Annual Report Form
For Individual NPDES Permits For
Municipal Separate Storm Sewer Systems
(RULE 62-624.600(2), F.A.C.)

- This Annual Report Form must be completed and submitted to the Department to satisfy the annual reporting requirements established in Rule 62-621.600, F.A.C.
- Submit this fully completed and signed form and any REQUIRED attachments by email to the NPDES Stormwater Program Administrator or to the MS4 coordinator (http://www.dep.state.fl.us/water/stormwater/npdes/contacts.htm). Files larger than 10MB may be placed on the FTP site at: ftp://ftp.dep.state.fl.us/pub/NPDES_Stormwater/. After uploading files, email the MS4 coordinator or NPDES Program Administrator to notify them the report is ready for downloading; or by mail to the address in the box at right.
- Refer to the Form Instructions for guidance on completing each section.
- **Please print or type information in the appropriate areas below.**

Submit the form and attachments to:
Florida Department of Environmental Protection
Mail Station 3585
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

SECTION I. BACKGROUND INFORMATION			
A.	Permittee Name: City of Lake Worth Beach		
B.	Permit Name: Palm Beach County MS4		
C.	Permit Number: FLS000018-004		
D.	Annual Report Year: ☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☐ Other, specify Year:		
E.	Reporting Time Period (month/year): October 2019 through September 2020		
F.	Name of the Responsible Authority: Brian Shields		
	Title: Water Utilities Director		
	Mailing Address: 301 College Street		
	City: Lake Worth Beach	Zip Code: 33460	County: Palm Beach
	Telephone Number: (561) 586-1675	Fax Number: (561) 533-7389	
	E-mail Address: bshields@lakeworthbeachfl.gov		
G.	Name of the Designated Stormwater Management Program Contact (if different from Section I.F above): Judy Love		
	Title: Water Sewer Storm Field Manager		
	Department: Water Utilities		
	Mailing Address: 301 College Street		
	City: Lake Worth	Zip Code: 33460	County: Palm Beach
	Telephone Number: (561) 586-1719	Fax Number: (561) 533-7389	
	E-mail Address: jlove@lakeworthbeachfl.gov		

SECTION II. MS4 MAJOR OUTFALL INVENTORY (Not Applicable in Year 1)	
A.	Number of outfalls ADDED to the outfall inventory in the current reporting year (insert "0" if none): (Does this number include non-major outfalls? ☐ Yes ☐ No ☒ Not Applicable)
B.	Number of outfalls REMOVED from the outfall inventory in the current reporting year (insert "0" if none): (Does this number include non-major outfalls? ☐ Yes ☐ No ☒ Not Applicable)
C.	Is the change in the total number of outfalls due to lands annexed or vacated? ☐ Yes ☐ No ☒ Not Applicable

SECTION III. PART V.B. ASSESSMENT PROGRAM	
A.	Provide a brief statement as to the status of water quality monitoring plan implementation. Status may include sampling frequency changes, monitoring location changes, or sampling waiver conditions. *DEP Note: If permittee participates in a collaborative monitoring plan, permittee may refer to a joint response as defined by the interlocal agreement.* Name and date of the approved plan: 5/15/2018 (via email) Status: The monitoring program is carried out jointly by the Palm Beach County Co-Permittees Report. See the PBC Cycle 5, Joint Annual Report. The information on the City's annual assessment report is provided herewith.
B.	Provide a brief discussion of the monitoring and loading results to date which includes a summary of the water quality monitoring data and / or stormwater pollutant loading changes from the reporting year. *DEP Note: Results must be specific to the permittee's SWMP.* Refer to attached City's 2020 Water Quality Report
C.	Attach a monitoring data summary as required by the permit. An analysis of the data discussing changes in water quality and/or stormwater pollutant loading from previous reporting years. *DEP Note: Analysis must be specific to the permittee's SWMP.* *See response for Section III.B., above.*

SECTION IV. FISCAL ANALYSIS	
A.	Total expenditures for the NPDES stormwater management program for the current reporting year: $1,812,145
B.	Total budget for the NPDES stormwater management program for the subsequent reporting year: $1,812,145
C.	Did the current reporting year resources decrease from the previous year? Y ☐ / N ☒ Program fully funded.

SECTION V. MATERIALS TO BE SUBMITTED WITH THIS ANNUAL REPORT FORM

Only the following materials are to be submitted to the Department along with this fully completed and signed Annual Report Form (check the appropriate box to indicate whether the item is attached or is not applicable):

Attached	N/A	Required Attachments	Permit Citation	Attachment Number/Title
☐	☒	Any additional information required to be submitted in this current annual reporting year in accordance with Part III.A of your permit that is not otherwise included in Section VII below.	Part III.A	
☐	☒	An explanation of why the minimum inspection frequency in Table II.A.1.a. was not met, if applicable.	Part II.A.1	
☐	☒	A list of the flood control projects that did not include stormwater treatment and an explanation for each of why it did not (if applicable).	Part III.A.4	
☒	☐	A monitoring data summary as directed in Section III.C above and in accordance with Rule 62-624.600(2)(c), F.A.C.	Part V.B.3	Refer to Joint Report And 2020 Water Quality Report
☐	☒	YEAR 1 ONLY: An inventory of all known major outfalls and a map depicting the location of the major outfalls (hard copy or CD-ROM) in accordance with Rule 62-624.600(2)(a), F.A.C.	Part III.A.1	
☐	☒	YEAR 2: A summary review of codes and regulations to reduce the stormwater impact from development.	Part III.A.2	
☐	☒	Year 3 ONLY: The estimates of pollutant loadings and event mean concentrations for each major outfall or each major watershed in accordance with Rule 62-624.600(2)(b), F.A.C.	Part V.A	
☐	☒	YEAR 3: Summary of TMDL Monitoring Results (if applicable).	Part VIII.B.2	
☐	☒	YEAR 3: Bacteria Pollution Control Plan (if applicable).	Part VIII.B.3	
☒	☐	YEAR 4: A follow-up report on plan implementation of changes to codes and regulations to reduce the stormwater impact from development.	Part III.A.2	No Changes
☐	☒	YEAR 4: A report on any amendments to the applicable legal authority (if applicable).	Part III.A.7.a	
☒	☐	YEAR 4: Permit re-application information in accordance with Rule 62-624.420(2), F.A.C. • The monitoring plan (with revisions, if applicable). • If the total annual pollutant loadings have not decreased over the past two permit cycles, revisions to the SWMP, as appropriate.	Part V.B.3 Part V.A.3	See Joint Annual Report
☐	☒	YEAR 4: TMDL Supplemental SWMP (if applicable).	Part VIII.B.3	

DO NOT SUBMIT ANY OTHER MATERIALS
(such as records and logs of activities, monitoring raw data, public outreach materials, etc.)

SECTION VI. CERTIFICATION STATEMENT AND SIGNATURE

The Responsible Authority listed in Section I.F above must sign the following certification statement, as per Rule 62-620.305, F.A.C:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name of Responsible Authority (type or print): Brian Shields

Title: Water Utilities Director

Signature:  Date: 02 / 19 / 21

SECTION VII.	STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE								
A.	**B.**						**C.**	**D.**	**E.**	**F.**
Permit Citation/ SWMP Element	**Permit Requirement/Quantifiable SWMP Activity**						**Number of Activities Performed**	**Documentation / Record**	**Entity Performing the Activity**	**Comments**
Part III.A.1	**Structural Controls and Stormwater Collection Systems Operation**									
	Report the current known inventory. Report the number of inspection and maintenance activities conducted for each applicable type of structure included in Table II.A.1.a, and the percentage of the total inventory of each type of structure inspected and maintained. *Note: Delete structures that are not in your MS4's inventory. The permittee may choose its own unit of measurement for each structural control to be consistent with the unit of measurement in the documentation. Unit options include: miles, linear feet, acres, etc.*									
	Type of Structure	**Number of Structures**	**Number of Inspections**	**Percent Inspected**	**Number of Maintenance Activities**	**Percent Maintained**				
	Dry retention systems	4	12	100%	12	100%	Storm Water Reports	Storm Water Division	Monthly Street/ Quarterly Maintenance	
	Exfiltration trench / French drains (lf)	762 ft.	4	100%	4	100%	Exfil. Insp. Log	100%		
	Grass treatment swales (miles)	12	12	100%	12	100%	Monthly Reports/Grounds Division	Grounds Division		
	Wet detention systems	1	12	100%	4	100%	Stormwater Division Reports	Stormwater Division	Monthly Inspections/ Quarterly Maintenance	
	Pollution control boxes	5	12	100%	12	100%	Control Inspection Log	Stormwater Division	Monthly Inspections/ Quarterly Maintenance	
	Major outfalls	46	46	100%	4	100%	Outfall Inspections Log	Stormwater Division	Inspected Annually	
	Weirs or other control structures	1	12	100%	12	100%	Inspector Log	Stormwater Division	Control Structure Operating Properly	
	pipes / culverts (miles)	22.1	16	73%	3	75%	Inspection Logs	Stormwater Division	Clean as needed	
	Inlets / catch basins / grates	1934	967	75%	500	50%	Inspection Logs	Stormwater Division	On schedule	

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	Ditches / conveyance swales (miles)	1	12	100%	12	100%	Inspection Logs	Stormwater Division	Mowed and Cleaned Monthly
	If the minimum inspection frequencies set forth in Table II.A.1.a. were not met, provide as an attachment an explanation of why they were not and a description of the actions that will be taken to ensure that they will be met.	☐							All Met

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Part III.A.1 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
	Strengths: All stormwater management assets are inventoried in a GIS data base and updated as new information is available. Active storm crew.				
	Limitations: Limited Stormwater staff to annually inspect the entire stormwater collection system				
	SWMP revisions implemented to address limitations: Thoroughly document the past inspections on the collection system to avoid overlap				
Part III.A.2	**Areas of New Development and Significant Redevelopment**				
	Report the number of significant development projects, including new and redevelopment, reviewed and approved by the permittee for post-development stormwater considerations.				
	Number of significant development projects reviewed	18	Site Plan Review Database	Public Services and Community Sustainability	
	Number of significant development projects approved	8	Site Plan Review Database	Public Services and Community Sustainability	Many of these development projects are still in progress
	Provide in the Year 2 Annual Report the summary report of the review activity. Provide in the Year 4 Annual Report the follow-up report on plan implementation.				
	Year 2 ONLY: Attach the summary report of the review activity	☐	Year 2 ARF	Mock Roos	
	Year 4 ONLY: Attach the follow-up report on plan implementation	☒	Phone call/email	Public Services and Utilities	No Changes
Part III.A.2 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
	Strengths: Stringent site plan review process as well as Lake Worth Beach policy for new development must contain 3-year 1-hour storm event, provide erosion control plans, exfiltration trench. Inspections are performed throughout the projects to ensure that BMP's are adhered to.				
	Limitations: None identified at this time				
	SWMP revisions implemented to address limitations: N/A				
Part III.A.3	**Roadways**				
	Report on the litter control program, including the frequency of litter collection, an estimate of the total number of road miles cleaned or amount of area covered by the activities, and an estimate of the quantity of litter collected. *Note: If the permittee does not contract activities, delete CONTRACTOR activities.*				
	PERMITTEE Litter Control: Frequency of litter collection	Daily	Disposal Assessment Form SWA	Grounds Division	Collection of trash daily from roads and parks

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	PERMITTEE Litter Control: Estimated amount of area maintained (lf)	63,100	Disposal Assessment Form SWA	Grounds Division	Collection of trash daily from roads and parks
	PERMITTEE Litter Control: Estimated amount of litter collected (cy)	47	5- gallon Bucket Log / Trash Bag Log	Grounds Division	Based on collection data
	CONTRACTOR Litter Control: Frequency of litter collection	0			Not contracted
	CONTRACTOR Litter Control: Estimated amount of area maintained (lf)	0			
	CONTRACTOR Litter Control: Estimated amount of litter collected (cy)	o			
	OPTIONAL: If an Adopt-A-Road or similar program is implemented, report the total number of road miles cleaned and an estimate of the quantity of litter collected. If you do not participate in an Adopt-A-Road program, report "0".				
	Trash Pick-up Events: Total miles cleaned	0			none
	Trash Pick-up Events: Estimated amount of litter collected (cy)	0			
	Adopt-A-Road: Total miles cleaned	0			
	Adopt-A-Road: Estimated amount of litter collected (cy)	0			
	Report on the street sweeping program, including the frequency of the sweeping, total miles swept, an estimate of the quantity of sweepings collected, and the total nitrogen and total phosphorus loadings that were removed by the collection of sweepings. If no street sweeping program is implemented, provide the explanation of why not in column F.				
	Frequency of street sweeping	Daily	NPDES Sweeper Log	Streets div.	Streets are swept 5 days a week
	Total miles swept	3,034	Sweeper Log	Streets Div.	City has 116 miles of roadway swept twice per month
	Estimated quantity of sweeping material collected (cy)	2,266	Sweeper Log	Streets Div.	Sweeper Logs and Tickets
	Total phosphorous loadings removed (pounds)	1,725	FSA Spreadsheet	Mock•Roos	
	Total nitrogen loadings removed (pounds)	3,169	FSA Spreadsheet	Mock•Roos	
	Report the equipment yards and maintenances shops that support road maintenance activities, and the number of inspections conducted for each facility.				
	Name of Facility	**Number of Inspections**			
	#1: Public Services Department – Fleet Maintenance Garage 1749 3rd Ave. South	12	Municipal Maintenance Yard Inspection Checklist	Stormwater Division	Public Services Garage
	#2: Public Services Department – Streets/Stormwater Division Yard 1880 2nd Ave. North, Lake Worth, FL 33460	12	Inspection Log	Stormwater Division	Facility houses Streets/Storm

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					Water Division Employees Material and Equipment
Part III.A.3 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
	Strengths: Lake Worth maintains routine street sweeping city wide. Also, the City has various trash receptacles along roads, parks, and beach. The Grounds Department systematically removes trash to avoid overflow which reduces pollution found in the system during treatment.				
	Limitations: Weather and littering				
	SWMP revisions implemented to address limitations: Collection of sediment and trash during inclement weather periods.				
Part III.A.4	**Flood Control Projects**				
	Report the total number of flood control projects that were constructed by the permittee during the reporting period and the number of those projects that did NOT include stormwater treatment. The permittee shall provide a list of the projects where stormwater treatment was not included with an explanation for each of why it was not. Report on any stormwater retrofit planning activities and the associated implementation of retrofitting projects to reduce stormwater pollutant loads from existing drainage systems that do not have treatment BMPs.				
	Flood control projects completed during the reporting period	**3**	Capital Improvement Plan (CIP)	Public Services & Water Dept.	
	Flood control projects completed that did <u>not</u> include stormwater treatment	2	CIP	Water Dept.	The project included additional branching to an existing collection system trunk line.
	Stormwater retrofit projects planned/under construction		SCIP and Neighborhood Improvement Project (NIP)	Water Dept.	
	Stormwater retrofit projects completed	3	CIP & NIP	Water Dept.	
	If there were projects that did not include stormwater treatment, provide as an attachment a list of the projects and an explanation for each of why it did not.	☐	CIP &NIP	Water Dept	
Part III.A.4 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
	Strengths: Implementing improvements or identifying areas of improvements based on the City's recent stormwater master plan. Working with other local agencies to improve flood control on municipalities' streets. Implementing bioswale and other alternative recharge methods.				
	Limitations:				
	SWMP revisions implemented to address limitations:				

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Part III.A.5	**Municipal Waste Treatment, Storage, and Disposal Facilities Not Covered by an NPDES Stormwater Permit**				
	Report the applicable facilities and the number of the inspections conducted for each facility.				
	Name of Facility	**Number of Inspections**			
	None	0	City Assets	Storm water Division	
Part III.A.5 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
	Strengths: N/A				
	Limitations: N/A				
	SWMP revisions implemented to address limitations: N/A				
Part III.A.6	**Pesticides, Herbicides, and Fertilizer Application**				
	Report the number of permittee personnel applicators and contracted commercial applicators of pesticides and herbicides who are FDACS certified / licensed. Report the number of permittee personnel who have been trained through the Green Industry BMP Program and the number of contracted commercial applicators of fertilizer who are FDACS certified / licensed.				
	PERSONNEL: FDACS public applicators of pesticides/herbicides	1	Employees licenses recorded on file with State of Florida	Grounds Maintenance DIV	Public Services Department
	CONTRACTORS: FDACS commercial applicators of pesticides/ herbicides	1	State License	Bright View	Contractor for City Owned Golf Course
	PERSONNEL: Green Industry BMP Program training completed	1	Certificate of Training	Grounds Maintenance Division	Public Service
	CONTRACTORS: FDACS certified / licensed applicators of fertilizer	1	Certificate of Training	Bright View	Golf Course
	Provide a copy of the adopted ordinance with the Year 2 Annual Report. If this provision is not applicable because the permittee is not within the watershed of a nutrient-impaired water body, indicate that in Column F.				
	Year 2 ONLY: Attach copy of adopted Florida-friendly ordinance	☐	Ordinance No. 2103-51	City Commission	
	Report on the public education and outreach activities that are performed or sponsored by the permittee within the permittee's jurisdiction to encourage citizens to reduce their use of pesticides, herbicides and fertilizers including the type and number of activities conducted, the type and number of materials distributed, and the number of Web site visits (if applicable).				
	Public Education and Outreach Program	The public outreach and education plan is carried out as a joint effort by the Palm Beach County Co-permittees. Please see the Palm Beach County Joint Annual Report for the public education and outreach..			

