Army Creek Marsh - Integration of Remediation Strategy and Wetland Restoration

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Presentation Outline

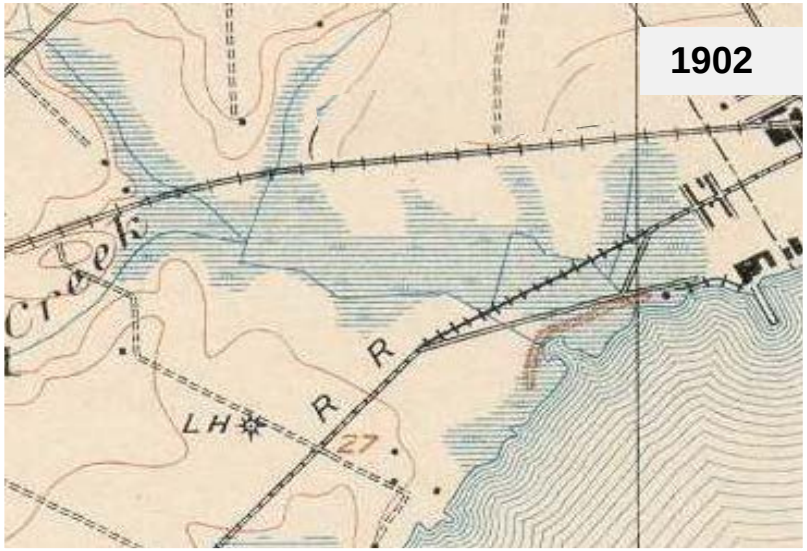
- Background / Project Objective
- Integrated Remedial and Restoration Approach
- Results
- Status
- Video




BACKGROUND / OBJECTIVE

Background

- Delaware River Basin
- Historically Disturbed Marsh
- Impounded Freshwater System (tidegate)
- Subject to Flooding (upstream stormwater)



Background / Objective

- Polypropylene Manufacturing (1961-1980)
- Waste Stream Process Residuals
  - Pellets
  - Paste
  - Powder
- 1999 Voluntary Cleanup Program - DNREC
- 2003 Proposed Plan of Remedial Action
  - Excavation / Off-site Disposal
  - Unsettled Impact Acreage / Restoration
- 2007 Consent Decree

