



Florida Department of Environmental Protection
Water Quality Restoration Program

**Caloosahatchee Estuary
Basin Management Action Plan (BMAP)
Draft 5-Year Review Meeting**

October 18, 2017

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Basin Coordinator





Agenda

- Legislation Pertinent to Caloosahatchee Estuary BMAP
- 5-Year Review Development
- Overview of Draft 5-Year Review
- Next Steps



Pertinent Legislation

Chapter 373.4595(4), F.S.

- Original BMAP adopted in November 2012
 - Five-Year Review finalized by end of November 2017
 - Review provided to the Governor, the President of the Senate, and the Speaker of the House of Representatives
- Review to include:
 - 5-year milestones towards meeting TMDL 20 years after adoption 
 - Assessment of progress towards meeting the milestones 
 - Determination of whether TMDL can be met in 20 years 
 - If not, explanation of why
 - Identification of recommended revisions to the BMAP 
 - Model revisions, monitoring network, etc.



Timeline

Caloosahatchee Estuary BMAP 5-Year Review

Timeline for Stakeholder Involvement	Deadline
1. Stakeholders submit 5-Year Review project updates and new projects to DEP (included updates through 5/31/2017)	7/14/2017
2. Stakeholders provide water quality monitoring data via WIN or STORET (include data through 5/31/2017)	8/31/2017
3. Public meeting – Draft 5-Year Review provided for comments	10/18/2017
4. Stakeholders submit comments on Draft 5-Year Review document to DEP	10/30/2017
5. Final BMAP 5-Year Review submitted to Governor/Legislature	11/30/2017





5-Year Review



- Chapter 1: Background Information

- Chapter 2: Assessing Progress



- Chapter 3: Recommendations



Chapter 1: Background

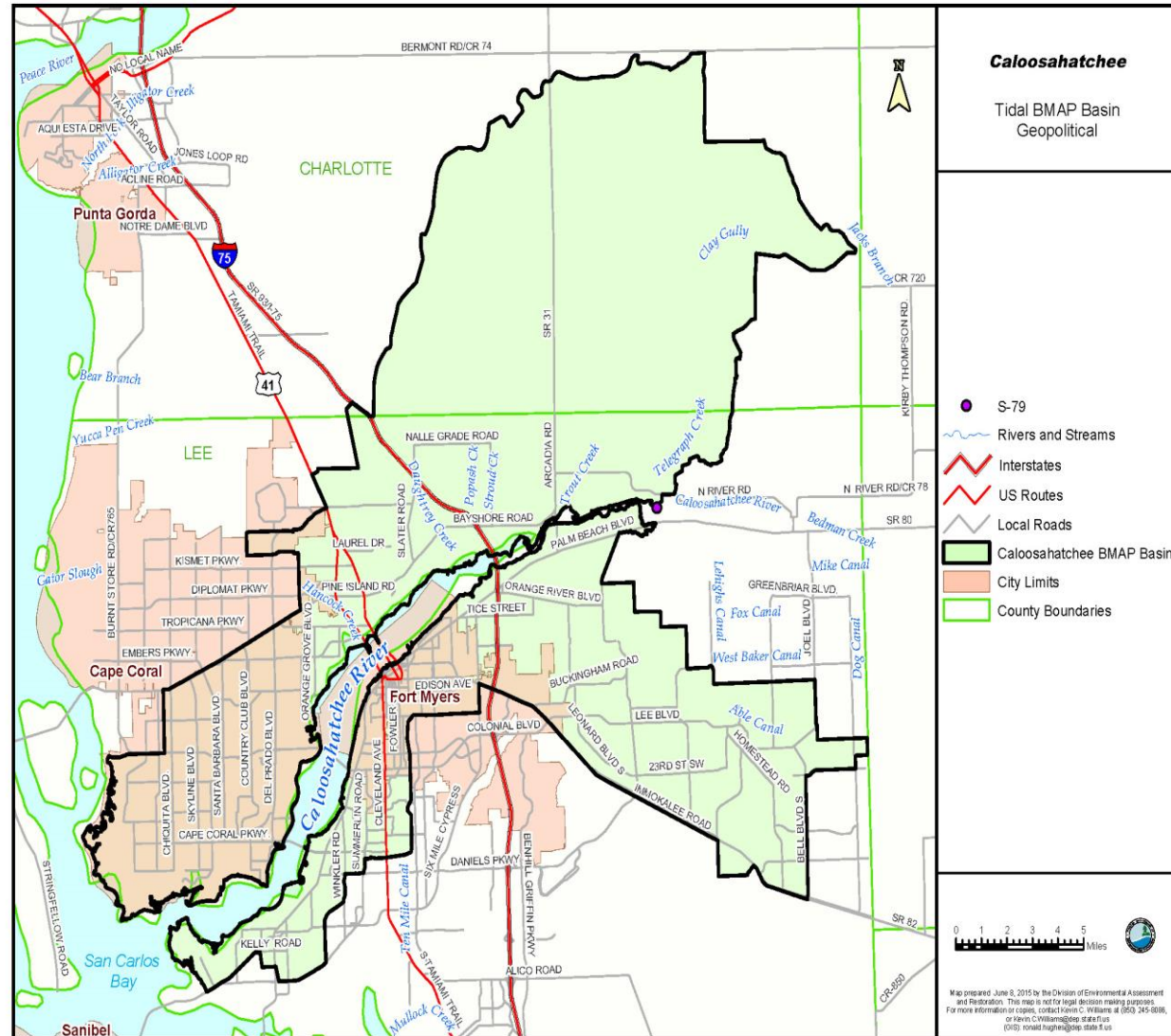
Parameter	Wasteload Allocation (WLA) for Wastewater (lbs/yr)	Current Domestic Wastewater Loading (lbs/yr)	WLA for NPDES Stormwater (% Reduction)	Load Allocation (LA) (% Reduction)	Current Stormwater Loading (lbs/yr)	TMDL Load (lbs/yr)
TN	Permitted loads	64,158	23%	23%	1,690,084	1,301,365

