Lake Seminole History and Restoration Efforts

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Lake Seminole Characteristics

- 684 acres
- 5.5 feet average depth
- Control structures regulate lake level
- Primarily used for recreation
  - Fishing
  - Boating
- Historically dominated by
  - Cattail
  - Hydrilla
  - Eel-grass

Lake Seminole History

1942

- Western arm of Long Bayou
- Tidal estuarine system composed of
  - Mangroves
  - Salt marshes
- Upland landscape dominated by
  - Orange Groves
  - Pasture Land
  - Sparse residential
- Freshwater from Long Creek to the North
- Estuarine from Boca Ciega Bay to the South

Lake Seminole History

Mid and Late 1940s

- Created in mid-1940s
  - Irrigation for orange groves
  - Potable water source
- Land use
  - low density residential and agricultural
- Created by
  - Impounding and arm of Long Bayou
  - Flooding existing mangrove and salt marsh systems
- Late 1940s second weir added at north end of lake
  - Necessary due to upstream flooding

Lake Seminole History

1950s and 1960s

- Time of rapid expansion in the area
- Start of decline in ecological conditions
  - Rapid urbanization
  - High residence time
- Lake Seminole Park constructed
- Current semi-circular weir installed in late 1960s

Lake Seminole History

1970s and 1980s

- Land use
  - High density residential and commercial
- 1976 Lake Seminole Bypass Canal created
- By the mid to late 1980s
  - Water quality was at an all-time low
  - Nuisance vegetation at an all time high
- 1989 Pinellas BOCC passes resolution
  - Urges for joint development of long-term management plan

Lake Seminole

1990s to Present

- Built-out Watershed
- Water Quality Issues
  - Habitat loss
  - Poor sport fishery
  - Harmful algal blooms
- Restoration efforts kick into high gear
  - WMP finalized in 2001
  - Improvement projects start in mid 2000s

Early Study Efforts

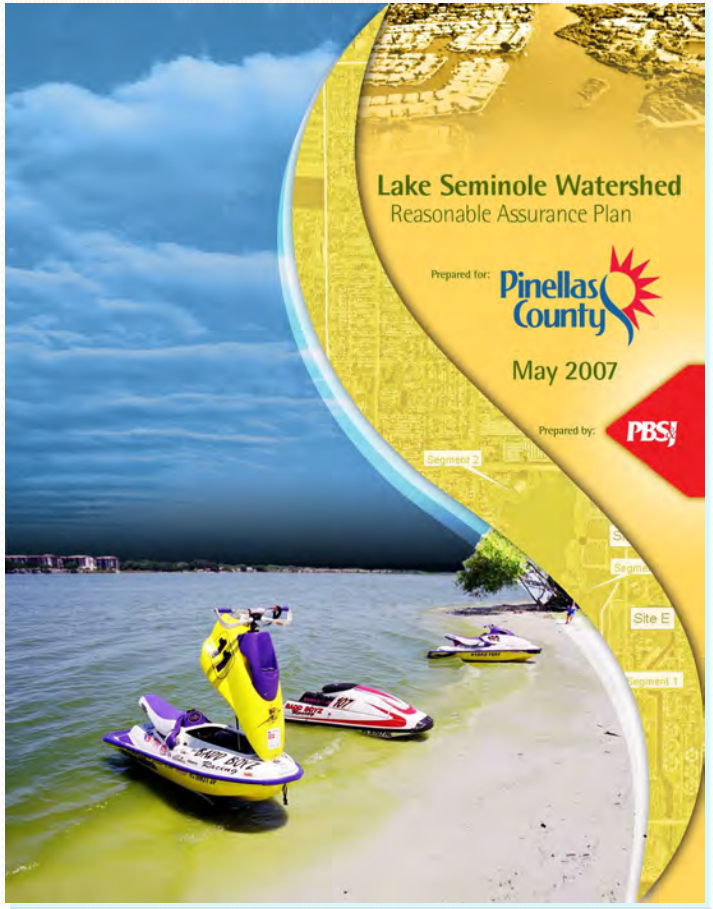
- 1989-BOCC passes resolution urging joint development of long-term lake management plan
- 1992-Joint Diagnostic Feasibility Study conducted
- 1999-Lake Seminole Sediment Removal Feasibility Study conducted (revised 2006)
- 2001-Lake Seminole Watershed Management Plan completed

