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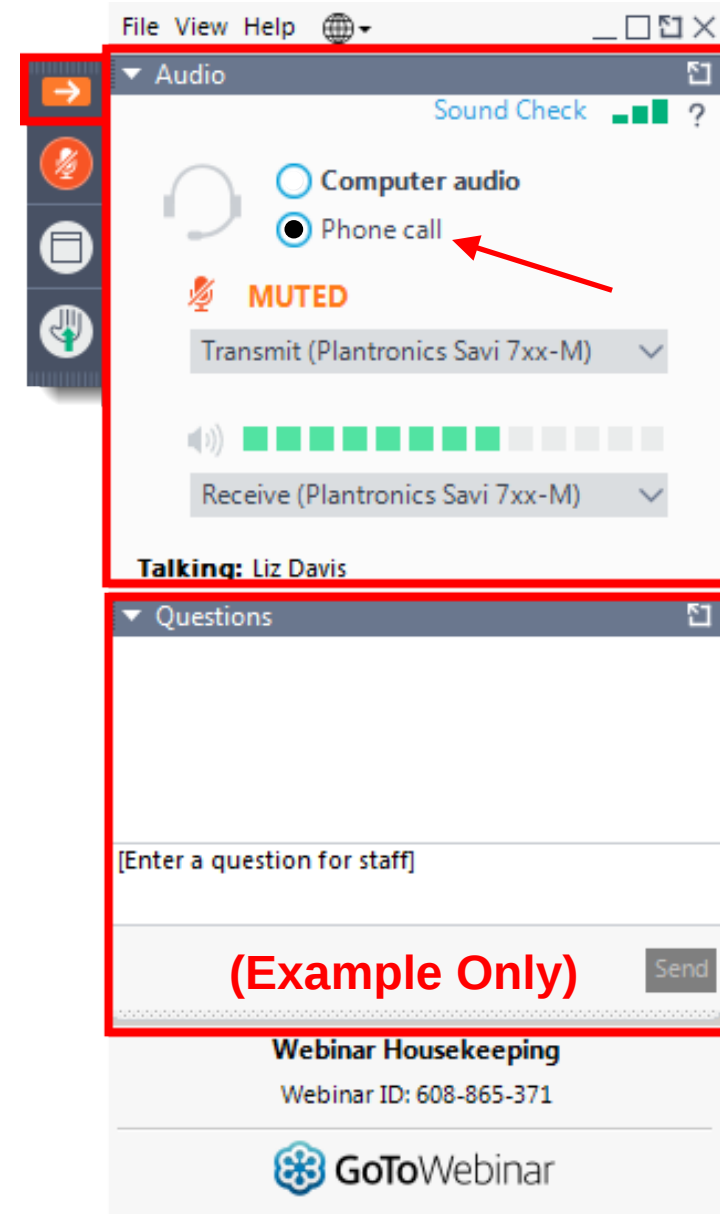
- Choose **Phone Call** and dial using the information provided
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Submit questions and comments via the Questions panel

If viewing this webinar as a group, please provide a list of attendees via the Questions panel

Note: Today's presentation is being recorded and will be provided on the ftp after the webinar.

3/27/2019





Lake Okeechobee Basin Management Action Plan 5-Year Review

March 27, 2019



Agenda

- *Overview of Lake Okeechobee Basin Management Action Plan (BMAP)*
- *5-Year Review and BMAP Update*
- *Water Quality Analysis Draft Results*
- *Watershed Assessment Model (WAM) Updates*
- *Statewide Annual Report*
- *Next Steps*



Overview of Lake Okeechobee BMAP

Lake Okeechobee Total Maximum Daily Load (TMDL)

Lake Okeechobee BMAP



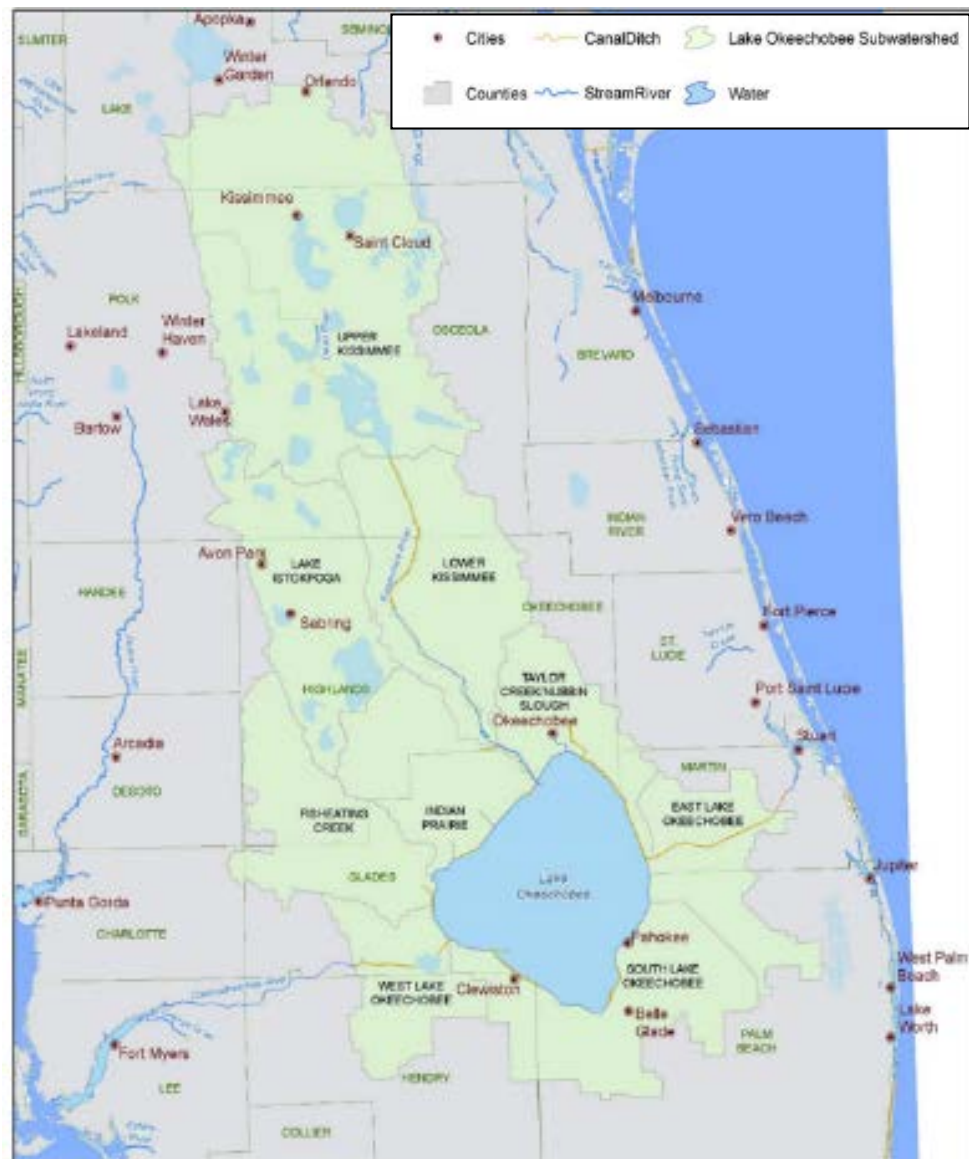
Lake Okeechobee TMDL

- Total maximum daily load (TMDL) for total phosphorus (TP) adopted in 2001
- TMDL is a TP load of 140 metric tons per year (mt/yr):
 - 35 mt/yr fall directly on the lake through atmospheric deposition
 - Remaining 105 mt/yr allocated to the entire Lake Okeechobee Watershed (LOW)
- TMDL attainment calculated using a 5-year rolling average of the monthly loads calculated from measured flow and concentration values



Lake Okeechobee BMAP

- BMAP adopted in December 2014
- Focus is on project implementation in the six sub-watersheds north of Lake Okeechobee
- Project reductions spread over a ten-year time frame:
 - Allows Coordinating Agencies to include long-term projects and develop additional projects to help meet the TMDL





BMAP 5-Year Review & Update

Legislative Requirements

Executive Order 19-12

Tentative Timeline



Legislative Requirements

Chapter 373.4595 (4), F.S.

- BMAP adopted in December 2014
 - 5-Year Review finalized by end of December 2019
 - Provided to the Governor, the President of the Senate, and the Speaker of the House of Representatives
- 5-Year Review to include:
 - Milestones
 - Assessment of progress
 - Determination of whether TMDL can be met in 20 years
 - If not, explanation of why
 - Recommendations
 - BMAP
 - Lake Okeechobee Watershed Construction Project (LOWCP)



5-Year Review

Report Format



- Chapter 1: Background Information

- Chapter 2: Assessing Progress



- Chapter 3: Recommendations



5-Year Review

Tentative Timeline



August 2018 through February 2019

- WQ Evaluation



October 2018 through June 2019

- LOWCP Review and Recommendations



March 2019

- Technical stakeholder meeting/webinar



June 2019

- STAR 2019



July 2019

- Stakeholder projects collected for milestones



October 2019

- 5-Year Review stakeholder meeting



December 2019

- Finalize 5-Year Review



January 2020

- Update BMAP





LOWCP Evaluation

- Chapter 373.4595, F.S. specifies that 5-Year Review should include evaluation of LOWCP
- In cooperation with the Coordinating Agencies
- Identify any further load reductions necessary for TMDL
- Incorporate modifications into BMAP



Lake Okeechobee Watershed Protection Plan Construction Project Evaluation Approach

Ansley Marr, P.E. SFWMD



Northern Everglades and Estuaries Protection Program Framework

Northern Everglades and Estuaries Protection Program (F.S. 373.4595)

Lake Okeechobee Watershed Protection Program

Caloosahatchee River Estuary and St. Lucie River Estuary Watershed Protection Programs

Lake Okeechobee Internal Phos Management Program (SFWMD)

Watershed Protection Plan (SFWMD)

BMAP (FDEP)

Exotic Species Control Program (Coordinating Agencies)

Watershed Construction Project (SFWMD)

Research and Monitoring Program (SFWMD)



Legislative Requirements

- 373.4595(3)(a) F.S.
 - District: “Beginning March 1, 2020, and every 5 years thereafter, the **district shall update the Lake Okeechobee Watershed Protection Plan** to ensure that it is consistent with the Lake Okeechobee Basin Management Action Plan adopted pursuant to s. 403.067.”
- To achieve consistency of the Lake Okeechobee Watershed Protection Plan with the BMAP, the legislation specifies (373.4595(3)(a)(1)(c) F.S).
 - FDEP: “**in cooperation with the Coordinating agencies, shall conduct an evaluation of the Lake Okeechobee Watershed Construction Project** and identify any further load reductions necessary to achieve compliance with the Lake Okeechobee total maximum daily loads established pursuant to s. 403.067.”
 - District: “shall **identify modifications to facilities of the Lake Okeechobee Watershed Construction Project** as appropriate to meet the total maximum daily loads.
 - FDEP: “**Modifications to the Lake Okeechobee Watershed Construction Project resulting from this evaluation shall be incorporated into the Lake Okeechobee Basin Management Action Plan** and included in the applicable annual progress report submitted pursuant to subsection (6).”



LOWPP Schedule

Update of the Lake Okeechobee Watershed Protection Plan (LOWPP)

2019

Feb 11-13

Construction Project Evaluation Workshop with Coordinating Agencies

Feb-April

- SFWMD Governing Board Briefing
 - Public Engagements
- Web-board postings begin and open for comment

June

Recommendations for Updates to the Construction Project submitted to FDEP (per Interagency Agreement)

July-October

LOWPP Document Drafting, Technical Editing, and Review

November

Coordinating Agency Review of Draft Document

December

LOWPP Presentation to Governing Board

Submit LOWPP to the Legislature

2020

January

Final LOWPP Update Document Complete

March

LOWPP Update Document Due to Legislature



Executive Order 19-12

Highlights

- **\$2.5 Billion to Everglades restoration** and protection of water resources
- Appoint **Chief Science Officer** to DEP
 - Prioritize scientific data, research, monitoring, and analysis needs to address Florida's environmental concerns
- Create **DEP Office of Environmental Accountability and Transparency**
 - Align scientific research and analysis with key environmental priorities
- Establish **Blue-Green Algae Task Force**
 - Lead progress toward reducing impacts of blooms



BMAP Directives

- Update all restoration plans impacting South Florida communities within the year
 - Lake Okeechobee
 - Caloosahatchee and St. Lucie Estuaries
- Provide Blue-Green Algae Task Force information necessary to provide guidance in water quality improvements



Questions & Comments





Water Quality Analysis Draft Results

Methods

Tier 1 Draft Results

Tier 2 Draft Results



Analysis Methods

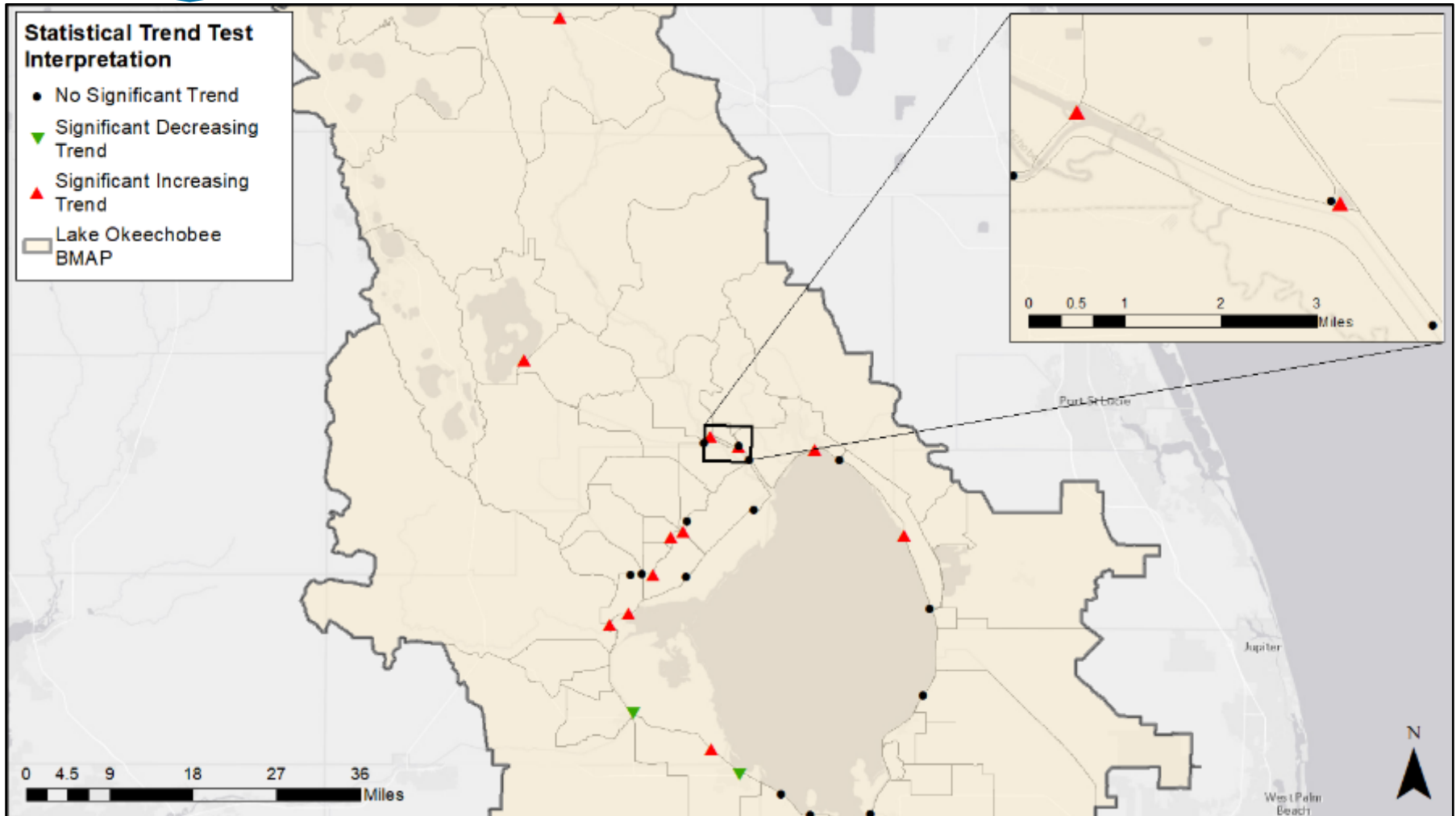
Times Series and Seasonal Kendall Trend Analysis

- SFWMD provided pre-processed data
- Tier 1 Stations
 - Removed outliers
 - Analyzed trends in **loads** and flow weighed mean (**FWM**) concentrations
 - Only analyzed stations with >50% of data for water year (WY) 2009 - WY2018
- Tier 2 Stations
 - Appended WIN data for last four months of WY18 when necessary
 - Analyzed trends in TP **concentrations**
 - Only analyzed stations with >50% of data for WY2009 - WY2018
- Statistical significance is indicated by a p-value ≤ 0.05
 - Note: Even if the p-value is statistically significant, the result may not be ecologically significant.