- Total Maximum Daily Load (TMDL) adopted in 2009
- BMAP adopted in 2012
- Draft 5-Year Review provided October 16, 2017
 - Includes information through May 31, 2017



Caloosahatchee Estuary BMAP

- Total required reductions:
388,718 lbs-N/yr
- Stakeholders:
 - Agriculture/FDACS
 - Charlotte County
 - City of Cape Coral
 - City of Fort Myers
 - FDOT District 1
 - Lee County
 - LA-MSID
 - Lucaya CDD





Chapter 2: Assessing Progress

Lead Entity	Total Projects	Completed	Underway	Planned
Agriculture/FDACS*	1	1	0	0
Charlotte County	1	1	0	0
City of Cape Coral	16	16	0	0
City of Fort Myers	11	11	0	0
FDOT	8	8	0	0
LA-MSID	10	7	3	0
Lee County	40	28	9	3
Lucaya CDD	1	1	0	0
Total	88	73	12	3

* The FDACS project is the Best Management Practice (BMP) Enrollment Program, for which updates are submitted to DEP annually.



Assessing Progress, cont.

Lead Entity	TN Required Reduction (lbs/yr)	TN Reduction to Date* (lbs/yr)	% of Allocation Achieved
Agriculture/FDACS	55,597	31,169	56
Charlotte County	943	381	40
City of Cape Coral	103,414	82,785	80
City of Fort Myers	40,924	21,533	53
FDOT	9,119	11,490	126
LA-MSID	37,736	23,532	62
Lee County	140,853	46,118	33
Lucaya CDD	132	0	0
Total	388,718	217,008	56

* Reductions to date include TN reductions associated with projects completed as of May 31, 2017.



Coordinating Agencies

- FDACS
 - BMP Enrollment
 - Cost-share Assistance
- SFWMD
 - C-43 West Basin Storage Reservoir
 - C-43 Water Quality Treatment and Testing Facility
 - Lake Hicpochee Hydrologic Enhancement – North Project



Water Quality Monitoring and Evaluation

- Used data available in STORET and WIN
 - POR May 1, 2007 through April 30, 2017 (WY 2008 – WY 2017)
- Nonparametric statistical techniques used (Seasonal Kendall and Mann-Kendall trend tests)
 - Robust against outliers and large data gaps
 - Data not required to conform to a particular distribution for nonparametric analyses
 - Using these techniques, identified monotonic trends
- Seasons for the Seasonal Kendall trend test were ascribed to months (typical collection frequency)
- Trend analyses were conducted on two different spatial scales:
 - Individual stations within freshwater tributaries in the Tidal Caloosahatchee watershed
 - Aggregated data for impaired Caloosahatchee Estuary WBIDs and data from S79



Tributary Trends

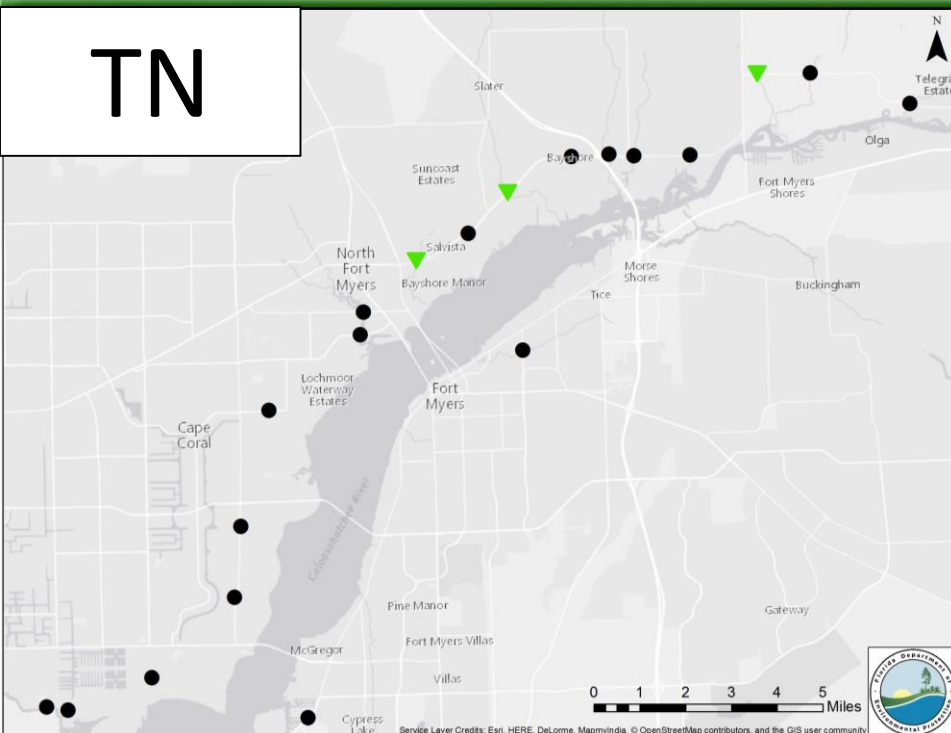
- TN data at 20 stations analyzed
 - None had statistically significant increasing trends
 - 3 had decreasing trends
 - 17 stations did not show any statistically significant trends
- TP data at 14 stations analyzed
 - 2 had statistically significant increasing trends
 - 3 had decreasing trends
 - 9 stations did not show any statistically significant trends

Statistical Trend Test Interpretation	Stations	Parameter
No significant trend	17	TN (mg/L)
Significant decreasing trend	3	TN (mg/L)
Significant increasing trend	0	TN (mg/L)
No significant trend	9	TP (mg/L)
Significant decreasing trend	3	TP (mg/L)
Significant increasing trend	2	TP (mg/L)



Tributary Trends, cont.

