

# Water Management at Great Dismal Swamp NWR

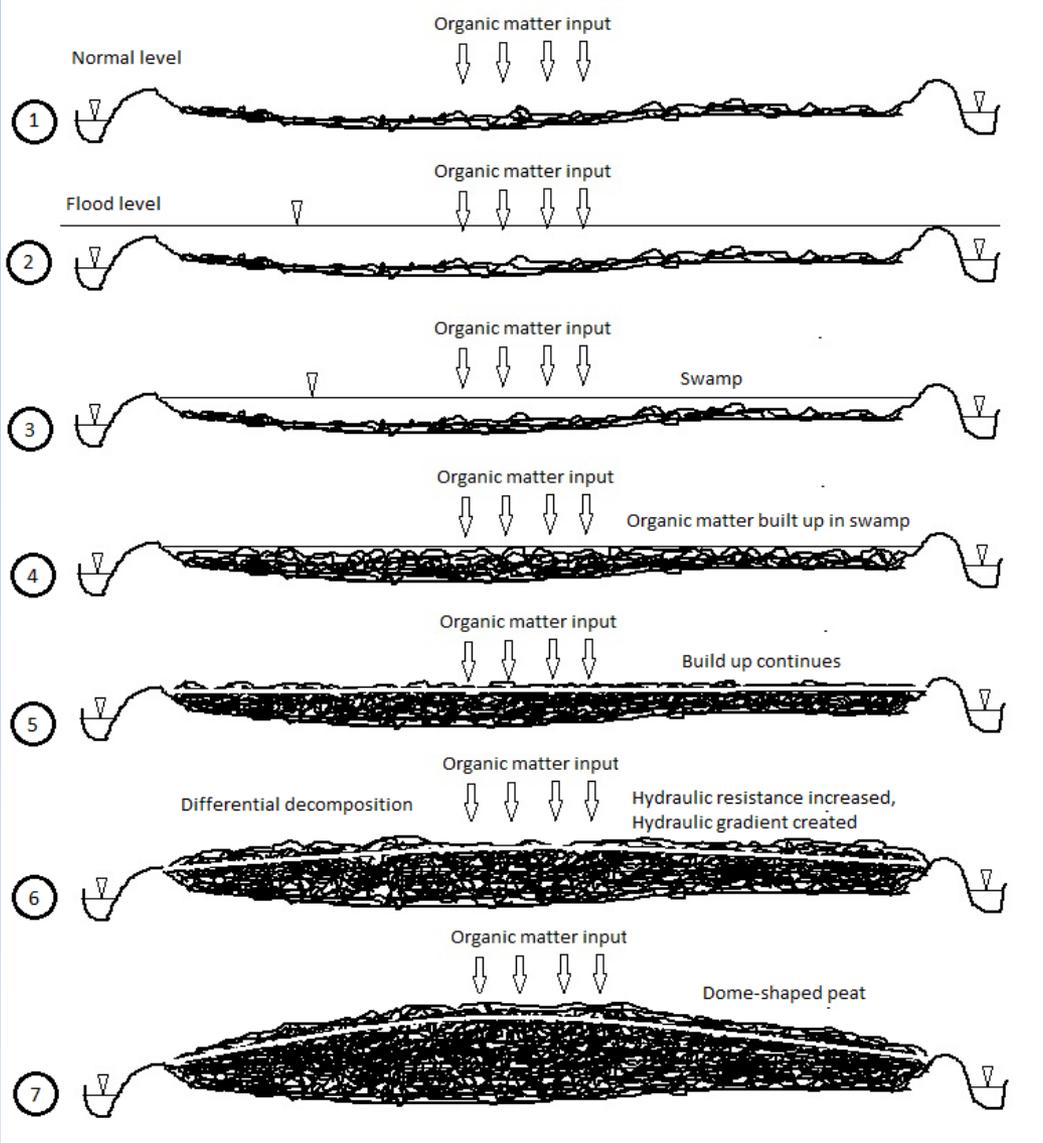
Frederic C. Wurster  
Great Dismal Swamp NWR

July 27, 2017

# Great Dismal Swamp is a Forested Peatland

- *Peatlands are areas of land with a naturally accumulated layer of dead plant material (peat) formed under waterlogged conditions.*

# Formation of a Peatland



# Albemarle/Pamlico Peatlands

- Southeastern shrub bog wetlands, or pocosins
- Dense growth of evergreen shrubs
- Atlantic White Cedar a key forest community at these refuges.
- Maximum peat depths approach 15 ft

