



**Florida Department of Environmental Protection**  
**Division of Environmental Assessment and Restoration**

***Lake Jesup Basin Management Action  
Plan (BMAP) Amendment***

***September 13, 2018***





# Agenda

1. Overview of BMAP Amendment
2. Stakeholder Projects
3. Next Steps and Timelines
4. Questions/Comments



# Overview of BMAP Amendment



# Chapter 1: Context, Purpose, and Scope of the Plan

- BMAP Amendment
  - Adding to/supplementing the 2010 BMAP.
- Only covers new or changed information since the 2010 BMAP.
  - Details included in the 2010 BMAP.
- Chapter 1 reviews the total maximum daily loads (TMDLs), meeting history, and key elements of the amendment.



# Reminder: Need for Total Nitrogen (TN) Reductions

- TMDL includes TN reduction requirements.
- 2010 BMAP Section 2.4: Technical Uncertainties Addressed Through Modification of TMDL Information and BMAP Assumptions
  - “At the time of the TMDL, information on the rate of nitrogen-fixation in Lake Jesup was not available...Due to this uncertainty, this BMAP focuses on external TP load reductions. Upon recalculation of the TMDL, the need to modify the BMAP to include external TN load reductions will be evaluated.”
- 2010 BMAP Section 2.5.1: Rationale for the TP Focus
  - “In order to move forward with efforts to improve the lake water quality, this BMAP focuses only on the TP reductions. Concurrent with the BMAP process and implementation, studies to determine the effects of nitrogen-fixation have been completed and are being conducted. The information from these studies will be utilized to refine the TMDL and BMAP, as necessary, and to guide future project implementation efforts.”

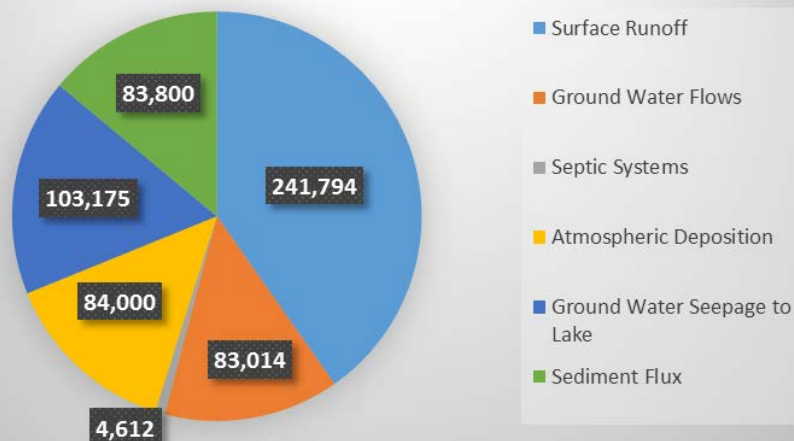
Note: TP--total phosphorus.



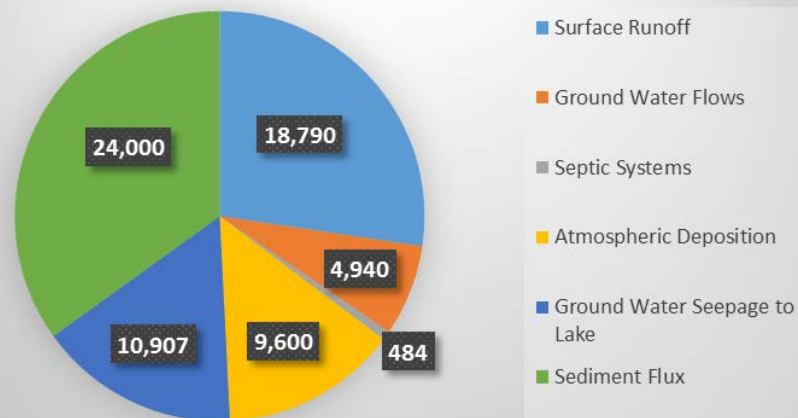
# Chapter 2: Model Update

| Parameter | Surface<br>Runoff<br>(lbs/yr) | Ground<br>Water<br>Flows<br>(lbs/yr) | Septic<br>Systems<br>(lbs/yr) | Atmospheric<br>Deposition<br>(lbs/yr) | Ground Water<br>Seepage to<br>Lake (lbs/yr) | Sediment<br>Flux<br>(lbs/yr) |
|-----------|-------------------------------|--------------------------------------|-------------------------------|---------------------------------------|---------------------------------------------|------------------------------|
| TP        | 18,790                        | 4,940                                | 484                           | 9,600                                 | 10,907                                      | 24,000                       |
| TN        | 241,794                       | 83,014                               | 4,612                         | 84,000                                | 103,175                                     | 83,800                       |

**TN Loads (lbs/yr)**



**TP Loads (lbs/yr)**



Note: lbs/yr—pounds per year.