Early Restoration Efforts

- 1960s - Point Sources for nutrient pollution evaluated and targeted for termination
- 1971 - Elimination of direct input from wastewater plant
- 1987 - Grass Carp Introduced
- 1990s - Stormwater pond rehabilitations
- 2002 - Littoral shelf sediment removal and revegetation
- 2006 - Largemouth Bass stocking
- 2006 - Lake draw-down and nuisance vegetation removal, replanting and drainage improvements

Reasonable Assurance Plan

- Developed in response to being an impaired waterbody pursuant to section 303(d) of the federal Clean Water
- Plan finalized in 2007
- Defined Structural, Management, Legal and Policy Components



Reasonable Assurance Plan

Water Quality Goals

- Reduce chlorophyll-a concentrations to 30 ug/L or less
- Attain a mean annual multi-parametric TSI value of 60 or less
- Reduce current annual TP loads from external sources by 50%
- Annually calculate current water and nutrient budgets
- Maintain Class-III water quality standards for DO, pH, specific conductance and chlorides
- Attain an 80% TSS load reduction for all permitted MSSW facilities in the watershed

Lake Seminole Restoration

Key Components

- Six Structural components
- Five Management components
- Two Legal components
- Two Public Education components
- One Policy component
- One Compliance and Enforcement component

Lake Seminole Restoration

Public Education Components

- Develop and Implement a Comprehensive Public Involvement Program
  - Produce watershed specific brochures
  - Speaking engagements at HOA and other public events
  - Maintain updated Lake Seminole Website
  - Continuous Education and Outreach
- Develop and Implement a local Citizens LakeWatch Program
  - Due to robust County sampling this was not needed

Education and Outreach

- Pet Waste Education
  - Education people on best practices
  - Install pet waste station bags
- Storm drain Markers
  - Provide storm drain marker kits
- Fertilizer Education Campaign
  - Education classes for lawn professionals
  - Mailers and website materials

www.BeFloridian.org

Lake Seminole Restoration

Structural Components

- Excavate Organic Peat Sediments from shoreline areas
- Restore Priority wetland and upland habitats
- Install stage and flow measurement instruments on the outfall control structure
- Construct enhanced regional stormwater treatment facilities in priority sub-basins
- Divert Seminole Bypass canal flows to improve flushing and dilution
- Dredge organic silt sediments from submerged areas

Littoral Shelf Organic Sediment Removal

- Completed in 2006
- Continuation of 2002 FWC project
- Focused on near shore areas and tussocks
- Removal
  - 130,000 CY of organic sediments
  - Over 26 tons of garbage and debris

Restore Priority Wetland and Upland Habitats

- Target nuisance species for removal
  - Brazilian Pepper
  - Air Potato
  - Cattail
  - Willows
- Completed 2008
  - Continued maintenance on as-needed basis
- Revegetated areas with native plants
- Goal to improve near-shore and upland habitats

Outfall Control Structure Gauge

- Accurately measure lake stage and flow volumes at the outfall control structure
- Completed in 2006
- Site measures stage
  - does not measure flow
- Aids in calculating loading models and water/nutrient budget balancing

