



Restoring WI Savannas with Rx Fire at Ecologically Meaningful Scales



Jeb Barzen
Wisconsin Prescribed
Fire Council

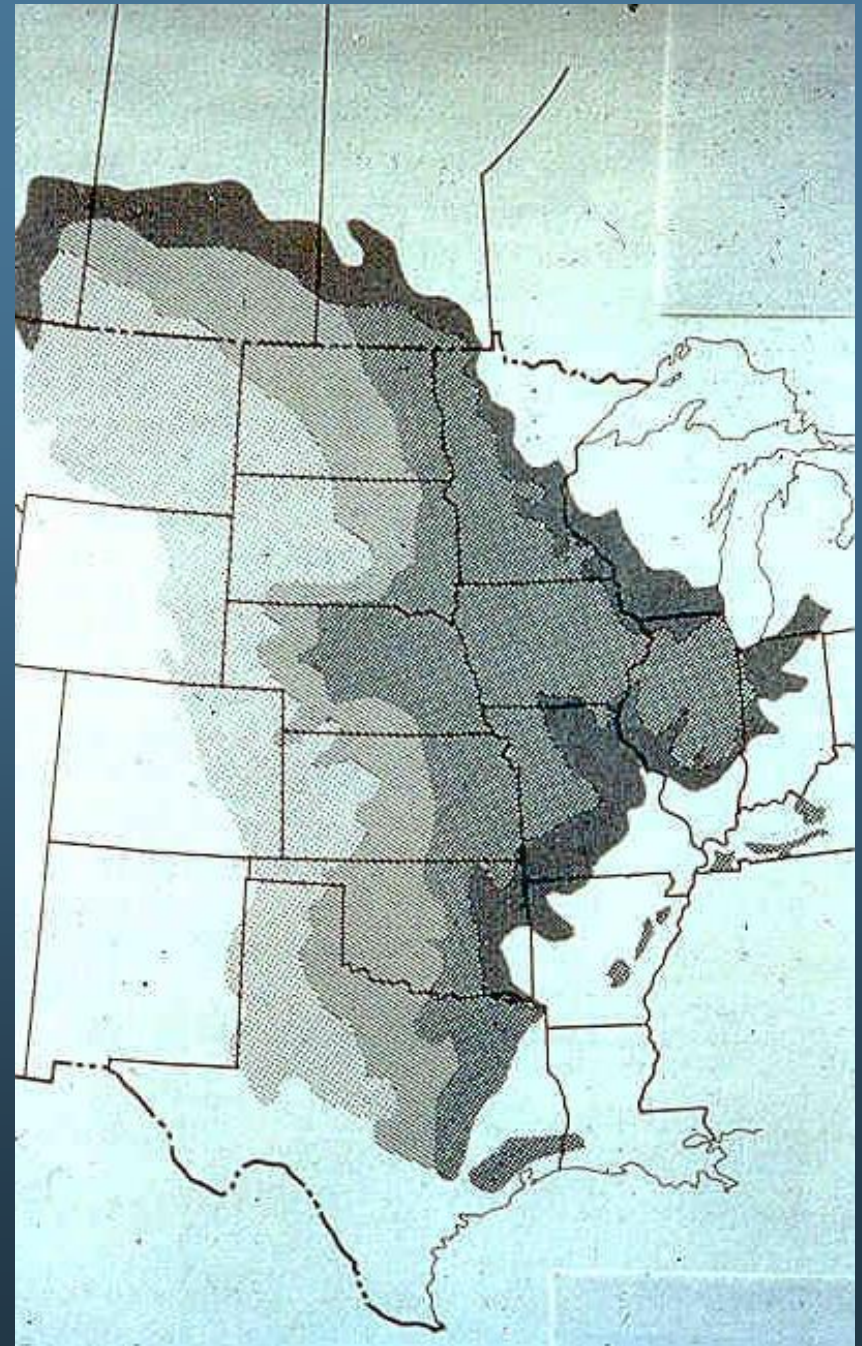
Goal:

Posit that time and fire are two primary abiotic factors that require understanding to succeed in savanna restoration

