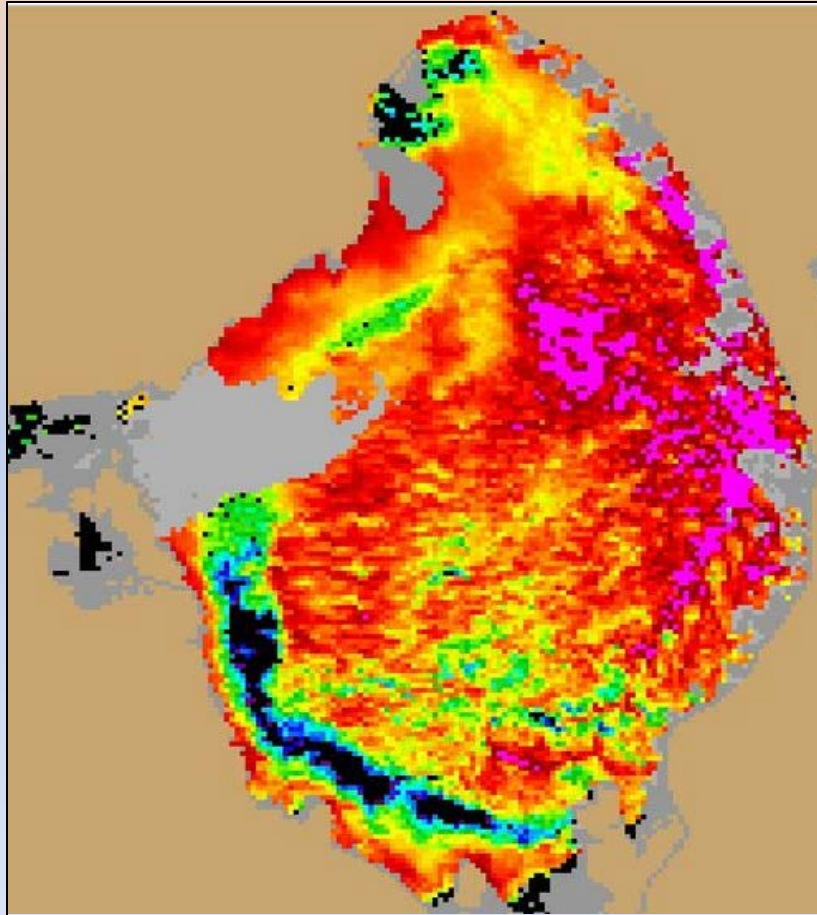


Water Quality of Lake Okeechobee and St. Lucie Estuary Watersheds – Are BMAPs Working?



January 11, 2019
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Gary Goforth, LLC

Lake Okeechobee

Watershed is almost 3.5 million acres

- 50% agriculture
- 38% natural lands and water
- 12% communities

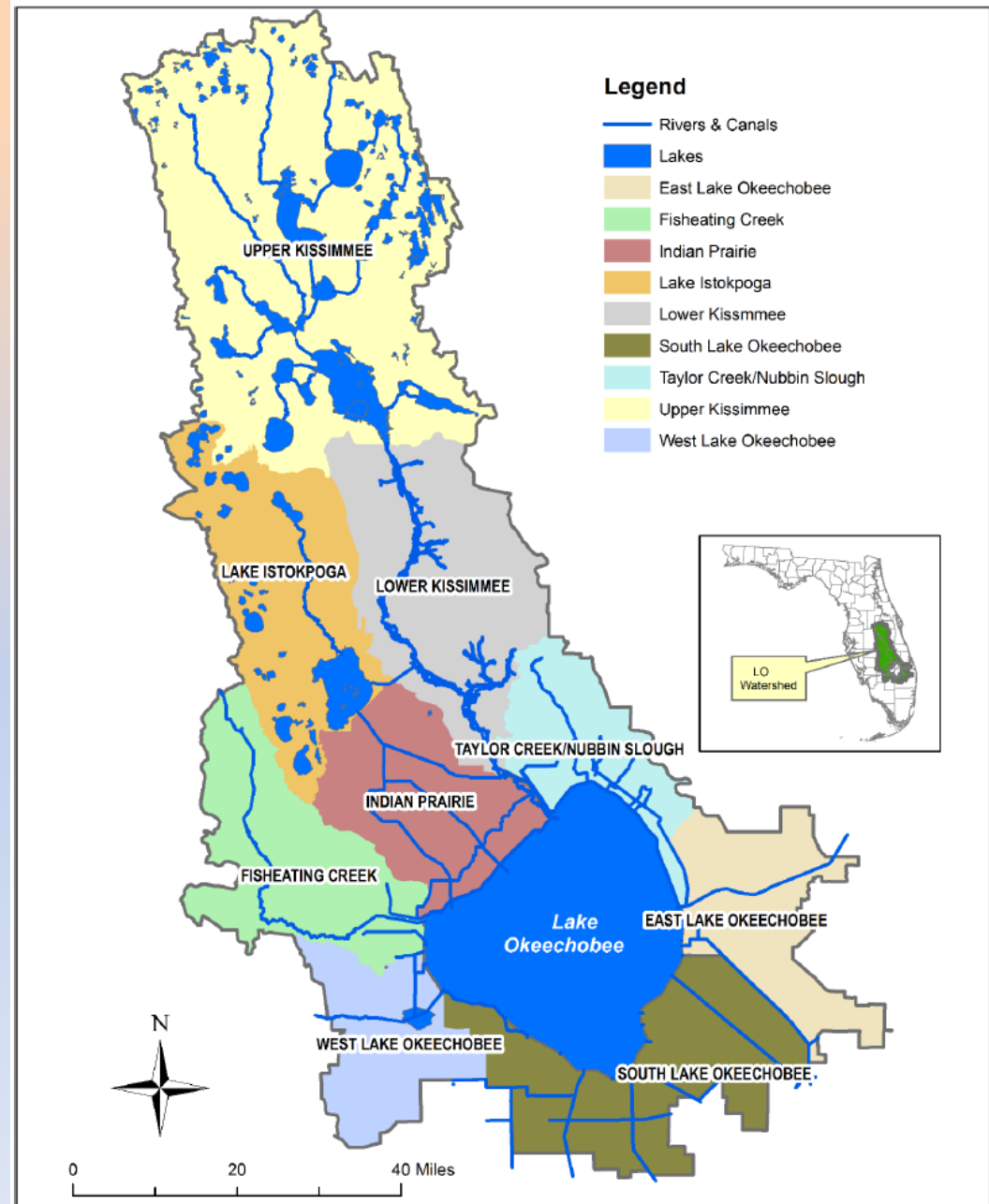
State has studied the causes of pollution for decades and identified solutions

