Research examining black ash management options and anticipating EAB impacts

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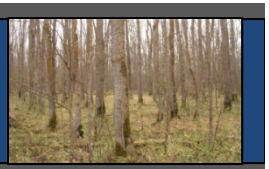
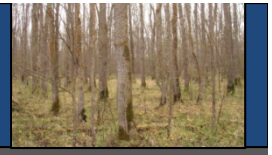
Black ash ecology and management

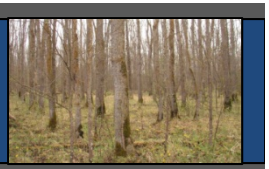


- What might we lose and how do we manage these areas in the face of EAB?
  - Characterizing composition, dynamics, and structure of black ash forests
  - Evaluating management options and anticipating EAB impacts

Dynamics and structure of black ash

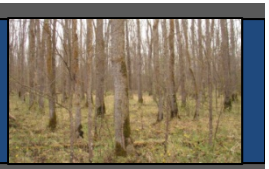


Dynamics and structure of black ash



- <u>Study Design</u>
  - Established one, 1.2 acre plot within six old-growth black ash forests (primarily WFn55 with WFn64 inclusions)
  - Spatial locations mapped for all living and dead stems (≥ 4” DBH)
  - Increment core samples collected from all stems (≥ 4”DBH)
  - Maximum ages 218-321 years

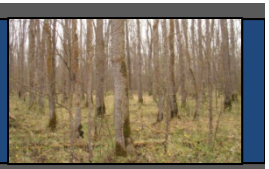
Black ash trivia



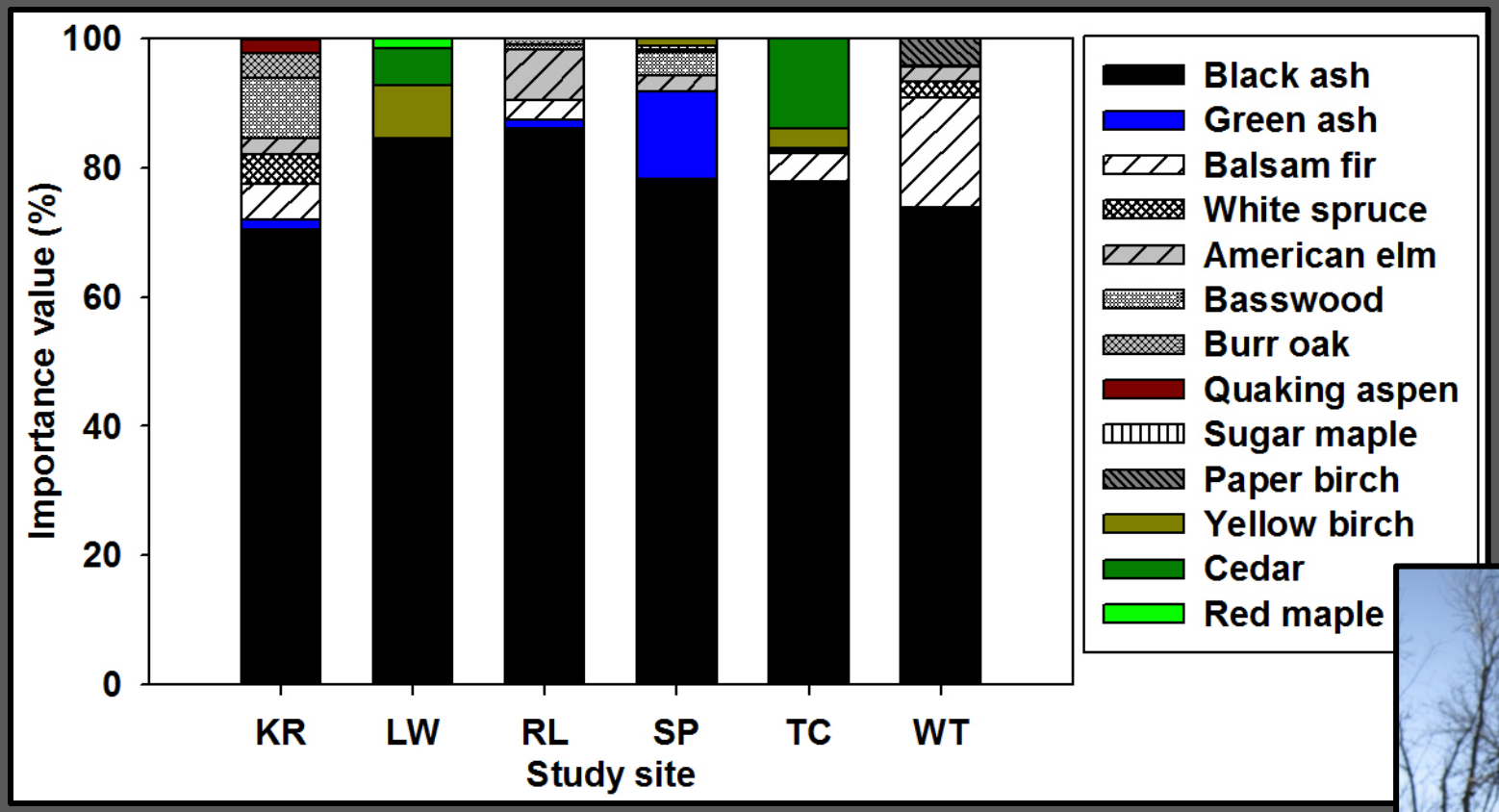
Where is the oldest documented black ash in the world?