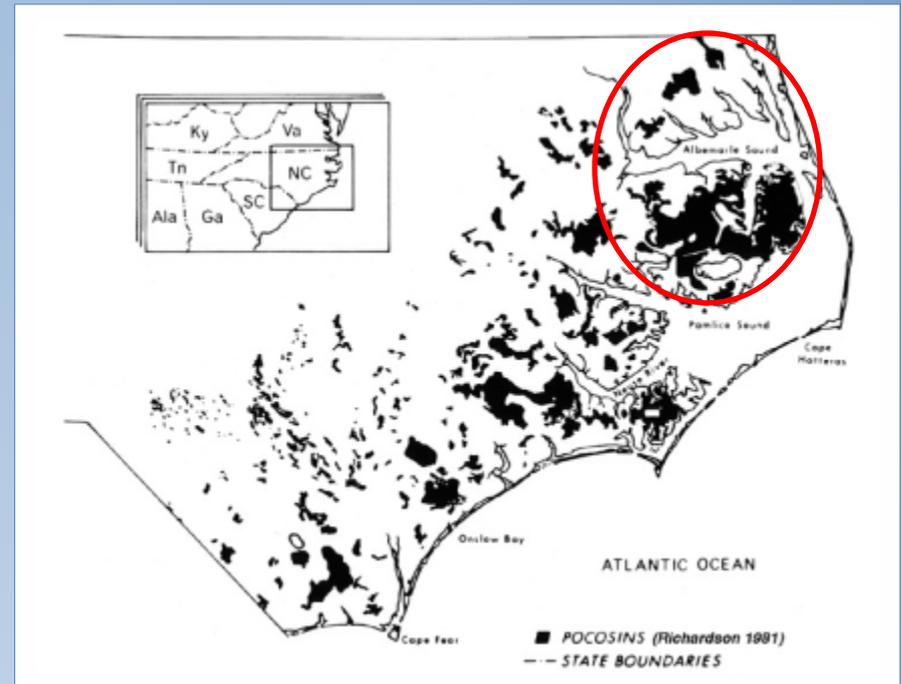


Peat soil profile



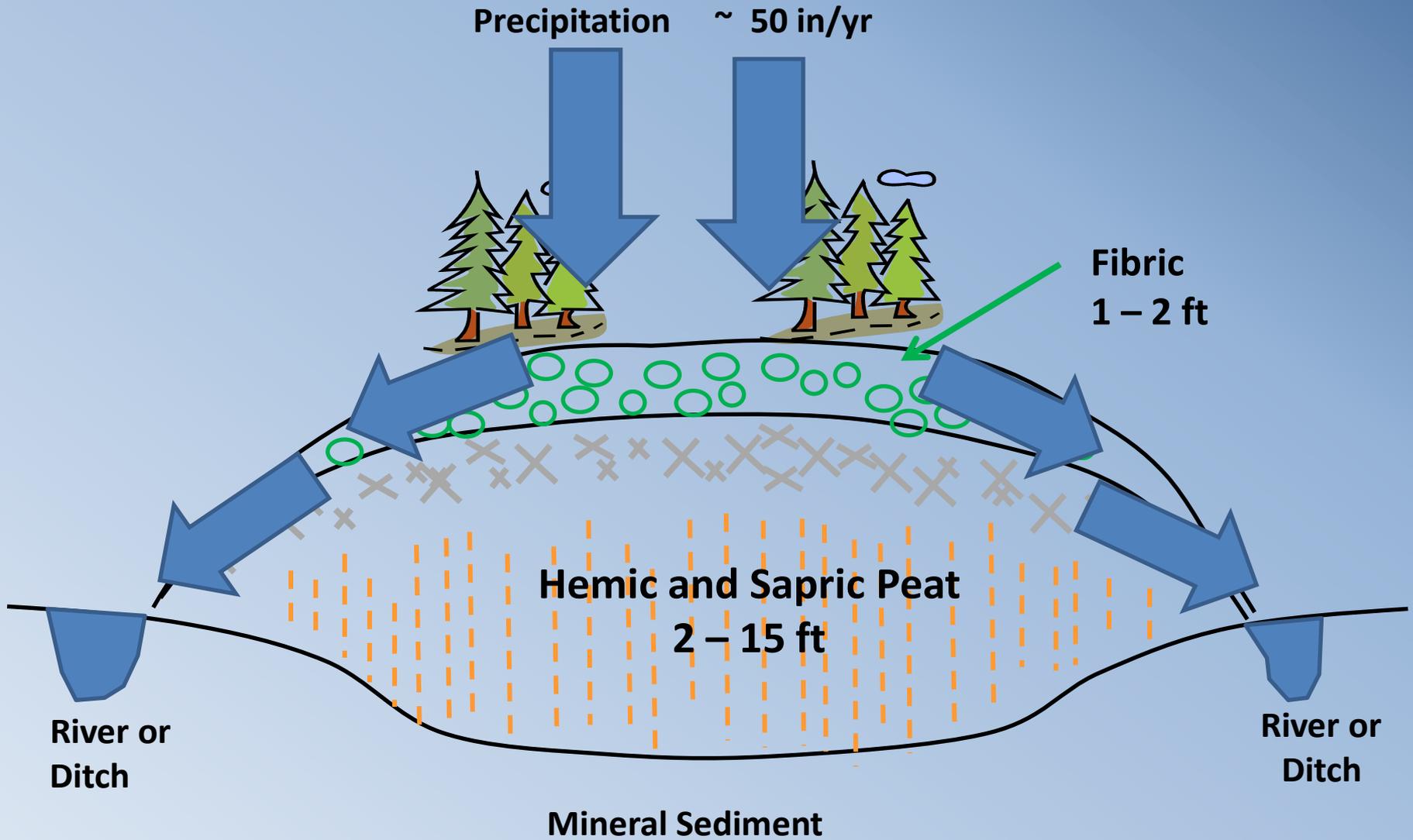
Photo: D. Suiter, USFWS

Healthy pocosin wetlands

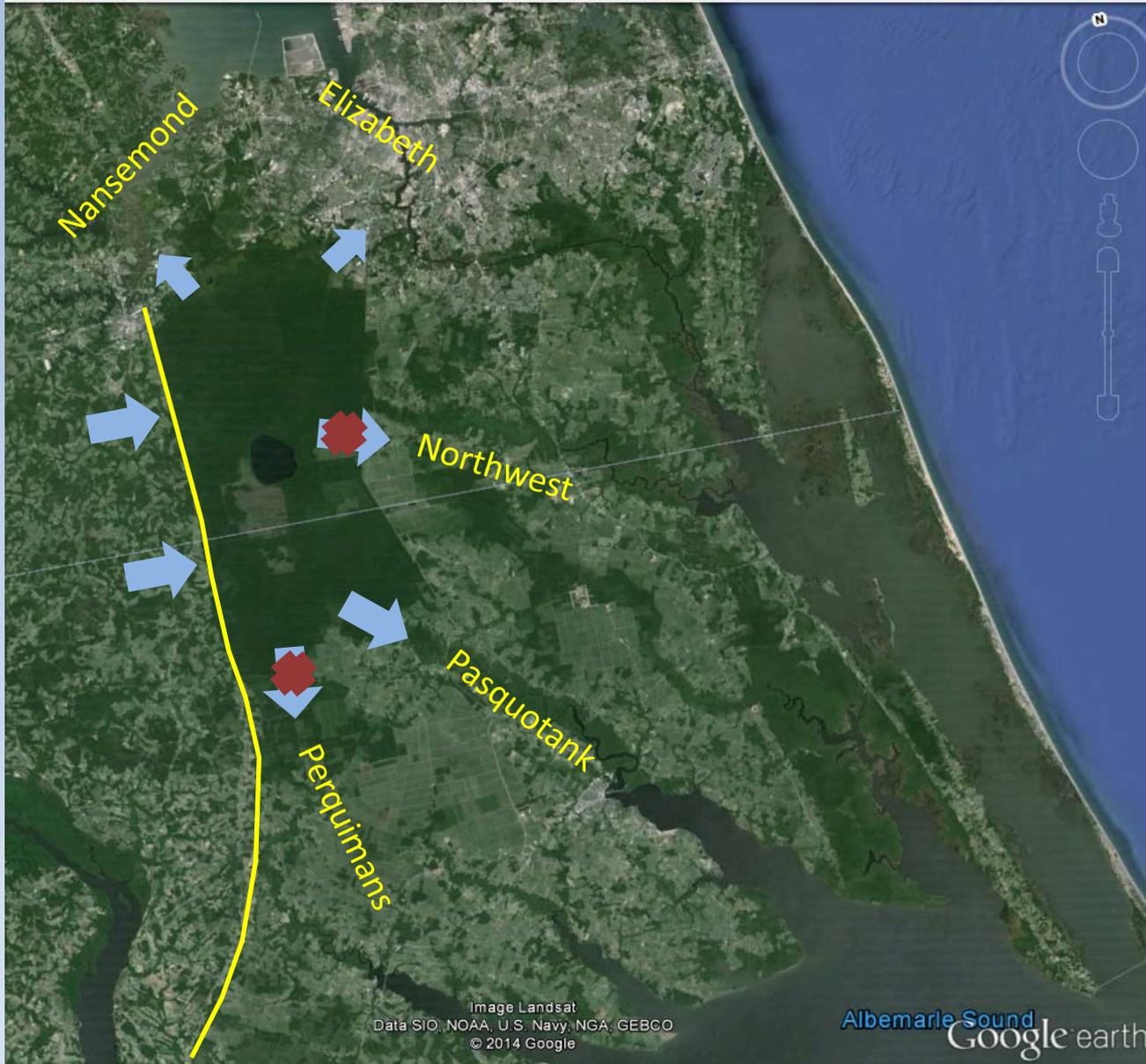


1950 pocosin distribution (Richardson 2003)

# Water Movement in a Pocosin



# Hydrologic Setting: Pre Ditching



- The Swamp Straddles Chesapeake Bay and Albemarle Sound watershed divide
- Includes headwaters of 5 coastal rivers
- Suffolk Scarp is major geographic feature on west side

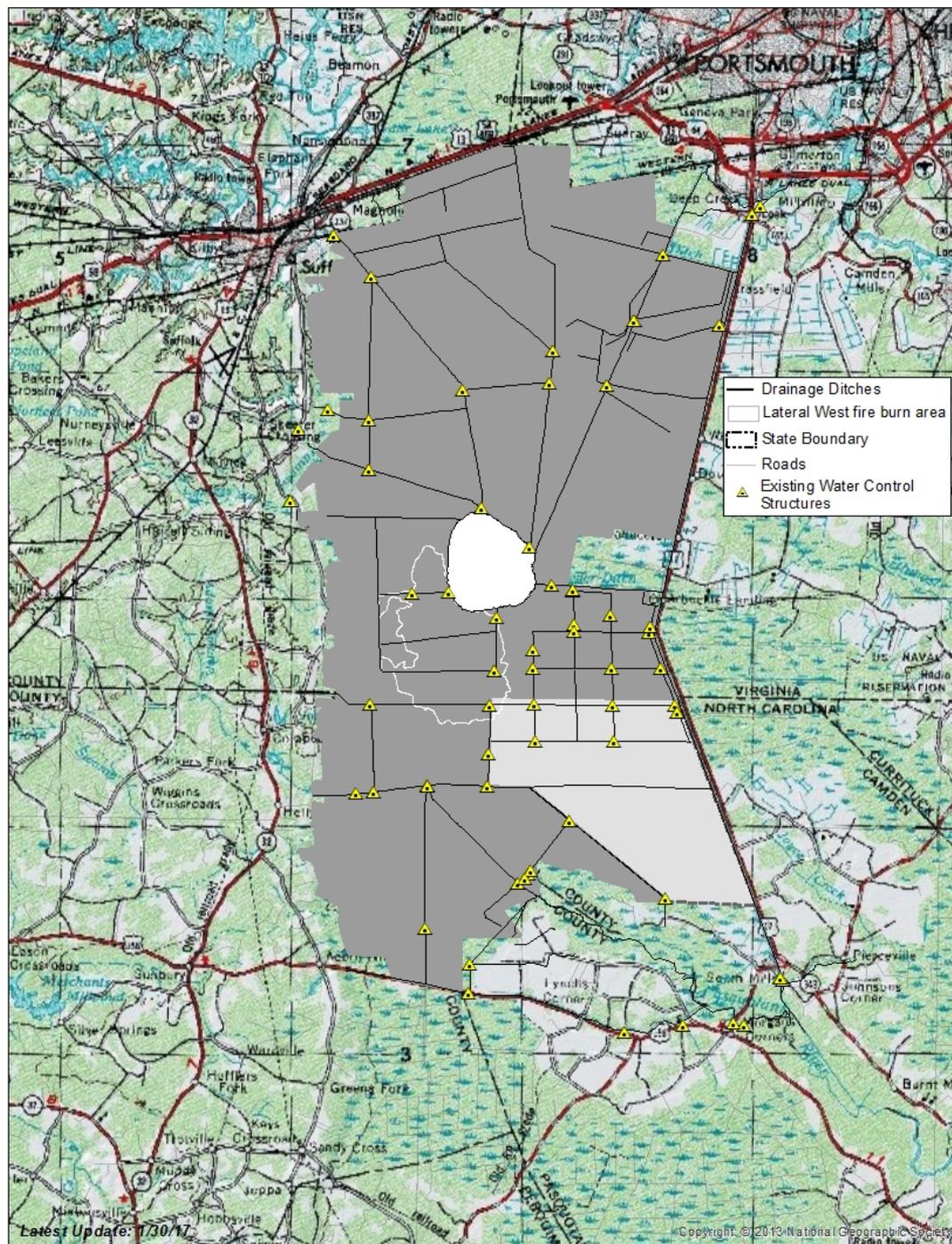
## *Great Dismal Swamp NWR Established 1974*

