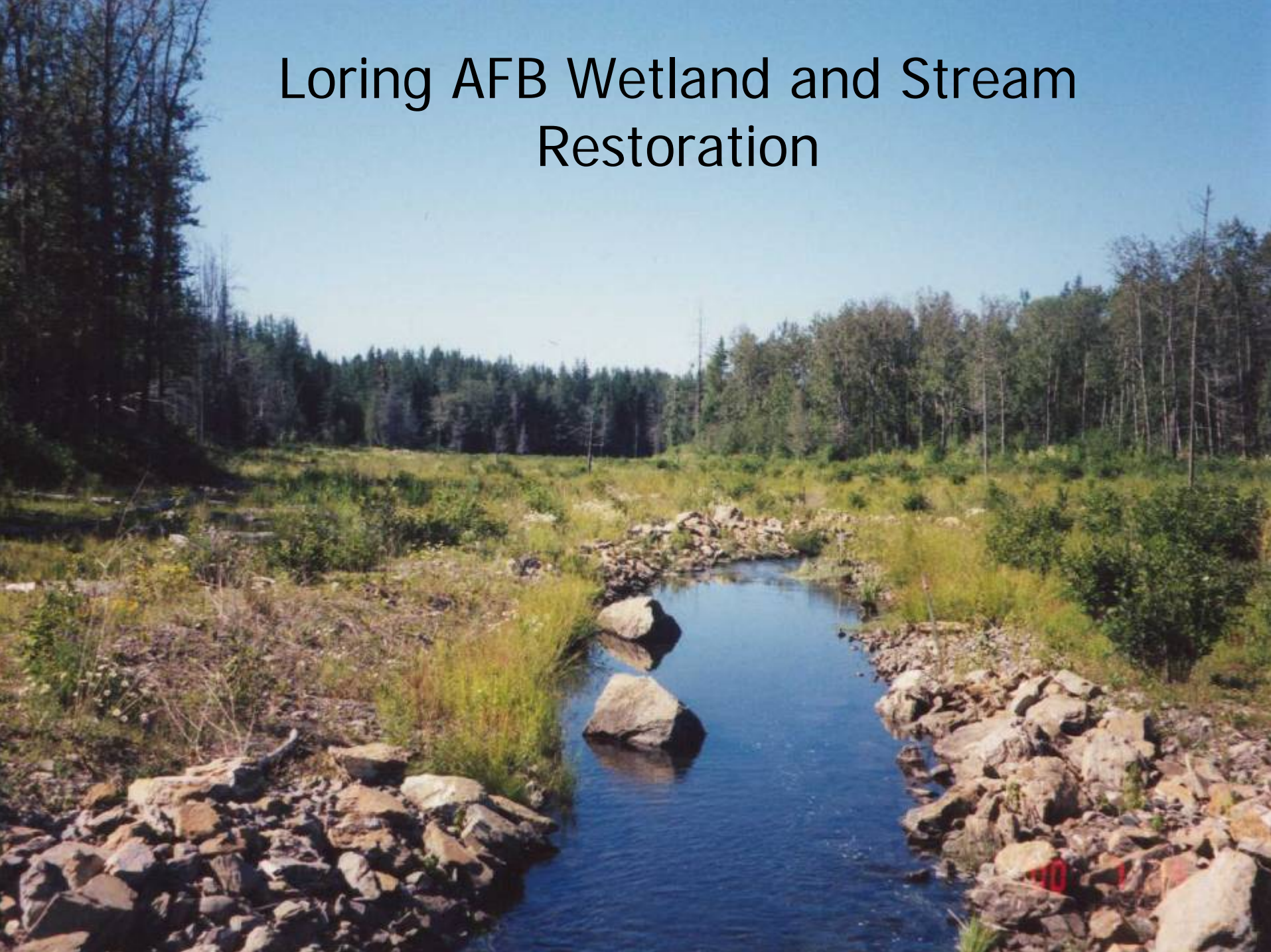


# Loring AFB Wetland and Stream Restoration



# Existing Conditions – Hydrology





# Existing Conditions - Soils

Two important features:

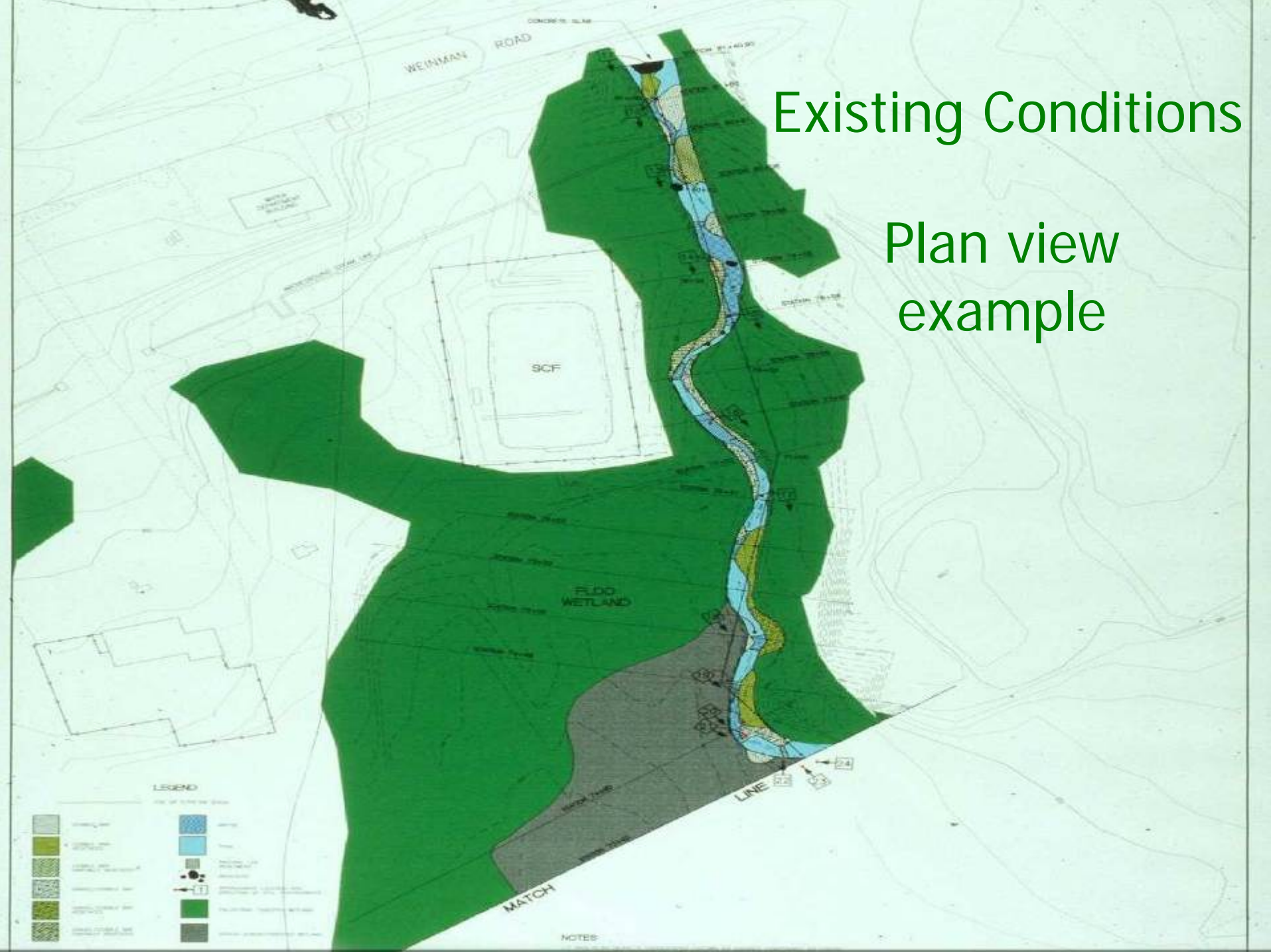
- Hydric soils/wetland hydrology
- Suitable growth medium post-remediation

# Existing Conditions – Vegetation



# Existing Conditions

Plan view  
example





# Challenges/Opportunities

- Beavers
  - Dam breach in 97/98 – expanded the extent of contamination
  - Ongoing browsing and flooding
- Hydrology
  - flashy stream (5 cfs to > 1000 cfs)
  - groundwater discharge
- Soils
  - Soils left following removal = good growth medium

10 23 0


# Challenges/Opportunities

- Plant stock availability
- Wetland hay
- Labor availability
- Cobble availability
- Ample work area, unrestricted limits of work