a) Ontario
b) New York
c) Minnesota (314)
d) Quebec (319)
e) Michigan

Dynamics and structure of black ash

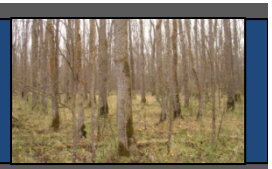


- **Overstory composition (stems > 4” DBH)**

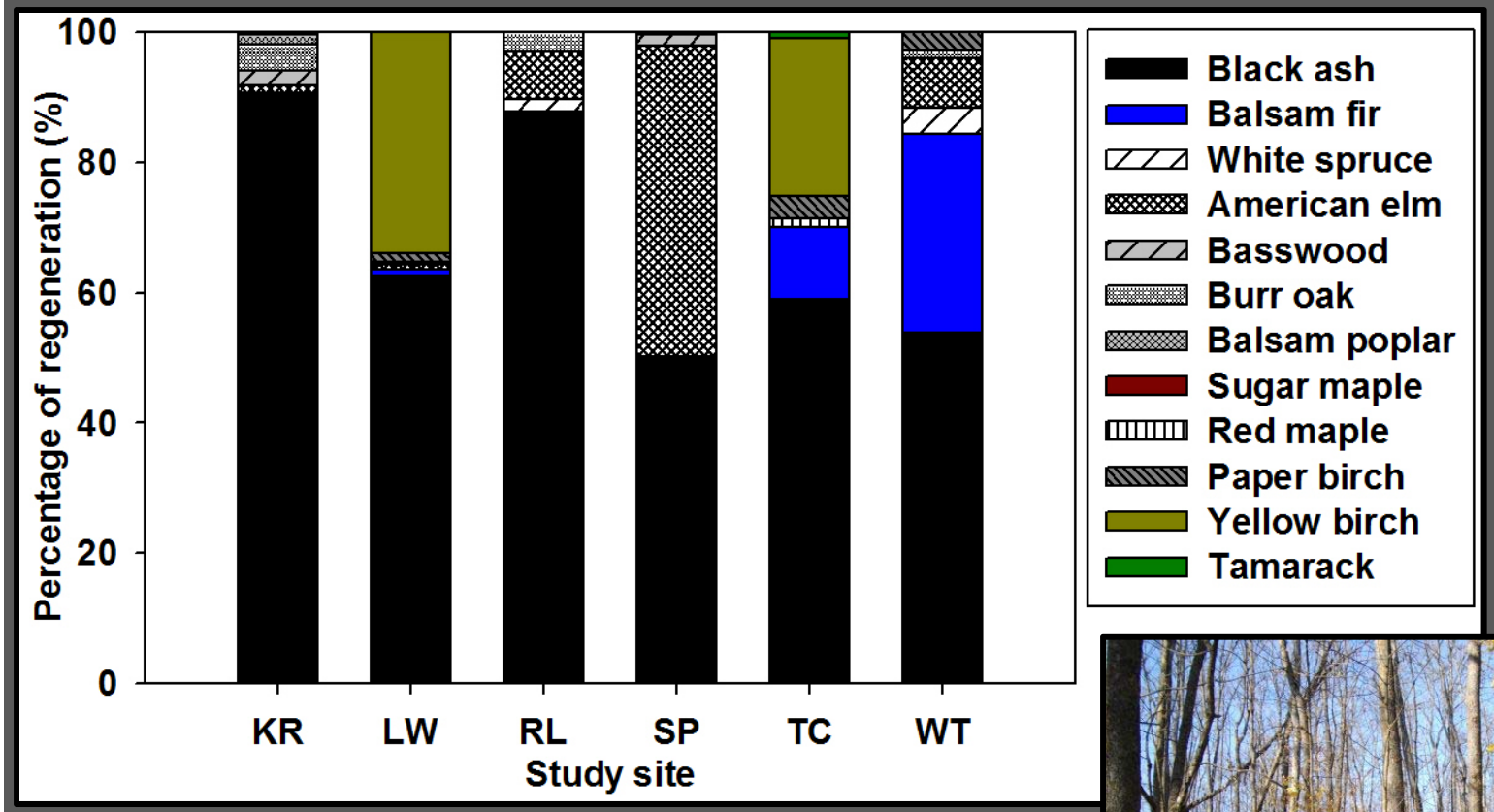


- Strong site dominance in overstory tree layer with non-ash species rarely making up more than 15% of stand