OBJECTIVE

- Integrate Remediation / Restoration

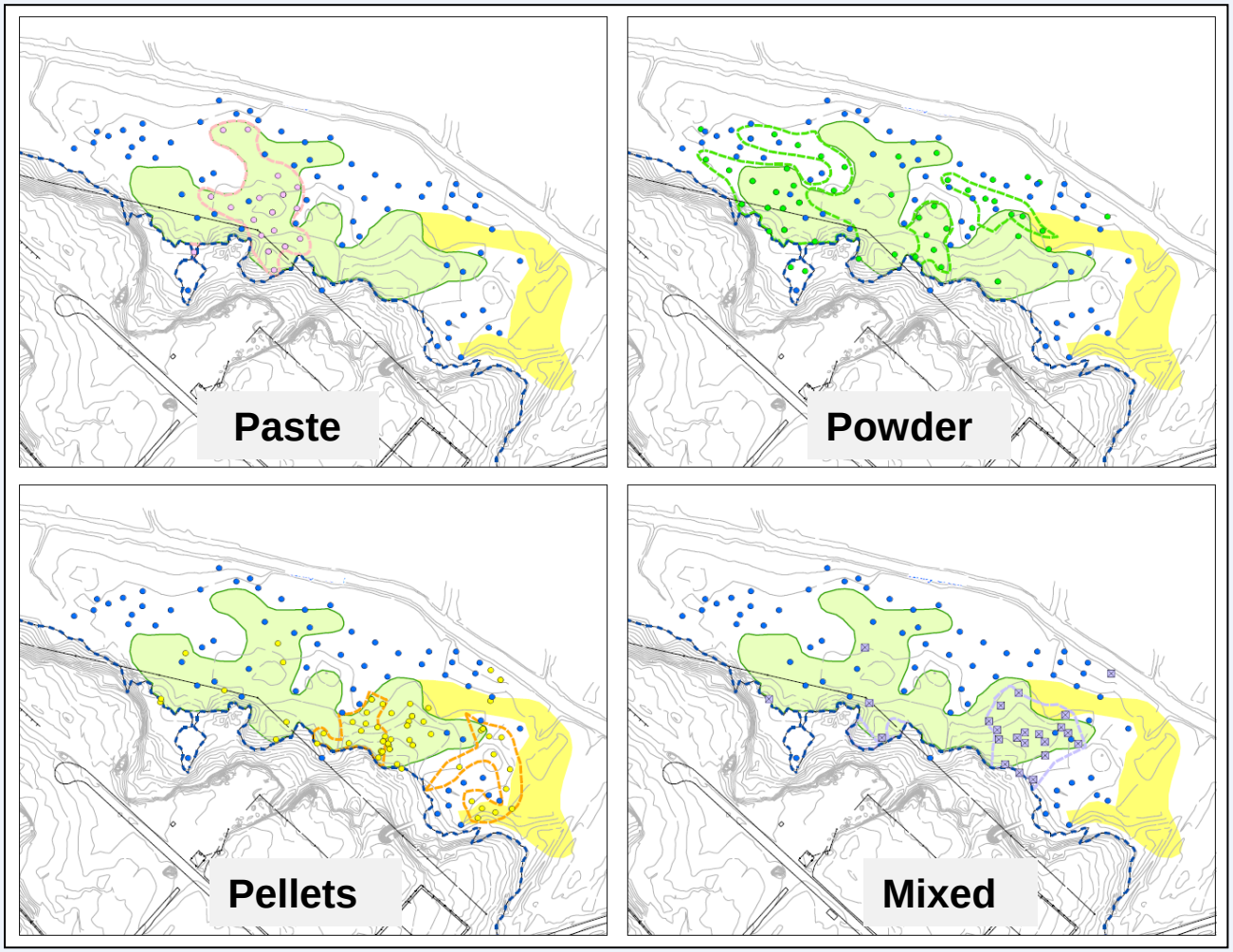
Integrated Approach

Integrated Approach - REMEDIATION

Human Health & Ecological Cleanup Goals

- 5 Metals:
  - Antimony (Sb),
  - Arsenic (As),
  - Thallium (Ti),
  - Vanadium (V),
  - Zinc (Zn)
- Alkyl/nonyl phenols

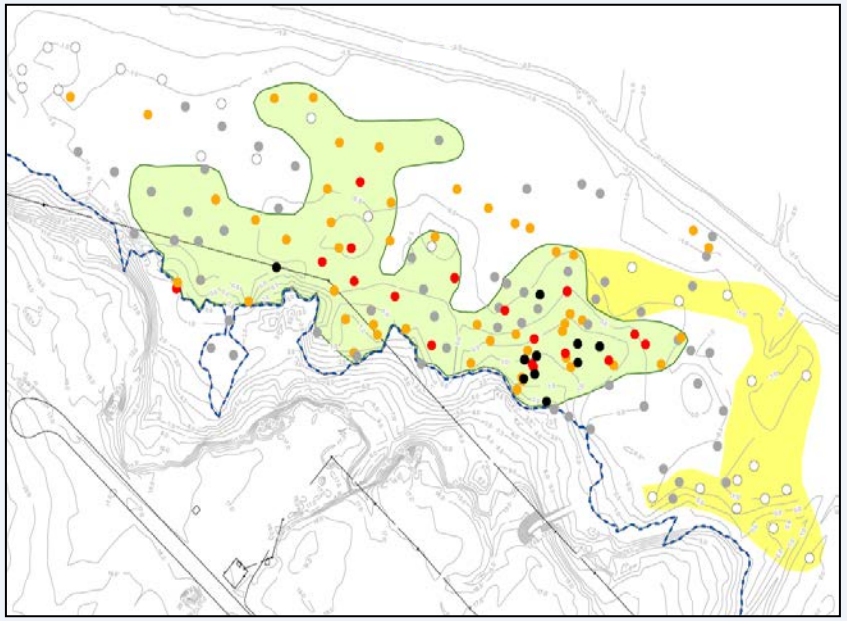
Distribution of Process Residuals



Integrated Approach - REMEDIATION

Technical Approach – Area / Volume

1. Calculated 95% UCL of mean for Soils/Residuals
2. Proportion of Remaining Soil/Residuals
3. Area-Weighted 95% UCL Soils/Residuals
   - Assumes Removal of:
     - Known Paste-type Waste,
     - 2x Cleanup Goals,
     - >1ft Thick, and
     - Area-weighted composite of remaining soils meets cleanup goals.

