



## Goal 1) restore natural structure

- Natural community
- Size & age structure

Planting	Nat. Regen.
+/-	++



## Goal 2) restore natural functions

- Water quality
- Flood resilience
- Habitat
- Climate change

Planting	Nat. Regen.
+/-	++



# Goal 3) Restore natural processes

- Self-sustaining
- Resilient
- Adaptable

Planting	Nat. Regen.
-	++



### Natural regeneration should be an objective

Tree planting does not always lead to natural regeneration

 A tree planting that doesn't also provide natural regeneration will not achieve all three goals (structure, function & process)





## Where is natural regeneration likely to occur?

 Between 2021-2023 monitored 13 tree plantings that occurred between 2002 and 2021

Some anecdotal results about natural regeneration



### Ground cover correlated with low or no natural tree regeneration

#### Low (100-400 stem/acre)

Golden rod (previously corn)



#### No (<50 stem/acre)





- Fern/bracken
- Buttercup









### Seed source

- Natural regeneration is not uniform
  - Patchy, follows prevailing winds (on large parcels)
  - Sediment deposits after inundation
- Natural regeneration is not representative of nearby species
  - Species with heavy seeds
    - Box elder, black locust
  - Long-range dispersal
    - Cottonwood
  - Inundation
    - Birch, alder



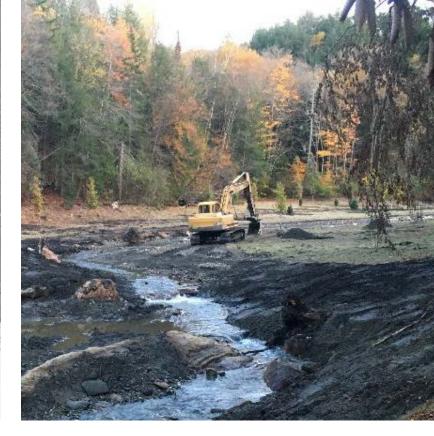
### Other observations

- Exposed soil
  - 50% exposed soil not sufficient for natural regeneration
- Herbivory
  - does not prevent natural regeneration
- Soil type, prior land use
  - importance not clear
- Inundation period
  - No data









When to pursue active restoration

Invasive species
Infrastructure
Erosion control / Exposed soils

# How to accelerate natural regeneration?

- Site preparation experiments in progress
  - Till / herbicide
  - Invasive control
- Planting density experiments in progress
  - 800 1200 stems / acre
  - Direct seeding
- Site maintenance?
  - Watering
  - Mulch
- Others?