Dynamics and structure of black ash



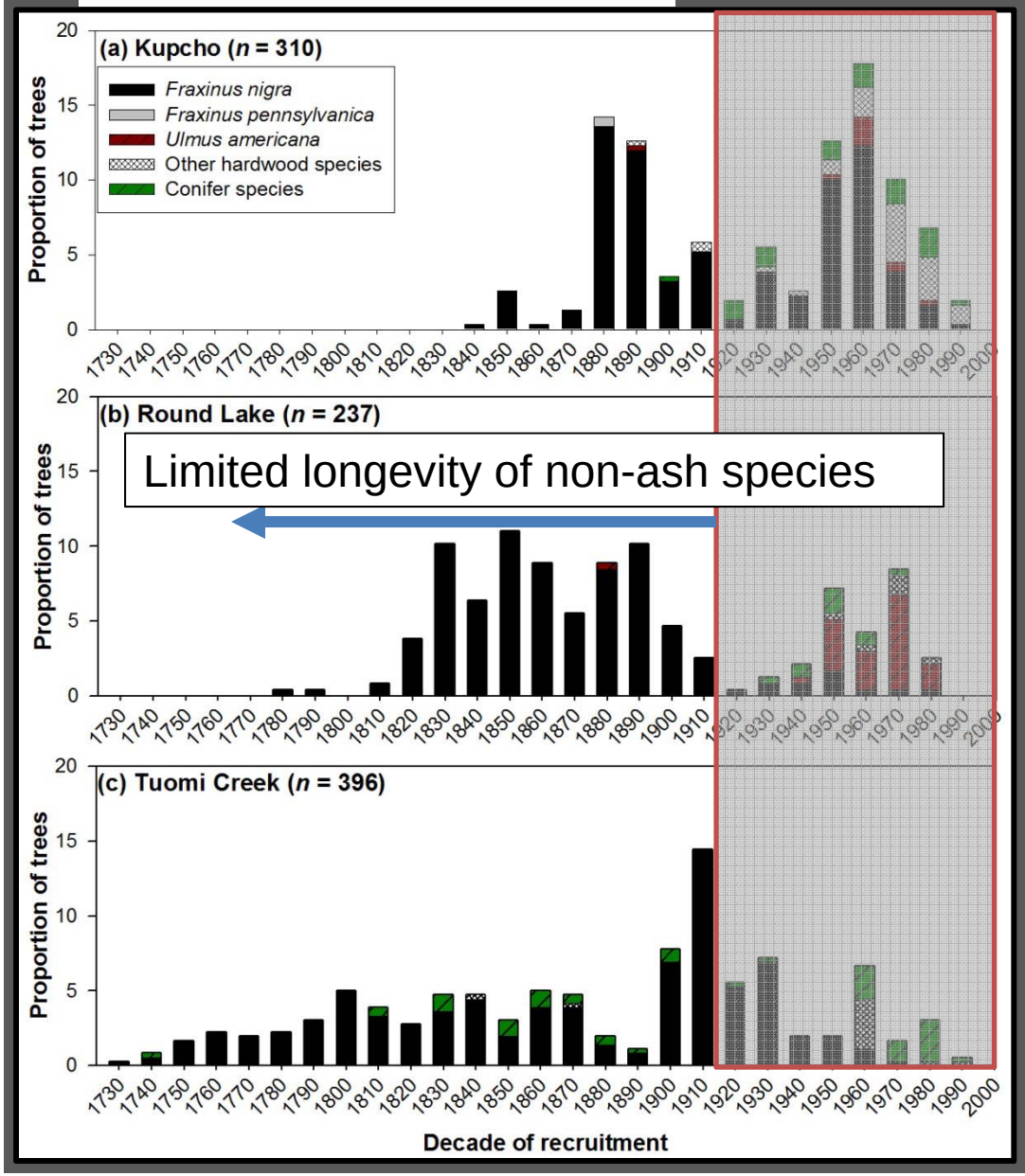
- **Regeneration composition (500-1121 stems acre^{-1})**



- Similar level of dominance in understory with some sites having more options than others

Dynamics and structure of black ash

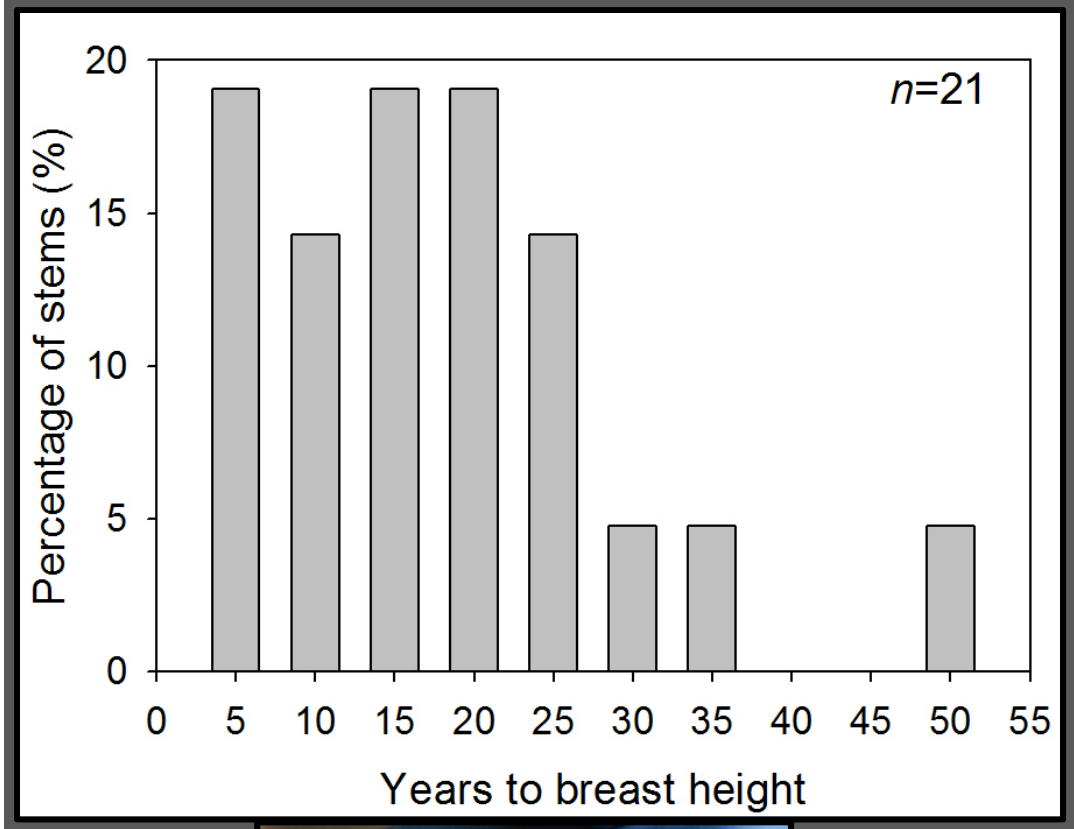
- **Recruitment dynamics**



- Generally constant ash recruitment over time
- Non-ash species largely restricted to past century
- Peaks reflective of both drought periods and canopy disturbance
  - Overstory ***present*** during regeneration events

