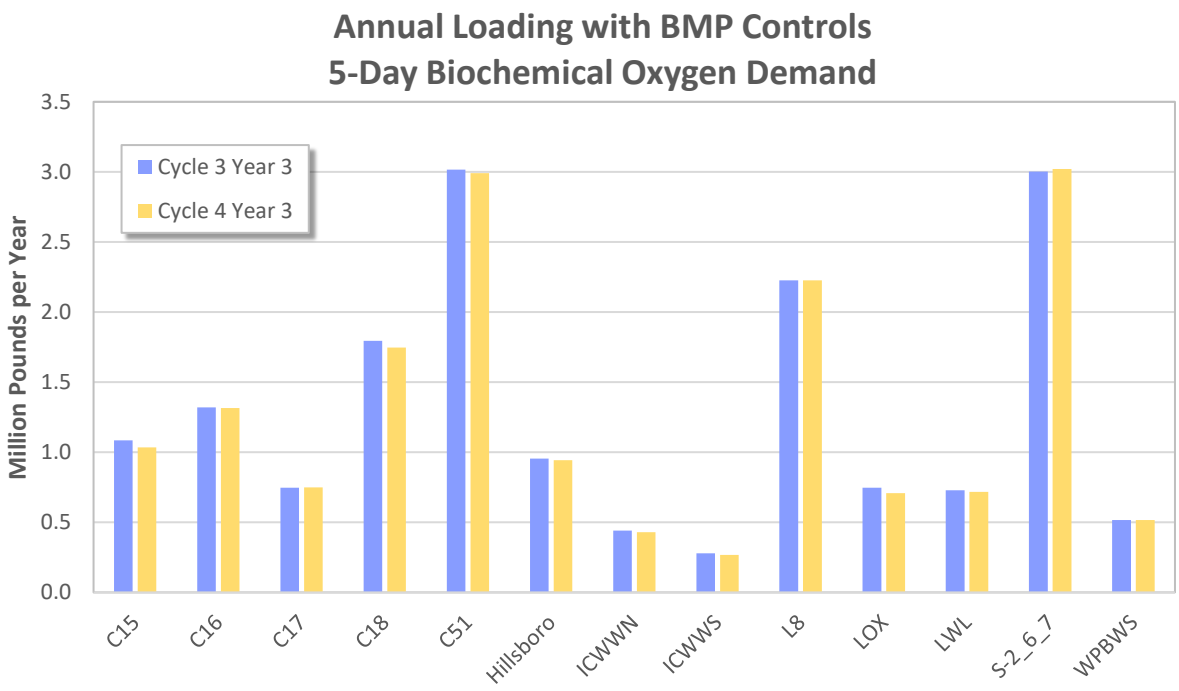


Figure 3 Annual Loading with BMP Controls: 5-Day Biochemical Oxygen Demand

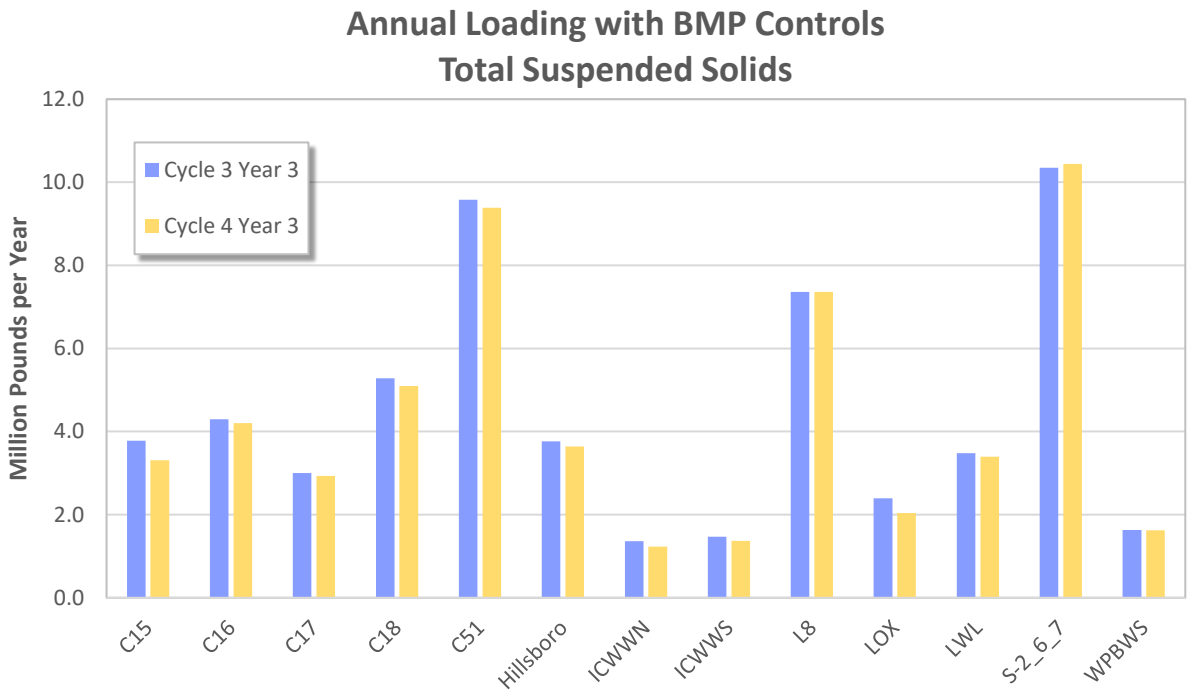


Figure 4 Annual Loading with BMP Controls: Total Suspended Solids

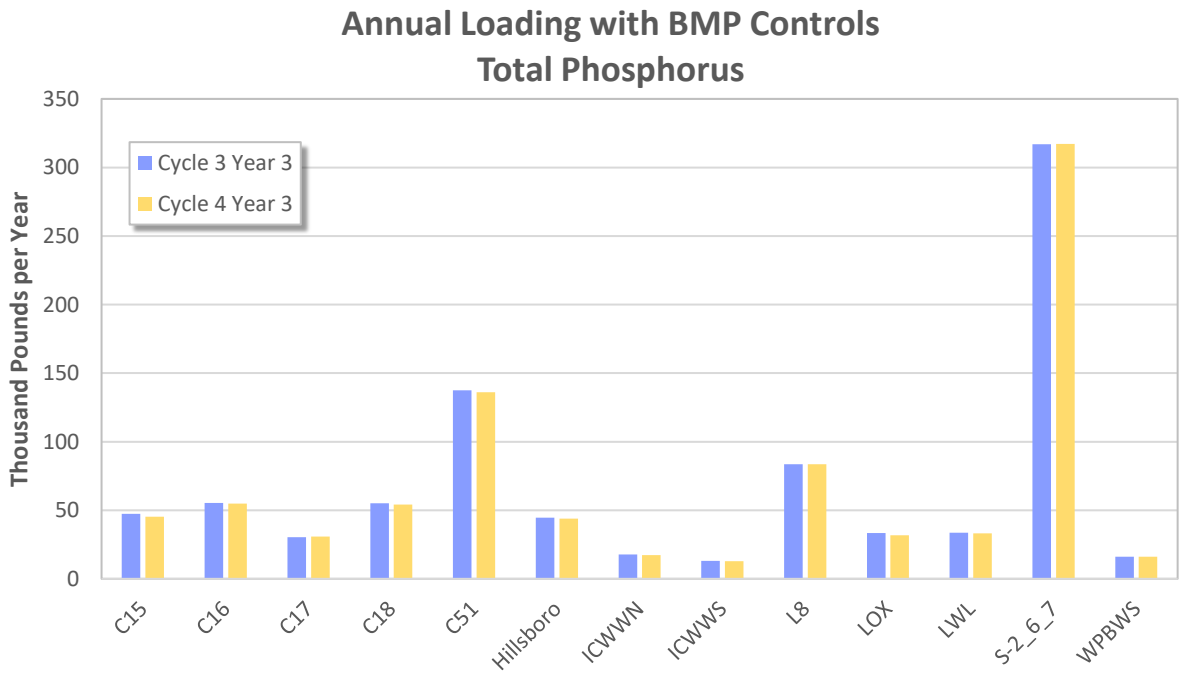


Figure 5 Annual Loading with BMP Controls: Total Phosphorus

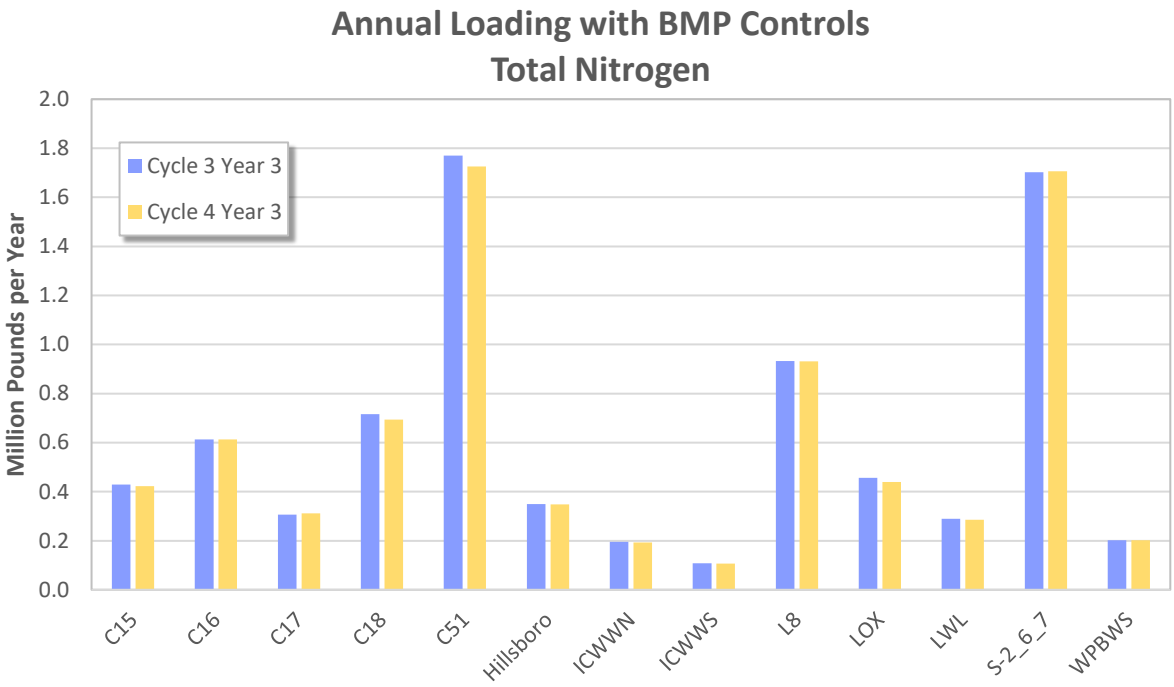


Figure 6 Annual Loading with BMP Controls: Total Nitrogen

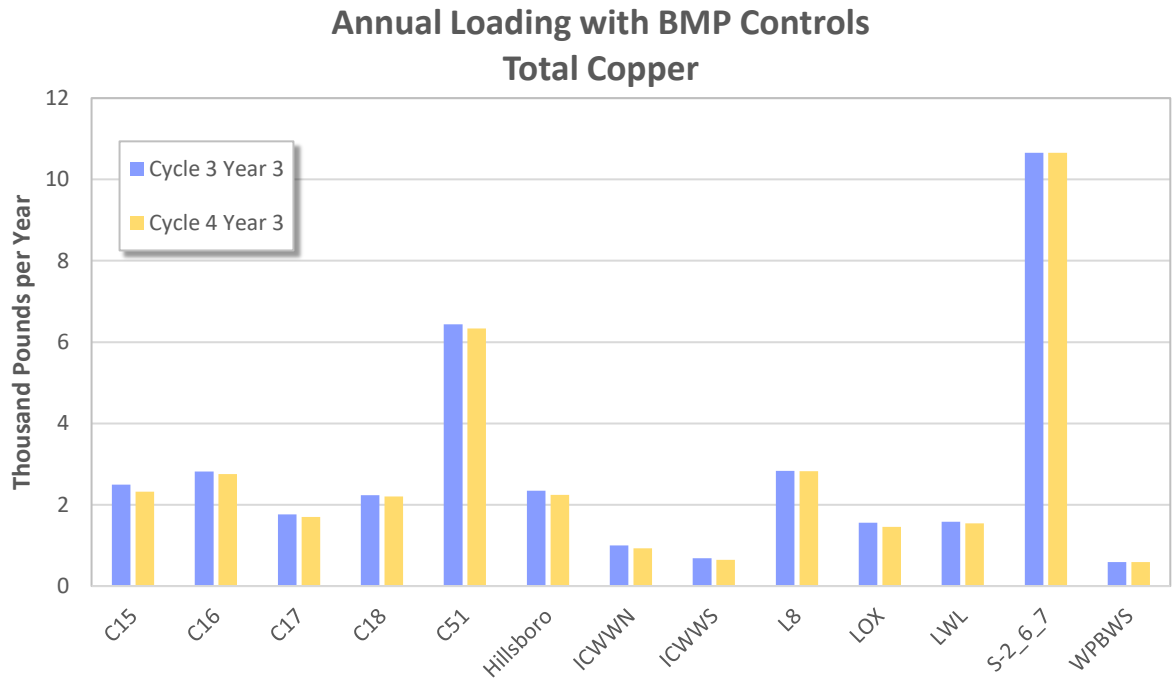


Figure 7 Annual Loading with BMP Controls: Total Copper

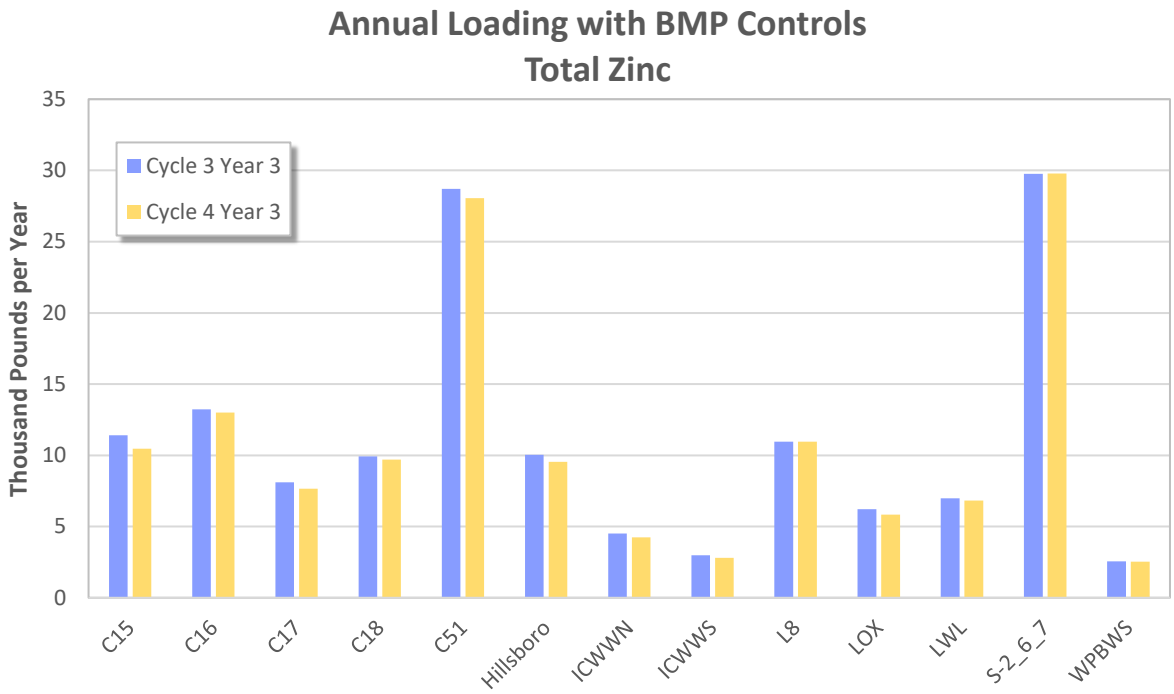


Figure 8 Annual Loading with BMP Controls: Total Zinc

K. MS4 Contribution

Palm Beach County is over 1.5 million acres in size, and large portions of the County are in agricultural production, land preserves, or surface water treatment. The watersheds containing MS4 area is a smaller sub-section of the County. Within each watershed the contributing area from MS4s is smaller still. The MS4s account for approximately 33% of the area in the Loxahatchee River Basin (Loxahatchee, ICWWN, and