Tier 1 Monthly TP Load

Station Locations and Trend Results





Tier 1 Monthly TP Load

Results Summary

TP Load Trend Analysis and Serial Correlation Results (Stations with MORE than 50 percent of data)

Station	Tau	P-Value	Adjusted P-Value	¹ Slope	² Selected P-value	Serial Correlation	³ Trend
C10A	0.009	0.9109	0.9458	0.0000	0.911		No Significant Trend
FECSR78	0.248	0.0006	0.0708	44.2000	0.001		Significant Increasing
INDUSCAN	-0.169	0.0192	0.0086	-1.3920	0.019		Significant Decreasing
L59W	0.091	0.2117	0.4382	3.8870	0.438	Yes	No Significant Trend
L60E	0.176	0.0131	0.1134	0.4175	0.013		Significant Increasing
L60W	0.231	0.0014	0.0065	1.4160	0.001		Significant Increasing
L61E	0.001	0.9556	0.9685	0.0000	0.956		No Significant Trend
S127	0.133	0.0575	0.2777	0.4762	0.058		No Significant Trend
S129	0.002	1.0000	1.0000	0.0000	1.000		No Significant Trend
S131	0.165	0.0204	0.2017	0.8327	0.020		Significant Increasing
S133	0.291	0.0000	0.0554	15.2800	0.000		Significant Increasing

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Tier 1 Monthly TP Load

Results Summary (Continued)

Station	Tau	P-Value	Adjusted P-Value	¹ Slope	² Selected P-value	Serial Correlation	³ Trend
S135	0.380	0.0000	0.0137	20.7900	0.014	Yes	Significant Increasing
S154	0.187	0.0072	0.1408	0.0270	0.007		Significant Increasing
S154C	0.017	0.8353	0.8972	0.0000	0.835		No Significant Trend
S191	0.083	0.2465	0.4680	0.0427	0.468	Yes	No Significant Trend
S308C	-0.033	0.6597	0.7983	-3.1330	0.660		No Significant Trend
S4	0.178	0.0139	0.0470	6.3680	0.014		Significant Increasing
S65	0.244	0.0007	0.0345	197.8000	0.001		Significant Increasing
S65E	0.293	0.0001	0.0192	595.2000	0.000		Significant Increasing
S68	0.183	0.0114	0.2363	174.7000	0.011		Significant Increasing
S71	0.115	0.1153	0.4178	89.2500	0.418	Yes	No Significant Trend
S72	0.163	0.0247	0.2663	138.3000	0.025		Significant Increasing
S84	0.170	0.0188	0.2255	160.8000	0.019		Significant Increasing

Notes:

- 1: Even if the p-value is statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) but the slope is near zero, then it may not be realistic to assume that an improvement in water quality by reductions in TP may positively impact the ecological system in a measurable way.
- 2: Series with serial correlation (as per autocorrelation analysis results) used the adjusted P-value for serial correlation.
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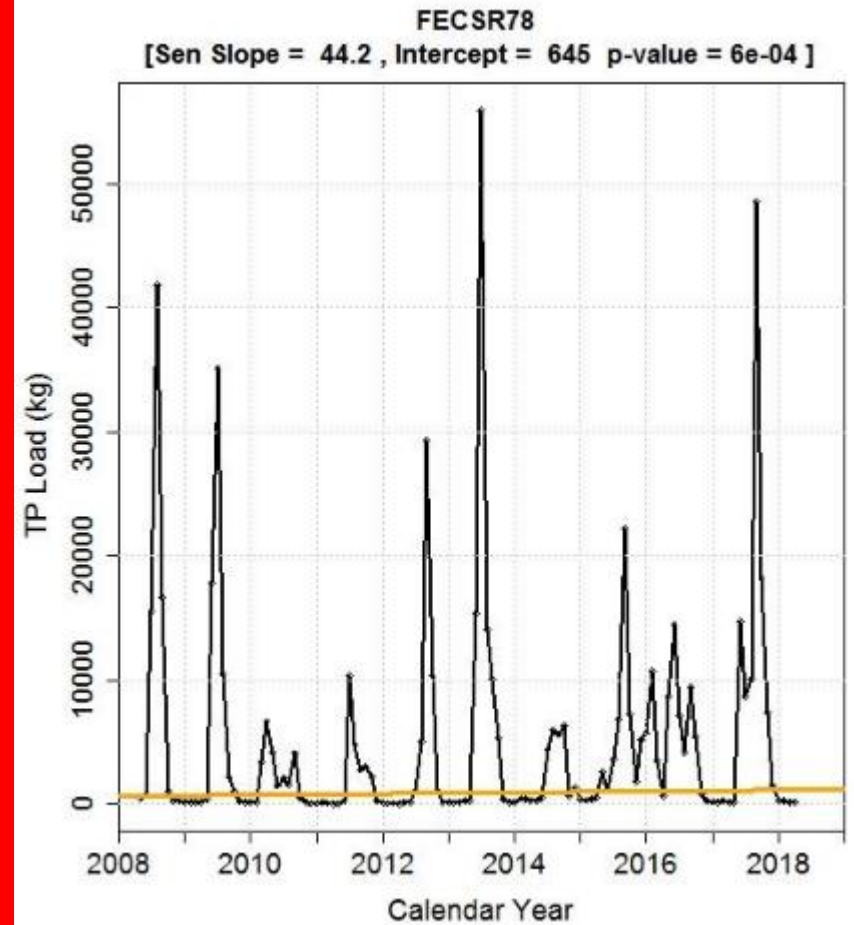
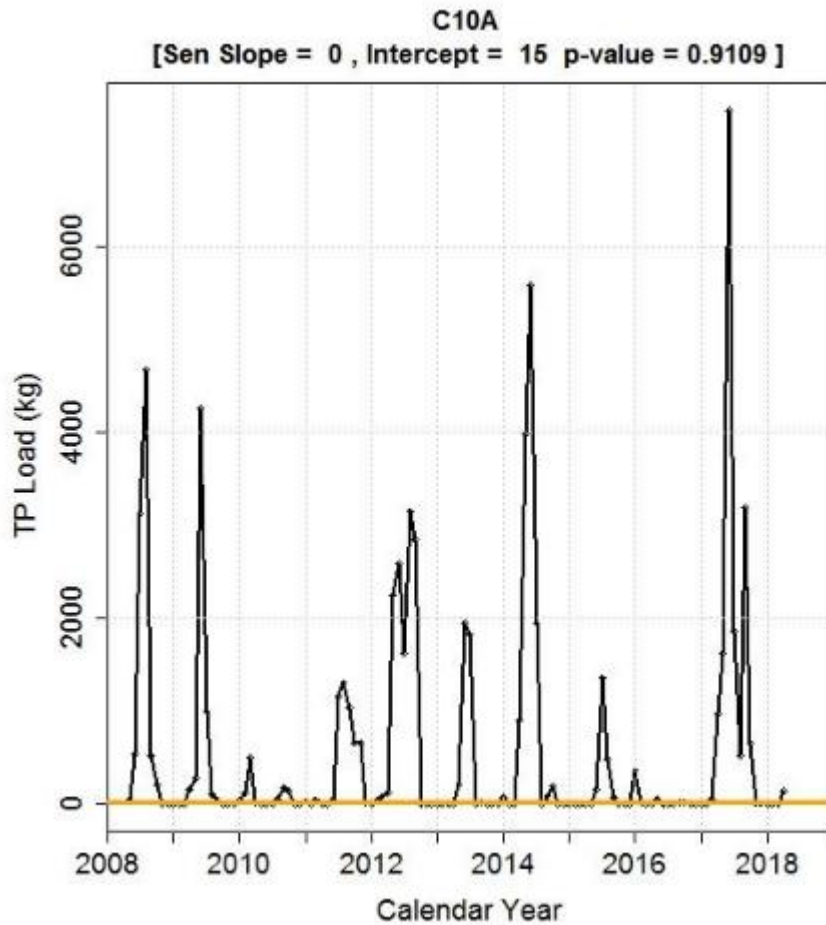
Tier 1 Monthly TP Load

Description of Example Graphs

- POR plotted on graphs is WY2009 through WY2018
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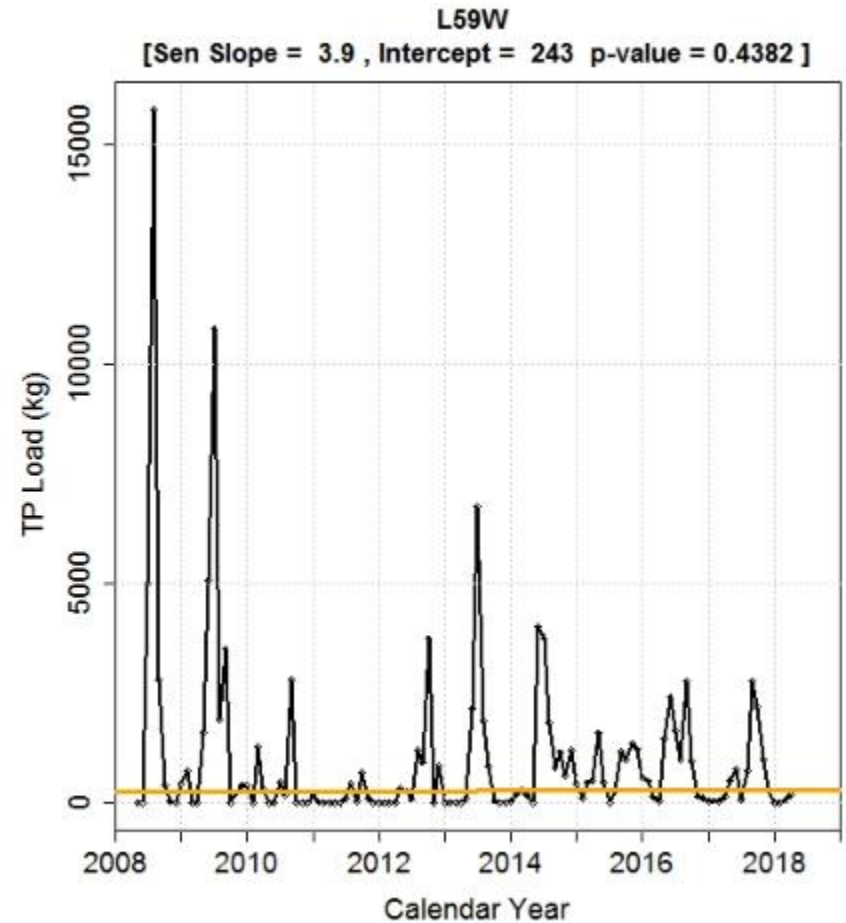
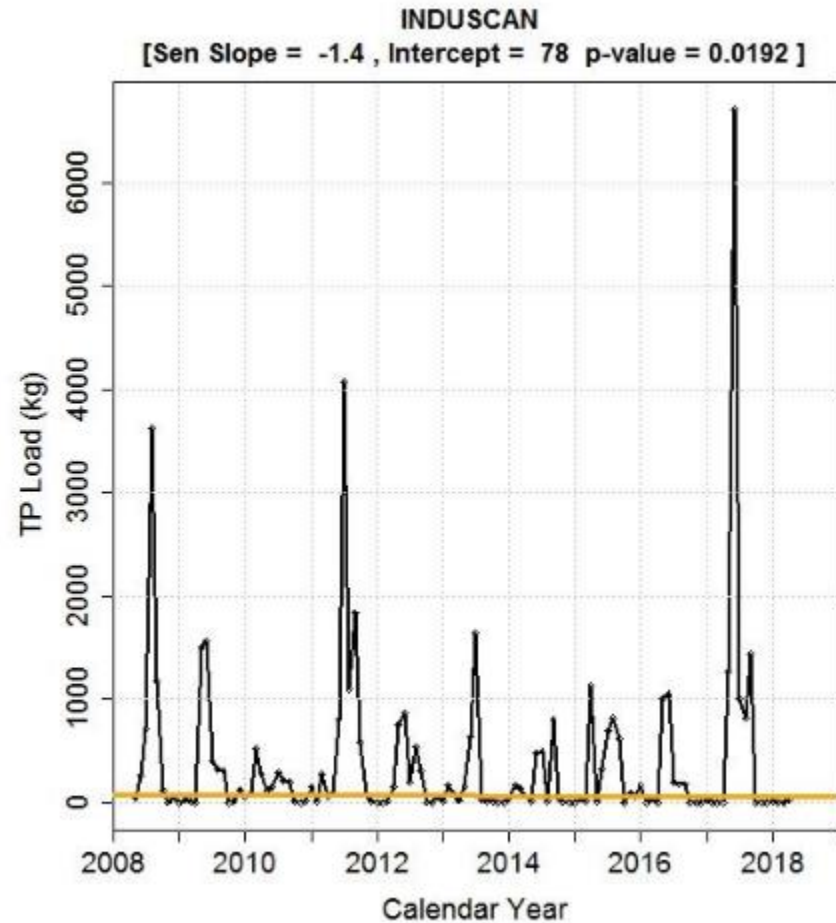


Tier 1 Monthly TP Load





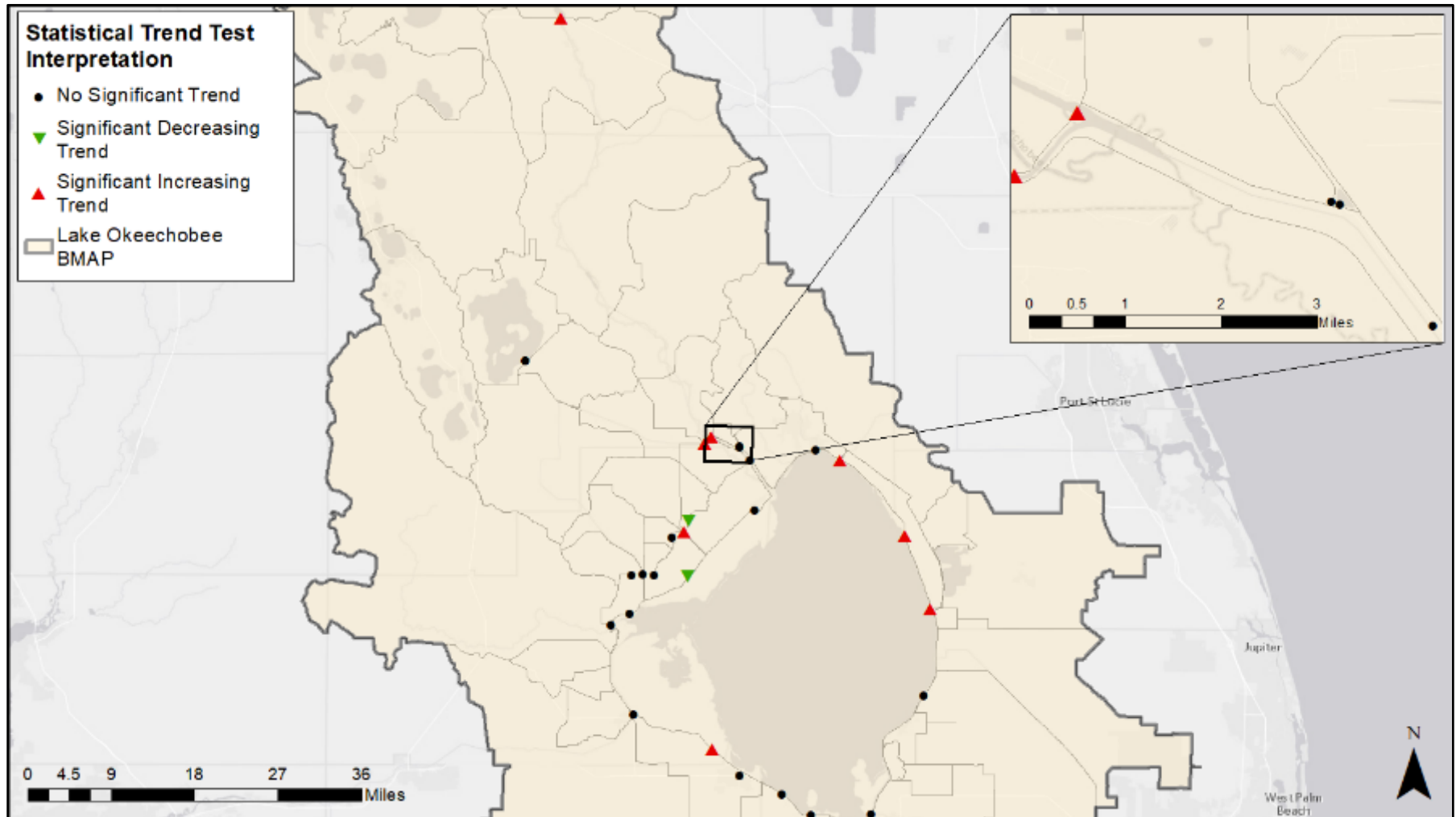
Tier 1 Monthly TP Load





Tier 1 Monthly TP FWM

Station Locations and Trend Results





Tier 1 Monthly TP FWM

Results Summary

Flow Weighted Mean Trend Analysis and Serial Correlation Results (Stations with MORE than 50 percent of data)