Dynamics and structure of black ash

- **Age to breast height**

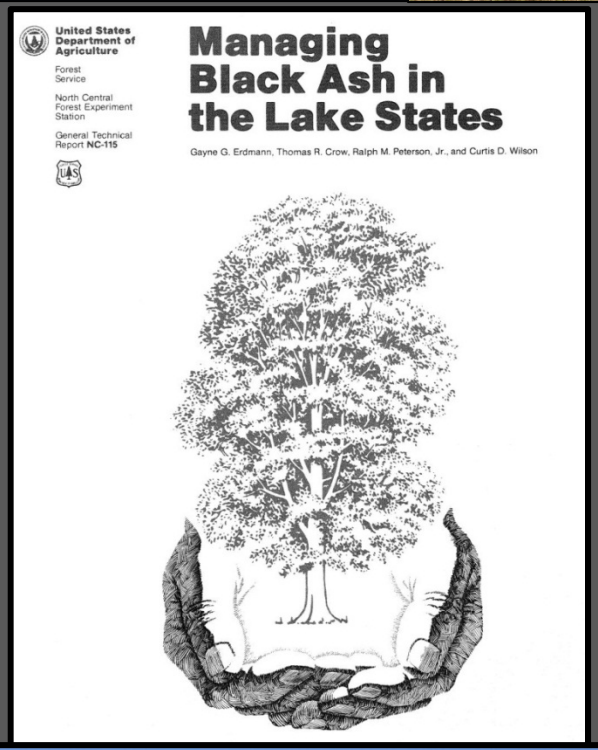


- Black ash behaves more like a shade-tolerant tree on these sites
  - Average age to breast height ~ 16 years
- Ability to dominate gaps limits opportunities for most other species

Dynamics and structure of black ash

<u>Take home points</u>

1. Black ash dominates these sites for a reason
   - Continuous recruitment and highly competitive on suitable microsites
2. Age structures and experience with declining stands underscore importance of maintaining overstory cover when attempting to diversify areas



Management objectives for black ash

Given **high vulnerability** of black ash lowland systems (WFn55 and WFn64) to EAB, a prevailing objective should be (where possible):

1. Build site-level resilience (i.e., how do we hold the site and maintain options?)
   - Increasing non-ash components and diversifying size and age structure

Management options & EAB impacts

Effects of regeneration harvests and EAB on black ash forests

- Large-scale manipulative project in collaboration with Chippewa NF
- 8 black ash swamps (4 WFn55, 4 WFn64)

Management options & EAB impacts

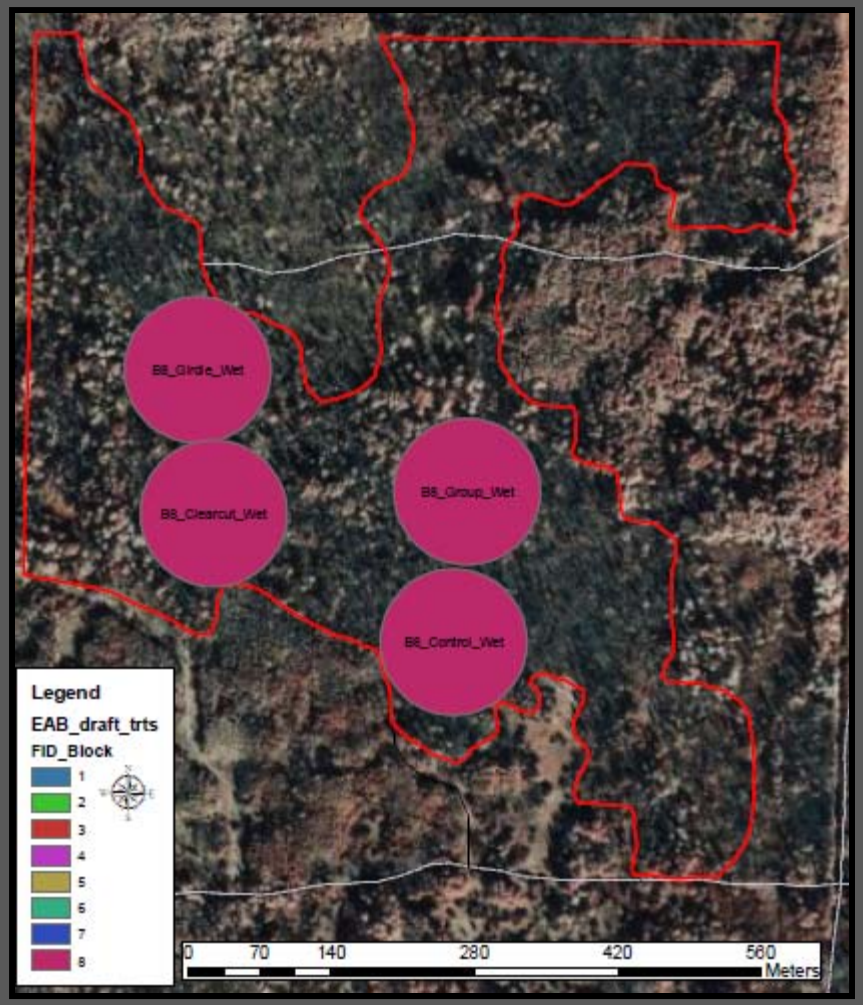
Effects of regeneration harvests and EAB on black ash forests