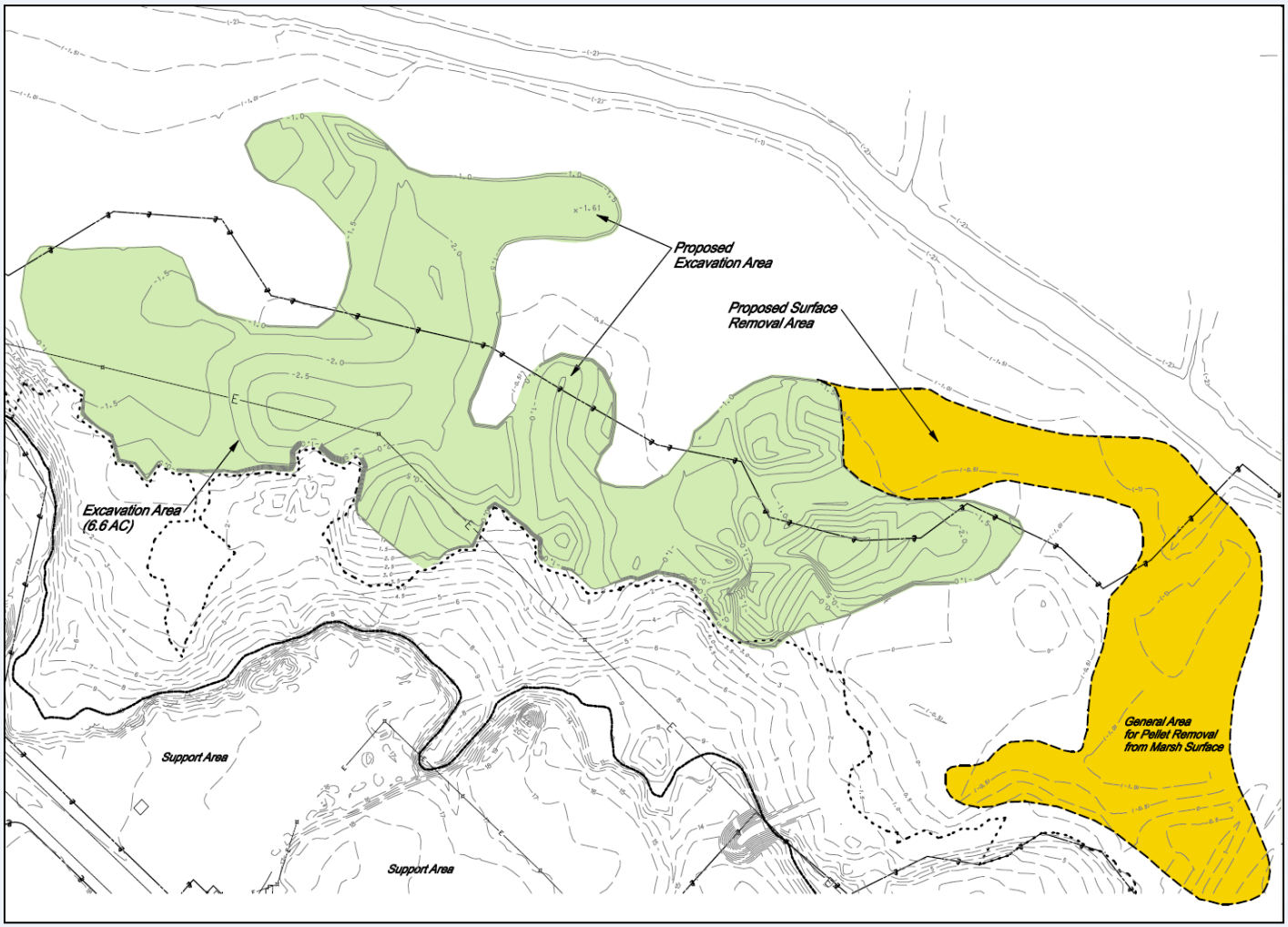


Thickness of Process Residuals

Integrated Approach - REMEDIATION

Removal Area / Volume

- 6.7 acres Excavation
  - ➢ 15,000 cy
- 3.4 acres Surficial Pellets

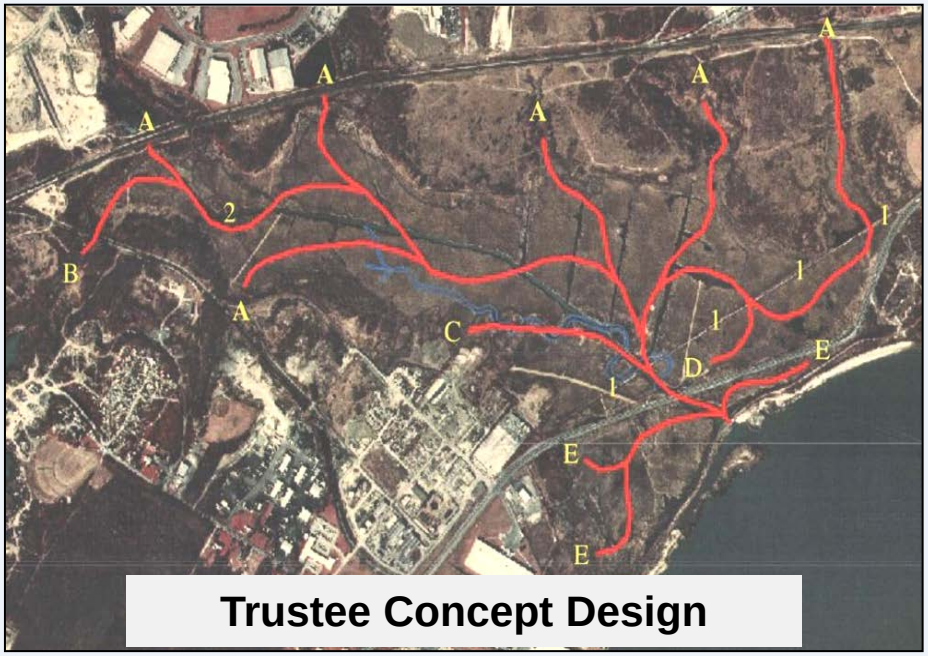


Integrated Approach - RESTORATION

Goals / Objectives

- Integrate with Removal Action
- Reestablish Diversity of Aquatic and Wetland Habitats
- Self-Sustaining Under Current Managed Hydrologic Conditions
- Consistent with Potential Tidal Regime
- Consistent with Federal/State Trustee Intent