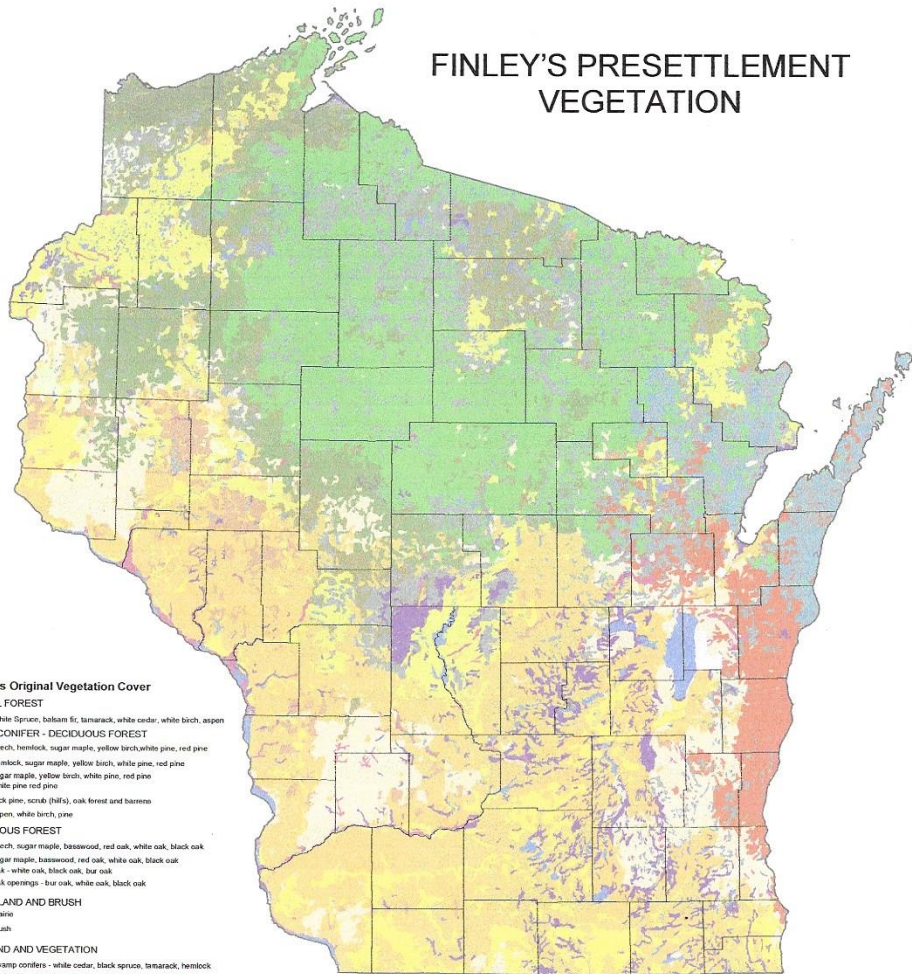


Sue Steinmann

**Extent of prairie
and savanna
communities in
North America
prior to
European
settlement**



FINLEY'S PRESETTLEMENT VEGETATION



Finley's Original Vegetation Cover

BOREAL FOREST

White Spruce, balsam fir, tamarack, white cedar, white birch, aspen

MIXED CONIFER - DECIDUOUS FOREST

Beech, hemlock, sugar maple, yellow birch, white pine, red pine

Hemlock, sugar maple, yellow birch, white pine, red pine

Sugar maple, yellow birch, white pine, red pine

White pine, red pine

Jack pine, scrub (hills), oak forest and barrens

Aspen, white birch, pine

DECIDUOUS FOREST

Beech, sugar maple, basswood, red oak, white oak, black oak

Sugar maple, basswood, red oak, white oak, black oak

Oak - white oak, black oak, bur oak

Oak openings - bur oak, white oak, black oak

GRASSLAND AND BRUSH

Prairie

Brush

WETLAND AND VEGETATION

Swamp conifers - white cedar, black spruce, tamarack, hemlock

Lowland hardwoods - willow, soft maple, box elder, ash, elm

Marsh and sedge meadow, wet prairie, wetland shrubs

OTHER

Area with vegetation cover type not interpreted on the source map

Hydrographic area from 1:250,000-scale land use and land cover layer

Presettlement Vegetation of Wisconsin

Robert W. Finley
1976, Univ. of WI

■ Sugar Maple, Basswood,
Oak Woodland

■ Prairie

■ Oak Opening/Savanna

■ Marsh and Sedge
Meadow, Wet Prairie

Data created by Robert W. Finley - 1976
Professor of Geography Emeritus, University
of Wisconsin Center System.
Digital Data prepared by Maribeth Milner, and Steve Ventura
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This data layer is included in DVGISib, a part of the DNRView
extension to ArcView. DNRView makes it easier to use and share
DNR geographic data. Trained ArcView users can obtain
DNRView from the appropriate regional contact listed in the
"GIS" DataSharing" section.

The data on this map are available on a
cost of resources basis from WDNR, GIS Services Section.
See the "GIS DataSharing" section.
Visit <http://www.dnr.state.wi.us/org/at/et/geo>.



Scale 1:2,750,000
Wisconsin Transverse Mercator NAD83(91)
Map Creator: Nina Jurska

**“We saw there neither feathered game nor fish,
but many deer, and a large number of cattle.”**

**Marquette and Joliet, 1673, on the
Meskousing (Wisconsin) River**



**Cattle?
1673-
1765**

Johnathan Carver

1766 (1750-1850)

“For many miles nothing was to be seen but lesser mountains, which appeared at a distance like haycocks, they being free from trees. Only a few groves of hickory, and stunted oaks, covered some vallies.”



Capt. JONATHAN CARVER.

From the Original Picture in the possession of J. Lettson M.D.

Published as the Act directs, by R. Stewart, N.º 287, near St. James's Church, Holborn, Nov. 16. 1766.



