Comments on the *Draft 2015 Progress Report for the St. Lucie River and Estuary Basin Management Action Plan*

Gary Goforth - September 10, 2015

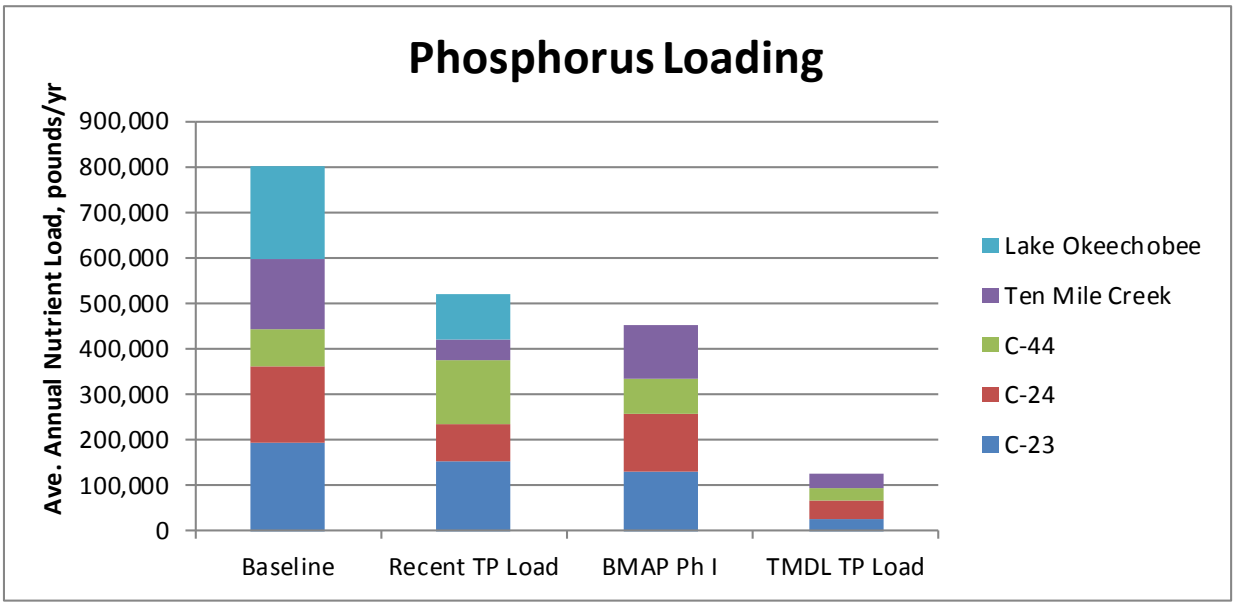
1. The Draft *Progress Report* is an excellent summary of the sizeable number of nutrient reduction projects being implemented by private landowners, municipalities and others to achieve the TMDLs for the St. Lucie River and Estuary. These entities deserve recognition for implementing effective nutrient reduction measures, such as the projects described for Martin County and St. Lucie County in the Draft *Progress Report* and during the August 12, 2015, Technical Meeting.
    a. **Recommendation: Entities should be recognized for effective nutrient control measures in the Final *Progress Report* and subsequent progress reports based on measured – not simulated or estimated - loads and load reductions from specific projects.**

