



Reading the Rings of Red Pine to Investigate Mechanisms of the Historic Fire Regime at Cloquet Forestry Center, Minnesota

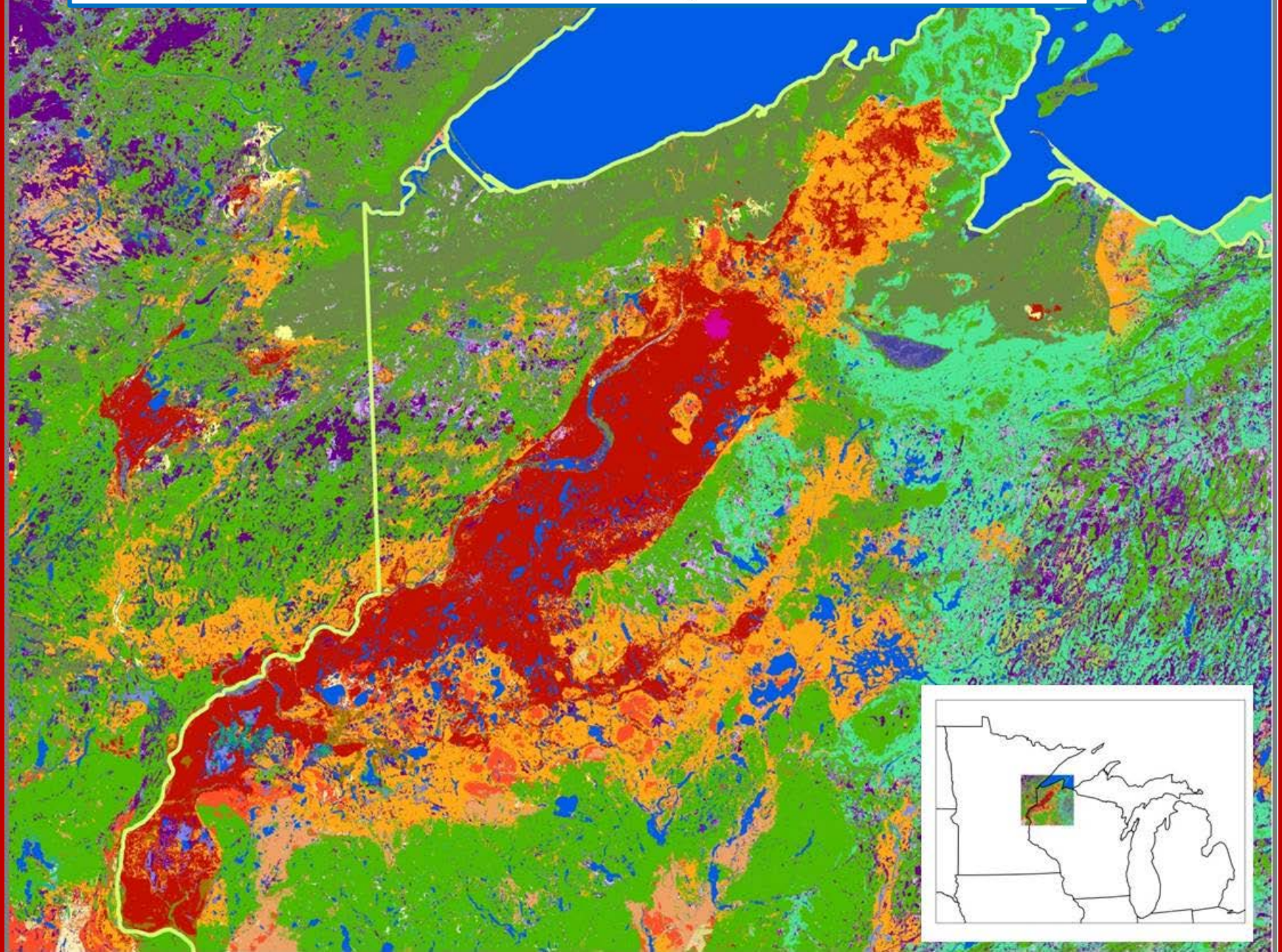
Adam Donaldson¹, Evan Larson¹, & Kyle Gill²