Common Sense Evaluation



Shuswappassion.ca



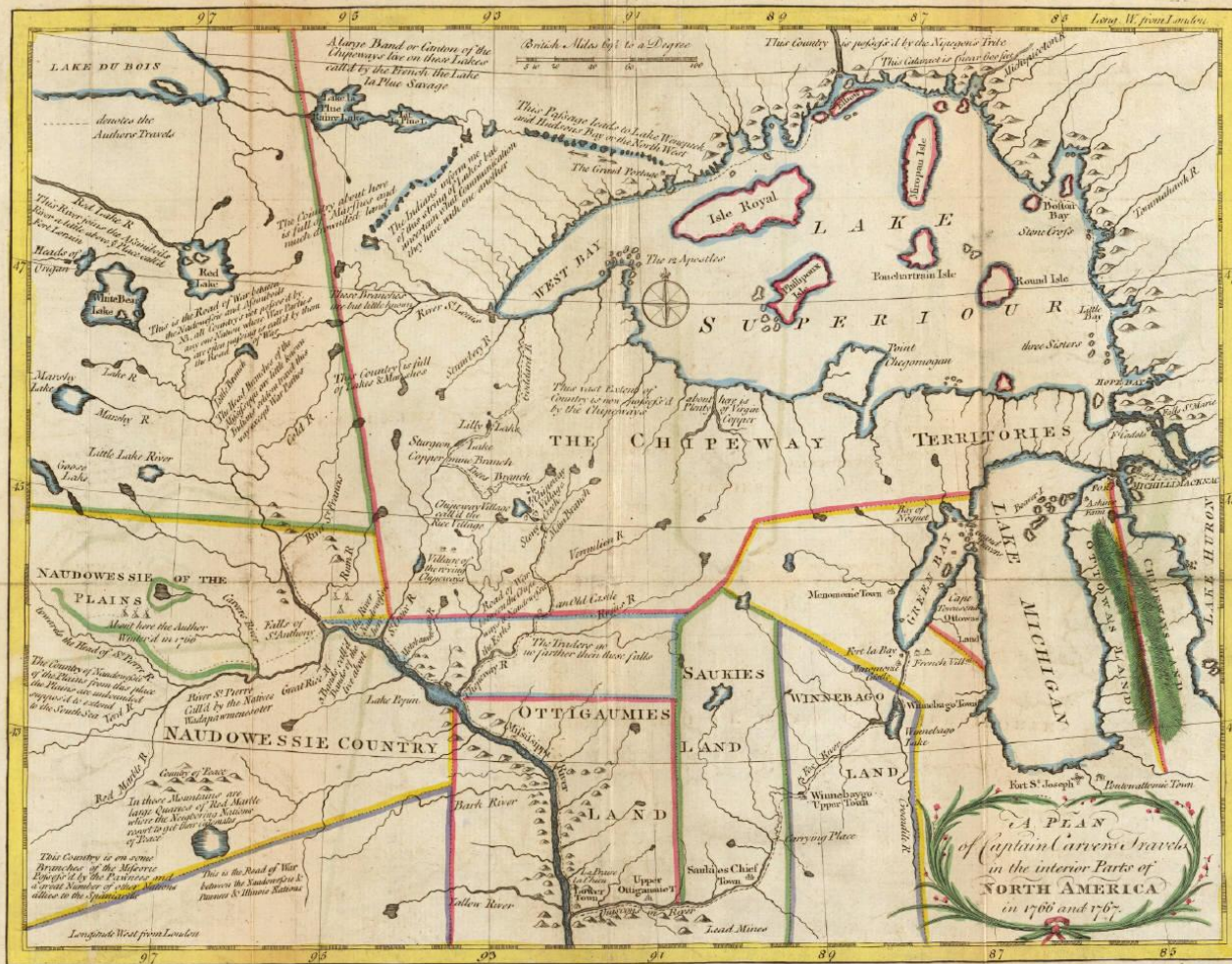
Defenders.org



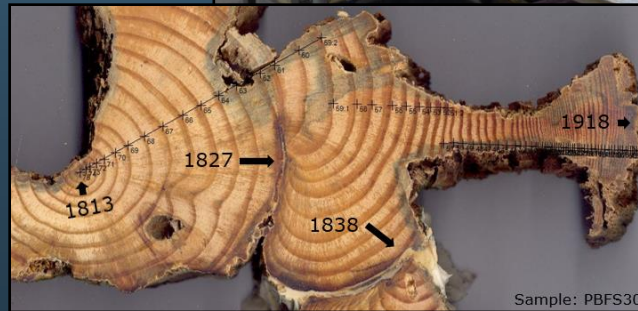
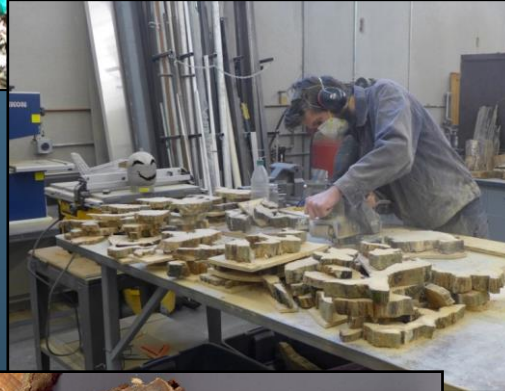
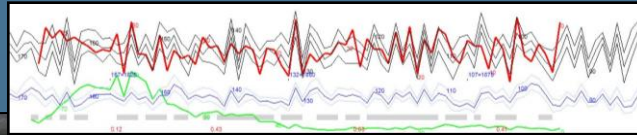
Retrieverman.net

From 1673-1873 most large fauna were extirpated from southern Wisconsin

Carver's Map of Tribes in WI 1766



Courtesy of Jed Meunier and Nathan Holoubek



Dendrochronology

Johnathan Carver

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Extent of oak savannas prior to European settlement

1832-1845

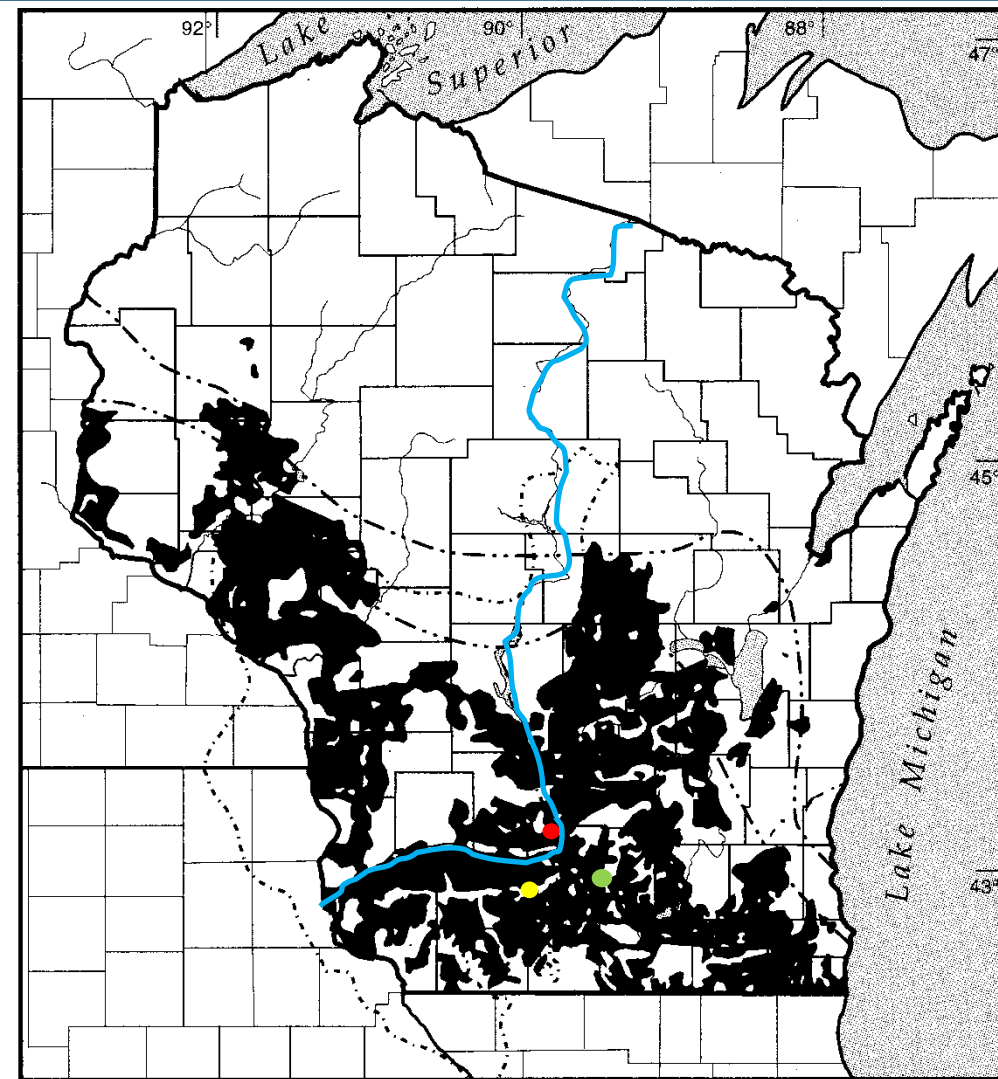
7.3 million acres of
Oak Savanna in
Wisconsin 1840-
1860.

Today, 0.02%
remains.