Station	Tau	P-Value	Adjusted P-Value	¹ Slope	² Selected P-value	Serial Correlation	³ Trend
C10A	0.253	0.0150	0.1683	0.0043	0.015		Significant Increasing
FECSR78	0.085	0.2453	0.4692	0.0025	0.245		No Significant Trend
INDUSCAN	-0.010	0.9277	0.9518	-0.0002	0.928		No Significant Trend
L59W	-0.241	0.0039	0.1456	-0.0156	0.004		Significant Decreasing
L60E	-0.052	0.5612	0.7368	-0.0021	0.561		No Significant Trend
L60W	0.019	0.8204	0.8585	0.0004	0.859	Yes	No Significant Trend
L61E	-0.167	0.0936	0.3040	-0.0030	0.094		No Significant Trend
S127	-0.161	0.0907	0.3922	-0.0081	0.091		No Significant Trend
S129	-0.407	0.0000	0.0476	-0.0048	0.048	Yes	Significant Decreasing
S131	-0.070	0.4372	0.6523	-0.0008	0.652	Yes	No Significant Trend
S133	-0.137	0.1789	0.4760	-0.0047	0.179		No Significant Trend
S135	0.346	0.0002	0.0817	0.0093	0.000		Significant Increasing

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Tier 1 Monthly TP FWM

Results Summary (Continued)

Station	Tau	P-Value	Adjusted P-Value	¹ Slope	² Selected P-value	Serial Correlation	³ Trend
S154	0.137	0.1366	0.3377	0.0107	0.137		No Significant Trend
S154C	-0.124	0.1175	0.3789	-0.0114	0.118		No Significant Trend
S191	0.391	0.0000	0.0086	0.0243	0.009	Yes	Significant Increasing
S308C	0.233	0.0036	0.1338	0.0071	0.004		Significant Increasing
S4	0.303	0.0001	0.0856	0.0177	0.000		Significant Increasing
S65	0.237	0.0010	0.0544	0.0021	0.001		Significant Increasing
S65E	0.293	0.0001	0.0139	0.0074	0.000		Significant Increasing
S68	0.266	0.0003	0.0785	0.0040	0.079	Yes	No Significant Trend
S71	0.107	0.1464	0.2646	0.0051	0.146		No Significant Trend
S72	0.202	0.0056	0.0560	0.0105	0.006		Significant Increasing
S84	0.190	0.0090	0.1120	0.0067	0.009		Significant Increasing

Notes:

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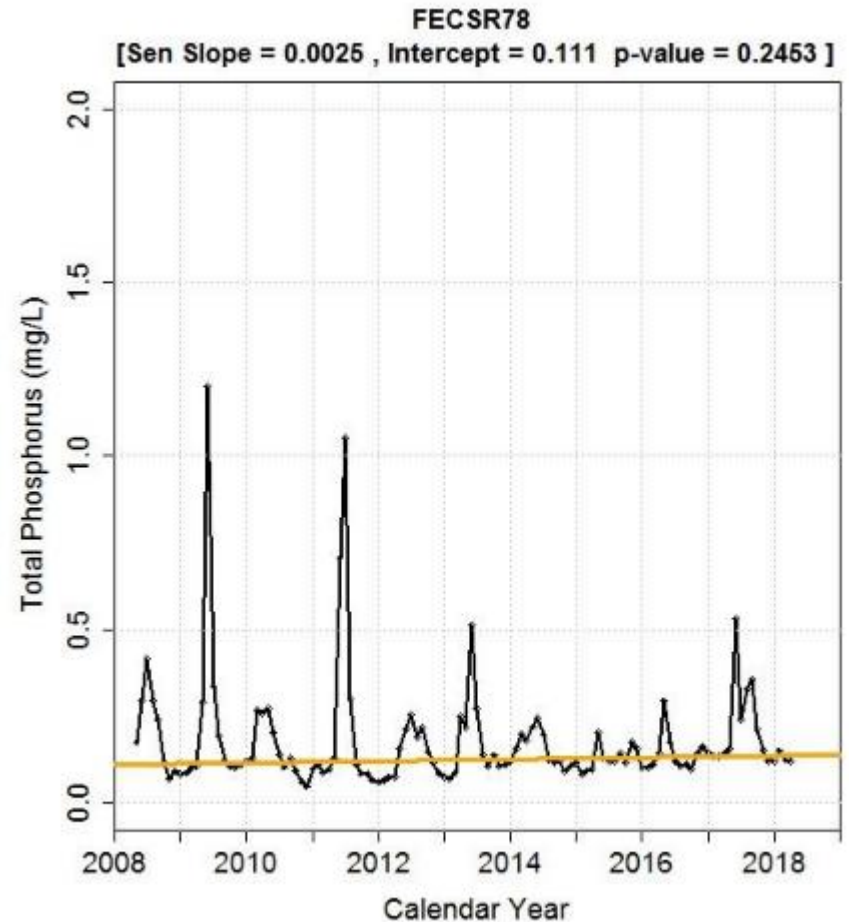
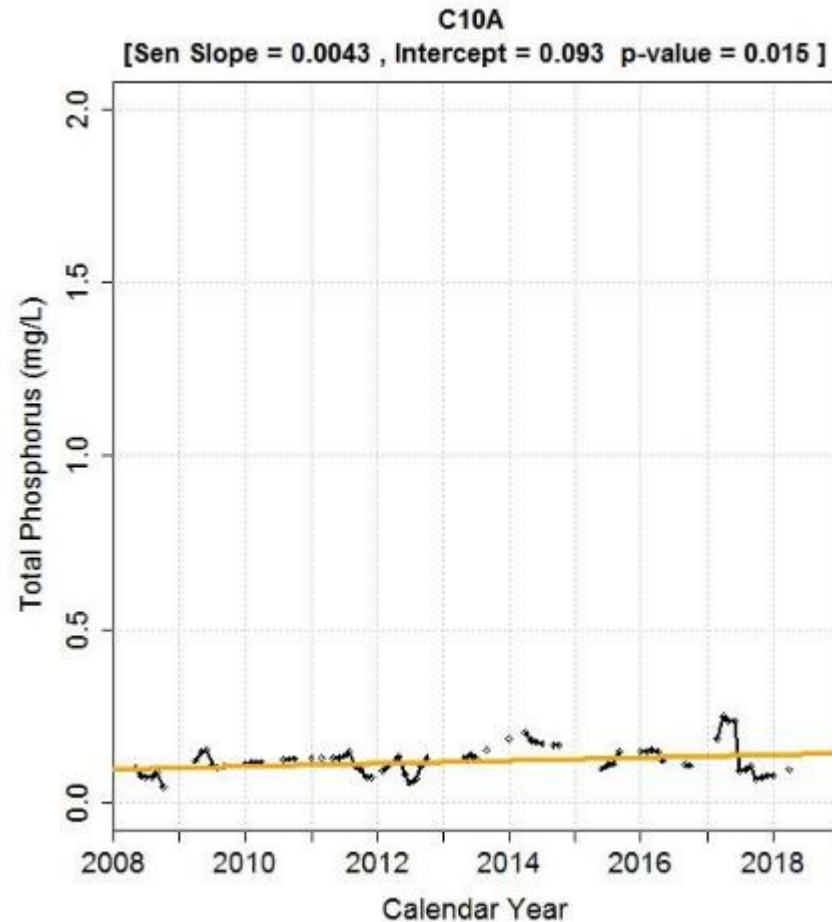
Tier 1 Monthly TP FWM

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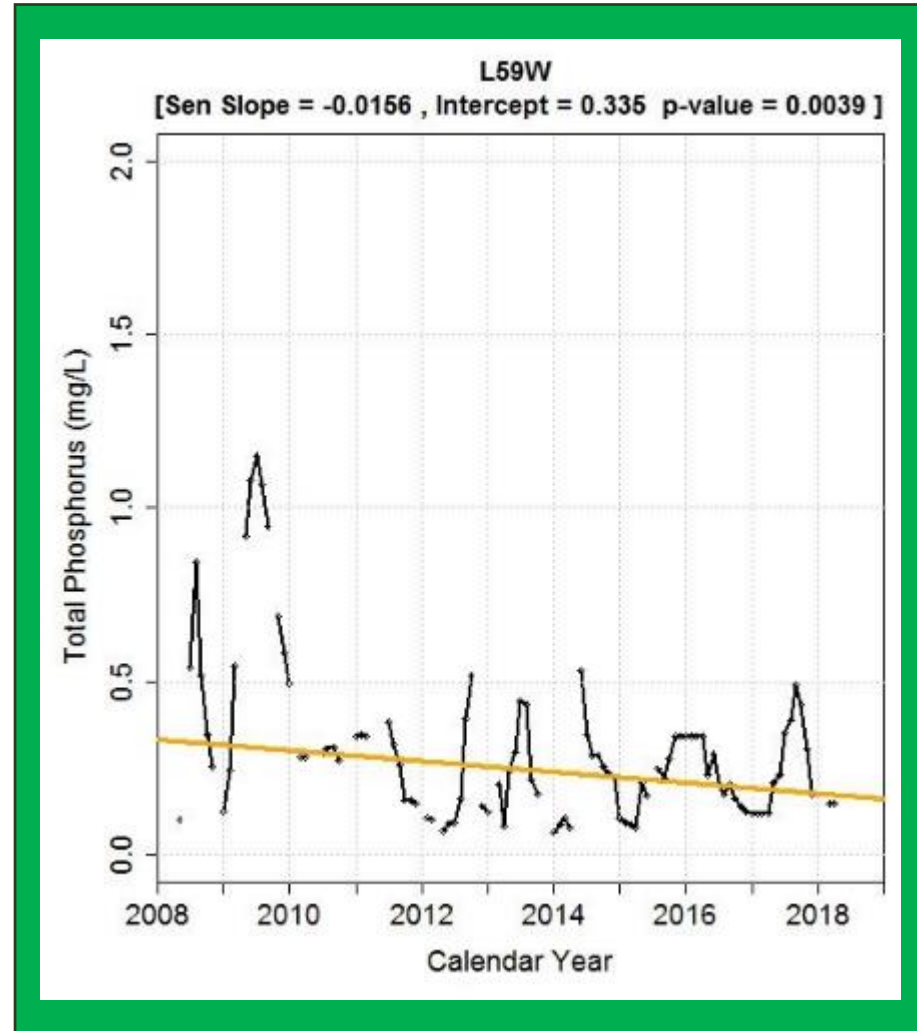
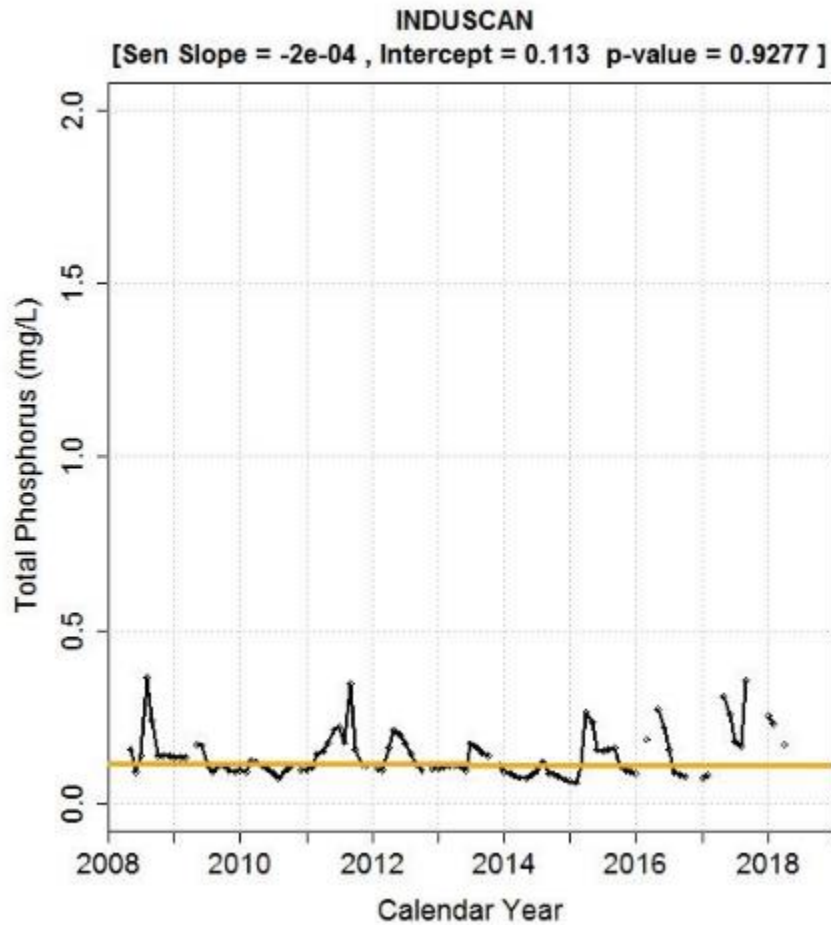


Tier 1 Monthly TP FWM



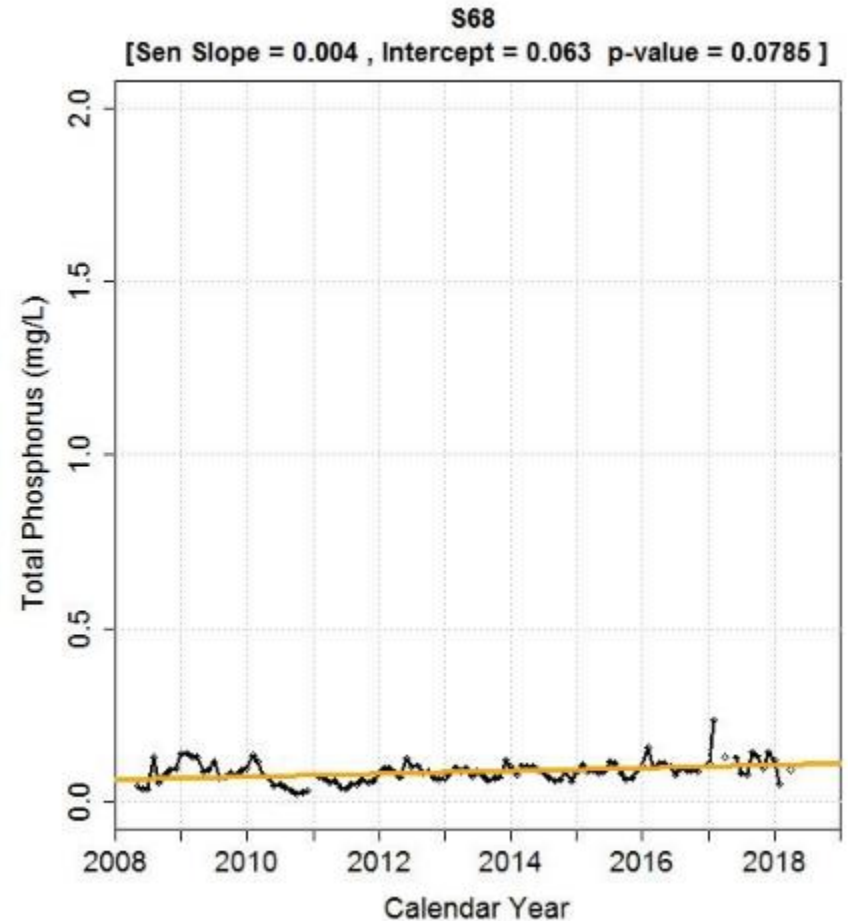
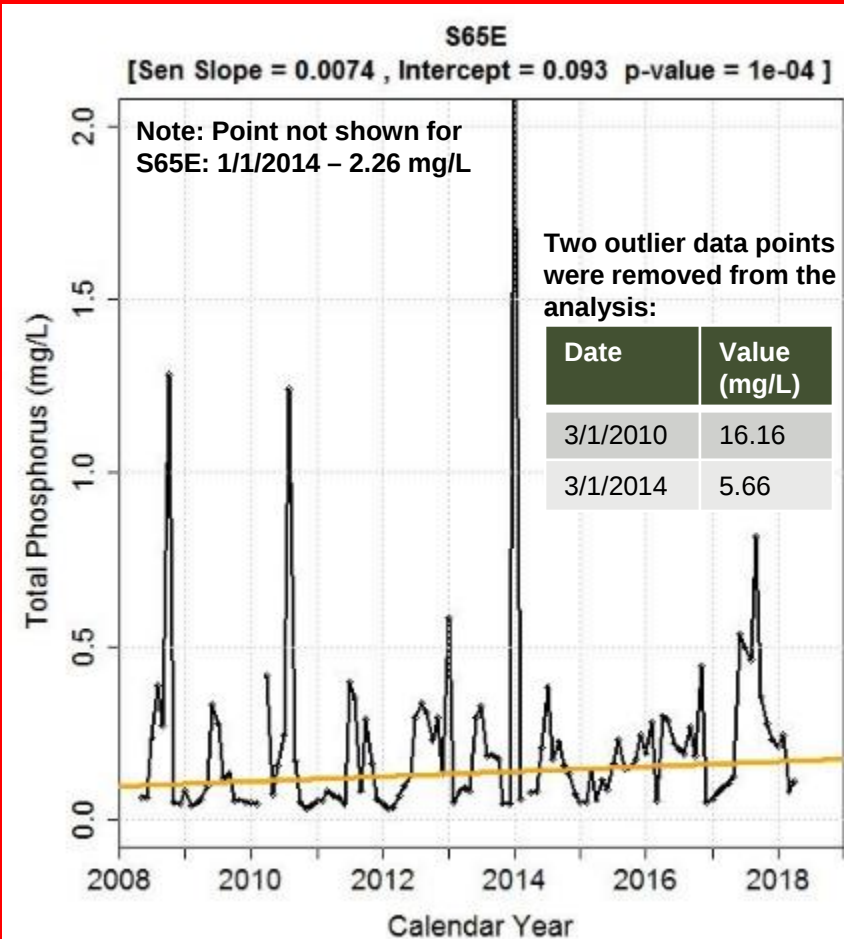