TN



Statistical Trend Test Interpretation



Negative significant trend

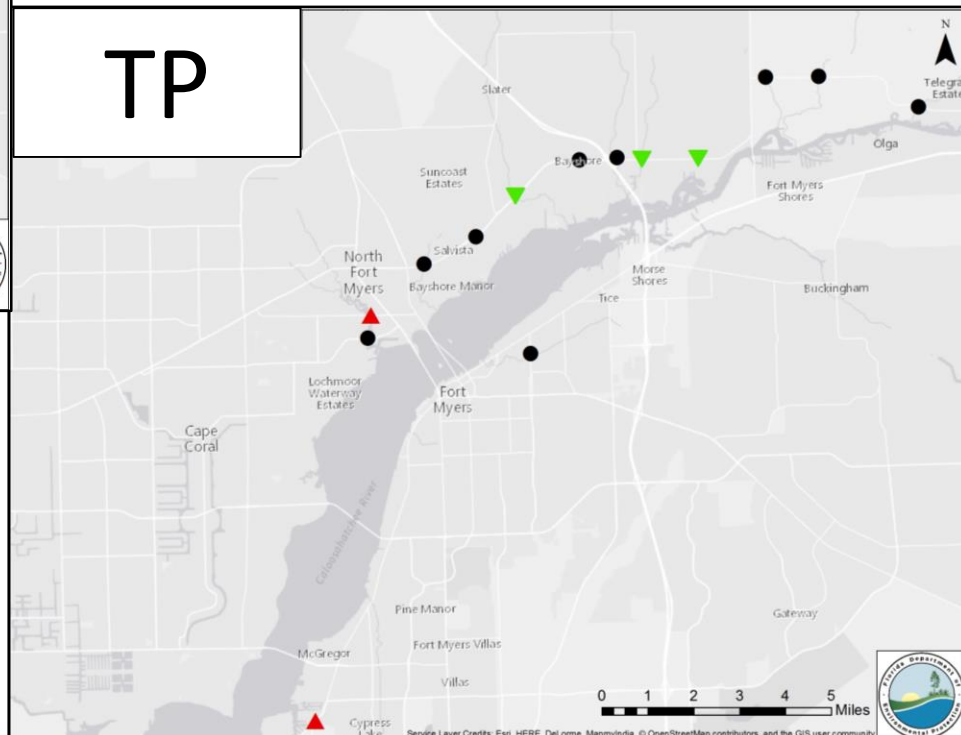


No significant trend



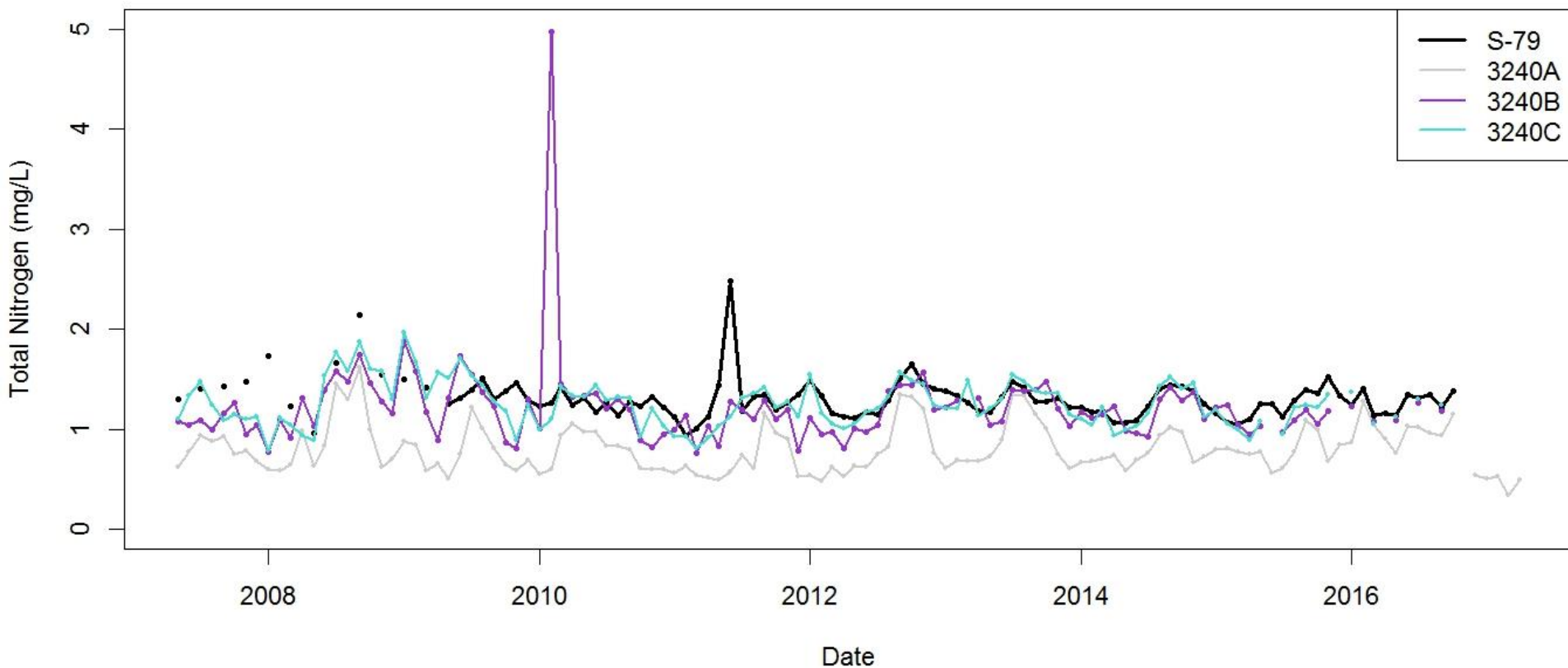
Positive significant trend

TP





Estuary WBIDs - TN





Estuary WBIDs - TN, cont.

Trend Test	Station/WBID	Parameter	Tau	P-value	Slope ¹	Statistical Trend Test Interpretation ²	Data Series Used ^{3, 4, 5}
Seasonal Kendall	3240A	TN (mg/L)	0.058	0.350	0.0030	No significant trend	Decomposed
Mann-Kendall	3240A	TN (mg/L)	0.058	0.351	0.0030	No significant trend	Decomposed
Seasonal Kendall	3240B	TN (mg/L)	-0.041	0.539	-0.0004	No significant trend	Nondecomposed
Mann-Kendall	3240B	TN (mg/L)	-0.041	0.541	-0.0004	No significant trend	Nondecomposed
Seasonal Kendall	3240C	TN (mg/L)	0.048	0.482	0.0005	No significant trend	Nondecomposed