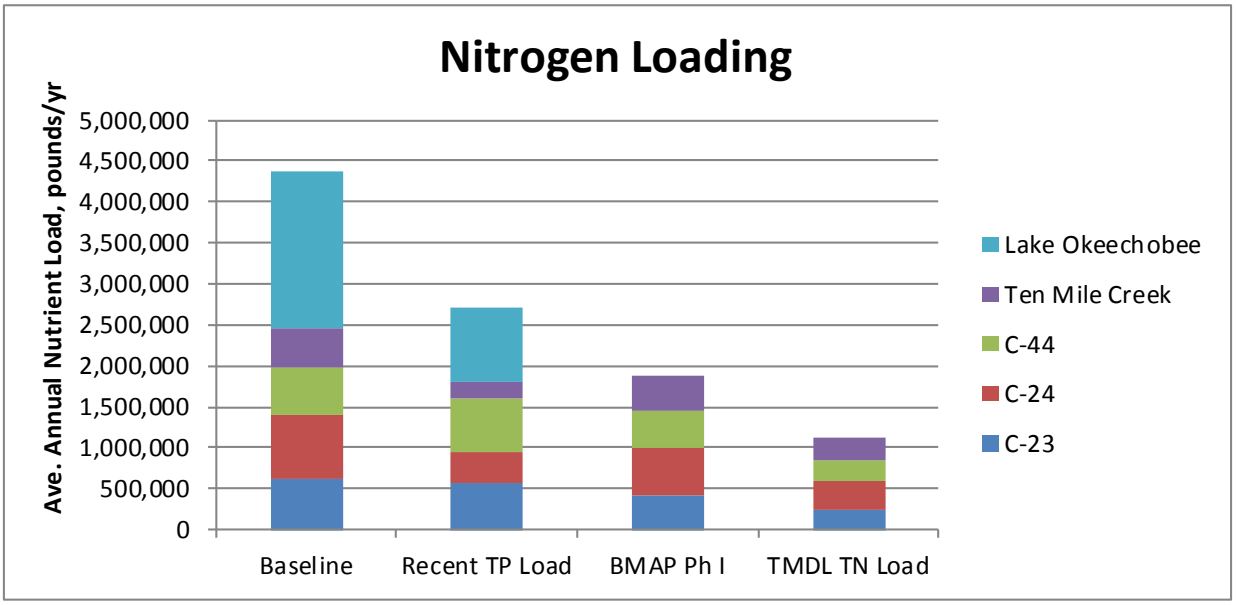
2. The nutrient load values presented in the *Progress Report* are not actual (i.e., measured) loads, nor are they actual load reductions, but rather, are a combination of simulated and projected loads and load reductions. See for example Figures ES-1 and ES-2. This critical distinction is not clearly made in the *Progress Report*. As a result, the *Progress Report* presents an overly optimistic assessment of water quality conditions for the St. Lucie River and Estuary Basins, and therefore presents an overly optimistic assessment of the progress towards achieving the TMDLs and Phase I BMAP Goals.
    a. Without assessment of actual loads from individual contributing basins, the *Progress Report* fails to document the actual load reductions, and fails to assess how well each basin is progressing towards achieving its TMDL and Phase I BMAP Goals. Deferring the assessment using measured loads until 2017 as proposed will delay the identification of basins that either
        i. have very effective source control projects that may be applicable to other basins, or
        ii. need additional nutrient reduction measures to achieve their Phase I BMAP Goals.

    b. Using data available in the DBHYDRO database of the South Florida Water Management District (SFWMD), nutrient loads and concentrations for any reporting period of interest may be calculated. This allows an annual assessment of actual water quality conditions - not simulated/projected conditions as done in the *Progress Report* - and an assessment of progress towards achieving the TMDLs and Phase I BMAP Goals within each basin. As

an alternative to Figures ES-1 and ES-2 from the *Progress Report*, a comparison of recent loads to the BMAP goals and TMDL is summarized in **Figure 1**, and indicates the cumulative loading from the source basins is not yet meeting the BMAP goals, and are significantly higher than the TMDL.

Figure 1. Comparison of baseline and recent loads with BMAP and TMDL goals for selected sources. Ten Mile Creek basin BMAP and TMDL targets are estimated, as they have not yet been developed by FDEP.





