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

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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.

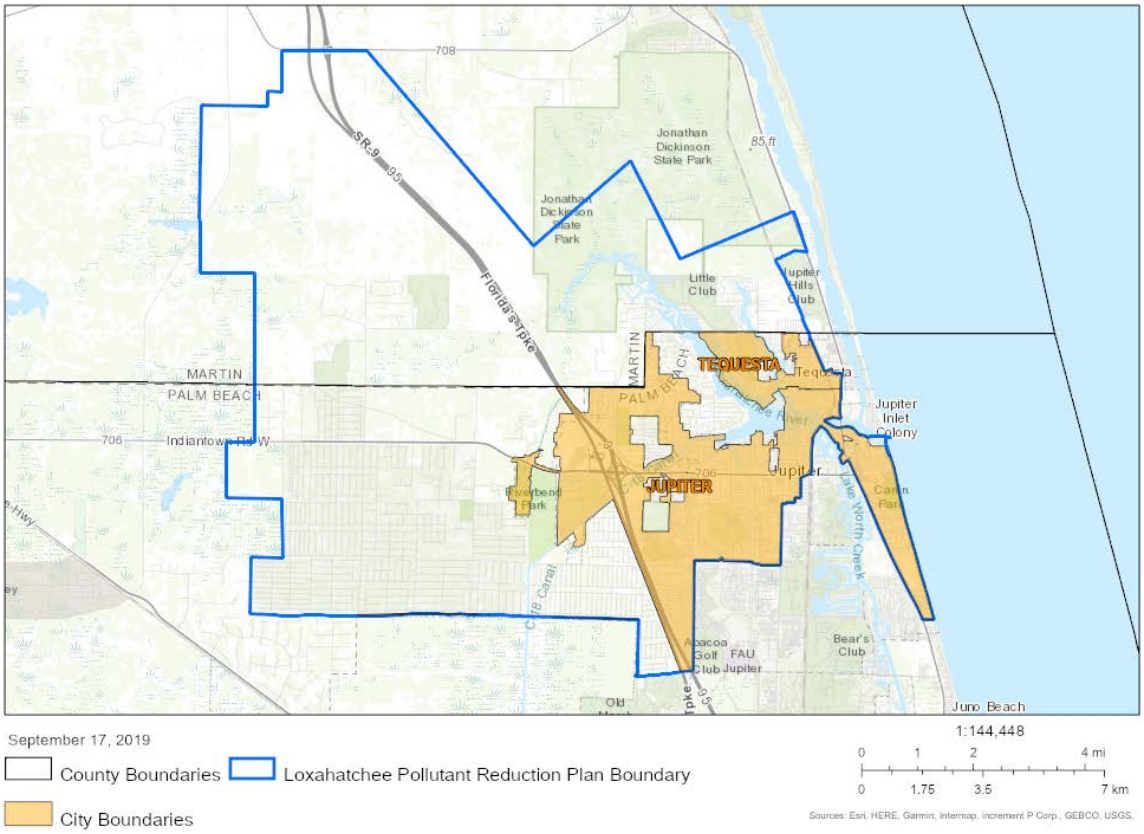

Figure 1. Loxahatchee River Pollutant Reduction Plan Boundary

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.