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Part III.A.6 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
	Strengths: Staff and/or Vendors are licensed and certified to execute work in a safe and proper manner. The Lake Worth Fertilizer Friendly Use Regulation (Code of Ordinances, Chapter 12, and Article 8) and the pesticide, herbicide, and fertilizer application log continue to be advantageous in tracking, recording and scheduling. The City customizes work schedules which meet the demand of the seasons.				
	Limitations: Some may not follow the City's Fertilizer Friendly Use Regulation and Maintenance Plan				
	SWMP revisions implemented to address limitations: Periodically check the logs for compliance and proper documentation. Public outreach and education to contractors and lawn service companies.				
Part III.A.7.a	**Illicit Discharges and Improper Disposal — Inspections, Ordinances, and Enforcement Measures**				
	Report amendments in Year 4.				
	Year 4 ONLY: Attach a report on amendments to applicable legal authority	☐	FY19-20 Council minutes	City Commission	No amendments
Part III.A.7.c	**Illicit Discharges and Improper Disposal — Investigation of Suspected Illicit Discharges and/or Improper Disposal**				
	Report on the proactive inspection program, including the number of inspections conducted by the permittee, the number of illicit activities found, and the number and type of enforcement actions taken.				
	Proactive inspections for suspected illicit discharges	6	Inspection Log	Stormwater Division	City MS4 Inspection
	Illicit discharges found during a proactive inspection	4	Illicit Discharge Connection Report	Stormwater Division	
	NOV/WL/citation/fines issued for illicit discharges found during proactive inspection	0	Illicit Discharge Form	Stormwater Division	
	Report on the reactive investigation program as it relates to responding to reports of suspected illicit discharges, including the number of reports received, the number of investigations conducted, the number of illicit activities found, and the number and type of enforcement actions taken.				
	Reports of suspected illicit discharges received	2	Call Log	Public Service	Reports received and dispatched to Stormwater Division/Code
	Reactive investigations of reports of suspected illicit discharges etc.	2	CIMS Stormwater Program	Public Services/ Utilities Department	Code Enforcement
	Illicit discharges etc. found during reactive investigation	0	CIMS Stormwater Program	Stormwater Division	

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	NOV/WL/citation/fines issued for illicit discharges etc. found during reactive investigation	0	Lake Worth Illicit Discharge Form	Stormwater Division	
	Report the type of training activities, and the number of permittee personnel and contractors trained (both in-house and outside training) within the reporting year.				
	Personnel trained	3	2020 Sign-In Sheet	PBC Steering Committee	Love, Kallich,Asbell
	Contractors trained	0	2020 Sign-In Sheet	PBC Steering Committee	
Part III.A.7.d	**Illicit Discharges and Improper Disposal — Spill Prevention and Response**				
	Report on the spill prevention and response activities, including the number of spills addressed.				
	Hazardous and non-hazardous material spills responded to				
	Report the type of training activities, and the number of permittee personnel and contractors trained (both in-house and outside training) within the reporting year.				
	Personnel trained	3	2020 Sign-In Sheet	PBC Steering Committee	Love, Kallich,Asbell
	Contractors trained	0	2020 Sign-In Sheet	PBC Steering Committee	
Part III.A.7.e	**Illicit Discharges and Improper Disposal — Public Reporting**				
	Report on the public education and outreach activities that are performed or sponsored by the permittee within the permittee's jurisdiction to encourage the public reporting of suspected illicit discharges and improper disposal of materials, including the type and number of activities conducted, the type and number of materials distributed, and the number of Web site visits (if applicable).				
	Public Education and Outreach Program	The public outreach and education plan is carried out as a joint effort by the Palm Beach County Co-permittees. Please see the Palm Beach County Joint Annual Report for the public education and outreach information.			
Part III.A.7.f	**Illicit Discharges and Improper Disposal — Oils, Toxics, and Household Hazardous Waste Control**				
	Report on the public education and outreach activities that are performed or sponsored by the permittee within the permittee's jurisdiction to encourage the proper use and disposal of oils, toxics, and household hazardous waste, including the type and number of activities conducted, the type and number of materials distributed, the amount of waste collected / recycled / properly disposed, and the number of Web site visits (if applicable).				
	Public Education and Outreach Program	The public outreach and education plan is carried out as a joint effort by the Palm Beach County Co-permittees. Please see the Palm Beach County Joint Annual Report for the public education and outreach information.			

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Part III.A.7.g	**Illicit Discharges and Improper Disposal — Limitation of Sanitary Sewer Seepage**				
	Report on the type and number of activities undertaken to reduce or eliminate SSOs and inflow/ infiltration, the number of SSOs or inflow / infiltration incidents found and the number resolved, and the name of the owner of the sanitary sewer system within the permittee's jurisdiction. Report only the SSOs and inflow / infiltration incidents into the MS4.				
	Owner of the sanitary sewer system	City of Lake Worth			
	Activity to reduce/eliminate SSOs and I&I: (description)	100 install inserts	CIP & Work Order	Utilities	Inflow Inserts& TV inspections
	Activity to reduce/eliminate SSOs and I&I: (description)	0	Maintenance & CIP	Utilities	Sewer Main replacement & Lateral lining
	SSO incidents discovered	2	Work Order	Utilities	ETA reported
	SSO incidents resolved	2	Work Order	Utilities	ETA reported
	Inflow / infiltration incidents discovered	2	Work Order	Utilities	Repaired & patched
	Inflow / infiltration incidents resolved	2	Work Order	Utilities	Repaired & patched
Part III.A.7 Summary	For activities required by Part III.A.7: Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
	Strengths: City owned system with I&I program				
	Limitations: None				
	SWMP Revisions implemented to address limitations: N/A				
Part III.A.8.a	**Industrial and High-Risk Runoff — Identification of Priorities and Procedures for Inspections**				
	Report on the high-risk facilities inventory, including the type and total number of high risk facilities and the number of facilities newly added each year. Report on the high-risk facilities inspection program, including the number of inspections conducted and the number and type of enforcement actions taken.				

Type of Facility	**Number of Facilities**	**Number of Inspections**	**Enforcement Actions**			
Operating municipal landfills	**0**	0	0	floridadep.gov waste/permitting website	Mock Roos	
Hazardous waste treatment, storage, disposal and recovery (HWTSDR) facilities	**36**	0	0	environ.epa.gov website	Mock Roos	Inspections completed and documented with Year 2 ARF
EPCRA Title III, Section 313 facilities (TRI)	**0**	0	0	environ.epa.gov	Mock Roos	

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					website		
	Facilities determined as high risk by the permittee	**0**	0	0	Illicit/reactive inspection program	Storm Water Division	
Part III.A.8.b	**Industrial and High-Risk Runoff — Monitoring for High Risk Industries**						
	Report the number of high risk facilities sampled.						
	High risk facilities sampled		0		Year 2 HRF inspection report	Storm Water Division	
Part III.A.8 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.						
	Strengths: Documentation and Inspection Protocols						
	Limitations: EPA database needs updating for inactive sites and areas outside pemittee's jurisdiction.						
	SWMP revisions implemented to address limitations: Added facilities since 2012, reviewed address locations and applicable categories, cross-referencing with Florida State Division of Corporations, checking active business, status and field verification.						
Part III.A.9.a	**Construction Site Runoff — Site Planning and Non-Structural and Structural Best Management Practices**						
	Report the number of permittee and private pre-construction site plans reviewed for stormwater, erosion, and sedimentation controls, and the number approved.						
	PERMITTEE SITES: Construction site plans reviewed		4		City Construction Drawings	Public Services/ Utilities Dept.	
	PERMITTEE SITES: Construction site plans approved		4		City Construction Dwgs.	Public Services/ Utilities Dept.	
	PRIVATE SITES: Construction site plans reviewed		22		Permit File/Naviline	Community Sustainability	Does not include SFH's
	PRIVATE SITES: Construction site plans approved		16		Permit File/Naviline	Community Sustainability	
	Report the number of development permit applicants notified of the ERP and CGP, and the number of applicants who confirmed ERP and CGP coverage.						
	Notified of ERP stormwater permit requirements		4		Permit Files	Public Services/ Water Utility	Document required prior to building permit
	Confirmed ERP coverage		3		ERP Permit	Public Services/ Water Utility	
	Notified of CGP stormwater permit requirements		12		Permit File	Public Services/ Water Utility	
	Confirmed CGP coverage		0		Permit File	Public	

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE					
A.	**B.**	**C.**	**D.**	**E.**	**F.**
Permit Citation/ SWMP Element	**Permit Requirement/Quantifiable SWMP Activity**	**Number of Activities Performed**	**Documentation / Record**	**Entity Performing the Activity**	**Comments**
				Services/ Water Utility	
Part III.A.9.b	**Construction Site Runoff — Inspection and Enforcement**				
	Report on the inspection program for privately-operated and permittee-operated construction sites, including the number of active construction sites during the reporting year, the number of inspections of active construction sites, the percentage of active construction sites inspected, and the number and type of enforcement actions / referrals taken.				
	PERMITTEE SITES: Active construction sites	4	Construction Plans	Public Services/ Water Utilities	
	PERMITTEE SITES: Pre-, During, and Post inspections of active construction sites for E&S and waste control BMPs	4	SWWP Log	Public Services	Typically design consultants provide the in construction inspection services
	PERMITTEE SITES: Percentage of active construction sites inspected	100	SWWP Log	Public Services	
	PRIVATE SITES: Active construction sites	12	Construction Plans	Public Services	
	PRIVATE SITES: Pre-, During, and Post inspections of active construction sites for E&S and waste control BMPs	12	Permit File	Community Sustainability	Kick off meetings and in progress visits
	PRIVATE SITES: Percentage of active construction sites inspected	92	Permit File	Community Sustainability	
	Enforcement Action	1	Building official shut down site	Building official	Work was stopped until erosion control issues were corrected
Part III.A.9.c	**Construction Site Runoff — Site Operator Training**				
	Report the type of training activities, the number of inspectors, site plan reviewers and site operators trained (both in-house and outside training).				
		DEP Certification	**Annual Training**		
	Permittee construction site inspectors	**3**	1	Sediment & Erosion Control Certification	PBC Steering Committee	Russel, Oudan, Love
	Permittee construction site plan reviewers		1	2020 Sign-In	PBC Steering	Carlos

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE					
A.	**B.**	**C.**	**D.**	**E.**	**F.**
Permit Citation/ SWMP Element	**Permit Requirement/Quantifiable SWMP Activity**	**Number of Activities Performed**	**Documentation / Record**	**Entity Performing the Activity**	**Comments**
			Sheet	Committee	Enriquez
	Permittee construction site operators	9	Preconstruction. Meeting	Public Services Contractors	
Part III.A.9 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
	Strengths: Stringent review processes and regular inspection along with supplementing inspection by Consultants				
	Limitations: Large amount of activity and requires contractors' self-regulation and NPDES Compliance				
	SWMP revisions implemented to address limitations: More stringent emphasis on NPDES regulations and erosion control BMP's				

SECTION VIII. CHANGES TO THE STORMWATER MANAGEMENT PROGRAM (SWMP) ACTIVITIES (Not Applicable in Year 4)		
A.	**Permit Citation/ SWMP Element**	**Proposed Changes to the Stormwater Management Program Activities Established as Specific Requirements Under Part III.A of the Permit (Including the Rationale for the Change) — REQUIRES DEP APPROVAL PRIOR TO CHANGE IF PROPOSING TO REPLACE OR DELETE AN ACTIVITY.**
	N/A	
B.	**Permit Citation/ SWMP Element**	**Changes to the Stormwater Management Program Activities NOT Established as Specific Requirements Under Part III.A of the Permit (Including the Rationale for the Change)**
	N/A	

SECTION IX. TMDL Status Report

A. YEAR 1 Provide a table summarizing the status of the TMDL process. Include a list of prioritized TMDLs and their monitoring and implementation schedule; and include the Identification number of the outfall prioritized for TMDL monitoring.

WBID Number	Segment/ Waterbody/ Basin	Pollutant of Concern	TMDL DEP / EPA	Percent Reduction (WLA)	Priority Rank	Priority Outfall	Monitoring Summary / BPCP Due Date	Supplemental SWMP Due Date
N/A			☐ / ☐		1		(*Year 3 AR*)	(*Year 4 AR; N/A) if BPCP*)
			☐ / ☐					
			☐ / ☐					

B. YEAR 3 and annually thereafter, provide a summary of the estimated load reductions that have occurred for the pollutant(s) of concern being discharged from the MS4 to the TMDL water body during the reporting period and cumulatively since the date the Supplemental SWMP was implemented.

Year 3: Submit a Monitoring data summary or BPCP (if applicable).

Year 4: Submit a Supplemental SWMP (if applicable).

WBID Number	Pollutant of Concern	Monitoring Summary / BPCP Submitted	Supplemental SWMP Submitted	Projected load reductions OR Actual load reductions to date
N/A		(*Year 3 AR*)	(*Year 4 AR; N/A if BPCP*)	

C. Provide a brief statement as to the status of TMDL implementation according to Part VIII.B of the permit (e.g. status of monitoring to validate WLA):

No discharge to a TMDL WBID at the time of permit issuance.

PA#C0051.00

City of Lake Worth Beach

MS4 SWMP ASSESSMENT PROGRAM

ANNUAL RESULTS REPORT

CYCLE 4, YEAR 4

Abstract

This report is to document the results of the SWMP Assessment Program, by the City of Lake Worth under the MS4 NPDES Permit No. 000018

MOCK • ROOS

CONSULTING ENGINEERS

Table of Contents

Engineer's Signature Page

I hereby state, as a Professional Engineer in the State of Florida, that this report titled MS4 SWMP Assessment Program Annual Results Report Cycle 4, Year 4, dated February 2021, for the City of Lake Worth Beach, was prepared and assembled under my direct responsible charge.

02/08/2021

Alan D. Wertepny, P.E. Date

P.E. No. 32350

Project Engineer

MOCK • ROOS

CONSULTING ENGINEERS

West Palm Beach, FL 33407

Florida C.A. No. 48

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

1. City of Lake Worth MS4 Assessment Program

1.1. Introduction

The Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) permit is part of 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 to develop the NPDES. In 1997, the first five-year permit (No. FLS000018) was issued by EPA to Palm Beach County's permittees, Lake Worth is one of the joint permittees of this permit under an Interlocal Agreements with Northern Palm Beach County Improvement District. 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. This report is to document the assessment results under this permit.

1.2. Goals

The fundamental goal of the City with respect the NPDES MS4 permit is to reduce the pollutant loadings to the receiving water bodies to the maximum extent reasonable possible. To this end this report discusses the water quality monitoring program and trends of the ambient water quality that the City's MS4 discharges to. So that the overall effectiveness of their Stormwater Management Program can be evaluated. Also discussed is the pollutant loading model, used to estimate loads that may flow to these waters, and reduction programs used to mitigate the impacts of development and urbanization. Discussion of current water quality data available, trends observed and conclusions that can be drawing from this data are summarized at the end of this report.

