

From: Gary Goforth [mailto:gary@garygoforth.net]

Sent: Tuesday, November 26, 2019 5:08 PM

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Cc: 'wgraham@ufl.edu'; 'mparsons@fgcu.edu'; 'jsullivan@fau.edu'; 'Paul@si.edu'; 'evelyn.gaiser@fiu.edu'

Subject: RE: Recommendations for Improving the Basin Management Action Plans for Lake Okeechobee and St. Lucie Estuary

Tom and all the members of the Blue-Green Algal Task Force: Congratulations on production of the initial consensus document – great job! I understand that additional details will be deliberated at your upcoming meeting in January.

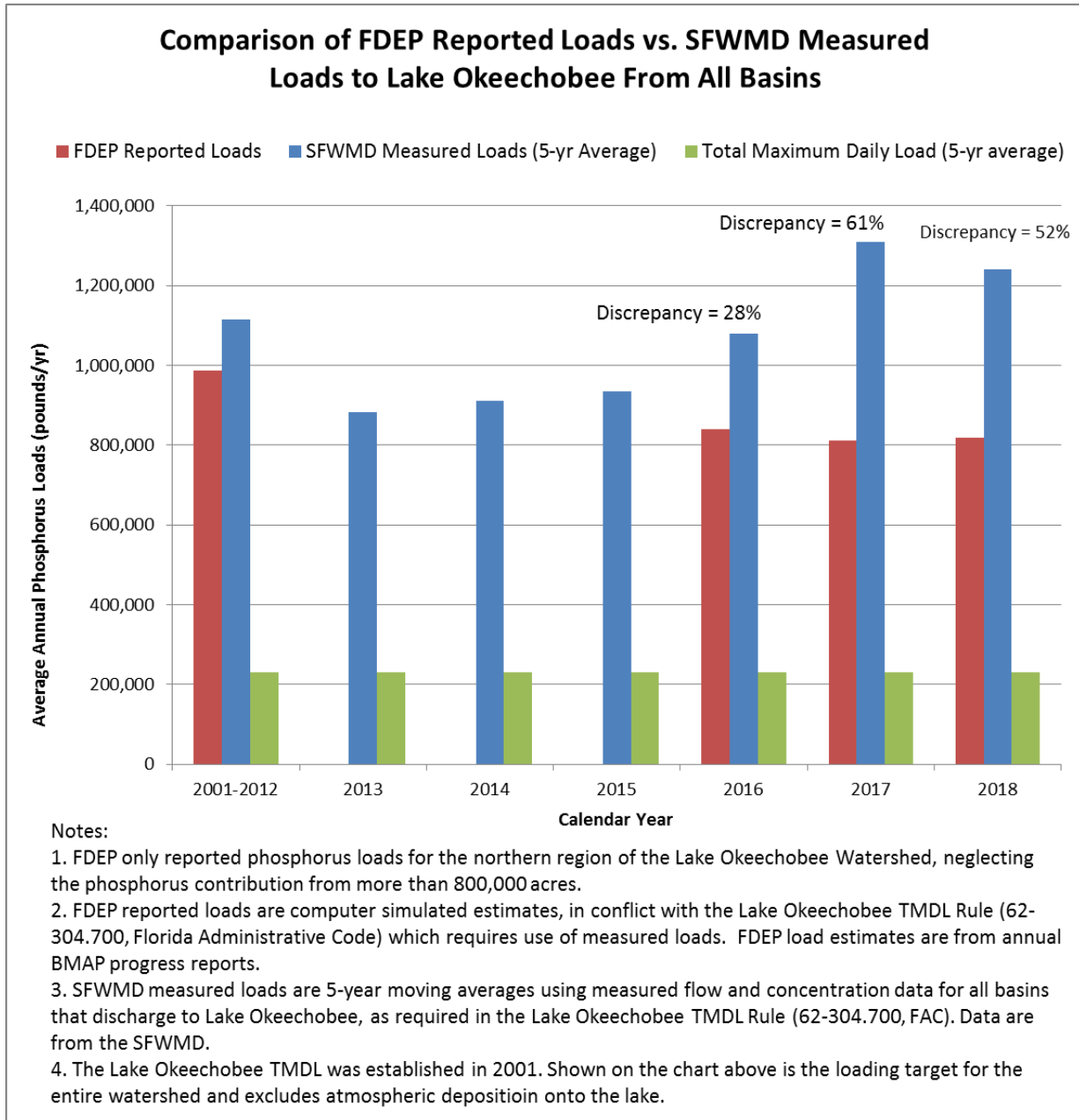
Some recommendations for your consideration:

1. FDEP should use measured nutrient load data for the annual BMAP progress reports – data that are available from the SFWMD. Currently FDEP uses computer simulations of best case scenarios regarding ag BMP performance, etc. and the discrepancies between what they report and measured data ranged from 28% to 61% for Lake Okeechobee (see attachments). Also – their Lake O report claims that phosphorus loading from the northern 6 subwatersheds has been reduced by 17% from the 2001-2010 starting period – but the SFWMD data show that loads have INCREASED by 15%. This misleading information has to be corrected.
2. FDEP should include a nutrient concentration map for the Lake O BMAP report (see attachment) to clearly identify the “hot” basins. This will help focus limited financial and staff efforts.
3. For the St. Lucie BMAP report, FDEP should include the nutrient loads from Lake Okeechobee – their reports currently ignore this significant source of pollution loading. Seriously – FDEP ignores this significant source of loading to the estuary.
4. Other specific recommendations for the Lake O and St. Lucie BMAP reports are attached.
5. As the “FDACS BMP Cost Share” attachment documents, since 2009, the Florida public has spent more than \$50 million for ag BMP cost share in the Lake Okeechobee watershed. Yet phosphorus loading is worse now than in the 2001-2010 starting period. (Can we get our money back? ☺) Suggest some level of financial and performance accountability be attached to ag BMP cost-share dollars.

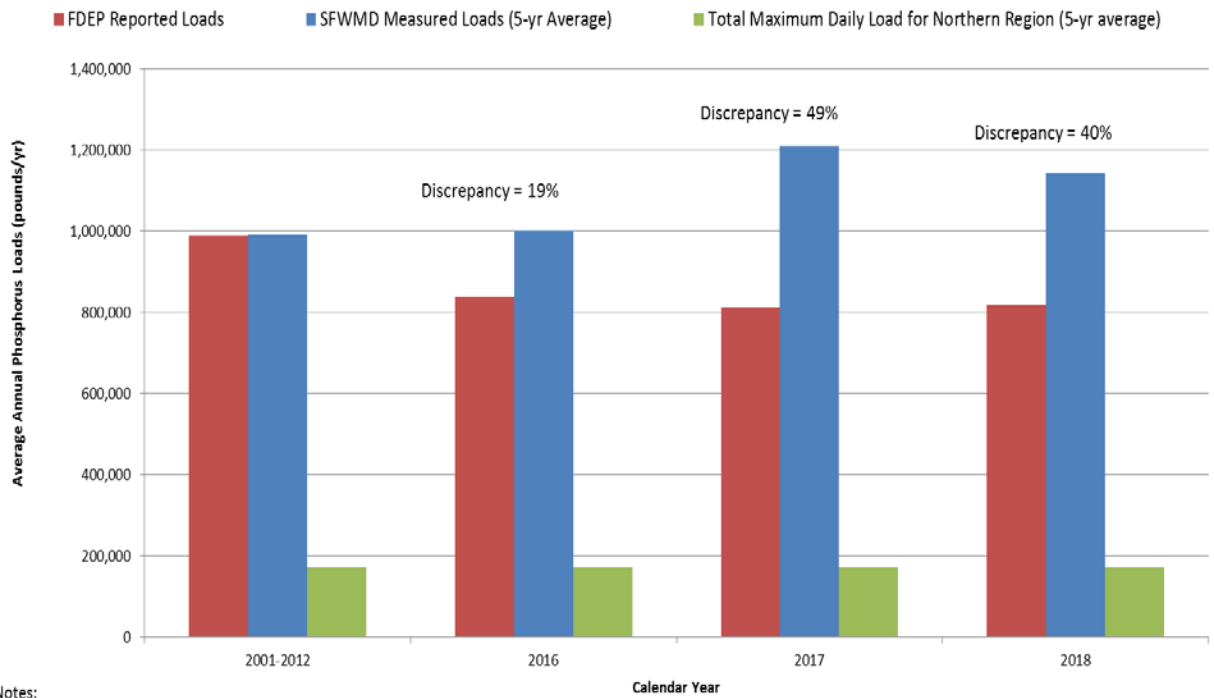
Thank you for your invaluable service on the Task Force.