10 23 10



# Remediation – Clearing and Grubbing



Tree boles stockpiled  
for reuse

# Remediation - Road Construction



# Post Remediation

Survey control  
at cross-sections



# Post-Remediation



- 150,00 cubic yards
- 2.25 miles of stream

# Stream Restoration - Materials



# Stream Restoration – Gravel Bars



# Stream Restoration – Cobble Bars



← Pool habitat

← Riffle habitat

# Stream Restoration

Vernal pool





# Stream Restoration



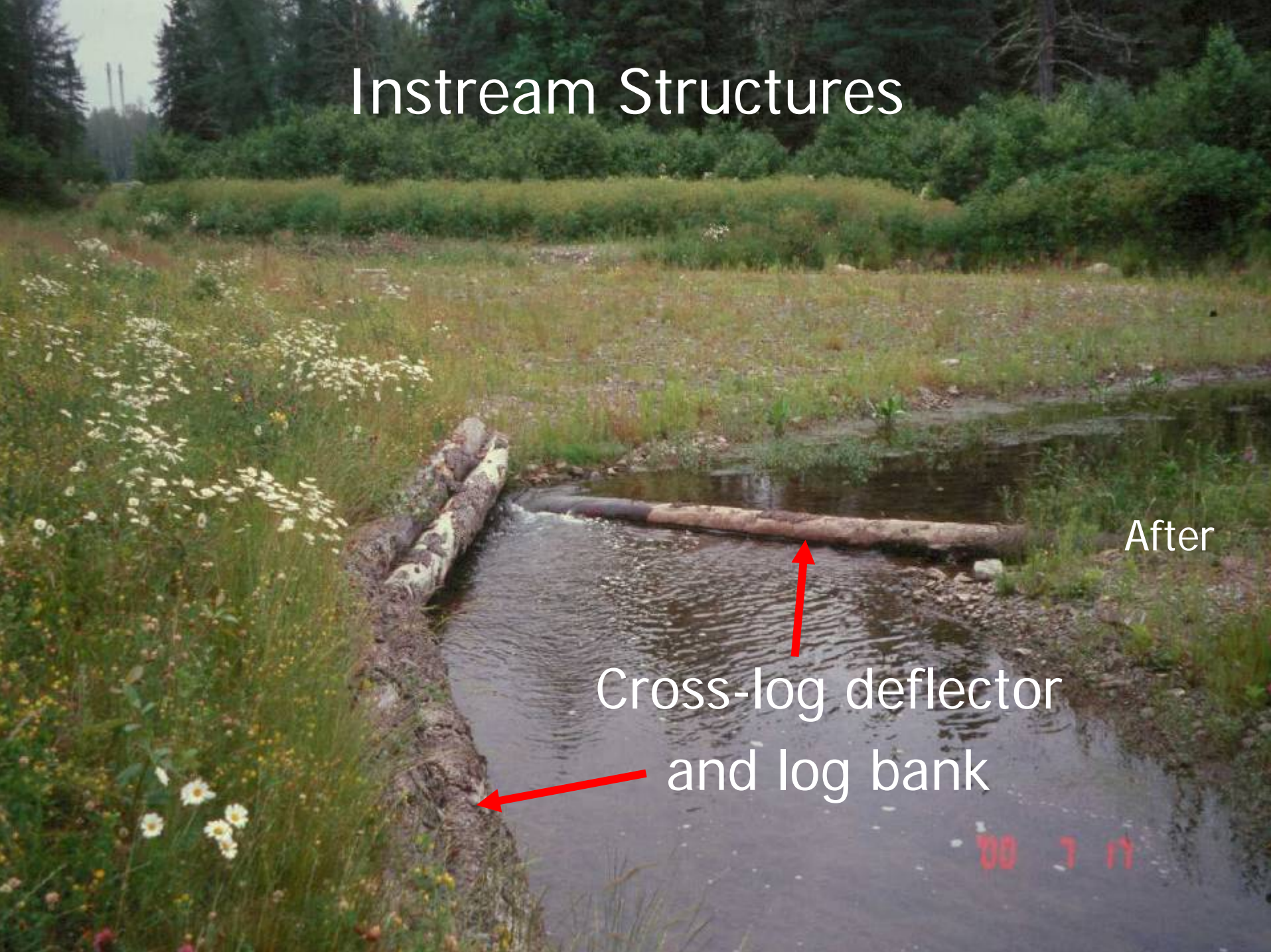
Placing Log Deflector

# Instream Structures

Before



# Instream Structures



After

Cross-log deflector  
and log bank

00 7 17

# Instream Structures



Half log

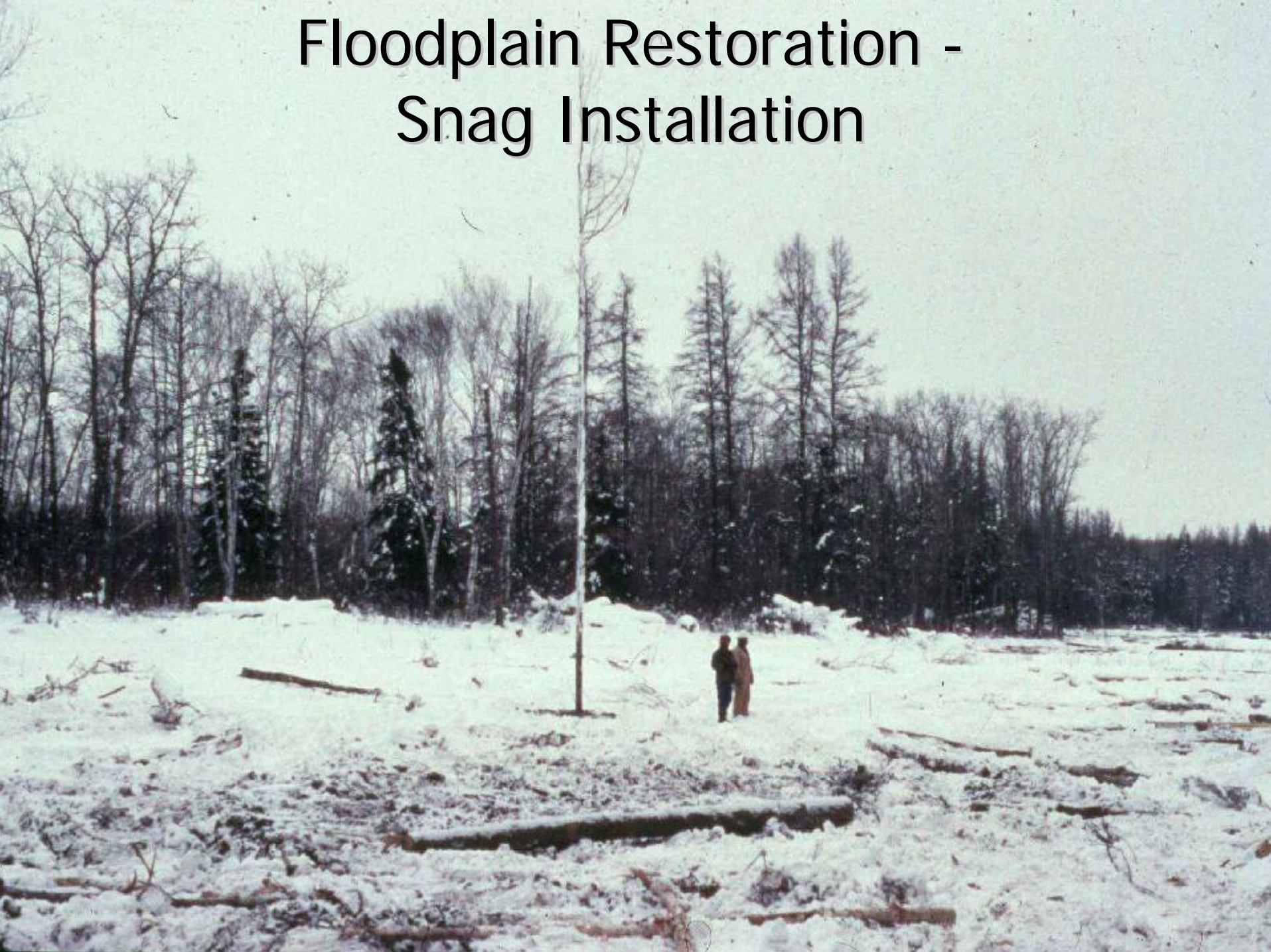
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# Floodplain Restoration