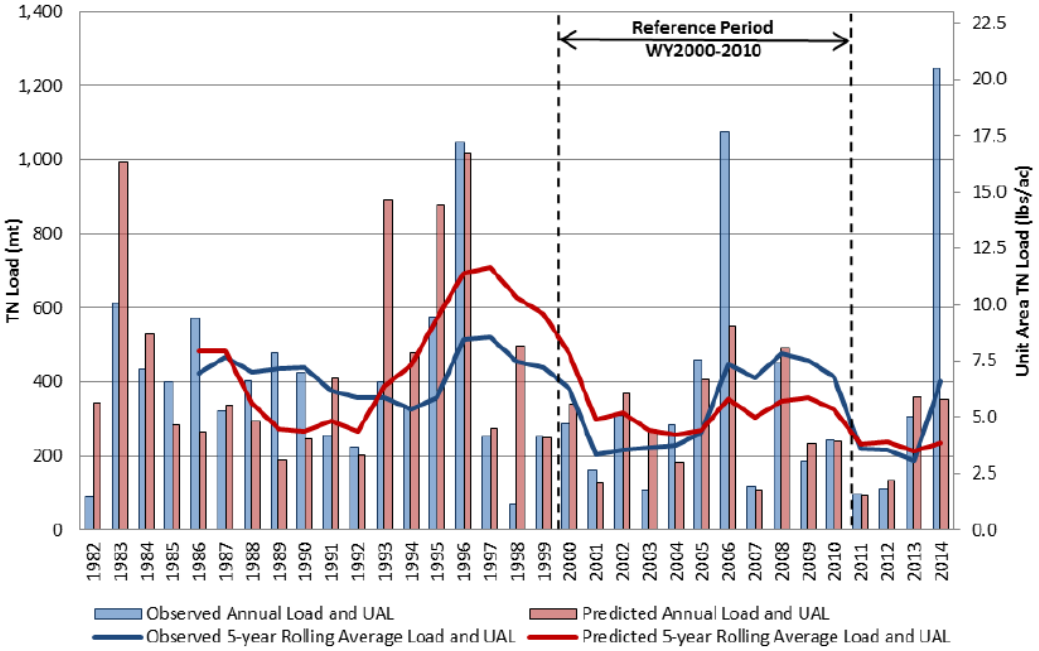
c. Nutrient loads are monitored and published by the SFWMD in their annual South Florida Environmental Report (SFER) for the majority of the watershed, yet the *Progress Report* fails to utilize this publicly available data in assessing current conditions, load reductions and progress towards achieving the TMDL and BMAP Goals. The 2015 SFER highlights the effectiveness of source control measures in the C-23, C-24, Ten Mile Creek basins and tidal streams, while documenting that the source controls in the C-44 basin has not yet been effective (SFWMD 2015, Chapter 4):

> WY2014 TP and TN nutrient loading for the C-23, C-24, and Ten Mile Creek basins are below their reference period nutrient load adjusted for hydrologic variability. However, for the C-25 and C-44 basins, the WY2014 TP and TN nutrient loading are above the reference period nutrient load adjusted for hydrologic variability.

d. In addition, trends in nutrient loading and concentrations for each basin are also presented in the annual SFER. **Figure 2** for example, is a reprint of from the 2015 SFER showing the trend in nitrogen loading from the C-44 Basin, and documents that the WY2014 loading exceeded the expected loading of the reference period, adjusted for hydrologic variability.

e. Recommendation: The Final *Progress Report* and subsequent progress reports should utilize available water quality data – and not simulated values - in assessing and documenting water quality conditions for each basin and in assessing progress towards achieving the TMDLs and Phase I BMAP Goals.

Figure 2. Observed and predicted (rainfall adjusted) annual TN load and unit area load (UAL) and five-year rolling averages for the C-44 Basin.



3. The Draft *Progress Report* omits a significant source of pollutant loading to the St. Lucie River and Estuary: Lake Okeechobee discharges.
    a. During the two years following the adoption of the BMAP, an average annual flow of approximately 256,000 acre feet/yr of damaging Lake Okeechobee discharges were made to the St. Lucie River and Estuary. These discharges carried tons of pollutants, including:
        i. approximately 903,000 pounds/yr of total nitrogen - almost four times the TMDL for the C-44 Canal - at a flow-weighted mean concentration of 1,298 parts per billion (ppb),
        ii. approximately 97,000 pounds/yr of total phosphorus - almost four times the TMDL for the C-44 Canal - at a flow-weighted mean concentration of 140 ppb, and
        iii. approximately 10.6 million pounds/yr of suspended solids, at a flow-weighted mean concentration of 15,233 ppb,
    b. During the 1996-2005 BMAP baseline, Lake discharges contributed and annual average of approximately 361,000 AF/yr; 201,000 pounds/yr of phosphorus; 1.9 million pounds/yr of nitrogen; and 60.5 million pounds/yr of suspended solids.
    c. The BMAP assumed that the Lake Okeechobee TMDL will be achieved, despite the fact that

i. the total phosphorus load to the Lake from contributing basins for Water Year 2014 was 574 metric tons, more than five times the TMDL for the Lake (SFWMD 2015), and
ii. Lake discharges to the St. Lucie River during the most recent 2 years had a flow-weighted mean TP concentration of 140 ppb – more than 3 times the 40 ppb concentration assumed under the Lake's TMDL.

