

BUILDING FOREST RESILIENCE: THE NORTHERN PINE MANAGEMENT INITIATIVE

- ❖Background, Forest Complexity
- ❖Historical Reference Data
- ❖Northern Pine Management Initiative, Resilient Forests

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"The timber occupying these tracts is peculiar and does not justify the application of the term barrens." - Moses Strong 1877

Photo: U.S. Public Library of Congress

Trees/ha
Forest: >99
Woodland: 47-99
Savanna: 0.5-47
Prairie: <0.5

Curtis 1984, Anderson & Anderson 1975

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MASSIVE EURO-SETTLEMENT CHANGES

MN Historical Society

MN Historical Society, 1894 "Hinkley" MN fire

Destructive "settlement" era fires



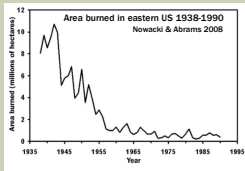
- o 1871: Oct. (WI & MI)
- o 1881: Sept. (WI & MI thumb re-burned > 1 million acres)
- o 1894 July (WI), Sept. (MN)
- o 1908: Apr. (WI), Sept. (MN), Oct. (MI)
- o 1910: Oct. (Baudette-Spooner Fire in MN, WI & MI too)
- o 1918: Oct. (Cloquet-Moose Lake fire in MN, 4th largest)

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TRADITIONAL U.S. FORESTRY – AGRICULTURAL MODEL WAS BASIS


- o Fire suppression
- o Tree planting & Successional theory underpinnings

Trout Lake Nursery seed beds, Vilas County WI, 1911

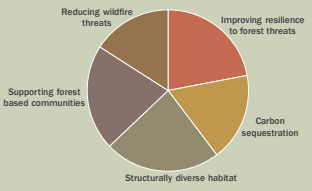




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“Scientifically, there is a broad consensus that to increase resilience, treatments should seek to restore the range of patterns found in forests with intact disturbance regimes.” – Churchill et al. 2009



What matters in a quality logging operations?



Forest Stewards Guild Logging Survey, Immet et al. 2022

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PLANTATION & NATURAL ORIGIN PINE MANAGED THE SAME

“to increase resilience, we need to restore the range of patterns found in forests with intact disturbance regimes.” – Churchill et al. 2009




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DENDROCHRONOLOGY...

Fire scar formation

Crossdating tree-rings

Heyerdahl et al., 2019

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WI FIRE HISTORY SITES

North American Ecoregion

- Western State
- Piedmont/Blue Ridge
- Piedmont Plateau
- Central USA Plains
- Temperate Forests

Water

Fire history sites

WI ecological landscapes

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WI FIRE HISTORY SITES

North American Ecoregion

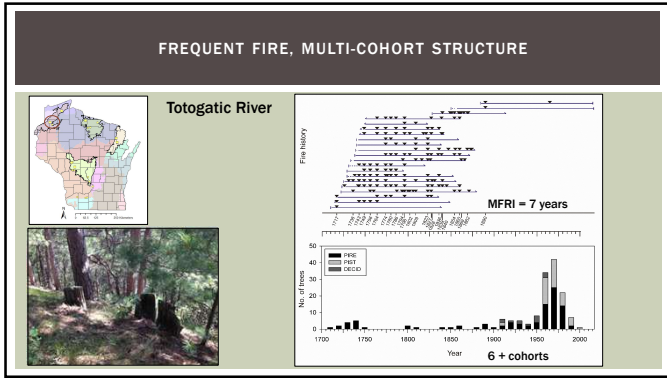
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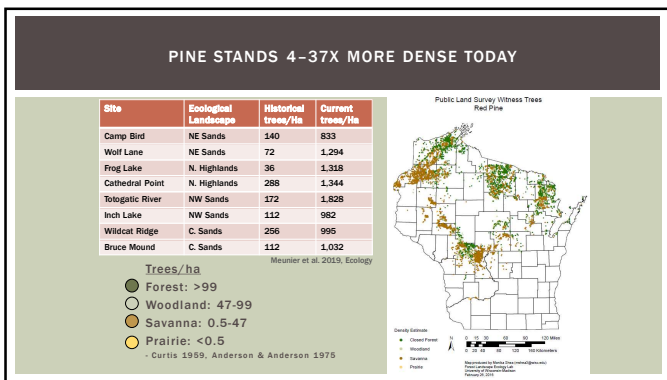
Fire history sites

WI ecological landscapes

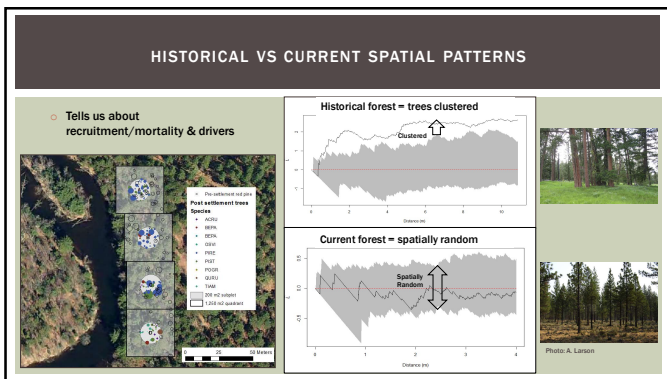
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"THERE ARE EVEN FEWER ABSOLUTES IN ECOLOGY THAN IN FORESTRY, BUT AN EMERGING OPERATING MAXIM IS SIMPLIFICATION IS RARELY BENEFICIAL."
FRANKLIN ET AL. 1996