# Chapter 3: Calculating and Allocating Load Reductions

| Entity                    | Area (Acres)  | Starting TN Load (lbs/yr) | Starting TP Load (lbs/yr) |
|---------------------------|---------------|---------------------------|---------------------------|
| Agriculture               | 5,733         | 36,797                    | 2,813                     |
| City of Altamonte Springs | 235           | 289                       | 11                        |
| City of Casselberry       | 3,257         | 14,643                    | 986                       |
| City of Lake Mary         | 2,091         | 4,966                     | 325                       |
| City of Longwood          | 2,064         | 5,550                     | 326                       |
| City of Maitland          | 1,229         | 3,200                     | 247                       |
| City of Orlando           | 3,813         | 282                       | 26                        |
| City of Oviedo            | 2,504         | 23,309                    | 1,866                     |
| City of Sanford           | 3,997         | 21,286                    | 2,399                     |
| City of Winter Park       | 3,981         | 4,616                     | 309                       |
| City of Winter Springs    | 5,540         | 43,969                    | 2,993                     |
| FDOT District 5           | 1,030         | 4,645                     | 402                       |
| Orange County             | 1,680         | 3,648                     | 126                       |
| Seminole County           | 14,432        | 96,303                    | 6,300                     |
| Town of Eatonville        | 112           | 95                        | 9                         |
| Turnpike Authority        | 668           | 5,107                     | 466                       |
| Site 10                   | 532           | 3,835                     | 266                       |
| Natural Lands             | 32,360        | 56,881                    | 4,347                     |
| <b>Total</b>              | <b>85,258</b> | <b>329,421</b>            | <b>24,217</b>             |



# Required Reductions

- TMDLs in rule (62-304.505[1], Florida Administrative Code [F.A.C.]) is a load:
  - 545,203 lbs/yr of TN and 41,888 lbs/yr of TP.
- Achieving the TMDLs is anticipated to achieve in-lake concentrations of 1.27 mg/L of TN and 0.096 mg/L of TP.
  - Concentrations are not part of rule.
- TMDL estimates a 95% reduction in nitrogen fixation associated with reducing watershed loading to TMDL target:
  - Decrease in nutrient loading will decrease the phytoplankton and nitrogen fixer biomass.
  - Decrease in TP loading into the system may make the system less nitrogen limited.



# Required Reductions, cont.

- To meet TMDLs, other sources (both watershed and in-lake) need to achieve reductions of 16.7 % TN and 45.5 % TP.

| Source                       | TN Existing Load (lbs/yr) | TN Allowable Load (lbs/yr) | TN % Reduction | TP Existing Load (lbs/yr) | TP Allowable Load (lbs/yr) | TP % Reduction |
|------------------------------|---------------------------|----------------------------|----------------|---------------------------|----------------------------|----------------|
| Watershed                    | 329,421                   | 274,407                    | 16.7 %         | 24,217                    | 13,197                     | 45.5 %         |
| Ground Water Seepage to Lake | 103,175                   | 85,945                     | 16.7 %         | 10,907                    | 5,944                      | 45.5 %         |
| Atmospheric Deposition       | 84,000                    | 84,000                     | 0.0 %          | 9,600                     | 9,600                      | 0.0 %          |
| Nitrogen Fixation            | 633,894                   | 31,695                     | 95.0 %         | 0                         | 0                          | 0.0 %          |
| Sediment Flux                | 83,800                    | 69,852                     | 16.7 %         | 24,000                    | 13,080                     | 45.5 %         |
| Total Load                   | 1,234,290                 | 545,774                    |                | 68,724                    | 41,821                     |                |



# Allowable Loading to Meet the TMDL

| Parameter | Watershed Starting Load (lbs/yr) | TMDL % Reduction | Allowable Watershed Load (lbs/yr) |
|-----------|----------------------------------|------------------|-----------------------------------|
| TN        | 329,421                          | 16.7%            | 274,408                           |
| TP        | 24,217                           | 45.5%            | 13,198                            |

| Load Source          | TN Load (lbs/yr) | TP Load (lbs/yr) |
|----------------------|------------------|------------------|
| TMDL Allowable Load  | 274,408          | 13,198           |
| Natural Areas Load   | 56,881           | 4,347            |
| Anthropogenic Target | 217,527          | 8,851            |



# Allocations

- Required reductions were assigned to stakeholders based on the percentage of each stakeholder's starting load.
- If a stakeholder is 10 % of the anthropogenic starting load, then that stakeholder received 10 % of the required reductions.
- This approach keeps the loading from each entity in the same proportion so each entity receives the same percent reduction requirement.