Mann-Kendall	3240C	TN (mg/L)	0.048	0.484	0.0005	No significant trend	Nondecomposed
Seasonal Kendall	S79	TN (mg/L)	0.014	0.845	0.0001	No significant trend	Nondecomposed
Mann-Kendall	S79	TN (mg/L)	0.014	0.848	0.0001	No significant trend	Nondecomposed

Note: P-values listed in bold indicate statistical significance ($p < 0.05$).

mg/L = Milligrams per liter.

¹ Even if the P-value is determined to be statistically significant, then the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) but the slope is near 0, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way.

² A negative trend indicates a downward or decreasing trend, which may suggest an improvement in water quality. The opposite is true for a positive trend, which may indicate an increase and possibly a decline in water quality.

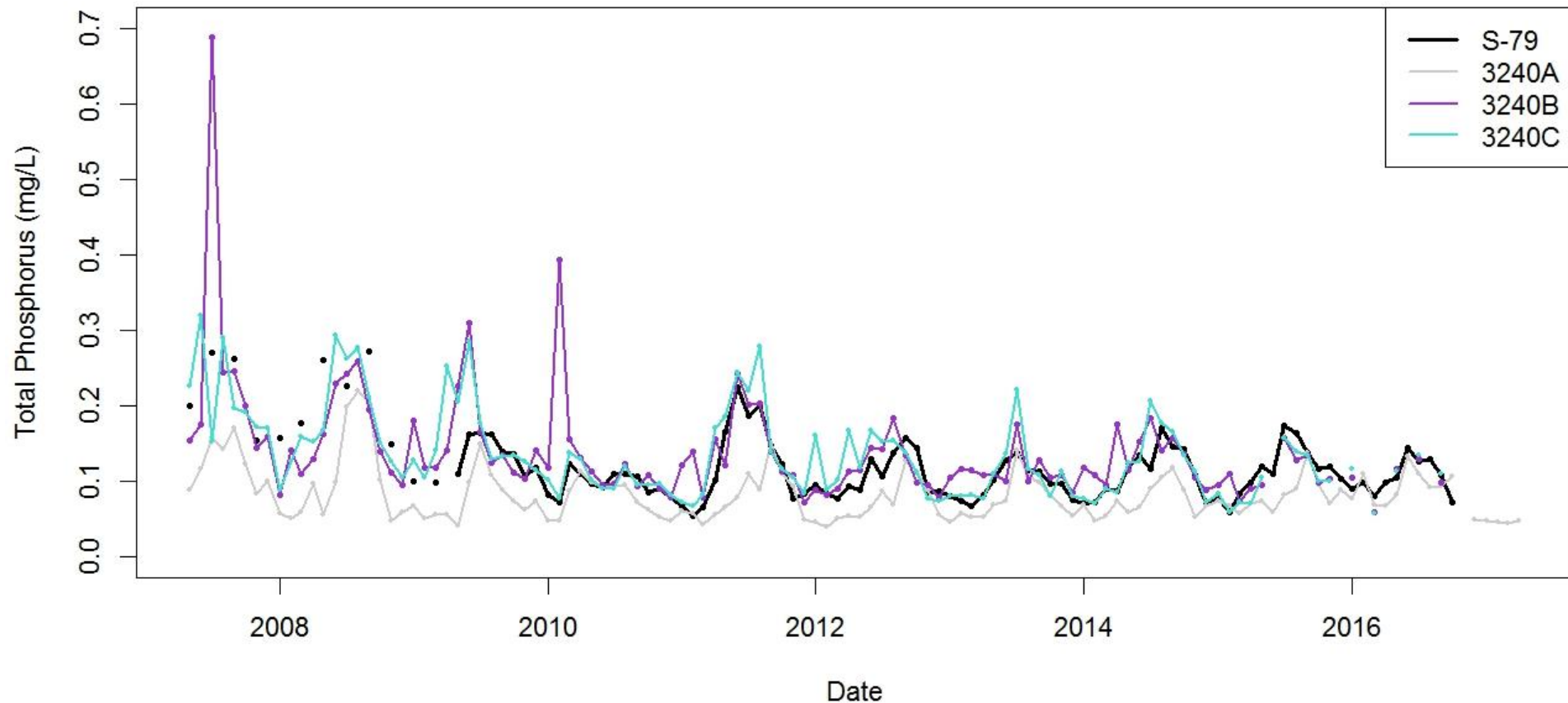
³ Based on the review of ACF and TSD results.