2. Florida Department of Environmental Protection's Impaired Waters

2.1. Water Quality Monitoring

Florida Department of Environmental Protection (FDEP) conducts a state-wide water quality monitoring program. The data used for this monitoring includes both theirs and others. The primary purpose of this program is to assess Florida's rivers, lakes, springs, and estuaries to determine whether they meet publicly adopted water quality standards. Because of limited resources, the state has been divided into areas "Basins Groups". A basin group is assessed once every five years, The City of Lake Worth Beach is in Group 3 and its last assessment was concluded in 2016.

The goal of FDEP's assessment is to update the comprehensive listing system, within each Basin Group and Water Boundary Identifications (WBIDs). By reviewing the water quality data for a WBID in comparison to the chapters 62-302, 62-303, 62-303.720, and 62-303.390 of the F.A.C, impaired WBIDs are added to or is removed from lists. Five outcomes can result typically from the cycle review. A WBID stays in its current status listed or unlisted, it can be added to or delisted from the Comprehensive Study List or added to or delisted from Impaired Waters. WBIDs can be delisted if a previously identified impairment cannot be verified or a Total Maximum Daily Load (TMDL) has been adopted. A TMDL represents the maximum

amount of pollutant loading that can be discharged to a water body and have its designated uses still be met. Once a TMDL is development, watershed stakeholders and FDEP staff develop a Basin Management Action Plan (BMAP). The BMAP specifies the activities, schedule, and funding sources that will be undertake to restore the waterbody. This comprehensive list can currently be found at the following link (https://floridadep.gov/dear/watershed-assessment-section/documents/comprehensive-verified-list)

2.2. Lake Worth Beach Lagoons Cycle 3 Verified List of Impairments

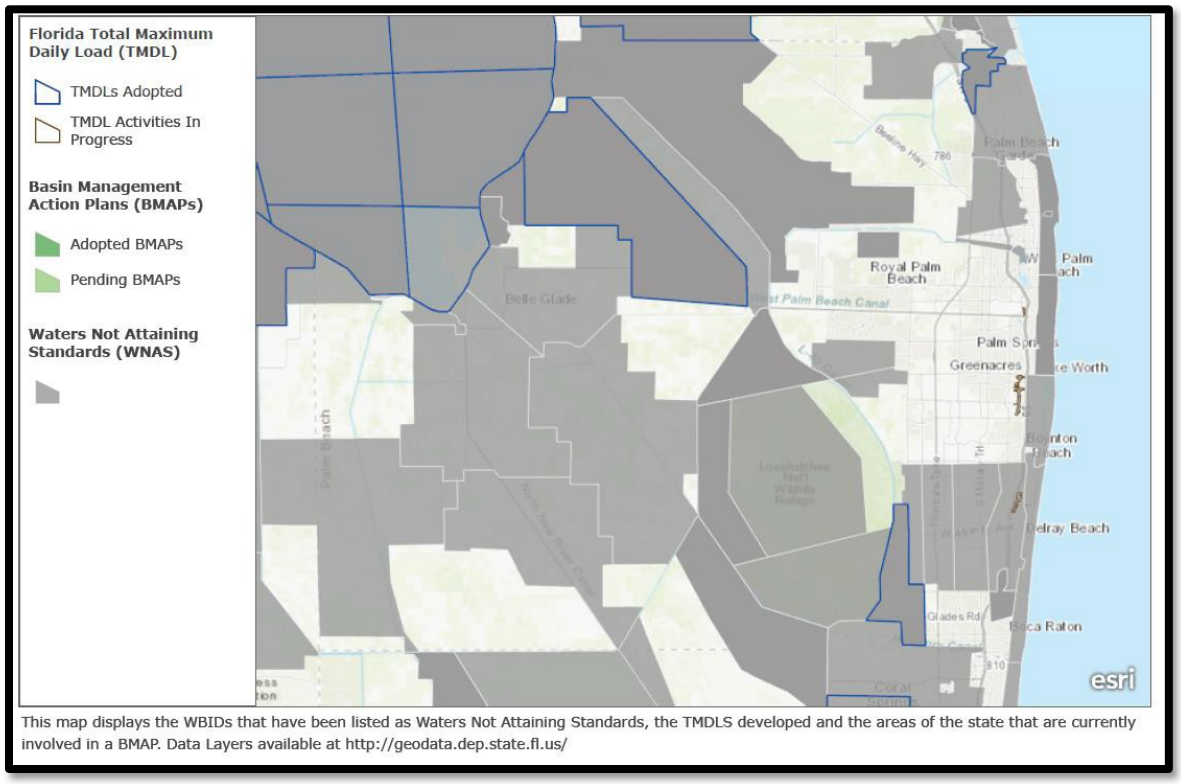
Currently the City discharges to one WBID on the TMDL Planning List for 2022 and two WBIDs on the impaired waters list as determined to be Waters Not Attaining Standards (WNAS). The listed WBIDs include impairments for: Copper, Chlorophyll-a, Total Phosphorus and Bio-assessments and are shown in Table 1. As noted in Table 1, Lake Worth Lagoon Central listed for copper. All marina estuaries along the Palm Beach County coastline are listed as impaired for copper, yet there are no identified copper impairments for any of the waters flowing in from the freshwater tributaries. The copper impairments does not appear to be related to stormwater runoff, however it may be related to the marina boating actives in the water body. The next step in the FDEP process is to rank the impairment for adopting a TMDL for the WBID. Based on the listed stormwater impairments the primary pollutants of concern are nutrients.

2.3. Basin Management Action Plans and Total Maximum Daily Loads Program

Currently the City of Lake Worth Beach does not have any waters with Basin Management Action Plans (BMAPs) and Total Maximum Daily Loads Program (TMDLs) that it discharges to or within its boundary. FDEP has a listing for site-specific TMDL priorities through 2022 and has no sites listed within the City. As stated, above Lake Osborne, WBIDs No. 3256A is listed under a planning phase or having activities in progress. Due to these activities the City may want to consider evaluating the basin that contribute to this discharge and determining the most effective ways to reduce loads to this WIB.

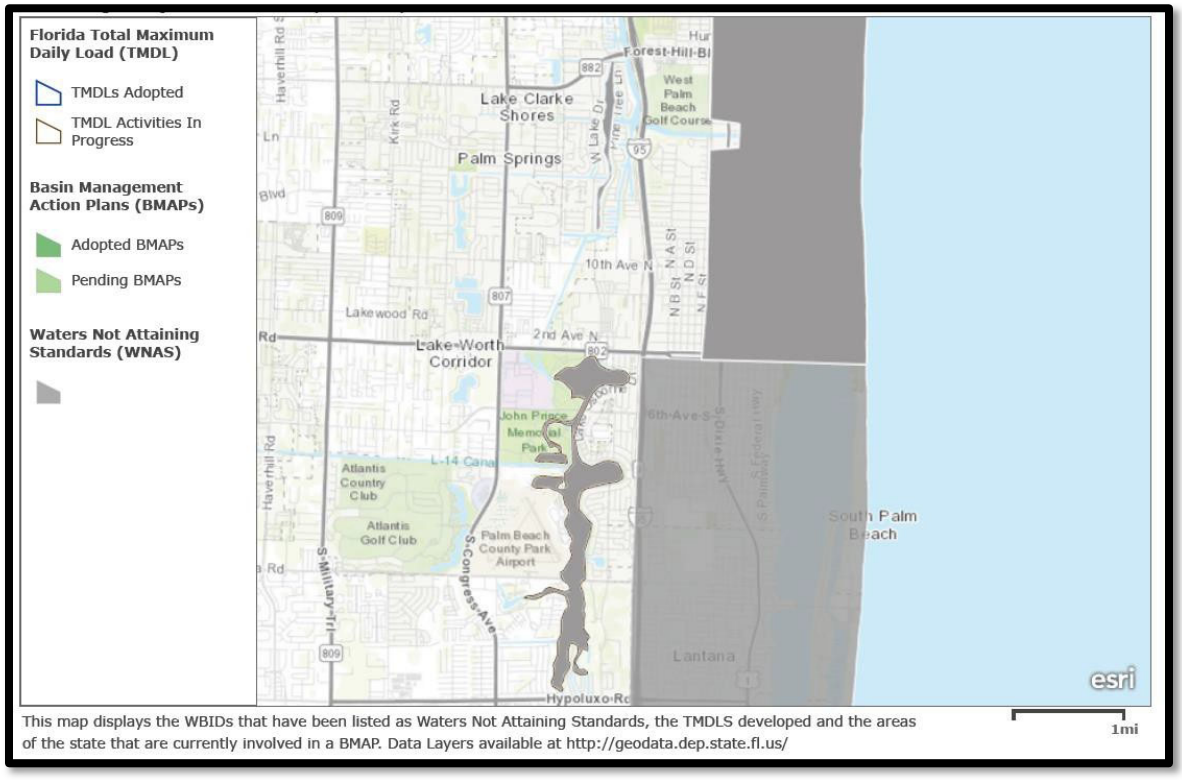
Maps via a website interface are available from the DEP for each of the WNAS, BMAPs, TMDL. These maps are provided in the following Figure 1 and Figure 2. In additional, to assist with location of WNAS and WIBs that are in a planning phase for a TMDLs, a map containing the City Boundary of Lake Worth Beach and these features is included as Figure 3. Notes associated with the table of listed impaired waters Table 1 within the city's MS4 from 2016 cycle 3 as of data adopted, June 27, 2018 just precedes the aforementioned table in Figure 4.

FIGURE 1 FDEP WATER QUALITY ASSESSMENTS, TMDLS, AND BMAPS PALM BEACH COUNTY



This map displays the WBIDs that have been listed as Waters Not Attaining Standards, the TMDLS developed and the areas of the state that are currently involved in a BMAP. Data Layers available at http://geodata.dep.state.fl.us/

FIGURE 2 FDEP WATER QUALITY ASSESSMENTS, TMDLS, AND BMAPS CITY OF LAKE WORTH BEACH



This map displays the WBIDs that have been listed as Waters Not Attaining Standards, the TMDLS developed and the areas of the state that are currently involved in a BMAP. Data Layers available at http://geodata.dep.state.fl.us/

FIGURE 3 FDEP WATER QUALITY ASSESSMENTS, TMDLS, AND BMAPS CITY OF LAKE WORTH BEACH

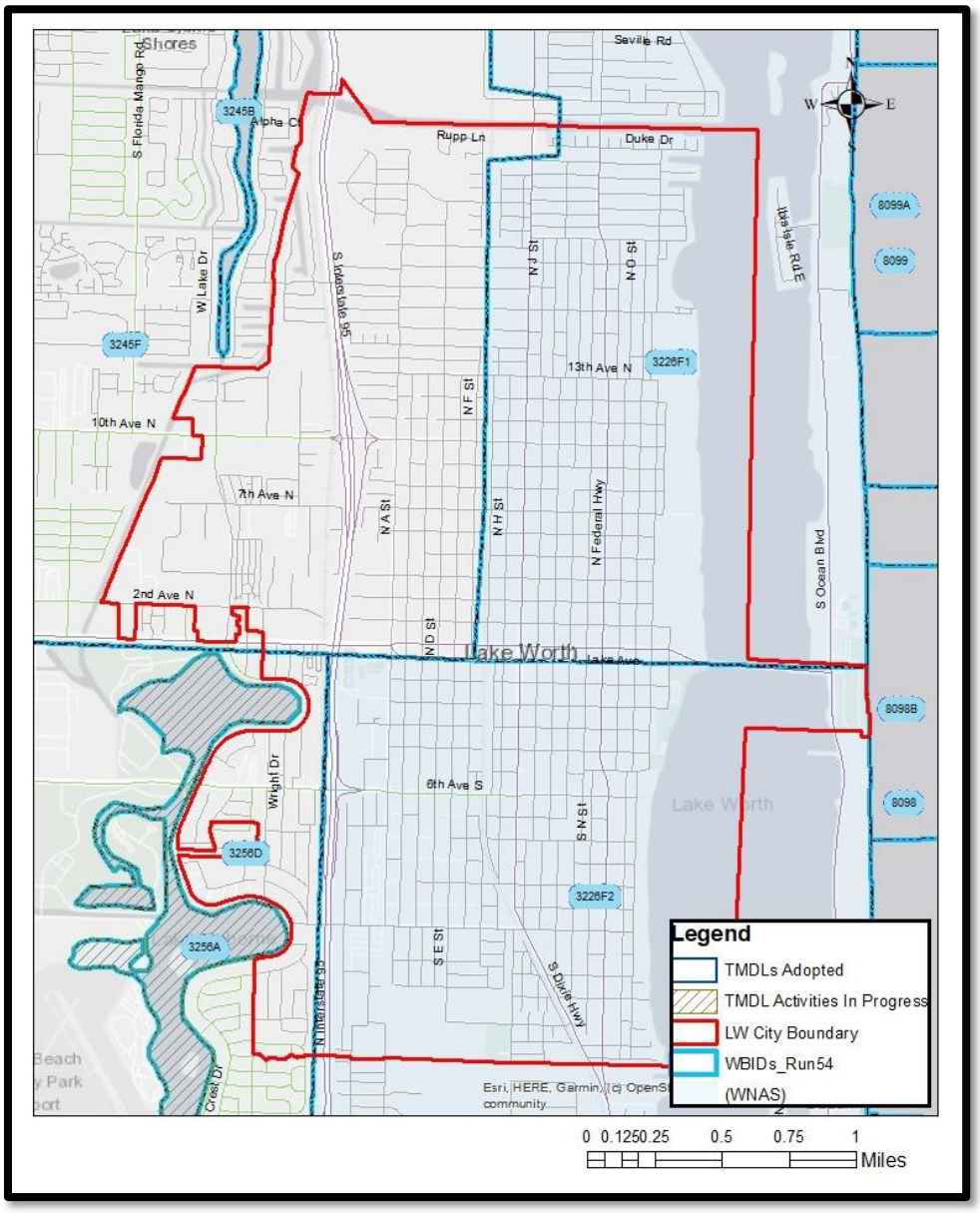


FIGURE 4 SUPERSCRIPTS AND CODES ASSOCIATED WITH TABLE 1 IMPAIRED WATERS WITHIN CITY'S MS4 FROM 2016 CYCLE 3

Florida's waterbody classifications are defined as:
1 - Potable water supplies
2 - Shellfish propagation or harvesting
3F - Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in freshwater 3M
- Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in marine water 4 -
Agricultural water supplies
5 - Navigation, utility, and industrial use 2 n is equal to the number of samples. When samples are collected at the same location less than 4 days apart, the median of those results represents a single sample for the purpose of determining n.
6 - Where a parameter was identified as impaired under the IWR, a priority of "medium" was assigned. Exceptions are waters where the impairment poses a threat to potable water or human health, which have been assigned a "high" priority, and fecal coliform impairments, which have been assigned a "low" priority. All other listings are prioritized based on the following: it is our intent that listings with a "High" priority be addressed within the next 5 years, listings with a "Medium" priority be addressed within 5-10 years as resources allow, and listings with a "Low" priority be addressed within the next 10 years.
7 PP - Planning Period (10-year period; beginning and ending date vary by group/cycle combination); Where data are presented as x/y, x represents the number of exceedances and y represents the total number of samples.
8 VP - Verified Period (7.5-year period; beginning and ending date vary by group/cycle combination); Where data are presented as x/y, x represents the number of exceedances and y represents the total number of samples.
* A statewide TMDL for mercury, that will address this waterbody, is scheduled to be completed in 2012.
N/A = Not Applicable, does not apply, or was not assessed in the previous cycle (i.e. it is a new WBID, waterbody type change, etc.).

^ Beach advisories are based on FL Dept of Health Enterococcus criterion of >103 CFU/100mL.