<u>4 treatments</u>

1. Group selection (6, 0.1 ac gaps)
2. Clearcutting (4 ac)
3. EAB infestation (girdling all ash)
4. Unharvest control

All treatments are 4 acres each

Harvests occurred in winter 2012



Management options & EAB impacts

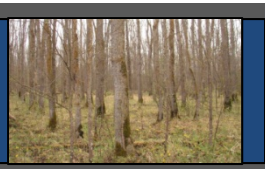
Group selection

Clearcutting

Management options & EAB impacts

Girdling (220-350 TPA)

Black ash trivia



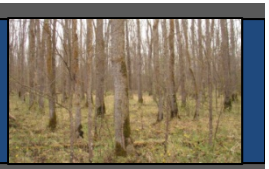
What species of ash is in the picture below?

a) Blue ash
b) White ash
c) Manchurian ash
d) Pumpkin ash
e) Black ash

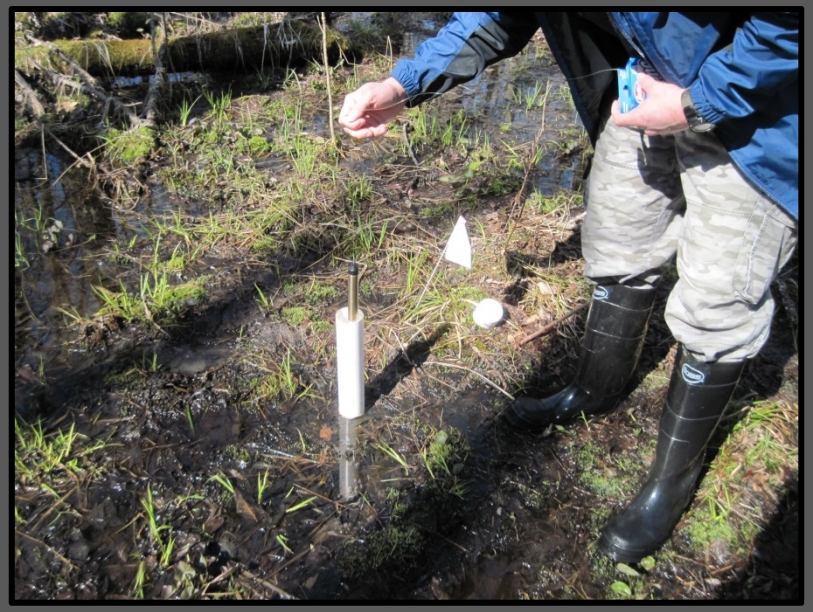
Management options & EAB impacts

- Evaluating replacement species
  - white cedar, yellow birch, tamarack, red maple, hackberry, swamp white oak, black spruce, quaking aspen, cottonwood, balsam poplar, American elm (resistant variety), Manchurian ash
  - Planted in all treatments (½ fall pre-harvest , ½ spring post-harvest)