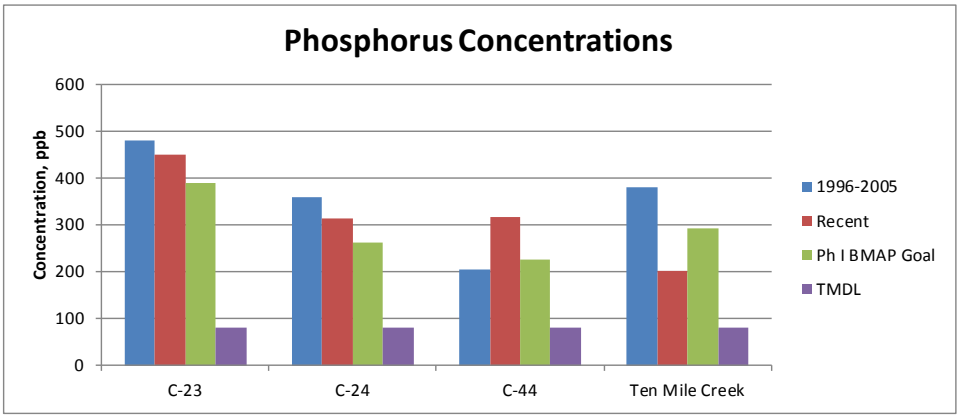
d. **Recommendations:**
   i. **The Final *Progress Report* and subsequent progress reports should present the observed nutrient and suspended sediment loads contained in Lake Okeechobee discharges to the St. Lucie River and Estuary.**
   ii. **The BMAP should be revised to identify projects to capture and treat Lake discharges to the St. Lucie River and Estuary sufficiently to achieve the watershed's TMDL and BMAP Goals.**

4. The Draft *Progress Report* does not document basin-specific nutrient loads and load reductions, and therefore, does not document individual basins' progress, or lack thereof, towards achieving the TMDLs and BMAP Goals.
   a. Documenting basin-specific loads and load reductions (as shown in **Figure 3** and **Table 1**) will identify basins that are performing better than expected, such as the Ten Mile Creek sub-basin, allowing agencies and landowners to learn which projects are most effective. Projects yielding superior results could be evaluated for application to other basins.
   b. Documenting basin-specific loads and load reductions will also identify basins that may not yet be meeting their goals, e.g., the C-23, C-24 and C-44 basins, allowing agencies and landowners to concentrate limited resources in those basins with the greatest need.

   c. Critical performance measures are missing from the Draft *Progress Report*:
      i. the Phase I BMAP goals for the C-23, C-24, C-44, Basin 4-5-6 and other basins within the St. Lucie River watershed; and
      ii. the TMDL for Basin 4-5-6. It isn't clear how the BMAP went from a TMDL for Bessey Creek, which is just one tributary within Basin 4-5-6, to performance measures for the entire Basin 4-5-6. Please explain.

   d. Recommendation: The Final and subsequent Progress Reports should show basin-specific Phase I BMAP Goals, measured loads and load reductions, and document the progress towards achieving the TMDLs and BMAP Goals.

Figure 3. Comparison of recent 2-yr (July 2013-June 2015) average concentrations with baseline, Ph. I BMAP Goal and TMDL. Top chart (phosphorus): recent concentrations for C-44 are above the baseline. Concentrations for C-23, C-24 and C-44 are above the Ph. I BMAP goal. Ten Mile Creek is below the Ph. I BMAP goal. Bottom chart (nitrogen): recent concentrations for C-23 and C-44 were above the baseline. Concentrations for C-23, C-24 and C-44 were above the Ph. I BMAP goal. Ten Mile Creek was below the Ph. I BMAP goal. For Ten Mile Creek, baseline period was 2001-2010 due to data availability.