● Sauk Prairie ● Madison

● Blue Mound

— Lower Wisconsin Riverway



S 8 N. R 1 E,

East On random between 22427

40.00 Lat Turn 1/4 Section post-
80.24 East Bdy. 11 lbs. 1/2 post-

Land known & strong -
Soil L. rate - Timber as before

Met corner between 22427

40.12 Lat 1/4 Section post on transition
{ Barn Oak 10 x 4 1/2
{ Do. 6 5/8 x 6 3/8

80.24 Section corner

S 8 N. R 1 E,

North Between sections 21422

17.67 Red Oak 16 [B]

40.50 Lat H. m. post-

[C] { Barn Oak 6 5/8 x 30
{ Do. 4 5/8 x 99

57.68 W. Oak 8 [D]

80.00 Lat post corner sections
15.16.21422.

[E] { W. Oak 8 5/8 x 49
{ Do. 6 1/8 x 32

Land known & rate.
Timber as before

15 W. Oak 8
16 Do. 8
21 Do. 8
22 Do. 7

Example of Surveyor Notes
Sylvester Sibley; 19 February – 4 March, 1833

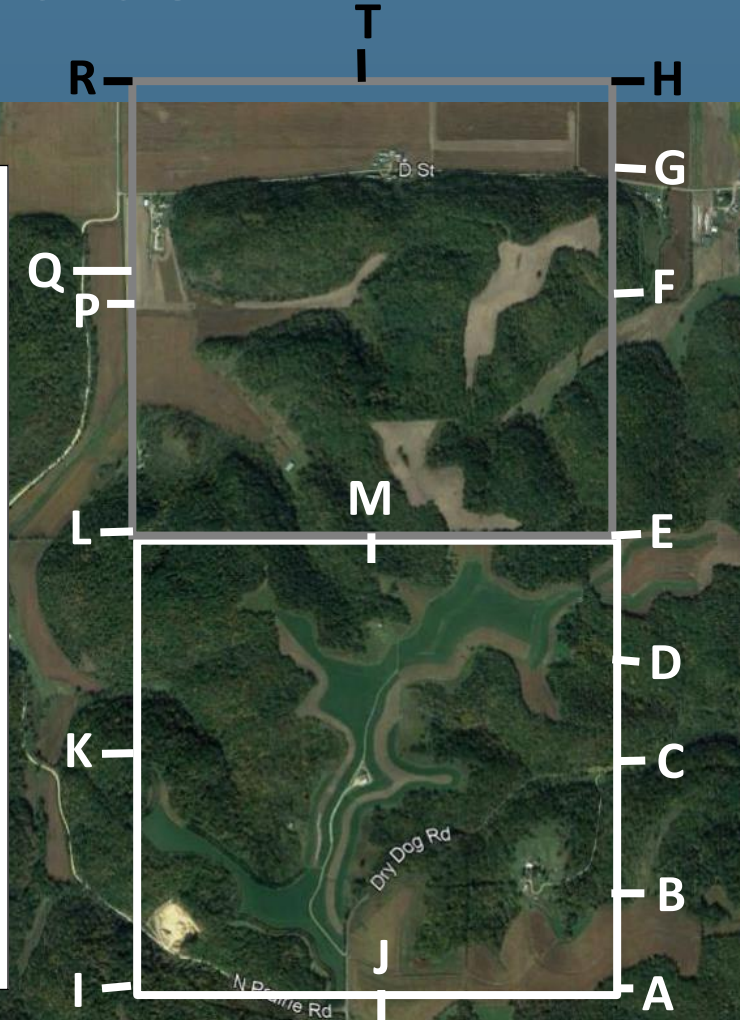
Evidence of Oak Expansion GLO Records

WI
River

Dry Dog Savanna

A: Set Post Corner Sections 21, 22, 27 & 28
Bearing Trees:
White Oak 18" dbh 326° @ 7'
Yellow Oak 16" dbh 214° @ 13'
Sand rather uneven and 2nd rate, thinly timbered.
Corner trees: Sec 21 Burr Oak 9" dbh, Sec 22 White Oak 18", Sec 27 Burr Oak 10", Sec 28 Yellow Oak 15"
B: Red Oak on survey line, 16" dbh
C: Set Half Mile Post;
Burr Oak 6" dbh, 100° @ 20'
Burr Oak 4" dbh, 267° @ 65'
D: White Oak on survey line, 8" dbh
E: Set Post Corner Sections 15, 16, 21 & 22
Bearing Trees:
White Oak 8" dbh, 130° @ 32'
White Oak 6" dbh, 306° @ 21'
Land uneven and 2nd rate, lightly timbered
Corner trees: Sec 15 White Oak 8" dbh, Sec 16 White Oak 8", Sec 21 White Oak 8", Sec 22 White Oak 7"

F: Set Half Mile Post;
Yellow Oak 12" dbh, 176° @ 26'
White Oak 8" dbh, 68° @ 28'
G: Enter bottom Wisconsin River and English Prairie
H: Set Post and Raised Mound, Corner Sections 9, 10, 15, & 16
Sand uneven until river bottom. Remainder level soil 2nd rate. Lightly timbered.
I: Set Post Corner Sections 20, 21, 28 & 29; Bearing Trees:
White Oak 16" dbh, 303° @ 20'
Yellow Oak 12" dbh 140° @ 48'
Land sandy and rocky, 2nd rate, lightly timbered.
Corner Trees: Sec 20 White Oak 10" dbh, Sec 21 White Oak 12", Sec 28 Yellow Oak 16", Sec 29 Yellow Oak 14".
J: Set ¼ section post on true line
Bearing trees:
White Oak 12" dbh, 105° @ 13'
White Oak 18" dbh, 346° @ 37'
Land sandy and rocky, 2nd rate, lightly timbered.



K: Set Half Mile Post;
Yellow Oak 12" dbh, 348° @ 14'
Burr Oak 10" dbh, 130° @ 25'
L: Set post corner sections 16, 17, 20, & 21 Bearing Trees:
Burr Oak 6" dbh, 354° @ 8'
Burr Oak 4" dbh, 167° @ 14'
Land sandy and rocky, 2nd rate, lightly timbered.
Corner Trees: Sec 16 Yellow Oak 7" dbh, Sec 17 Burr Oak 5", Sec 20 White Oak 12", Sec 21 White Oak 10".
M: Set ¼ section post on true line
Bearing trees:
White Oak 12" dbh, 105°, 13'
White Oak 18" dbh, 346°, 37'
Land sandy and rocky, 2nd rate, lightly timbered.
N: Brook, 3' across, running NW
O: Brook, 3' across, running NE
P: Set half-mile post.
Bearing Trees:
Burr Oak 4" dbh, 93° @ 403'
Burr Oak 8" dbh, 66° @ 434'
Q: Enter bottom Wisconsin River and English Prairie.

R: Set post corner sections 8, 9, 16 & 17. Bearing Trees:
Yellow Oak 18" dbh, 297.5° @ 632'
Yellow Oak 14" dbh, 247° @ 911'
Land generally level. Soil good. Lightly timbered.
S: Stream, 8' across, running N
T: Set ¼ section post on true line
Bearing trees:
Yellow Oak 7" dbh, 121°, 1461'
No other tree found.
Land level and poor. Timber a few scattering Pine and Oak.