Total Maximum Daily Load (TMDL)

- Set in 2001 at 231,483 pounds/yr of phosphorus from watershed

Original compliance date: January 2015

In 2016, Florida legislature deleted the 2015 deadline, and replaced it with an ambiguous process (BMAP) that does not hold landowners accountable for their pollution

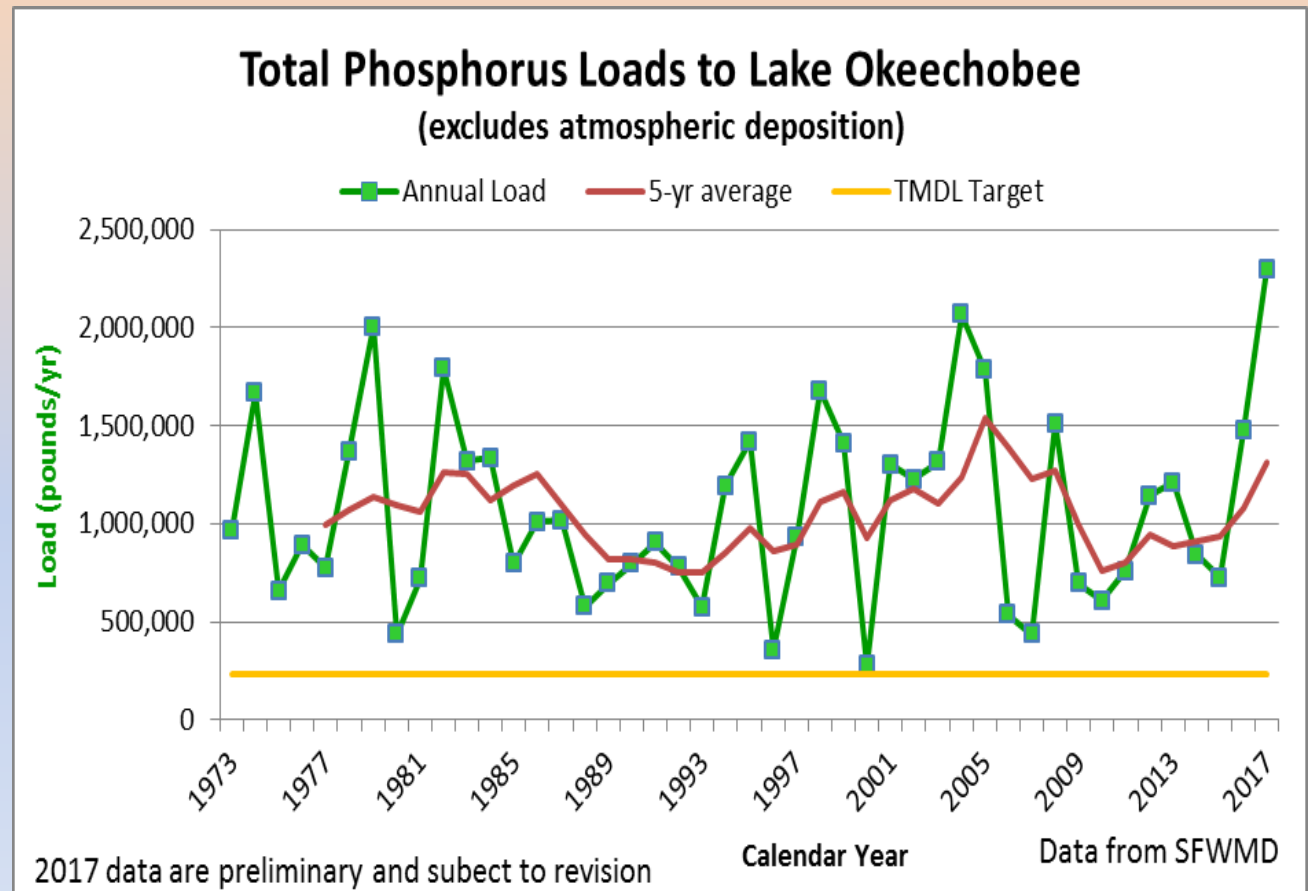


Pollution to the Lake is Increasing

During 2017 - historic high phosphorus loads.

1. High flows from Hurricane Irma
2. **High concentrations from watershed**
 - 252 ppb concentration – 3rd highest in history

The average load was more than 5 times the target for the watershed, and getting worse, despite 2014 Plan.

