Florida TMDLs and Biosolids

A Topic for Concern Related to Florida Surface Waters
By: Gary N. Roderick - 2018
“Research in Florida has shown that bahiagrass may produce satisfactorily without phosphorus fertilization.”

Source: IFAS changes protocol for generating P recommendations for established bahiagrass pastures

Maria L. Silveira, University of Florida/IFAS, Range Cattle Research and Education Center, February 2008
“…it would take 23 to 57 years to flush the existing legacy phosphorus from the system, assuming phosphorus imports and exports were immediately balanced…”
Phosphorus Fertilizer Farm = 89%

Nitrogen Fertilizer Farm = 81%

“Implementing (and maintaining) verified FDACS adopted BMPs provides a *presumption of compliance* with state water quality standards for the pollutants addressed by the BMPs.

BMP implementation provides protection under the Florida Right to Farm Act from duplicative local regulation.”

Between 2003 and 2011
Florida Purchased Fertilizer DECREASED
N < 22%
P < 33%
“there were no sites with decreasing trends in any parameters”

Lake Okeechobee Watershed Tributary Nutrient Loading Trends

WR-2016-004

Joyce Zhang, Patricia Burke, Lucia Baldwin, Cheol Mo, Steven Hill

South Florida Water Management District

June 2016

A correction was made on July 5, 2016, to figures 4 through 8 to correct the x-axis label 2009 that was shown twice.

Figure 3. Current OKUSCS project tributary loading stations highlighting stations with significant trend in one or more parameters using Seasonal Kendall Tau trend analyses for Water Year 2006–2015.
About 12% of both TN and TP imports end up in surface waters.
TN migrates towards surface waters
In many onsite wastewater systems, phosphorus (P) is effectively immobilized within the first two or three feet of soil below drainfield trenches. This area has been referred to as the Phosphorus Rapid Attenuation Zone or Phosphorus Enrichment Zone. This is in contrast to the plume associated with other more mobile wastewater constituents such as nitrate (NO$_3^-$) and chloride (Cl$^-$). The extent of movement of phosphorus varies from system to system but is almost always less than that of NO$_3^-$ and Cl$^-$. TP stays “attenuated” near drainfield.
Uncertainty Surrounding Septic Loading Estimates

During 2016, septic tank loading estimated at less than 5%

Septic Tank TN Loading to St. Lucie River (+/-) 6%

Septic tanks do not contribute toxic blue-green algae or sediment – two of the most pressing pollution problems facing the Estuary and Lagoon.

Source: Perspectives on Septic Tank Loading to the St. Lucie Estuary, Gary Goforth, PE, PhD, April 18, 2017
The table shows the total nitrogen loads by sector in the Maryland portion of the Bay Watershed.

### Table 1: Total Nitrogen Loads, By Sector in Maryland Portion of Bay Watershed

<table>
<thead>
<tr>
<th>Loading Sector</th>
<th>2009 Load</th>
<th>Target Load</th>
<th>% Reduction Needed to Meet Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Runoff</td>
<td>7.13</td>
<td>7.13</td>
<td>0</td>
</tr>
<tr>
<td>Atmospheric Deposition</td>
<td>0.69</td>
<td>0.69</td>
<td>0</td>
</tr>
<tr>
<td>Wastewater 1</td>
<td>14.15</td>
<td>10.46</td>
<td>26%</td>
</tr>
<tr>
<td>Urban and Suburban Runoff</td>
<td>5.65</td>
<td>4.62</td>
<td>35%</td>
</tr>
<tr>
<td>Agricultural Runoff 2</td>
<td>17.8</td>
<td>13.8</td>
<td>23%</td>
</tr>
<tr>
<td>Septic Leaching</td>
<td>4.0</td>
<td>2.45</td>
<td>39%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>49.4</strong></td>
<td><strong>39.1</strong></td>
<td>21%</td>
</tr>
</tbody>
</table>

Source: MDE (2010)
1 includes combined sewer overflows
2 includes confined animal feedlots

- TN load % from septic leaching = \( \frac{4.0}{49.4} = 8\% \)
- TN load % from direct wastewater = \( \frac{14.15}{49.4} = 29\% \)
Map of Biosolids Land Application Sites

Class B Biosolids Only

Biosolids Site Map (Feb 2016)
Once Class AA biosolids are termed “marketed and distributed as fertilizer” – they are no longer considered “biosolids” by State Statute……

Class AA (200,000 dry tons)
Class B   (100,000 dry tons)

“These are not the biosolids you are looking for….”
Class AA Biosolids Only

Source 2015 Class AA Biosolids:
Investigation: Human waste fertilizes farms, but fuels toxic algae blooms
Deregulated “fertilizer” contains same nitrogen and phosphorus as regulated “sludge”

TCPalm
Lucas Dapril
February 07, 2017
Investigation: Human waste fertilizes farms, but fuels toxic algae blooms
Deregulated "fertilizer" contains same nitrogen and phosphorus as regulated "sludge"

TCPalm
Lucas Daprile
February 07, 2017
25 adopted BMAPs throughout the state.