1870

Wisconsin Historical Society



1910

Wisconsin Historical Society

**1870-1950's
Afforestation
from lack of
fire**

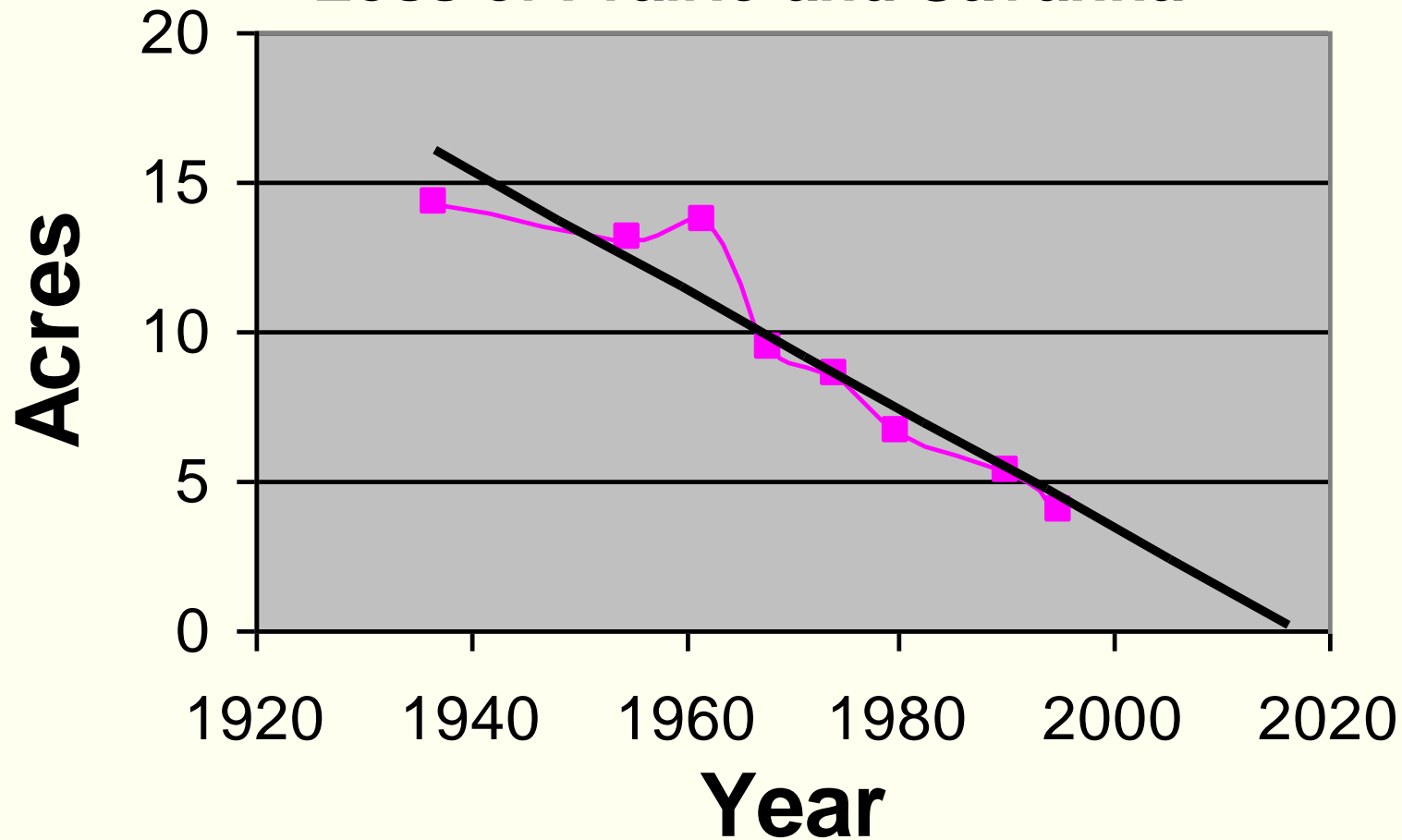


1993

Remnant

↓
Winery

Loss of Prairie and Savanna



Aldo Leopold Foundation

Closure of Canopy

Loss per year = 8,664 sq. feet (0.2 acre)



**Change Occurs at Different Rates
Regardless, the Time to Act is Now**



R.B. Hardy 3rd, Blogspot

1950's to now – Invasive Species Become Dominant

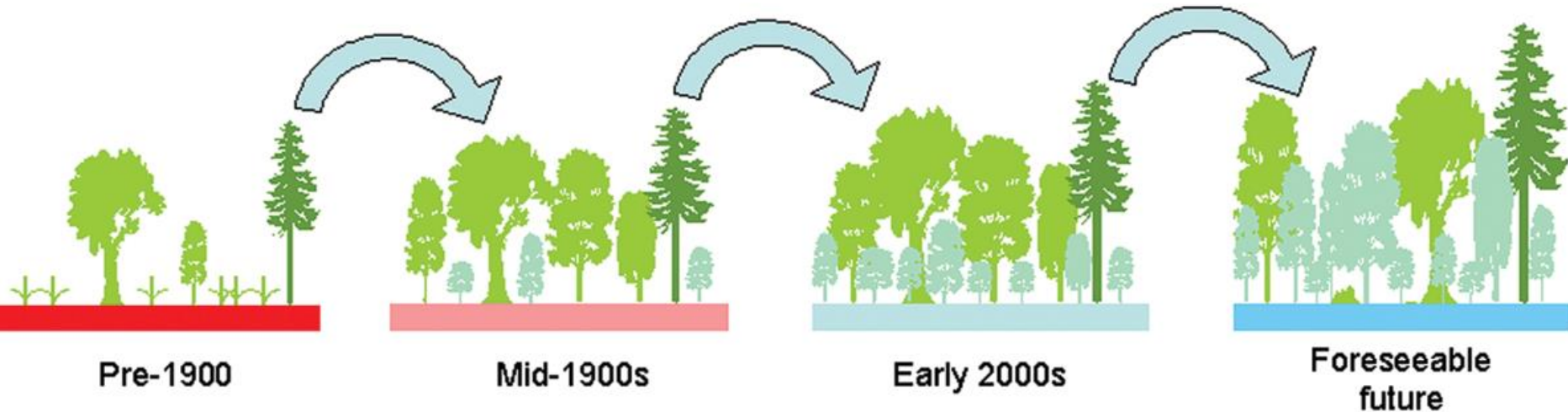
Nowacki & Abrams 2008.
The Demise of Fire and
“Mesophication” of
Forests in the Eastern
United States

Fire importance

Fire suppression;
canopy closure;
increased shade

Dramatic increase
of shade-tolerant,
mesophytic trees

Decreased flammability
due to mesophytic litter and
cool, humid microclimate



Mesophication



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**1870-1950's
Afforestation
from lack of
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1993

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A Large Proportion of Species of Conservation Concern in Wisconsin are Likely Declining Due to Afforestation



Red-headed Woodpecker



Rusty-patch Bumblebee



Purple Milkweed

Ecosystem Restoration is Key

Fire is a Primary Abiotic Component to most Ecosystems in the Midwest



Jim Shurts

Swamp White Oak Savanna

A photograph of a savanna landscape. The foreground is filled with dense, green and brown vegetation, including grasses and shrubs. In the middle ground, there are several trees, some with bare branches and some with green leaves. A white line runs diagonally across the image, separating the foreground from the background. The background shows a dense forest of green trees.