Tier 1 Monthly TP FWM





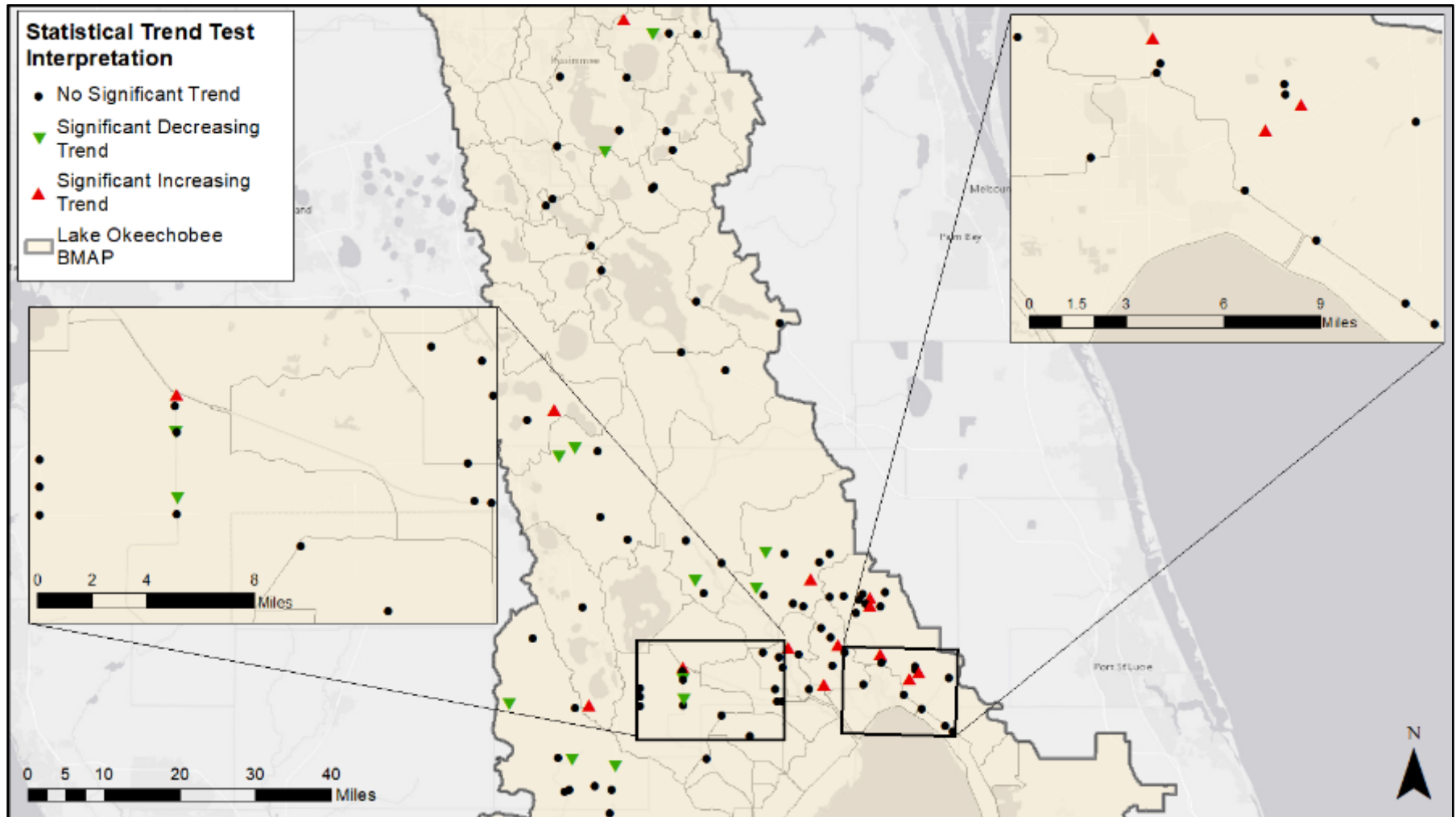
Tier 1 Monthly TP FWM





Tier 2 Monthly TP Concentration

Station Locations and Trend Results





Tier 2 Monthly TP Concentration

Results Summary

TP Concentration Trend Analysis and Serial Correlation Results (Stations with MORE than 50 percent of data)

Station	Tau	P-Value	Adjusted P-Value	¹ Slope	² Selected P-value	Serial Correlation	³ Trend
AB27343014	0.096	0.2168	0.3458	0.0030	0.346	Yes	No Significant Trend
ABOGGN	0.251	0.0064	0.0302	0.0007	0.006		Significant Increasing
AR06333013	-0.058	0.4380	0.7287	-0.0005	0.729	Yes	No Significant Trend
AR18343012	0.114	0.1583	0.2549	0.0021	0.255	Yes	No Significant Trend
BH04392912	-0.413	0.0000	0.0118	-0.0285	0.012	Yes	Significant Decreasing
BN03332911	-0.291	0.0001	0.0226	-0.0392	0.023	Yes	Significant Decreasing
BN08332912	-0.226	0.0037	0.1545	-0.0798	0.004		Significant Decreasing
BNSHINGLE	-0.157	0.0556	0.2949	-0.0013	0.295	Yes	No Significant Trend
BS-59	-0.098	0.4080	0.6328	-0.0002	0.408		No Significant Trend
CL18273011	-0.255	0.0321	0.1305	-0.0015	0.032		Significant Decreasing
CREEDYBR	-0.196	0.0670	0.2630	-0.0030	0.263	Yes	No Significant Trend
CY05353444	-0.026	0.7678	0.7829	-0.0022	0.783	Yes	No Significant Trend
DLMARNCR	-0.050	0.6841	0.7923	-0.0005	0.684		No Significant Trend
ET05253114	-0.262	0.0133	0.1262	-0.0009	0.126	Yes	No Significant Trend
ET06253113	-0.196	0.0113	0.0617	-0.0028	0.011		Significant Decreasing
FE20393013	0.144	0.1781	0.3790	0.0146	0.178		No Significant Trend
FE21392913	-0.311	0.0050	0.0616	-0.0124	0.062	Yes	No Significant Trend
FE26362812	-0.069	0.4703	0.6584	-0.0013	0.470		No Significant Trend
GA09393011	-0.398	0.0000	0.0251	-0.0326	0.025	Yes	Significant Decreasing
HP06393242	0.155	0.1928	0.1979	0.0086	0.198	Yes	No Significant Trend



Tier 2 Monthly TP Concentration

Results Summary (Continued)

Station	Tau	P-Value	Adjusted P-Value	¹ Slope	² Selected P-value	Serial Correlation	³ Trend
HP11373132	0.424	0.0004	0.0451	0.0053	0.045	Yes	Significant Increasing
HP15373112	0.224	0.0350	0.1408	0.0194	0.141	Yes	No Significant Trend
HP22373112	-0.321	0.0015	0.0076	-0.0218	0.008	Yes	Significant Decreasing
HP25373013	-0.037	0.6375	0.7282	-0.0011	0.728	Yes	No Significant Trend
IP09383232	0.180	0.1339	0.0894	0.0095	0.134		No Significant Trend
KR05373311	0.168	0.1534	0.1248	0.0193	0.153		No Significant Trend
KR16373414	0.294	0.0019	0.0361	0.0200	0.036	Yes	Significant Increasing
KR17373513	0.203	0.0255	0.1766	0.0095	0.177	Yes	No Significant Trend
KR24353114	-0.326	0.0012	0.0475	-0.0139	0.048	Yes	Significant Decreasing
KREA 01	-0.037	0.7771	0.7797	-0.0030	0.780	Yes	No Significant Trend
KREA 04	-0.061	0.6129	0.7429	-0.0019	0.743	Yes	No Significant Trend
KREA 14	0.026	0.8684	0.8953	0.0024	0.868		No Significant Trend
KREA 17A	0.232	0.0139	0.1324	0.0163	0.014		Significant Increasing
KREA 22	-0.043	0.6448	0.7214	-0.0003	0.645		No Significant Trend
KREA 23	-0.276	0.0038	0.0511	-0.0050	0.004		Significant Decreasing
*KREA91	-0.224	0.0024	0.0874	-0.0035	0.002		Significant Decreasing
*KREA92	0.248	0.0010	0.0423	0.0020	0.001		Significant Increasing
*KREA93	0.066	0.3902	0.5585	0.0008	0.559	Yes	No Significant Trend
*KREA94	0.086	0.2574	0.4369	0.0010	0.437	Yes	No Significant Trend
*KREA97	-0.206	0.0060	0.1370	-0.0022	0.137	Yes	No Significant Trend



Tier 2 Monthly TP Concentration

Results Summary (Continued)

Station	Tau	P-Value	Adjusted P-Value	¹ Slope	² Selected P-value	Serial Correlation	³ Trend
KREA98	0.084	0.2555	0.5383	0.0005	0.538	Yes	No Significant Trend
LB29353513	0.079	0.3974	0.5749	0.0131	0.397		No Significant Trend
LI02362923	0.094	0.3378	0.3580	0.0005	0.338		No Significant Trend
LV14322813	-0.043	0.7122	0.7604	-0.0033	0.760	Yes	No Significant Trend
MS08373611	0.257	0.0156	0.1978	0.0660	0.198	Yes	No Significant Trend
OK09353212	-0.167	0.0830	0.2218	-0.0067	0.083		No Significant Trend
OT34353513	0.167	0.1309	0.2019	0.0218	0.202	Yes	No Significant Trend
PA10313112	0.137	0.1338	0.3620	0.0026	0.362		No Significant Trend
PB24392912	0.113	0.1467	0.2500	0.0062	0.250		No Significant Trend
PL01382911	0.346	0.0000	0.0058	0.0336	0.006	Yes	Significant Increasing
RD08322913	0.454	0.0000	0.0026	0.0050	0.003	Yes	Significant Increasing
TCNS 204	0.016	0.9010	0.9236	0.0032	0.901		No Significant Trend
TCNS 207	0.060	0.6268	0.6732	0.0025	0.673	Yes	No Significant Trend
TCNS 213	0.047	0.6155	0.6843	0.0018	0.616		No Significant Trend
TCNS 214	0.500	0.0000	0.0015	0.0426	0.000		Significant Increasing
TCNS 217	0.116	0.1418	0.3598	0.0060	0.142		No Significant Trend
TCNS 220	0.239	0.0275	0.1118	0.0331	0.028		Significant Increasing
TCNS 222	0.109	0.2146	0.3497	0.0073	0.350	Yes	No Significant Trend

Notes:

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4. * = data from DEP STORET/WIN Databases was appended due to calendar year sampling



Tier 2 Monthly TP Concentration

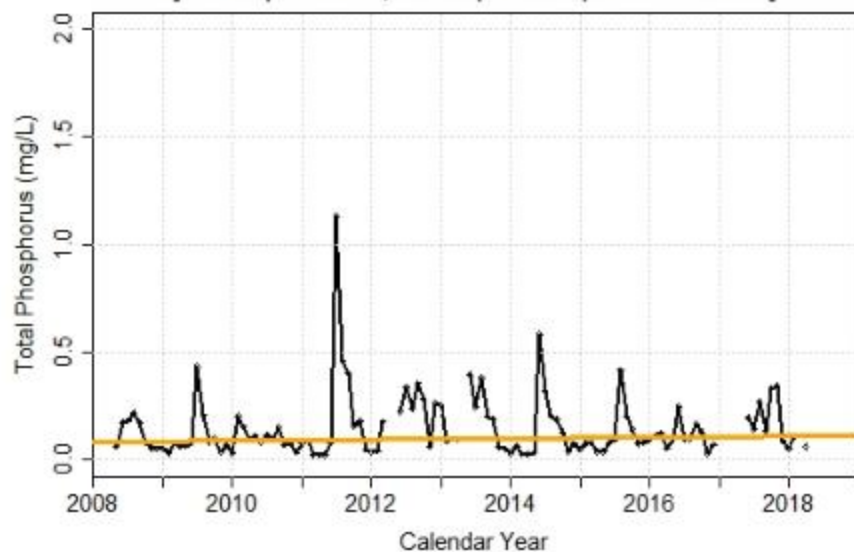
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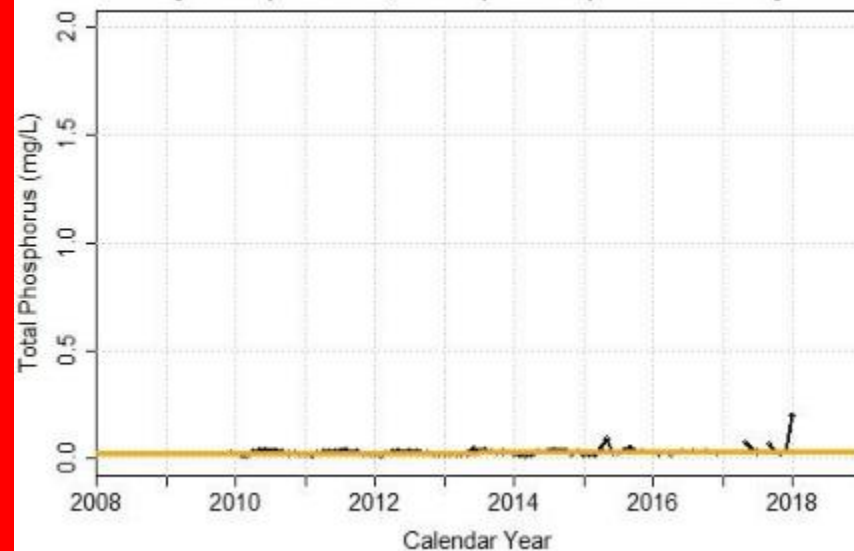


Tier 2 Monthly TP Concentration

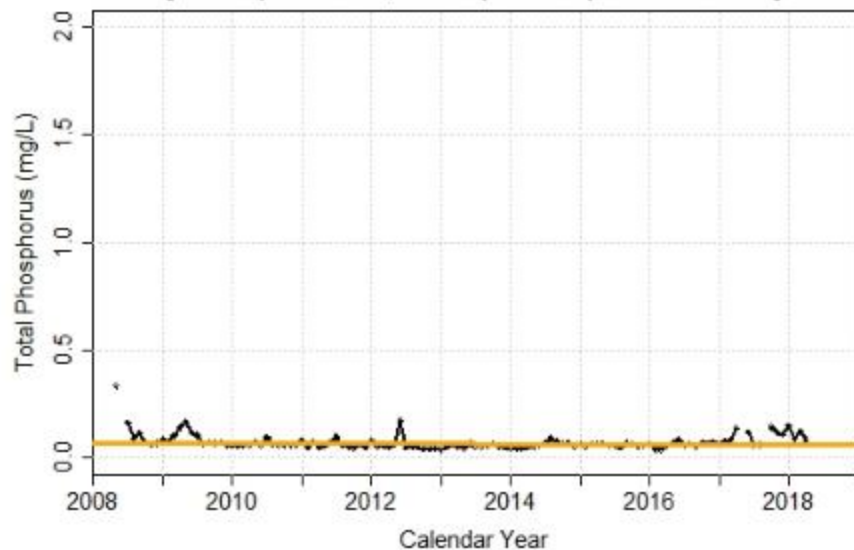
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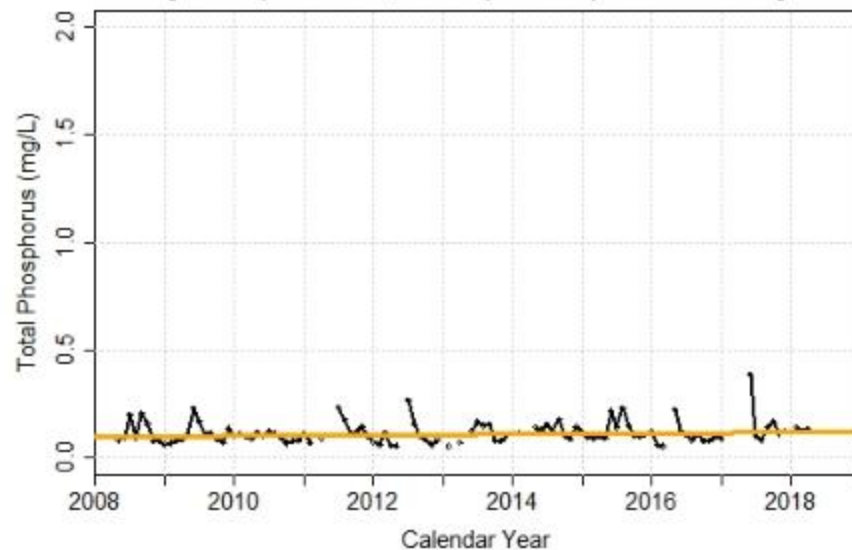
ABOGGN
[Sen Slope = 7e-04 , Intercept = 0.02 p-value = 0.0064]