Removal Area – 2007 Aerial



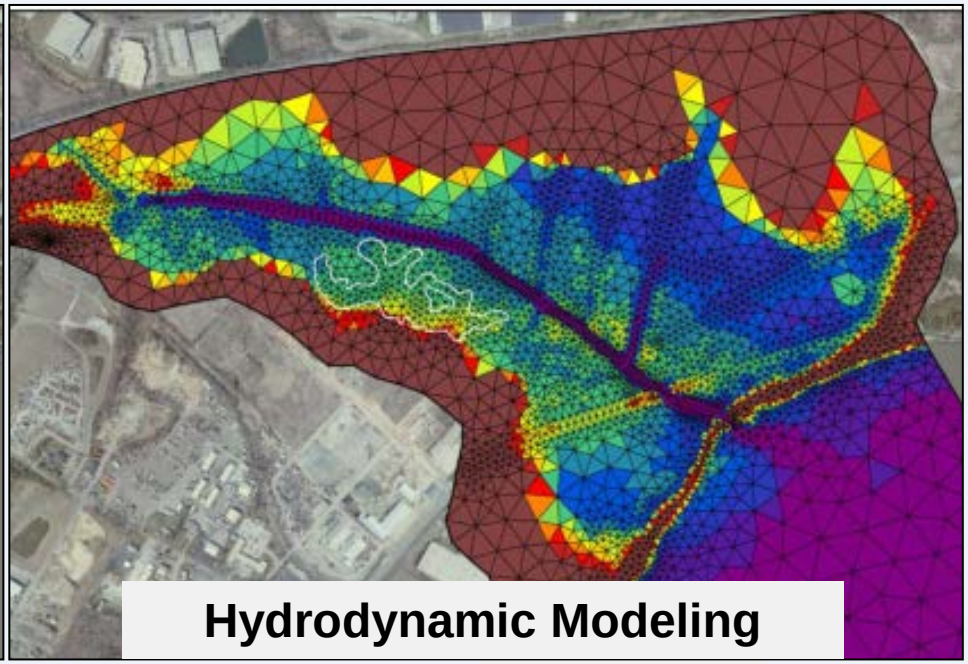
Trustee Concept Design

Integrated Approach - RESTORATION

Technical Approach / Basis

- Expansion of Ecological Functions
- Reestablish Historical Conditions / Acct. for Potential Tidal Influence
- Based on Site Specific and Regional Ecological Benchmarks
- Modeled on Empirical Water Level Data (Impoundment / Tidal)

Marsh Vegetative Cover

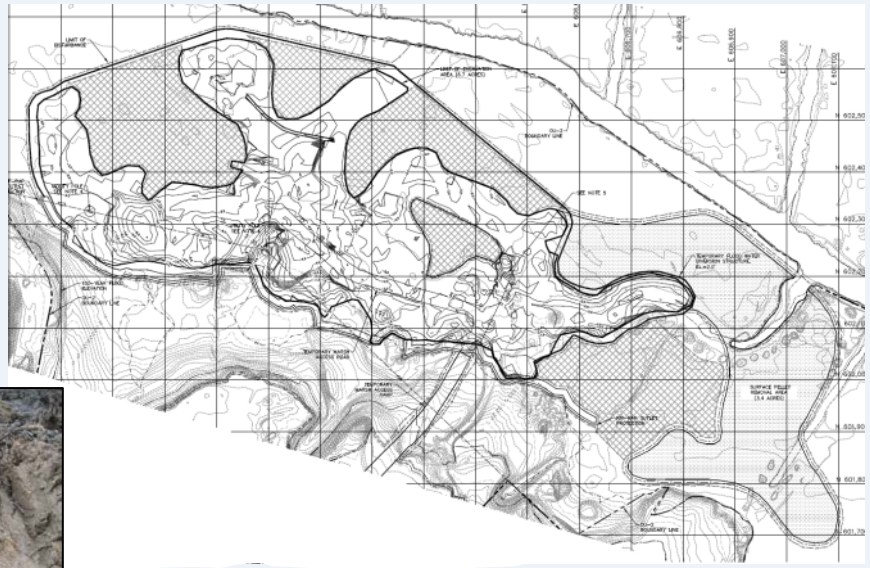


Hydrodynamic Modeling

RESULTS and STATUS

Results / Status - Remediation

- Spring 2011 to Fall 2011
- Restoration by June 2012
- 10.1 ac of Excavation/Pellet Removal
- 17,100 cy of Process Residuals