Source: http://water.usgs.gov/edu/watermonitoring.html

Alum Facilities

Alum 101

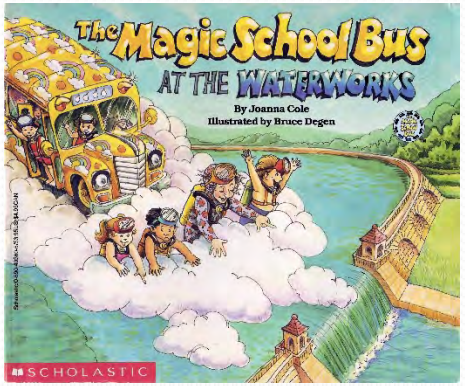
- Aluminum Sulfate
- Long history of use
  - Romans used to clarify drinking water
  - Wastewater treatment has used this for over a hundred years
- Forms gelatinous Floc that that is active for a long period
- High efficiency, stable end product

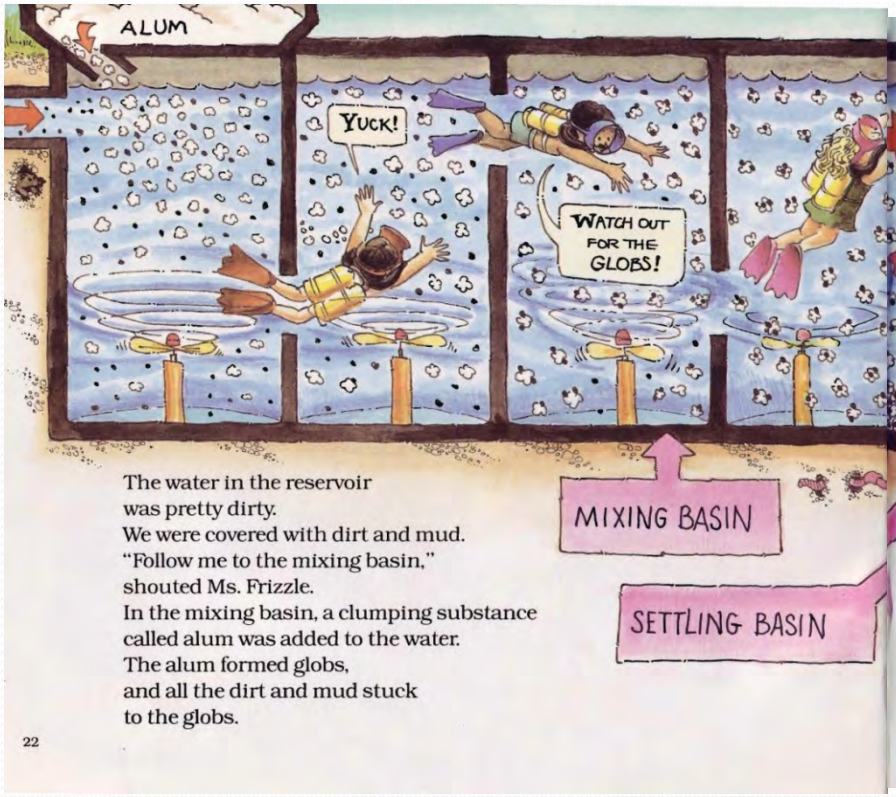
Before

After

Alum Facilities

How Alum Works

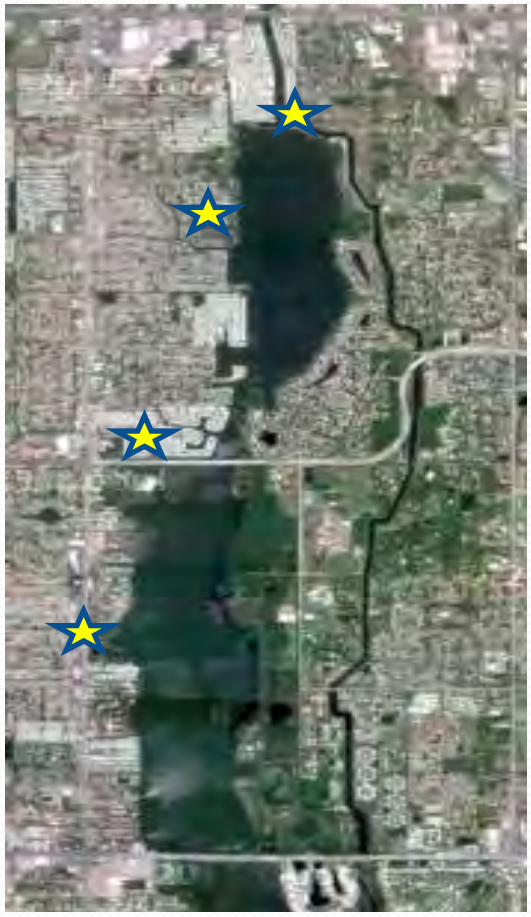




Alum Facilities

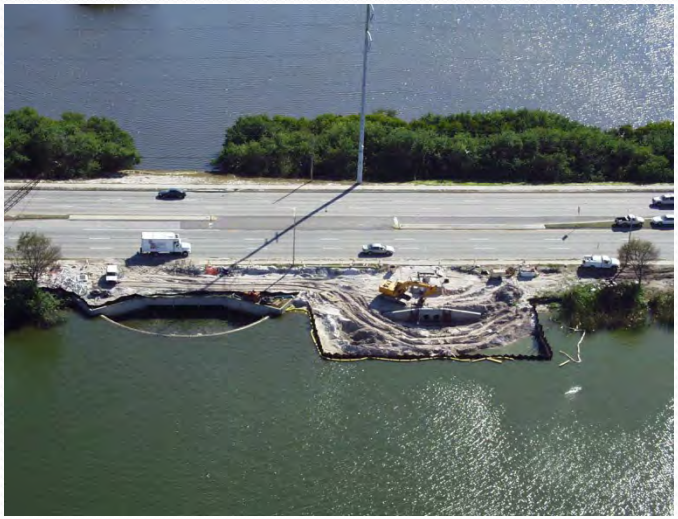
Lake Seminole Sites

- Total of 5 systems at 4 locations
- Selection based on basins that contribute the highest pollutant loads
- Most systems are flow activated
- Anticipated annual reductions