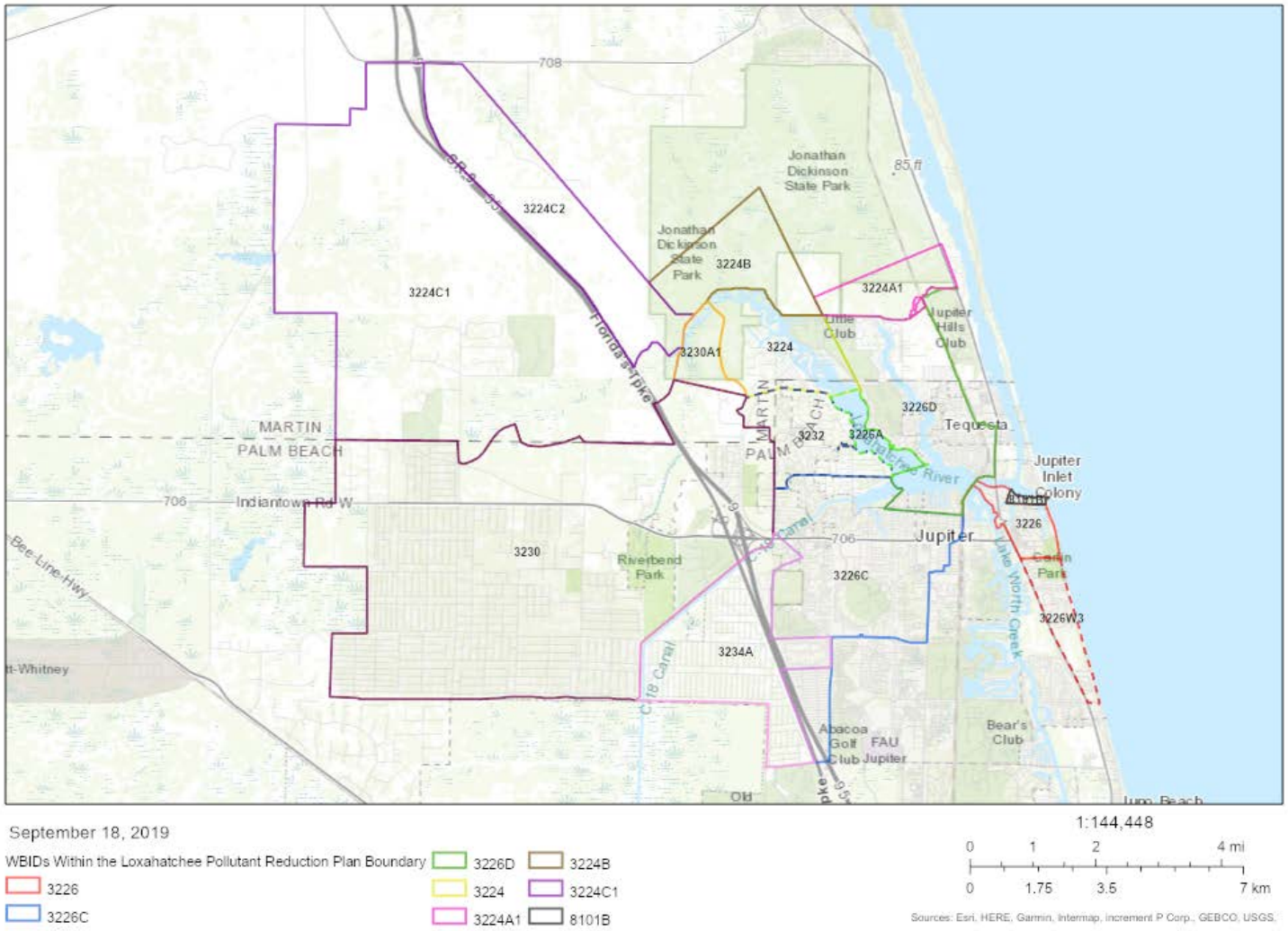

Figure 2. Loxahatchee River WBIDs

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**).

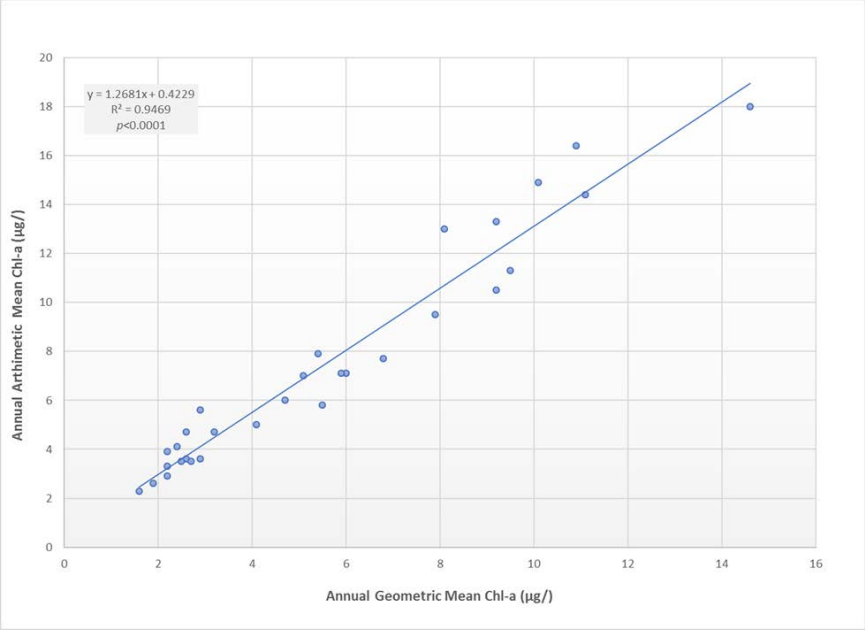

Figure 3. Least Squares Regression Analysis Between AGM and AAM Within the Loxahatchee Estuary

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.