⁴ If "decomposed," then a potential seasonality pattern was observed from the ACF and/or TSD analysis. Therefore, gap-filled, seasonally adjusted, decomposed trend data were used for the trend analyses.

⁵ If "nondecomposed," then no obvious seasonality pattern was observed; therefore, a regular processed dataset (not gap-filled or decomposed) was used for the trend analyses.



Estuary WBIDs - TP





Estuary WBIDs - TP, cont.

Trend Test	Station/WBID	Parameter	Tau	P-value	Slope ¹	Statistical Trend Test Interpretation ²	Data Series Used ^{3, 4, 5}
Seasonal Kendall	3240A	TP (mg/L)	-0.273	< 0.001	-0.0015	Negative significant trend	Decomposed
Mann-Kendall	3240A	TP (mg/L)	-0.273	< 0.001	-0.0015	Negative significant trend	Decomposed
Seasonal Kendall	3240B	TP (mg/L)	-0.725	< 0.001	-0.0095	Negative significant trend	Decomposed
Mann-Kendall	3240B	TP (mg/L)	-0.725	< 0.001	-0.0095	Negative significant trend	Decomposed
Seasonal Kendall	3240C	TP (mg/L)	-0.633	< 0.001	-0.0105	Negative significant trend	Decomposed
Mann-Kendall	3240C	TP (mg/L)	-0.633	< 0.001	-0.0105	Negative significant trend	Decomposed
Seasonal Kendall	S79	TP (mg/L)	-0.428	< 0.001	-0.0063	Negative significant trend	Decomposed
Mann-Kendall	S79	TP (mg/L)	-0.428	< 0.001	-0.0063	Negative significant trend	Decomposed

Note: P-values listed in bold indicate statistical significance ($p < 0.05$).

mg/L = Milligrams per liter.

¹ Even if the P-value is determined to be statistically significant, then the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) but the slope is near 0, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way.