  - ~40% TN (~7,600 lbs/yr)
  - ~80% TP (~3,100 lbs/yr)
  - ~80% TSS (~200,000 lbs/yr)
- Goal is to reduce nutrient loadings prior to entering the lake



Increase Flushing

- Development of operational schedule for outfall
- Summer-time diversion of Alum treated water from Lake Seminole Bypass Canal
- To be implemented once Alum facilities and dredge operations are completed
- Expected benefits are:
  - Reduce residence time in the lake
  - Reduction of nuisance aquatic vegetation



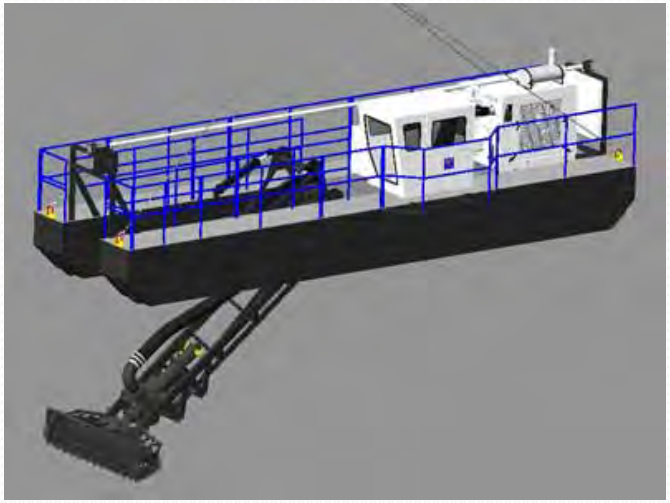
Organic Sediment Dredge

- Number one recommended project
- Removal of 900,000 cubic yards of muck
  - Result in removal
    - 416 tons of TN
    - 77 Tons of TP
- Design started in 2010
- Goal is to reduce internal nutrient loads