# Required Reductions

| Entity                    | TN Starting Load (lbs/yr) | TN Reduction Required (lbs/yr) | % TN Reduction | TP Starting Load (lbs/yr) | TP Required Reduction (lbs/yr) | % TP Reduction |
|---------------------------|---------------------------|--------------------------------|----------------|---------------------------|--------------------------------|----------------|
| Agriculture               | 36,797                    | 7,428                          | 20.2 %         | 2,813                     | 1,560                          | 55.5 %         |
| City of Altamonte Springs | 289                       | 58                             | 20.2 %         | 11                        | 6                              | 55.5 %         |
| City of Casselberry       | 14,643                    | 2,956                          | 20.2 %         | 986                       | 547                            | 55.5 %         |
| City of Lake Mary         | 4,966                     | 1,002                          | 20.2 %         | 325                       | 180                            | 55.5 %         |
| City of Longwood          | 5,550                     | 1,120                          | 20.2 %         | 326                       | 181                            | 55.5 %         |
| City of Maitland          | 3,200                     | 646                            | 20.2 %         | 247                       | 137                            | 55.5 %         |
| City of Orlando           | 282                       | 57                             | 20.2 %         | 26                        | 14                             | 55.5 %         |
| City of Oviedo            | 23,309                    | 4,705                          | 20.2 %         | 1,866                     | 1,035                          | 55.5 %         |
| City of Sanford           | 21,286                    | 4,297                          | 20.2 %         | 2,399                     | 1,330                          | 55.5 %         |
| City of Winter Park       | 4,616                     | 932                            | 20.2 %         | 309                       | 171                            | 55.5 %         |
| City of Winter Springs    | 43,969                    | 8,875                          | 20.2 %         | 2,993                     | 1,660                          | 55.5 %         |
| FDOT District 5           | 4,645                     | 938                            | 20.2 %         | 402                       | 223                            | 55.5 %         |
| Orange County             | 3,648                     | 736                            | 20.2 %         | 126                       | 70                             | 55.5 %         |
| Seminole County           | 96,303                    | 19,439                         | 20.2 %         | 6,300                     | 3,494                          | 55.5 %         |
| Town of Eatonville        | 95                        | 19                             | 20.2 %         | 9                         | 5                              | 55.5 %         |
| Turnpike Authority        | 5,107                     | 1,031                          | 20.2 %         | 466                       | 258                            | 55.5 %         |
| Site 10                   | 3,835                     | 774                            | 20.2 %         | 266                       | 148                            | 55.5 %         |
| <b>Total</b>              | <b>272,540</b>            | <b>55,013</b>                  |                | <b>19,870</b>             | <b>11,019</b>                  |                |



# BMAP Reductions

- Proposal to achieve at least 50 % of the required reductions during the next five years.

| Entity                    | TN BMAP Iteration Required<br>Reductions (lbs/yr) | TN BMAP Iteration Required<br>Reductions (lbs/yr) |
|---------------------------|---------------------------------------------------|---------------------------------------------------|
| Agriculture               | 3,714                                             | 780                                               |
| City of Altamonte Springs | 29                                                | 3                                                 |
| City of Casselberry       | 1,478                                             | 273                                               |
| City of Lake Mary         | 501                                               | 90                                                |
| City of Longwood          | 560                                               | 90                                                |
| City of Maitland          | 323                                               | 68                                                |
| City of Orlando           | 28                                                | 7                                                 |
| City of Oviedo            | 2,353                                             | 517                                               |
| City of Sanford           | 2,148                                             | 665                                               |
| City of Winter Park       | 466                                               | 86                                                |
| City of Winter Springs    | 4,438                                             | 830                                               |
| FDOT District 5           | 469                                               | 111                                               |
| Orange County             | 368                                               | 35                                                |
| Seminole County           | 9,720                                             | 1,747                                             |
| Town of Eatonville        | 10                                                | 2                                                 |
| Turnpike Authority        | 515                                               | 129                                               |
| Site 10                   | 387                                               | 74                                                |



# Low Priority Ranking

- Several stakeholders contribute less than 1 % of both the TP and TN loading to Lake Jesup:
  - City of Altamonte Springs.
  - City of Orlando.
  - Town of Eatonville.
- Reductions may be needed from these entities in the future.



# Chapter 4: Management Actions

- Education efforts and non-structural projects are eligible, regardless of when they were implemented.
  - These efforts are not in the Hydrologic Simulation Program FORTRAN (HSPF) model.
- Urban structural projects completed since January 1, 2013 and future projects are eligible for BMAP credit.
- Agricultural best management practices (BMPs) are eligible, regardless of when they were implemented.
  - These BMPs are not in the HSPF model.
- Feasibility studies ongoing to identify projects to achieve in-lake reductions.



# Project Credits

| Entity                     | TN Required Reduction (lbs/yr) | TN Project Credits (lbs/yr) | % of TN Reductions Achieved | TP Required Reduction (lbs/yr) | TP Project Credits (lbs/yr) | % of TP Reductions Achieved |
|----------------------------|--------------------------------|-----------------------------|-----------------------------|--------------------------------|-----------------------------|-----------------------------|
| Agriculture                | 7,428                          | 12,928                      | 174.0 %                     | 1,560                          | 941                         | 60.3 %                      |
| City of Altamonte Springs* | 58                             | 50                          | 86.2 %                      | 6                              | 13                          | 216.7 %                     |
| City of Casselberry        | 2,956                          | 2,398                       | 81.1 %                      | 547                            | 850                         | 155.4 %                     |
| City of Lake Mary          | 1,002                          | 593                         | 59.2 %                      | 180                            | 97                          | 53.9 %                      |
| City of Longwood           | 1,120                          | 9,802                       | 875.2 %                     | 181                            | 323                         | 178.5 %                     |
| City of Maitland           | 646                            | 359                         | 55.6 %                      | 137                            | 287                         | 209.5 %                     |
| City of Orlando*           | 57                             | 147                         | 257.9 %                     | 14                             | 97                          | 692.9 %                     |
| City of Oviedo             | 4,705                          | 3,027                       | 64.3 %                      | 1,035                          | 517                         | 50.0 %                      |
| City of Sanford            | 4,297                          | 13,667                      | 318.1 %                     | 1,330                          | 2,849                       | 214.2 %                     |
| City of Winter Park        | 932                            | 743                         | 79.7 %                      | 171                            | 321                         | 187.7 %                     |
| City of Winter Springs     | 8,875                          | 5,182                       | 58.4 %                      | 1,660                          | 937                         | 56.4 %                      |
| FDOT District 5            | 938                            | 1,807                       | 192.6 %                     | 223                            | 901                         | 404.0 %                     |
| Orange County              | 736                            | 775                         | 105.3 %                     | 70                             | 141                         | 201.4 %                     |
| Seminole County            | 19,439                         | 43,019                      | 221.3 %                     | 3,494                          | 5,485                       | 157.0 %                     |
| Town of Eatonville*        | 19                             | 1                           | 5.3 %                       | 5                              | 0                           | 0.0 %                       |
| Turnpike Authority         | 1,031                          | 1,003                       | 97.3 %                      | 258                            | 131                         | 50.8 %                      |
| Site 10                    | 774                            | 1,150                       | 148.6 %                     | 148                            | 146                         | 98.6 %                      |