C-18 watersheds), 40% in the Lake Worth Lagoon Basin (C16, C17, C51, Lake Worth Lagoon, and WPBWS watersheds) and 21% in the Intracoastal Waterway South Basin (C15, Hillsboro, and ICWWS watersheds). MS4s account for approximately 20% of the total contributing area in Palm Beach County. An estimate of the pollutant loading for each PBC MS4 area was estimated for each watershed, by annual load, as well as by percentage. These estimated values are provided in Table 14 through Table 28.

1.3 Conclusions

The pollutant loading estimates generally show no increase of pollutant loading over past two permit cycles. A majority of the pollutant loading appears to be from non-MS4 sources. The pollutant loading estimates indicate that the current stormwater pollution prevention programs in place are generally managing the stormwater runoff

in terms of pollutant loading, and implementation of additional programs is not warranted for most PBC MS4s at this time.

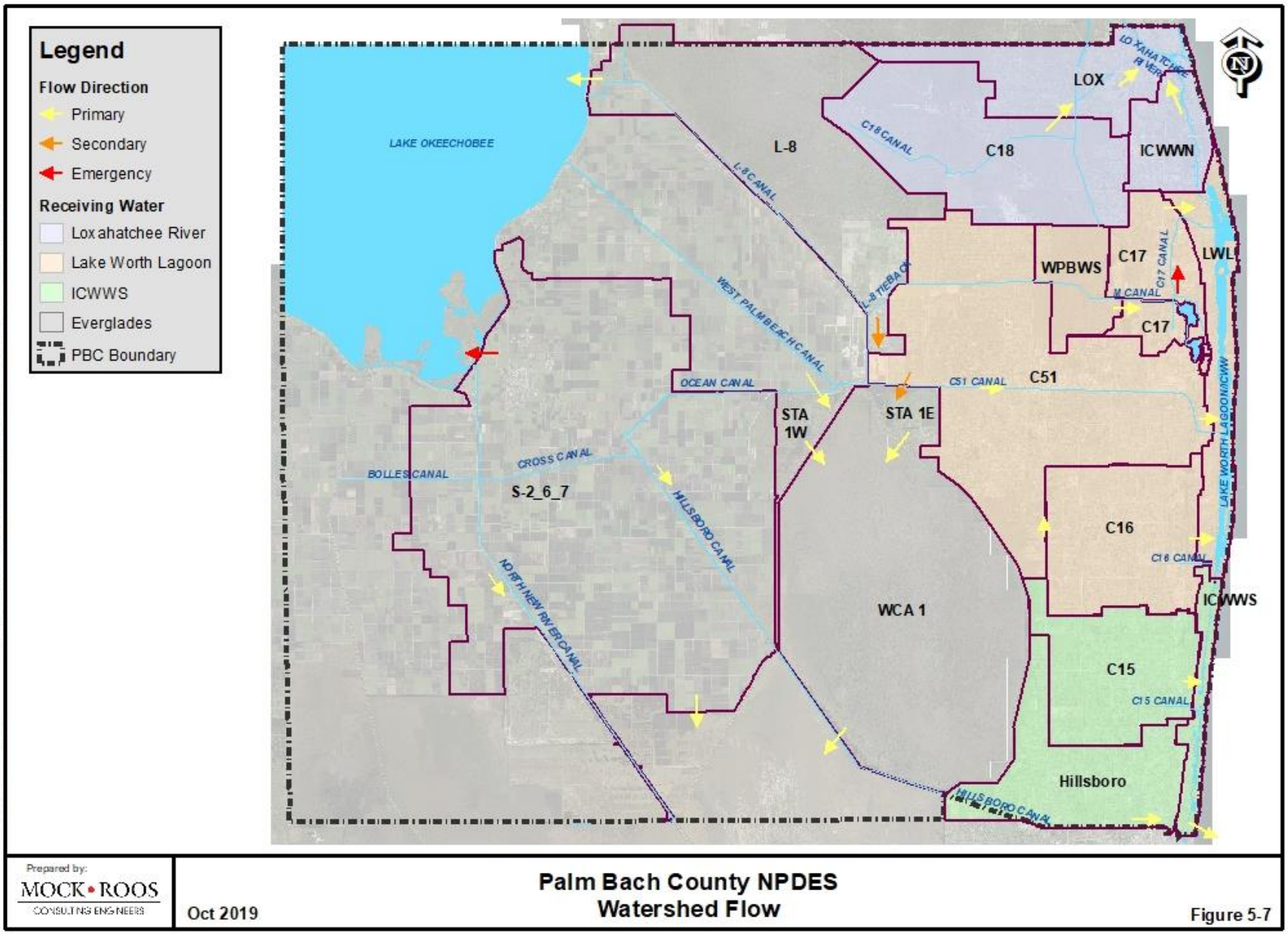
On a watershed level a slight increase in pollutant loading has been estimated for the C-17 watershed. Within this basin, MS4s show reductions or no increases in pollutants loading. This indicates that the estimated increase is coming from non-MS4 contributing areas. This could be attributed to the development of lands in these non-MS4 areas. The estimated increase appears to be a 2-percent change. The State of Florida allows for assumed pollutant loading reductions as a result of non-structural BMPs such as public education and outreach. In fact, a six-percent reduction in the estimated loading of TN and TP is allowed for a contributing area. These reductions are not included in the SIMPLE model. The Palm Beach County MS4 group conducts public outreach programs throughout the year, and throughout Palm Beach County. If a six-percent pollutant loading estimate reduction is applied to the C-17 Watershed, a net decrease in the pollutant loading estimate for these parameters has occurred. Therefore, the implementation of additional programs is not warranted for PBC MS4s in the C-17 Watershed.