¹University of Wisconsin Platteville TREES Lab

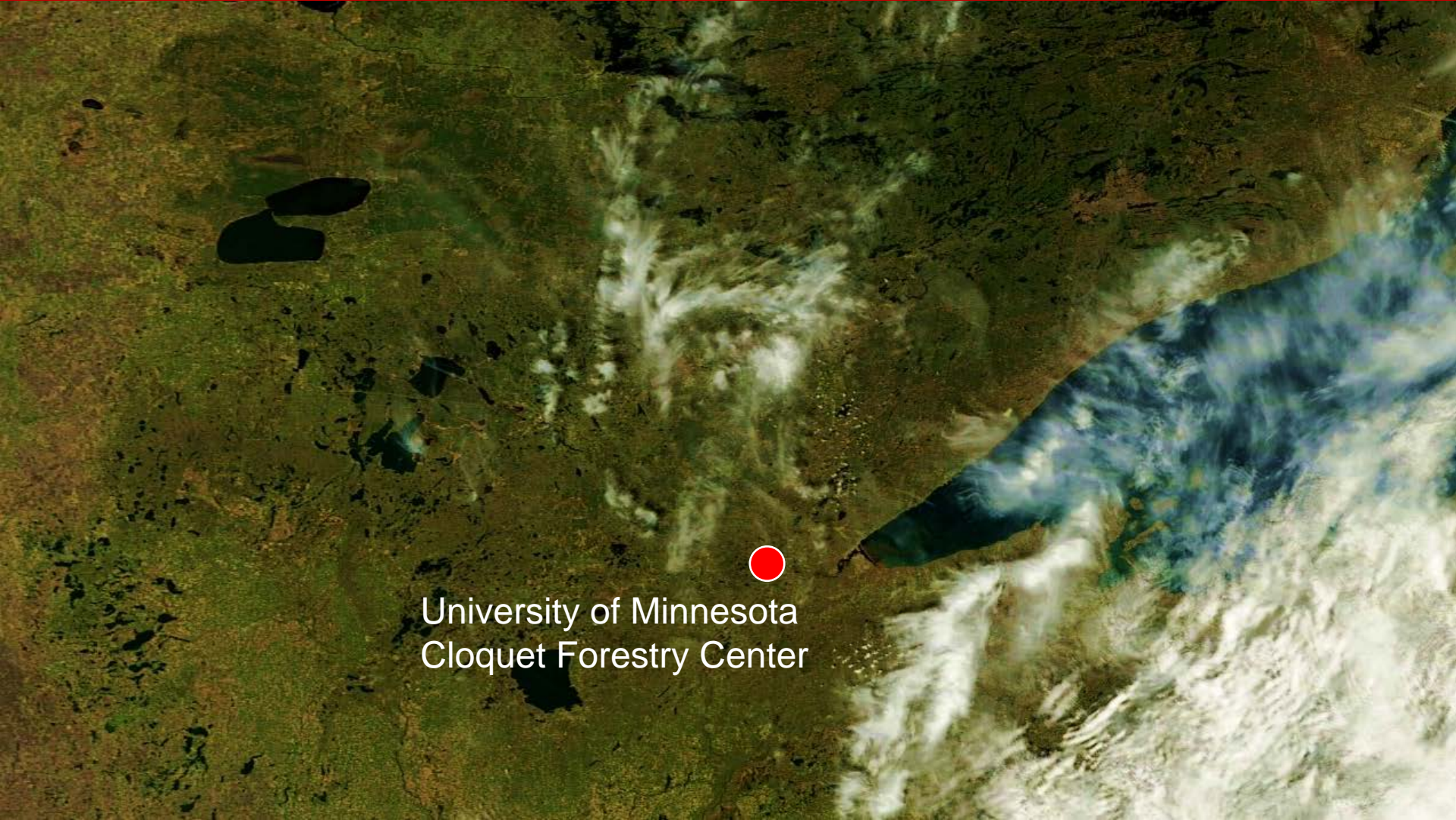
²University of Minnesota Cloquet Forestry Center