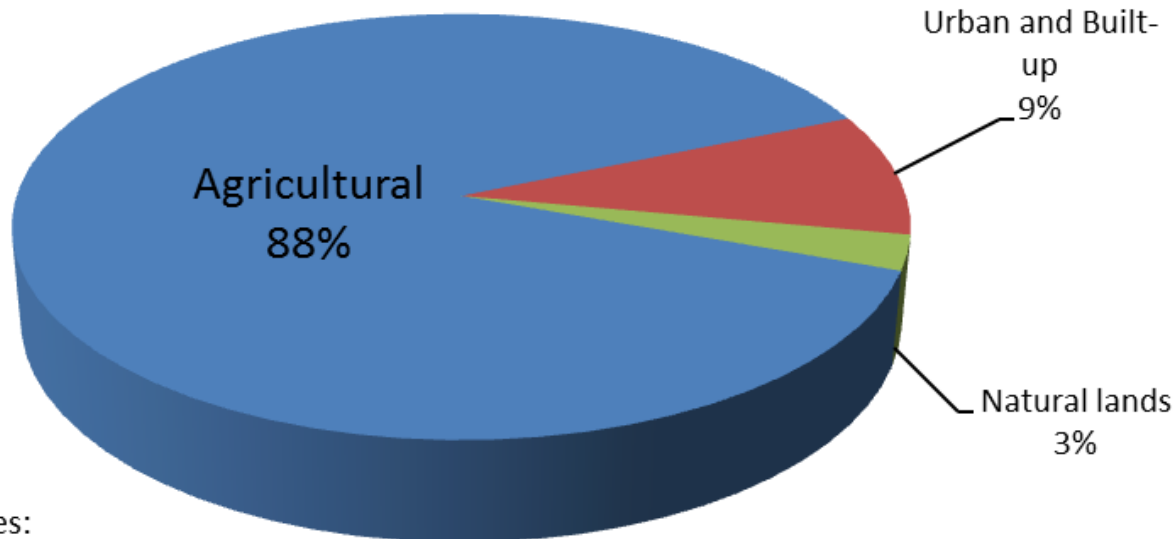


Estimated Pollutant Loading by Land Use – 2017

Total Phosphorus Loading to Lake Okeechobee (2017)

Annual load = 2,298,875 lbs/yr

Draft



Notes:

Land use data from SFWMD (2018); unit area loads revised from Goforth et al. (2013).

"Agricultural" includes traditional agricultural activities.

"Urban and built-up" includes residential, transportation, communication and utilities.

"Natural lands" includes wetlands, waterbodies, upland forests, rangeland and barren land.

This is only an estimate – since no parcel-specific water quality data are available; this estimate assumes each land use has responded uniformly to load reduction measures since the 2001-2012 Starting Period.

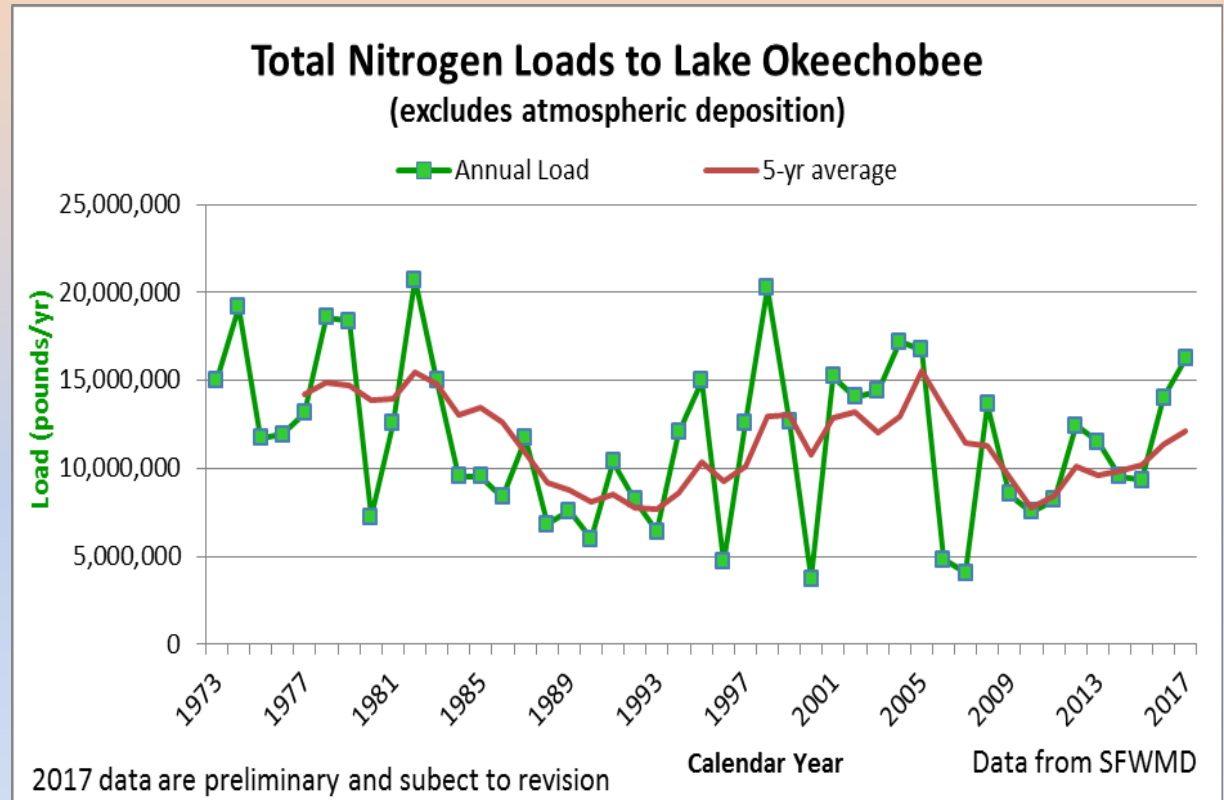
Experimental product for discussion only