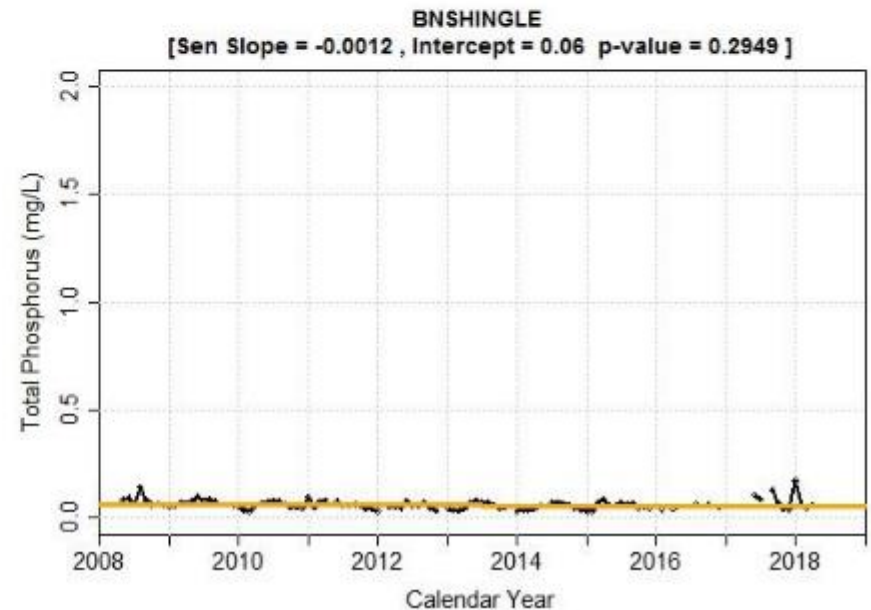
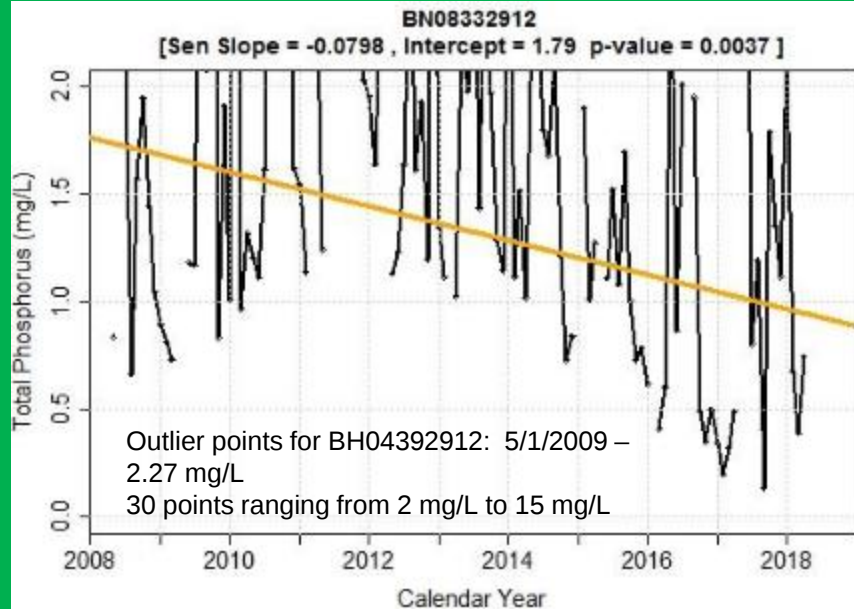
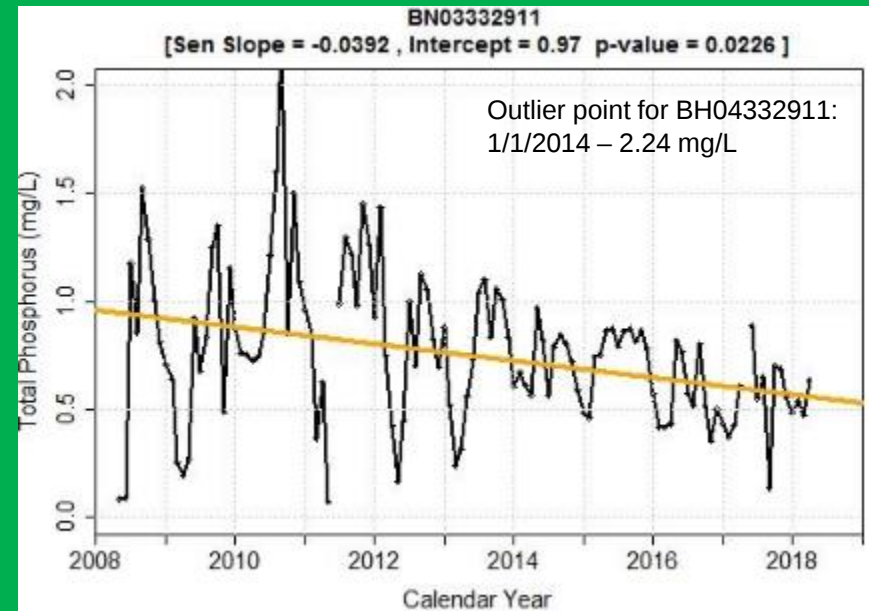
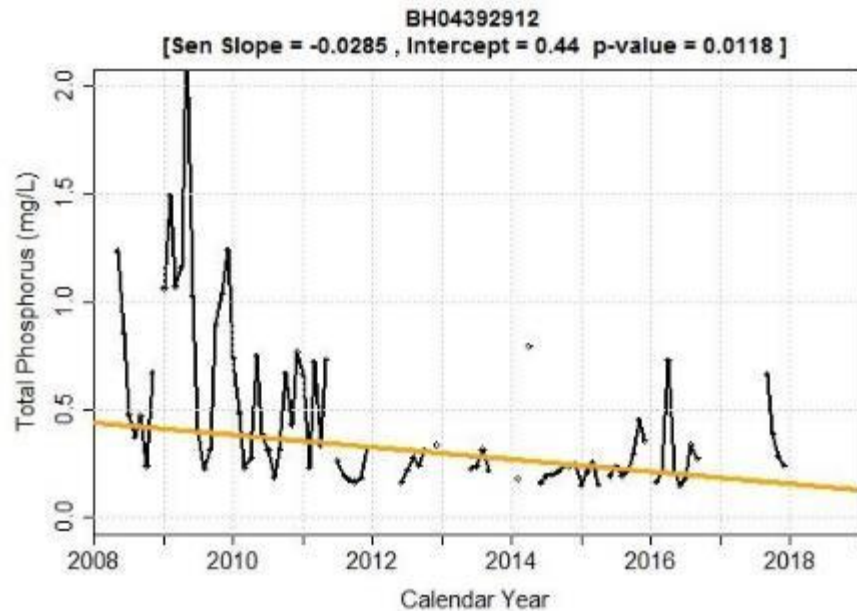
AR06333013
[Sen Slope = -5e-04 , Intercept = 0.06 p-value = 0.7287]



AR18343012
[Sen Slope = 0.0021 , Intercept = 0.09 p-value = 0.2549]



Tier 2 Monthly TP Concentration





Questions & Comments





Watershed Assessment Model (WAM) Updates

*Pre-drainage Characterization and
Abatement Strategies 2018-2019 Contract*

Draft Results

Project Objectives

Use the WAM to:

- Compare existing conditions to pre-drainage conditions in the LOW – Completed in 2018
- Evaluate the effectiveness of abatement strategies against existing conditions (includes evaluating abatement scenarios and performing cost-benefit analyses) – Draft completed in March 2019; final underway

Project Background

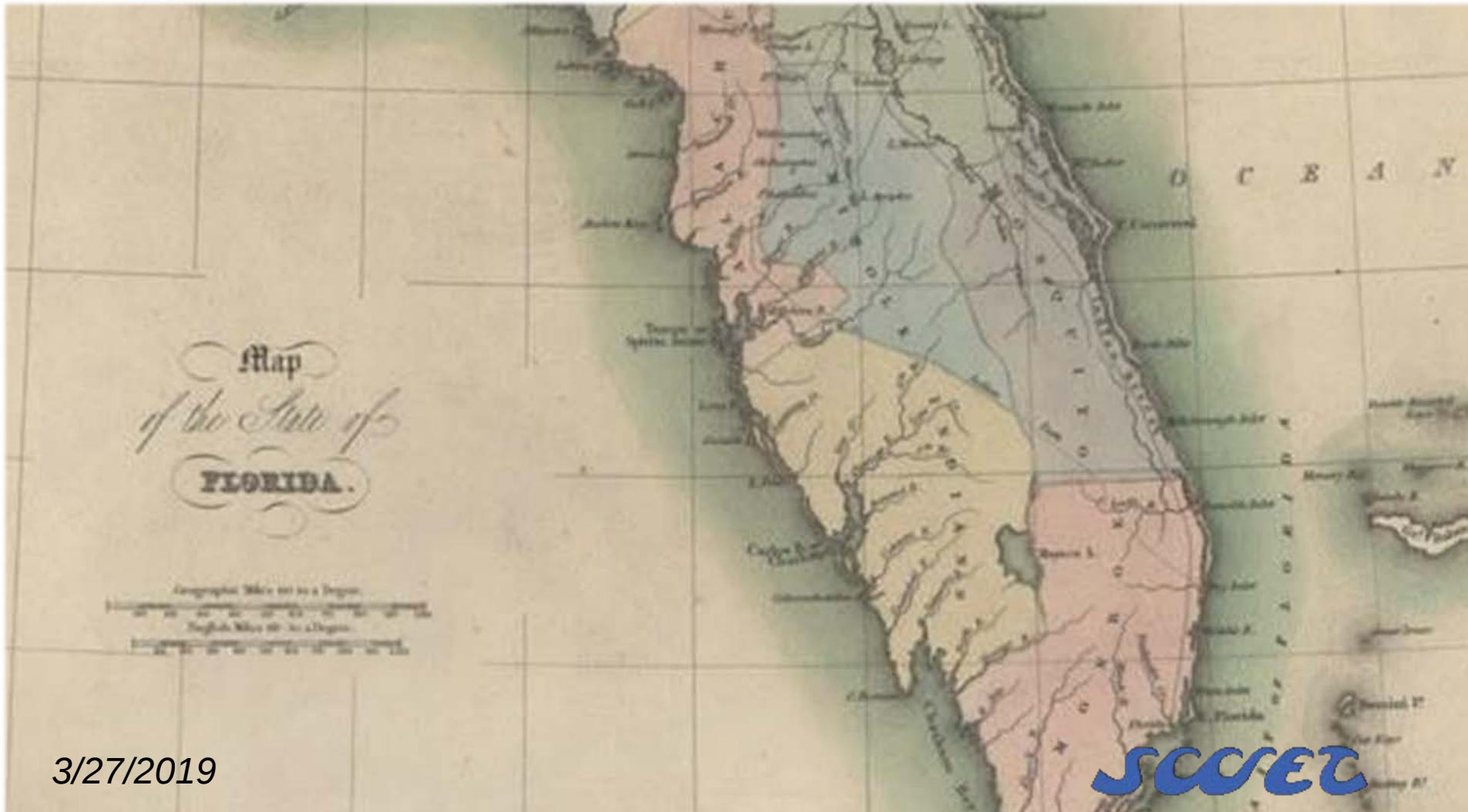
- WAM is a GIS-based model that simulates the complex hydrology and water quality responses in the LOW
- In 2017, WAM calibration and sensitivity/uncertainty analyses were completed for the LOW
- In mid-2017, Coordinating Agencies identified further WAM assessment needs (e.g., defining pre-drainage conditions)
- Overview of this contract presented at Dec. 2018 BMAP meeting; this follow-up presentation highlights the study results

A photograph of a wetland landscape. In the foreground, there are tall, green and brown reeds. A body of water reflects the sky and the surrounding vegetation. In the background, there is a line of trees under a blue sky with white and grey clouds.

Pre-Drainage WAM Simulations

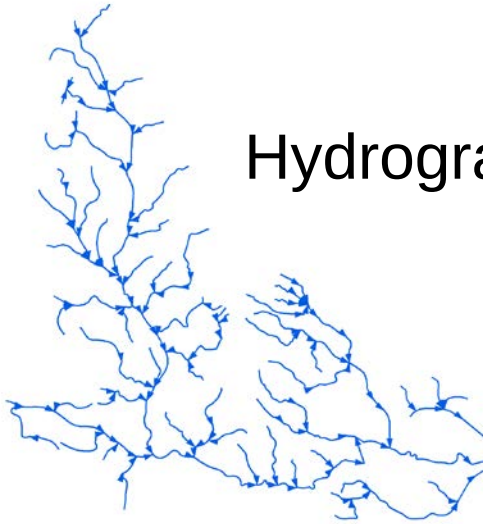
Pre-drainage Definition

“Pre-drainage” conditions reflect historical environmental conditions ca. 1850 – 1900, i.e., pre-development

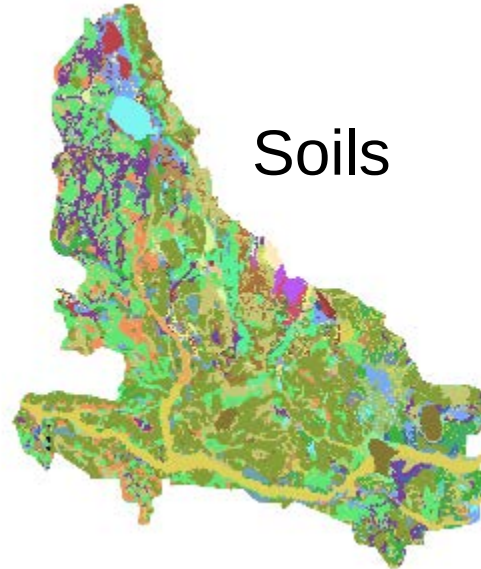


Spatial Datasets

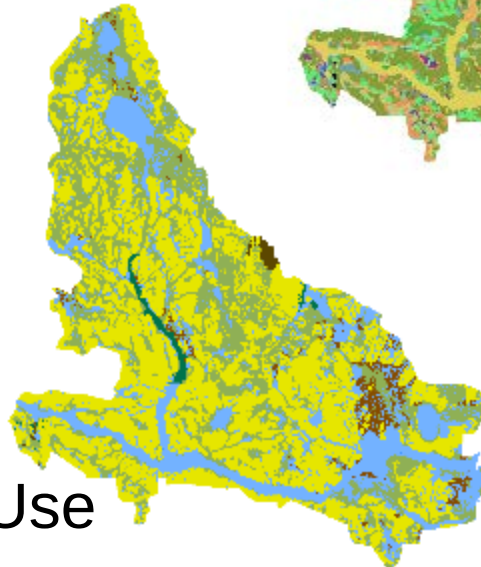
Generated GIS datasets reflecting pre-drainage conditions