DNR

**Clausen
Savanna
25 years of effort**



2019

Cutting & Burning



2023

**5-7 Rx
Burns Over
10-15 Yrs to
Convert
Middle
Story
Domination
to
Herbacious
Understory
Domination**



Fire Exclusion Plot



Rx Fire Plot

Native Grasses and Forbs can be Long-Lived



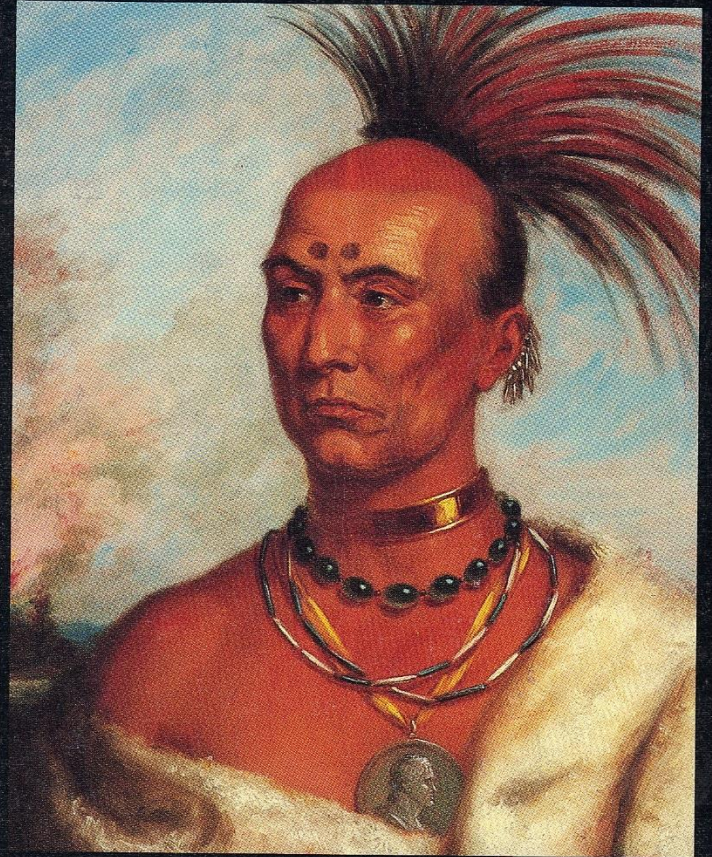
1999, 7 Growing Seasons
Old (first Flower)

2010, 18 Growing
Seasons Old

Plants that witnessed Black Hawk's
retreat down the Lower Wisconsin
River in 1832 may still survive