Figure 4. Monitoring Stations Used in Regression Analysis

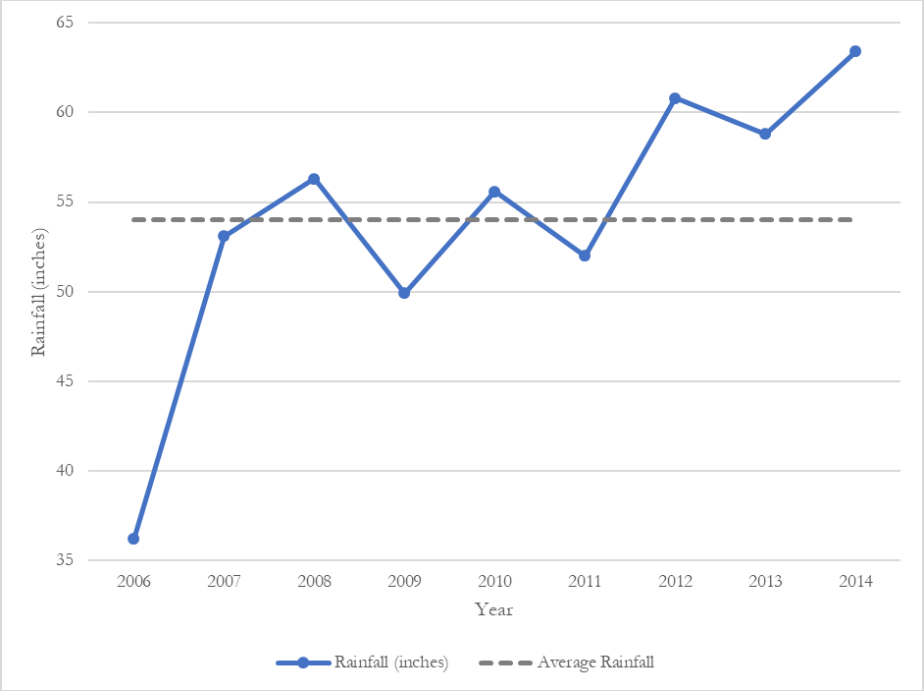

Figure 5. Rainfall Over the Plan Boundary from 2006 through 2014

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.

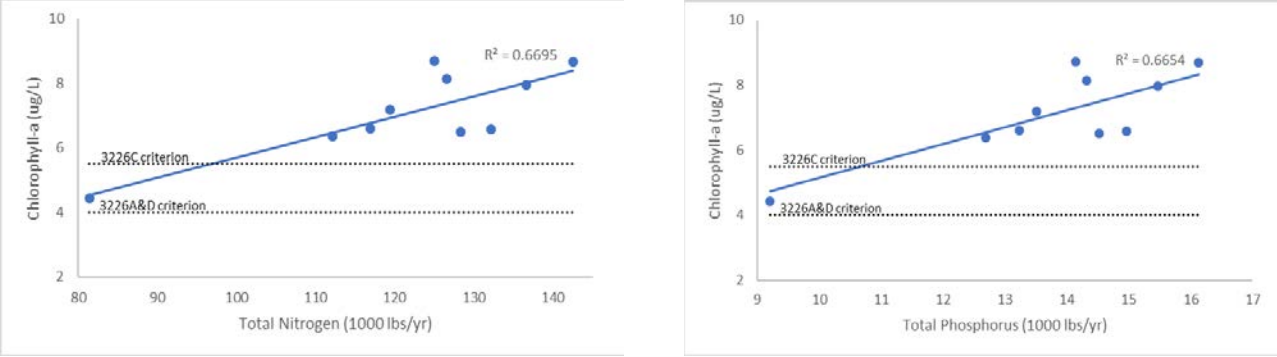

Figure 6. Annual Mean Chlorophyll-a Concentration Compared to Simulated Nutrient Loads for TN and TP

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.