TABLE 1 : LISTING OF IMPAIRED WATERS WITHIN CITY'S MS4 FROM 2016 CYCLE 3 AS OF DATA ADOPTED JUNE 27, 2018

Cycle	Group	Group Name	Planning Unit	County (-ies)	WBID	Water Segment Name	Water-body Type	Water-body Class[1]	Parameters Assessed Using the Impaired Waters Rule (IWR)	Dissolved Oxygen/Biology Pollutant of Concern	Concentration of Criterion or Threshold Not Met	Priority for TMDL Development[3]	Projected Year For TMDL Develp.[3]	Verified Period Assessment Data[8]	Comments[7,8]
3	3	Lake Worth Lagoon - Palm Beach Coast	Intracoastal	Palm Beach	3226F1	Lake Worth Lagoon (Central Segment)	Estuary	3M	Copper		≤ 3.7 µg/L	Medium		6/22	This waterbody is impaired for this parameter based on the number of exceedances for the sample size. This parameter is being added to the 303(d) List.
3	3	Lake Worth Lagoon - Palm Beach Coast	Intracoastal	Palm Beach	3226F1	Lake Worth Lagoon (Central Segment)	Estuary	3M	Nutrients (Chlorophyll-a)		ENRR2: PCT ≤ 10.2 µg/L	Medium		ENRR2 (PCT) 68/412	This waterbody is impaired for this parameter based on the number of exceedances for the sample size. This parameter is being added to the 303(d) List.
3	3	Lake Worth Lagoon - Palm Beach Coast	Intracoastal	Palm Beach	3226F1	Lake Worth Lagoon (Central Segment)	Estuary	3M	Nutrients (Total Phosphorus)		ENRR2: AGM ≤ 0.049 mg/L	Medium		ENRR2: AGM 2008 (0.023 mg/L) 2009 (0.035 mg/L) 2010 (0.033 mg/L) 2011 (0.026 mg/L) 2012 (0.028 mg/L) 2013 (0.032 mg/L) 2014 (0.056 mg/L) 2015 (0.052 mg/L)	This waterbody is impaired for this parameter because the annual geometric means exceeded the criterion more than once in a three year period. This parameter is being added to the 303(d) List.
3	3	Lake Worth Lagoon - Palm Beach Coast	C-16	Palm Beach	3256A	Lake Osborne	Lake	3F	Biology	Nutrients	Average score of at least two temporally independent LVI scores ≥ 43.	Medium		LVI 21FLGW 37860 (04JUN2009: 33) 21FLGW 40243 (23AUG2011: 40) 21FLWPB 28010470 (02DEC2013: 43) 21FLWPB 28010737 (07AUG2008: 45) 21FLWPB 41842 (14NOV2012: 37)	This waterbody is impaired for this parameter based on failing bioassessments and nutrients have been determined to be the causative pollutant. This parameter is being added to the 303(d) List.
3	3	Lake Worth Lagoon - Palm Beach Coast	C-16	Palm Beach	3256A	Lake Osborne	Lake	3F	Nutrients (Chlorophyll-a)		≤ 20 µg/L	Medium		AGM 2008 (25 µg/L) 2009 (16 µg/L) 2010 (16 µg/L) 2011 (17 µg/L) 2012 (26 µg/L) 2013 (29 µg/L) 2014 (17 µg/L)	This waterbody is impaired for this parameter. The annual geometric means exceeded the nutrient criteria more than once in a three year period. This parameter is being added to the 303(d) List.
3	3	Lake Worth Lagoon - Palm Beach Coast	C-16	Palm Beach	3256A	Lake Osborne	Lake	3F	Nutrients (Total Phosphorus)		Chl-a AGM ≤ 20 µg/L, TP AGM ≤ 0.16 mg/L; If Chl-a has Insufficient or No Data to calculate AGM or if Chl-a AGM > 20 µg/L, TP AGM ≤ 0.05 mg/L	Medium		AGM 2008 (0.03 mg/L) 2009 (0.10 mg/L) 2010 (0.06 mg/L) 2011 (0.05 mg/L) 2012 (0.06 mg/L) 2013 (0.07 mg/L) 2014 (0.07 mg/L)	This waterbody is impaired for this parameter. This parameter was assessed against the minimum nutrient criterion because corrected chlorophyll-a annual geometric means exceeded the applicable chlorophyll-a threshold. The annual geometric means exceeded the nutrient threshold more than once in a three year period. This parameter will be added to the 303(d) list.

3. Water Quality Monitoring Program

3.1. Description

The Palm Beach County NPDES MS4 includes the following components:

- Ambient Water Quality Sampling
- Water Quality Data Analyses
- Trend Analyses
- Annual Pollutant Loading Estimations in Year 3
- Program Modifications as Needed

The Palm Beach County wide monitoring program included 40 ambient water quality monitoring sites in Cycle 4 Year 2 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 the Palm Beach County permittees.

The sites monitored are sampled and initially analyzed in-situ by staff using a multiparameter water quality monitoring instrument. Water samples are collected, preserved and stored in accordance with Standard Operating Procedures. Final analysis of samples is conducted in laboratory settings under the direction of the entities listed above.

3.2. Monitoring Sites

City of Lake Worth Beach reviewed the available data from the groups water quality monitoring program. Table 2 provide information on the selected sites for the City assessment program. A map of monitoring stations and the City's MS4 can be seen in Figure 5.

TABLE 2 : AMBIENT WATER QUALITY MONITORING STATIONS TABLE

Monitoring Station Number	Location Description	Northing/ Easting	Type	Watershed WBID
C51S155 (SFWMD)	S-155 Discharge Structure in the C-51 Canal	N841132.85 E964349.43	Freshwater	C-51: 3245F
LWL-11 (ERM)	Lake Avenue Bridge LWL	N830580.53 E967926.64	Marine	LWL: 3226F1
22 (ERM)	6th Avenue South Bridge in Lake Osborne (C-16)	N828280.34 E957602.68	Freshwater	Lake Osborne: 3256A
24 *(ERM)*	Lantana Road Bridge in Lake Osborne	N820399.97 E957270.70	Freshwater	Lake Osborne: 3256A

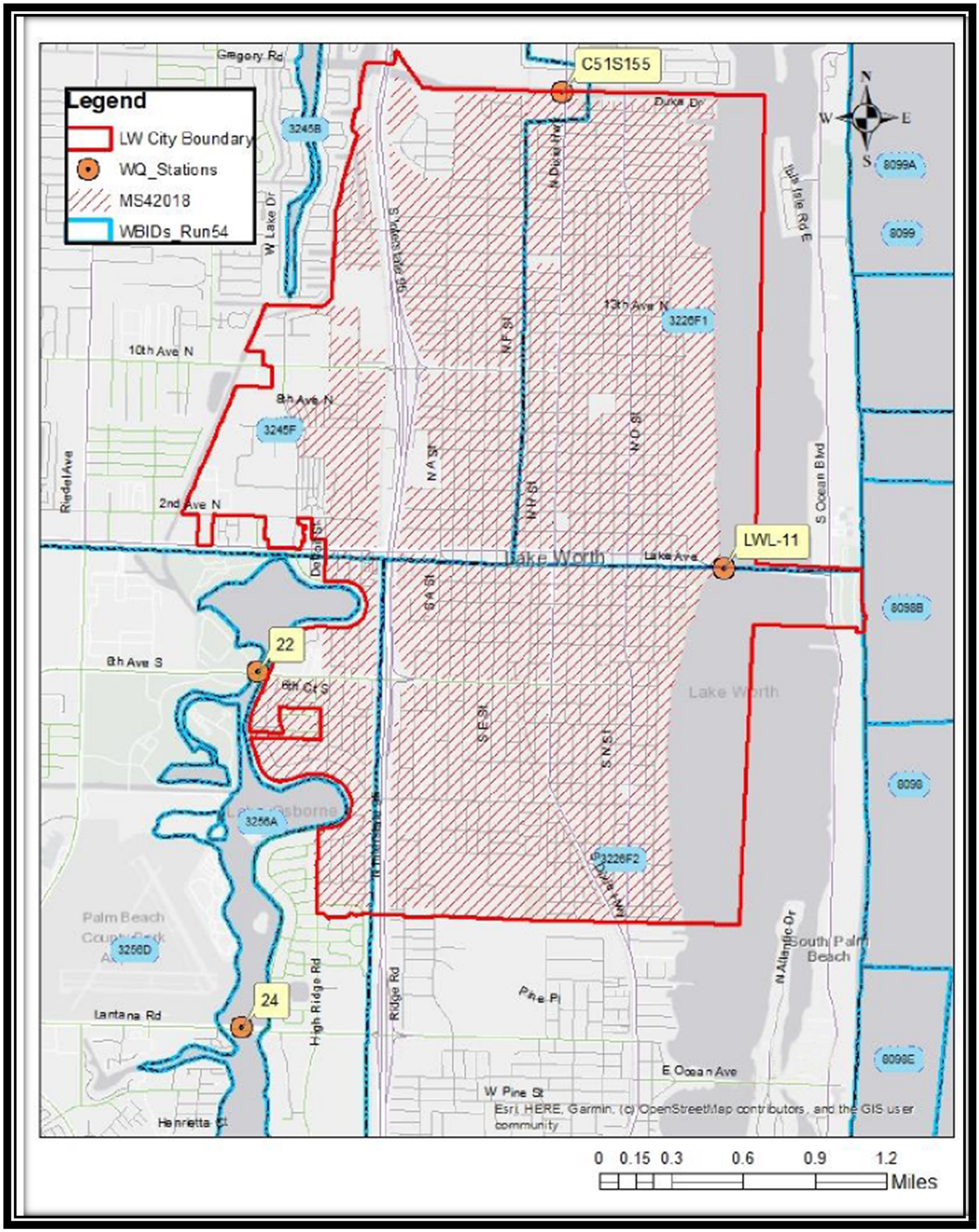


FIGURE 5 : MONITORING LOCATIONS WITH WBIDS

3.3. Water Quality Monitoring Results

The City of Lake Worth Beach does not have its own monitoring program and relies on the groups monitoring program for data. The historical data on the selected five stations are provided to the group via the group's website and can be found at:

http://www.pbco-npdes.org/WaterQualityMonitoring/WaterQualityData_PeriodOfRecord.zip

Parameters are monitored typically month for marine environments or bi-monthly for freshwater. Parameters of primary interest to FDEP and the City are phosphorus, and nitrogen. Chlorophyll A can be an indicator of nutrient enrichment and was also included. Table 3 below helps provide a summary of the limits. To aid in the review of the data and trends the criteria has been placed on the graph with a red line and labeled. Where needed additional commentary with regards to the criteria has been provided on the graphs.

TABLE 3 SOUTH FLORIDA REGION WATER QUALITY CRITERIA

Applicable Class III - Freshwater Lakes Water Quality Criteria C-16 (22 and 24)		
PARAMETER	**UNITS**	**CRITERIA**
Chlorophyll-a (corrected)	ug/L	≤ 20 AGM
Nitrogen, Total	mg/L	1.27 to 2.23 AGM
Phosphorus, Total	mg/L	0.05 to 0.16 AGM
Applicable Class III - Freshwater Canal South Florida Region Water Quality Criteria C-51 (38B, 37B, C51S155)		
PARAMETER	**UNITS**	**CRITERIA**
Chlorophyll-a (corrected)	ug/L	≤ 20 AGM
Nitrogen, Total	mg/L	Narrative
Phosphorus, Total	mg/L	Narrative
Applicable Class III - Marine Water Quality Criteria Lake Worth Lagoon Central (LWL-11)		
PARAMETER	**UNITS**	**CRITERIA**
Chlorophyll-a (corrected)	ug/L	≤ 10.2 TPTV
Nitrogen, Total	mg/L	≤ 0.66 AGM
Phosphorus, Total	mg/L	≤ 0.049 AGM

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

3.4. Trend Analysis

Figures located in Appendix A provide the concentration trend lines at each of the monitoring stations for the period of record for TN, TP, and Chl-a. All trend graphs were obtained from the Palm Beach Count groups website (http://pbco-npdes.org/monitoring.asp?menu=JointMenu). A trend line provides an indication if the TP, TN, and Chl-a are increasing (upward), or a decreasing (downward). The appropriate water quality standards are depicted on the trend graphs to allow for a comparison of the trend and trend relationship to the standard. A general summary of the trends can be seen in Table 4 below.

TABLE 4 : SUMMARY OF TRENDS

Monitoring Station	Total Phosphorus		Total Nitrogen		Chlorophyll-A	
	Trend	**Comparison to Standard**	**Trend**	**Comparison to Standard**	**Trend**	**Comparison to Standard**
C51S155 (SFWMD) 1999-2020	Downward	NA	Downward	NA	Downward	Below
LWL-11 (ERM) 1999-2020	Downward	Below	Downward	Below	Upward	Below
22 (ERM) 2004-2020	Downward	Above	Downward	Below	Upward	Above
24 *(ERM) 1999-2020*	Downward	Below	Downward	Below	Upward	Below

Review of the trend graphs indicates the following:

Total Phosphorus in general is in a downward trend within the watersheds. However, Stations 22 in Lake Osborne (WBID 3256A) values are above the State water quality standard. Lake Osborne is currently under development for a TMDL. The City is actively participating in the process and is waiting on second draft of the TMDL report.

Total Nitrogen graphs indicate the concentrations are improving (downward and below the standard) in the watersheds.

Chlorophyll-a trend graphs indicate that concentrations are improving (downward and below the standard) in one watershed. Two of the watersheds (Lake Worth Lagoon Central and C-16- Lake Osborne) have decreasing trends but appear to be below the state standards with the exception of Station 22.

4. Pollutant Loading Estimates

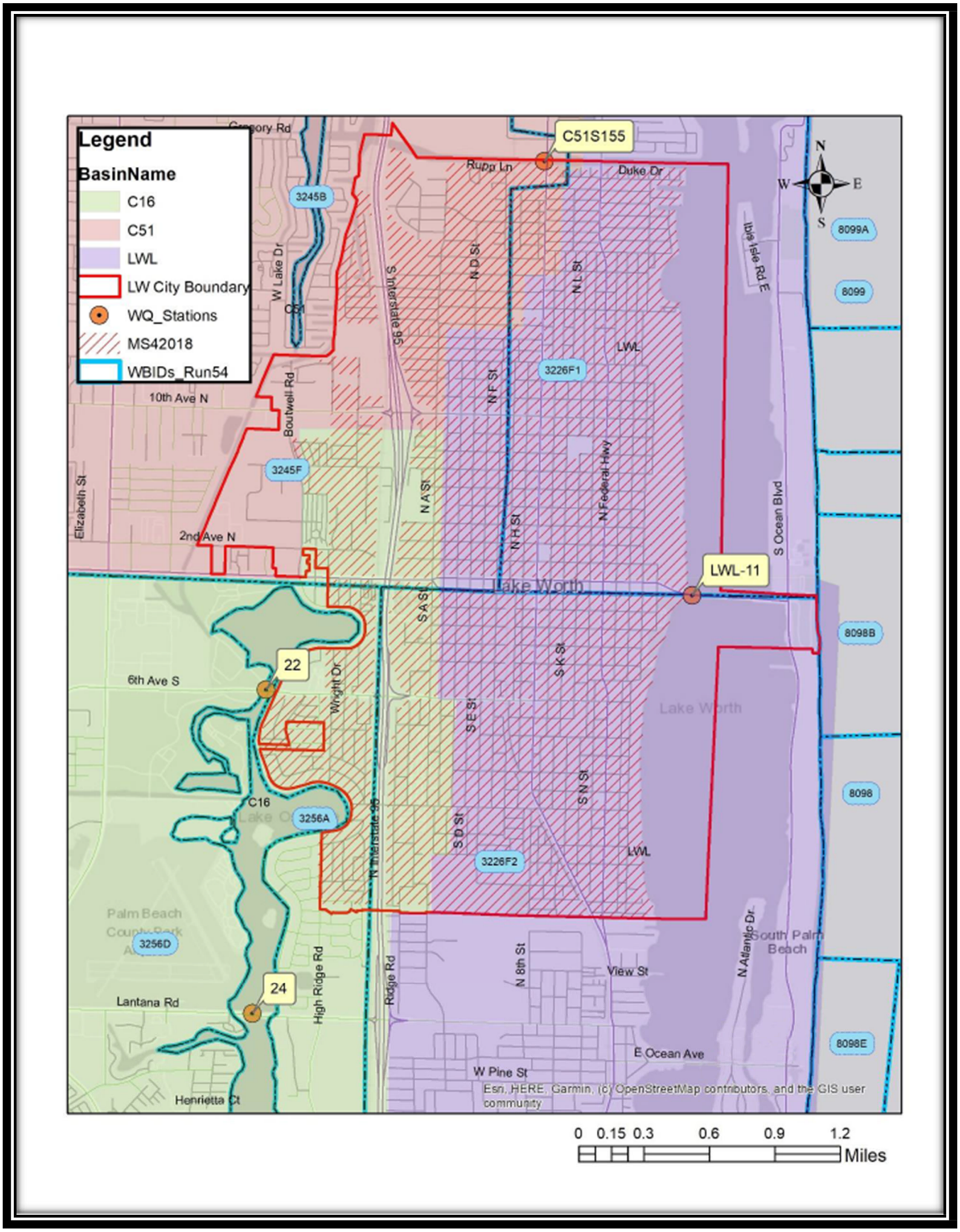
4.1. Description

As part of the requirements in the joint permit the average annual pollutant loading, and event mean concentration (EMC) estimates are to be provided for six parameters. The six parameters identified by the FDEP 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). Pollutant loading models do provide a tool to compare the effects of varying contributing area conditions over a time interval. The permit allows the average annual pollutant loading estimates be 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 October 2019, a pollution loading model was completed as a joint activity by the Palm Beach County MS4 Group. Previous cycles pollutant loading models were done with Watershed Management Model (WMM) developed by CDM Smith to estimate pollutant loading. WMM is a public domain model used by the Florida Department of Environmental protection (FDEP). It provides high level planning simulations of pollutant loadings on both a seasonal and annual time step. It was decided to change to Spatially Integrated Model for Pollutant Loading Estimates (SIMPLE) model for Cycle 4 of the permit. One of the major benefits of SIMPLE is it uses a 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. 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).

