Water Management at Great Dismal Swamp NWR

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Great Dismal Swamp NWR

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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.*

Source: IUCN 2014
Formation of a Peatland

Source: Satriadi Rais 2011
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

Healthy pocosin wetlands

1950 pocosin distribution (Richardson 2003)
Water Movement in a Pocosin

Precipitation: ~ 50 in/yr

- Fibric 1 – 2 ft
- Hemic and Sapric Peat 2 – 15 ft
- Mineral Sediment

River or Ditch
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

Source: GDSNWR CCP 2006
- 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

Before 1940

After 1970
Ditch and Canal Configurations

Peat surface | Spoil Bank Road | Peat surface
---|---|---

Ditch

Spoil Bank Road

Washington Ditch
Before:

- Ditch
- Water Ponds “upstream” Of roads.
- Roads impede Groundwater movement

After:

- Road
- Ditch
- Ditches capture water and remove from swamp
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
Water Management
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

- **Hermine**: ~ 4 inches
- **Julia**: ~ 11 inches
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

Matthew: ~11 inches
Julia: ~11 inches
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