Log stockpile in  
clean area

# Floodplain Restoration - Snag Installation



# Floodplain Restoration – Spring Planting

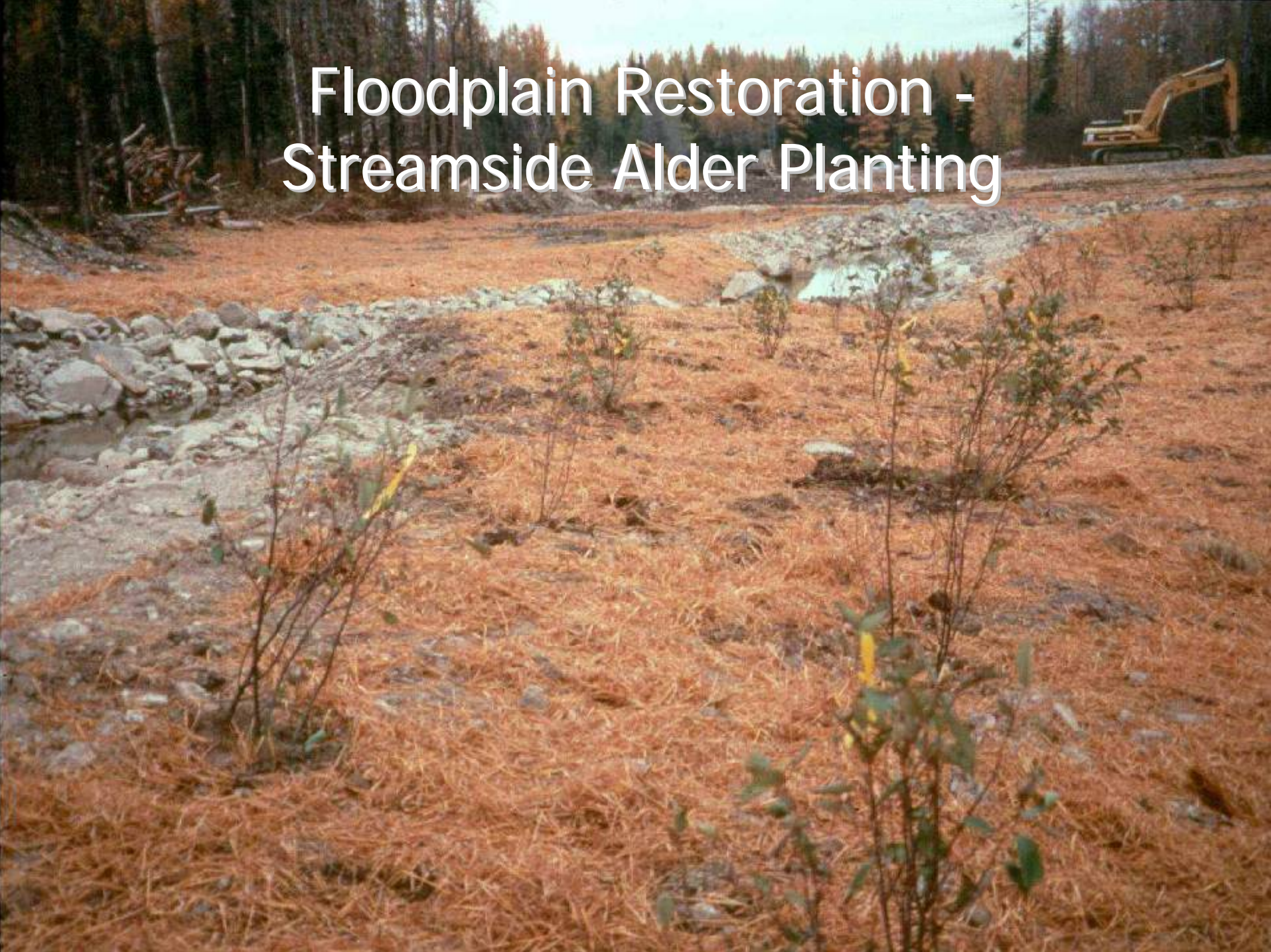


# Floodplain Restoration –Spring Planting





# Floodplain Restoration - Streamside Alder Planting



# Monitoring: Stream/Wetland



- Plant establishment and survivorship
- Vegetative plots
- Invasive species
- Erosion
- Stream channel stability