Similar Trend for Nitrogen Pollution

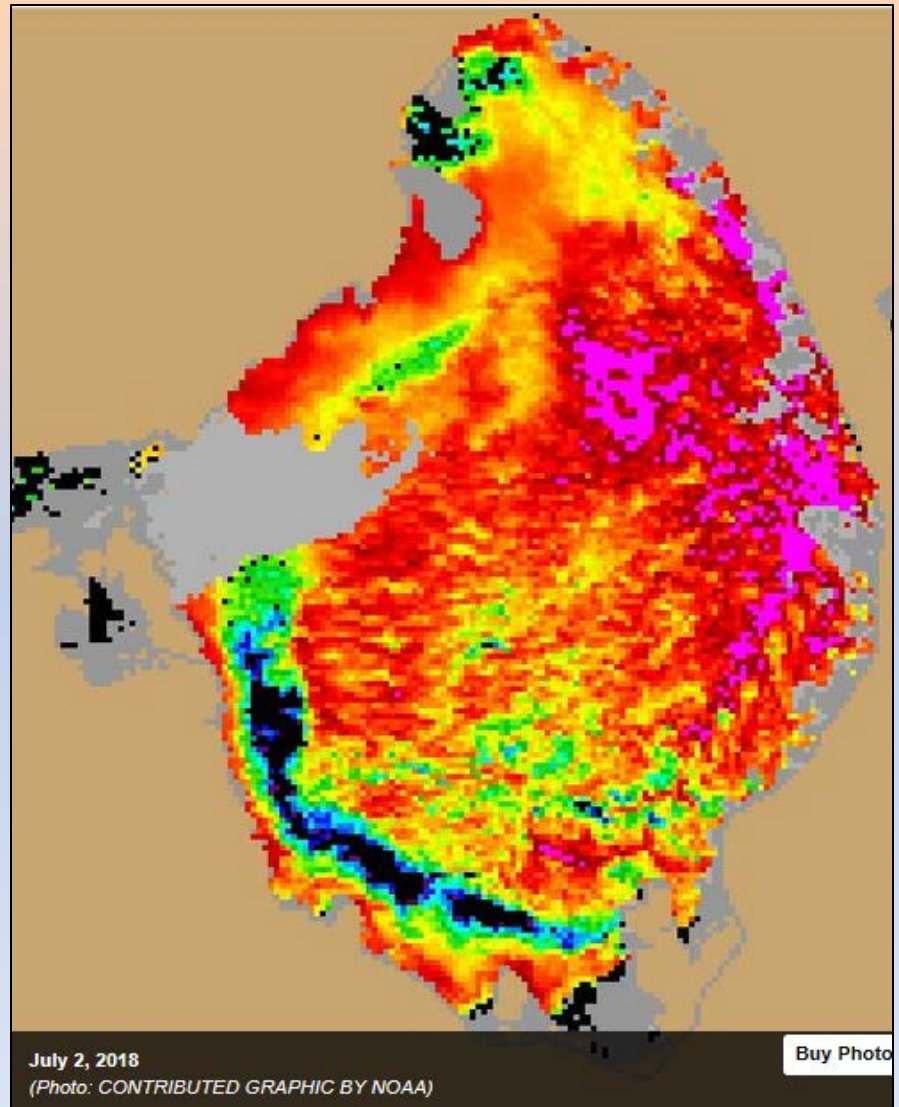
Average nitrogen loads have generally increased after achieving near-historic low in 2010

Total nitrogen is critical as toxic algae cannot obtain nitrogen from the air – feeds off of waterborne source

Yet the state has not set a limit for inflows of nitrogen



On July 2, 2018, NOAA reported that 90 percent of Lake's open water was covered by toxic blue green algae.



So ... in light of

- **historic high pollution loads to Lake**
- **trend of increasing pollution loads**
- **toxic algae bloom on lake**
- **polluted discharges to estuaries**

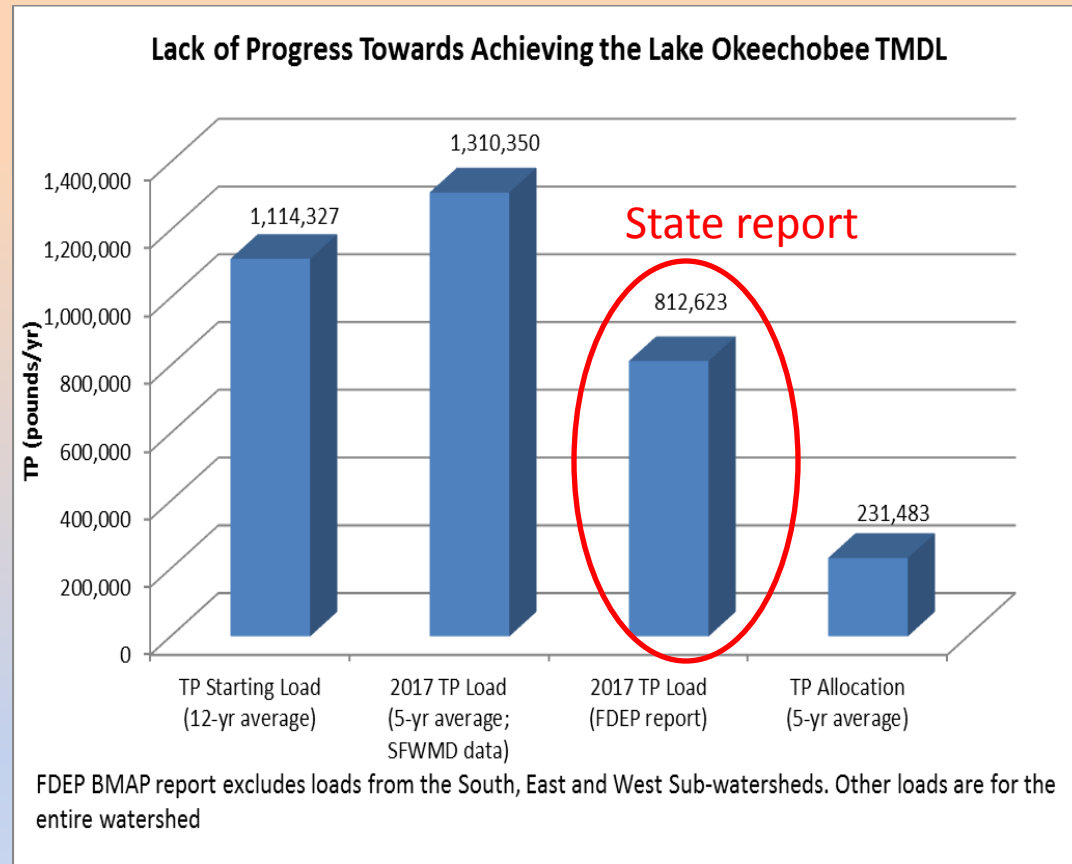
How were these addressed in the BMAP report?