Within the MS4s an increase in the estimated pollutant loading is indicated for the City of Lake Worth Beach, Palm Beach Gardens, Lantana, and Northern Palm Beach County Improvement District. None of these MS4s have an increase greater than six-percent, which means any increase would be offset by the County-wide public education activities. Therefore, the implementation of additional programs is not warranted for the listed MS4s.

Lastly, throughout the county numerous other water quality programs are ongoing. Some of these programs are as follows:

- Street Sweeping and Liter Control
- Structural Controls Cleanout Activities
- Equestrian BMPs.

These actives transport large volumes of debris from the streets, structural controls and open lands to the landfill that would be washed into the stormwater flow. The FDEP has a tool that can be used to estimate the amount of TN and TP that is removed by these activities per pound of waste land filled. Additionally, many municipalities have implemented fertilizer ordinances between 2013 and 2018 that reduce the amount of fertilizer compounds that are washed into water bodies. Many of the MS4s have development regulation that require retention /detention water quality volumes for new and redevelopment. These efforts are done on a municipal level and not modeled in this report but should be considered when looking at the loading model.



Appendix A: Figure 9 Watershed Flow Directions and Watershed Direction

Appendix B: Pollutant Loading Results

Table 14 Pollutant Loading Results Watershed C-15

Watershed C-15
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Boca Raton, City of	1,574	8,769	69	5	22	481	40.61	0.11%
Boynton Beach, City of	5,268	7,109	151	8	48	1,601	181.86	0.47%
Delray Beach, City of	140,855	765,668	6,095	372	1,675	42,479	3,103.22	8.08%
FDOT – District Four	17,773	108,960	774	97	378	5,305	427.12	1.11%
FDOT – Turnpike Enterprises	9,961	44,518	516	50	139	3,744	331.67	0.86%
Palm Beach County	49,858	230,340	2,132	208	853	16,602	1,631.33	4.25%
All MS4 Total	**225,290**	**1,165,365**	**9,736**	**740**	**3,116**	**70,213**	**5,715.81**	**14.88%**
All Watersheds Total	**1,085,890**	**3,780,619**	**47,511**	**2,491**	**11,414**	**428,992**	**38,407.11**	**100.00%**

Watershed C-15
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Boca Raton, City of	1,423	7,668	63	4	18	448	40.61	0.11%
Boynton Beach, City of	5,269	7,114	151	8	48	1,601	181.86	0.47%
Delray Beach, City of	120,652	585,783	5,362	312	1,346	39,699	3,103.22	8.08%
FDOT – District Four	13,399	70,065	682	70	222	4,850	427.12	1.11%
FDOT – Turnpike Enterprises	9,952	44,477	516	50	139	3,742	331.67	0.86%
Palm Beach County	47,156	205,033	2,025	190	785	16,155	1,631.33	4.25%
All MS4 Total	**197,852**	**920,140**	**8,799**	**635**	**2,559**	**66,494**	**5,715.81**	**14.88%**
All Watersheds Total	**1,035,576**	**3,308,847**	**45,366**	**2,322**	**10,456**	**422,172**	**38,407.11**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**12.2%**	**21.0%**	**9.6%**	**14.1%**	**17.9%**	**5.3%**
All Watersheds Total	**4.6%**	**12.5%**	**4.5%**	**6.8%**	**8.4%**	**1.6%**

Table 15 Pollutant Loading Results Watershed C-16

Watershed C-16
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Atlantis, City of	12,679	31,056	465	28	127	4,217	451.27	1.03%
Boynton Beach, City of	53,576	83,664	1,489	91	521	16,361	1,635.09	3.73%
FDOT – District Four	27,091	158,643	1,227	143	541	8,599	744.70	1.70%
FDOT – Turnpike Enterprises	10,663	38,806	555	37	104	4,293	396.17	0.90%
Greenacres, City of	7,065	35,477	339	17	77	3,477	156.96	0.36%
Lake Worth, City of	30,700	176,290	1,400	74	330	9,963	633.06	1.44%
Lantana, Town of	604	3,236	32	2	4	258	12.32	0.03%
Palm Beach County	107,029	503,939	4,434	428	1,791	34,354	3,221.96	7.34%
All MS4 Total	**249,408**	**1,031,110**	**9,942**	**819**	**3,496**	**81,524**	**7,251.53**	**16.52%**
All Watersheds Total	**1,319,230**	**4,294,861**	**55,301**	**2,817**	**13,229**	**613,163**	**43,889.46**	**100.00%**

Watershed C-16
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Atlantis, City of	12,533	30,504	463	27	125	4,189	451.27	1.03%
Boynton Beach, City of	53,572	83,725	1,489	91	521	16,362	1,635.09	3.73%
FDOT – District Four	16,911	77,248	912	80	301	7,198	744.70	1.70%
FDOT – Turnpike Enterprises	10,663	38,806	555	37	104	4,293	396.17	0.90%
Greenacres, City of	7,068	35,496	339	17	77	3,478	156.96	0.36%
Lake Worth, City of	31,316	179,259	1,453	79	333	10,385	633.06	1.44%
Lantana, Town of	605	3,236	32	2	4	258	12.32	0.03%
Palm Beach County	106,487	499,775	4,418	425	1,780	34,283	3,221.96	7.34%
All MS4 Total	**239,154**	**948,049**	**9,661**	**757**	**3,246**	**80,447**	**7,251.53**	**16.52%**
All Watersheds Total	**1,314,644**	**4,201,904**	**54,807**	**2,756**	**13,003**	**612,669**	**43,889.46**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**4.1%**	**8.1%**	**2.8%**	**7.6%**	**7.2%**	**1.3%**
All Watersheds Total	**0.3%**	**2.2%**	**0.9%**	**2.1%**	**1.7%**	**0.1%**