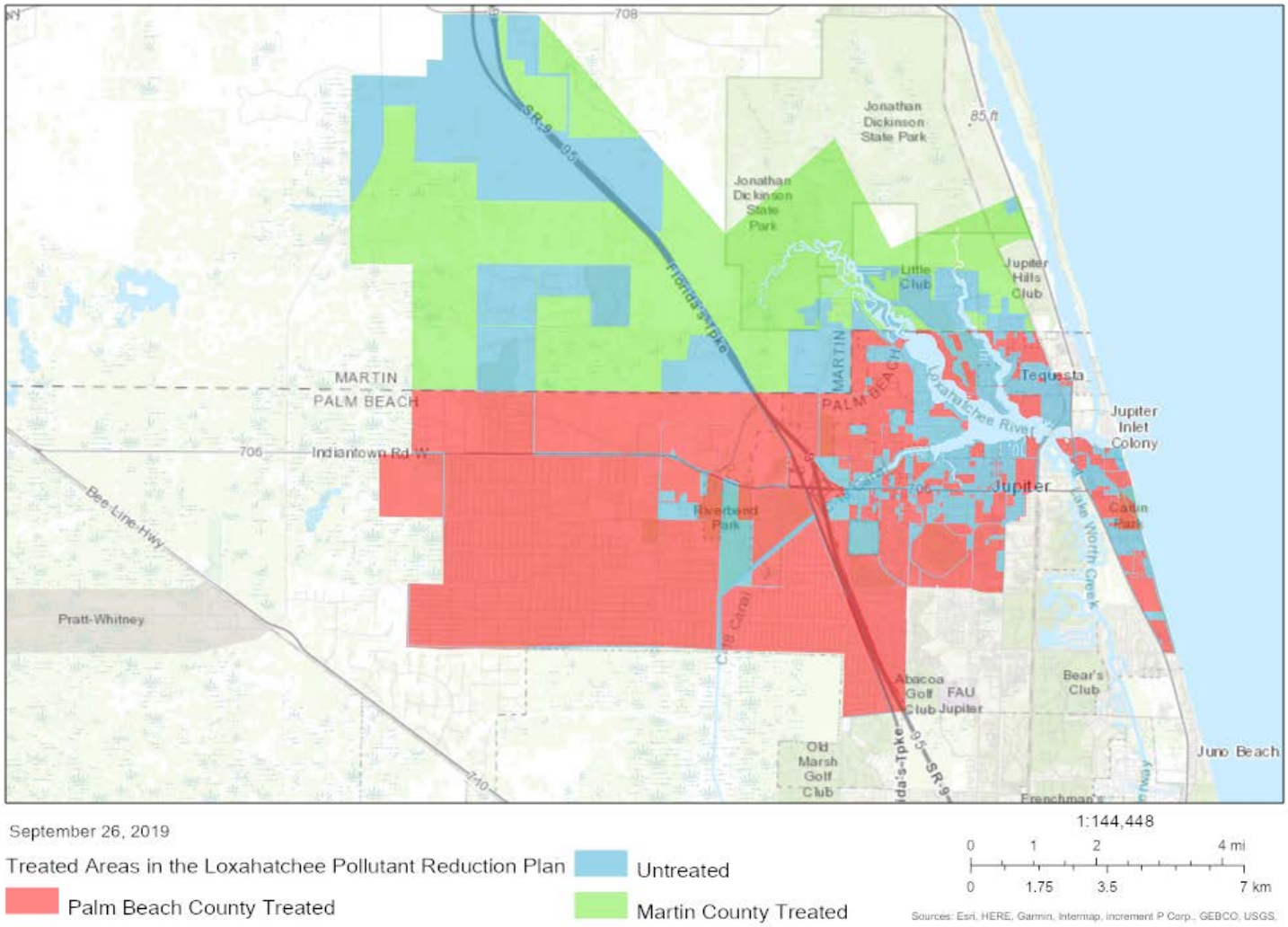

Figure 7. Treated Areas Within the Pollutant Reduction Plan Boundary

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.