\* Low priority entity



# Chapter 5: Monitoring Strategy

- Monitoring plan designed to:
  - Track trends in TP and TN loads in Lake Jesup and its tributaries.
  - Determine inputs to Lake Jesup.
  - Identify hot spots to better focus management efforts.
  - Track ecological and limnological responses.
- Chapter includes updates on:
  - Stations removed from original BMAP monitoring network.
  - Stations added to the original BMAP monitoring network.
  - Changes in parameters sampled.



# Chapter 6: Commitment to Plan Implementation

- Reductions achieved by 2030.
  - 20 years after initial BMAP adoption.
- Load reduction status reevaluated in 2023.
- BMAP will continue to be adaptively managed.



# Appendices

- Appendix A. References.
- Appendix B. Projects to Reduce Nutrient Sources.
  - Please carefully review information in your project table.
  - Please provide any missing information for the tables to fill in cells highlighted in yellow.
  - Project information will be used as starting point for next statewide annual report (STAR).



## Stakeholder Projects

# Passive Steps Toward Restoration

Re-connecting the Floodplain of Lake Jesup

Danielle M. Honour,  
PE, DWRE

Shannon Wetzel



**CDM  
Smith®**

  
**SEMINOLE COUNTY**  
FLORIDA'S NATURAL CHOICE

# Lake Jesup Background

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Approximately 17 mi<sup>2</sup> surface area

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Located in central Seminole County, FL

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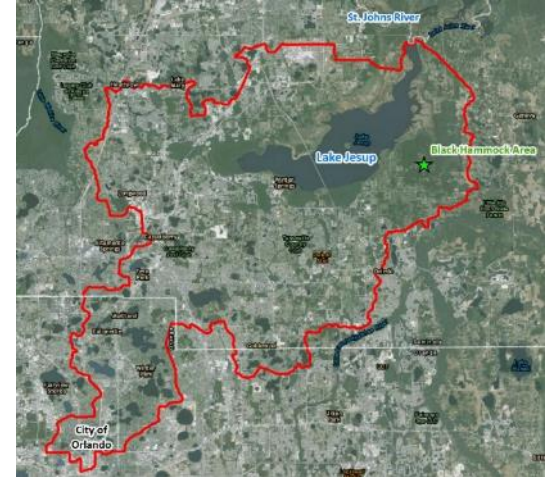
Approximately 136 mi<sup>2</sup> watershed

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Receiving water for Seminole County,  
Orange County, and eleven other municipalities

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Outfalls into St. Johns River



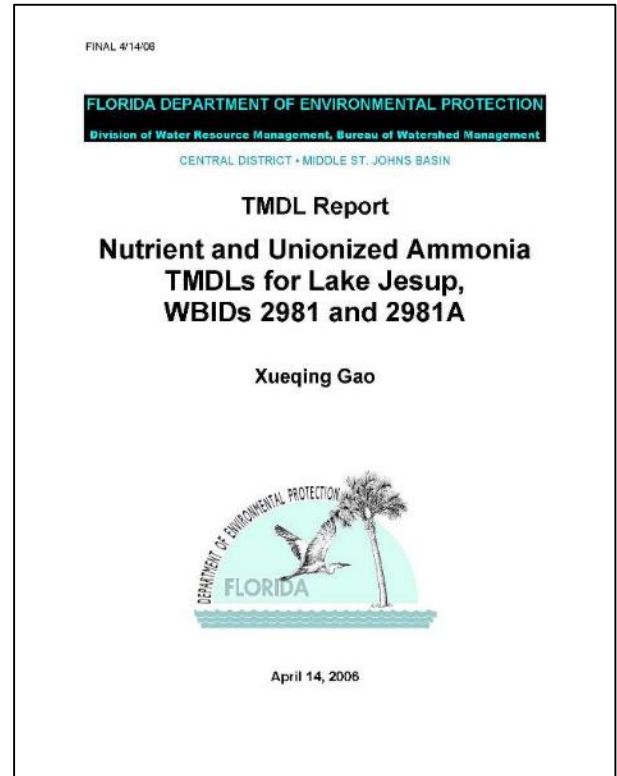
# Lake Jesup Water Quality Concerns

Impaired for nutrients and unionized ammonia

TMDL established in 2006, requiring 50% and 34% reductions in TN and TP, respectively; BMAP adopted in 2010

Seminole County originally required to achieve load reduction of 6,411 lbs TP/yr over 15-year implementation timeframe

Draft Updated BMAP (2017) Required Reductions: 3,493 lbs TP/yr AND 19,439 lbs/yr TN