### ***Refuge Purpose:***

*Protect and preserve the unique and outstanding ecosystem as well as protect and perpetuate the diversity of life therein*

### ***Refuge Vision:***

*The refuge will endeavor to restore the biological diversity of the swamp ecosystem through hydrological restoration and fire management*

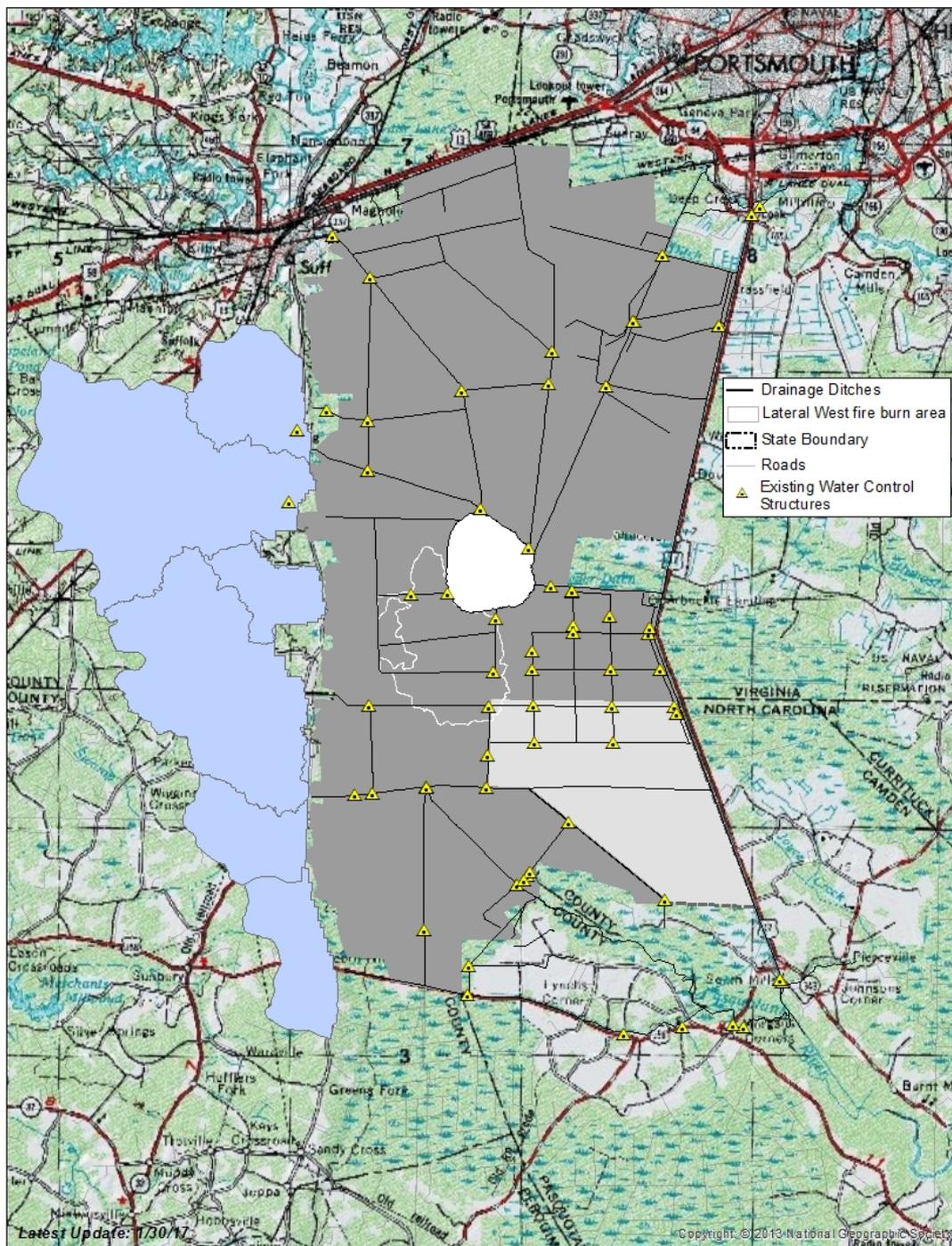


- National Wildlife Refuge

112,000 acres

- North Carolina State Park

16,000 acres



National Wildlife  
Refuge

112,000 acres

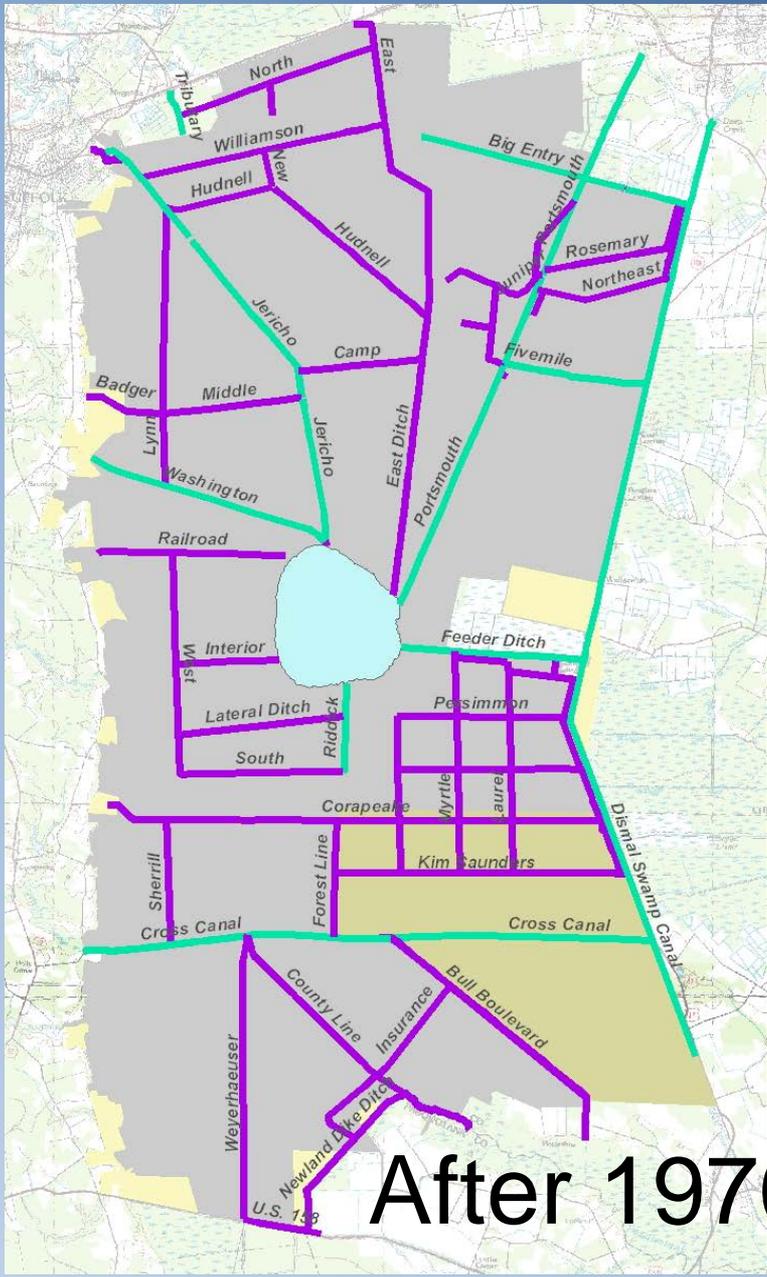
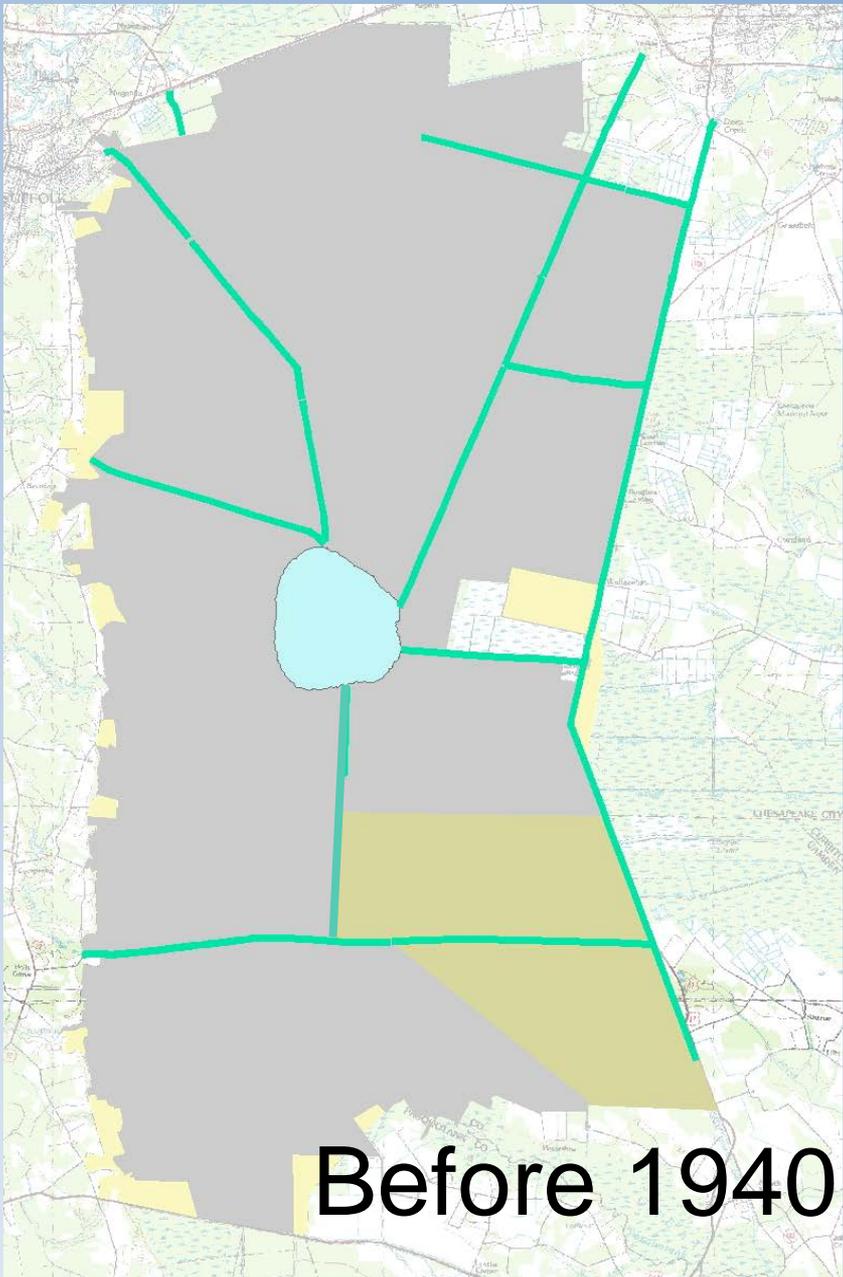