State of Florida Protection Plan: Doesn't Use the Data

Uses computer model to simulate best case scenario ... as a result,

Significantly underestimated loading

- Claims phosphorus loading to the lake has **decreased**
- The **measured** 5-yr average annual load in 2017 was more than 60% higher than reported



Other flaws in the Basin Management Action Plan (BMAP) process include:

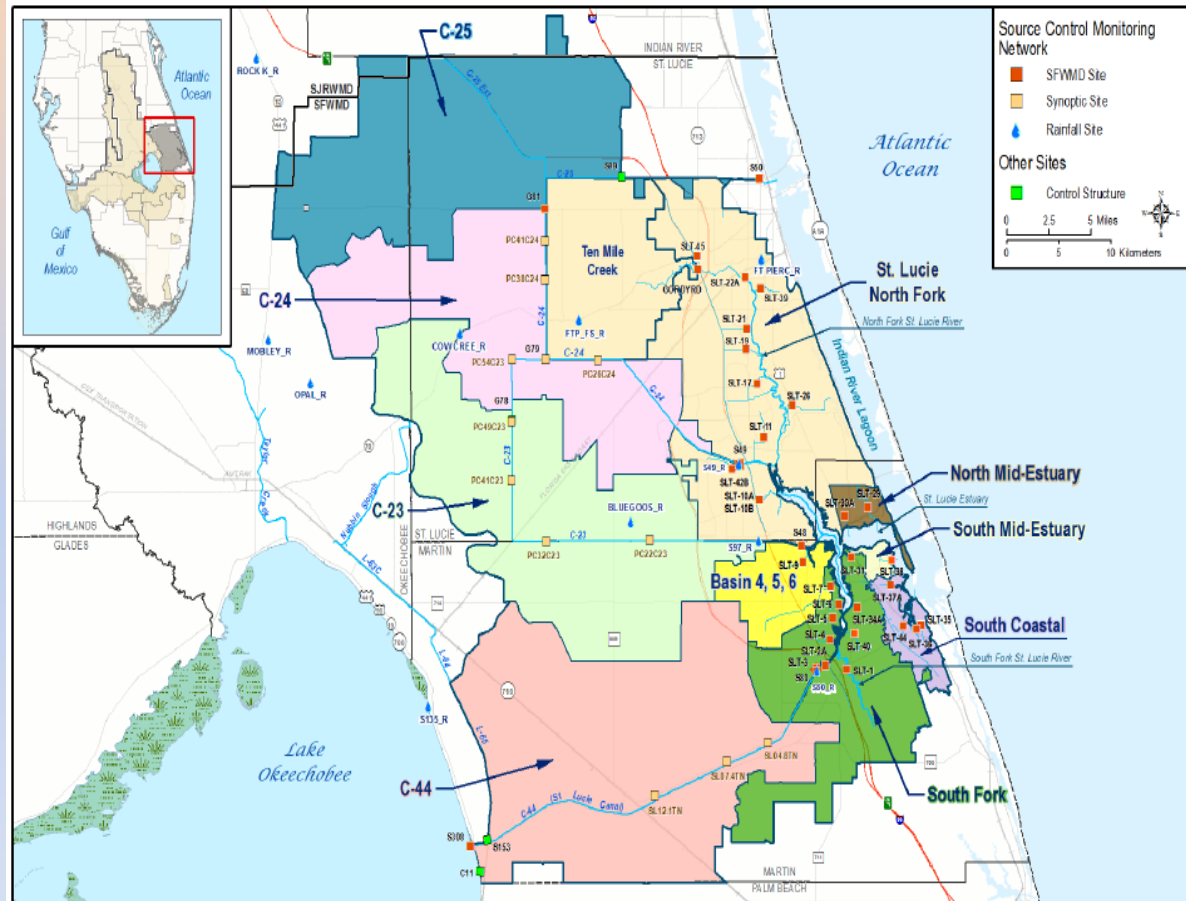
- ignores loading from over 800,000 acres of the watershed;
- fails to require field verification of Best Management Practices before assuming they are implemented;
- fails to use actual BMP performance data and instead relies on optimistic assumed load reductions;
- fails to account for the vast tonnage of nutrients being imported into the watershed from Class AA biosolids;
- fails to identify measures that will collectively achieve the TMDL;
- fails to assess and report loads on a sub-watershed level that would allow remediation of hot spots; instead generates a single load;
- fails to evaluate loading trends – but rather, adopts a “wait and see” approach that can only begin to make necessary corrections every 5-10 years – way too late to be effective.
- No TMDL for nitrogen

Recommendation: fix the flaws in the BMAP process!

Water Quality of St. Lucie Estuary Watershed

Major basins:

- C-23
- C-24
- C-44
- Ten Mile Creek
- Tidal Basins
 - 29 stations – concentrations
- Lake Okeechobee

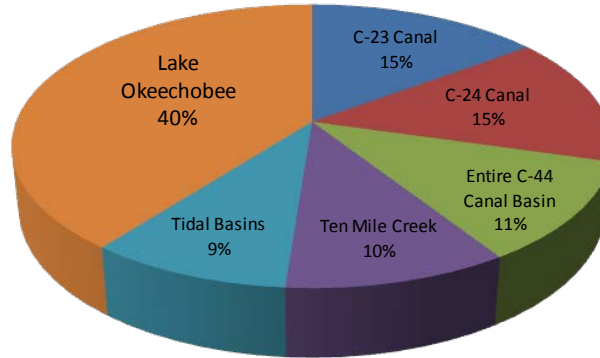


Loading to Estuary – Water Year 2018

117 days of discharges from the Lake **represented the single largest source of flow and pollution loading.**

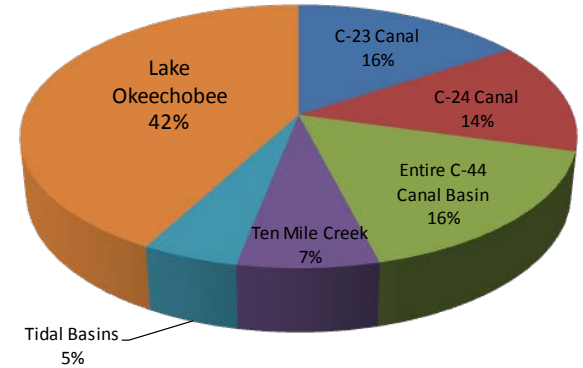
By contrast, runoff from **the highly urbanized Tidal Basin** contributed the smallest amount of pollution loading, ranging from 1-5 percent.