“ The Great Lakes region features some of the most fire-dependent vegetation in the United States. The red areas in this LANDFIRE map of pre-settlement vegetation had surface fires every 5-10 years. The Lake States Moquah Barrens Field Tour will explore some of the management issues of this area. ”







University of Minnesota
Cloquet Forestry Center




2016 Forestry & Wildlife Research Review

A day-long symposium:
Tuesday, Jan. 12, 2016
8:45am – 3:45pm
Cloquet Forestry Center







GEOG 4030 GEOGRAPHY SEMINAR:
**People and Fire in the
Great Lakes Region**

Class meets Tuesdays, 2–5pm

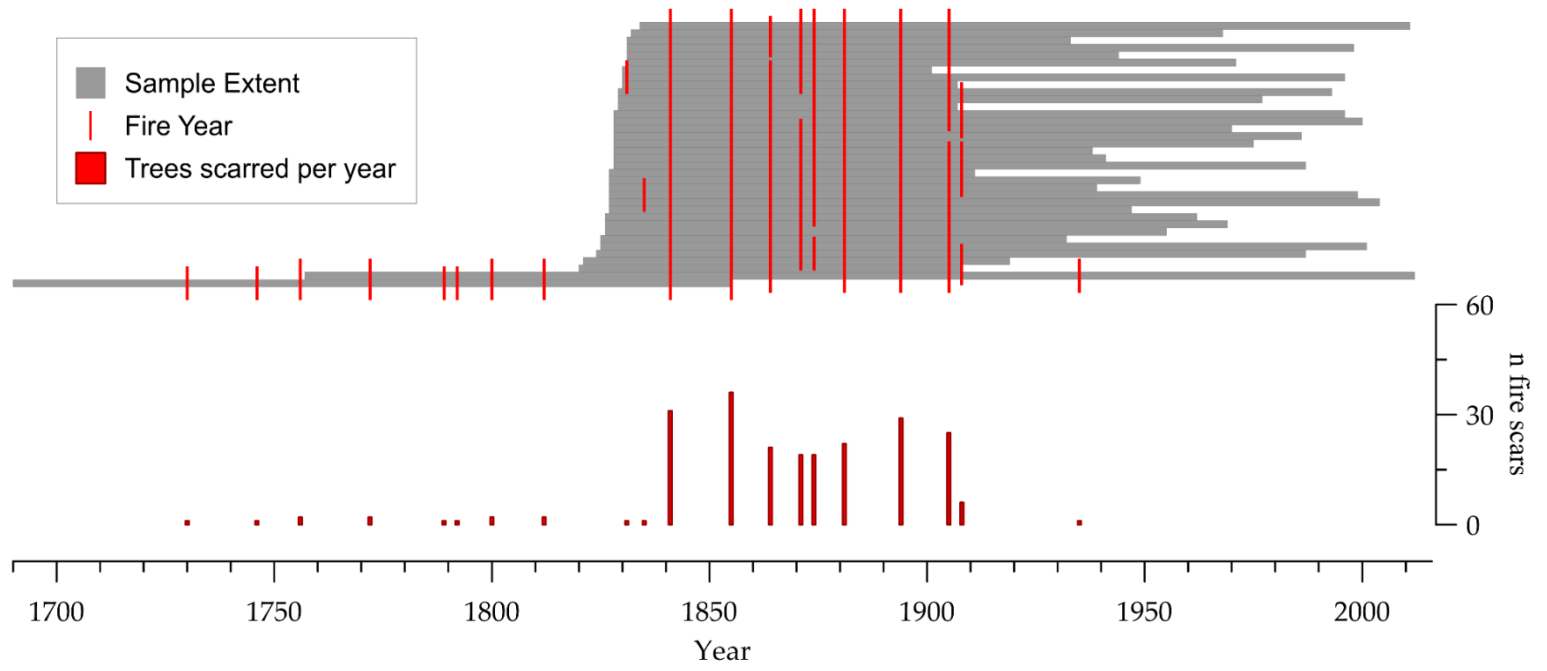
3 upper division credits

Research-based curriculum and a need to know.