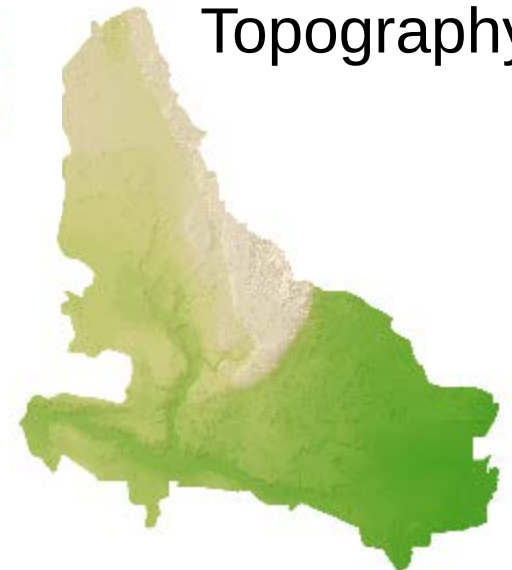
Hydrography



Soils

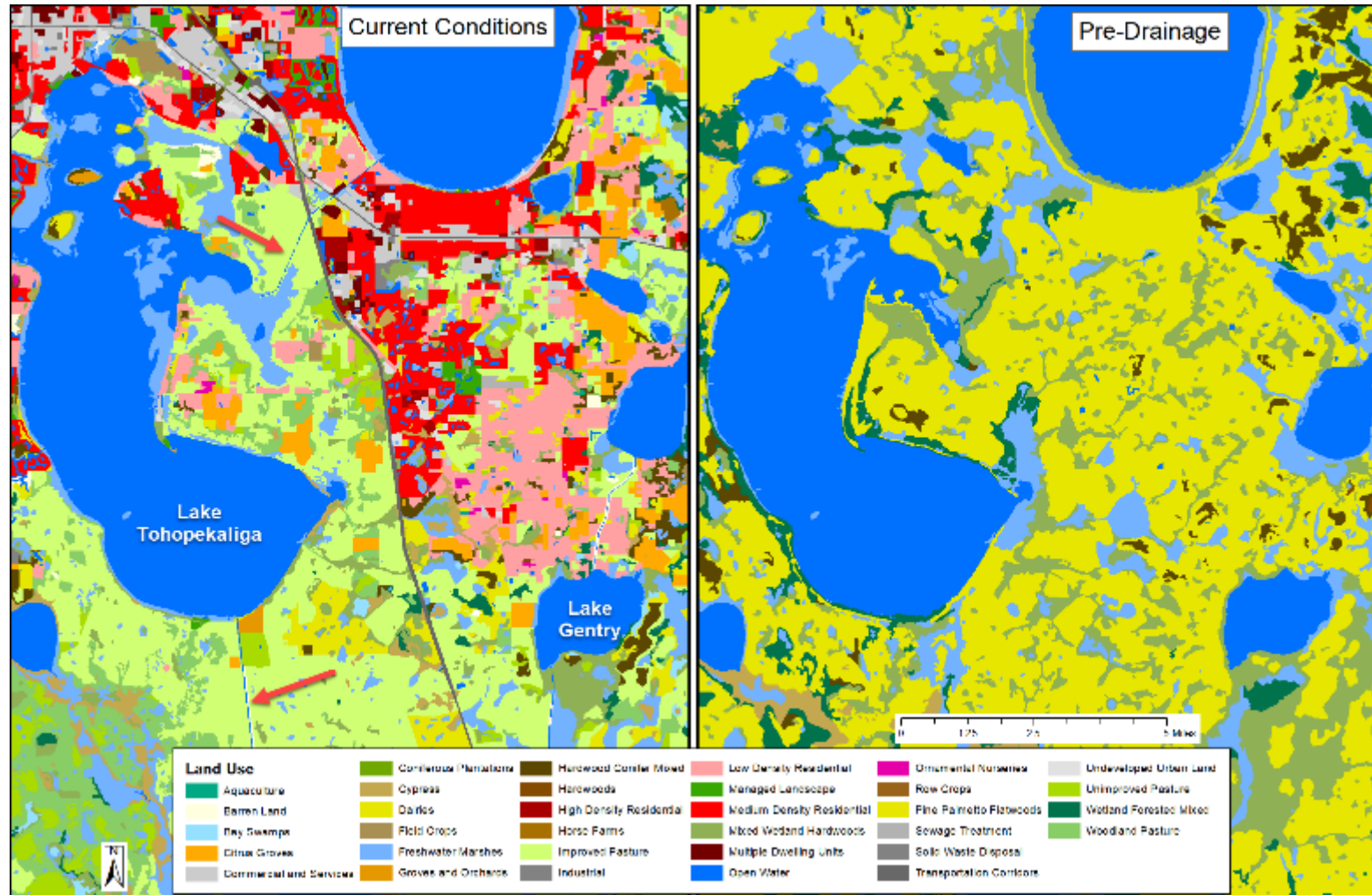


Land Use



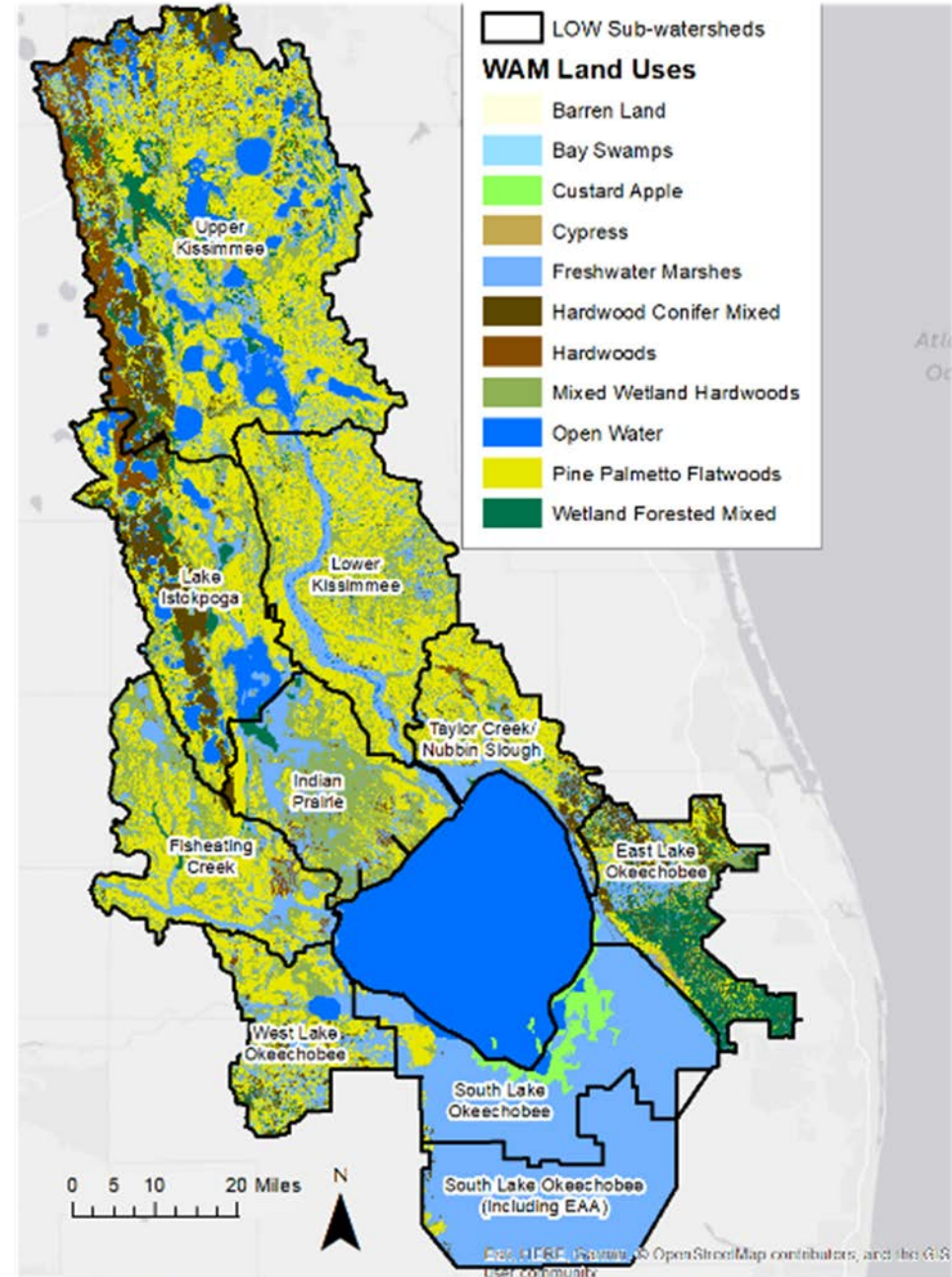
Topography

Current* vs. Pre-drainage Land Cover Example (Upper Kissimmee)



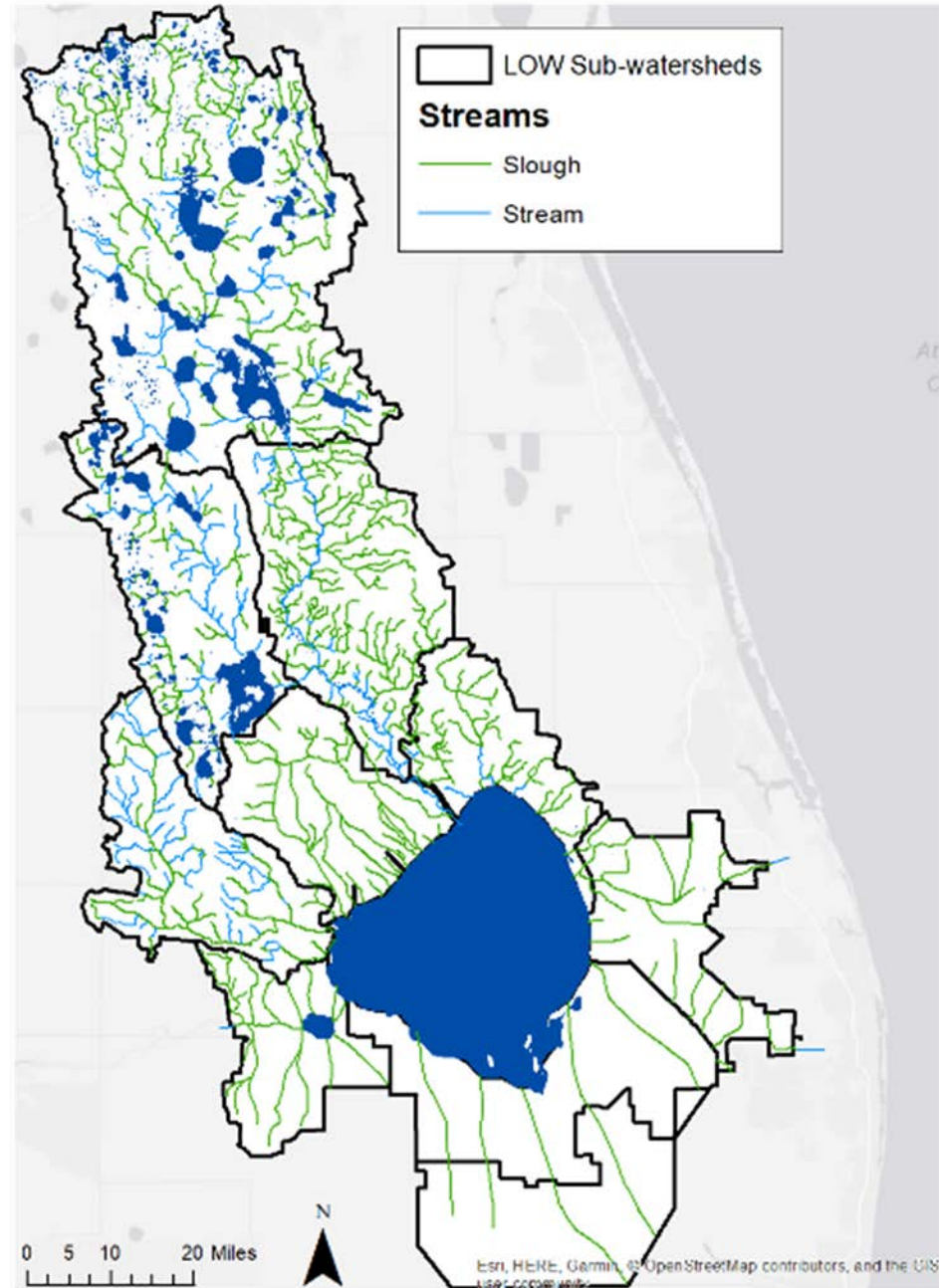
Pre-drainage Land Cover

- All native land covers
- Based on:
 - Associations of native vegetation with soils
 - Additional data from SFWMD staff (Zahina et al., 2007; McVoy et al., 2011; Said & Brown, 2010)



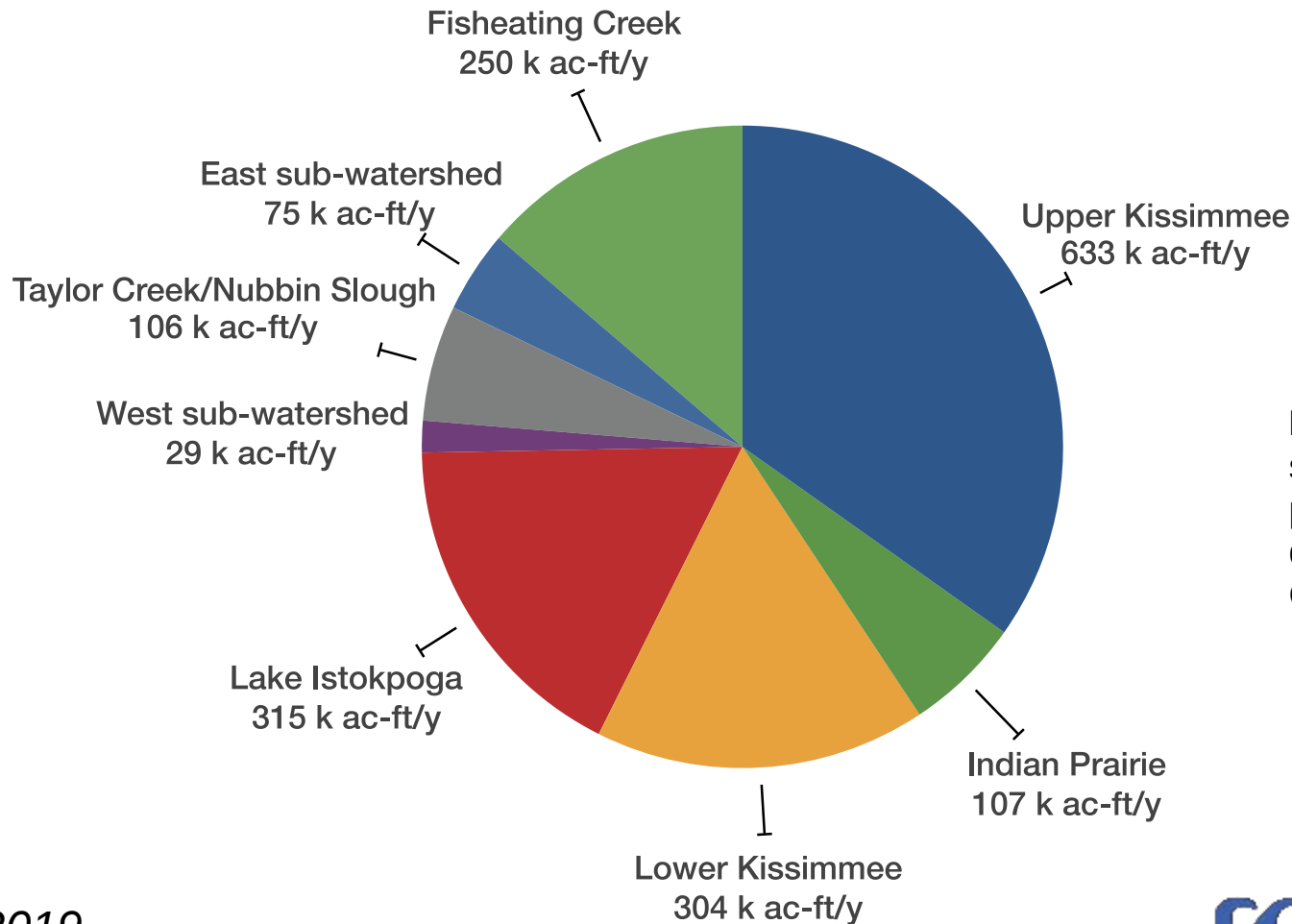
Pre-drainage Hydrography

- Natural channels and waterways
- Based on:
 - Historical records
 - Topographic data
 - Pre-1950 aerial imagery



Simulation Results

*Simulated pre-drainage water volume
to Lake Okeechobee*

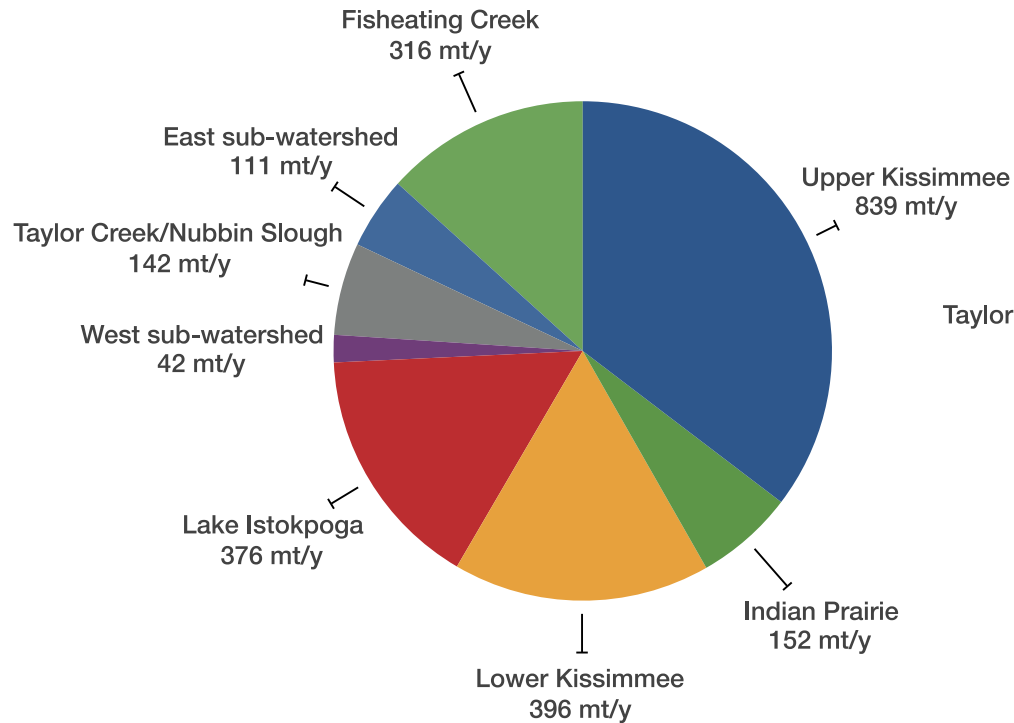


Note: no South sub-watershed pre-drainage discharge to Lake Okeechobee

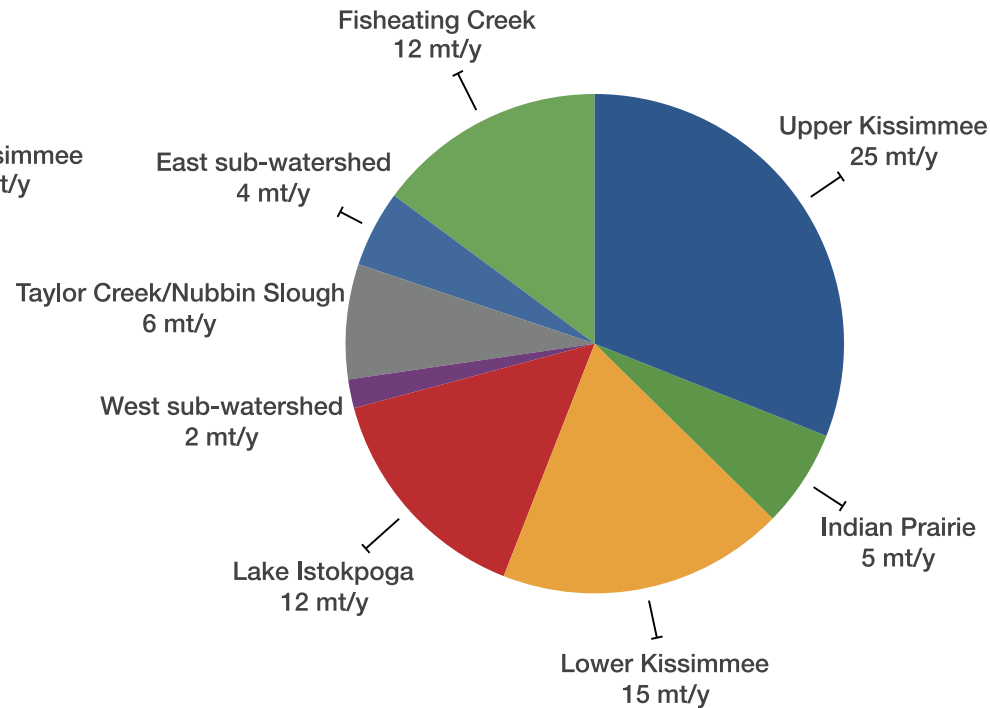
Simulation Results

*Estimated pre-drainage nutrient loadings
to Lake Okeechobee*

TN



TP



Note: no South sub-watershed
pre-drainage nutrient loadings
to Lake Okeechobee

3/27/2019

A photograph of a swampy landscape. Tall, thin trees with green foliage stand in shallow water. The water is calm, reflecting the trees and the sky. The sky is blue with white clouds. The text "Evaluation of Abatement Strategies" is overlaid in the center of the image.