For the City of Lake Worth Beach the MS4 three Basins can be identified as contributing to the WBIDs as follows, the MS4 in C-51 discharges to WIBs 3245F, MS4 in the basin Lake Worth Lagoon (LWL) discharges to WBIDs 3226F1 and 3226F2, while Lake Osborne WBID 3256A receives flows from the MS4 in C16. Figure 6 graphicly depicts these basins. Within the report prepared for the group several summary tables indicate the loads per MS4 for each basin for both 2013 and 2018.

FIGURE 6 BASINS AND WIBS MAP FOR CITY OF LAKE WORTH BEACH'S MS4 BOUNDARY



4.2. Pollutant Loading Results

Results of the modeling efforts found that the highest pollutant loads, both total and area weighted, were generated in the Lake Worth Lagoon, followed by Lake Osborne with C-51 being the smallest portion. A summary of the results can be found per cycle in Table 5 and Table 6. Table 7 Reports the percentage of the Cycle 4 loads from the City's MS4 contributions to the basins.

TABLE 5 : RESULTS FROM LOADING ANALYSIS CYCLE 3

Monitoring Station Number	General Location	Tributary Area (acres)	BOD (lb/yr)	TSS (lb/yr)	TP (lb/yr)	TN (lb/yr)	CU (lb/yr)	ZN (lb/yr)
C51S155 (SFWMD)	C-51 Basin	426	17,024	94,144	754	5,263	46	202
LWL-11 (ERM)	Lake Worth Lagoon	1885	55,359	301,422	2,571	17,276	142	637
22 & 24 (ERM)	C-16 Basin	633	30,700	176,290	1,400	9,963	74	330
Totals		2943	103083	571856	4725	32502	262	1169

TABLE 6 : RESULTS FROM LOADING ANALYSIS CYCLE 4

Monitoring Station Number	General Location	Tributary Area (acres)	BOD (lb/yr)	TSS (lb/yr)	TP (lb/yr)	TN (lb/yr)	CU (lb/yr)	ZN (lb/yr)
C51S155 (SFWMD)	C-51 Basin	426	16,270	88,318	757	5,289	45	183
LWL-11 & 13 (ERM)	Lake Worth Lagoon	1885	56,199	303,733	2,591	17,499	143	646
22 & 24 (ERM)	C-16 Basin	633	31,316	179,259	1,453	10,385	79	333
Totals		2943	103785	571310	4801	33173	267	1162

TABLE 7 PERCENT OF LOAD MS4 CONTRIBUTES TO TOTAL BASIN

Basin	BOD (lb/yr)	TSS (lb/yr)	TP (lb/yr)	TN (lb/yr)	CU (lb/yr)	ZN (lb/yr)
LW_MS4_C51	16,270	88,318	757	5,289	45	183
LW_MS4_LWL	56,199	303,733	2,591	17,499	143	646
LW_MS4_C16	31,316	179,259	1,453	10,385	79	333
C51 _Total	2,990,483	9,387,559	136,117	1,725,169	6,332	28,061
LWL_Total	718,096	3,395,653	33,279	285,882	1,543	6,818
C16_Total	1,314,644	4,201,904	54,807	612,669	2,756	13,003
LW_C51_%	1%	1%	1%	0%	1%	1%
LW_LWL_%	8%	9%	8%	6%	9%	9%
LW_C16_%	2%	4%	3%	2%	3%	3%

4.3. Reductions Based on Stormwater Management Programs

The premise of the MS4 permit program is that the SWMP will reduce pollution loadings. BMP's reduce the amount of pollutant loading to a system by reducing the volume of discharge or the pollutant being carried by the discharge. Other methods of reducing loads to the system include, street sweeping, fertilizer ordinances, public outreach and land regulations. New land development regulations were passed in late 2012. These regulations required new land development in the City to meet higher requirements of impervious areas as a ratio of the site. The regulations also required more stringent water quality management, resulting in reduction in stormwater volume and improved water quality. Due to the fact that the regulations effected redevelopment these effects would not be seen in the first few years of implementation but were in full effect by 2018. The City of Lake Worth Beach participates in public outreach with the group on an annual basis. The use of public outreach has previously been decided by the FDEP to provide a reduction of six percent of the annual loadings. As part of the annual reporting for Cycle 4 Year 4 street sweeping debris volumes 2,266 cubic yards were recorded. These loads were also removed from the estimate as reductions as an area weighted reduction. Tables 8 -10 below details the results from the loading model and additional reductions due to Stormwater Management Programs and the resulting totals.

TABLE 8 : POLLUTANT LOADING TOTALS AND REMOVALS DUE TO STORMWATER MANAGEMENT TOTALS C51 BASIN

Basin	BOD (lb/yr)	TSS (lb/yr)	TP (lb/yr)	TN (lb/yr)	CU (lb/yr)	ZN (lb/yr)
LW_MS4_C51_Model_CY3	17,024	94,144	754	5,263	46	202
LW_MS4_C51_Model_CY4	16,270	88,318	757	5,289	45	183
C51_6% Reduction Value	976	5,299	45	317	3	11
LW_MS4_C51_Effective Load	15,294	83,019	712	4,972	42	172
LW_MS4_C51_St. Sweep Prgm			249	458		
LW_MS4_C51_Final Load	15,294	83,019	463	4,514	42	172
LW_MS4_C51_% Change	-10%	-12%	-39%	-14%	-8%	-15%

TABLE 9 : POLLUTANT LOADING TOTALS AND REMOVALS DUE TO STORMWATER MANAGEMENT TOTALS LWL BASIN

Basin	BOD (lb/yr)	TSS (lb/yr)	TP (lb/yr)	TN (lb/yr)	CU (lb/yr)	ZN (lb/yr)
LW_MS4_LWL_Model_CY3	55,359	301,422	2,571	17,276	142	637
LW_MS4_LWL_Model_CY4	56,199	303,733	2,591	17,499	143	646
LWL_6% Reduction Values	3,372	18,224	155	1,050	9	39
LW_MS4_LWL_Effective Load	52,827	285,509	2,436	16,449	134	607
LW_MS4_LWL_St. Sweep Prgm			1,105	2,030		
LW_MS4_LWL_Final Load	52,827	285,509	1,331	14,419	134	607
LW_MS4_LWL_% Change	-5%	-5%	-49%	-17%	-6%	-5%

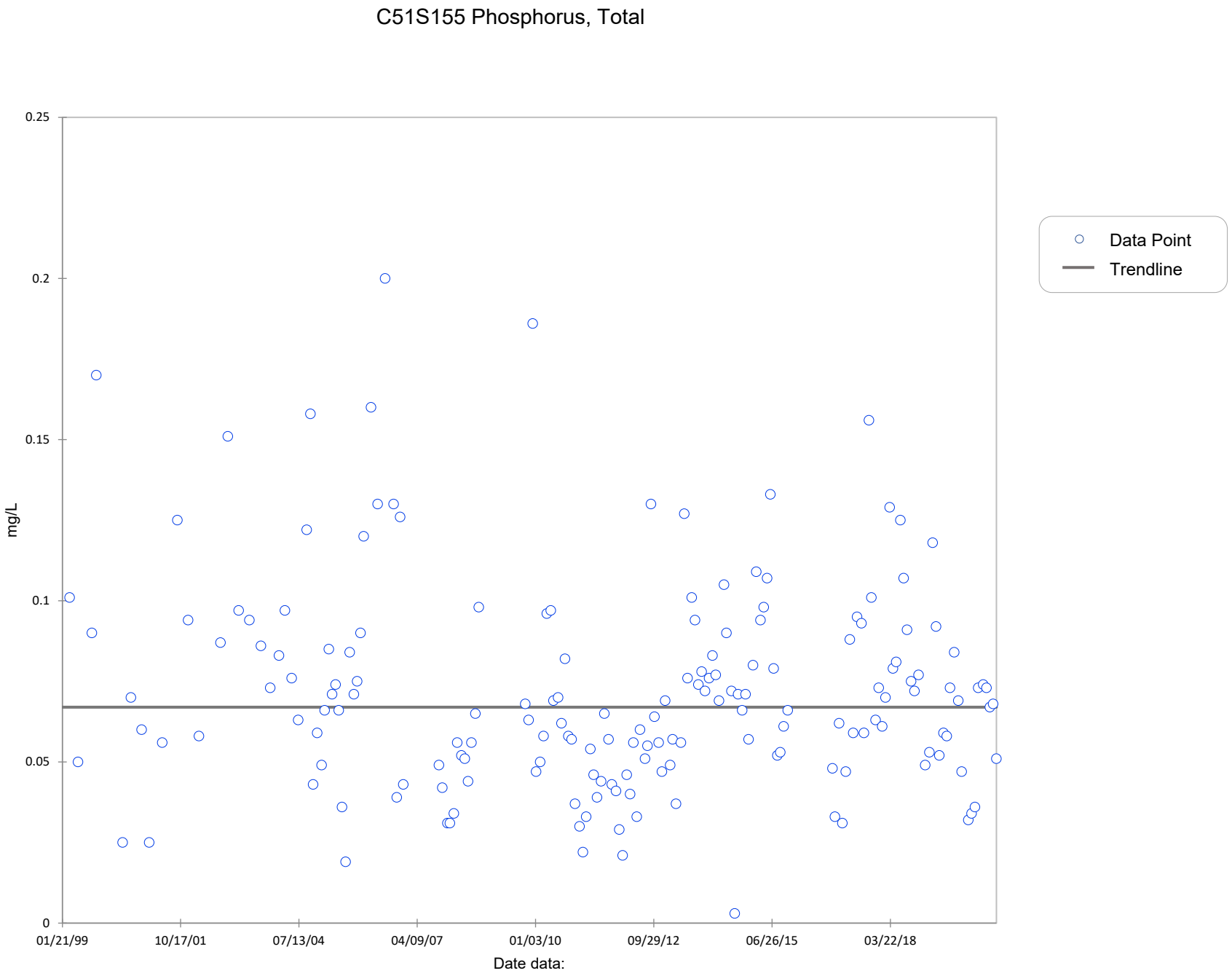
TABLE 10 : POLLUTANT LOADING TOTALS AND REMOVALS DUE TO STORMWATER MANAGEMENT TOTALS C16 BASIN

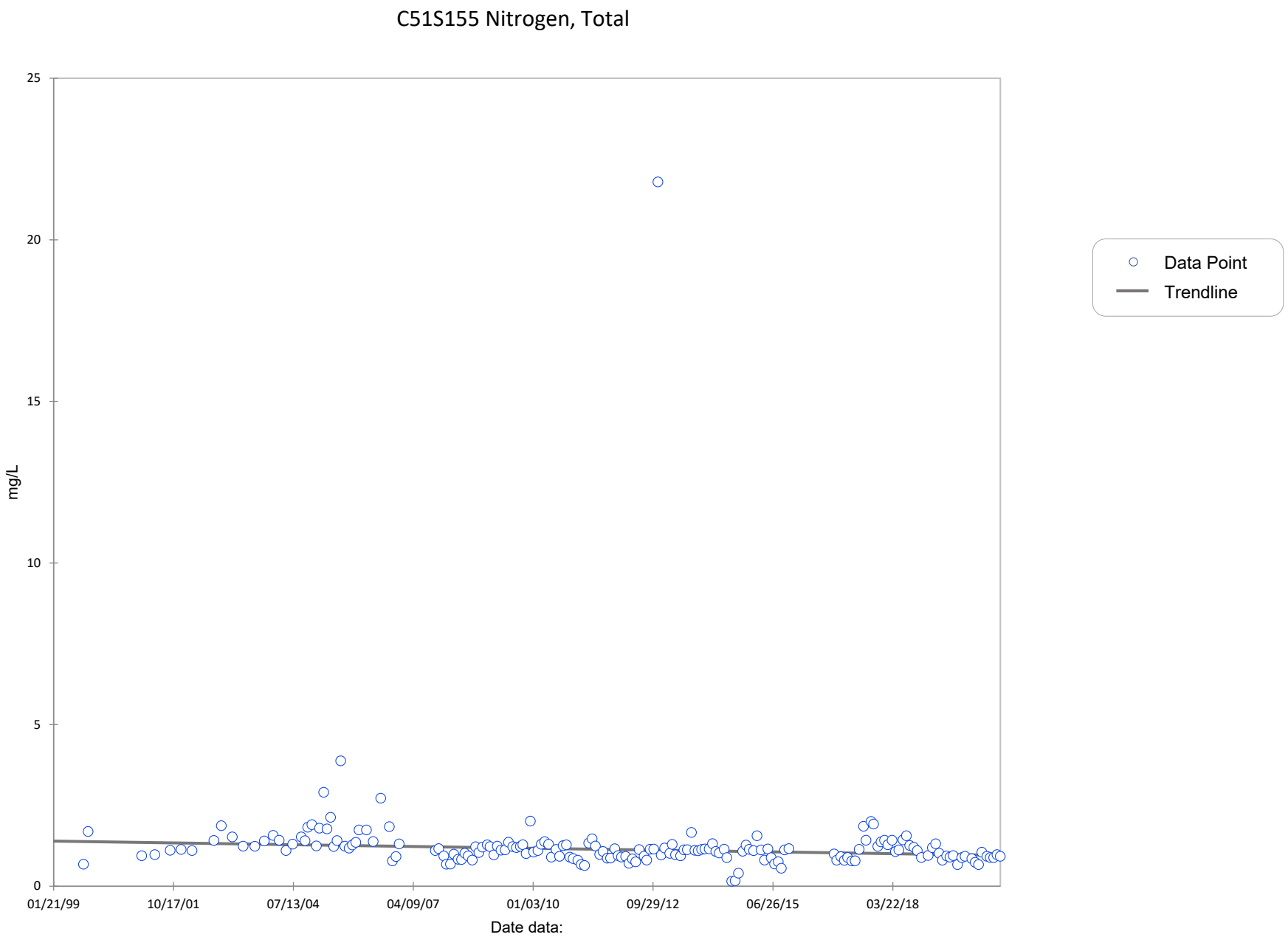
Basin	BOD (lb/yr)	TSS (lb/yr)	TP (lb/yr)	TN (lb/yr)	CU (lb/yr)	ZN (lb/yr)
LW_MS4_C16_Model_CY3	30,700	176,290	1,400	9,963	74	330
LW_MS4_C16_Model_CY4	31,316	179,259	1,453	10,385	79	333
C16_6% Reduction Value	1,879	10,756	87	623	5	20
LW_MS4_C16_Effective Load	29,437	168,503	1,366	9,762	74	313
LW_MS4_C16_St. Sweep Prgm			371	681		
LW_MS4_C16_Final Load	29,437	168,503	995	8,752	74	313
LW_MS4_C16_% Change	-4%	-4%	-29%	-12%	-0%	-5%