Bob Hanson, WI DNR

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SPATIAL PATTERNING (COMPLEXITY) AS WILDFIRE HAZARD MITIGATION

Larson & Churchill, 2012, Forest Ecol. & Management

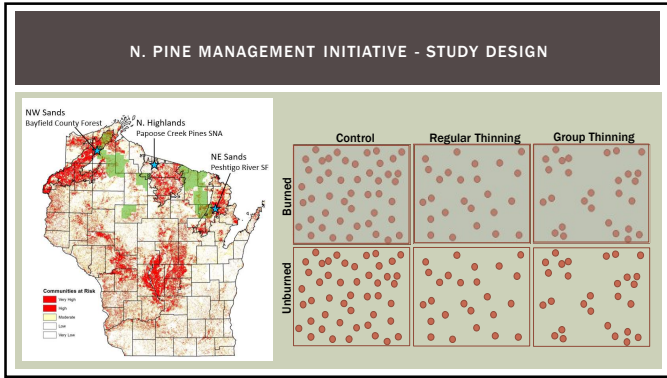
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ADDING COMPLEXITY WITH SPATIAL PATTERNING: INDIVIDUALS, CLUMPS, & OPENINGS (ICO)

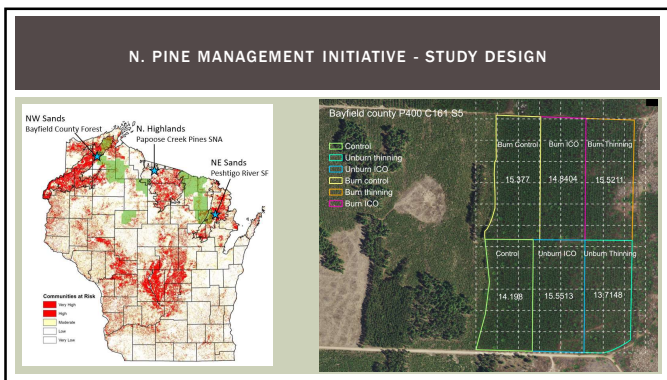
"Stand-level spatial pattern influences key aspects of resilience and ecosystem function such as disturbance behavior, regeneration, snow retention, and habitat quality in frequent-fire pine and mixed-conifer forests."
Churchill et al. 2016

"The ICO method is a stand-level tool to restore the mosaic patterns of individual trees, clumps, and openings commonly found in pine and mixed conifer forests that have intact, frequent-fire regimes."
Larson and Churchill 2012

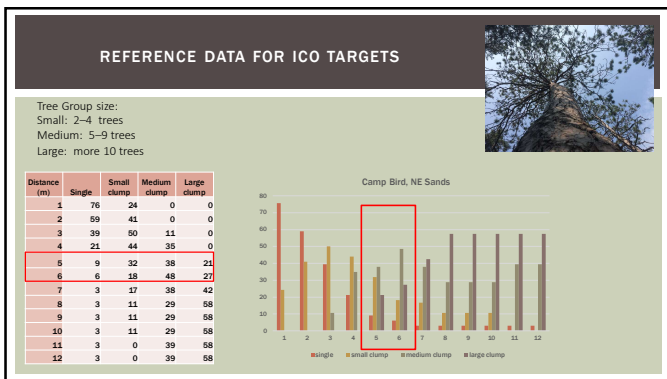
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SILVICULTURE PRESCRIPTIONS BASED ON HISTORICAL DATA

Marinette county	Individual	Small (2-4 trees)	Medium (5-9 trees)	Large (10+)
1. Average clump size for bin	[1]	[3]	[7]	[15]
2. Target Clump Percentages (historical %)	12	29	41	18
3. Trees per 0.5 ha (Target 51 trees)	6	15	21	9
4. Clump target per 0.5 ha	6	5	3	1

↓

Sites	Trees/acre	Reference data
Bayfield Co	58	Totogatic River & Inch Lake
Vilas Co	59	All historical sites for WI
Marinette Co	41	Camp Bird & Wolf Lane


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POST HARVEST

Regular Harvest:
83 trees/acre, BA = 113 ft²/acre



ICO Harvest:
47 trees/acre, BA = 78 ft²/acre



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Northern Pine Management Initiative (NPMI) Goals/Objectives

Primary Goals:

- (1) Increase complexity
nonspatial - types, number, size of individual elements
spatial - arrangement
- (2) Retain and promote long lived pine
- (3) Restore historical ranges of density and structure
- (4) Increase resistance to fire hazard

Specific Objectives:

- (1) Heterogeneous fine-scale forest structure/patterning
- (2) Reduction of hazel & woody understory
- (3) Natural pine regeneration
- (4) Promote native herbaceous vegetation




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SILVICULTURE - THE ART & SCIENCE OF FOREST MANAGEMENT

In Lake States Pine Systems:

This is the art...



SOLD - \$120,000

This is the science...

H₀: Homogeneity is easy
 H₁: Density thinning is easy
 H₂: Density thinning pays
 = plantation (type) forestry is all we need
 (ca. everywhere)

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WE NEED TO BEGIN TO APPRECIATE OLD GROWTH AS MORE THAN DARK, MESIC FORESTS



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ECOSYSTEM MANAGEMENT IS STILL WEAK AT A TIME WHEN CARBON LEVELS ARE RISING & BIODIVERSITY IS AT RISK

-17%	-23%	-29%	-33%	-37%	-53%
EASTERN FOREST BIRDS	ARCTIC TUNDRA BIRDS	WESTERN FOREST BIRDS	BOREAL FOREST BIRDS	SHOREBIRDS	GRASSLAND BIRDS

"The object is to portray the mechanism which produces *all* species on *all* lands, rather than to prescribe the procedures for producing particular species or managing particular lands" Aldo Leopold, Game Management 1953

The Cornell Lab, 2019

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THANK YOU!!