Table 16 Pollutant Loading Results Watershed C-17

Watershed C-17
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
FDOT – District Four	31,871	181,547	1,399	165	634	9,860	817.19	3.54%
FDOT – Turnpike Enterprises	9,070	40,438	440	45	139	3,257	286.31	1.24%
Lake Park, Town of	5,159	35,307	195	14	67	1,449	94.21	0.41%
Mangonia Park, Town of	3,807	22,990	172	11	41	1,253	71.67	0.31%
NPBCID	182,804	401,084	6,656	327	1,722	81,521	6,880.11	29.84%
Palm Beach County	19,953	88,214	905	85	339	7,232	860.77	3.73%
Palm Beach Gardens, City of	32,623	144,133	1,452	87	378	13,512	1,145.74	4.97%
Riviera Beach, City of	63,990	337,782	2,667	163	718	19,592	1,435.03	6.22%
West Palm Beach, City of	86,510	339,512	3,390	194	860	29,977	2,860.81	12.41%
All MS4 Total	**435,787**	**1,591,007**	**17,274**	**1,091**	**4,898**	**167,653**	**14,451.84**	**62.68%**
All Watersheds Total	**746,421**	**3,001,973**	**30,455**	**1,762**	**8,095**	**306,205**	**23,057.60**	**100.00%**

Watershed C-17
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
FDOT – District Four	24,315	114,530	1,220	119	383	9,060	817.19	3.54%
FDOT – Turnpike Enterprises	8,599	39,875	434	44	130	3,167	286.31	1.24%
Lake Park, Town of	4,694	30,990	188	13	58	1,409	94.21	0.41%
Mangonia Park, Town of	3,012	15,929	165	9	22	1,207	71.67	0.31%
NPBCID	181,610	396,636	6,634	322	1,694	81,240	6,880.11	29.84%
Palm Beach County	19,868	87,510	901	84	333	7,223	860.77	3.73%
Palm Beach Gardens, City of	29,683	121,974	1,349	58	268	12,865	1,145.74	4.97%
Riviera Beach, City of	59,754	302,620	2,578	151	639	19,157	1,435.03	6.22%
West Palm Beach, City of	86,404	338,972	3,390	193	855	29,979	2,860.81	12.41%
All MS4 Total	**417,938**	**1,449,036**	**16,859**	**992**	**4,383**	**165,306**	**14,451.84**	**62.68%**
All Watersheds Total	**748,576**	**2,933,718**	**30,944**	**1,702**	**7,663**	**311,079**	**23,057.60**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**4.1%**	**8.9%**	**2.4%**	**9.1%**	**10.5%**	**1.4%**
All Watersheds Total	**-0.3%**	**2.3%**	**-1.6%**	**3.4%**	**5.3%**	**-1.6%**

Table 17 Pollutant Loading Results Watershed C-18

Watershed C-18
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
FDOT – District Four	18,195	98,440	721	80	318	5,797	461.77	0.73%
FDOT – Turnpike Enterprises	10,559	48,617	619	55	126	4,550	448.91	0.71%
NPBCID	132,467	209,578	4,879	240	1,176	57,077	7,173.47	11.29%
Palm Beach County	3,624	14,867	154	13	49	1,340	144.40	0.23%
Palm Beach Gardens, City of	2,339	8,114	124	6	21	969	142.13	0.22%
All MS4 Total	**167,185**	**379,616**	**6,496**	**394**	**1,690**	**69,733**	**8,370.68**	**13.17%**
All Watersheds Total	**1,795,960**	**5,281,837**	**55,081**	**2,234**	**9,914**	**716,469**	**63,557.76**	**100.00%**

Watershed C-18
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
FDOT – District Four	15,577	75,253	694	66	207	5,643	461.77	0.73%
FDOT – Turnpike Enterprises	10,483	48,382	616	55	125	4,525	448.91	0.71%
NPBCID	132,260	208,576	4,713	237	1,159	49,575	7,173.47	11.29%
Palm Beach County	3,282	13,538	148	13	46	1,248	144.40	0.23%
Palm Beach Gardens, City of	2,340	8,115	124	6	21	969	142.13	0.22%
All MS4 Total	**163,942**	**353,864**	**6,295**	**376**	**1,558**	**61,960**	**8,370.68**	**13.17%**
All Watersheds Total	**1,747,703**	**5,093,882**	**54,145**	**2,204**	**9,693**	**693,855**	**63,557.76**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**1.9%**	**6.8%**	**3.1%**	**4.6%**	**7.8%**	**11.1%**
All Watersheds Total	**2.7%**	**3.6%**	**1.7%**	**1.3%**	**2.2%**	**3.2%**

Table 18 Pollutant Loading Results Watershed C-51 1 of 2

Watershed C-51
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Cloud Lake, Town of	880	1,226	48	2	8	1,234	35.84	0.03%
FDOT – District Four	76,026	412,710	3,362	374	1,407	25,337	2,051.58	1.75%
FDOT – Turnpike Enterprises	13,190	44,252	537	54	207	4,453	437.88	0.37%
Glen Ridge, Town of	2,654	9,497	156	6	25	2,836	85.63	0.07%
Greenacres, City of	20,134	107,137	1,253	50	226	21,637	505.41	0.43%
Haverhill, Town of	7,100	33,783	453	19	76	8,236	189.33	0.16%
Indian Trail Improve. District	437,655	675,918	20,586	748	3,512	428,645	20,145.73	17.20%
Lake Clarke Shores, Town of	17,783	80,127	1,240	46	184	25,882	499.64	0.43%
Lake Worth, City of	17,024	94,144	754	46	202	5,263	425.58	0.36%
NPBCID	50,665	79,328	1,771	87	448	18,166	2,563.30	2.19%
Palm Beach County	104,962	474,148	4,702	443	1,738	36,722	4,217.60	3.60%
Palm Springs, Village of	56,838	296,489	2,810	136	600	28,860	1,276.83	1.09%
Royal Palm Beach, Village of	62,446	95,667	2,027	124	629	21,362	2,690.76	2.30%
Wellington, Village of	381,601	621,909	15,850	742	3,813	237,820	20,040.53	17.11%
West Palm Beach, City of	58,324	277,313	2,545	142	823	22,401	1,718.71	1.47%
All MS4 Total	**1,307,282**	**3,303,650**	**58,096**	**3,020**	**13,899**	**888,854**	**56,818.97**	**48.51%**
All Watersheds Total	**3,015,247**	**9,577,086**	**137,506**	**6,440**	**28,706**	**1,770,218**	**117,139.15**	**100.00%**

Table 19 Pollutant Loading Results Watershed C-51 2 of 2

Watershed C-51
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Cloud Lake, Town of	858	1,165	47	1	8	1,231	35.84	0.03%
FDOT – District Four	62,158	292,203	2,993	289	933	23,091	2,051.58	1.75%
FDOT – Turnpike Enterprises	13,109	44,096	535	54	206	4,436	437.88	0.37%
Glen Ridge, Town of	2,051	2,817	107	4	18	2,642	85.63	0.07%
Greenacres, City of	20,140	107,180	1,254	50	226	21,639	505.41	0.43%
Haverhill, Town of	6,718	32,160	438	17	70	8,144	189.33	0.16%
Indian Trail Improve. District	437,414	665,351	20,595	747	3,499	428,941	20,145.73	17.20%
Lake Clarke Shores, Town of	17,787	80,162	1,239	47	184	25,810	499.64	0.43%
Lake Worth, City of	16,270	88,318	757	45	183	5,289	425.58	0.36%
NPBCID	51,669	80,105	1,787	88	453	18,383	2,563.30	2.19%
Palm Beach County	104,814	472,503	4,702	442	1,730	36,720	4,217.60	3.60%
Palm Springs, Village of	57,320	296,875	2,610	135	595	18,183	1,276.83	1.09%
Royal Palm Beach, Village of	62,446	95,627	2,027	124	629	21,360	2,690.76	2.30%
Wellington, Village of	371,342	605,673	15,248	732	3,570	211,819	20,040.53	17.11%
West Palm Beach, City of	58,325	277,749	2,548	142	580	20,234	1,718.71	1.47%
All MS4 Total	**1,282,420**	**3,141,982**	**56,886**	**2,915**	**12,883**	**847,922**	**56,818.97**	**48.51%**
All Watersheds Total	**2,990,483**	**9,387,559**	**136,117**	**6,332**	**28,061**	**1,725,169**	**117,139.15**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**1.9%**	**4.9%**	**2.1%**	**3.5%**	**7.3%**	**4.6%**
All Watersheds Total	**0.8%**	**2.0%**	**1.0%**	**1.7%**	**2.2%**	**2.5%**