Evaluation of Abatement Strategies

Nutrient Abatement Scenarios*

Objective: Evaluate the effectiveness of abatement strategies against existing conditions (final underway)

Evaluated four abatement scenarios in the LOW:

1. Advanced fertility management Best Management Practices (BMPs) for major crops and urban landscapes
2. Advanced farm-level and urban stormwater water management BMPs
3. a) Seven select LOWCP projects, and
b) Planned Lake Okeechobee Watershed Restoration Project (LOWRP) Tentatively Selected Plan (TSP) features (as of July 2018)
4. The fully implemented Kissimmee River Restoration Project (KRRP)

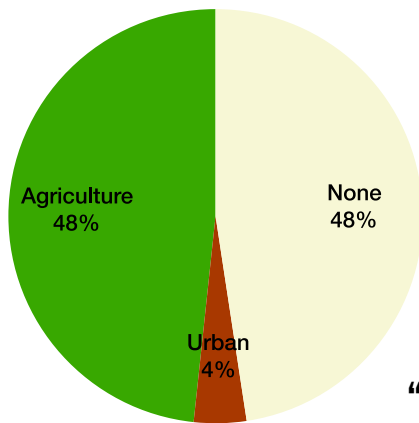
Performed cost-benefit analyses

- Cost-effectiveness (“value-for-money”) in terms of dollars per pound of TP removal by BMPs and projects

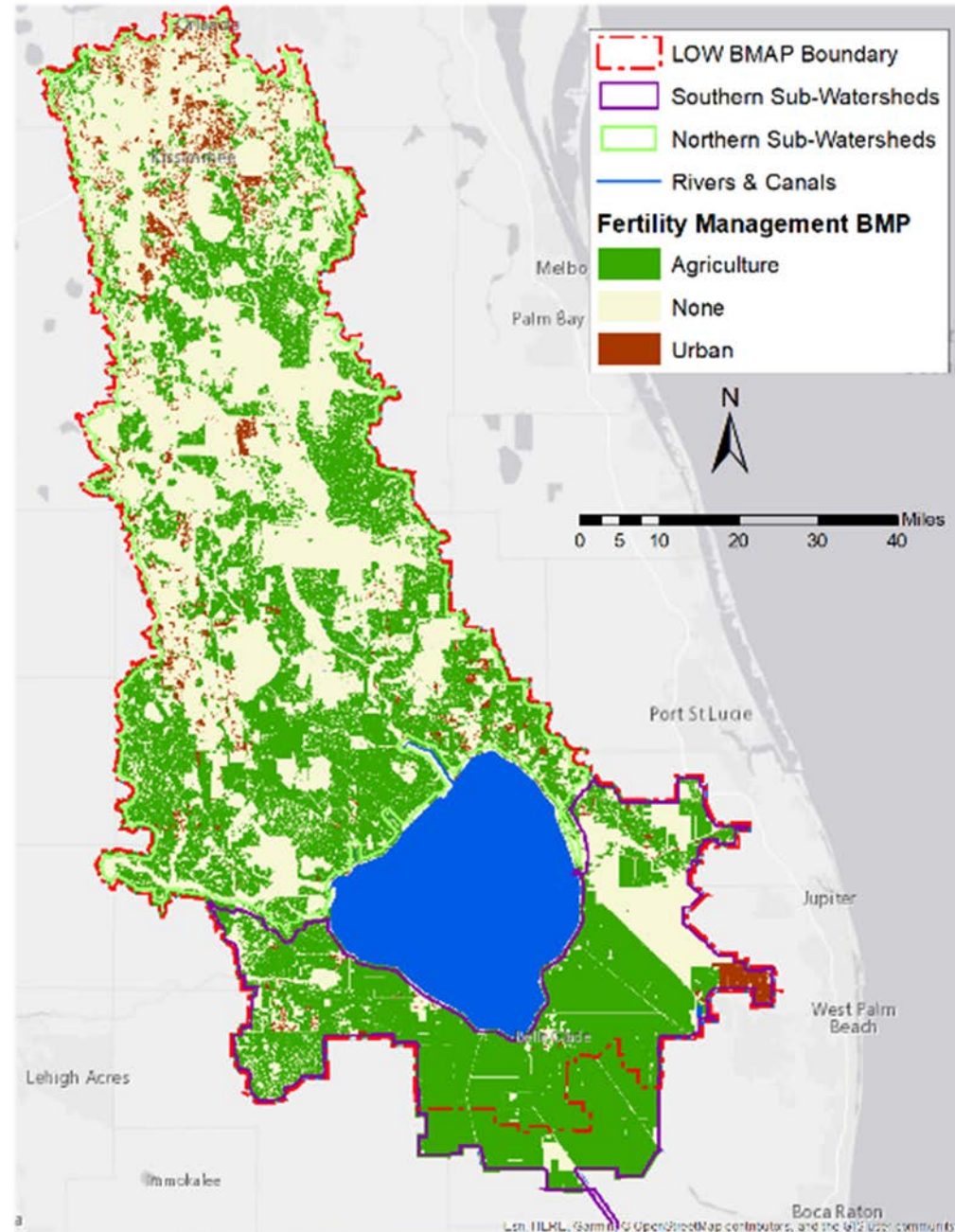
* From Draft Abatement Scenarios Report (SWET, March 4, 2019)

Advanced Fertility Management BMPs

- Applied to agriculture and urban land uses in all LOW sub-watersheds

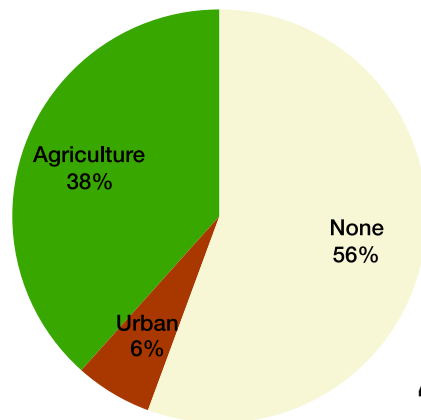


**“None” denotes
no BMPs applied**

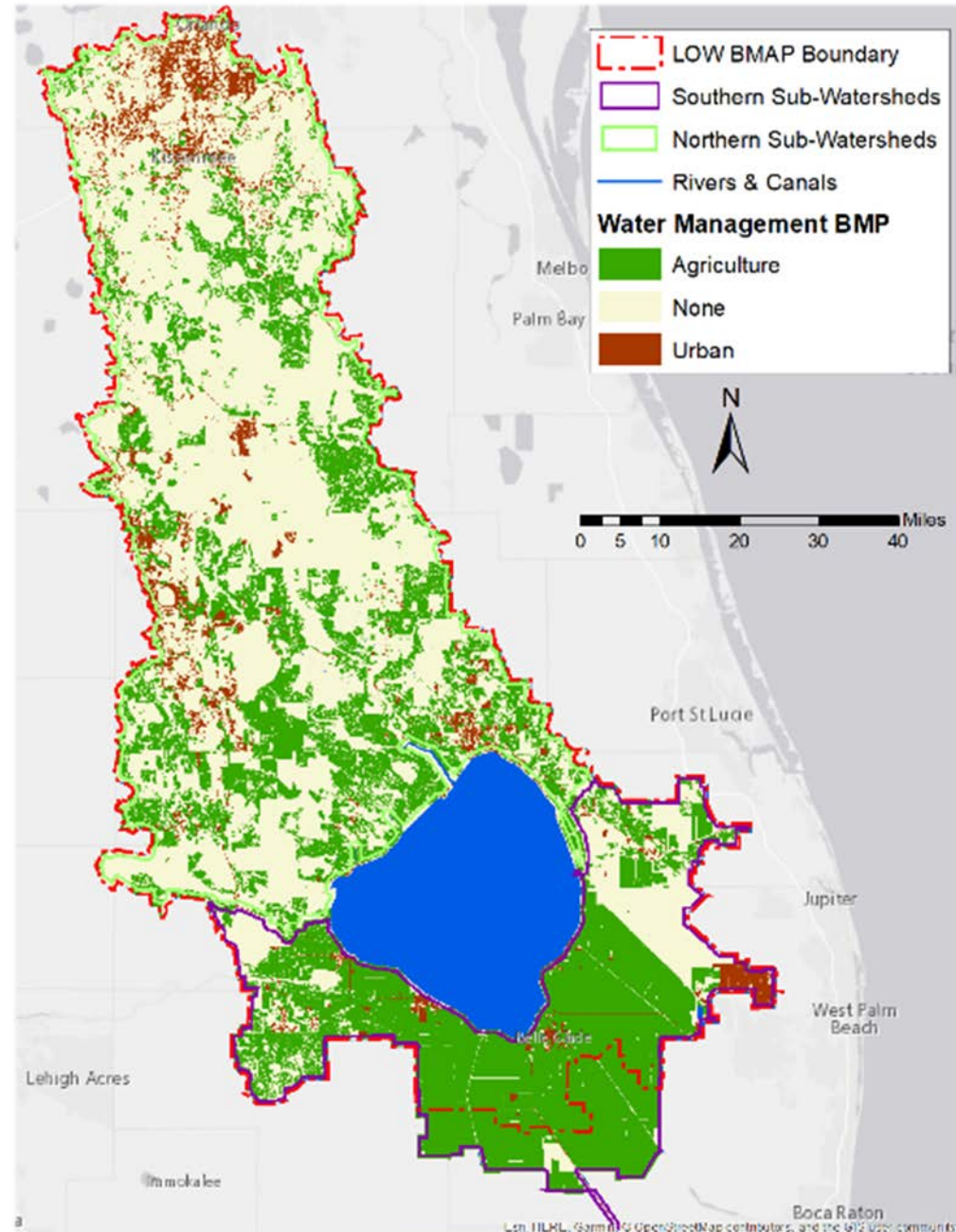


Scenario 2: Advanced Water Management BMPs

- Applied to agriculture and urban land uses in all LOW sub-watersheds



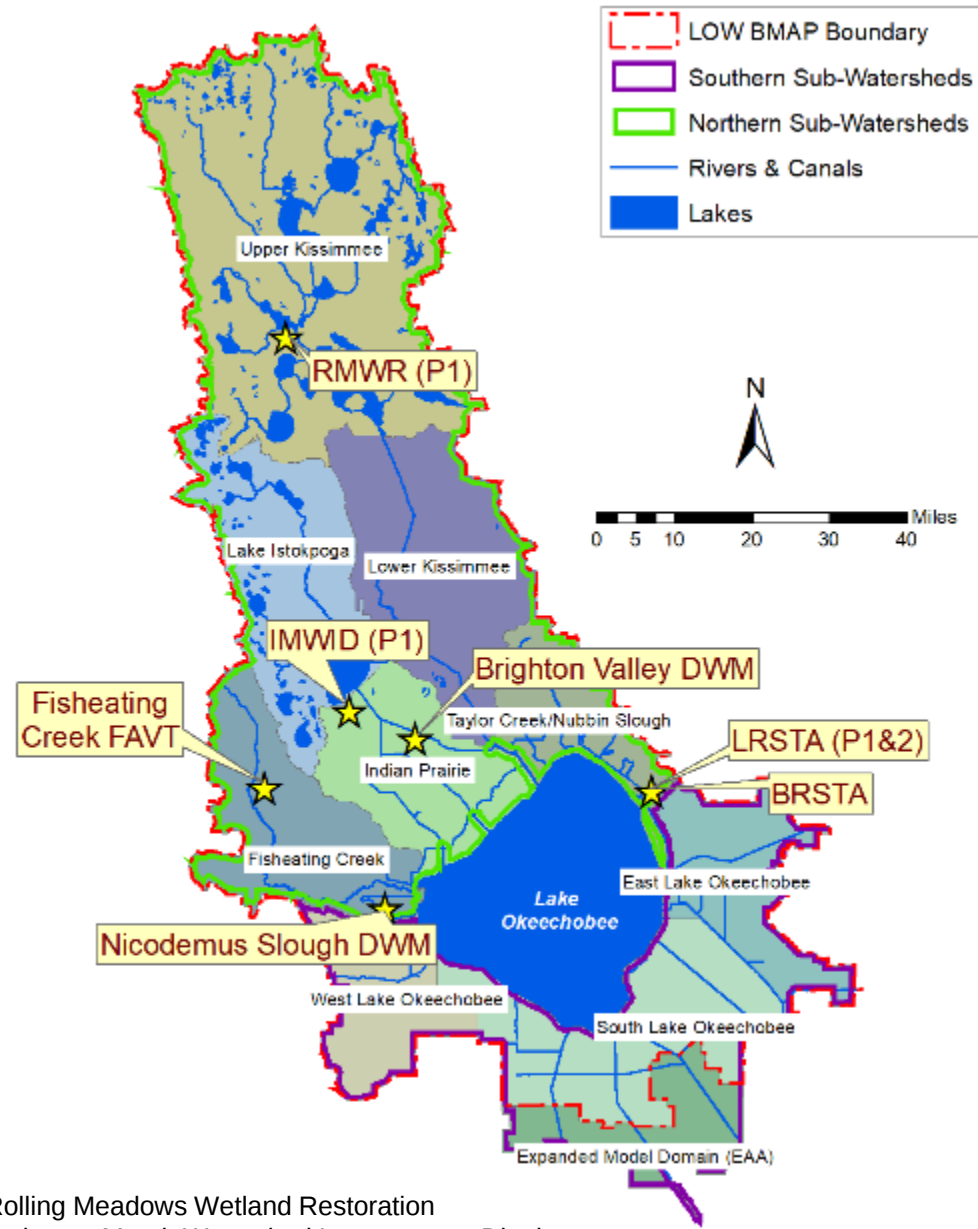
“None” denotes
no BMPs applied



Scenario 3a:

Select LOWCWP Projects

- Simulated 7 LOWCWP projects across four sub-watersheds
- Includes completed, underway/near-term, planned, large-scale (i.e., >200 acres) projects



Notes:

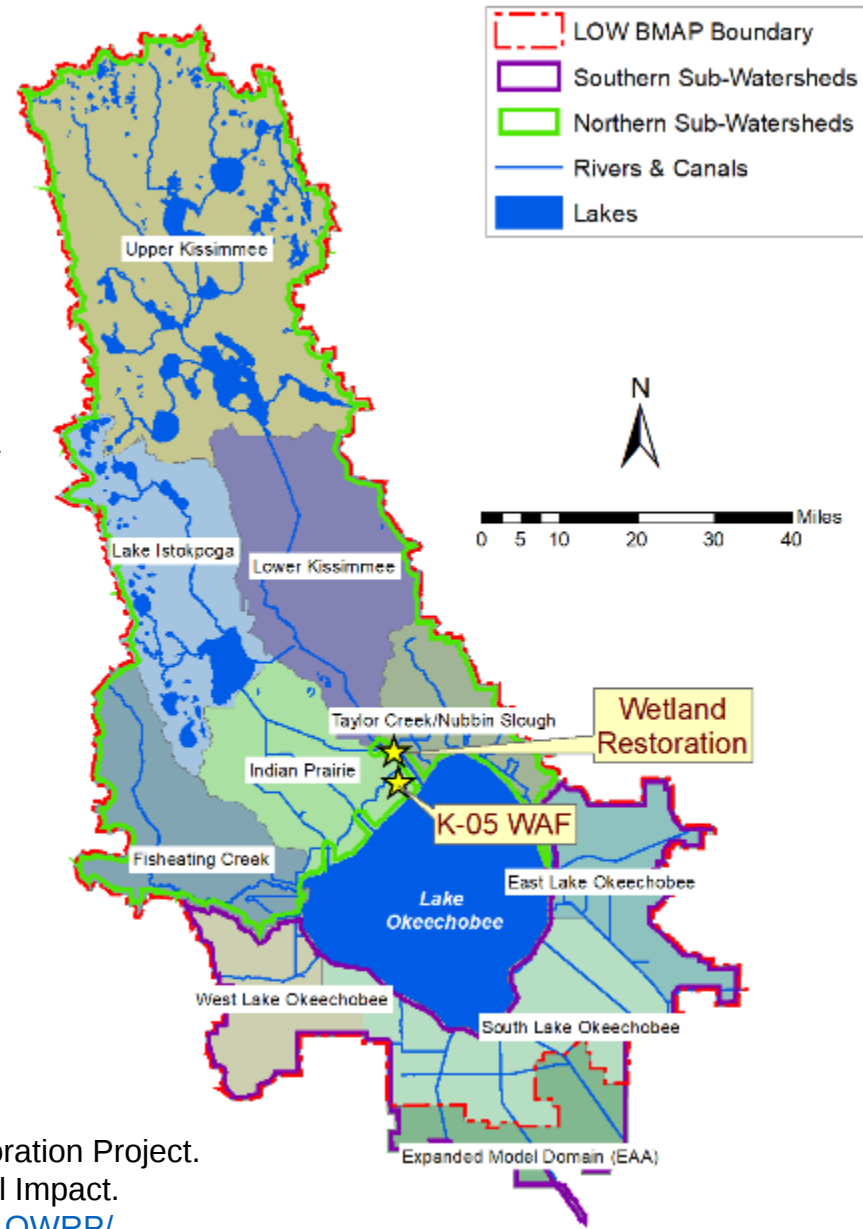
RMWR: Rolling Meadows Wetland Restoration
 IMWID: Istokpoga Marsh Watershed Improvement District
 FAVT: Floating Aquatic Vegetative Tilling
 LRSTA: Lakeside Ranch Stormwater Treatment Area
 BRSTA: Brady Ranch Stormwater Treatment Area
 DWM: Dispersed Water Management

Scenario 3b: Planned LOWRP

- Simulated proposed LOWRP TSP features, as of July 2018*
- K-05 Wetland Attenuation Feature (WAF), 25 WAF-assisted Aquifer Storage and Recovery (ASR) wells**
- Paradise Run and Kissimmee River Center wetlands

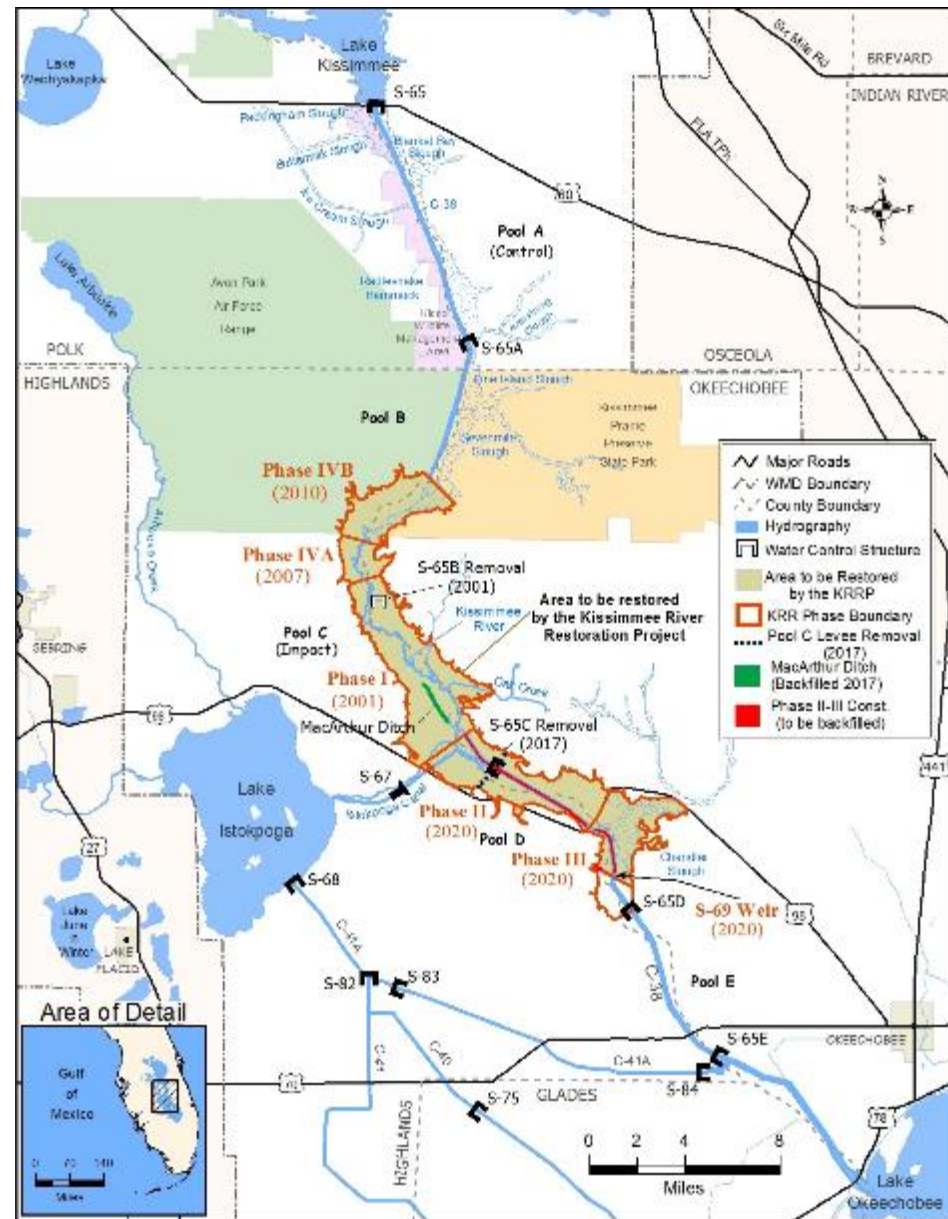
*USACE and SFWMD. 2018. Lake Okeechobee Watershed Restoration Project. Draft Integrated Project Implementation Report and Environmental Impact. Draft Report, July 2018 Online at <https://www.saj.usace.army.mil/LOWRP/>

** The additional 55 LOW ASR wells included in TSP were not modeled in this simulation



Scenario 4: Fully Implemented KRRP

- Simulated the complete Kissimmee River Restoration and Kissimmee River Headwaters Revitalization projects
- Includes implementation of Headwaters Revitalization Schedule and Kissimmee River Restoration Evaluation Program



Abatement Scenarios Results

Draft Results – Scenarios 1 and 2

Sub-watershed	Base Scenario		Scenario 1 (Nutrients BMPs)					Scenario 2 (Water Management BMPs)				
	N (lbs/y)	P (lbs/y)	N (lbs/y)	P (lbs/y)	Cost (\$M/y)	Cost-effectiveness (\$/lb-N) (\$/lb-P)		N (lbs/y)	P (lbs/y)	Cost (\$M/y)	Cost-effectiveness (\$/lb-N) (\$/lb-P)	
Upper Kissimmee	2,515,625	177,770	2,331,576	170,635	34.48	\$187	\$4,833	2,228,767	151,325	267.8	\$934	\$10,127
Lower Kissimmee	3,900,192	328,176	3,886,863	317,316	0.54	\$41	\$50	3,824,982	296,298	31	\$412	\$973
Indian Prairie	2,062,514	235,339	1,666,908	116,530	0.93	\$2	\$8	1,617,644	96,235	23.8	\$54	\$171
Lake Istokpoga	1,368,807	108,516	1,318,518	76,379	0.97	\$19	\$30	1,299,359	66,168	138.6	\$1,995	\$3,272
Fisheating Creek.	1,001,617	133,977	982,858	126,407	0.47	\$25	\$62	917,952	96,399	17.5	\$209	\$466
Taylor Ck./Nubbin Slough	896,375	279,933	887,279	208,254	0.95	\$105	\$13	808,823	170,436	48.7	\$557	\$445
West Lake Okeechobee	99,960	6,182	84,024	4,921	2.1	\$132	\$1,663	78,457	4,592	27.3	\$1,270	\$17,174
East Lake Okeechobee	803,568	70,409	754,495	63,060	1.29	\$26	\$176	741,207	61,886	71.4	\$1,146	\$8,382
South Lake Okeechobee	2,471,796	106,870	1,888,859	81,248	16.15	\$28	\$630	1,903,649	69,363	78.8	\$139	\$2,100

Abatement Scenarios Results

(Takeaways)

- Scenario 1 (Fertility BMPs):
 - Cost-effectiveness estimates range from \$8 to \$4,800 per pound P removed
 - Cost-effectiveness estimates range from \$2 to \$190 per pound N removed
- Scenario 2 (Water Management BMPs):
 - Cost-effectiveness estimates range from \$170 to \$10,000 per pound P removed
 - Cost-effectiveness estimates range from \$50 to \$2,000 per pound N removed

Abatement Scenarios Results

Draft Results – Scenarios 3 and 4

Scenarios/Project Name	Estimated P Load Reduction Project Outlet (mt/y)	Project Capital Cost (\$)	Estimated Amortized Annual Capital Cost ¹ (\$/y)	Estimated Annual O&M Cost (\$y)	Estimated Cost Benefit P (\$/lb)
Scenario 3a – Select LOWCP Projects					
Fisheating Creek FAVT	1.7	3,000,000	261,554	2,573,000	758 ²
BRSTA	13.5	30,368,000	2,647,621	254,307	98
Brighton Valley DWM	4.6	12,182,509	1,062,127	3,050,000	406
IMWID (Phase 1)	0.58	14,837,146	1,293,570	258,714 ³	1,217
LRSTA (Phase 1 and 2)	8.6	132,693,651	11,568,837	334,615	629
Nicodemus Slough DWM	5.9	4,989,653	435,021	2,844,848	253
RMWR (Phase 1)	1.5	5,141,792 ⁴	448,285	100,706	166
Scenario 3b – Planned LOWRP Projects ⁵					
K-05 WAF, 25 WAF-assisted ASR Wells, Paradise Run/Kissimmee River Center Wetlands	10.1				
Scenario 4 - Fully Implemented KRR					
Restored River Hydrography					
Restored Wetlands	31.8	786,994,000	68,613,723	433,288	987
Upper Kissimmee Initiatives					
¹ Amortized annual capital cost assumed 20-year project life and 6% interest. ² Reported as \$136/lb-P in project report (Water & Soil Solutions, LLC, 2018. Implementation of Floating Aquatic Vegetative Tilling Treatment Technology). ³ Estimated O&M cost is not presently available as this project is under construction and, therefore, this estimated cost is assumed to be 20% of annual capital cost.. ⁴ Reduction reported at S-65, the reduction at Lake Okeechobee would likely be less due to attenuation in the Lower Kissimmee. ⁵ While LOWRP will likely have an ancillary water quality benefit, this planned project is designed primarily for water storage and, therefore, an estimate of cost effectiveness in terms of TP removal was not calculated.					

Abatement Scenarios Results

(Takeaways)

- Scenario 3a (Select Projects):
 - Cost-effectiveness estimates range from \$100 to \$1,200 per pound P removed
- Scenario 4 (Fully Implemented KRRP):
 - Estimated cost-effectiveness is about \$1,000 per pound P removed

Key Findings

- Advanced Fertility BMPs had the **most cost-effective** estimates for LOW, but have limited potential for meeting BMAP targets for TP.
- Advanced Water Management BMPs have a **greater potential** of meeting BMAP targets, but at a **higher estimated cost per pound** for TP removed than fertility BMPs.
- Estimated TP reductions for the select LOW/KRRP projects varied significantly, but on average were as cost effective or **more cost effective** than the Water Management BMPs.
- To meet BMAP targets a **combination of all of the above** abatement strategies will be needed with a continued focus on regional projects.

Contact Information:

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Andrew James

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Questions & Comments





Statewide Annual Report (STAR)

STAR Background

STAR 2019 Timeline

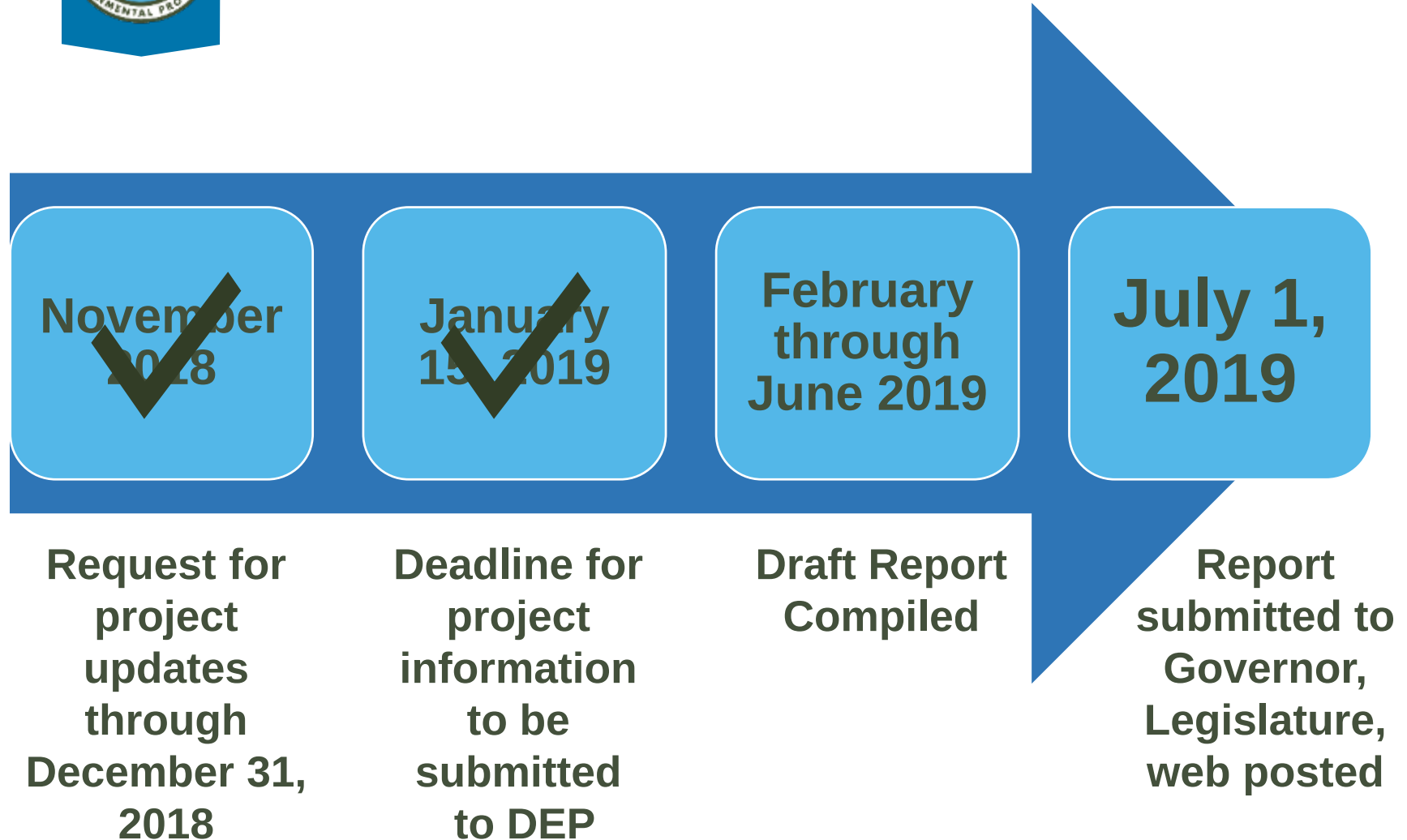


STAR Background

- Requirement under Section 403.0675 Florida Statutes (F.S.) to provide an annual update to the Governor and Legislature
- Summarizes accomplishments in BMAPs **statewide**
- Reports on restoration projects and management strategies
- All BMAP **reporting periods** align with calendar year
- Submitted to the Governor and the Legislature by **July 1** of each year



STAR 2019 Timeline





Water Quality Assistance Grants

Please visit the link below:

*[Division of Water Restoration Assistance
Nonpoint Source Management Program](#)*



Proposals for Water-Quality Assistance Grants

- **Two grant opportunities**
 - Section 319(h) Nonpoint Source (NPS) Grant
 - Up to \$3 million
 - State Water-Quality Assistance Grant
 - Up to \$5 million
- Submit NPS Project Proposal Request and supporting documents via DEP Grant Portal
 - Due by **11:59 PM on Tuesday, April 30, 2019**
- **Questions:** Emily Forinash at 850-245-2944



Next Steps

- *One-on-one stakeholder conversations about future projects*
 - *LOWCP Stakeholder Feedback April 2019*
 - *STAR Submitted June 2019*
 - *Future projects collected July 2019*
 - *Tentative meetings April, July, October 2019*
 - *5-Year Review December 2019*
 - *Update BMAP January 2020*



Contact Information

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Questions & Comments