Gary Goforth

Figure 1.



Comparison of FDEP Reported Loads vs. SFWMD Measured Loads to Lake Okeechobee From the Northern Region



Notes:

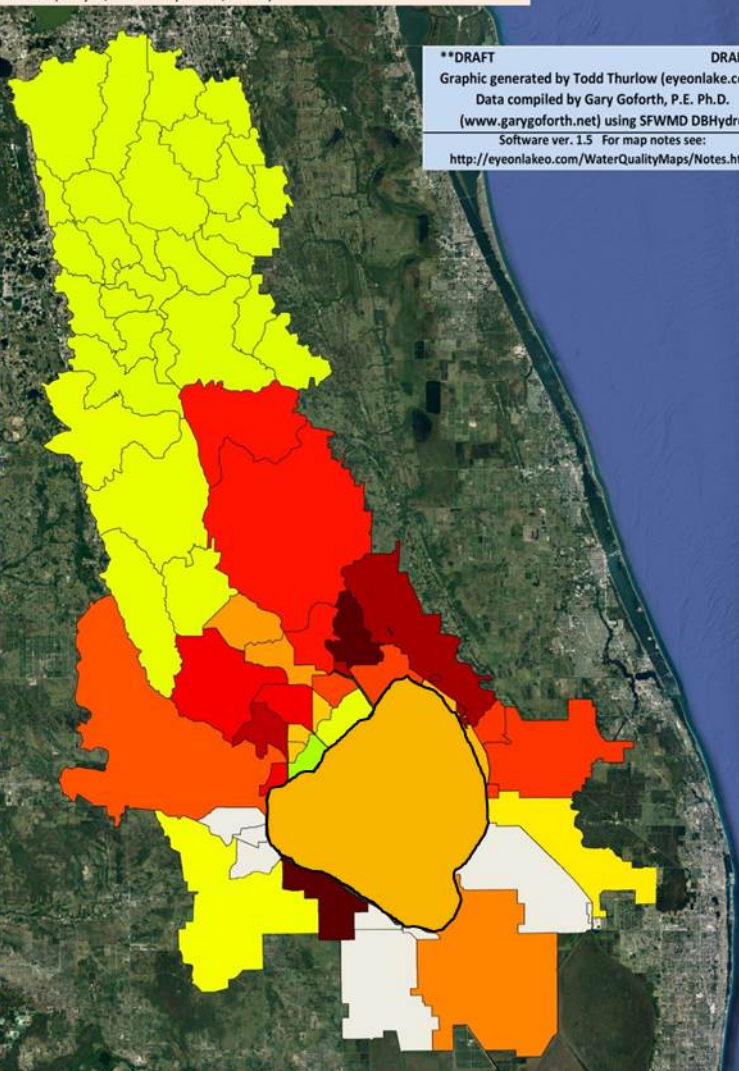
1. FDEP only reported phosphorus loads for the Northern Region of the Lake Okeechobee Watershed, neglecting the phosphorus contribution from more than 800,000 acres.
2. FDEP reported loads are computer simulated estimates, in conflict with the Lake Okeechobee TMDL Rule (62-304.700, Florida Administrative Code) which requires use of measured loads. FDEP load estimates are from annual BMAP progress reports.
3. SFWMD measured loads are 5-year moving averages for the Northern Region using measured flow and concentration data, as required in the Lake Okeechobee TMDL Rule (62-304.700, FAC). Data are from the SFWMD.
4. The Lake Okeechobee TMDL was established in 2001. Shown on the chart above is the loading target for the Northern Region established in the Lake Okeechobee Operating Permit issued by FDEP to the SFWMD in June 2007.