# Floodplain Restoration (1998)



# Floodplain Restoration – Vernal Pool (1999)

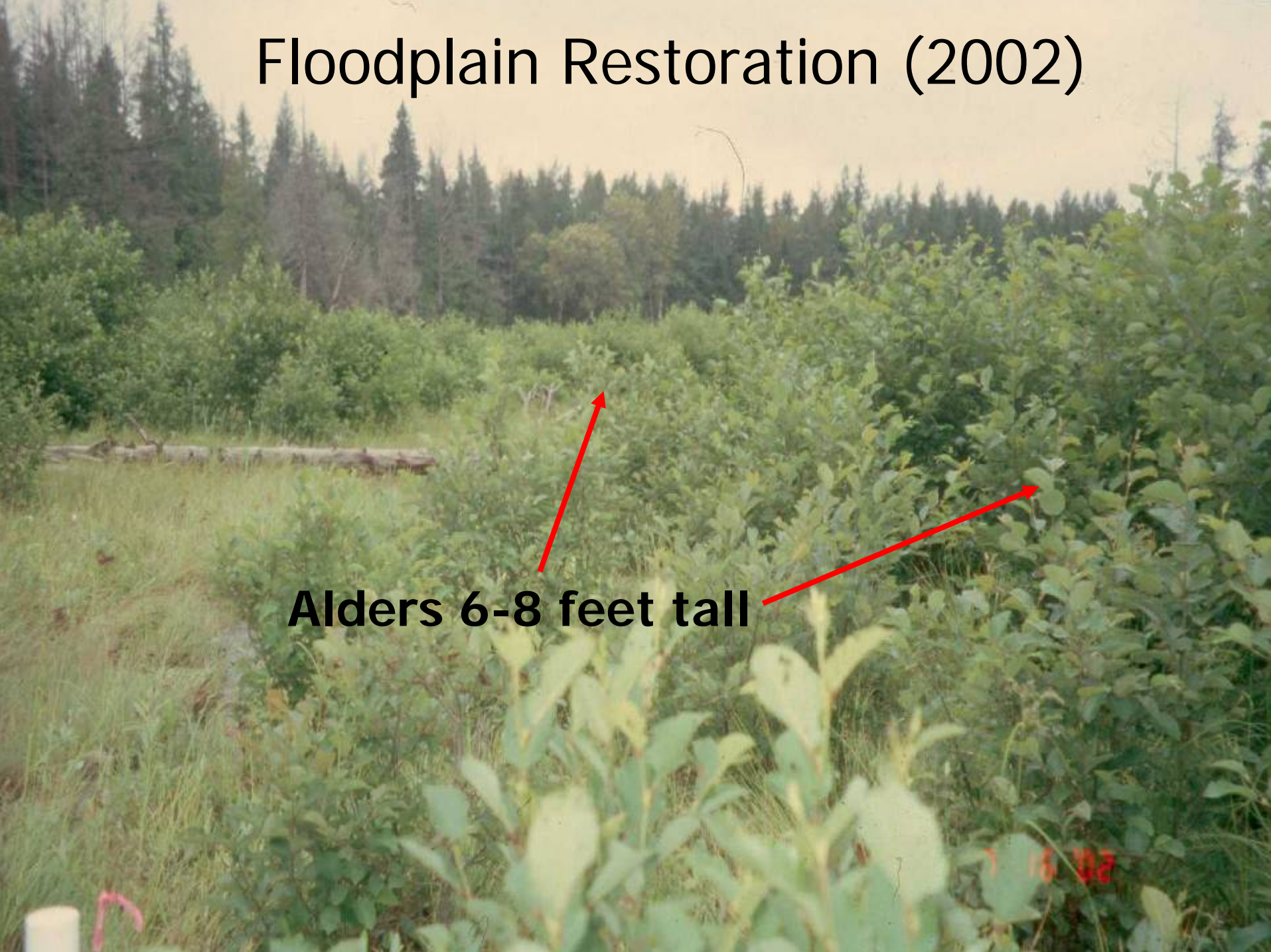


# Floodplain Restoration (2000)



# Floodplain Restoration (2002)

**Alders 6-8 feet tall**



# Floodplain Restoration (2003)



# Stream and Floodplain Restoration (2003)





2006



2006



2006



# Restored Stream and Floodplain

**Brook Trout**

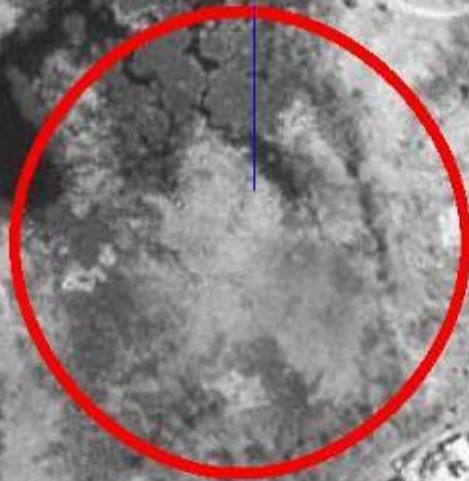


# Sudbury River Wetland Restoration



# Site Location

APPROXIMATE AREA OF REMEDIATION