Table 20 Pollutant Loading Results Watershed L-8

Watershed L-8
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Palm Beach County	543	1,368	35	2	6	317	156.17	0.18%
FDOT – District Four	771	3,765	33	3	10	246	20.90	0.02%
Indian Trail Improve. District	16,929	24,000	474	19	83	6,545	775.10	0.91%
All MS4 Total	**18,243**	**29,134**	**542**	**24**	**99**	**7,108**	**1,014.78**	**1.19%**
All Watersheds Total	**2,226,117**	**7,363,771**	**83,490**	**2,829**	**10,963**	**931,902**	**85,431.06**	**100.00%**

Watershed L-8
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Palm Beach County	543	1,368	35	2	6	317	156.17	0.18%
FDOT – District Four	529	2,065	31	2	4	231	20.90	0.02%
Indian Trail Improve. District	16,930	24,002	474	19	83	6,545	775.10	0.91%
All MS4 Total	**18,002**	**27,436**	**540**	**23**	**93**	**7,092**	**1,014.78**	**1.19%**
All Watersheds Total	**2,225,830**	**7,361,863**	**83,488**	**2,828**	**10,957**	**931,884**	**85,431.06**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**1.3%**	**5.8%**	**0.4%**	**3.2%**	**6.1%**	**0.2%**
All Watersheds Total	**0.01%**	**0.03%**	**0.00%**	**0.03%**	**0.1%**	**0.0%**

Table 21 Pollutant Loading Results Watershed S-2-6-7

Watershed S-2-6-7
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Belle Glade, City of	70,548	405,190	3,217	184	818	23,210	1,672.21	0.69%
FDOT – District Four	45,234	273,914	2,021	240	938	13,709	1,212.51	0.50%
Palm Beach County	30,327	141,093	1,580	104	397	10,892	1,146.28	0.47%
South Bay, City of	1,930	9,507	100	6	18	732	64.67	0.03%
All MS4 Total	**148,040**	**829,704**	**6,918**	**534**	**2,171**	**48,543**	**4,095.68**	**1.69%**
All Watersheds Total	**3,001,967**	**10,348,659**	**316,928**	**10,656**	**29,755**	**1,702,345**	**242,798.43**	**100.00%**

Watershed S-2-6-7
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Belle Glade, City of	70,582	405,452	3,218	184	818	23,219	1,672.21	0.69%
FDOT – District Four	42,361	247,926	1,973	225	831	13,479	1,212.51	0.50%
Palm Beach County	30,308	140,996	1,580	104	397	10,888	1,146.28	0.47%
South Bay, City of	1,934	9,537	100	6	18	733	64.67	0.03%
All MS4 Total	**145,184**	**803,911**	**6,871**	**519**	**2,064**	**48,319**	**4,095.68**	**1.69%**
All Watersheds Total	**3,021,209**	**10,444,784**	**317,153**	**10,652**	**29,783**	**1,706,412**	**242,798.43**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**1.9%**	**3.1%**	**0.7%**	**2.8%**	**4.9%**	**0.5%**
All Watersheds Total	**-0.6%**	**-0.9%**	**-0.1%**	**0.0%**	**-0.1%**	**-0.2%**

Table 22 Pollutant Loading Results Watershed Hillsboro

Watershed Hillsboro
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Boca Raton, City of	112,165	556,101	5,118	335	1,354	39,730	3,718.63	9.31%
FDOT – District Four	40,437	247,421	1,777	197	768	11,998	1,117.42	2.80%
FDOT – Turnpike Enterprises	5,259	23,456	284	27	67	2,039	207.16	0.52%
Palm Beach County	93,352	335,774	3,926	306	1,305	34,899	4,341.27	10.87%
All MS4 Total	**251,213**	**1,162,752**	**11,104**	**864**	**3,494**	**88,667**	**9,384.47**	**23.49%**
All Watersheds Total	**954,749**	**3,768,384**	**44,540**	**2,341**	**10,028**	**349,585**	**39,953.67**	**100.00%**

Watershed Hillsboro
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Boca Raton, City of	111,045	544,510	5,072	327	1,329	39,579	3,718.63	9.31%
FDOT – District Four	32,915	179,866	1,671	157	492	11,428	1,117.42	2.80%
FDOT – Turnpike Enterprises	5,259	23,456	284	27	67	2,039	207.16	0.52%
Palm Beach County	93,037	333,588	3,917	304	1,298	34,829	4,341.27	10.87%
All MS4 Total	**242,257**	**1,081,420**	**10,944**	**815**	**3,185**	**87,875**	**9,384.47**	**23.49%**
All Watersheds Total	**943,216**	**3,640,819**	**44,011**	**2,246**	**9,554**	**348,386**	**39,953.67**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**3.6%**	**7.0%**	**1.4%**	**5.7%**	**8.8%**	**0.9%**
All Watersheds Total	**1.2%**	**3.4%**	**1.2%**	**4.1%**	**4.7%**	**0.3%**

Table 23 Pollutant Loading Results Watershed Inter-coastal Waterway North

Watershed ICWWN
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
FDOT – District Four	20,246	109,915	928	104	371	6,618	558.55	3.40%
FDOT – Turnpike Enterprises	1,369	2,330	43	4	19	449	52.23	0.32%
Juno Beach, Town of	6,095	15,775	185	11	65	2,200	133.31	0.81%
Jupiter, Town of	9,516	22,058	321	21	104	3,154	366.81	2.23%
NPBCID	195,257	430,840	7,204	378	1,800	79,669	8,324.82	50.66%
Palm Beach County	24,098	125,676	1,057	115	453	8,117	758.79	4.62%
Palm Beach Gardens, City of	1,832	4,070	95	5	17	871	140.93	0.86%
All MS4 Total	**258,413**	**710,664**	**9,833**	**637**	**2,829**	**101,078**	**10,335.44**	**62.90%**
All Watersheds Total	**441,016**	**1,365,455**	**17,839**	**1,002**	**4,522**	**195,209**	**16,432.06**	**100.00%**