Lake Okeechobee Watershed Total Phosphorus Concentrations

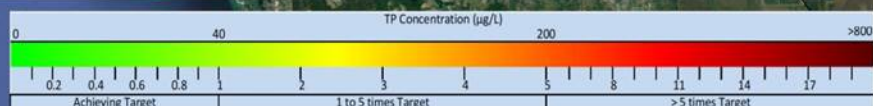
WY2019 (May 1, 2018 - April 30, 2019)

Source	TP Concentration $\mu\text{g/L}$	Target Multiple
East Lake Okeechobee Subwatershed 2	133	3.3
C-44/S-153/Basin 8 (S-308 at St. Lucie Canal) 2	289	7.2
L-8 Basin (Culvert 10A) 2	110	2.7
Fisheating Creek Subwatershed	221	5.5
Fisheating Creek at Lakeport/L-61W Basin	221	5.5
Nicodous Slough North (Culvert 5)	no flow	no flow
Indian Prairie Subwatershed	225	5.6
C-40 Basin [(S-72)-w*(S-72)]	431	10.8
C-41 Basin [(S-71)-w*(S-71)]	565	14.1
C-41A Basin [(S-84)-w*(S-84)]	160	4
L-48 Basin (S-127 total)	84	2.1
L-49 Basin (S-129 total)	46	1.2
L-59E Basin [(G-33)+(G-34)]	259	6.5
L-59W Basin (G-74)	132	3.3
L-60EBasin(G-75)	135	3.4
L-60W Basin (G-76)	133	3.3
L-61E Basin	no flow	no flow
S-131 Basin	57	1.4
Taylor Creek Nubbin Slough Subwatershed	503	12.6
S-133 Basin	267	6.7
S-135 Basin	141	3.5
S-154 Basin	857	21.4
S-154C Basin	578	14.4
S-191 Basin	626	15.7
South Lake Okeechobee Subwatershed 2	391	9.8
715 Farms (Culvert 12A) 2	no flow	no flow
East Beach Drainage District (Culvert 10) 2	no flow	no flow
East Shore Drainage District (Culvert 12) 2	no flow	no flow
Industrial Canal (S-310 in S-4 Basin) 2	289	7.2
S-2 Basin 2	174	4.3
S-3 Basin 2	no flow	no flow
S-4 Basin 2	813	20.3
South Florida Conservancy Drainage District (S-236) 2	no flow	no flow
South Shore/South Bay Drainage District (Culvert 4A) 2	no flow	no flow
S-5A Basin (S-352 West Palm Beach Canal) 2	no flow	no flow
West Lake Okeechobee Subwatershed (S-77) 2	92	2.3
East Caloosahatchee Basin (S-77) 2	92	2.3
Nicodemus Slough South (Culvert 5A) 2	no flow	no flow
Lake Istokpoga Subwatershed (min(S-68),Indian Prairie out)	84	2.1
Lower Kissimmee Subwatershed (S-65E-min[(S-65),(S-65E)])	367	9.2
Upper Kissimmee Subwatershed (min[(S-65),(S-65E)])	77	1.9
Total Lake Okeechobee Watershed	166	4.1

****DRAFT** **DRAFT****
 Graphic generated by Todd Thurlow (eyeonlake.com).
 Data compiled by Gary Goforth, P.E. Ph.D.
 (www.garygoforth.net) using SFWMD DBHydro
 Software ver. 1.5 For map notes see:
<http://eyeonlake.com/WaterQualityMaps/Notes.html>



In-lake concentration **156**



Attachment 2A - Key Recommendations for Enhancing the Lake Okeechobee BMAP (page 1 of 2)