5. Conclusions

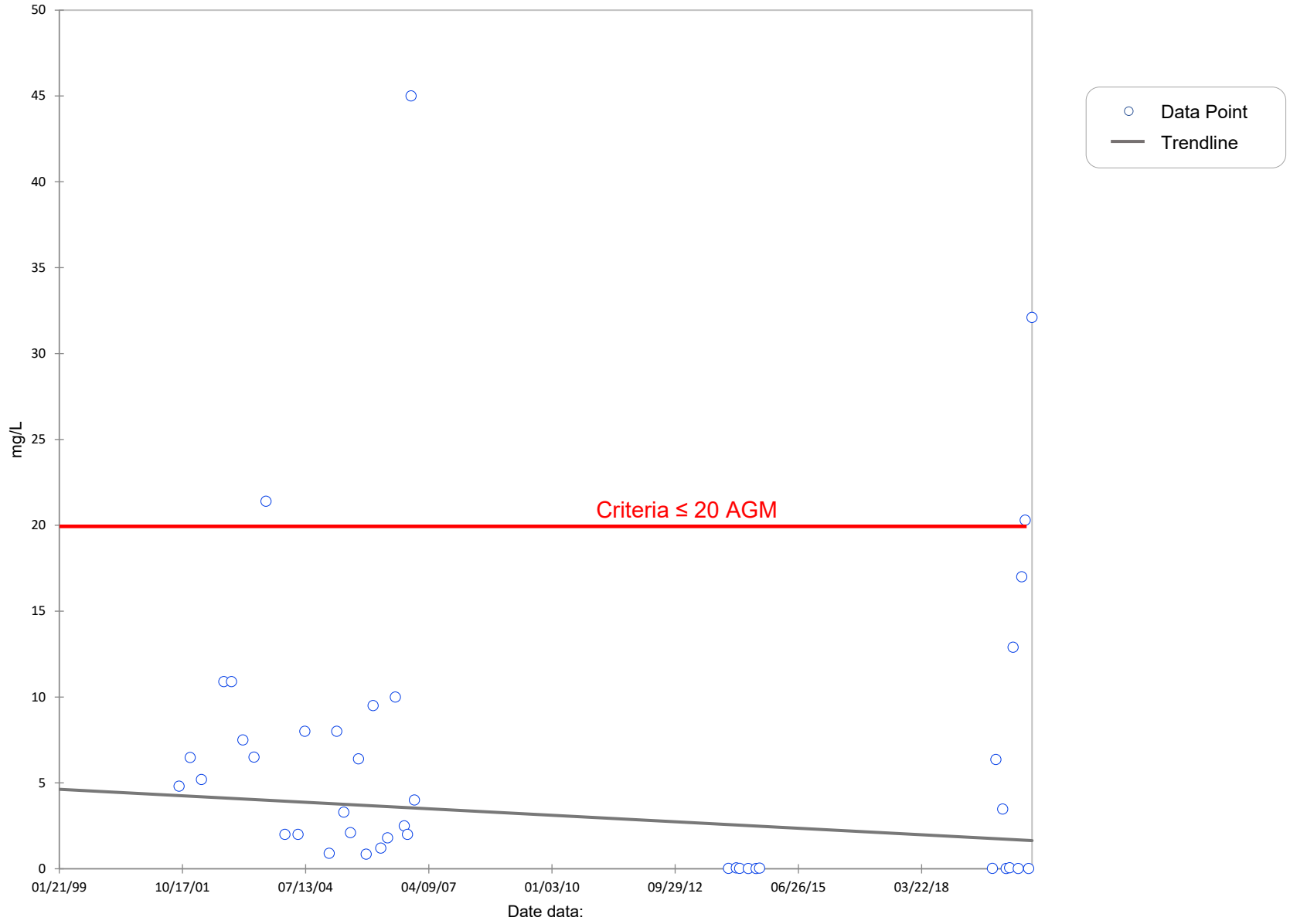
Generally, the water quality monitoring results are encouraging. Nutrient trends are downward. Recent activities between Cycle 3 and Cycle 4 appear to have reduced loadings into the watersheds. These reductions should help maintain the current water quality or help with downward trends. No revisions to City's Stormwater Management Programs (SWMP) are needed at this time. Since WBID 3256A is in under development for a TMDL the City should continue to monitor the ambient water quality for changes in trends, but no current recommended changes are needed. The Year 4 SWMP programs (including public education and street sweeping) has reduced the Year 3 nutrient loadings of TN and TP by 10% and 36%, respectively, as a result, the City SWMP are effective in reducing the loads with this program.

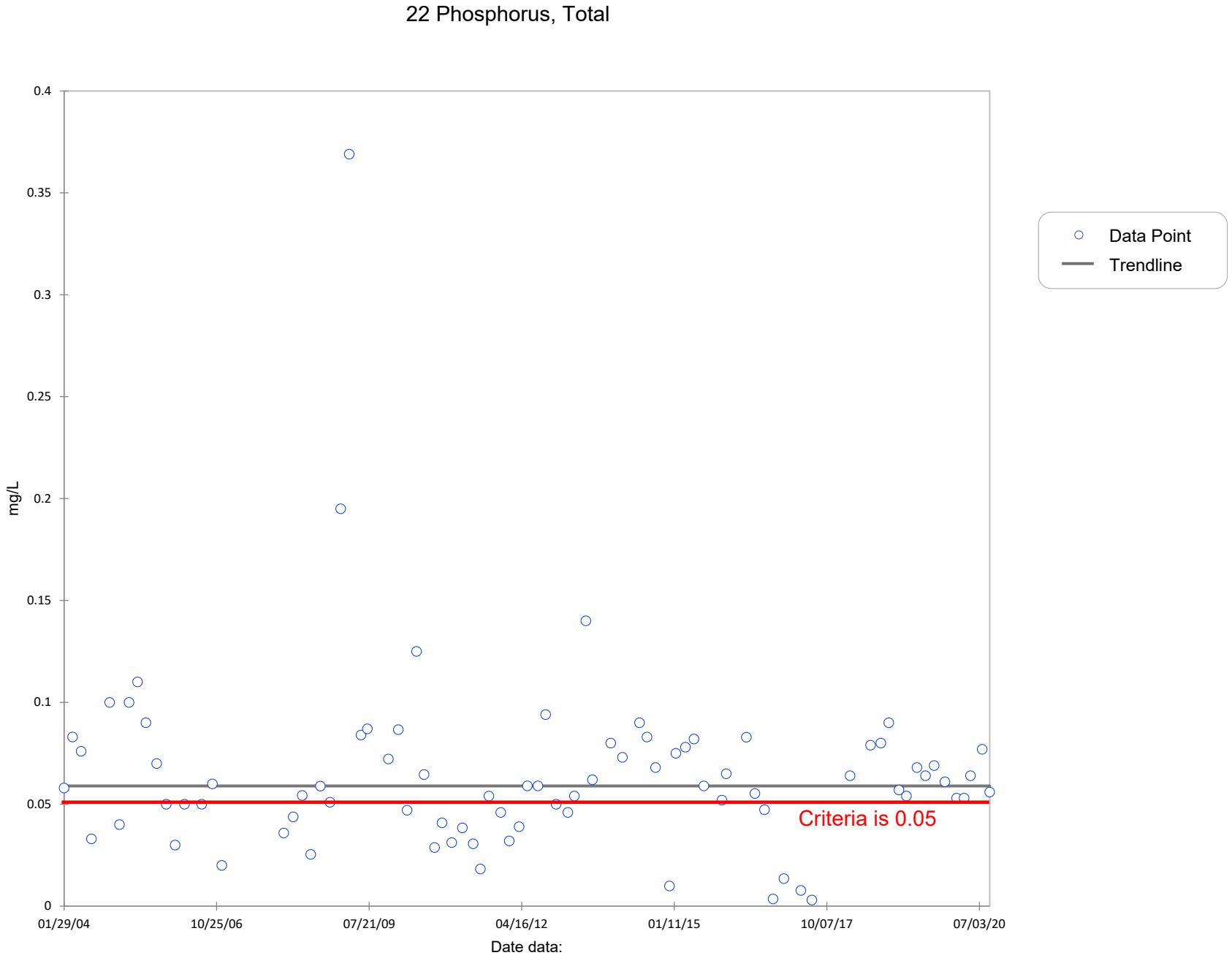
Appendix A – Water Quality Data and Trends

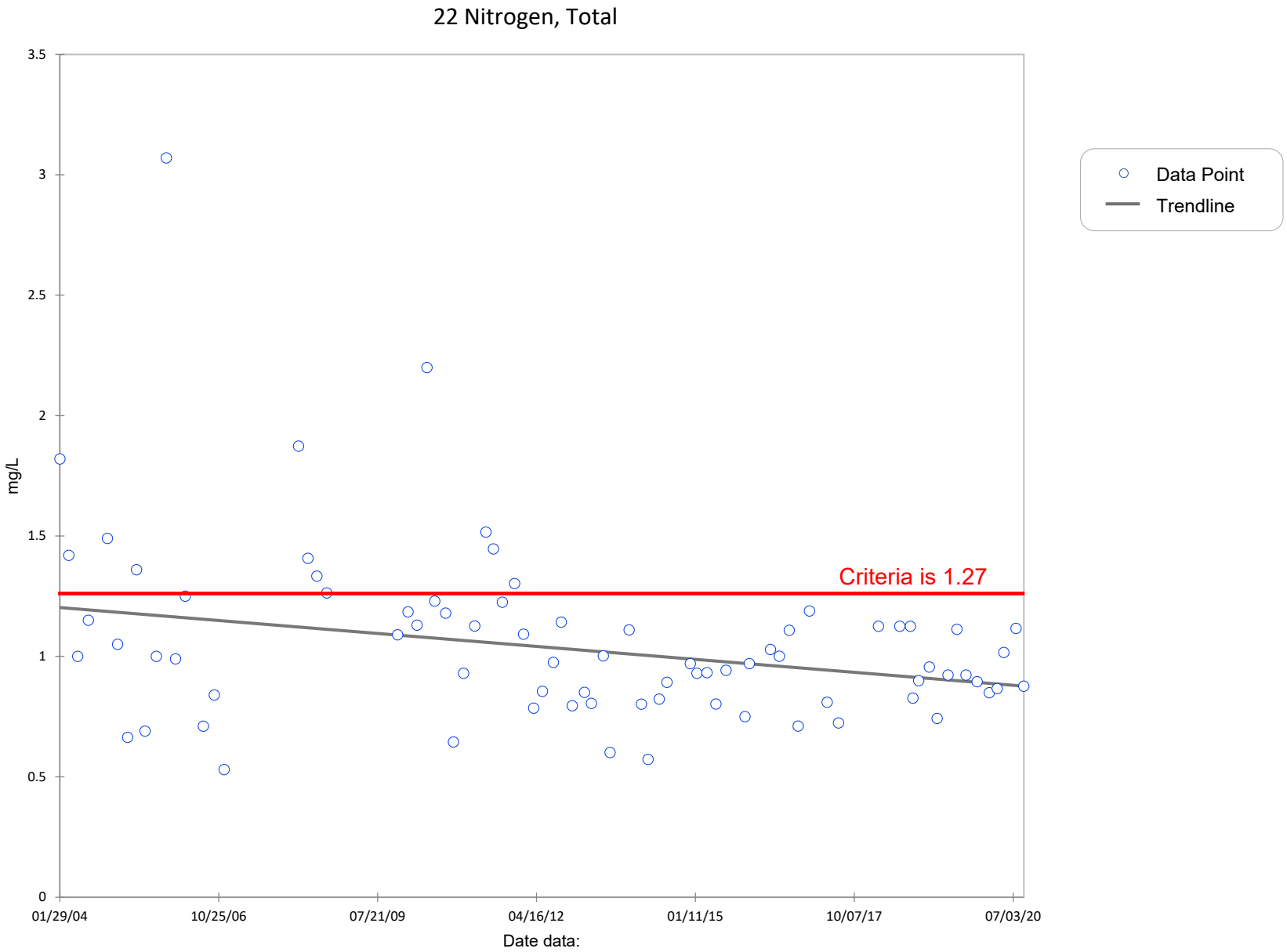

C51S155 Phosphorus, Total
0.25
0.2
0.15
0.1
0.05
0
mg/L
01/21/99
10/17/01
07/13/04
04/09/07
01/03/10
09/29/12
06/26/15
03/22/18
Date data:
Data Point
Trendline

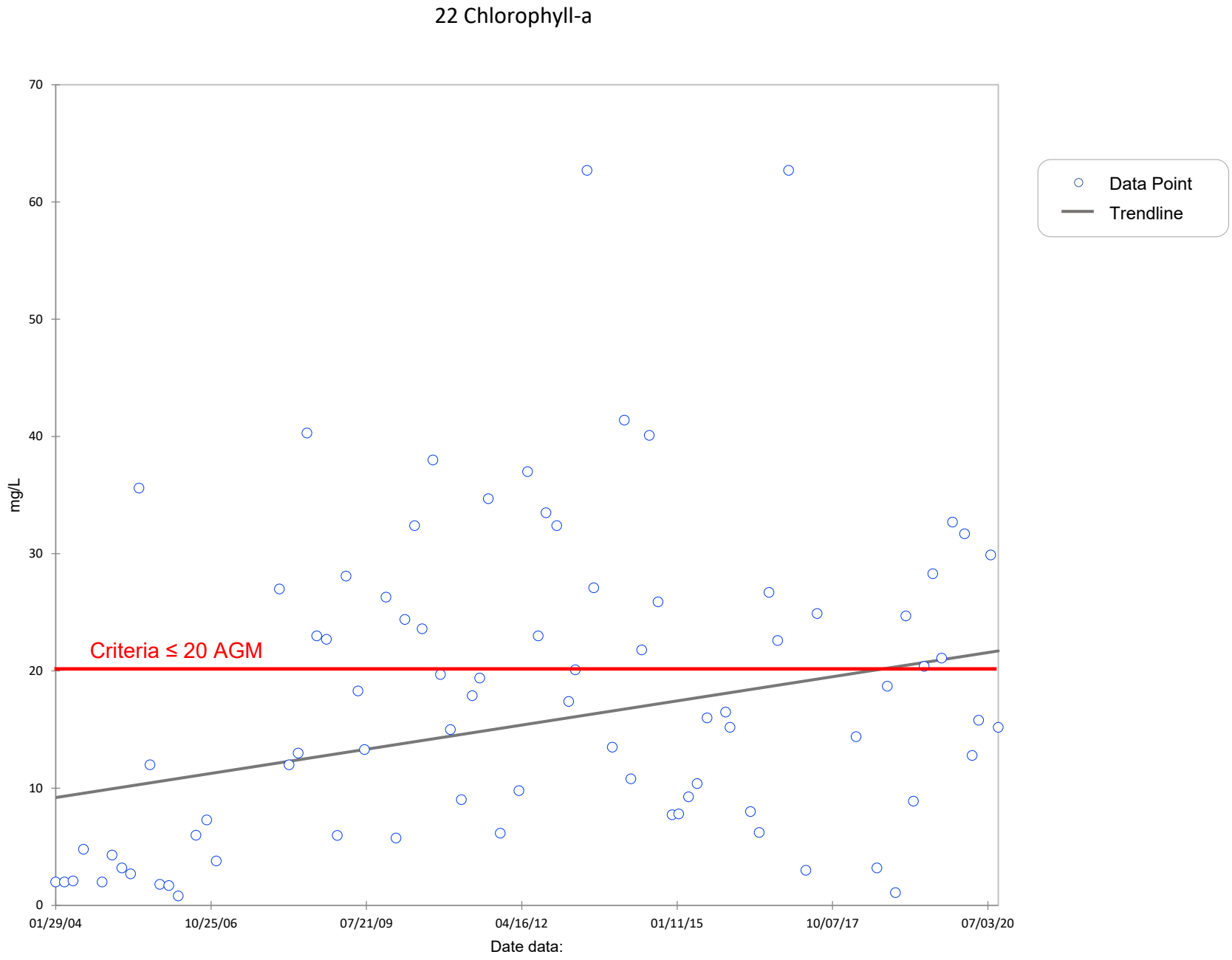

C51S155 Nitrogen, Total
25
20
15
10
5
0
mg/L
01/21/99
10/17/01
07/13/04
04/09/07
01/03/10
09/29/12
06/26/15
03/22/18
Date data:
Data Point
Trendline