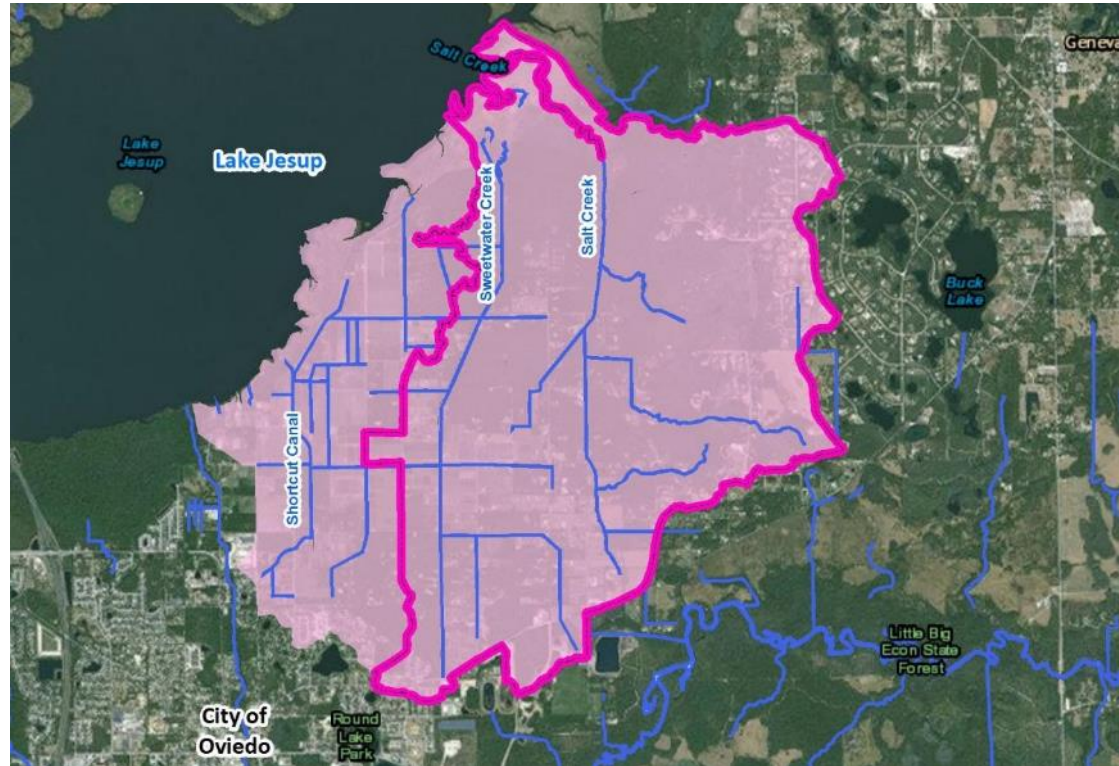


# Lake Jesup Interagency Restoration Strategy Identified Restoration Opportunities in Salt and Sweetwater Creeks

- Two of three primary conveyances serving Black Hammock and discharge directly to Lake Jesup
- Creeks were channelized in 1920s to support agricultural activities
- Excavated material deposited on channel banks are forming berms which have severed the creeks from historic floodplain
- County received FDEP grant in 2013 to fund design and construction



# Black Hammock Tributary Area

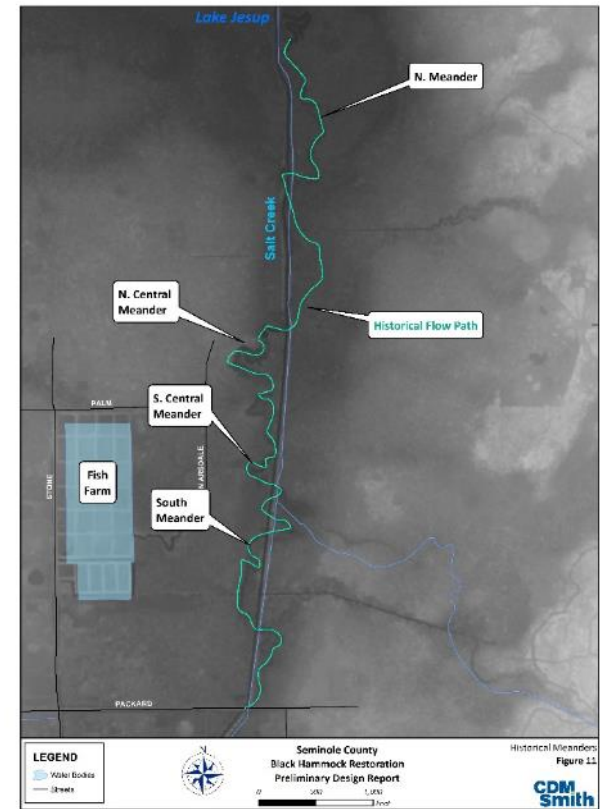


# Salt Creek Restoration



# Salt Creek Restoration and Treatment System Goals

- Passive Treatment
  - Re-connect Salt Creek to natural meanders
  - Provide restoration and rehydration of wetlands in historic floodplain
  - Area not conducive to traditional stormwater BMP treatment
  - Minimal maintenance
  - Minimal impact during construction