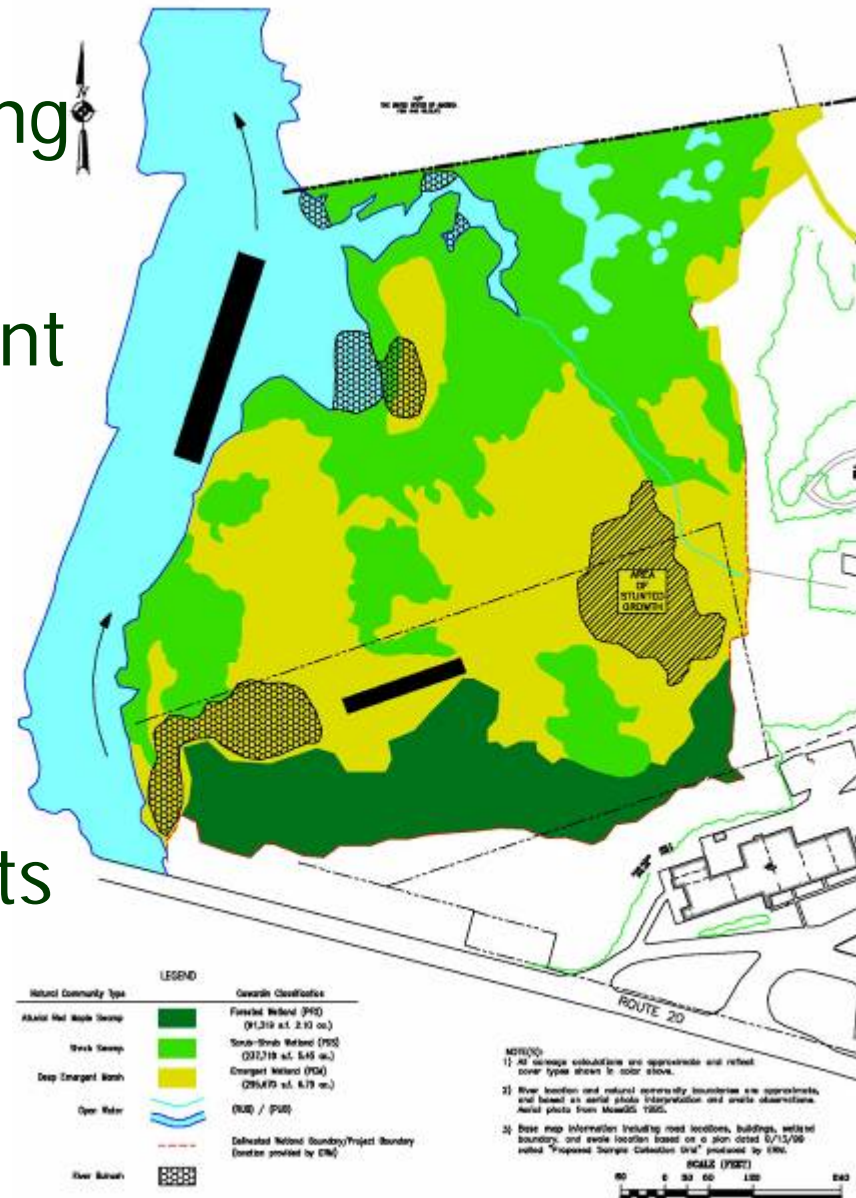
# Background

- RCRA site
- Phase I, II, III investigations
- Contamination in floodplain soils – PCBs, Cu, Cr
- Risk assessment and remediation alternatives evaluation
- Area of Readily Apparent Harm (ARAH) - included zone of stressed vegetation



# Baseline Ecological Characterization

- Natural community mapping
- Habitat evaluations
- Breeding bird and rare plant surveys
- Wildlife observations
- Cover type mapping
- Wetland characterization
- Function value assessments