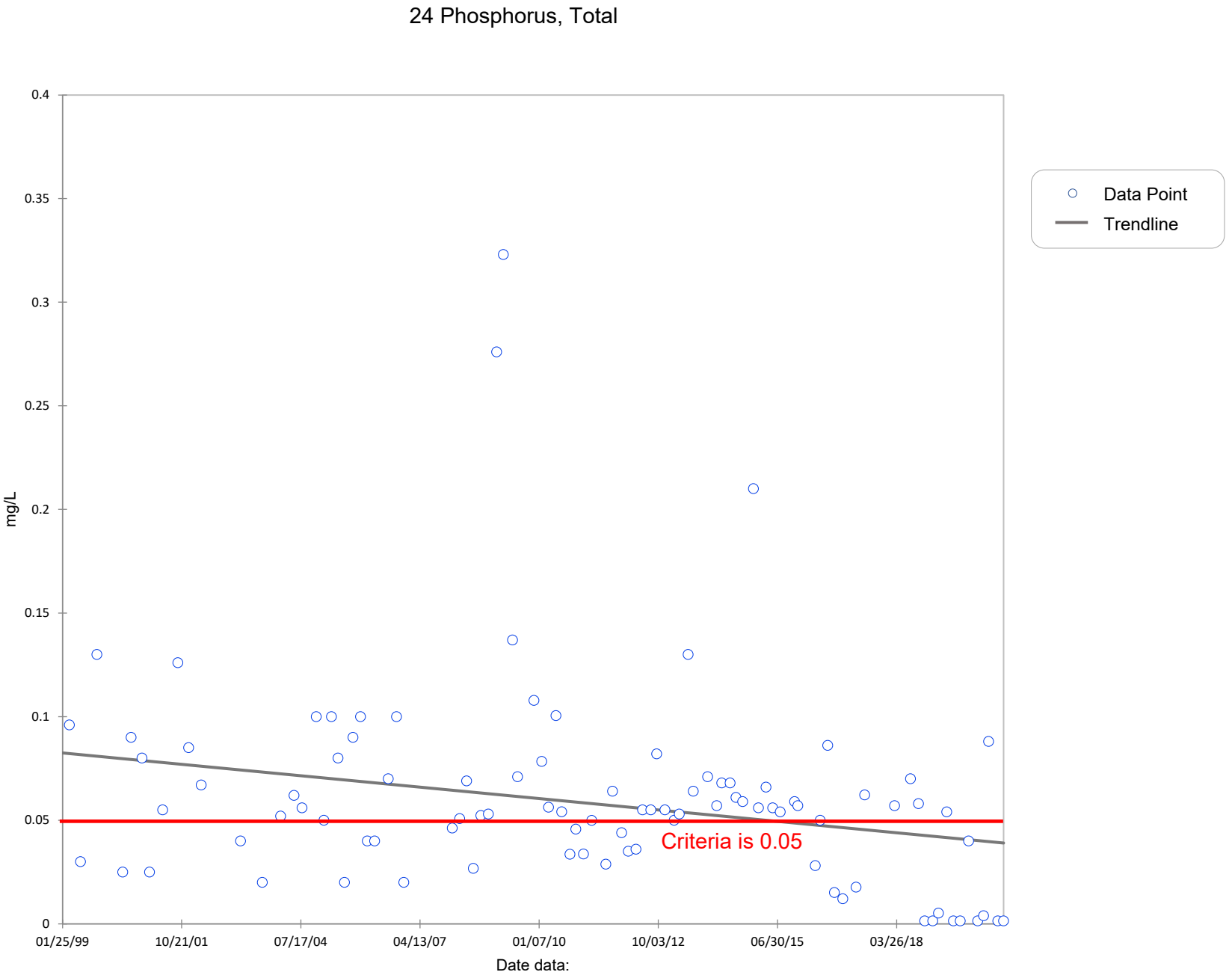
C51S155 Chlorophyll-a

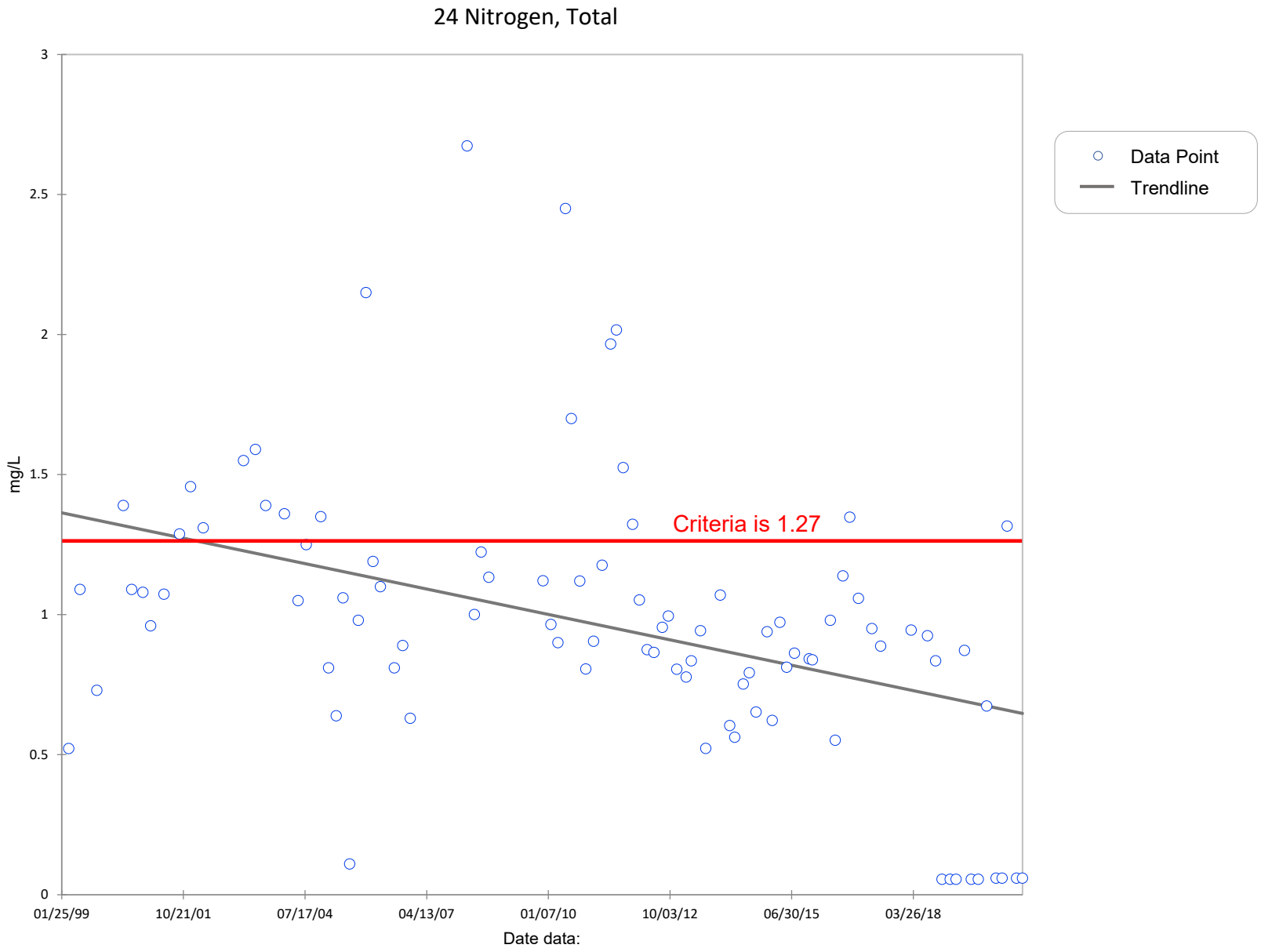


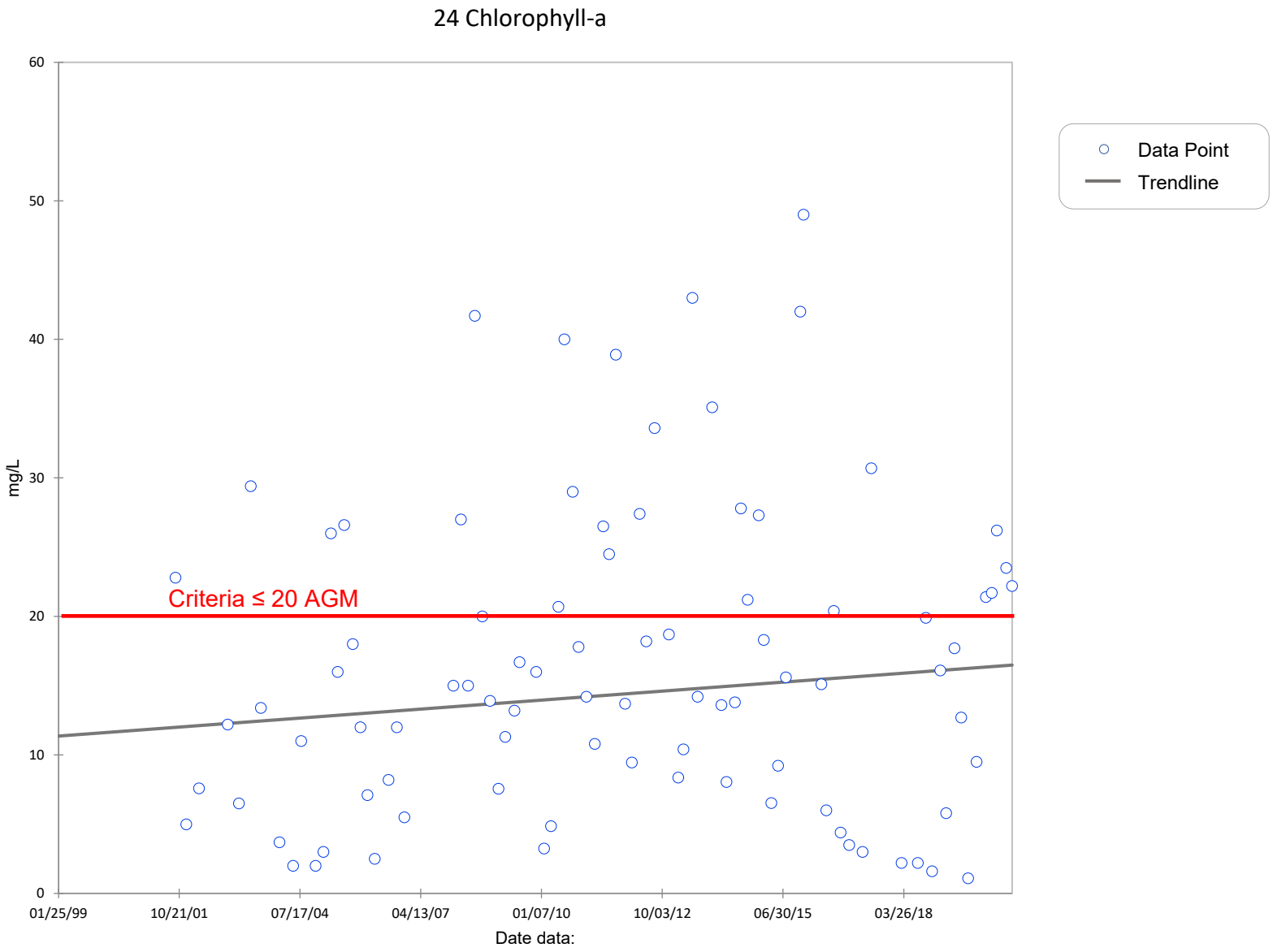

22 Phosphorus, Total
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
mg/L
01/29/04
10/25/06
07/21/09
04/16/12
01/11/15
10/07/17
07/03/20
Date data:
Data Point
Trendline
Criteria is 0.05

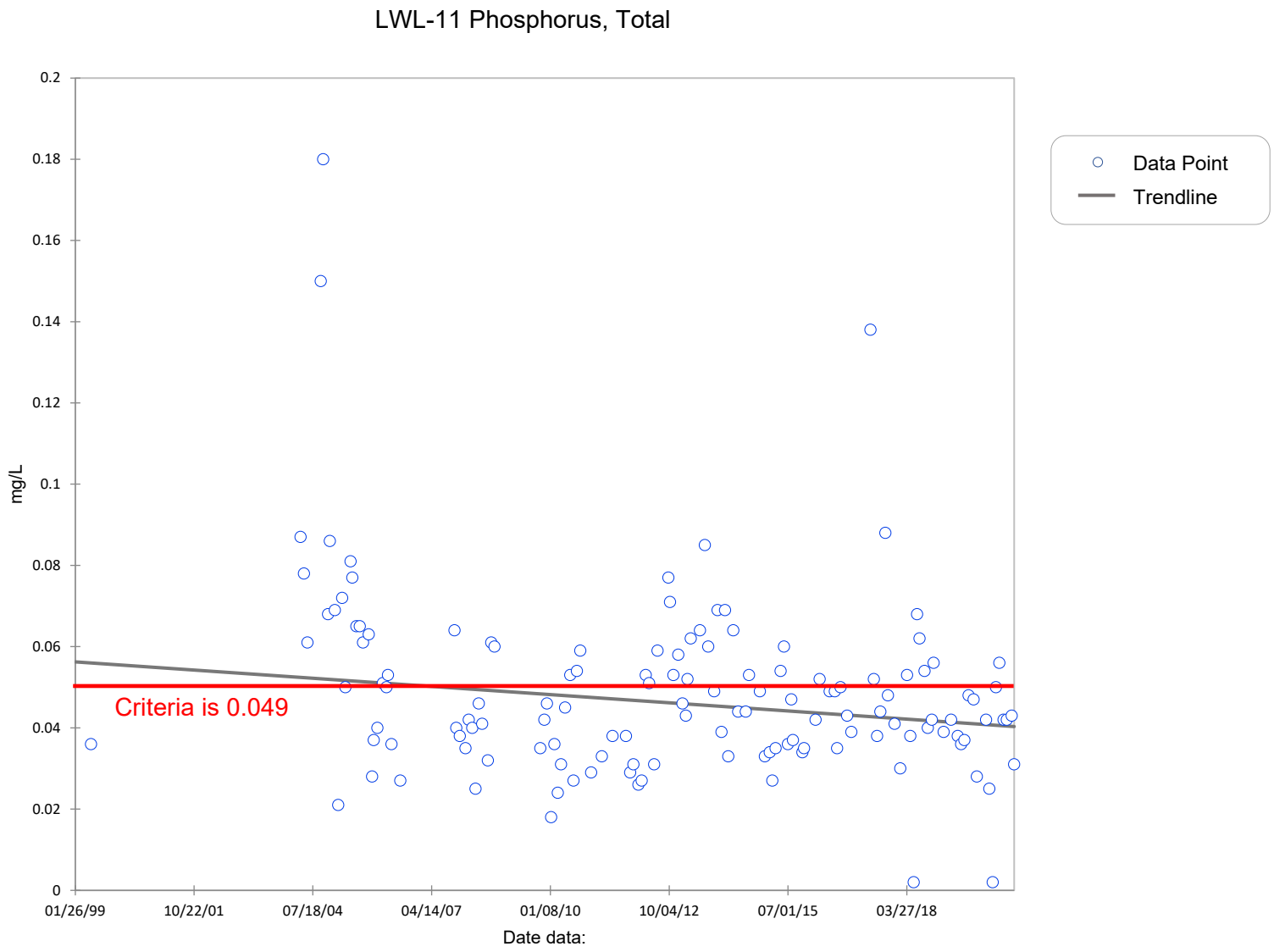

22 Nitrogen, Total
3.5
3
2.5
2
1.5
1
0.5
0
mg/L
Criteria is 1.27
Data Point
Trendline
01/29/04
10/25/06
07/21/09
04/16/12
01/11/15
10/07/17
07/03/20
Date data:

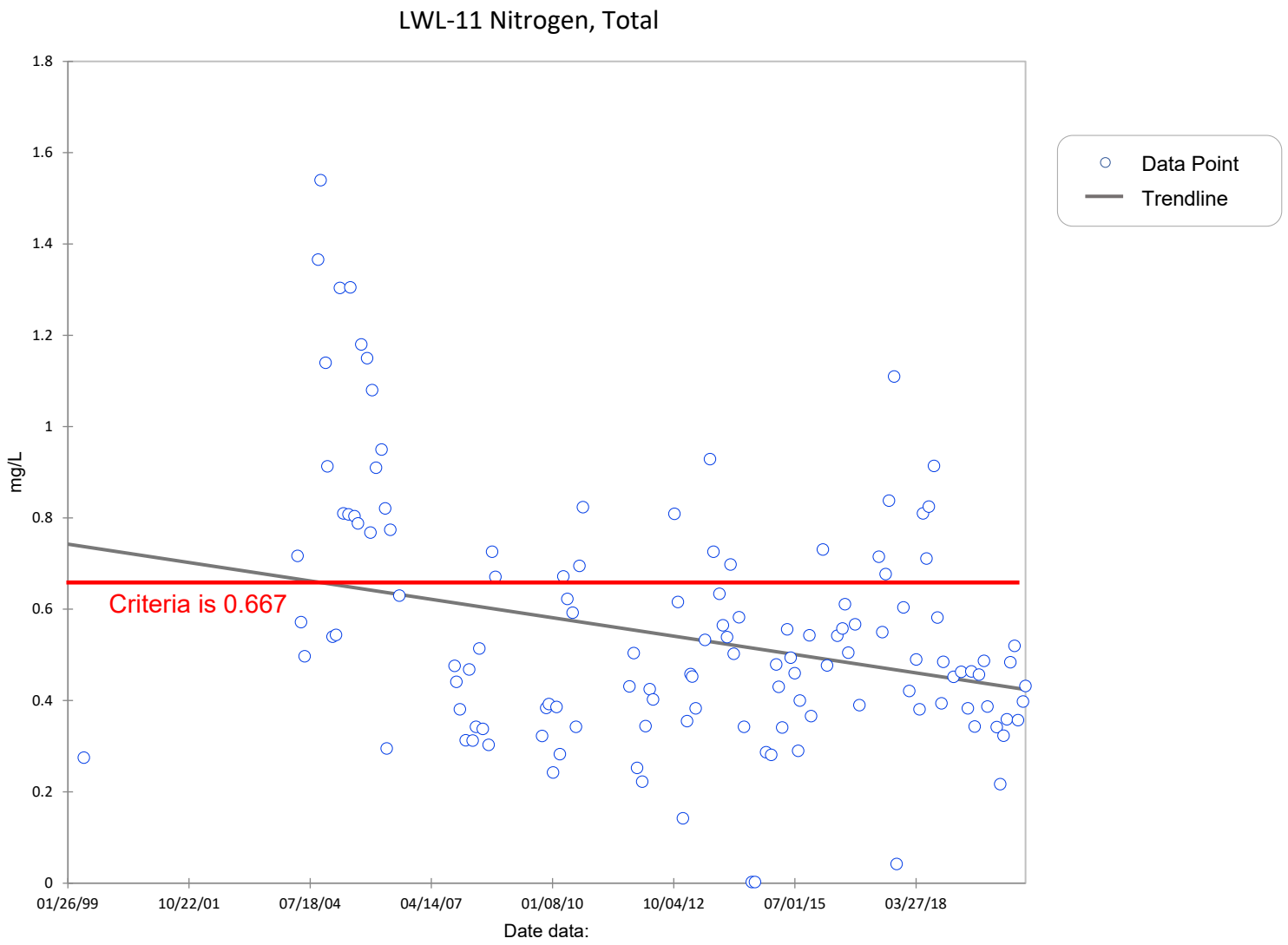

22 Chlorophyll-a
70
60
50
40
30
20
10
0
mg/L
Criteria ≤ 20 AGM
Data Point
Trendline
01/29/04
10/25/06
07/21/09
04/16/12
01/11/15
10/07/17
07/03/20
Date data:

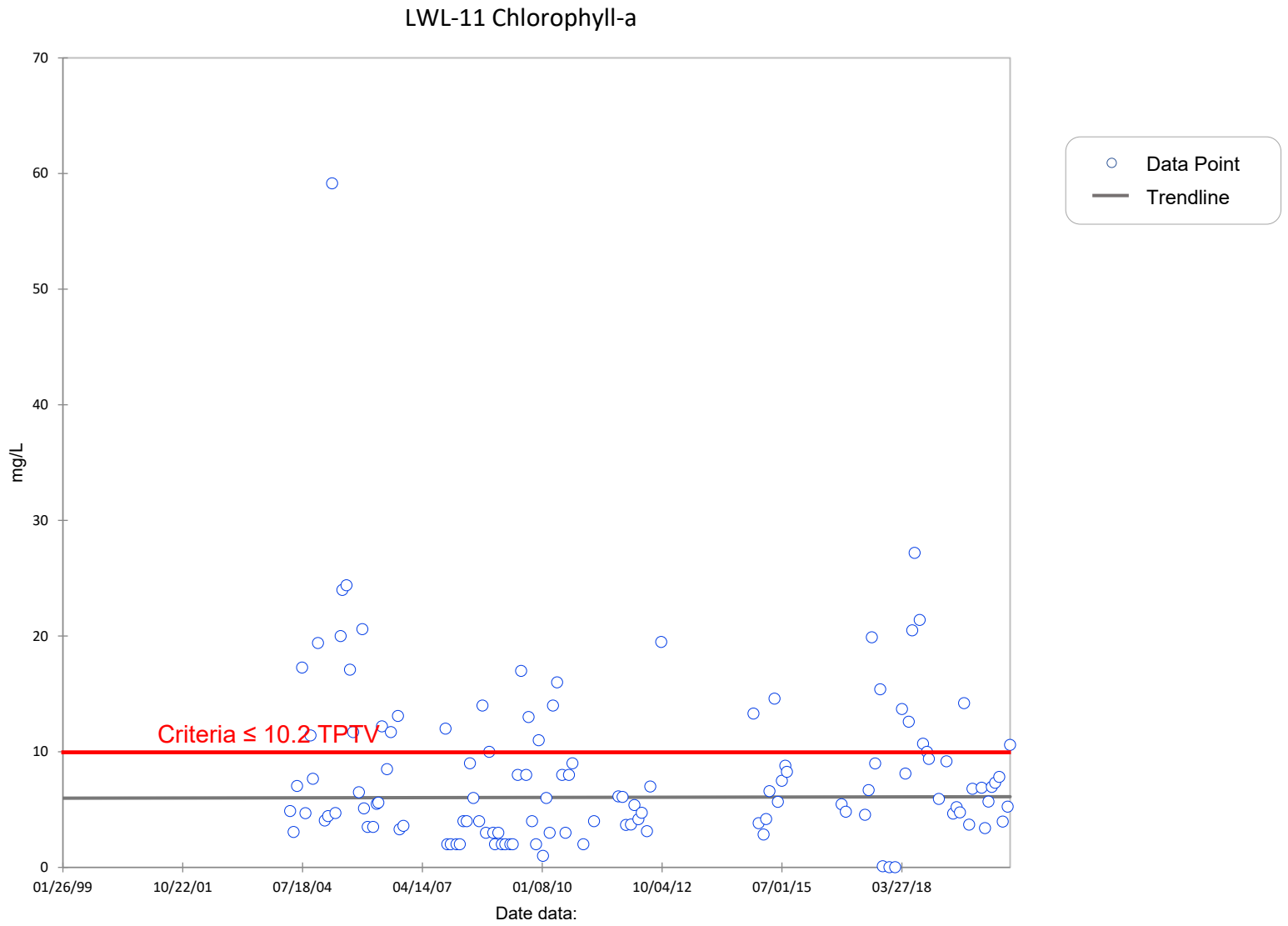

24 Phosphorus, Total
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
mg/L
Data Point
Trendline
Criteria is 0.05
01/25/99
10/21/01
07/17/04
04/13/07
01/07/10
10/03/12
06/30/15
03/26/18
Date data:

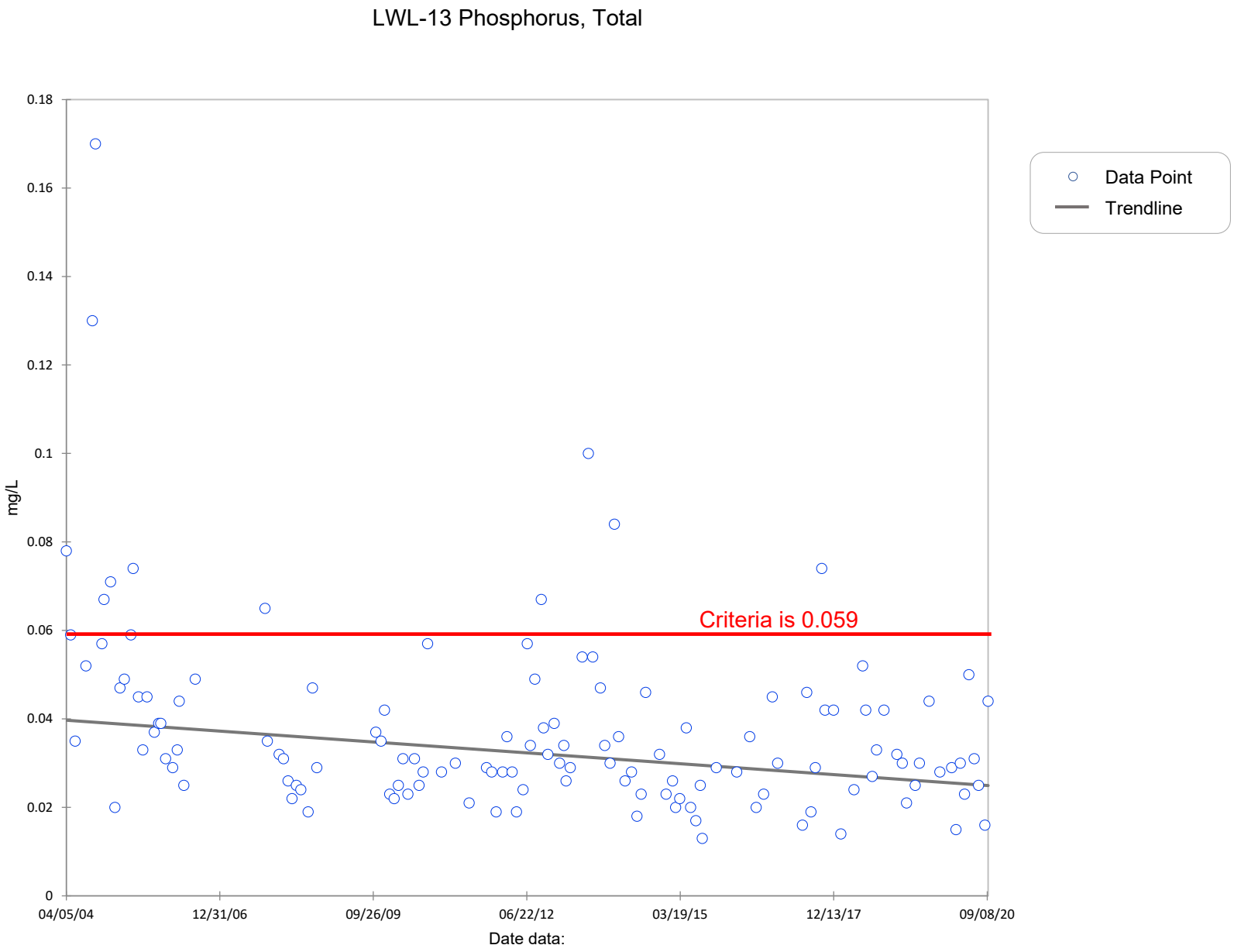

24 Nitrogen, Total
3
2.5
2
1.5
1
0.5
0
mg/L
Criteria is 1.27
Data Point
Trendline
01/25/99
10/21/01
07/17/04
04/13/07
01/07/10
10/03/12
06/30/15
03/26/18
Date data:


24 Chlorophyll-a
60
50
40
30
20
10
0
mg/L
Criteria ≤ 20 AGM
Data Point
Trendline
01/25/99
10/21/01
07/17/04
04/13/07
01/07/10
10/03/12
06/30/15
03/26/18
Date data:

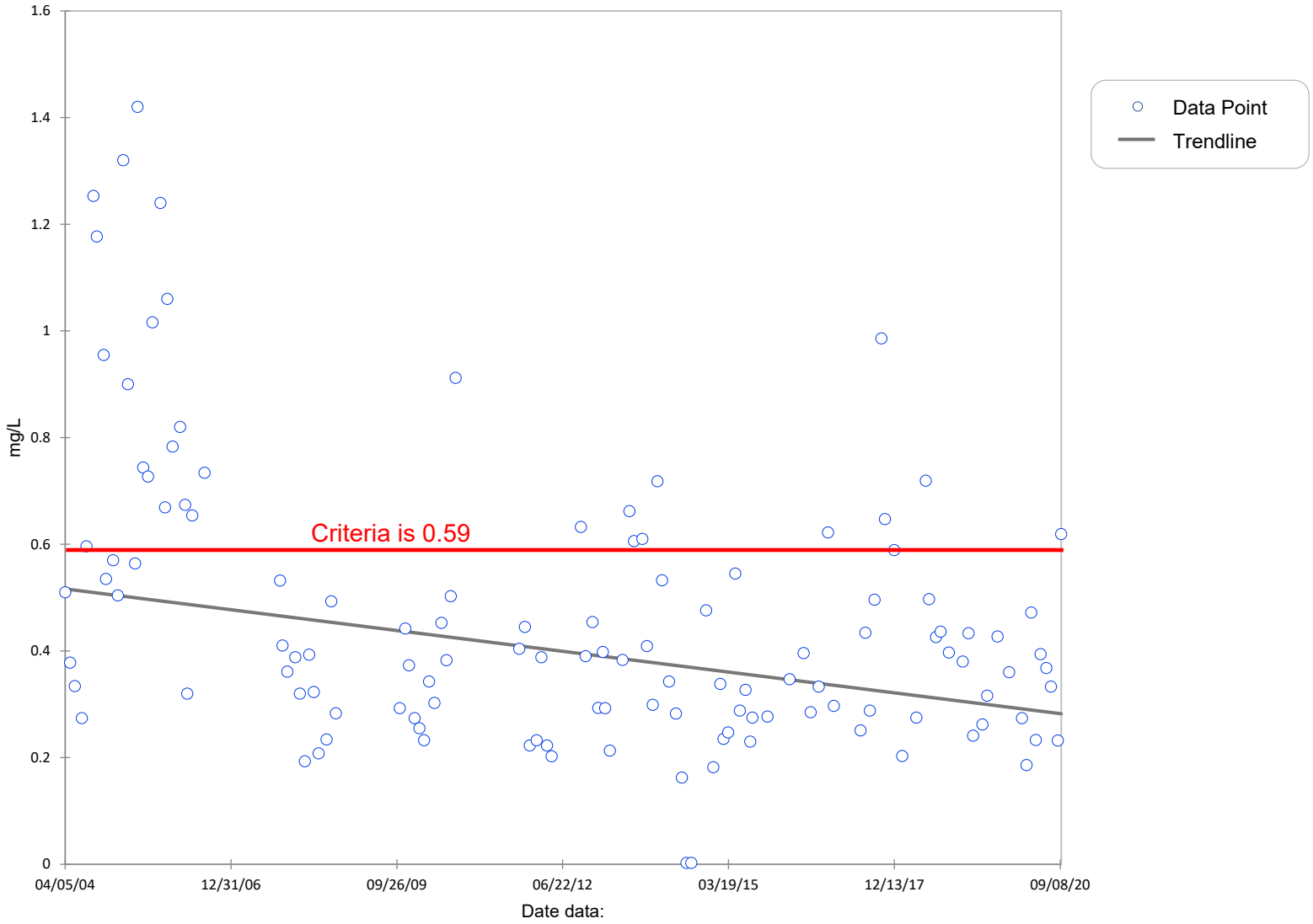

LWL-11 Phosphorus, Total
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
mg/L
Criteria is 0.049
01/26/99
10/22/01
07/18/04
04/14/07
01/08/10
10/04/12
07/01/15
03/27/18
Date data:
Data Point
Trendline


LWL-11 Nitrogen, Total
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
mg/L
Criteria is 0.667
01/26/99
10/22/01
07/18/04
04/14/07
01/08/10
10/04/12
07/01/15
03/27/18
Date data:
Data Point
Trendline


LWL-11 Chlorophyll-a
70
60
50
40
30
20
10
0
mg/L
Criteria ≤ 10.2 TPTV
01/26/99
10/22/01
07/18/04
04/14/07
01/08/10
10/04/12
07/01/15
03/27/18
Date data:
Data Point
Trendline


LWL-13 Phosphorus, Total
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
mg/L
Criteria is 0.059
Data Point
Trendline
04/05/04
12/31/06
09/26/09
06/22/12
03/19/15
12/13/17
09/08/20
Date data:

LWL-13 Nitrogen, Total



LWL-13 Chlorophyll-a