North Carolina  
State Park

16,000 acres

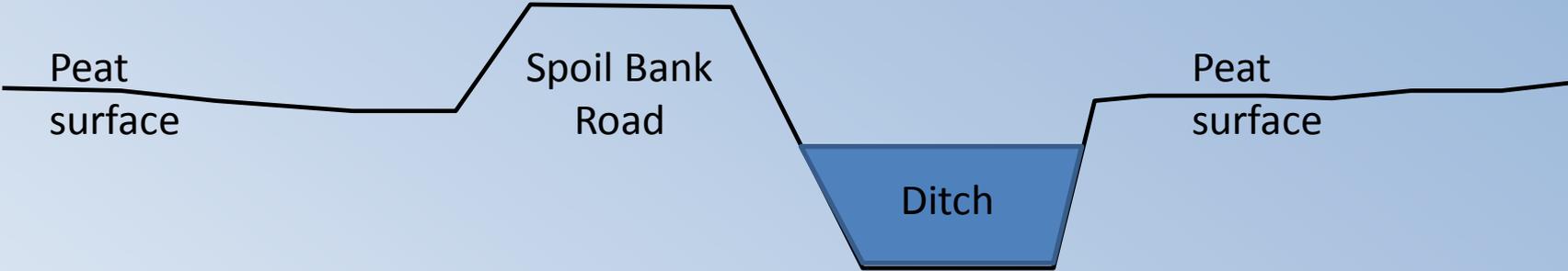
Inflowing  
Watersheds

50,000 acres

# Ditches and Canals

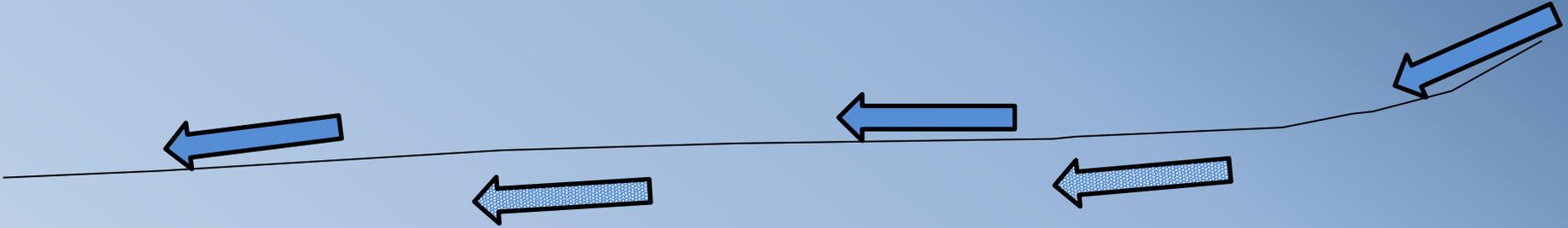


# Ditch and Canal Configurations

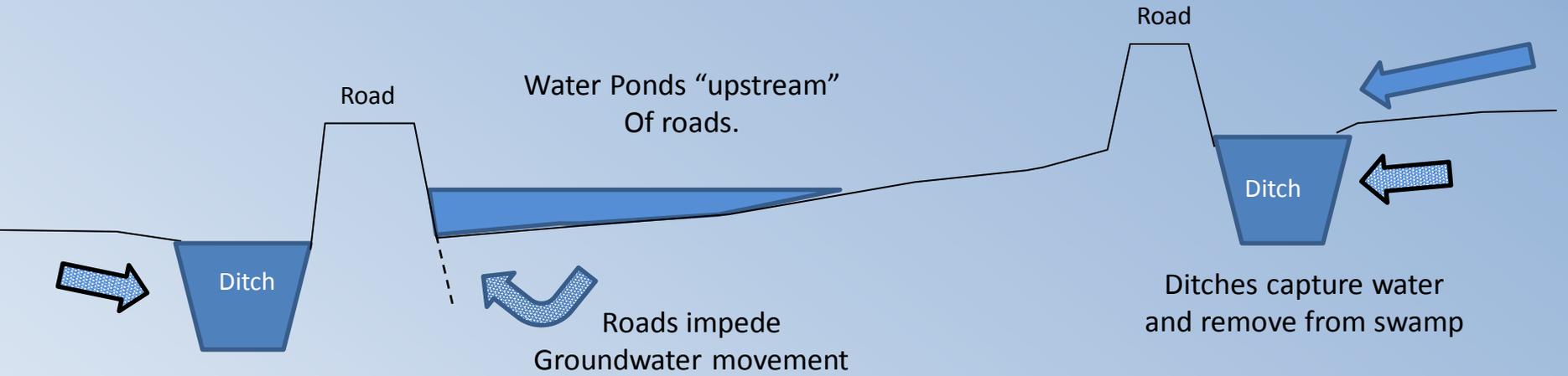


# Schematic of Water Flow Before and After Road and Ditch Construction

Before



After



# Effects of altered hydrology on the landscape

- Peat Subsidence (Elevation Loss)
- Impair Water Quality
- Vegetation Changes
- Increased Fire Frequency
- Higher Flood Flows