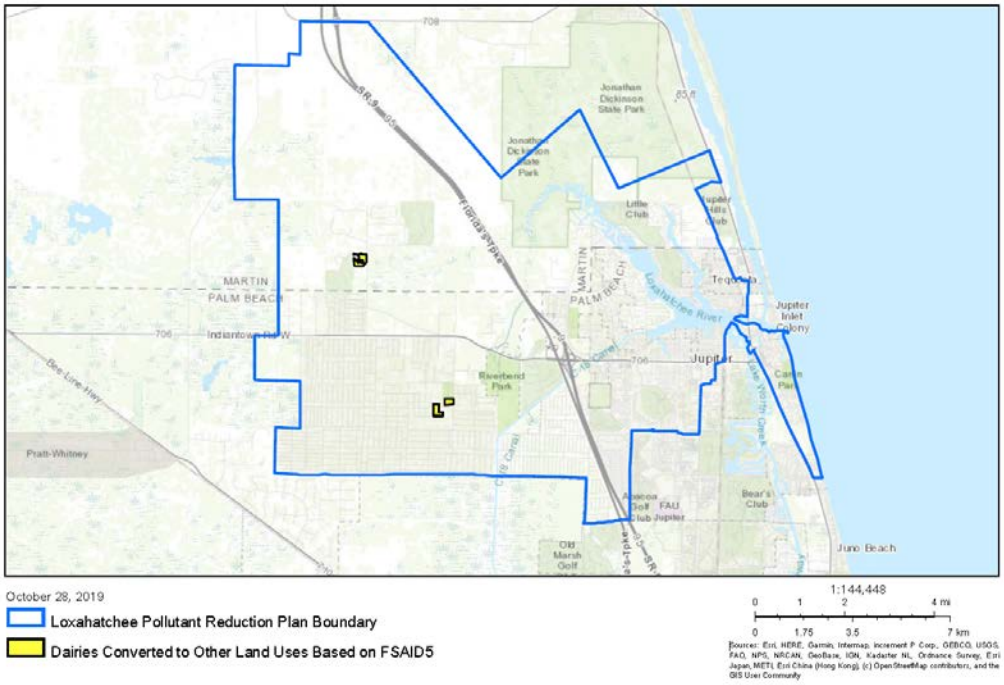

Figure 8. Former Dairy Land Uses Now Attributed to Residential Land Uses Based on FSAID 5

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.