Watershed ICWWN
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
FDOT – District Four	12,688	49,692	697	57	194	5,682	558.55	3.40%
FDOT – Turnpike Enterprises	1,334	2,280	42	4	19	443	52.23	0.32%
Juno Beach, Town of	5,673	12,382	171	10	60	2,139	133.31	0.81%
Jupiter, Town of	8,595	14,127	288	18	92	2,981	366.81	2.23%
NPBCID	198,550	438,214	7,258	371	1,794	80,404	8,324.82	50.66%
Palm Beach County	24,028	123,617	1,049	113	449	8,109	758.79	4.62%
Palm Beach Gardens, City of	1,788	4,061	94	5	17	860	140.93	0.86%
All MS4 Total	**252,656**	**644,373**	**9,600**	**578**	**2,626**	**100,618**	**10,335.44**	**62.90%**
All Watersheds Total	**429,380**	**1,229,472**	**17,269**	**928**	**4,241**	**193,500**	**16,432.06**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**2.2%**	**9.3%**	**2.4%**	**9.4%**	**7.2%**	**0.5%**
All Watersheds Total	**2.6%**	**10.0%**	**3.2%**	**7.4%**	**6.2%**	**0.9%**

Table 24 Pollutant Loading Results Watershed Inter-coastal Waterway South

Watershed ICWWS
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Boca Raton, City of	60,758	307,808	2,780	174	705	20,195	2,303.77	23.63%
Boynton Beach, City of	2,809	8,337	111	6	25	958	115.68	1.19%
Delray Beach, City of	11,004	67,037	472	28	131	3,129	279.30	2.86%
FDOT – District Four	12,375	74,494	553	66	251	3,795	412.62	4.23%
Gulf Stream, Town of	4,511	21,849	351	12	48	8,014	178.01	1.83%
Highland Beach, Town of	1,976	11,482	91	4	20	553	50.10	0.51%
Ocean Ridge, Town of	2,389	9,439	326	6	17	9,176	122.47	1.26%
Palm Beach County	2,387	14,111	107	11	45	788	90.83	0.93%
All MS4 Total	**98,207**	**514,558**	**4,789**	**307**	**1,242**	**46,609**	**3,552.78**	**36.44%**
All Watersheds Total	**278,171**	**1,471,489**	**13,128**	**683**	**2,986**	**108,085**	**9,749.39**	**100.00%**

Watershed ICWWS
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Boca Raton, City of	60,912	306,466	2,786	172	704	20,293	2,303.77	23.63%
Boynton Beach, City of	2,813	8,363	111	6	25	960	115.68	1.19%
Delray Beach, City of	10,212	59,571	444	26	121	3,020	279.30	2.86%
FDOT – District Four	10,079	49,245	500	51	168	3,572	412.62	4.23%
Gulf Stream, Town of	4,556	22,179	353	12	48	8,023	178.01	1.83%
Highland Beach, Town of	1,839	10,265	87	4	19	534	50.10	0.51%
Ocean Ridge, Town of	2,390	9,442	326	6	17	9,176	122.47	1.26%
Palm Beach County	2,341	13,732	106	11	44	781	90.83	0.93%
All MS4 Total	**95,142**	**479,261**	**4,712**	**288**	**1,146**	**46,359**	**3,552.78**	**36.44%**
All Watersheds Total	**267,863**	**1,367,076**	**12,758**	**644**	**2,794**	**106,657**	**9,749.39**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**3.1%**	**6.9%**	**1.6%**	**6.0%**	**7.7%**	**0.5%**
All Watersheds Total	**3.7%**	**7.1%**	**2.8%**	**5.7%**	**6.4%**	**1.3%**

Table 25 Pollutant Loading Results Watershed Loxahatchee

Watershed Loxahatchee
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
FDOT – District Four	14,974	50,444	599	58	216	5,421	644.91	1.95%
FDOT – Turnpike Enterprises	7,341	32,013	365	36	102	2,722	267.99	0.81%
Jupiter, Town of	56,440	269,369	2,249	143	642	17,830	89.54	0.27%
Jupiter Inlet Colony, Town of	2,763	12,226	256	8	29	6,889	1,526.68	4.62%
NPBCID	30,678	55,771	1,190	63	288	11,476	1,653.80	5.00%
Palm Beach County	35,385	149,112	1,615	142	537	13,536	1,758.28	5.32%
SIRWCD	187,758	306,714	11,131	389	1,389	228,807	12,080.74	36.52%
Tequesta, Village of	19,814	89,072	920	57	230	7,030	701.06	2.12%
All MS4 Total	**355,153**	**964,722**	**18,324**	**895**	**3,434**	**293,712**	**18,723.00**	**56.61%**
All Watersheds Total	**746,513**	**2,390,398**	**33,363**	**1,554**	**6,224**	**456,387**	**33,076.50**	**100.00%**

Watershed Loxahatchee
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
FDOT – District Four	13,174	35,499	545	48	164	5,148	644.91	1.95%
FDOT – Turnpike Enterprises	7,341	32,013	365	36	102	2,722	267.99	0.81%
Jupiter, Town of	45,099	173,919	1,882	113	494	15,908	89.54	0.27%
Jupiter Inlet Colony, Town of	1,990	7,207	101	5	19	802	1,526.68	4.62%
NPBCID	30,804	55,707	1,131	61	290	11,175	1,653.80	5.00%
Palm Beach County	35,040	143,902	1,588	139	529	13,428	1,758.28	5.32%
SIRWCD	189,438	302,160	11,115	388	1,398	229,054	12,080.74	36.52%
Tequesta, Village of	19,602	85,993	900	55	226	6,959	701.06	2.12%
All MS4 Total	**342,487**	**836,400**	**17,627**	**845**	**3,222**	**285,195**	**18,723.00**	**56.61%**
All Watersheds Total	**709,032**	**2,038,886**	**31,659**	**1,456**	**5,840**	**439,785**	**33,076.50**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**3.6%**	**13.3%**	**3.8%**	**5.6%**	**6.2%**	**2.9%**
All Watersheds Total	**5.0%**	**14.7%**	**5.1%**	**6.3%**	**6.2%**	**3.6%**

Table 26 Pollutant Loading Results Watershed Lake Worth Lagoon 1 of 2

Watershed Lake Worth Lagoon
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
Boynton Beach, City of	8,616	15,787	289	17	84	3,148	408.56	1.56%
FDOT – District Four	16,549	97,522	748	86	326	5,395	576.47	2.21%
Hypoluxo, Town of	688	3,196	47	2	7	927	25.48	0.10%
Juno Beach, Town of	2,719	14,972	129	5	25	806	65.35	0.25%
Lake Park, Town of	22,478	124,813	1,004	66	283	6,802	687.90	2.63%
Lake Worth, City of	55,359	301,422	2,571	142	637	17,276	1,884.69	7.21%
Lantana, Town of	4,785	22,169	239	13	48	1,662	189.78	0.73%
Manalapan, Town of	1,776	8,342	176	5	20	4,972	65.81	0.25%
North Palm Beach, Village of	29,915	150,512	1,440	76	329	12,065	1,116.58	4.27%
NPBCID	2,622	12,503	168	8	32	3,063	95.60	0.37%
Ocean Ridge, Town of	1,570	6,052	227	5	11	6,713	82.88	0.32%
Palm Beach, Town of	35,444	183,401	1,606	91	389	10,964	1,174.78	4.50%
Palm Beach County	7,121	40,302	326	33	129	2,443	319.51	1.22%
Palm Beach Gardens, City of	3,807	9,410	164	11	36	1,505	221.92	0.85%
Palm Beach Shores, Town of	4,274	23,832	377	11	48	9,770	123.79	0.47%
Riviera Beach, City of	19,235	107,715	859	55	234	5,919	606.00	2.32%
South Palm Beach, Town of	48	333	2	0	1	13	0.88	0.00%
West Palm Beach, City of	90,047	419,492	4,034	242	1,007	28,322	3,024.44	11.57%
All MS4 Total	**307,055**	**1,541,776**	**14,406**	**4,513**	**3,646**	**121,765**	**10,670.41**	**40.83%**
All Watersheds Total	**727,658**	**3,479,044**	**33,667**	**1,579**	**6,984**	**289,708**	**26,134.41**	**100.00%**