Organic Sediment Dredge

How it Works

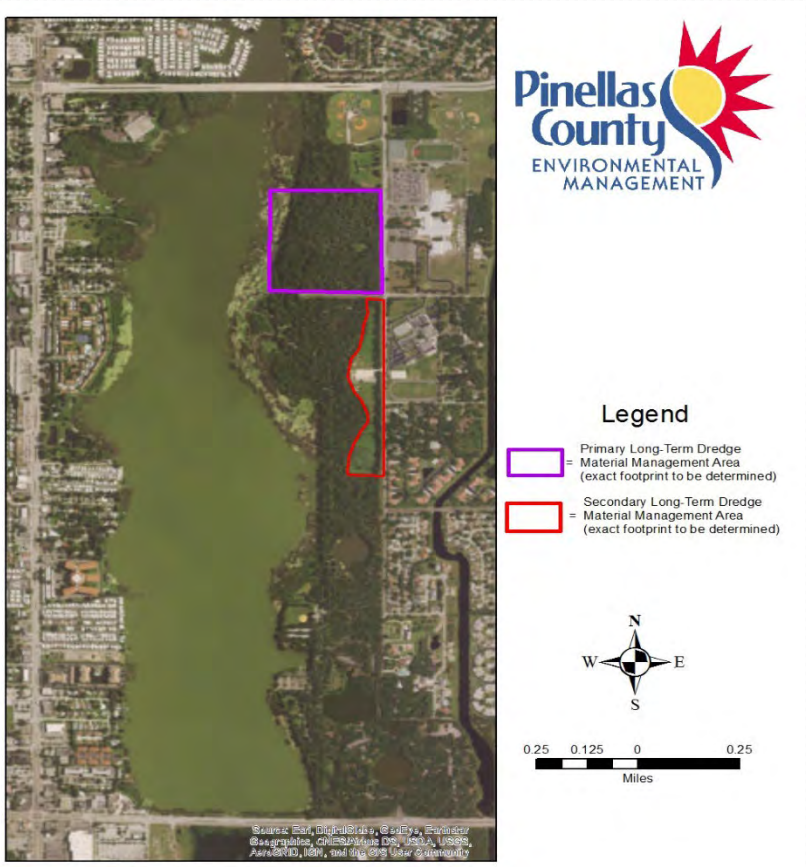
- Cutter head of barge will loosen, and vacuum will suck up sediment
- Sediment then sent by pipe to upland dewatering site
- Sediment and associate debris separated at upland site and clean sediment-free water returned to the lake



Organic Sediment Dredge

Project Update

- July 18, 2017 - BOCC signs Contract to conduct Project
- Permit Modifications and Additional Pre-Construction Work over next 10 months
- Active dredging to begin in Summer 2018



Lake Seminole Restoration

Management Components

- Implement an enhanced lake level fluctuation schedule
  - Hope to implement during the 2018 year
  - Divert treated By-Pass Canal flow into the lake
- Biomanipulate sport fish populations
  - May continue post dredge
- Improve treatment efficiencies of existing stormwater infrastructure
  - On-going activities