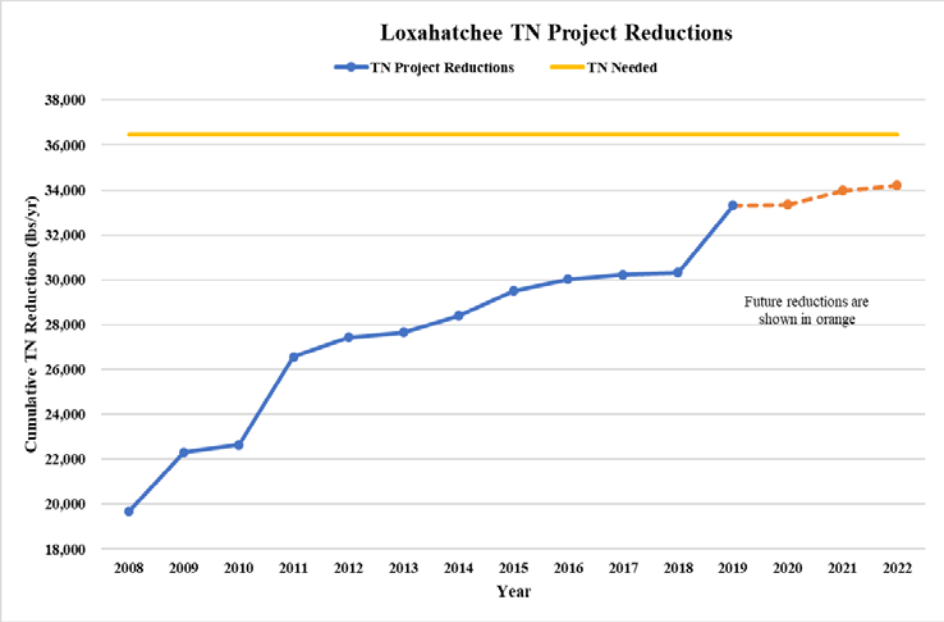

Figure 9. Estimated TN Reduction Schedule Based on Project Completion Dates

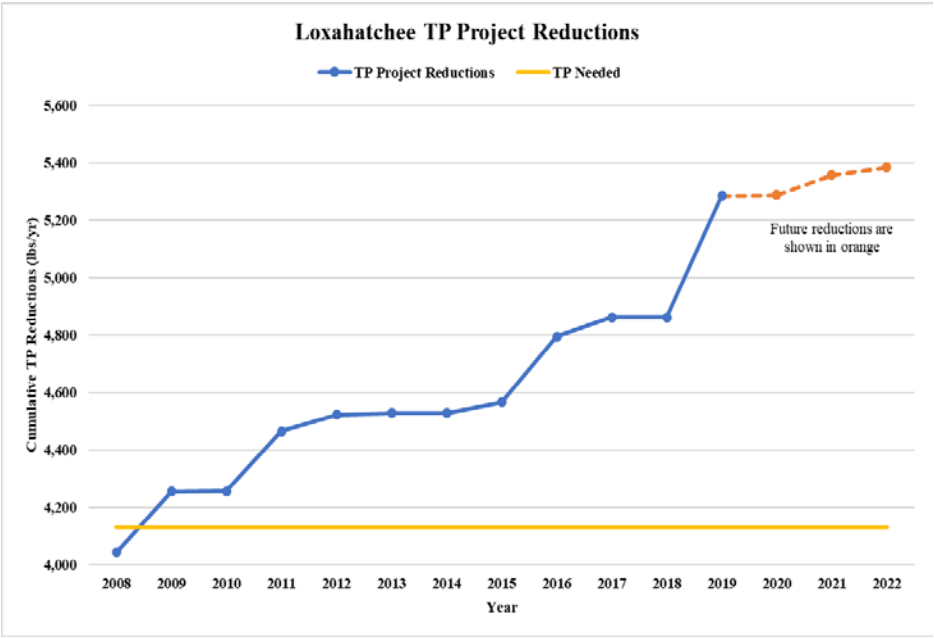

Figure 10. Estimated TP Reduction Schedule Based on Project Completion Dates

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.

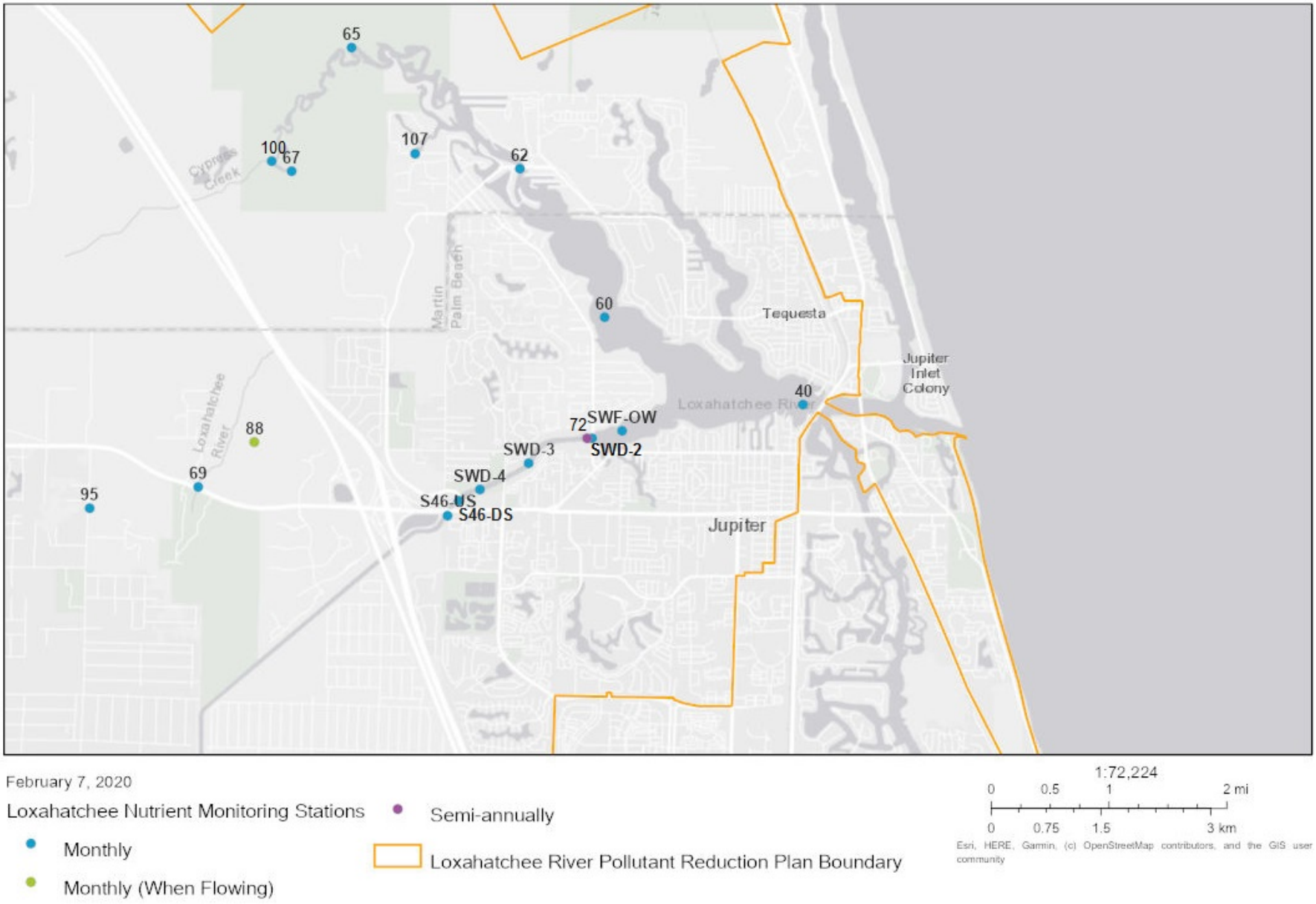

Figure 11. Water Quality Stations Monitored Monthly and Semi-annually Within the Loxahatchee River Pollutant Reduction Plan Boundary for Nutrients