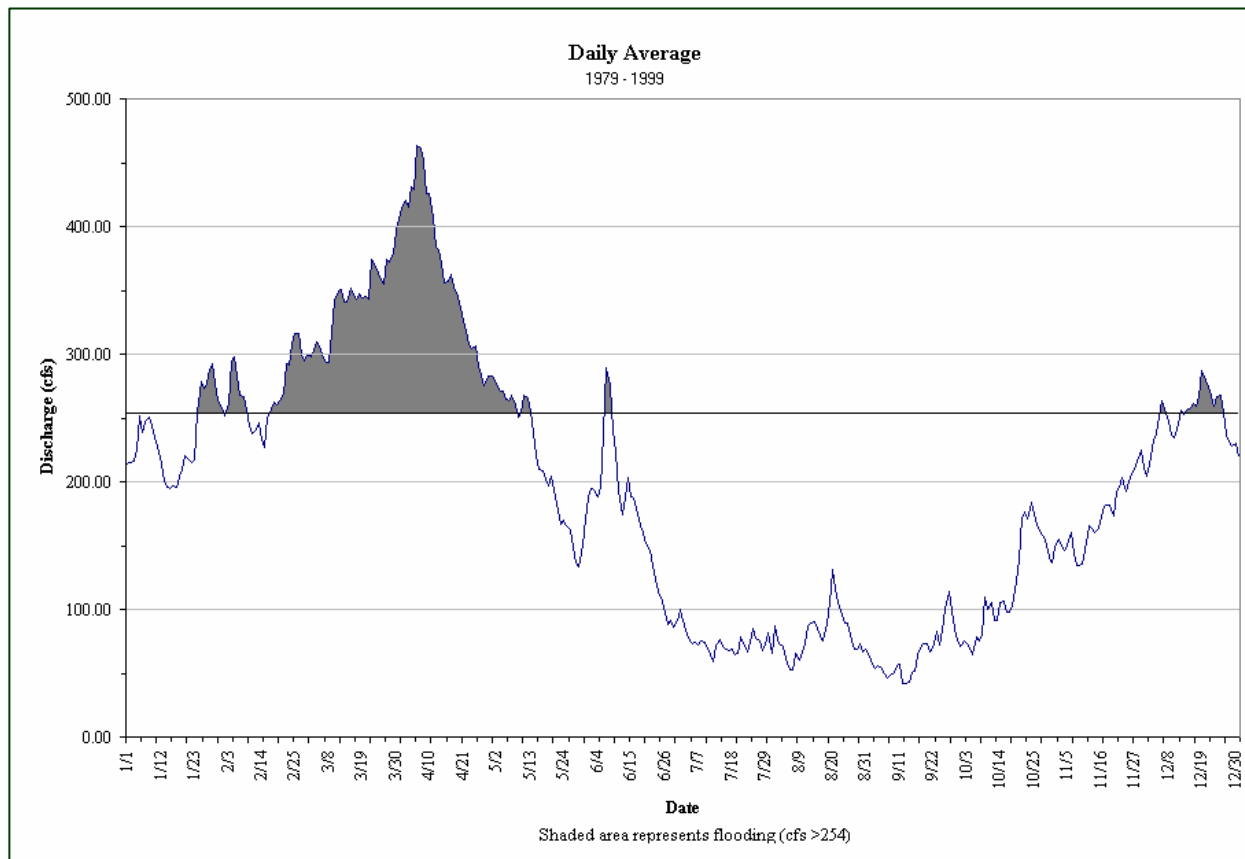




# Baseline Ecological Characterization

## Flooding Characterization

- Calculated frequency and duration of flooding
- Seasonal floodplain inundation - effect on woody vegetation



# Remedial Action

- Conducted in winter 2003/2004
- 1.5 acres of floodplain remediated
- 3,700 cubic yards of wetland soil and sediment removed



# Restoration – Construction Winter 2003/2004

- Wetland soil mix
- Resoiling and grading
- Erosion control
- Use of geotextiles



# Restoration Construction Winter 2003/2004

- Hydrology
- Microtopography
- Site Drainage



# Restoration – Revegetation

## Spring 2004

- Seeding with native wetland species mix
- Mulching with weed-free straw
- Bare-root herbaceous species hand-planted on one-foot centers - 63,000 plants
- Buttonbush (*Cephalanthus occidentalis*) and ferns planted from one-gallon containers
- Spread coarse woody debris



# Long-Term Monitoring



Performance Standards include:

- Survivorship of plants
- Percent areal cover (i.e. 75% areal cover of native, noninvasive wetland species within two growing seasons)
- Invasive species control
- Erosion control

# Monitoring April 2004



Monitoring  
June 2004





Successful  
Restoration  
August 2004