Table 27 Pollutant Loading Results Watershed Lake Worth Lagoon 2 of 2

Watershed Lake Worth Lagoon
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area	Percent
Boynton Beach, City of	8,620	15,801	289	17	84	3,148	408.56	1.56%
FDOT – District Four	14,699	76,553	676	72	276	5,091	576.47	2.21%
Hypoluxo, Town of	691	3,207	47	2	8	928	25.48	0.10%
Juno Beach, Town of	2,428	12,239	112	4	21	735	65.35	0.25%
Lake Park, Town of	22,371	123,807	1,003	66	280	6,797	687.90	2.63%
Lake Worth, City of	56,199	303,733	2,591	143	646	17,499	1,884.69	7.21%
Lantana, Town of	4,781	22,143	239	13	48	1,661	189.78	0.73%
Manalapan, Town of	1,790	8,401	177	5	20	4,976	65.81	0.25%
North Palm Beach, Village of	29,922	150,572	1,430	76	329	11,574	1,116.58	4.27%
NPBCID	2,589	12,368	165	8	32	3,001	95.60	0.37%
Ocean Ridge, Town of	1,531	5,719	225	5	11	6,704	82.88	0.32%
Palm Beach, Town of	35,452	183,437	1,606	91	389	10,967	1,174.78	4.50%
Palm Beach County	7,098	40,034	325	33	129	2,440	319.51	1.22%
Palm Beach Gardens, City of	3,696	7,595	160	8	27	1,504	221.92	0.85%
Palm Beach Shores, Town of	4,277	23,858	377	11	48	9,770	123.79	0.47%
Riviera Beach, City of	19,006	105,736	851	54	228	5,888	606.00	2.32%
South Palm Beach, Town of	49	333	2	0	1	13	0.88	0.00%
West Palm Beach, City of	90,087	419,214	4,032	241	1,008	28,318	3,024.44	11.57%
All MS4 Total	**305,284**	**1,514,753**	**14,307**	**4,434**	**3,586**	**121,016**	**10,670.41**	**40.83%**
All Watersheds Total	**718,096**	**3,395,653**	**33,279**	**1,543**	**6,818**	**285,882**	**26,134.41**	**100.00%**

Reductions %

	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**0.6%**	**1.8%**	**0.7%**	**1.8%**	**1.7%**	**0.6%**
All Watersheds Total	**1.3%**	**2.4%**	**1.2%**	**2.2%**	**2.4%**	**1.3%**

Table 28 Pollutant Loading Results Watershed WPBWS

Watershed WPBWS
2013 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
FDOT – District Four	2,765	11,711	138	10	34	1,066	122.25	0.72%
NPBCID	40,446	58,906	1,321	71	364	13,884	1,785.09	10.53%
Palm Beach County	404	1,346	17	1	4	157	16.04	0.09%
West Palm Beach, City of	691	2,364	21	1	4	271	21.14	0.12%
All MS4 Total	**44,306**	**74,329**	**1,497**	**83**	**407**	**15,378**	**1,944.52**	**11.47%**
All Watersheds Total	**516,116**	**1,628,588**	**16,166**	**588**	**2,558**	**202,132**	**16,952.43**	**100.00%**

Watershed WPBWS
2018 Pollutant Loads (lbs./yr.)

Municipality	BOD_5	TSS	TP	CU	ZN	TN	Area (ac.)	Percent
FDOT – District Four	2,569	9,955	136	9	26	1,054	122.25	0.72%
NPBCID	40,451	58,931	1,321	71	364	13,885	1,785.09	10.53%
Palm Beach County	404	1,346	17	1	4	157	16.04	0.09%
West Palm Beach, City of	680	2,273	21	1	3	270	21.14	0.12%
All MS4 Total	**44,104**	**72,506**	**1,495**	**82**	**398**	**15,366**	**1,944.52**	**11.47%**
All Watersheds Total	**515,843**	**1,626,169**	**16,161**	**586**	**2,545**	**202,125**	**16,952.43**	**100.00%**

Reductions %

Municipality	BOD_5	TSS	TP	CU	ZN	TN
All MS4 Total	**0.46%**	**2.45%**	**0.14%**	**1.36%**	**2.13%**	**0.08%**
All Watersheds Total	**0.05%**	**0.15%**	**0.03%**	**0.34%**	**0.51%**	**0.00%**

PERMITTEE	C-15	C-16	C-17	C-18	C51	L-8	S-2-6-7	Hillsboro	ICCWN	ICCWS	Lox.	Lake Worth Lagoon	WCA-1	WPBWS
Atlantis, City of		X												
Belle Glade, City of							X							
Boca Raton, City of	X							X		X				
Boynton Beach, City of	X	X								X		X		
Cloud Lake, Town of					X									
Delray Beach, City of	X									X				
FDOT - District Four	X	X	X	X	X		X	X	X	X	X	X		X
FDOT - Turnpike Enterprises	X	X	X	X	X				X		X			
Glen Ridge, Town of					X									
Greenacres, City of		X			X									
Gulf Stream, Town of										X				
Haverhill, Town of					X									
Highland Beach, Town of										X				
Hypoluxo, Town of												X		
Indian Trail Improvement District					X									
Juno Beach, Town of									X					
Jupiter, Town of									X		X	X		
Jupiter Inlet Colony, Town of											X			
Lake Clarke Shores, Town of					X									
Lake Park, Town of			X									X		
Lake Worth, City of		X			X							X		
Lantana, Town of												X		
Manalapan, Town of												X		
Mangonia Park, Town of			X											
Northern Palm Beach County Improvement District			X	X	X				X		X			X
North Palm Beach, Village of									X			X		
Ocean Ridge, Town of										X		X		
Palm Beach, Town of												X		
Palm Beach County	X	X	X	X	X	X	X	X	X	X	X	X		X
Palm Beach Gardens, City of			X	X					X			X		
Palm Beach Shores, Town of												X		
Palm Springs, Village of					X									
Riviera Beach, City of			X									X		
Royal Palm Beach, Village of					X									
South Bay, City of							X							
South Indian River WCD											X			
South Palm Beach, Town of												X		
Tequesta, Village of											X			
Wellington, Village of					X									
West Palm Beach, City of				X	X							X		X
Total	**6**	**7**	**8**	**6**	**15**	**1**	**4**	**3**	**7**	**8**	**8**	**17**	**0**	**4**

Appendix C: List of watersheds each MS4 falls within