WY2018 Annual Surface Flow From the SLRE Watershed



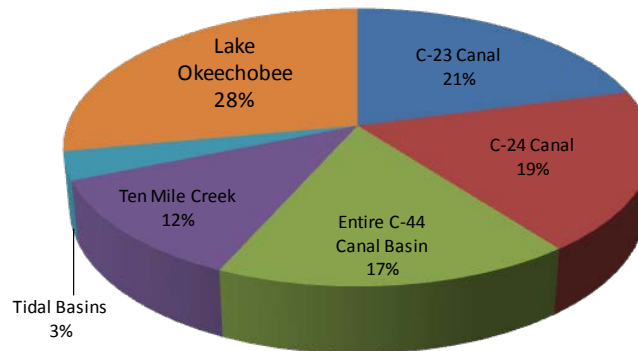
Flow data for Tidal Basins estimated from SFWMD calculations.

WY2018 Annual Nitrogen Loads From the SLRE Watershed



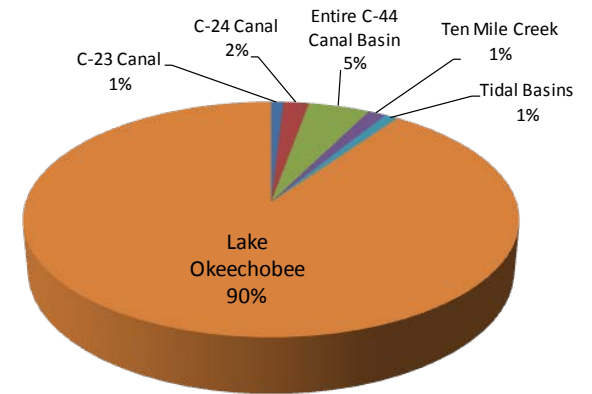
Flow data for Tidal Basins estimated from SFWMD calculations.

WY2018 Annual Phosphorus Loads From the SLRE Watershed



Flow data for Tidal Basins estimated from SFWMD calculations.

WY2018 Annual Total Suspended Solids Loads From the SLRE Watershed



Flow data for Tidal Basins estimated from SFWMD calculations.

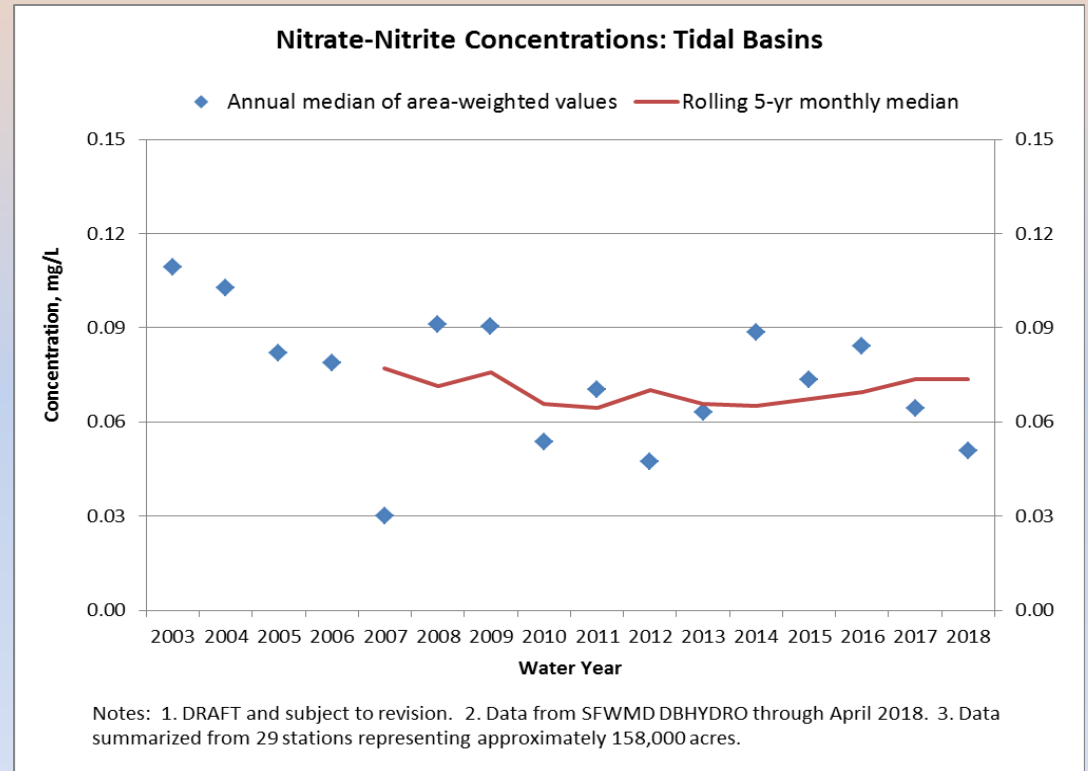
Septic Tanks – Contribution is Getting Smaller

Septic tanks are part of the loading problem

Estimated contribution remains below 10 percent of total nitrogen loading to estuary

Efforts by counties and municipalities are resulting in declining nitrogen levels