No.	Deficiency	Reason This is a Problem	Recommended Remedy
1	The Lake Okeechobee TMDL Rule (Ch. 62.304.700(1)) requires loads to be reported as a 5-yr annual average of measured values. However, the BMAP does not use available measured data when calculating nutrient loads, instead uses a computer simulated best case scenario that ignores many sources of pollution, including Class AA biosolids, excess fertilization, and legacy nutrients	The BMAP underestimates pollution load to Lake Okeechobee. For example, the measured 5-yr average load into Lake Okeechobee for the period ending Dec. 2017 was 60% greater than the load reported in the 2018 BMAP progress report.	Use available flow and concentration data collected, analyzed, made available to the public and reported by the SFWMD when calculating and reporting nutrient loads for attainment of the TMDL. This is required by the TMDL Rule and will be consistent with relevant regulatory programs.
2	The BMAP loading estimate ignores loads from more than 800,000 acres (23%) of the Lake Okeechobee watershed.	The BMAP underestimates pollution load to Lake Okeechobee	Include all of the Lake's watershed when estimating loads to the lake, as required by the TMDL Rule.
3	The BMAP does not identify projects that collectively achieve the TMDL.	The BMAP is not a complete plan to achieve the TMDL.	Identify sufficient projects to achieve the TMDL.
4	There is no deadline to achieve the TMDL. The Florida Legislature removed the January 2015 deadline, established in 2000, and replaced it with an ambiguous 15-20 year timeframe.	With no deadline, there is no sense of urgency, no accountability, and likely, no attainment of the required load reductions.	The legislature should establish a hard deadline to achieve the TMDL with suitable consequences for failure to attain it.
5	The state's nutrient control program for the lake, which is based on the BMAP, does not contain an annual assessment for compliance purposes.	Without an annual assessment for compliance purposes, landowners are not held accountable for implementing timely measures to reduce excessive nutrient levels leaving their property. Without accountability, there is no mechanism to identify what projects and BMPs are working, or to implement additional measures.	Establish an annual assessment for compliance; see e.g., the EAA and C-139 Basin Rules (40E-63 or Goforth et al. 2013, http://www.garygoforth.net/Draft_LOW_TSD_-_Feb_2013.pdf)
6	The BMAP does not establish sub-watershed level performance measures which would focus efforts in the most critical areas. Instead it establishes a single value for the entire watershed. Related, the BMAP does not give an accounting of the status and water quality conditions within the nine sub-watersheds.	Without sub-watershed level performance measures, it is impossible to identify trends, focus on hot spots, and to better understand what BMPs are working well in some basins so these lessons learned could be applied in other basins that may not be working as well.	Establish sub-watershed level performance measures for sub-watersheds, and give an annual accounting of the status and water quality conditions within the nine sub-watersheds (see Goforth et al. 2013)
7	The BMAP has changed reporting periods since its initial development, and these are different from established water year consistent with data reports from SFWMD	This unnecessarily creates conflict and confusion when cross referencing reports and loading estimates.	Use a May 1 to April 30 water year, which is the standard period used by the SFWMD.
8	The BMAP does not calculate or report nitrogen loads to the Lake, in part because the state has failed to set a TMDL for total nitrogen.	The explosive growth of toxic blue green algae (microcystis) in Lake Okeechobee requires high levels of water-borne nitrogen, and due to the public health, economic and environmental consequences of these blooms, particularly when discharged to the estuaries, nitrogen loading to the lake must be controlled.	The state should adopt a Lake Okeechobee TMDL for nitrogen. In the interim, the BMAP could report the nitrogen loads to the lake using available data collected and reported by SFWMD.

Attachment 2A - Key Recommendations for Enhancing the Lake Okeechobee BMAP (concluded)