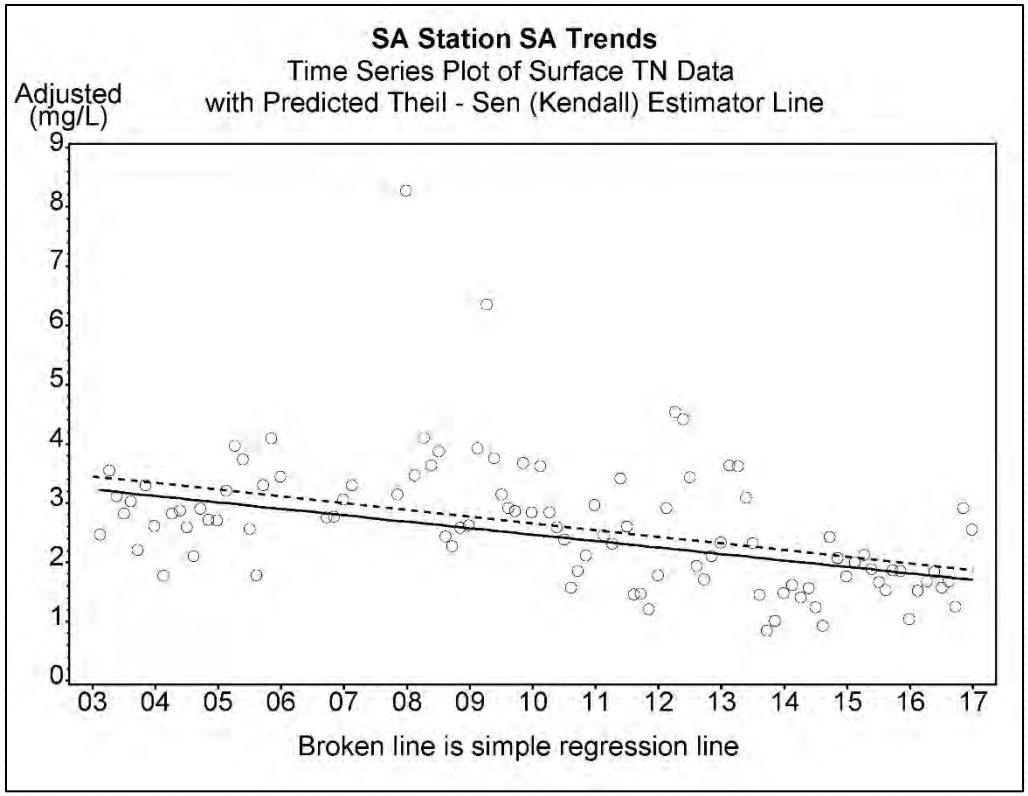
Lake Seminole Restoration

Management Components (cont.)

- Inactivate phosphorus through whole lake Alum applications
  - Will re-evaluate the need for this after completion of the dredge project
  - May not be necessary
- Mechanical harvest of nuisance aquatic vegetation
  - Conducted as needed
  - Not necessary in recent years

The Good News Recent Water Quality

- Time series analysis shows significant decreasing trends
  - Chl-a (Both Lobes)
  - TP (Both Lobes)
  - TN (Both Lobes)
  - Turbidity (Both Lobes)
  - TSS (Both Lobes)



Where to Go from Here

- Continued public education
- Conduct the dredge project
- Monitor Alum systems
  - ERP Compliance
  - Annually to determine
    - Nutrient reductions
    - Removal efficiencies
    - Pond capacity status
- Continue monitoring lake water quality
- Continue updating compliance with Reasonable Assurance Plan

Penny for Pinellas Accomplishments

WATER QUALITY & FLOOD PREVENTION

A peninsula on a peninsula, Pinellas County is surrounded by water. Keeping our lakes, ponds, Bay and Gulf healthy, as well as protecting our citizens from flooding is essential to the whole community.

116 REHABILITATION PROJECTS to enhance our drainage systems and reduce flood risk

28 FLOOD CONTROL PROJECTS to protect homes

12 CREEKS STABILIZED to protect homes and the environment

9 MAJOR WATER QUALITY PROJECTS to remove pollutants from our waterways

Lake Tarpon Water Quality | Walsingham Reservoir Enlargement | Bee Branch Erosion Control | Joe's Creek Flood Control

THANK YOU!

We would like to thank the following organizations and people for their efforts in managing and restoring Lake Seminole:

- SWFWMD (Primary Funding Partner)
- Atkins (Formerly PBS&J)
- Environmental Research and Design
- FDEP
- FFWCC
- AMEC Foster Wheeler
- Janicki Environmental
- Pinellas Environmental Management Staff
- Countless Volunteers and Volunteer Groups