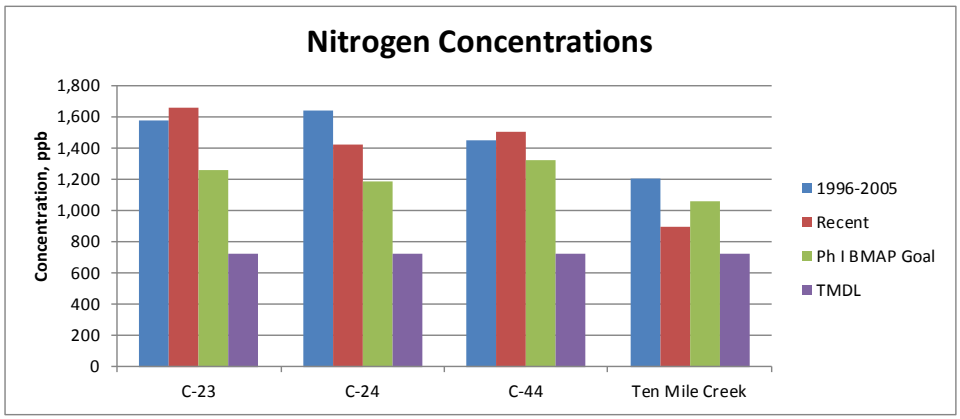


Table 1. Comparison of 2-yr Average Annual Values to BMAP Goals (July 2013-June 2015)

Parameter	C-23		C-24		C-44/S-153 Basin	
	TP	TN	TP	TN	TP	TN
TMDL Load, pounds/yr	27,248	242,202	39,258	348,957	27,330	242,929
Phase I BMAP Goal, pounds/yr	130,726	421,872	127,470	573,915	75,834	446,285
Ave. Annual Measured Load, pounds/yr	151,314	557,751	84,219	381,389	138,296	654,256
Comparison to BMAP Goal, pounds/yr (+) indicates an increase over goal	20,588	135,879	-43,251	-192,527	62,462	207,971
TMDL Concentration, ppb	81	720	81	720	81	720
Phase I BMAP target Conc, ppb	388	1,254	263	1,184	225	1,322
Measured TP Concentration, ppb	449	1,653	313	1,418	317	1,499
Comparison to BMAP target, ppb (+) indicates an increase over Target	60	400	50	234	92	176

Data and calculations are provisional and subject to revisions. C-24 Basin values include some flow and loads from the C-25 Basin.

5. The load reductions presented in the Draft *Progress Report* are based on "Starting Loads" for the 1996-2005 period, established during the BMAP development through simulation modeling and literature values for unit area loads. In addition, target loads for basins were based on concentrations associated with the Starting Loads using simulated flows. However, as shown in **Table 2**, the Starting Loads, associated concentrations and flows deviate significantly from the measured values observed during the 1996-2005 period. As a result, the load targets and reductions presented in the Draft *Progress Report* are likely flawed, and may not accurately reflect progress made towards achieving the TMDLs and BMAP Goals.
    a. The SFWMD monitors and annually publishes measured nutrient loads for the majority of the watershed (SFWMD 2015). In addition, the SFWMD compiled historical nutrient loads for the basins of the St. Lucie River and Estuary Watershed (SFWMD 2013).
        i. Why weren't these publicly available documents utilized in preparing the BMAP and annual progress reports?

    b. Recommendation: The Final *Progress Report* and subsequent progress reports should present the measured 1996-2005 nutrient loads and concentrations for those basins with measured loads, and document actual load reductions by comparing measured loads/concentrations with the 1996-2005 values.

Table 2. Comparison of BMAP Starting Values to 1996-2005 Measured Values.