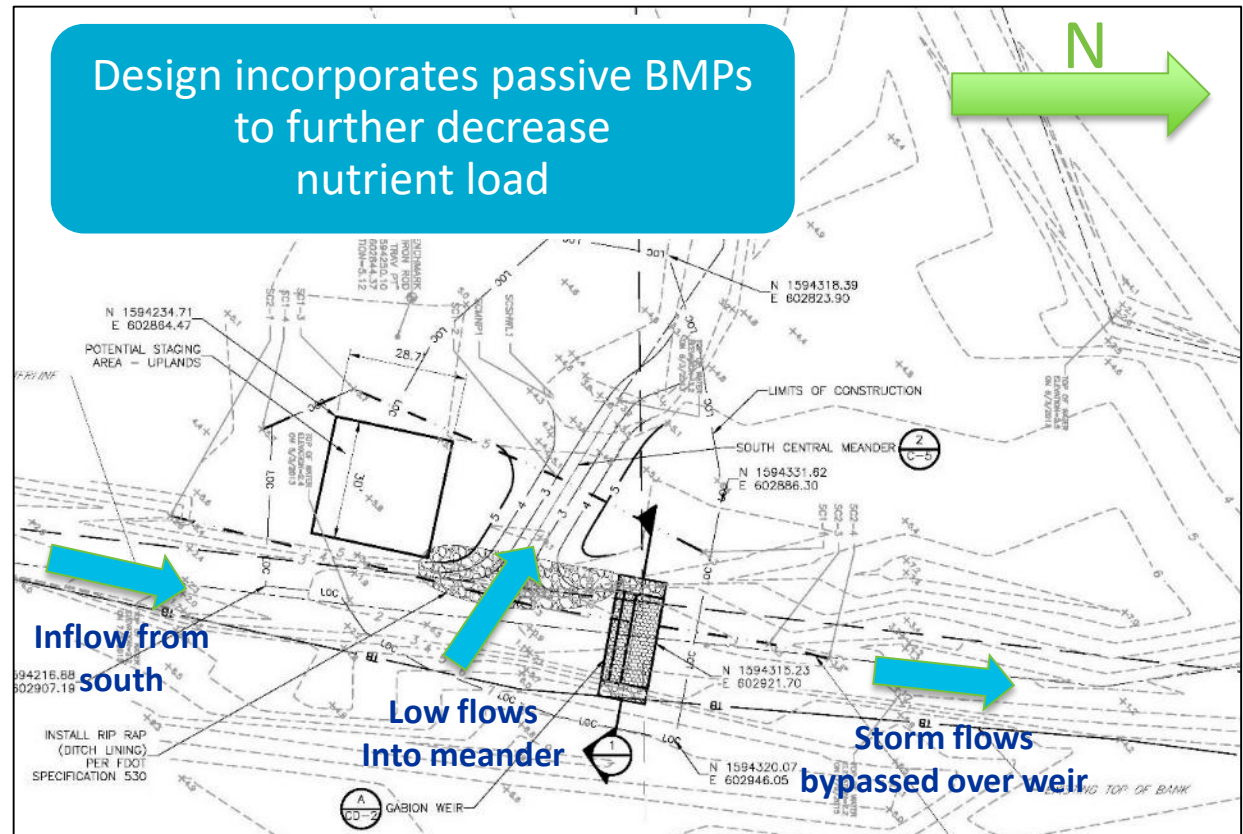


# Floodplain Meander Entrance Design

Removal of spoil berm to re-connect channel and meanders

Grading of entrance channels into meanders

Installation of low flow (~1-foot high) gabion diversion weirs



# Hydraulic Benefit of Proposed Improvements

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Long-term continuous simulation modeling demonstrates that proposed weirs are effective in providing a positive gradient into the meanders

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Number of days per year with at least 1 cfs average flow into meanders significantly higher with meander connections and gabion weirs

|               | Pre-Project                     | With Project                    |
|---------------|---------------------------------|---------------------------------|
| Meander       | Number of Days with >1 cfs flow | Number of Days with >1 cfs flow |
| South         | 50                              | 365                             |
| South Central | 22                              | 359                             |
| North Central | 24                              | 78                              |
| North         | 55                              | 344                             |

# Pollutant Load Removal Estimates

Based on the estimated storage volume in the floodplains and the low threshold of rainfall depth necessary to induce flow into the floodplains, removal efficiencies estimated to be **7%** for TN and **11%** for TP for stream restoration component

With the addition of filtration media , the system is predicted to remove **23%** of TN and **31%** of TP

|           | Stream Restoration     |                                   | With Addition of Media |                                   | Total Project          |                                   |
|-----------|------------------------|-----------------------------------|------------------------|-----------------------------------|------------------------|-----------------------------------|
| Pollutant | Removal Efficiency (%) | Estimated Load Reduction (lbs/yr) | Removal Efficiency (%) | Estimated Load Reduction (lbs/yr) | Removal Efficiency (%) | Estimated Load Reduction (lbs/yr) |
| TN        | 7                      | 1,215                             | 17                     | 3,636                             | 23                     | 4,851                             |
| TP        | 11                     | 321                               | 22                     | 839                               | 31                     | 1,160                             |