Management options & EAB impacts

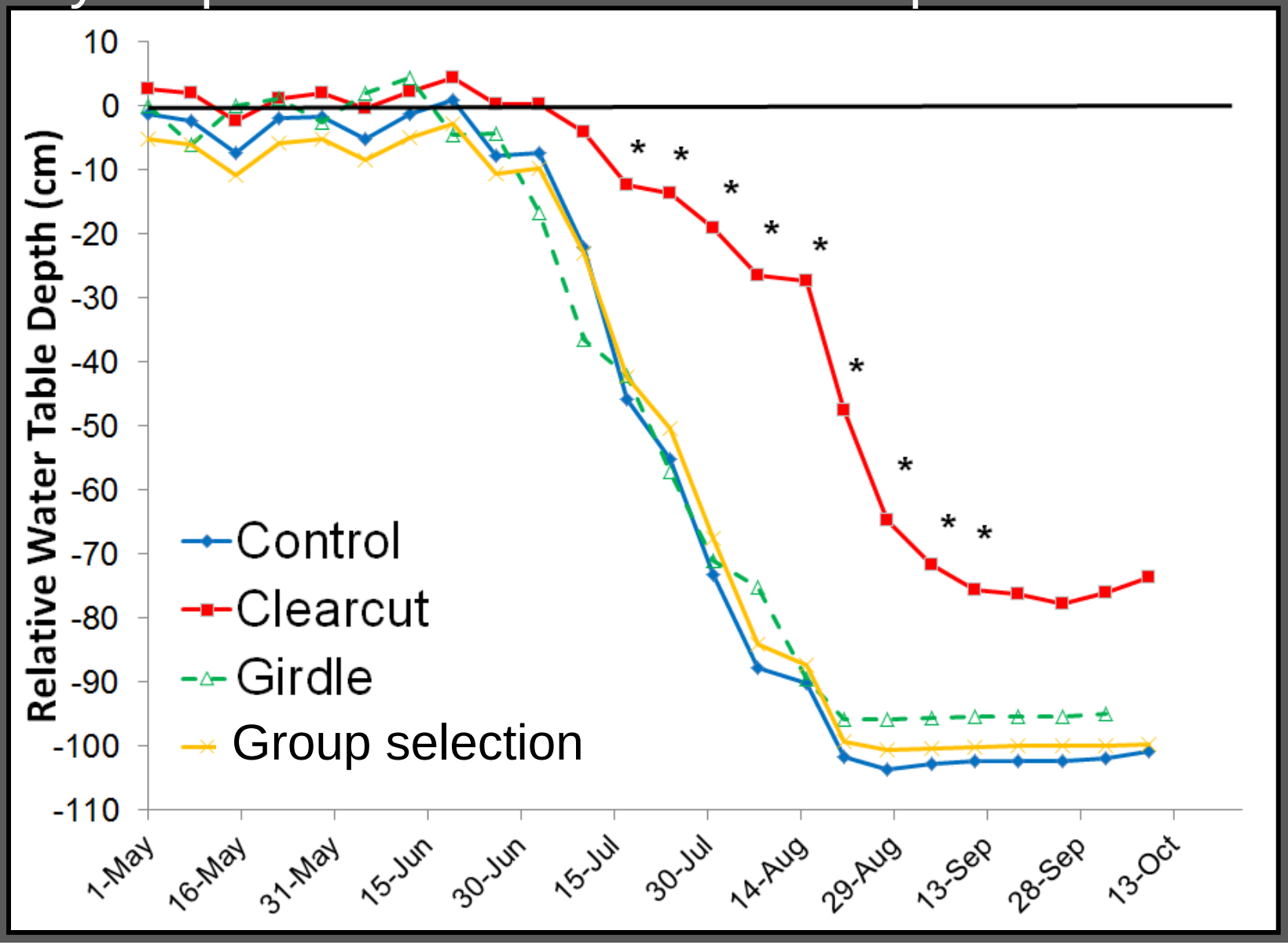


- Hydrology measurements



Management options & EAB impacts

- 1st year post-harvest water table depths



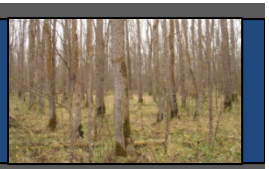
Management options & EAB impacts

- 1st Year Seedling Survival

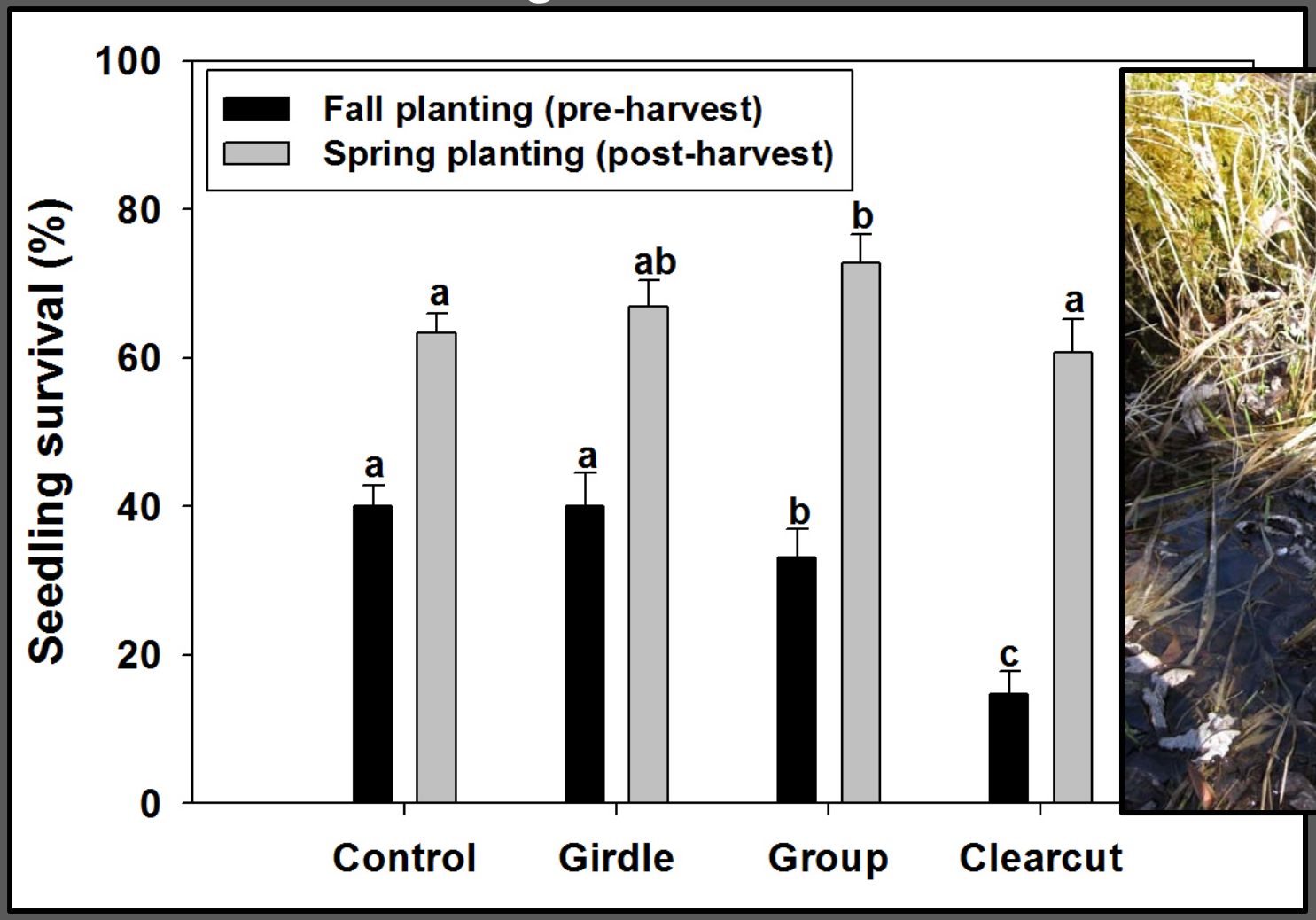
Species	Overall Survival (%)	Fall Survival (%)	Spring Survival (%)
Manch. ash *	97.6 ± 0.5	-	97.6 ± 0.5
Sw. white oak *	93.7 ± 1.0	-	93.7 ± 1
Amer. elm**	84.1 ± 2.1	84.1 ± 2.1	-
Cottonwood	78.1 ± 1.4	67.1 ± 2.2	89.1 ± 1.2
Hackberry	73.7 ± 1.5	65.1 ± 2.5	82.2 ± 1.6
Balsam poplar*	66.1 ± 2.2	-	66.1 ± 2.2
Red maple	51.8 ± 1.8	32.7 ± 2.2	70.9 ± 1.9
N. white cedar	50.6 ± 2.1	19.3 ± 1.8	81.9 ± 1.9
Black spruce	46.1 ± 2.0	17.6 ± 1.5	74.5 ± 2.3
Yellow birch	37.7 ± 1.9	12.1 ± 1.7	63.2 ± 2.1
Q. aspen	31.9 ± 1.7	14.1 ± 1.5	49.8 ± 2.3
Tamarack	21.8 ± 1.6	27.6 ± 2.2	16.1 ± 2.2