Types of BMAPs:

- Nutrients
- Bacteria
Caloosahatchee BMAP

- TMDL adopted in 2009
- BMAP adopted in 2012

Progress Toward Meeting TMDL

<table>
<thead>
<tr>
<th></th>
<th>Pounds TN per Year (lbs/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TN Starting Load</td>
<td>1,690,084</td>
</tr>
<tr>
<td>2016 TN Load</td>
<td>1,508,404</td>
</tr>
</tbody>
</table>

TMDL Target = 1,301,366 lbs/yr
Lake Okeechobee Basin

- TMDL adopted in 2001
- BMAP adopted in 2014

Progress Toward Meeting TMDL

<table>
<thead>
<tr>
<th>Metric Tons TP per Year</th>
<th>2015 TP Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP Starting Load</td>
<td>448</td>
</tr>
<tr>
<td>2015 TP Load</td>
<td>385</td>
</tr>
</tbody>
</table>

TMDL Target = 105 mt/yr
Banana River Lagoon

Progress Toward Meeting TMDL Adopted 2009

- TMDL TN Target = 291,755
- TMDL TP Target = 23,253

Starting Load:
- TN: 484,462
- TP: 442,013

2016 Load:
- TN: 61,900
- TP: 53,191
North Indian River Lagoon

Progress Toward Meeting TMDL Adopted 2009

Pounds per Year (lbs/yr)

Starting Load 2016 Load

TMDL TN Target = 687,044
TMDL TP Target = 56,550

North Indian River Lagoon
Progress Toward Meeting TMDL Adopted 2009

Pounds per Year (lbs/yr)

Starting Load 2016 Load

TMDL TN Target = 687,044
TMDL TP Target = 56,550
Central Indian River Lagoon

Progress Toward Meeting TMDL Adopted 2009

Starting Load 2016 Load

Pounds per Year (lbs/yr)

0 500,000 1,000,000 1,500,000 2,000,000 2,500,000

TMDL TN Target = 962,988
TMDL TP Target = 165,193

1,961,103 1,826,616

Central Indian River Lagoon

TMDL TP Target = 165,193
TMDL TN Target = 962,988
St. Lucie River & Estuary

- TMDL adopted in 2009
- BMAP adopted in 2013

Progress Toward Meeting TMDL

<table>
<thead>
<tr>
<th>Years</th>
<th>Starting Load</th>
<th>2016 Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMDL TN Target</td>
<td>1,136,633 lbs/yr</td>
<td>1,893,192</td>
</tr>
<tr>
<td>TMDL TP Target</td>
<td>507,552 lbs/yr</td>
<td>454,981</td>
</tr>
</tbody>
</table>
Cost per pound to remove TP and TN from surface waters by Constructed Stormwater Treatment Facilities in agricultural and urban landscapes

Agricultural/Rural:
Taylor Creek STA
Nubbin Slough STA
Lakeside Ranch STA

Avg. = $130 /lb TP
$26 /lb TN

Urban:
TCRPC BMPs Impediments Report 2015 =
(Treasure Coast Regional Planning Council)

$5,888 /lb TP
$2,007 /lb TN

Agricultural Source: Compilation of Benefits and Costs of STA and Reservoir Projects in the South Florida Water Management District Report Prepared by Hazen and Sawyer For the World Wildlife Fund acting on behalf of the Florida Ranchlands Environmental Services Project – July 2011 – pg. 8-2
Most Effective Solutions:

1) Municipality and the State Stormwater Programs need to continue to increase urban and regional water attenuation

2) Municipalities need to continue to convert failing septic system areas to central sewer

3) Agriculture needs to “raise it’s game” to attenuate more water and increase fertilizer “efficacy” (nutrient import vs export)

4) Are there “alternatives” to the land application of biosolids