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Chapter 3: Recommendations

3.1 Milestones



3.2 Modeling and Allocations

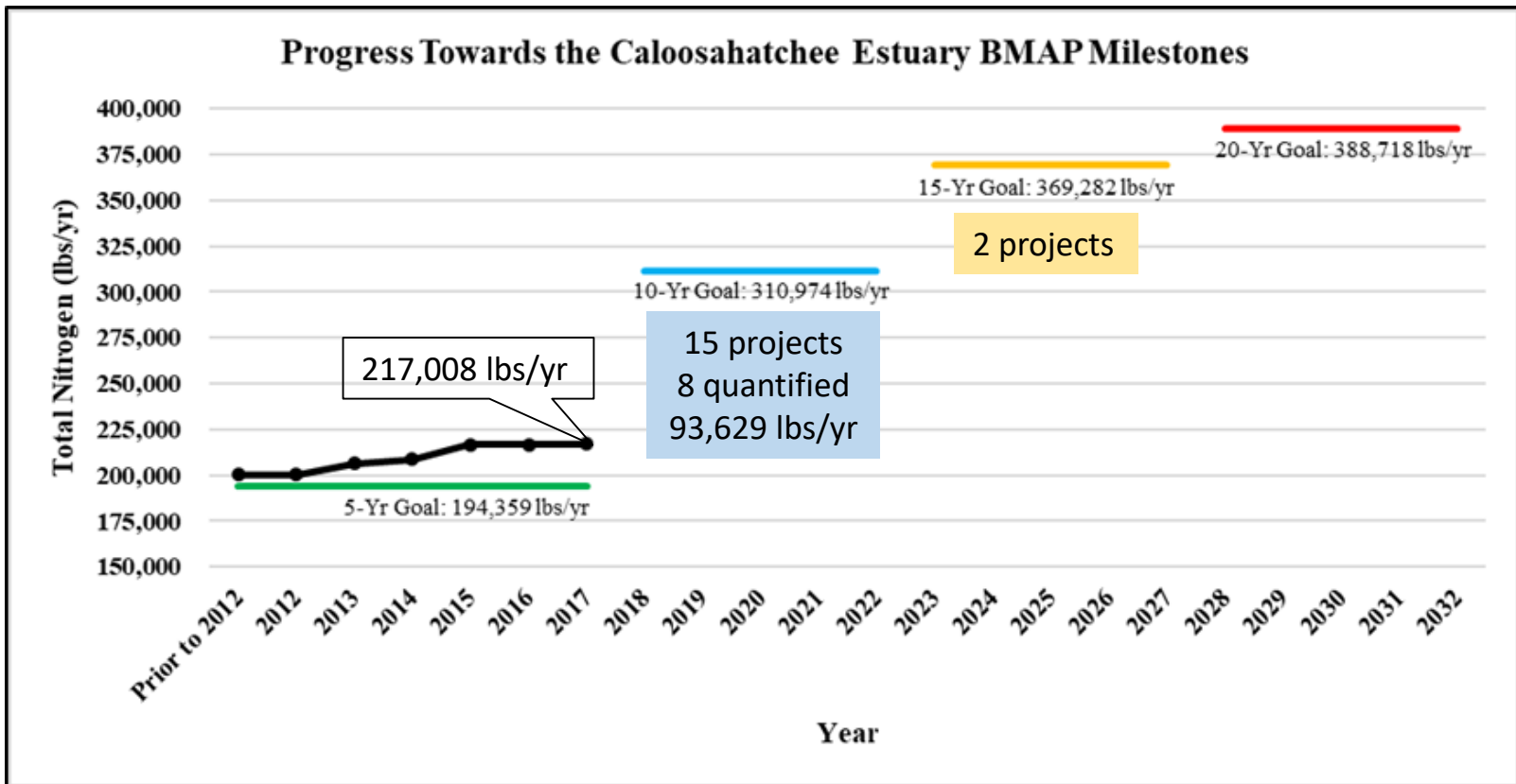


3.3 Water Quality Monitoring





3.1 Milestones



- 5-year milestone (Years 1 to 5): 50 % or 194,360 lbs/yr TN
- 10-year milestone (Years 6 to 10): 80 % or 310,975 lbs/yr TN
- 15-year milestone (Years 11 to 15): 95 % or 369,283 lbs/yr TN



3.2 Modeling and Allocations

- During BMAP development, stakeholders expressed concerns about the models used for the TMDL
- Tetra Tech and Wood PLC (formerly AMEC Foster Wheeler) were contracted by DEP to evaluate and revise the existing models
- Modeling is ongoing, and results can help guide implementation
 - Tributary: clipped HSPF model to investigate causative pollutant(s)
 - Estuary: EFDC model scenarios to investigate multiple stressors, including the role of nutrients





Tributaries Path Forward

- Clipped HSPF model
- Focused
- Faster
- Investigate causative pollutant(s)

A process flow diagram consisting of two blue chevron-shaped boxes pointing to the right. Each chevron contains a white rounded rectangle with text. The first chevron points to the second, indicating a sequence of steps.

New model complete
Early 2018

Draft TMDL
Spring-Summer 2018



Estuary: Environmental Fluid Dynamics Code (EFDC)

Why Revisit Estuary TMDL?

- Support current and future restoration activities
- Revised HSPF and EFDC models as better tools
- More recent data
- Determine more refined target
- Address numeric nutrient criteria (NNC)