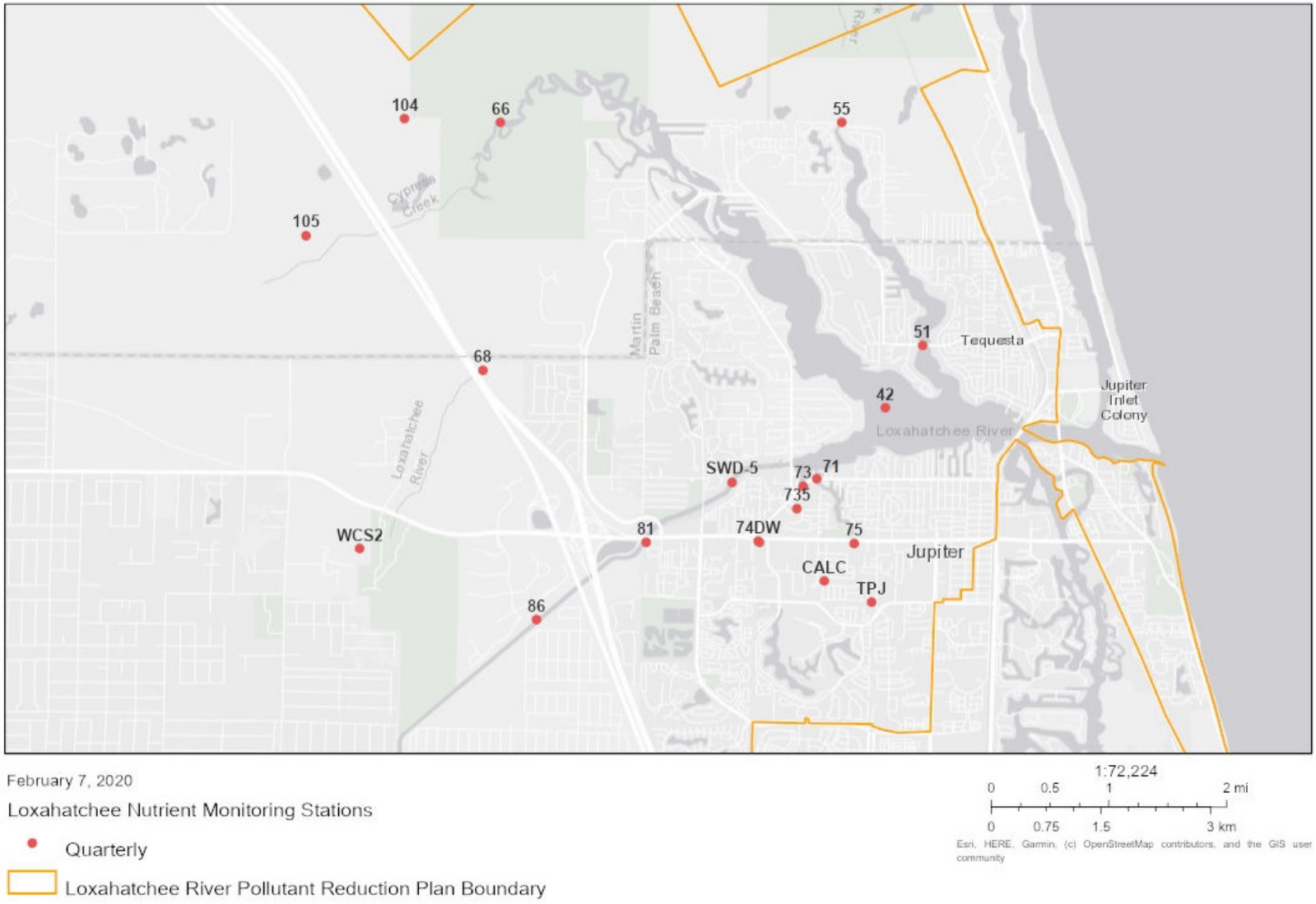

Figure 12. Water Quality Stations Monitored Quarterly Within the Loxahatchee River Pollutant Reduction Plan Boundary for Nutrients

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)	Alkalinity	Water Temperature
Enterococcus (estuarine)	Color	pH
Fecal Coliform	Sucralose	Specific Conductance
	Acetaminophen	Salinity
	Turbidity	Dissolved Oxygen
	Total Suspended Solids	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.