***spring-only planting**
****fall-only planting**

Management options & EAB impacts

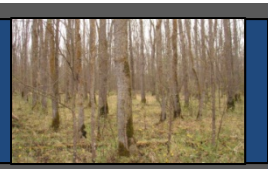


- 1st Year Seedling Survival

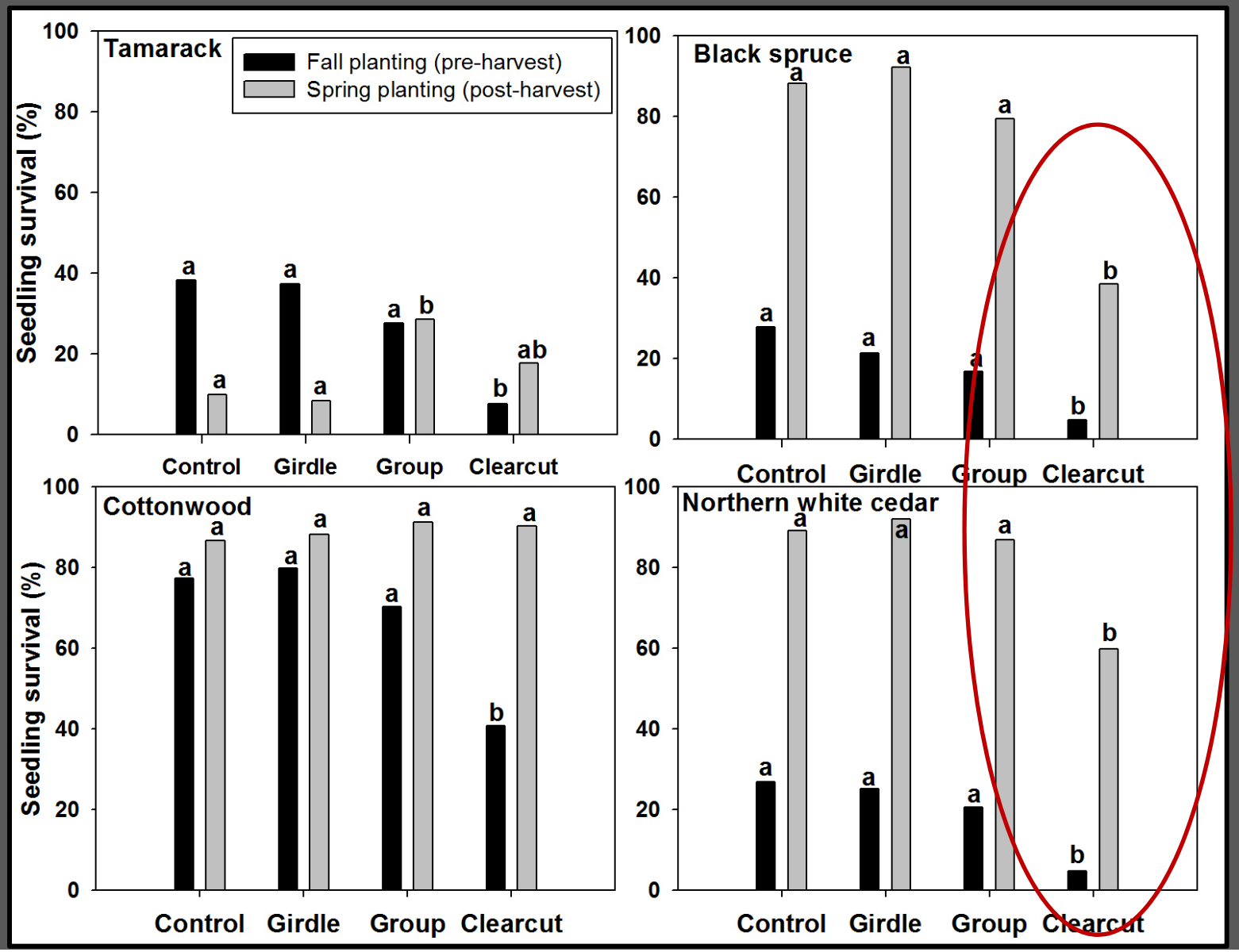


- **Lack of snow cover in winter 2012 increased likelihood of seedling damage from equipment, deer, and desiccation**