The Battle of **WISCONSIN HEIGHTS**



Eye-Witness Account by Participants
Compiled and Edited by Crawford B. Thayer

4 Growing Seasons



9 Growing Seasons



1990 Planting at ICF

19 Growing Seasons



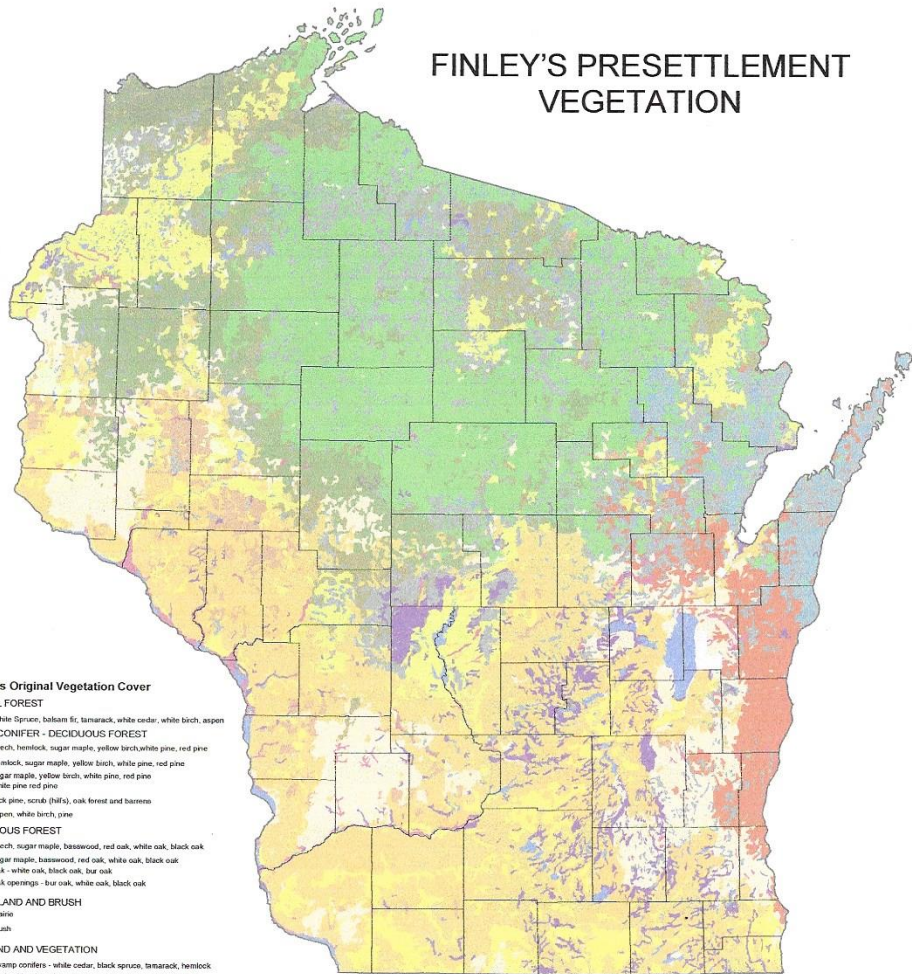
32 Growing Seasons



Natives Promote Ecosystem Services



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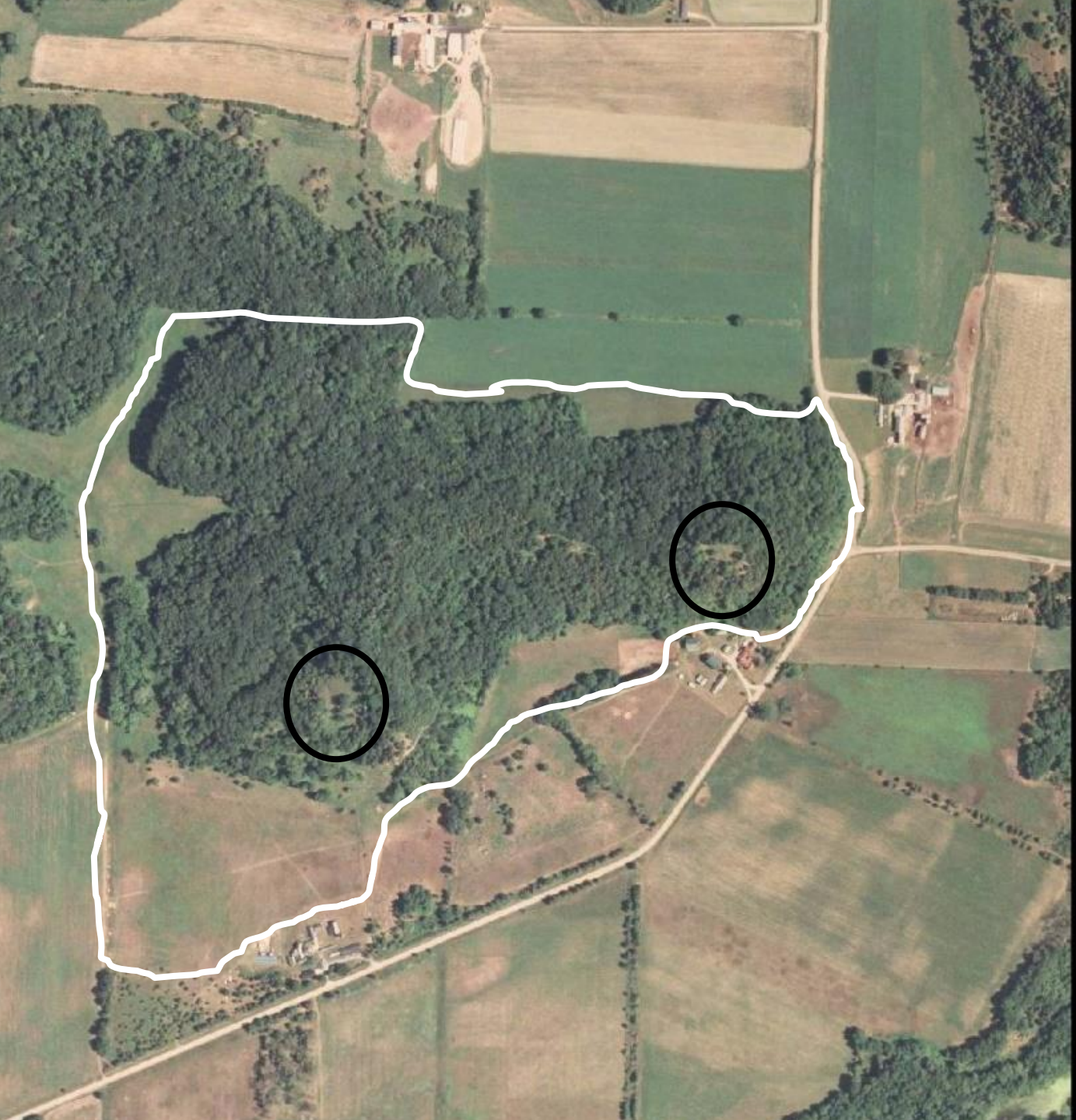


Scale 1:2,750,000
Wisconsin Transverse Mercator NAD83(91)
Map Creator: Nina Jursick

Ground Plants Lag Behind Trees

But many savanna plants have bimodal distribution:
Sunny & Wet or Partial Shade & Dry





Cassell Savanna

How do
Remnants
Influence
Manage-
ment?