- Conversion of more than 8,000 septic tanks and 70 package treatment plants
- Active septic conversion program - \$155 million
- \$85 million spent on other nutrient reduction projects
- Met and exceeded all nitrogen reduction goals of BMAP



St. Lucie Estuary Watershed Report Card

Source Basin	Total Nitrogen		Total Phosphorus	
	WY2018 Status	10-yr Trend	WY2018 Status	10-yr Trend
C-23 Canal	Poor	Improving	Poor	Improving
C-24 Canal	Poor	Improving	Poor	Improving
<i>C-44 Canal</i>	<i>Poor</i>	<i>Worsening</i>	<i>Poor</i>	<i>Worsening</i>
Ten Mile Creek	Fair	Improving	Poor	Improving
Tidal Basins	Fair	Improving	Poor	Improving
Lake Okeechobee	Poor	Improving	Poor	Worsening
Total Inflow	Poor	Worsening	Poor	Worsening

“Fair” indicates the water year exceeded the TMDL by less than 33%.

“Poor” indicates the water year exceeded the TMDL by more than 33%.

“Improving” indicates the 10-yr average nutrient level was below the base period value, adjusted for hydrologic variability;

“Worsening” indicates the 10-yr average nutrient level was above the base period value, adjusted for hydrologic variability.

The Tidal Basins and Lake Okeechobee assessment were based on observed concentrations; other source basin assessments were based on observed loads compared to hydrologically-adjusted base period loads.

The assessment of trend in each source basin was based on the most recent 10-yr average nutrient level compared to its base period. For the Tidal Basins and Lake Okeechobee, concentrations were assessed; for all other source basins loads were assessed.

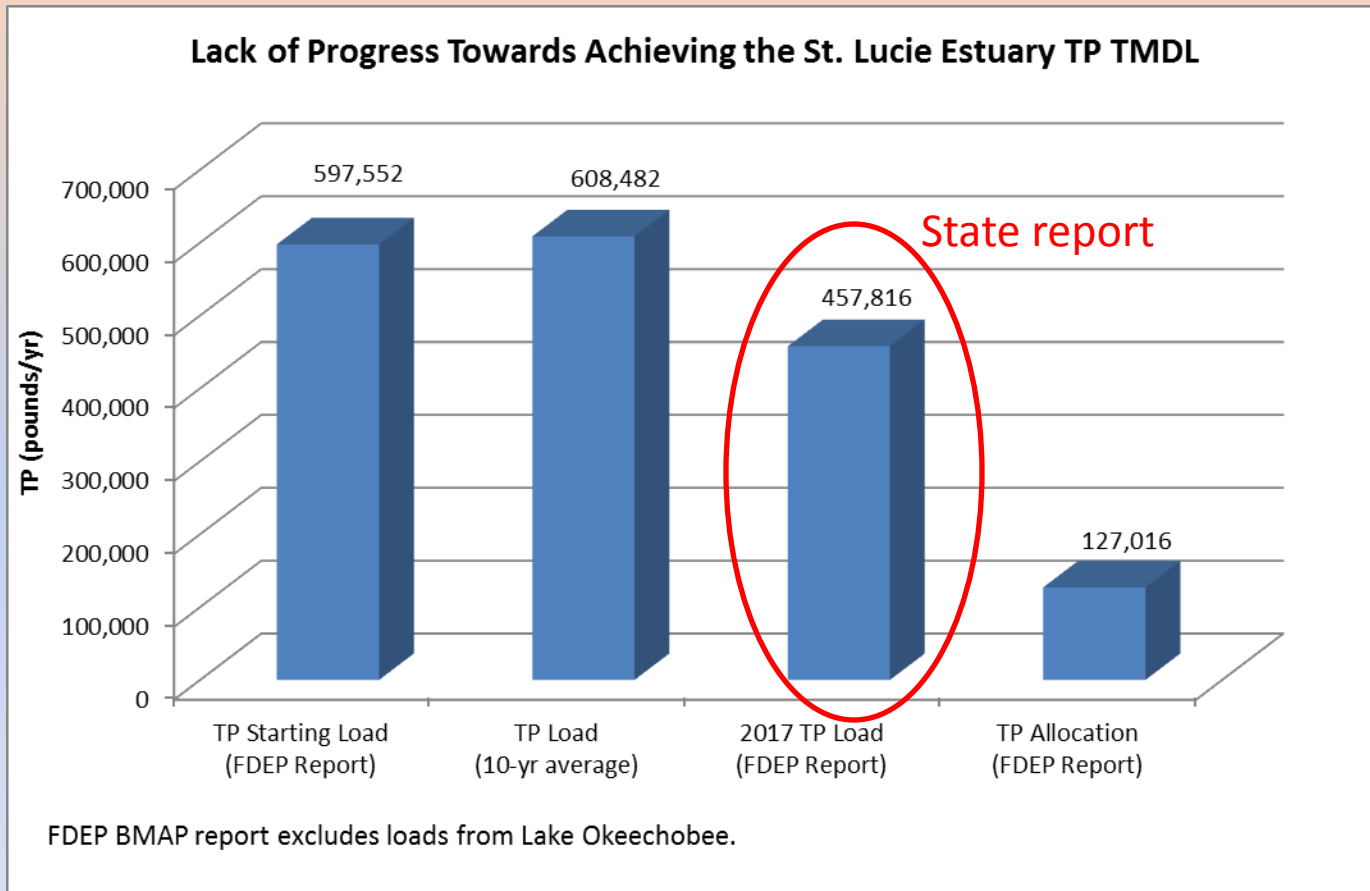
So ... in light of poor water quality entering Estuary from watershed and Lake,

How was this addressed in the BMAP report?