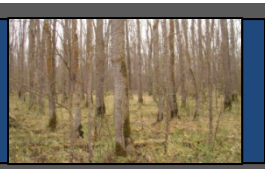
Management options & EAB impacts



- 1st Year Seedling Survival



Management options & EAB impacts

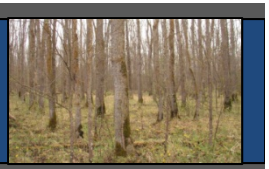


- Natural regeneration

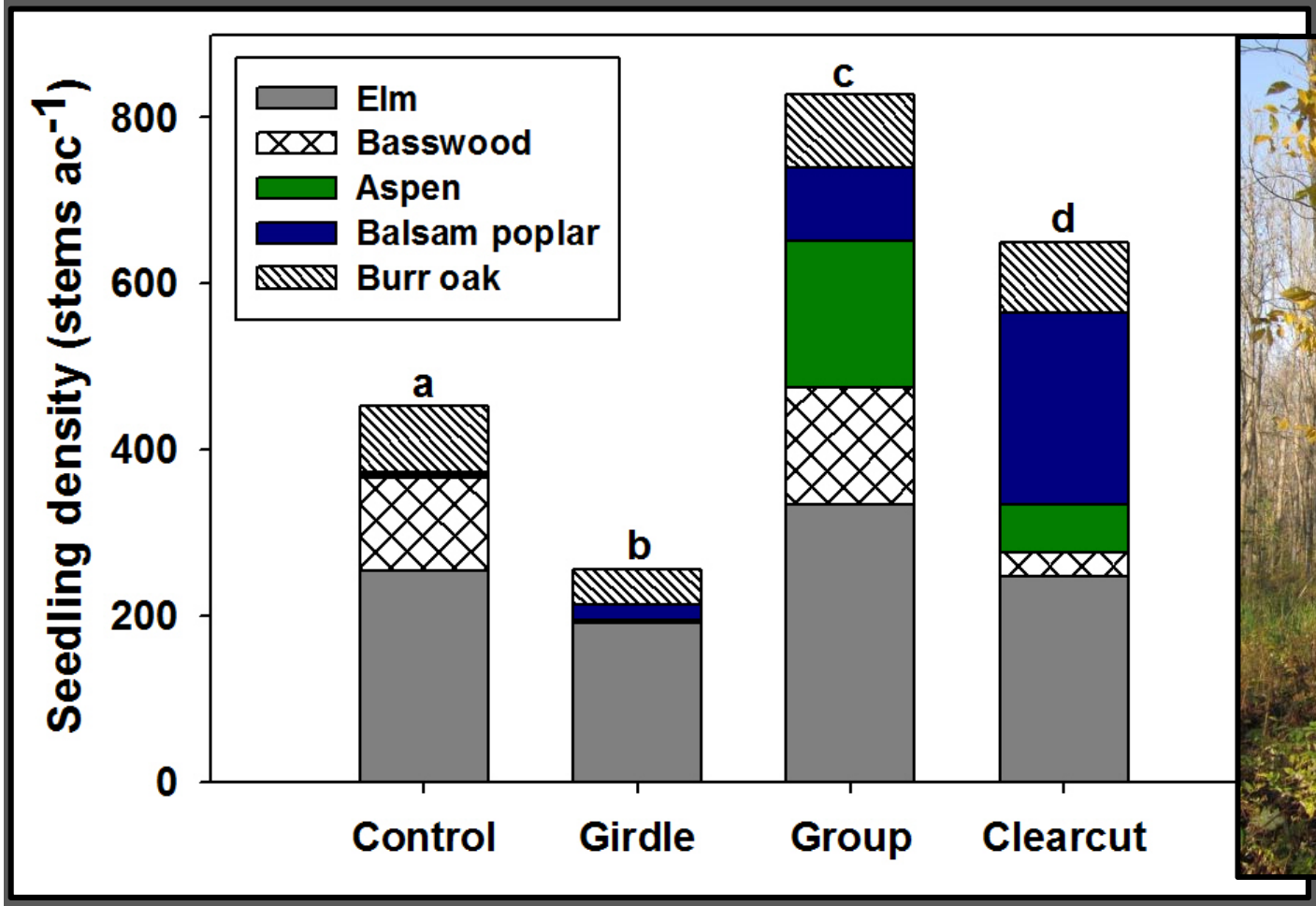
Species	Average density (stems ac^{-1})
Black ash	1439 (59-7292)
American elm	257 (0-1018)
Red maple	58 (0-971)
Basswood	71(0-1124)
Quaking aspen	59 (0-1154)
Balsam poplar	85 (0-1361)
Burr oak	73 (0-675)
Box elder	8 (0-178)

- 50-70% of black ash regen is sprout-origin
- No natural conifer regen encountered across 576 sample plots

Management options & EAB impacts

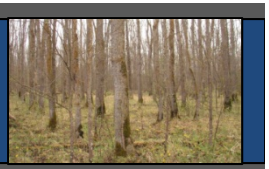


- Natural regeneration (non-ash species)



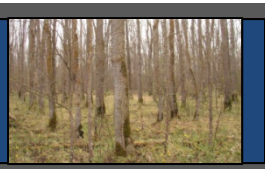
- Harvesting primarily served to increase balsam poplar and aspen components

Management options & EAB impacts



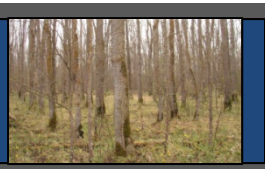
- <u>Take home points (site hydrology)</u>
  - Initial hydrologic responses reinforce importance of ash overstory at maintaining water tables
    - Clearcutting may accelerate loss of site
      - ACLD experience indicates risks with large groups (1/2 acre gaps)
  - Lengthening periods with standing water eliminates many possible replacement species

Management options & EAB impacts



- <u>Take home points (regeneration)</u>
  - Initial results argue strongly against pre-harvest regeneration efforts
    - Conditions allowing for harvesting also increase likelihood of regen damage
  - Consistent with the ecology of sites, survival was greatest when overstory was retained
    - Group selection provided greatest opportunities for diversifying species mix (shelterwood also possible)

Management options & EAB impacts



- <u>Take home points (silviculture and communication)</u>
  - Great need for informal experimentation to build silvicultural knowledgebase (**see** WIDNR efforts)
    - Record keeping/sharing and use of site classification (i.e., NPCs)
    - Where opportunities exist, focus should be on shifting composition towards other species

Thanks!

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