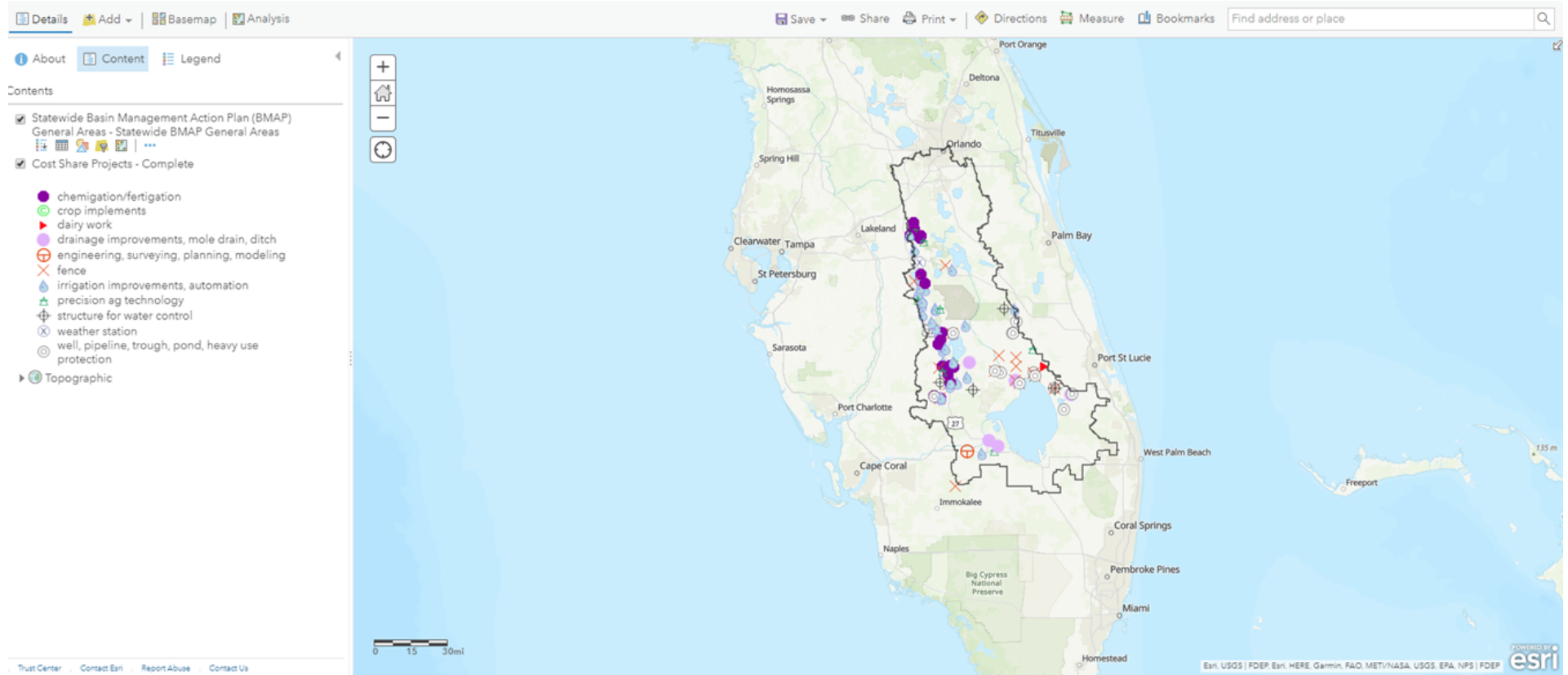
No.	Deficiency	Reason This is a Problem	Recommended Remedy
9	The BMAP assumes that agricultural BMPs have been implemented (many without field verification) and are working at 100% effectiveness (most without monitoring) as long as landowners sign a notice of intent to voluntarily implement BMPs.	Agriculture is the largest land use within the watershed, and was responsible for more than 75% of the phosphorus load during the starting period. The significant discrepancy between reported and actual phosphorus loading to the Lake is clear evidence that the assumption of 100% effectiveness is flawed.	Multiple actions are needed. 1. Additional staff and agency budget are needed to field verify the implementation of ag BMPs. 2. Additional staff and agency budget are needed to implement reasonable monitoring programs at secondary and perhaps tertiary tiers within each sub-watershed in order to verify the effectiveness of ag BMPs. 3. Report measured loads for each sub-watershed, and if available each tier within the sub-watersheds. This will help identify basins with the higher unit area loads that could be prioritized. 4. if computer simulations continue to be used, they should be re-calibrated each year to estimate the loading from each land use.
10	The BMAP method does not directly account for hydrologic variability, inherent in south Florida rainfall and runoff, and therefore cannot produce a reliable annual assessment. Instead the BMAP uses a computer simulation to represent the overall hydrologic variability of a "long-term period."	Loads are a function of runoff volume which varies from year-to-year with rainfall. Without a method that directly incorporates hydrologic variability, the assessment method cannot ascertain whether source controls are effective, or the loads are variable resulting from variable rainfall patterns.	Establish performance measures that directly account for hydrologic variability; see for example the EAA and C-139 Basin regulatory programs (40E-63, F.A.C.) and the draft assessment method contained in Goforth et al. 2013.
11	The BMAP is not in synch with the Works of the District permitting program establish in 1989 to limit phosphorus levels entering the lake (Rule 40E-61).	There is presently no regulatory program that holds individual landowners accountable for pollution leaving their property. Without accountability, there is no mechanism to identify what projects and BMPs are working or to implement additional measures.	Complete the revisions to 40E-61 as directed by the 2007 NEEPP legislation. Until the BMAP process began, the District was reinforcing the Works of the District regulatory program as directed by the Legislature through the 2007 Northern Everglades and Estuaries Protection Plan (373.4595). A Technical Support Document was drafted (see Goforth et al. 2013) that can be used as a foundation.
12	The BMAP in general requires more rigorous monitoring for projects implemented by municipalities than by agricultural landowners.	A reasonable monitoring program is essential for an effective program and there should be a minimum standard for all projects, or projects within a geographical area.	FDEP should establish a minimum standard for monitoring for all projects, or projects within a geographical area.
13	Inadequate funding opportunities exist for full BMAP implementation.	Water quality improvement projects require adequate funding.	Assist landowners and municipalities with increased state or federal funding opportunities.