Parameter	C-23 Basin		C-24 Basin		C-44/S-153 Basin	
	TP	TN	TP	TN	TP	TN
BMAP Starting Load, pounds/yr	175,073	498,874	165,275	670,326	96,621	533,437
1996-2005 Observed Load, pounds/yr	192,576	630,935	167,119	762,046	82,184	579,913
Discrepancy, pounds/yr	**-17,503**	**-132,061**	**-1,844**	**-91,720**	**14,437**	**-46,476**
Discrepancy, %	**-9%**	**-21%**	**-1%**	**-12%**	**18%**	**-8%**
BMAP Starting Concentration, ppb	520	1,482	341	1,383	286	1,580
1996-2005 Observed Concentration, ppb	480	1,571	358	1,634	205	1,444
Discrepancy, ppb	**41**	**-89**	**-17**	**-251**	**82**	**136**
Discrepancy, %	**8%**	**-6%**	**-5%**	**-15%**	**40%**	**9%**
BMAP Simulated 1996-2005 flow, AF/yr	123,751		178,296		124,122	
1996-2005 Observed flow, AF/yr	147,686		171,512		147,638	
Discrepancy, AF/yr	**-23,935**		**6,784**		**-23,516**	
Discrepancy, %	**-16%**		**4%**		**-16%**	

Data and calculations are provisional and subject to revisions. C-24 Basin values include some flow and loads from the C-25 Basin.

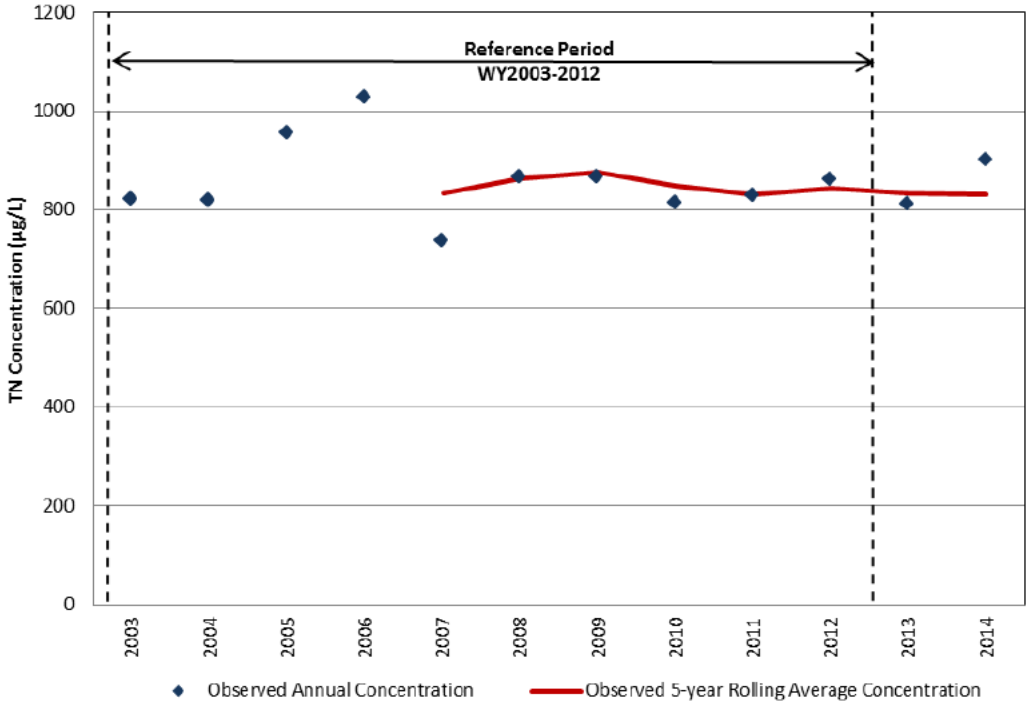
6. Approximately 27 percent of the St. Lucie River Watershed is tidal or coastal (SFWMD 2015). This area is referred to as the "composite area" and includes portions of the North Fork basin outside of the Ten Mile Creek sub-basin; as well as the South Fork, North Mid-Estuary, South Mid-Estuary, Basin 4-5-6, and South

Coastal basins. This composite area is represented by water quality data monitored at 29 tributary stations, however, flow is not monitored for this area. As a result, measured loads and load reductions will never be available for calibration of simulation models, nor for comparison to TMDL loads and BMAP load reduction goals.

a. Water quality data for the composite area are presented each year in the annual SFER (see **Figure 2** below, from SFWMD 2015).

b. Recommendation: The FDEP should recognize the limitations in establishing TMDLs and BMAP goals for the composite area and revise the TMDLs and BMAP goals to utilize concentrations: 81 ppb for TP and 720 ppb for TN.

