Nutrient Management

Sarasota Bay Fisheries Forum
October 11, 2018
John Ryan, Environmental Manager
Sarasota County Stormwater Environmental Utility
We live in a special place
Today’s Topics

Nutrient Pollution

1. Natural Systems
2. Stormwater
3. Wastewater
   – Effluent = Reclaimed Water
   – Septic Systems
Who’s Fault is It?

IT IS HARD WALKIN’ ON THIS STUFF.

YEP, SON, WE HAVE MET THE ENEMY AND HE IS US.
Harmful Algal Blooms

Tiny Organisms with a Toxic Punch

Nutrient Pollution

Harmful Algal Blooms

Harmful algal blooms are a major environmental problem in all 50 states. Red tides, blue-green algae, and cyanobacteria are examples of harmful algal blooms that can have severe impacts on human health, aquatic ecosystems, and the economy.

Algal blooms can be toxic. Keep people and pets away from water that is green, scummy or smells bad.

On this page:
- Learn about harmful algal blooms
- Effects
- Causes
- What you can do
- See infographics, videos and other multimedia
- Find partner resources

Learn about harmful algal blooms

What are harmful algal blooms?
Harmful Algal Blooms
Worldwide Problems

- Harmful Algal Blooms
- Nutrient Pollution
- Depletion of Fish and Nature

A Remarkable Recovery for the Oysters of Chesapeake Bay

After being decimated by disease, pollution, and overharvesting, the Chesapeake Bay’s renowned oysters are thriving once again, thanks largely to a selectively bred oyster that grows rapidly and is more resistant to pathogens.

BY RONA KOBELE • MAY 14, 2015

If the world is our oyster, where are the oysters in our world? Not in the places we’re used to finding them.

Louisiana once supplied most of the United States’ oysters, but Hurricane Katrina and the Deepwater Horizon oil spill have slashed the state’s oyster production. The Pacific Northwest was the U.S.’s second-largest oyster supplier, but ocean acidification is hurting those populations. In Florida, Apalachicola Bay oyster production has fallen by two-thirds because of freshwater diversions. Globally, oyster populations are in serious trouble, with more than 90 percent of the world’s oyster reefs having been lost in the past century, according to a 2011 study.
Total Nitrogen for 10 Years, 2008 - 2017

The map below shows the trend being experienced at the long-term monitoring stations spread throughout the Sarasota County area.

Map Legend:
- Increasing Trend, Larger Rate
- Increasing Trend, Smaller Rate
- Declining

Note: Trends were prepared on April 23, 2018 using the latest available data.

Sarasota Water Atlas (website)
Water Quality Trends

Data Download is also an option
<table>
<thead>
<tr>
<th>Waterbody</th>
<th>Pollutant</th>
<th>Waterbody</th>
<th>Pollutant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alligator Creek</td>
<td>Bacteria</td>
<td>Mud Lake Slough</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Big Slough</td>
<td>Bacteria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blackburn Bay</td>
<td>Nitrogen</td>
<td></td>
<td>Bacteria</td>
</tr>
<tr>
<td>Bowlees Creek</td>
<td>Bacteria</td>
<td></td>
<td>Bacteria</td>
</tr>
<tr>
<td>Catfish Creek</td>
<td>Bacteria</td>
<td></td>
<td>Bacteria</td>
</tr>
<tr>
<td>Clower Creek</td>
<td>Copper</td>
<td>Myakka River</td>
<td>Bacteria</td>
</tr>
<tr>
<td></td>
<td>Iron</td>
<td></td>
<td>Bacteria</td>
</tr>
<tr>
<td>Cooper Creek</td>
<td>Bacteria</td>
<td></td>
<td>Bacteria</td>
</tr>
<tr>
<td>Cow Pen Slough</td>
<td>Nutrients</td>
<td></td>
<td>Nitrogen</td>
</tr>
<tr>
<td>Curry Creek</td>
<td>Bacteria</td>
<td></td>
<td>Nutrients</td>
</tr>
<tr>
<td>Dona Bay</td>
<td>Nitrogen</td>
<td></td>
<td>Nutrients</td>
</tr>
<tr>
<td>Elligray Bayou</td>
<td>Bacteria</td>
<td>North Creek</td>
<td>Bacteria</td>
</tr>
<tr>
<td></td>
<td>Nutrients</td>
<td></td>
<td>Iron</td>
</tr>
<tr>
<td>Forked Creek</td>
<td>Copper</td>
<td></td>
<td>Bacteria</td>
</tr>
<tr>
<td></td>
<td>Nutrients</td>
<td></td>
<td>Nitrogen, Phosphorus, BOD</td>
</tr>
<tr>
<td>Hatchett Creek</td>
<td>Bacteria</td>
<td>Oglebay Creek</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Howard Creek</td>
<td>Bacteria</td>
<td>Phillippi Creek</td>
<td>Bacteria</td>
</tr>
<tr>
<td></td>
<td>Iron</td>
<td></td>
<td>Nutrients</td>
</tr>
<tr>
<td>Hudson Bayou</td>
<td>Bacteria</td>
<td>Roberts Bay</td>
<td>Nitrogen</td>
</tr>
<tr>
<td></td>
<td>BOD</td>
<td>Sarasota Bay</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Indian Creek</td>
<td>Nutrients</td>
<td>South Creek</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Intracoastal Waterway Venice</td>
<td>Nutrients</td>
<td>Upper Myakka Lake</td>
<td>Phosphorus</td>
</tr>
<tr>
<td>Lemon Bay</td>
<td>Bacteria</td>
<td>Venice Beach</td>
<td>Bacteria</td>
</tr>
<tr>
<td></td>
<td>Nitrogen</td>
<td>Whitaker Bayou</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Longboat Key</td>
<td>BOD</td>
<td>Woodmere Creek</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Matheny Creek</td>
<td>Bacteria</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Sarasota County TMDLs