Attachment 2B – Key Recommendations for Enhancing the St. Lucie Estuary BMAP (page 1 of 2)

No.	Deficiency	Reason This is a Problem	Recommended Remedy
1	The BMAP does not use available data when calculating nutrient loads, instead uses a computer simulated best case scenario that ignores many sources of pollution, including Class AA biosolids, excess fertilization, and legacy nutrients	The BMAP underestimates pollution load to the estuary. For example, the most recent 5-yr average nitrogen load to the estuary was approximately 70% greater than the load reported in the 2018 BMAP progress report.	Use available data collected, analyzed, made available to the public and reported by the SFWMD when calculating and reporting nutrient loads. This will be consistent with relevant regulatory programs.
2	The BMAP loading estimate ignores loads from Lake Okeechobee regulatory releases.	The BMAP significantly underestimates the pollution load to the estuary. For example, in WY2018, the Lake contributed more than 350,000 pounds of phosphorus - which is more than twice the TMDL for the entire watershed.	Modify the BMAP to account for loads from Lake Okeechobee regulatory releases.
3	There is no deadline to achieve the TMDL.	With no deadline, there is no sense of urgency, no accountability, and likely, no attainment of the required load reductions.	The legislature should establish a hard deadline to achieve the TMDL with suitable consequences for failure to attain it.
4	The state's nutrient control program for the estuary, which is based on the BMAP, does not contain an annual assessment for compliance purposes.	Without an annual assessment for compliance purposes, landowners are not held accountable for implementing timely measures to reduce excessive nutrient levels leaving their property. Without accountability, there is no mechanism to identify what projects and BMPs are working, or to implement additional measures.	Establish an annual assessment for compliance; see e.g., the EAA and C-139 Basin Rules (40E-63 or Goforth et al. 2013, http://www.garygoforth.net/TSD%20for%20SLRW%20-%2012%2018%202013.pdf)
5	The BMAP does not establish sub-watershed level performance measures which would focus efforts in the most critical areas. Instead it establishes a single value for the entire watershed. Related, the BMAP does not give an accounting of the status and water quality conditions within the nine sub-watersheds.	Without sub-watershed level performance measures, it is impossible to identify trends, focus on hot spots, and to better understand what BMPs are working well in some basins so these lessons learned could be applied in other basins that may not be working as well.	Establish sub-watershed level performance measures for sub-watersheds, and give an annual accounting of the status and water quality conditions within the sub-watersheds (see Goforth et al. 2013).
6	The BMAP reporting period is different from established water year consistent with data reports from SFWMD.	This unnecessarily creates conflict and confusion when cross referencing reports and loading estimates.	Use a May 1 to April 30 water year, which is the standard period used by the SFWMD.