# *Great Dismal Swamp NWR*

## *Comprehensive Conservation Plan Hydrology Objectives*

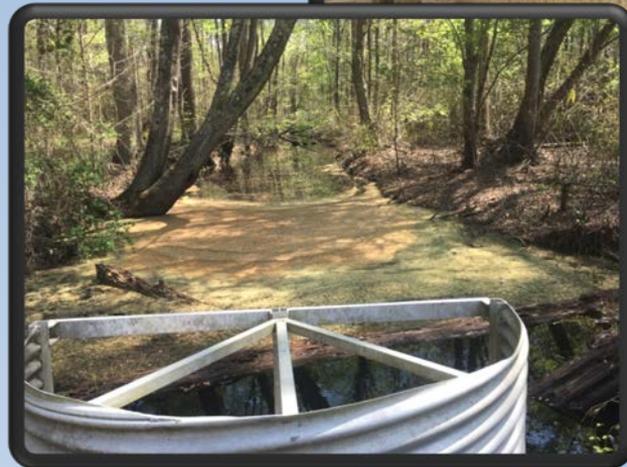
- ***Maintain or restore hydrologic conditions to sustain or improve viability of wetland communities***
- ***Maintain and operate structures to support flood control and fire management***

# Hydrology Restoration

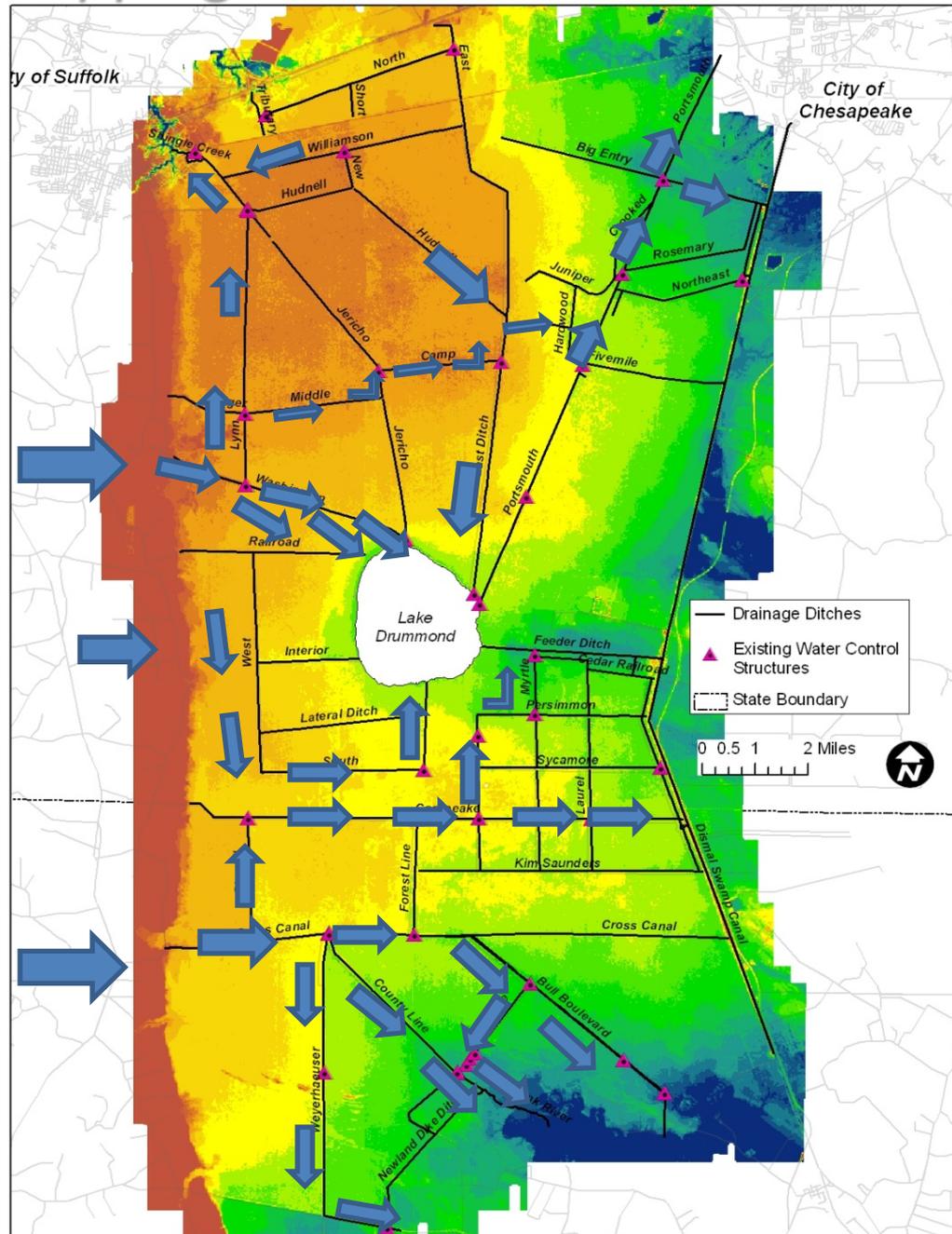
*Adding water management capability*

## Approach:

- Install water control structures and culverts in ditches
- Raises ditch water levels to slow drainage from surrounding peatland

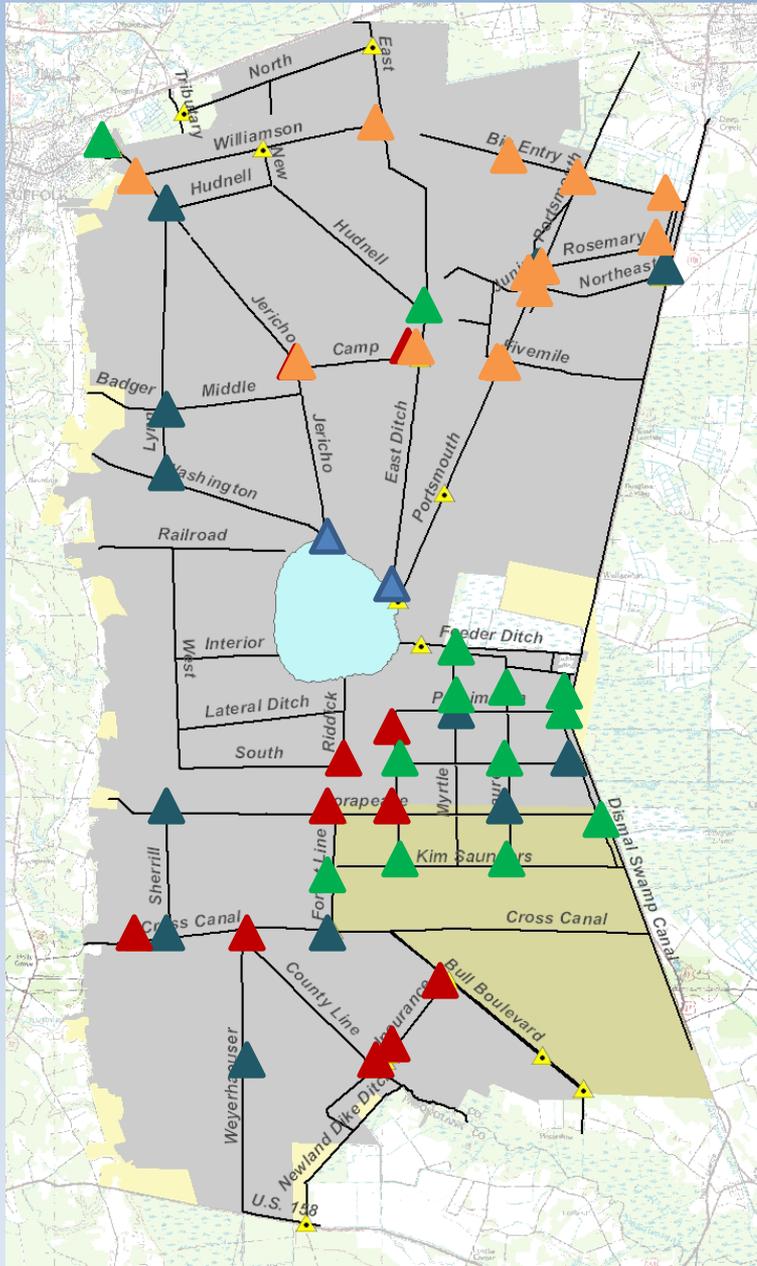


# Mapping the Ditch Network & Elevation of Peat Surface



- Necessary to determine canal density and flow directions
- Prioritize Control Structure Locations
- Slope of Peat Surface