<table>
<thead>
<tr>
<th>Waterbody</th>
<th>Pollutant</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillippi Creek</td>
<td>Nitrogen</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>Phosphorus</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>BOD</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>Bacteria</td>
<td>98%</td>
</tr>
<tr>
<td>Clark Lake (Phillippi Tributary)</td>
<td>Nitrogen</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td>Phosphorus</td>
<td>80%</td>
</tr>
<tr>
<td>Cloower Creek</td>
<td>Bacteria</td>
<td>76%</td>
</tr>
<tr>
<td>Elligraw Bayou</td>
<td>Nitrogen</td>
<td>29%</td>
</tr>
<tr>
<td></td>
<td>BOD</td>
<td>71%</td>
</tr>
<tr>
<td></td>
<td>Bacteria</td>
<td>70%</td>
</tr>
<tr>
<td>Catfish Creek</td>
<td>Nitrogen</td>
<td>51%</td>
</tr>
<tr>
<td>North Creek</td>
<td>Nitrogen</td>
<td>47%</td>
</tr>
<tr>
<td>South Creek</td>
<td>Nitrogen</td>
<td>48%</td>
</tr>
<tr>
<td>Curry Creek</td>
<td>Nitrogen</td>
<td>63%</td>
</tr>
<tr>
<td>Alligator Creek</td>
<td>Nitrogen</td>
<td>28%</td>
</tr>
<tr>
<td>Woodmere Creek</td>
<td>Nitrogen</td>
<td>55%</td>
</tr>
<tr>
<td>Forked Creek</td>
<td>Nitrogen</td>
<td>20%</td>
</tr>
<tr>
<td>Gottfried Creek</td>
<td>Nitrogen</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Bacteria</td>
<td>74%</td>
</tr>
<tr>
<td></td>
<td>BOD</td>
<td>16%</td>
</tr>
<tr>
<td>Big Slough</td>
<td>Bacteria</td>
<td>26%</td>
</tr>
<tr>
<td>Mud Lake Slough</td>
<td>Bacteria</td>
<td>93%</td>
</tr>
<tr>
<td>Myakka River (between lakes)</td>
<td>Nitrogen</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>Phosphorus</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>BOD</td>
<td>11%</td>
</tr>
<tr>
<td>Myakka River (at Big Slough)</td>
<td>Nitrogen</td>
<td>56%</td>
</tr>
<tr>
<td></td>
<td>Phosphorus</td>
<td>67%</td>
</tr>
</tbody>
</table>
Crisis in the Indian River Lagoon: Solutions for an Imperiled Ecosystem

There is an ecological crisis in Indian River Lagoon. Large quantities of water with high levels of nutrient pollution from Lake Okeechobee and the St. Lucie Basin are being discharged to tide, leading to toxic algae blooms in the Lagoon’s waters. There have been numerous, mysterious reports of deaths of Pelicans, manatees, and dolphins in the area. Harmful bacteria have also been detected in some areas, making the water dangerous for human contact.

A parallel story is taking place on Florida’s Southwest coast. Water from Lake Okeechobee and the Caloosahatchee Basin are being flushed into the Caloosahatchee.
Nitrogen Cycle

- Photosynthesis
- Runoff
- Nitrogen fixation by cyanobacteria
- Leaching
- Urea Ammonia
- Nitrogen fixing bacteria
- Denitrifying bacteria in anaerobic mud
- NO₃ and NH₄ in groundwater
Nutrients create Life

Unless out of balance
Depleted Natural Systems Can Only Produce Algae
Every waterbody needs plants

Let nature do the work for you
- Plants will take up nutrients
- Provide habitat for birds and fish
- Convert nutrients into desirable living things

Herbicides convert living plants into chemical nutrients that flow downstream to feed more algae
Canals offer potential

Stream Restoration is happening all over the world.

Why not us?
No place for nutrients to become life
What is Stormwater?