# Design Challenges and Construction Timeline

## Main design challenge was construction access

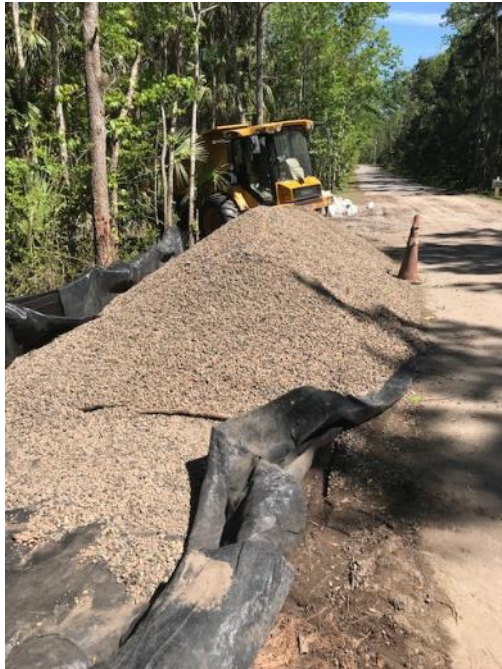
- Location and timing
- Preferred access will be up the stream bed
- Preferred timing of construction would be during dry season

## Construction Timeline

- Bid awarded in May 2017
- Due to rainy season, construction start delayed until October 2017
- *Hurricane Irma hits Central Florida September 2017*
- Construction started January 2018
- Irma impacted the design of low-flow gabion weirs
- Construction completed in July 2018

# Salt Creek Construction Progress (March 2018)

Bold and Gold staging area and sock construction



## Salt Creek Construction (March 2018)

Construction Staging  
Area / Entrance to Salt  
Creek



# Salt Creek Construction (March 2018)

## South Central Meander



Graded meander with Filter Soxx

## Salt Creek Construction (June 2018)

### North Central Meander



Completed stabilized meander entrance

## Early onset of Rainy Season



## Salt Creek Construction (July 2018)

Gabion Weir  
Construction in  
Salt Creek





# Sweetwater Creek Restoration

# Sweetwater Creek Characteristics

- Different characteristics from Salt Creek presents unique challenges
- Channel excavated considerably lower than adjacent floodplain and has high spoil berms
- Considerable amount of muck in channel
- Remote project location makes access challenging
- Diversion options into floodplain considered but cost prohibitive

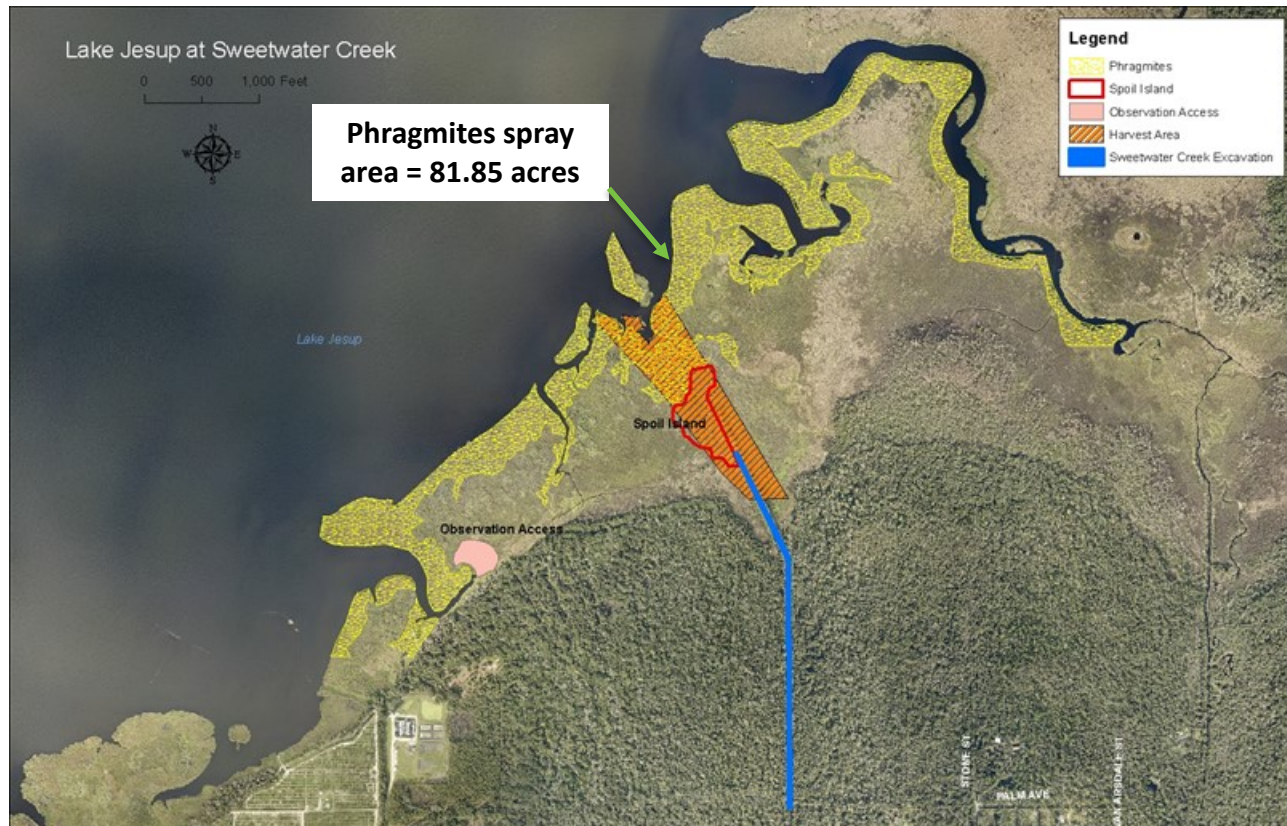


# Sweetwater Creek Restoration Components

- SJRWMD, FWC, and USFWS permits required
- Special Use Authorization from SJRWMD
- Aerial spraying to treat invasive Phragmites
- Removal of up to 2 feet (depth) of existing invasive vegetation in the marsh area
- Removal of muck in channel
- Delays due to Hurricane Irma