Creating Internal Refugia is Important but More Complicated

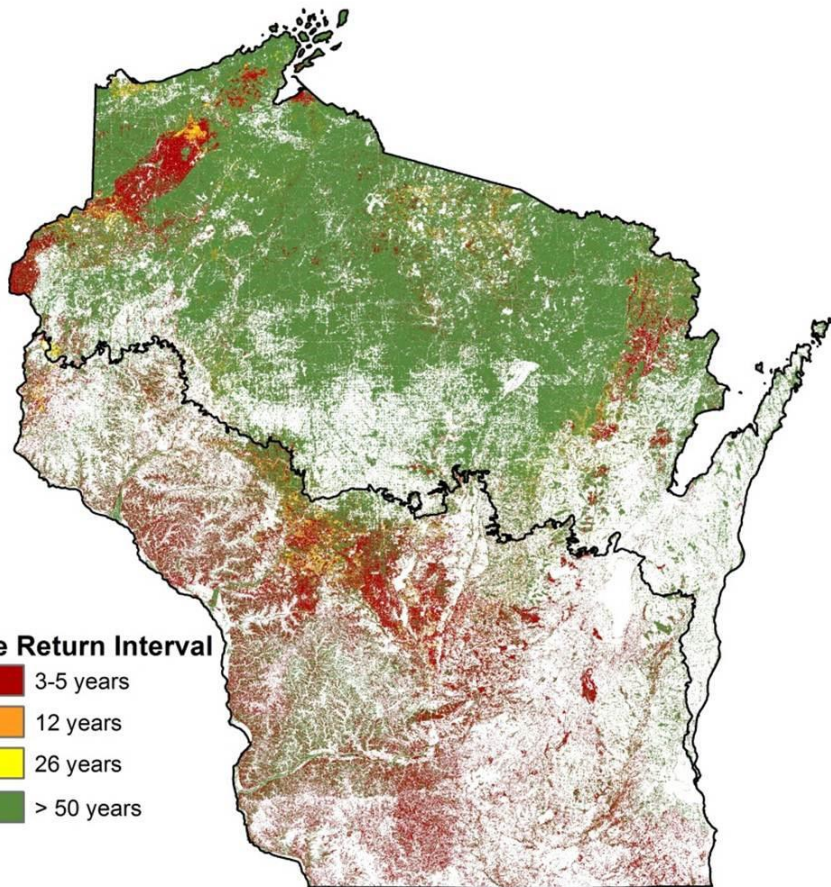


Kurt Eakle

Scale-up Rx Fire. Absolutely! With a match instead of a firestorm

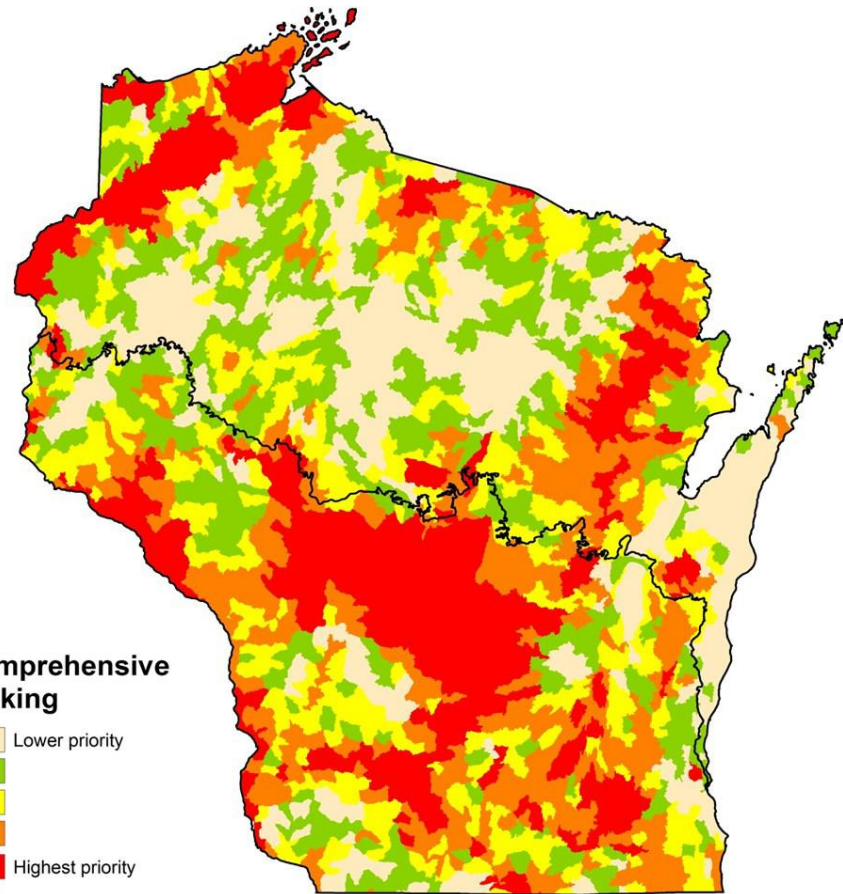
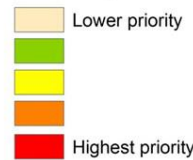


Mean Fire Return Interval



Map created by Sarah Carter

Comprehensive ranking



MAP CREATED BY SARAH K. CARTER

2014 Wisconsin Fire Needs Assessment
Tracy Hmielowski;
thmielowski.tpos.firescience@gmail.com

1,000,000 ac./yr. Burned

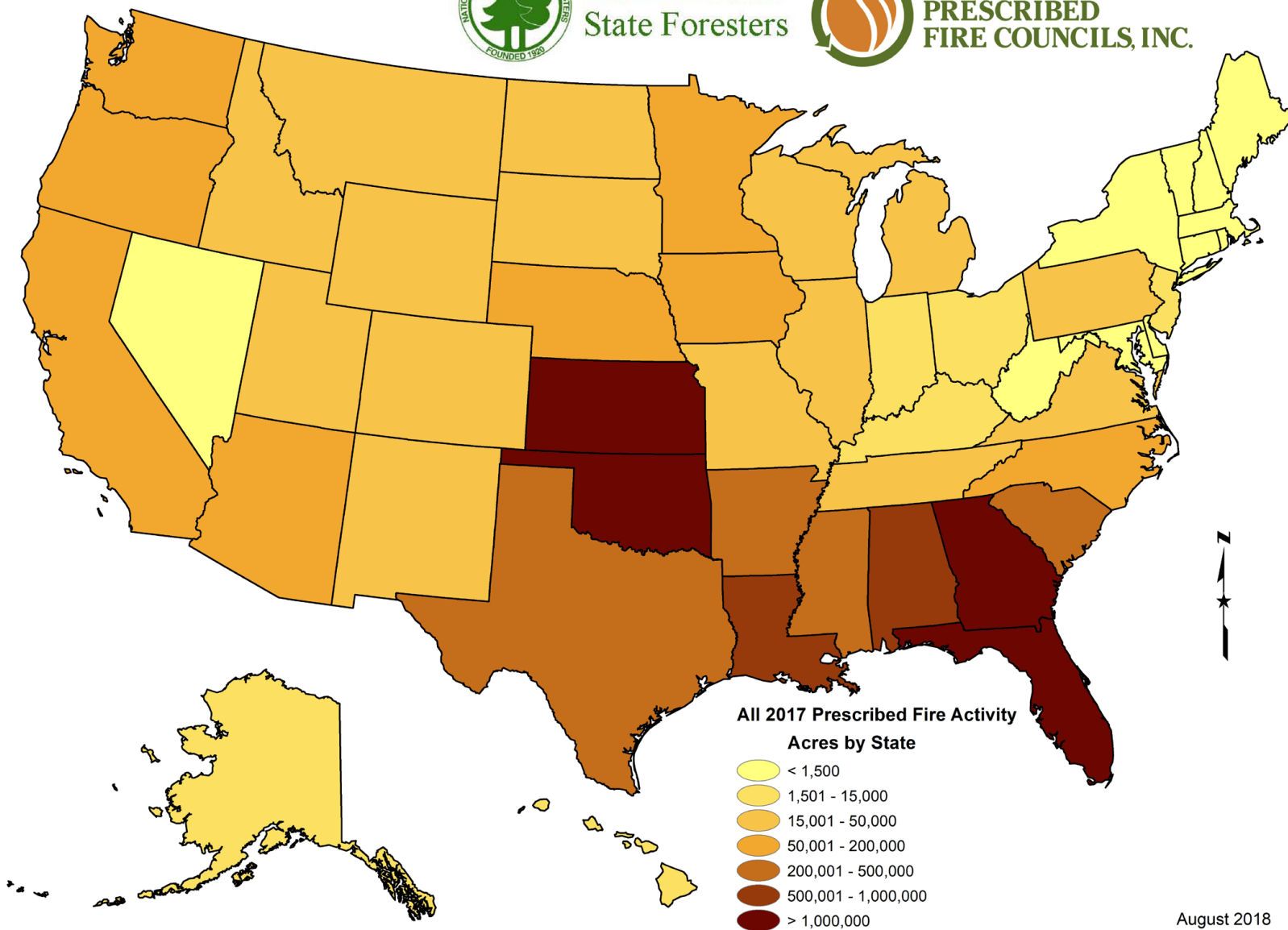
**Where does
WI Need Fire?**



NATIONAL ASSOCIATION OF
State Foresters



COALITION OF
PRESCRIBED
FIRE COUNCILS, INC.



2017 National Statistics Prescribed Fire

Private Ownership is Still the Rule, Not the Exception

US Land Ownership:

73% privately owned

20% federally owned

7% other government
ownership

WI is about 85% private

Worldwide 'ownership' data are
similar

**We need to up our game,
wherever we live, however we can.
Time matters. Getting dramatically
more fire on the ground safely and
effectively is our collective mission.**

Thank You

Tom Lynn