Clean

• Starts as Rain

Huge Volume

• 681 billion gallons rain/year in Sarasota County
• Picks up pollution as it flows
• Low concentration
• Adds up to a lot of pollutant load
• Volume increases with more impervious
• Ponds only 40% effective in removing nitrogen
Statewide Stormwater Rule Proposed in 2009

Nutrients Post-Construction = Natural Condition

- Treatment Train removes nutrients as flows from one BMP to the next
  - Wet detention
  - Stormwater harvesting
  - Green roofs
  - Cistern systems
  - Pervious pavement
  - Bio-filtration
  - Retention
  - Exfiltration
Undeveloped Land
- No runoff in dry season
- Soaked in
- Puddles

Developed Land
- Roofs
- Roads
- Parking Lots
- Sidewalks
- All rain makes runoff
- Even dry season
What You Can Do

- Rain Barrels
- Flexi-Pave
- Pervious Pavers
- Bioswales
- Swales
Save the Swales
2010 Study comparing Swale Drainage to Curb Drainage

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Curb and Gutter</th>
<th>Swale</th>
<th>Percent Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nitrogen</td>
<td>9.6</td>
<td>0.69</td>
<td>93%</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>1.53</td>
<td>0.27</td>
<td>82%</td>
</tr>
</tbody>
</table>

Grassy Swales:
Water soaks in and never makes it to the storm drain
No flow means no pollution
Resembles natural flow pattern
Sandy Soil
- not very fertile

Today these landscapes are lush
Keep our Bay BLUE not GREEN
skip the fertilizer
June 1 - Sept. 30
pick it up!

THERE IS NO POOP FAIRY
What is Wastewater?

- Dirty
- Much less volume than Stormwater
  (12B gal/year)

<table>
<thead>
<tr>
<th>Treatment Type</th>
<th>Nitrogen Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Sewage</td>
<td>30 mg/l Nitrogen</td>
</tr>
<tr>
<td>Secondary Treatment</td>
<td>20 mg/l Nitrogen</td>
</tr>
<tr>
<td>Advanced Treatment</td>
<td>&lt;3 mg/l Nitrogen</td>
</tr>
<tr>
<td>Streams</td>
<td>1 to 2 mg/l Nitrogen</td>
</tr>
<tr>
<td>Sarasota Bay</td>
<td>0.4 mg/l Nitrogen</td>
</tr>
</tbody>
</table>
Disease Prevention

This is why the Liberian waiter laughed at me. He thought that I thought a toilet was my right, when he knew it was a privilege.

It must be, when 2.6 billion people don’t have sanitation. I don’t mean that they have no toilet in their house and must use a public one with queues and fees. Or that they have an outhouse, or a rickety shack that empties into a filthy drain or pigsty. All that counts as sanitation, though not a safe variety. The people who have those are the fortunate ones. Four in ten people have no access to any latrine, toilet, bucket, or box. Nothing. Instead, they defecate by train tracks and in forests. They do it in plastic bags and fling them through the air in narrow slum alleyways. If
Septic Systems

Nutrient removing septic systems are an option

- Cost more $$

Florida studies show nutrients coming from septic systems

- Indian River Lagoon
- Springs
- Florida Keys

Guest Column: Local Communities Must Step Up to Address Septic Pollution to St. Lucie River, Indian River Lagoon

NOTE: This guest column by SWMD Governing Board member Melanie Pearson appeared in the February 2018 issue of Martin County Current.

The St. Lucie River and Estuary in Martin County and the Indian River Lagoon are replete with natural beauty and recreational opportunities to be enjoyed by residents and visitors year-round. Unless, of course, it was during one of the 184 times the Florida Department of Health had to issue “No Swimming” advisories for beaches and other swimming spots in Martin County since 2002. The culprit – unsafe levels of bacteria in the water that can make people sick. Shedding some light on the cause are two recent peer-reviewed papers by Harbor Branch Oceanographic Institute, which point to the source of this beach-closing bacteria as septic system pollution.
Phillippi Creek Septic System Replacement Program

- 10,000 septic tanks connected to central sewer
- More than 2 Million gallons per day NOT discharged under ground by septic tanks
- 33 small wastewater treatment plants connected
- More than 7 Million gallons per day NOT discharged under ground

Expensive! $120,000,000
Public Notice of Pollution
Florida Department of Environmental Protection

https://floridadep.gov/pollutionnotice

- Submit or Update Notice
- Subscribe to Receive Notifications
- View Submitted Notices
Do Something – Work Together

South Gators, Riverview High, Suncoast Waterkeepers, Sarasota Bay Watch, Sarasota Bay Estuary Program, Sarasota County
Call Mollie!

- Plant a Shoreline
- Install a rain barrel
- Pervious Driveway
- Build a swale

Mollie Holland
NEST Coordinator
(941) 861-0672
mkholland@scgov.net

It’s her job to help You
Citizen Leaders

• Saved Caspersen Beach
• Made Total Maximum Daily Loads happen
  – Require cleanup of polluted bodies of water
  – Sued EPA 1998
  – Driving force in Florida today
• Recycling referendum
• Amendment 1
• Environmentally Sensitive Lands Program
Civics 101

- Participate!
- It’s the American Way
Count Your Blessings
Why Not Phosphorus?