# Water Management Capability: Existing Water Control Structures



63 Total

57 Repaired, Replaced, or  
Installed since Refuge  
was Established

2 in 1970s

12 in 1980s

15 in 1990s

14 2000 - 2015

14 in 2016

# Building Water Management Capability



# Building Water Management Capability



# Building Water Management Capability



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# Water Management



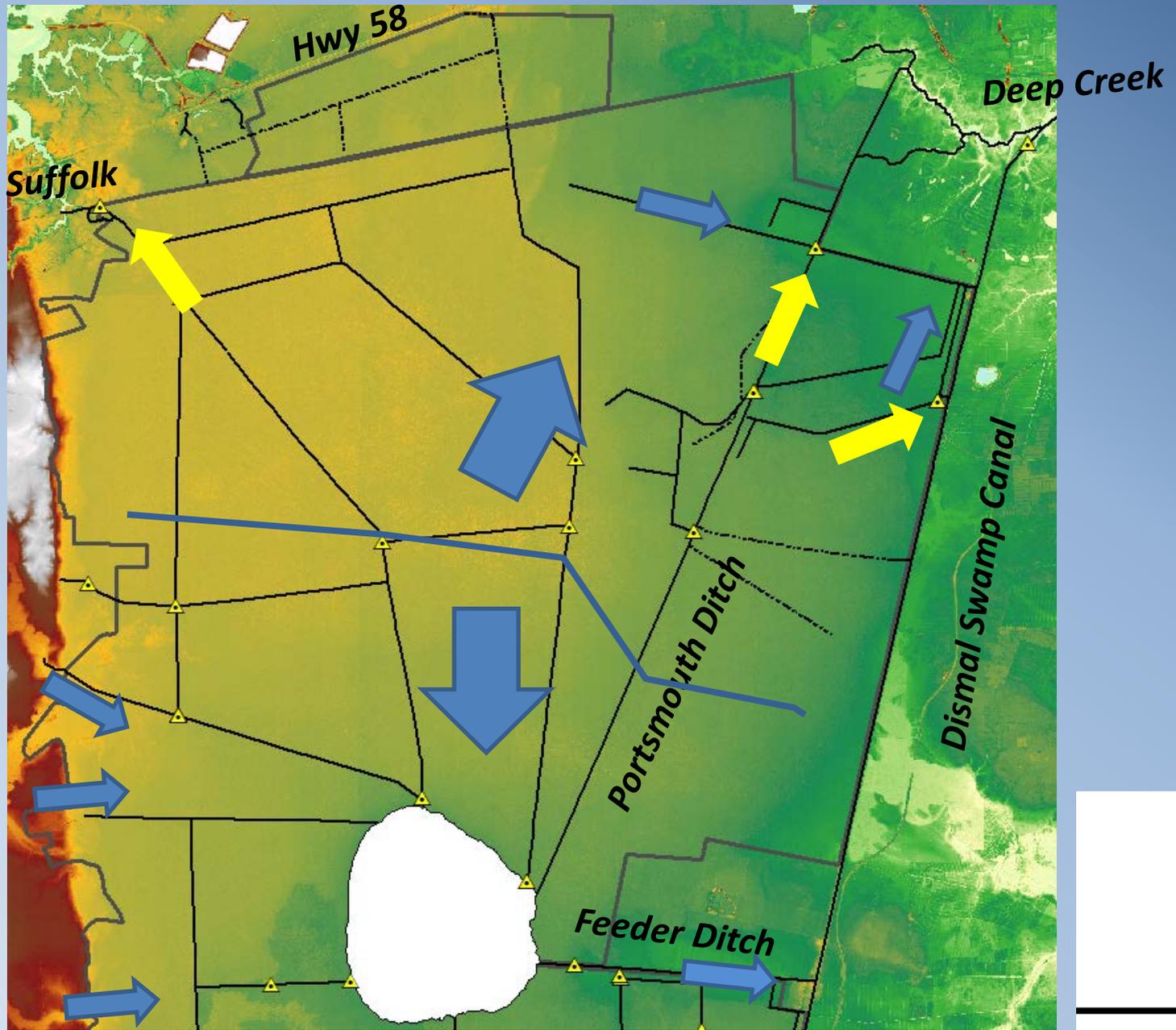
# Water Management



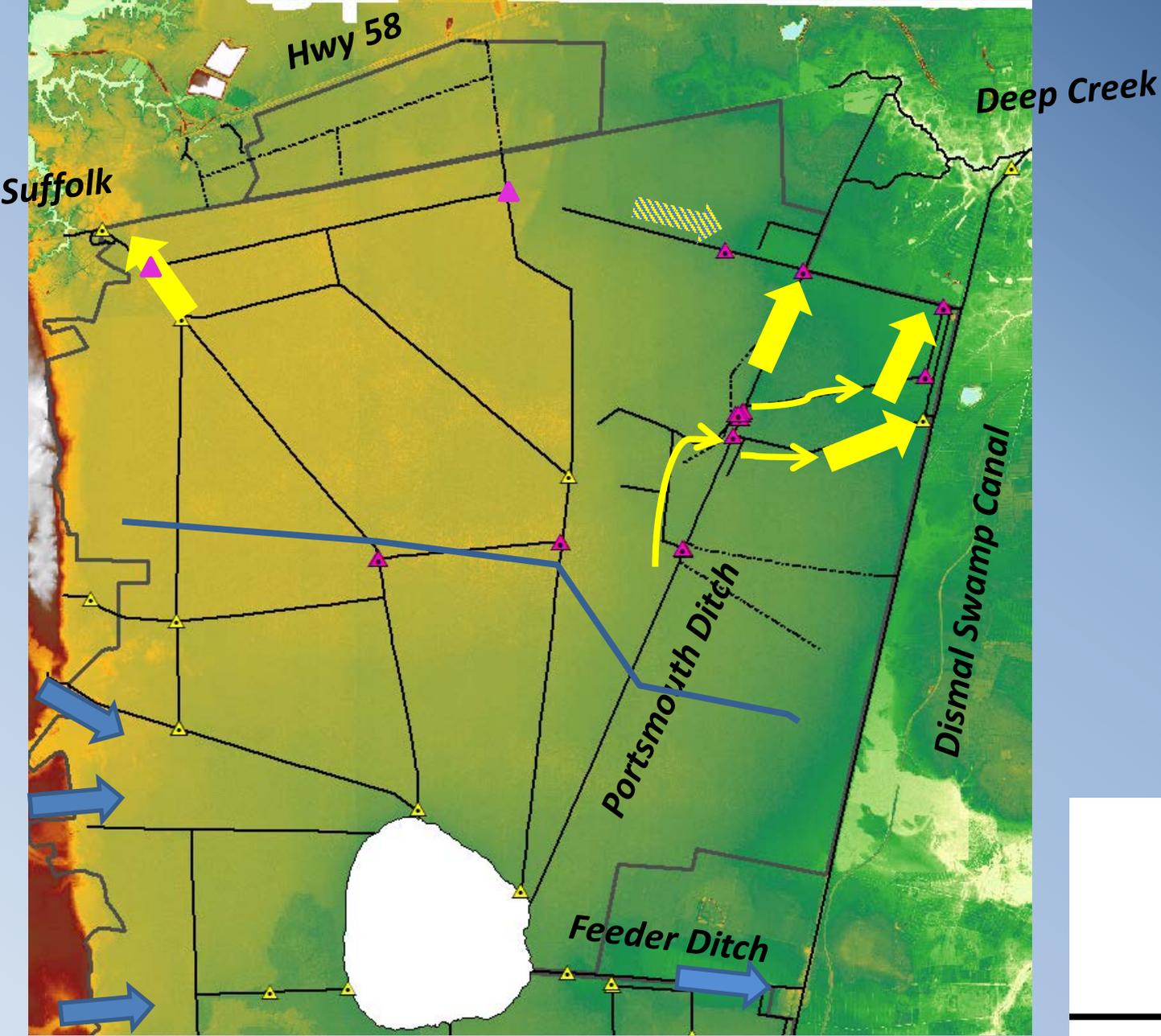
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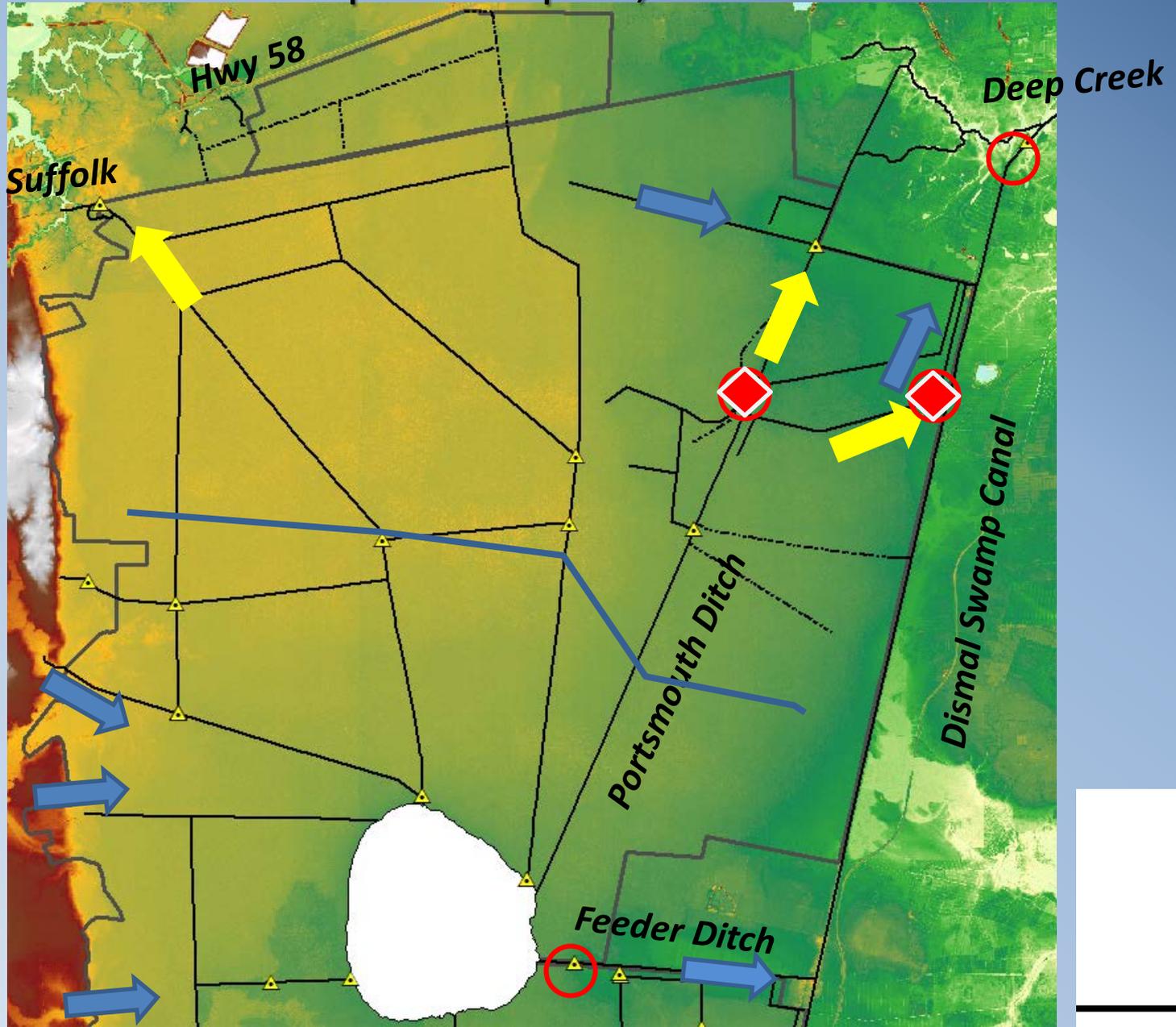
# Water Management in North End Refuge



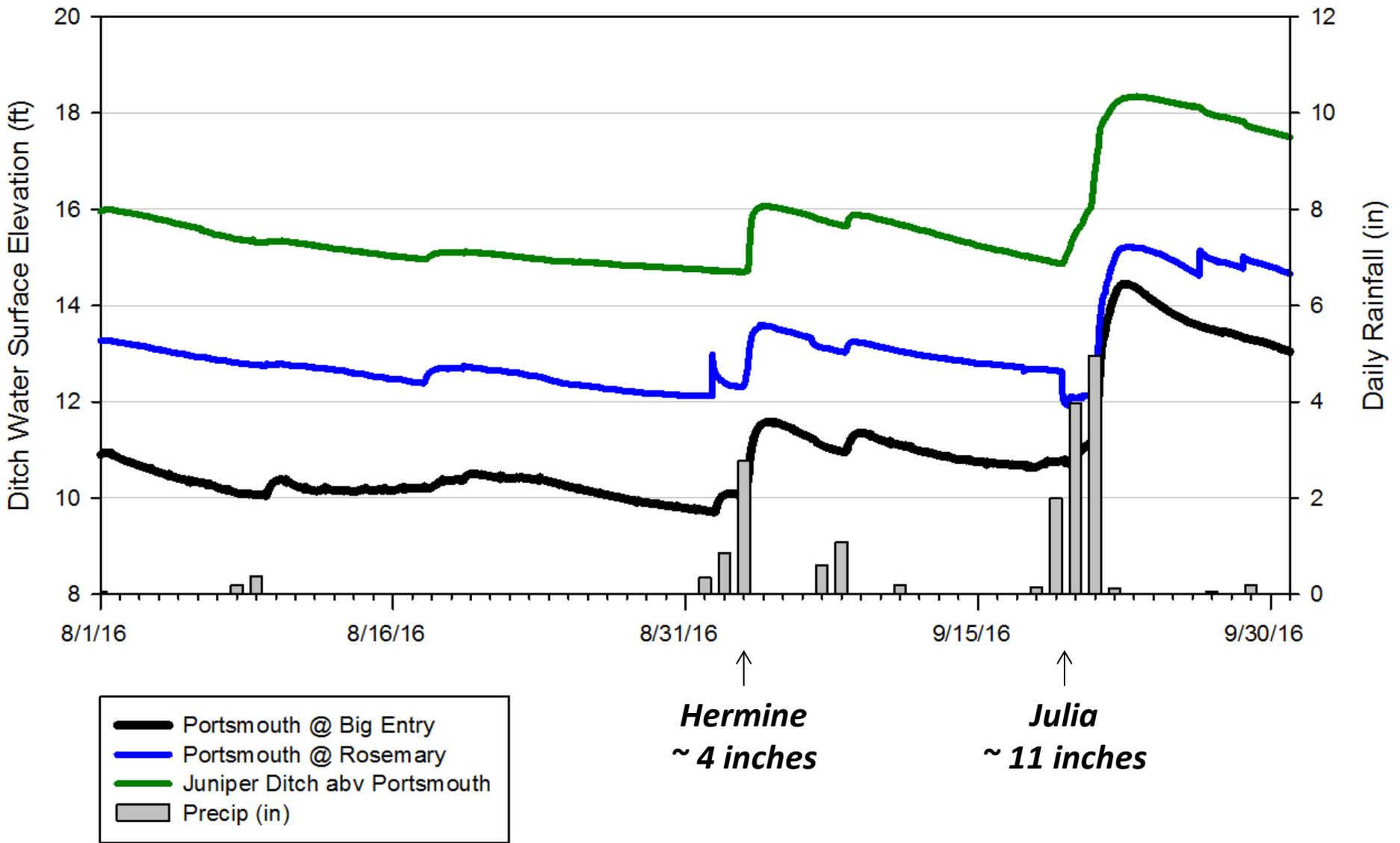
# Water Management in North End Refuge with New Structures