Estuary Path Forward

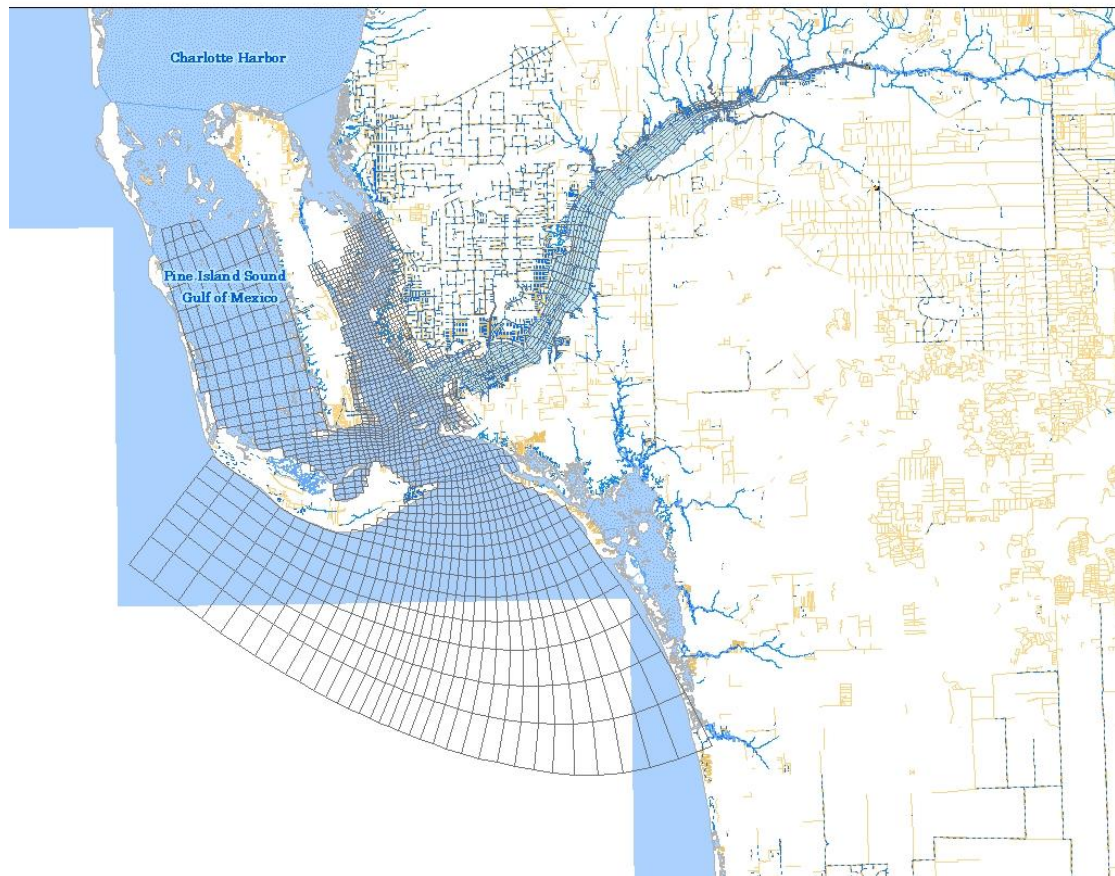
- V1: Final Report May 2017

- V2

- Chlorophyll *a*
- Carbon
- Total suspended solids
- Light extinction

- V3

- Chlorophyll *a*
- Total suspended solids





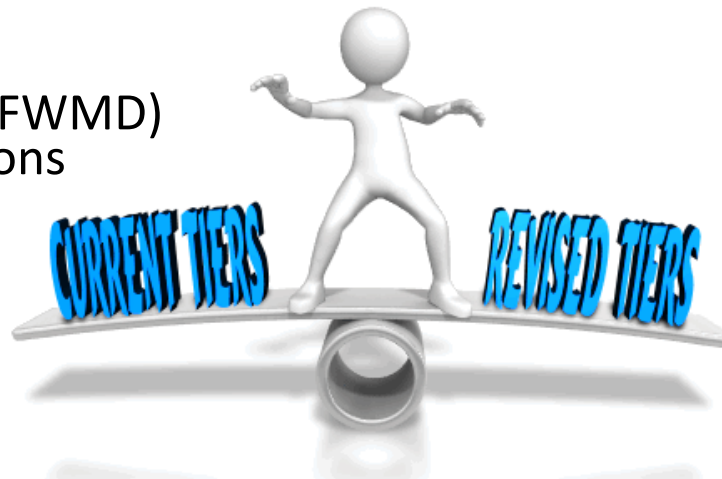
3.3 Water Quality Monitoring

Current Tier System

- Tier 1
 - Essential/mandatory for tracking WQ trends and pollutant reductions
- Tier 2
 - Help to understand the total load
- Tier 3
 - Non-stakeholder sampling station
- Tier 4
 - Florida (DEP/SFWMD) sampling stations

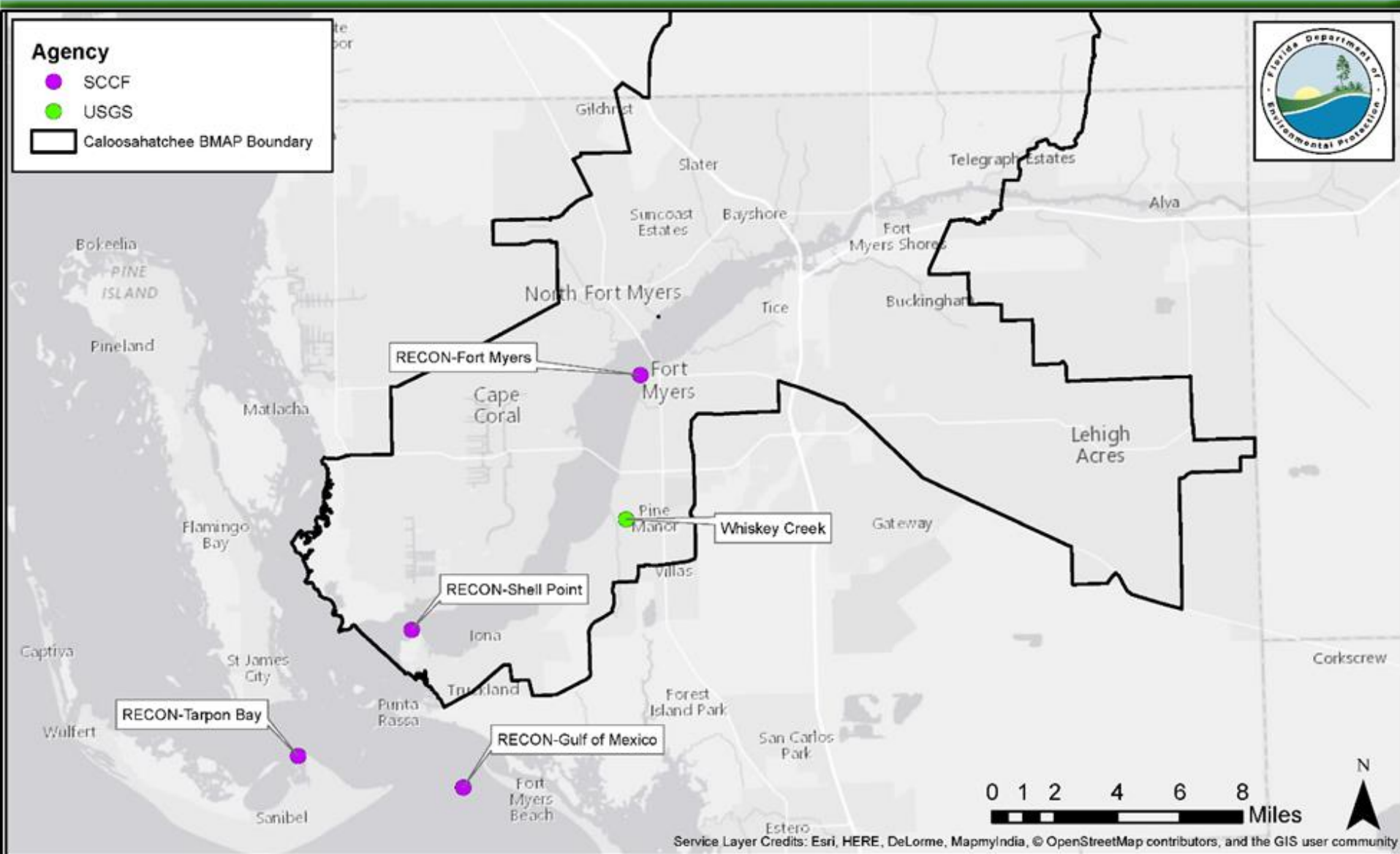
Draft Revised Tier System

- Tier 1
 - Essential/mandatory stations to track BMAP progress
- Tier 2
 - Regional/secondary analyses
- Tier 3
 - Other purposes designated by USGS/SCCF