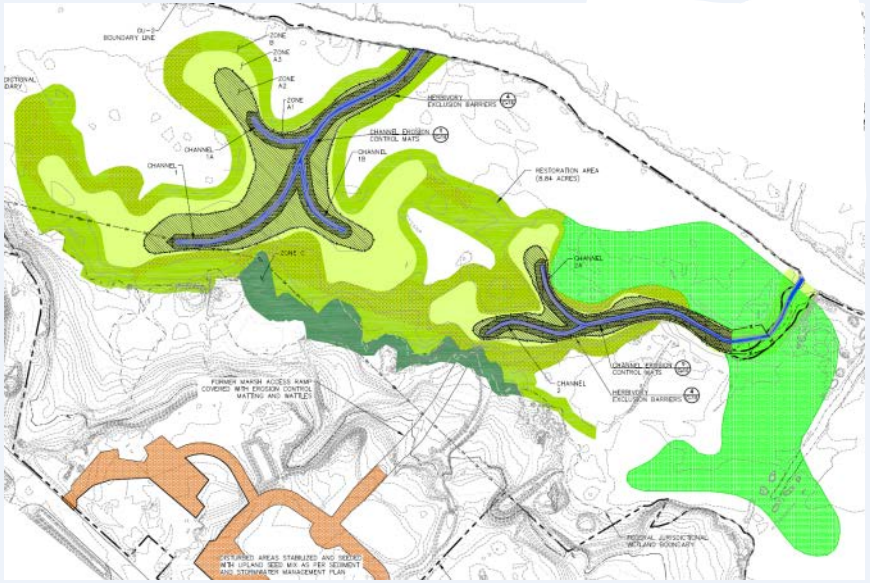


Results / Status - Remediation

- Hurricane Irene / TS Lee
- 2.4M Gallons Treated Contact Water
- 53,000+ Safe Work Hours
- Cert. of Comp. of Remedy, Nov. 2012

Results / Status - Restoration

- Multi-Zoned – Lower to Higher Marsh
- Establish Aquatic Habitat
- ~22,000 Herbaceous & Woody
- Certified Habitat by WHC
- Long-Term Monitoring



Results / Status - Restoration

- **Ecological Function Assessments**
  - Established Habitat Providing Capacity for Shoreline Bank and Fish Services
  - Substantial Increase in Wildlife Services
  - Establishing Conditions for Sediment Stabilization and Water Quality

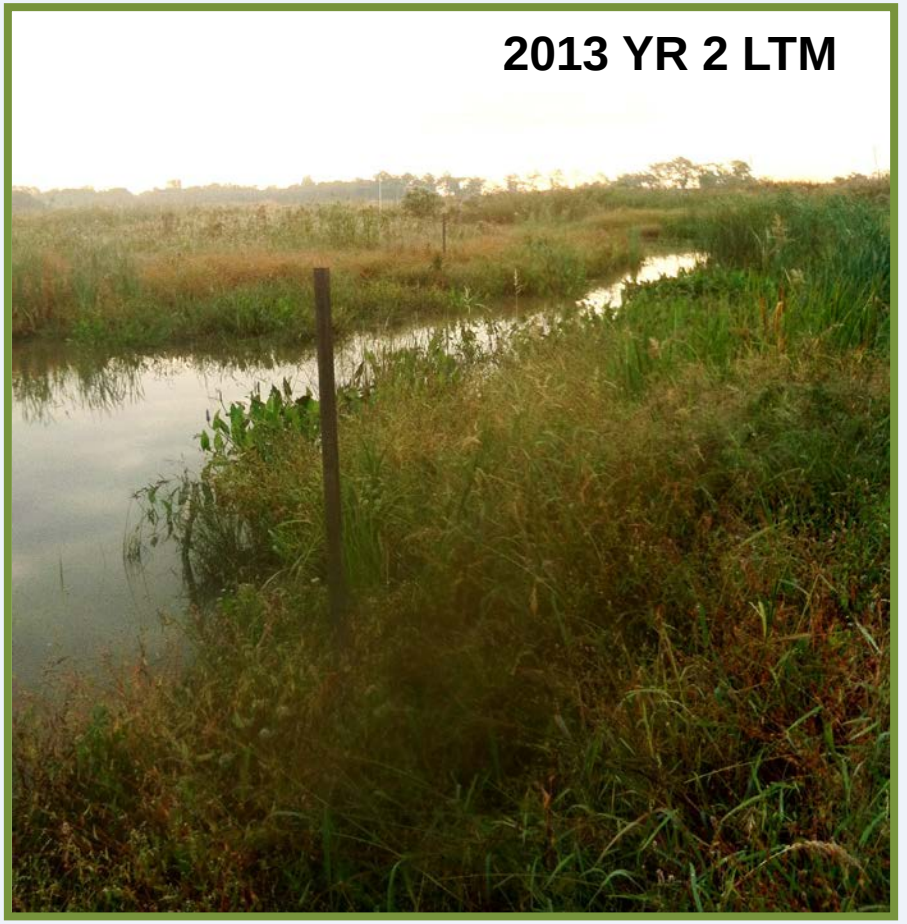




Results / Status - Restoration

Results / Status - Restoration

Results / Status - Restoration



Video