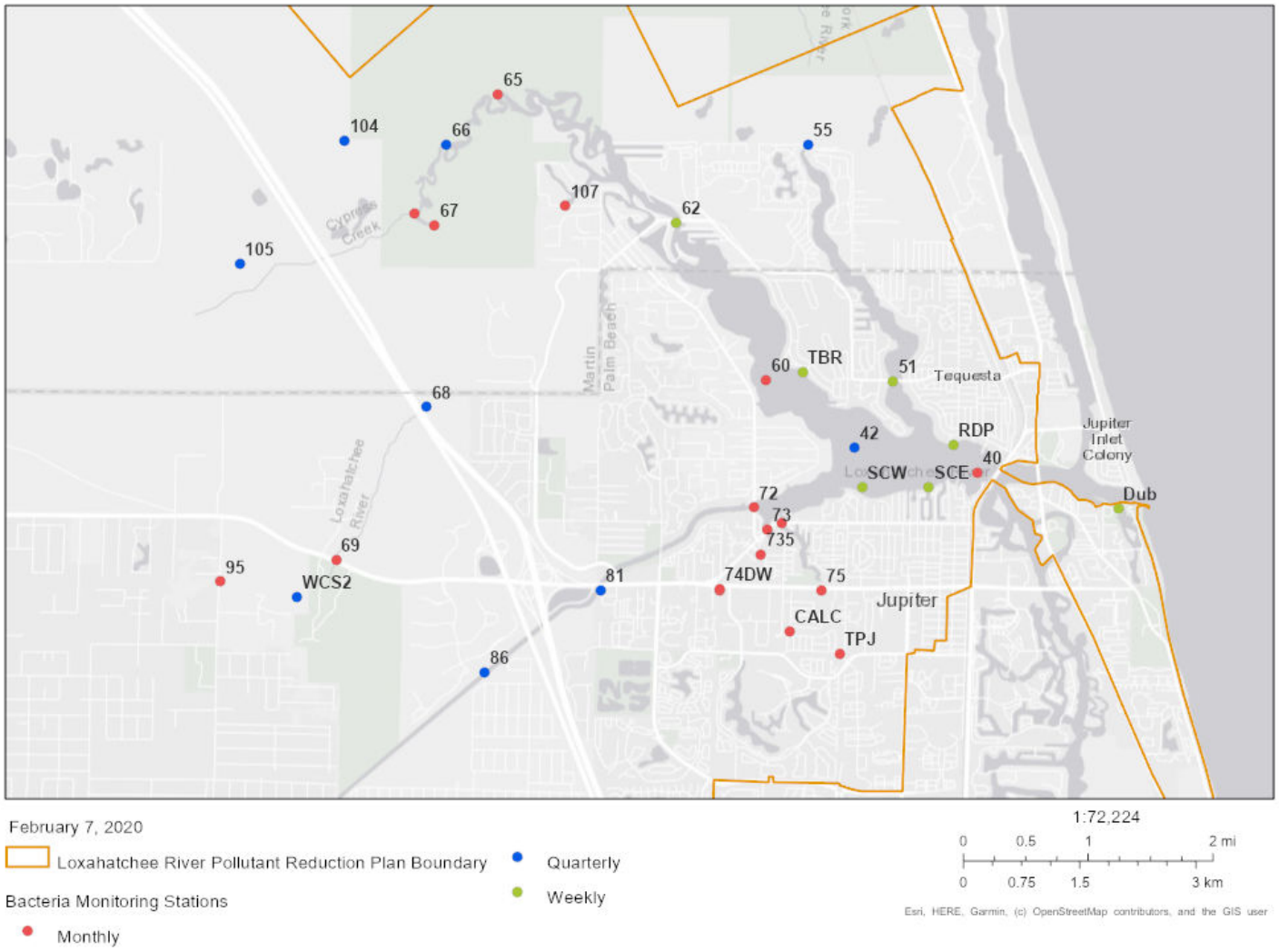

Figure 13. Water Quality Stations Within the Loxahatchee River Pollutant Reduction Plan Boundary for Bacteria

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

Florida Administrative Code, 62-302.532, Estuary-Specific Numeric Interpretations of the Narrative Nutrient Criterion. February 17, 2016.

Florida Department of Environmental Protection, Statewide Best Management Practice Efficiencies for Nonpoint Source Management of Surface Waters, Draft July 2018.

Loxahatchee River Environmental Control District Water Quality Monitoring Program at https://loxahatcheeriver.org/river/river-keeper/

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.*