Same deficiencies as identified for the Lake Okeechobee BMAP, plus

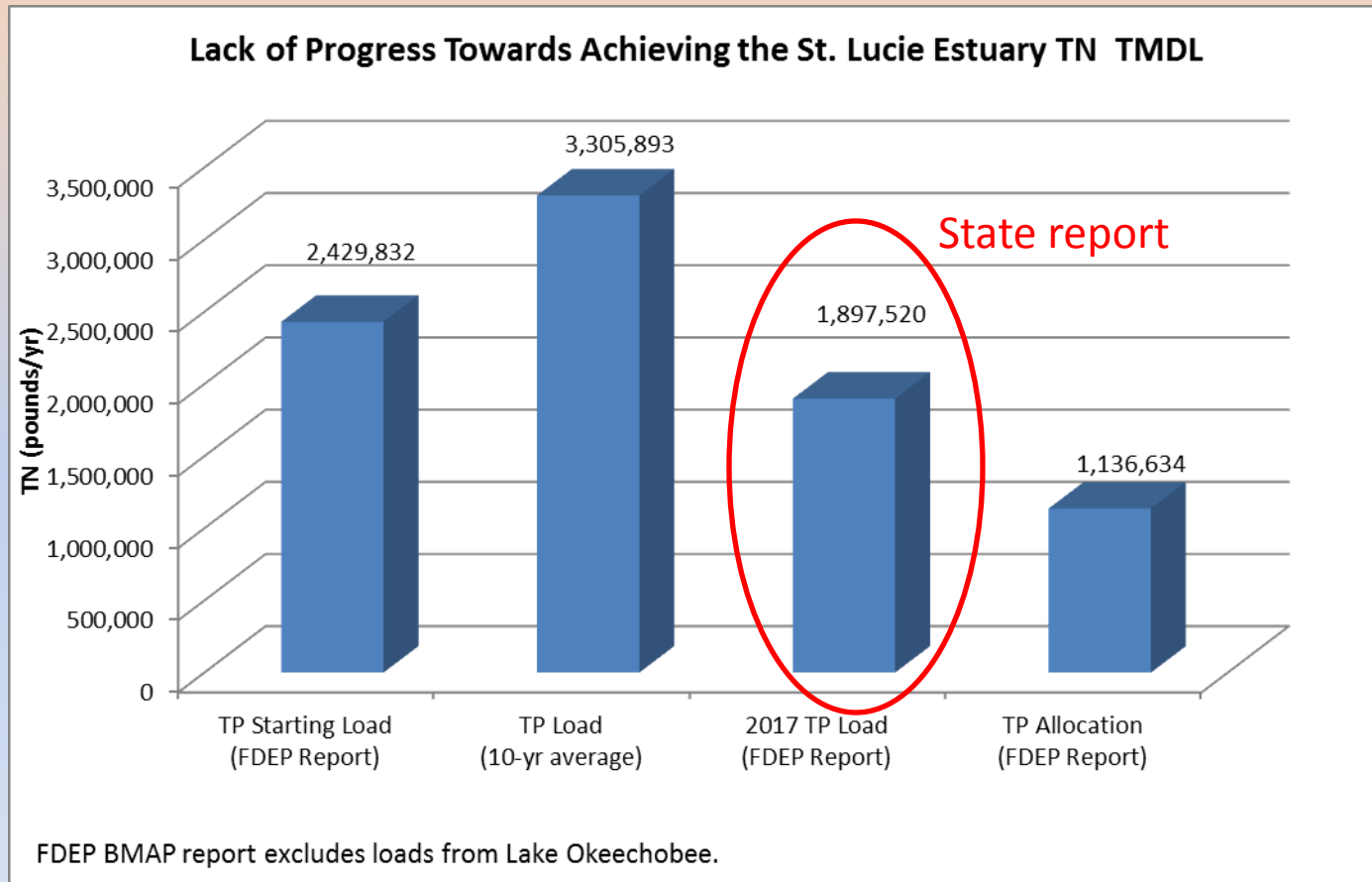
- **BMAP ignores pollution loading from Lake Okeechobee**

BMAP Assessment of Phosphorus Load



Estimated phosphorus load was 33% more than reported by FDEP.

BMAP Assessment of Nitrogen Load



Estimated nitrogen load was 74% more than reported by FDEP.

Others Have Documented BMAP Issues

Impediments to Implementation of the Indian River Lagoon Basin Management Action Plans



2015 report by regional planning councils documented the major impediments to implementing BMAPs:

1. Inadequate funding
2. Legacy nutrient loading from muck is not being addressed
3. Legacy nutrient loading from groundwater is not being addressed
4. No incentives for innovative techniques
5. Incomplete water quality data
6. Inadequate water quality monitoring
7. Unequal treatment of public and private entities, agriculture, and water control districts.
8. Onerous conditions attached to BMAP projects
9. Inadequate technology to meet TMDL goals
10. BMAPs are based on flawed TMDLs.
11. Trends in nutrient loading from the atmosphere are not being considered.
12. Legacy Loading in Lake Okechobee
13. Lack of operations and maintenance monitoring
14. Load allocation process is not consistent between BMAPs
15. Incomplete knowledge of existing infrastructure

My Opinion: Program is Broken

What Can Be Done?

Many effective pollution control projects have been implemented under BMAP.

Many recommendations have been developed and provided to FDEP staff to improve the BMAP program. However, due to a combination of legislative and policy constraints, and shortage of staff, it appears that significant improvements are not forthcoming.

1. **Strengthen water quality regulations**, e.g., rescind relevant provisions of the 2016 Water Act to allow establishing discharge limits for parcels that discharge into state waters (including “Works of the District”), establish appropriate monitoring, set requirements for landowner collaboration, and when necessary, strengthen enforcement;
2. **Strengthen the Basin Management Action Plans**, including accelerating timeframes to achieve the TMDLs; establishing subwatershed-specific load allocations; annual assessments based on measured nutrient loads (or concentrations for tidal basins); increasing staffing to verify and monitor the implementation of Best Management Practices; and incorporating estimates of pollution loading from the application of Class AA and Class B biosolids.
3. **Strengthen biosolids reporting requirements**, monitoring and overall regulation of the application of Class AA and Class B biosolids.