Attachment 2B – Key Recommendations for Enhancing the St. Lucie Estuary BMAP (concluded)

No.	Deficiency	Reason This is a Problem	Recommended Remedy
7	The BMAP assumes that agricultural BMPs have been implemented (many without field verification) and are working at 100% effectiveness (most without monitoring) as long as landowners sign a notice of intent to voluntarily implement BMPs.	Agriculture is the largest land use within the watershed, and was responsible for more than 75% of the phosphorus load during the starting period. The significant discrepancy between reported and actual phosphorus loading to the estuary is clear evidence that the assumption of 100% effectiveness is flawed.	Multiple actions are needed. 1. Additional staff and agency budget are needed to field verify the implementation of ag BMPs. 2. Additional staff and agency budget are needed to implement reasonable monitoring programs at secondary and perhaps tertiary tiers within each sub-watershed in order to verify the effectiveness of ag BMPs. 3. Report measured loads for each sub-watershed, and if available each tier within the sub-watersheds. This will help identify basins with the higher unit area loads that could be prioritized. 4. if computer simulations continue to be used, they should be re-calibrated each year to estimate the loading from each land use.
8	The BMAP method does not directly account for hydrologic variability, inherent in south Florida rainfall and runoff, and therefore cannot produce a reliable annual assessment. Instead the BMAP uses a computer simulation to represent the overall hydrologic variability of a "long-term period."	Loads are a function of runoff volume which varies from year-to-year with rainfall. Without a method that directly incorporates hydrologic variability, the assessment method cannot ascertain whether source controls are effective, or the loads are variable resulting from variable rainfall patterns.	Establish performance measures that directly account for hydrologic variability; see for example the EAA and C-139 Basin regulatory programs (40E-63, F.A.C.) and the draft assessment method contained in Goforth et al. 2013.
9	The BMAP is not in synch with the Works of the District permitting program establish in 1989 to limit phosphorus levels entering the lake (Rule 40E-61).	There is presently no regulatory program that holds individual landowners accountable for pollution leaving their property. Without accountability, there is no mechanism to identify what projects and BMPs are working or to implement additional measures.	Complete the revisions to 40E-61 as directed by the 2007 NEEPP legislation. Until the BMAP process began, the District was reinforcing the Works of the District regulatory program as directed by the Legislature through the 2007 Northern Everglades and Estuaries Protection Plan (373.4595). A Technical Support Document was drafted (see Goforth et al. 2013) that can be used as a foundation.
10	The BMAP in general requires more rigorous monitoring for projects implemented by municipalities than by agricultural landowners.	A reasonable monitoring program is essential for an effective program and there should be a minimum standard for all projects, or projects within a geographical area.	FDEP should establish a minimum standard for monitoring for all projects, or projects within a geographical area.
11	Inadequate funding opportunities exist for full BMAP implementation.	Water quality improvement projects require adequate funding.	Assist landowners and municipalities with Increased state or federal funding opportunities.
12	The FDEP BMAP method ignores the annual variability in the proportion of C-44 Canal Basin runoff that flows to the SLRE (as opposed to Lake Okeechobee).	The BMAP will fail to accurately document the load from the C-44 Canal Basin, by either underestimating or overestimating the load.	Modify the BMAP to account for loads from the entire C-44 Canal sub-watershed, and then separate those loads that are sent to the estuary.



FDACS BMP Cost Share Expenditures by Year

* The following represents those funds that have been contracted for expenditure.

Fiscal Year	Cost-share
2009-2010	1,500,133
2010-2011	3,168,575
2011-2012	1,255,962
2012-2013	1,046,285
2013-2014	2,010,750
2014-2015	4,984,516
2015-2016	8,897,110
2016-2017	9,135,025
2017-2018	10,078,094
2018-2019	8,634,590*
Total	50,711,040

Currently Invoiced and Implemented Cost Share Projects for FY 2018-2019

Subcategory	Sum of Amount Paid
chemigation/fertigation	\$71,729.22
crop implements	\$24,975.00
dairy work	\$331,642.62
drainage improvements, mole drain, ditch cleaning	\$44,469.74
engineering, surveying, planning, modeling	\$4,680.00
fence	\$316,019.89
groundwater protection	\$1,682.63
irrigation improvements, automation	\$824,388.03
precision ag technology	\$172,395.98
structure for water control	\$74,796.56
weather station	\$7,263.75
well, pipeline, trough, pond, heavy use protection	\$156,330.52
Grand Total	\$2,030,373.94