BMAP Monitoring Network – Recommended Tier 3 Stations



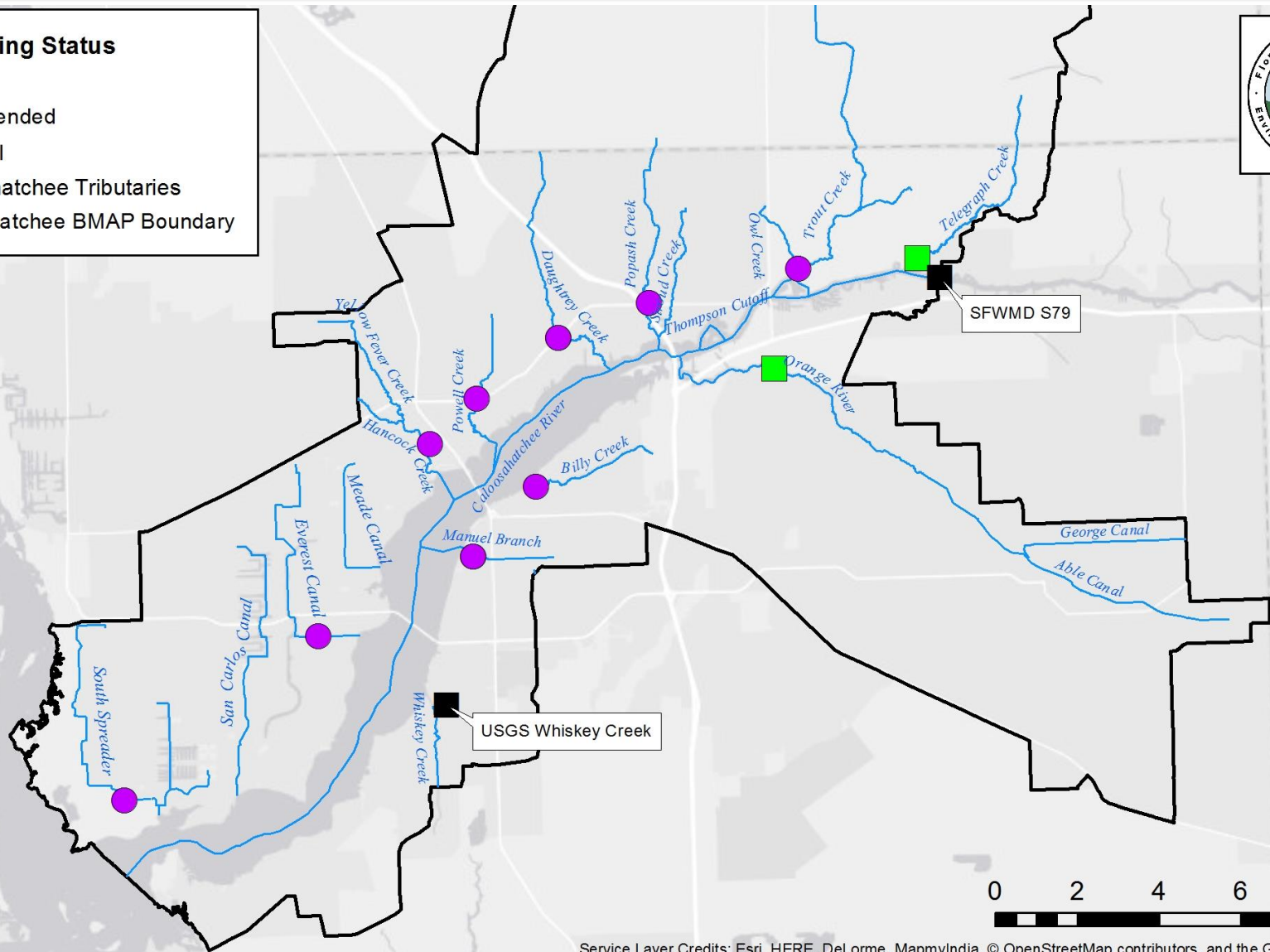


Flow Monitoring Locations



Flow Monitoring Status

- Current
- Recommended
- Additional
- Caloosahatchee Tributaries
- Caloosahatchee BMAP Boundary



Service Layer Credits: Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community



WIN Update

More information at:

<http://publicfiles.dep.state.fl.us/DEAR/storet/WIN> Communication

Denise Miller - Denise.Miller@dep.state.fl.us - 850-245-8516

Julie Zimmerman - Julie.M.Zimmerman@dep.state.fl.us - 850-245-8508

WIN/STORET Coordinators:

WIN/STORET Coordinator	DEP District/Area of Responsibility	Phone	Email
Tommy Adams	South, Central, & Statewide	850-245-8467	thomas.l.adams@dep.state.fl.us
Justin Nelson	Southeast, Northeast, & Northwest	850-245-8510	justin.m.nelson@dep.state.fl.us
Lisa Schwenning	Southwest	850-245-8509	lisa.schwenning@dep.state.fl.us



Next Steps

Please submit comments on the draft
5-Year Review by

Monday, October 30, 2017

Timeline for Stakeholder Involvement	Deadline
1. Stakeholders submit 5-Year Review project updates and new projects to DEP (included updates through 5/31/2017)	7/14/2017
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Contact Information

For additional information please contact:

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Questions & Comments