Figure 2. Composite Area observed annual composite Total Nitrogen concentration and five-year rolling average.



7. The method for calculating load reductions presented in the Draft *Progress Report* does not directly account for hydrologic variability, e.g., variations in annual rainfall within each contributing basin. Hence, annual nutrient loads from individual contributing basins are not directly comparable to the baseline period (1996—2005) in calculating load reductions. This could lead to overestimating load reductions during drought years and underestimating load reductions during wet

years, resulting in incorrect assessment of water quality conditions and progress towards achieving the TMDLs and BMAP goals.

a. By contrast, the SFWMD method contained in their *Draft Technical Support Document: St. Lucie River Watershed Performance Metric Methodologies* directly accounts for hydrologic variability in the calculation of annual load reductions (SFWMD 2013).

b. Recommendation: The method for assessing current water quality conditions and calculating load reductions should account for hydrologic variability in manner similar to that developed by the SFWMD.

8. During the August 12, 2015, Technical Meeting, agency staff acknowledged that the load reductions and credits attributable to agricultural BMPs have not been completely field verified due to a lack of staffing.
   a. Recommendation: The Progress Report should clearly note that the projected load reductions from agricultural BMPs have not been field verified, and may overestimate the load reductions. A similar caveat may be necessary for non-agricultural projects.

9. During the August 12, 2015, Technical Meeting, a disparity was observed regarding the requirements for monitoring the effectiveness of nutrient control projects. It was noted that municipal projects, such as those discussed by Dianne Hughes from Martin County and Jason Bessey from St Lucie County, have monitoring requirements to measure the load reduction effectiveness, while the agricultural BMPs – which receive the most projected load reductions and even "credits" within the BMAP – do not have similar monitoring requirements.
   a. Recommendation: There should be a balanced set of requirements for municipal and agricultural source control projects regarding monitoring their effectiveness.

10. During the August 12, 2015, Technical Meeting, agency staff acknowledged that nutrient discharge limits in existing 40E-61 permits issued to landowners in the C-44 Basin were not being enforced.
    a. **Recommendation: The Final *Progress Report* and subsequent progress reports should document compliance with all nutrient discharge limits of existing permits issued to landowners in the St. Lucie River and Estuary Basin.**

11. The *Progress Report* utilizes a 12-month reporting period from July 1 – June 30. This period is based on the June 2013 adoption date of the St. Lucie BMAP, and is not related to the hydrologic cycle in south Florida, nor is it consistent with the annual reporting period used by the SFWMD in their annual South Florida Environmental Reports (SFER, e.g., SFWMD 2015). As such it does not allow agencies or the public the opportunity to readily compare the observed nutrient loads documented in the annual SFER with the loads presented in the *Progress Reports*.
    a. **Recommendation: The Final *Progress Report* and subsequent progress reports should use an annual reporting period consistent with the precedent established by the SFWMD, utilizing a Water Year of May 1 to April 30.**

12. Approximately 24,000 acre feet moved from the C-24 Basin into the C-25 Basin via the G-81 structure during the 2 years since adoption of the BMAP. During some years, C-25 Basin runoff flows into the C-24 basin through this same structure.
    a. How will these periodic inter-basin transfers of flow and associated load be addressed in future *Progress Reports*?

13. Suggested corrections to the draft minutes of the August 12, 2015, Technical Meeting Summary are attached.

REFERENCES

FDEP 2015. Draft *2015 Progress Report for the St. Lucie River and Estuary Basin Management Action Plan*. August 2015.

SFWMD 2013. Draft Technical Support Document: St. Lucie River Watershed Performance Metric Methodologies. December 2013.

SFWMD 2015. South Florida Environmental Report. Chapter 4. Nutrient Source Control Programs and associated appendices. March 2015.