# Sweetwater Creek Restoration Overview



# Aerial view of Sweetwater Creek Prior to Restoration Work

- Prior to restoration activities, channel was completely overgrown with Carolina willow, Wax myrtle, and Giant reed grass
- Created flow blockages between the creek and the lake



# Sweetwater Creek (during/post-restoration efforts)

- Harvested vegetation was stockpiled to form islands
- Muck removal was used to fill lateral ditches for concurrent project on District property



## Sweetwater Creek (post-restoration efforts)

- Sweetwater creek looking upstream



# Sweetwater Creek Restoration Benefits

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Vegetation enhancement through removal of invasive species and planting marsh/lake interface with native vegetation

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Nutrient load reduction due to muck removal

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Improved conveyance and connectivity with Lake Jesup





Questions



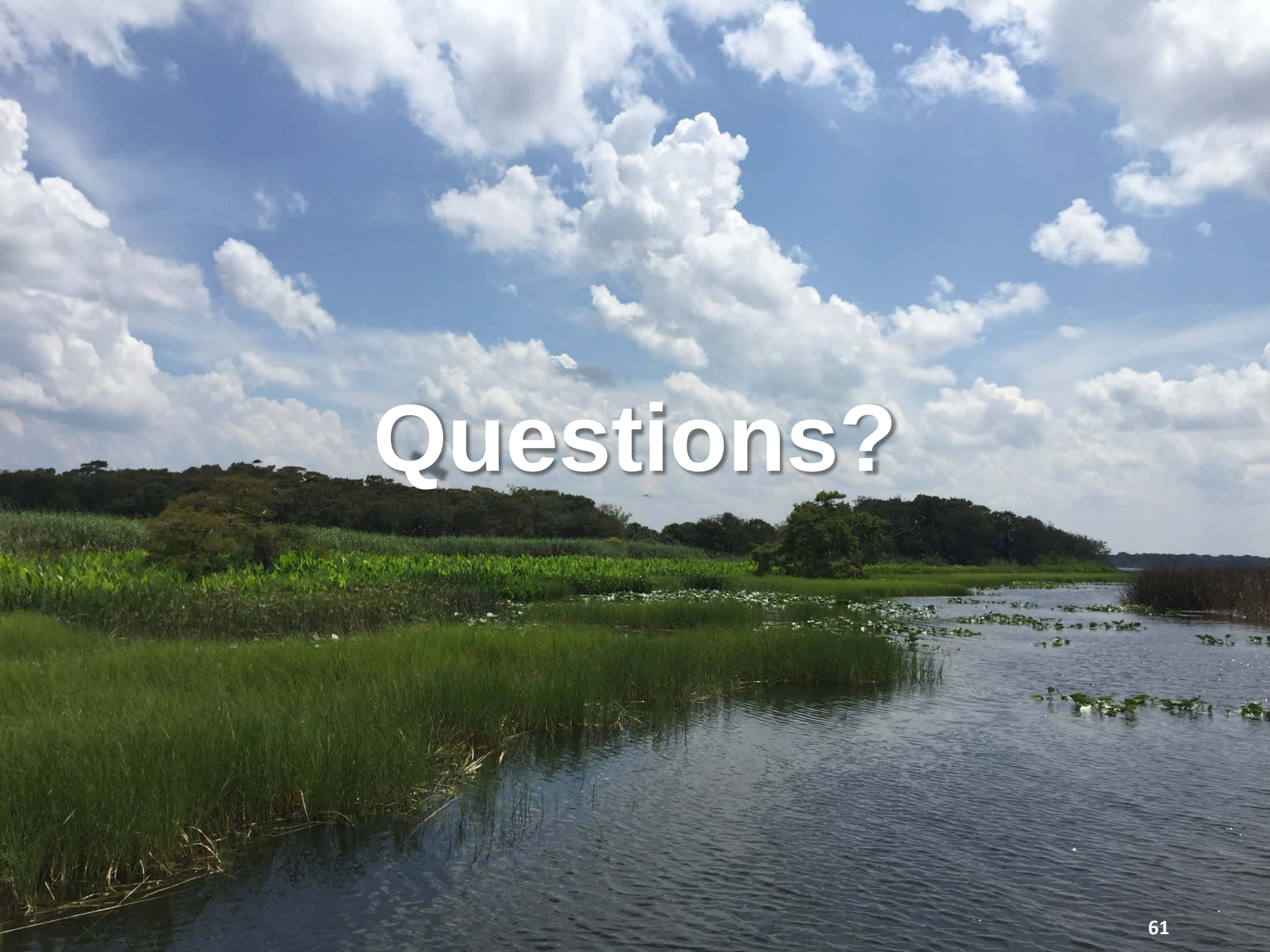
## Next Steps and Timelines



# Next Steps

- Comments on BMAP Amendment due September 21, 2018.
- Statewide Annual Report
  - 2019 Report
    - Status of projects through December 31, 2018
  - [Webpage](#)



A scenic landscape featuring a body of water in the foreground, with green reeds and lily pads. The background shows a line of trees under a bright blue sky filled with large, white, fluffy clouds. The word "Questions?" is overlaid in the center in a large, white, sans-serif font.

# Questions?