# Water Management: Pre - Julia Sept. 1 – Sept. 6, 2017



# Hydrologic Conditions: August 1 – Sept. 30, 2016



# Post Julia: Deep Creek Lock Spillway

9/22/16 ~ 10:00



# Post Julia: Portsmouth Ditch at Big Entry

9/23/16 ~ 11:00



# Post Julia: Portsmouth Ditch at Big Entry

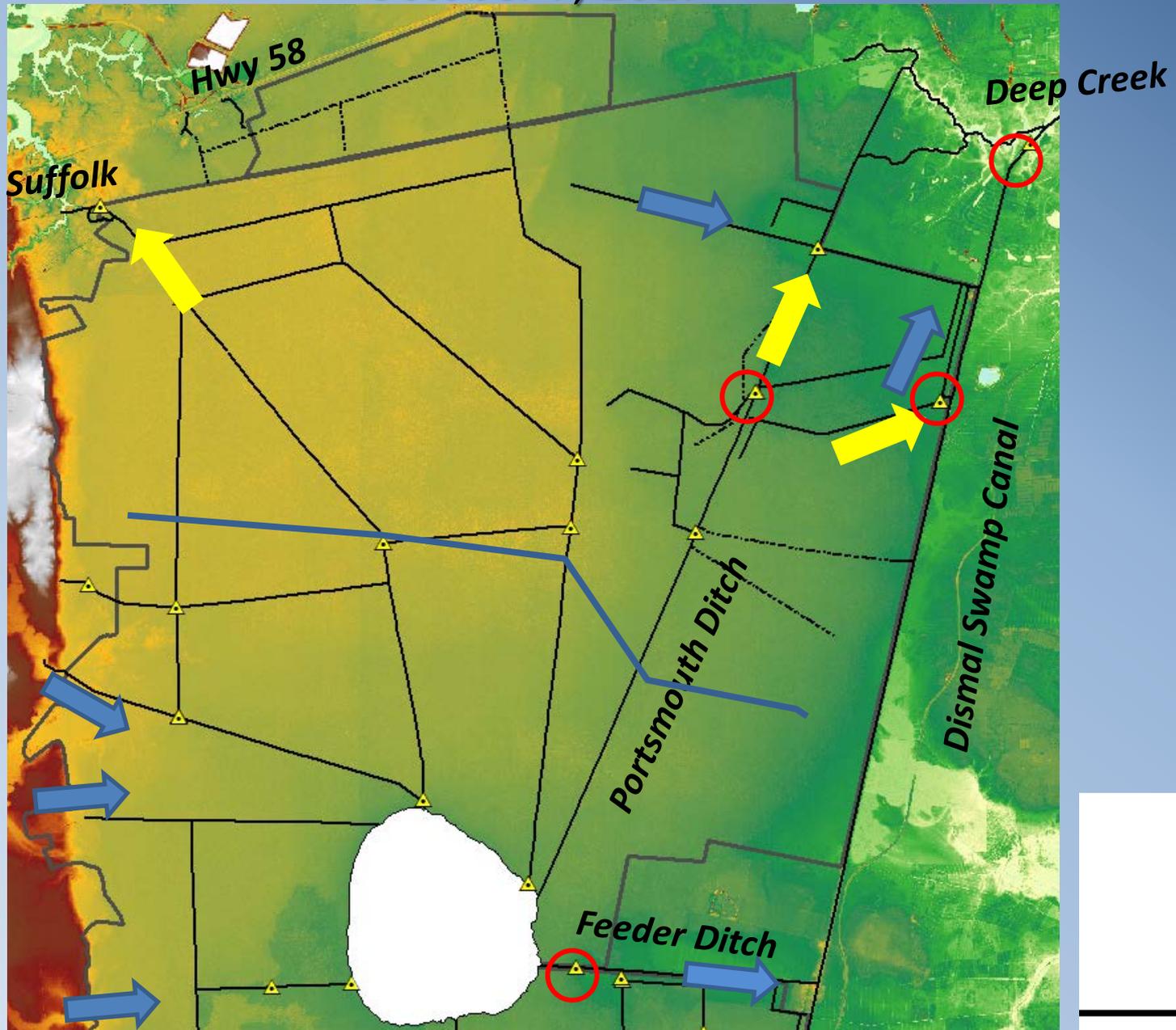
9/23/16 ~ 11:00



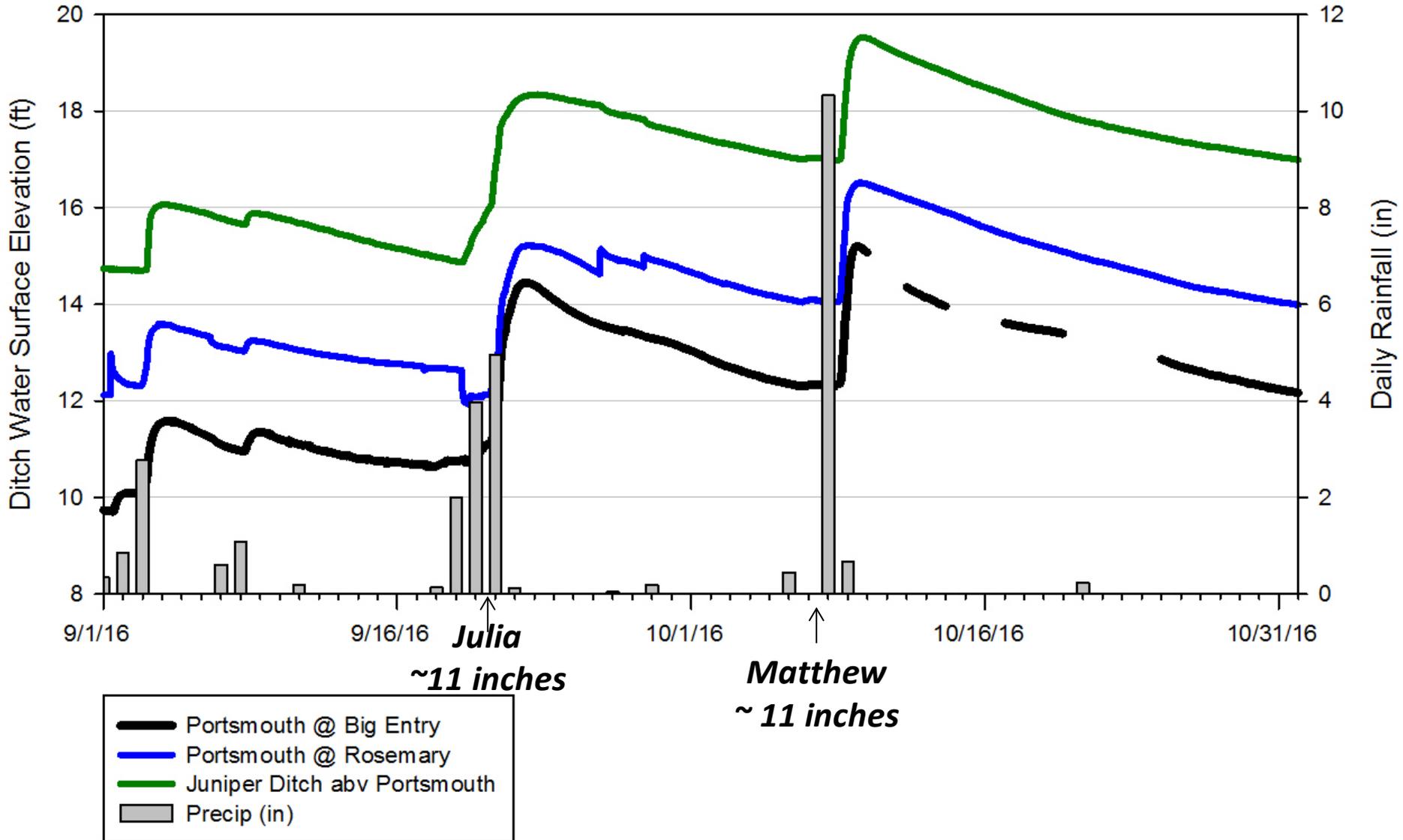
# Post Julia: Portsmouth Ditch at Martin Johnson road 9/23/16 ~ 11:00



# Water Management: Pre – Matthew October 7, 2017



# Hydrologic Conditions: Sept. 1 – Oct. 31, 2016



# Portsmouth Ditch at Hardwood: 10/13/16



**Portsmouth Ditch at Juniper: 10/13/16**



**Portsmouth Ditch Road: 10/13/16** *Looking south*



## Feeder Ditch at Reservation: 10/13/16



# Lake Drummond Reservation 10/13/16 @15:20



Thank You