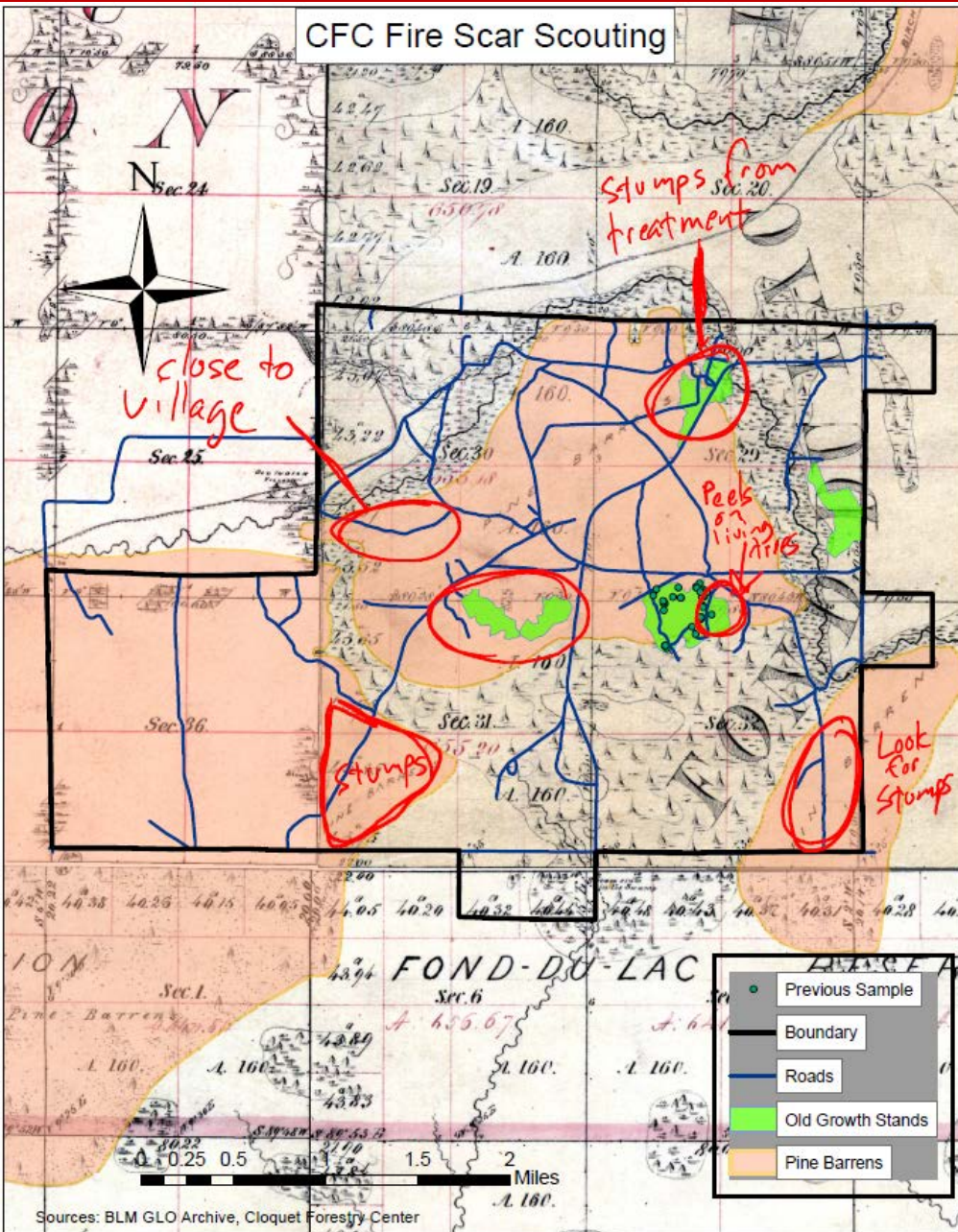




Cloquet Forestry Center Camp 8 Fire History







April 2017 Scouting

- Made scouting maps using Original Survey
- Met with Kyle Gill
- Leaf-off conditions

Summer 2017 Sampling
80 cross sections
two transects cored

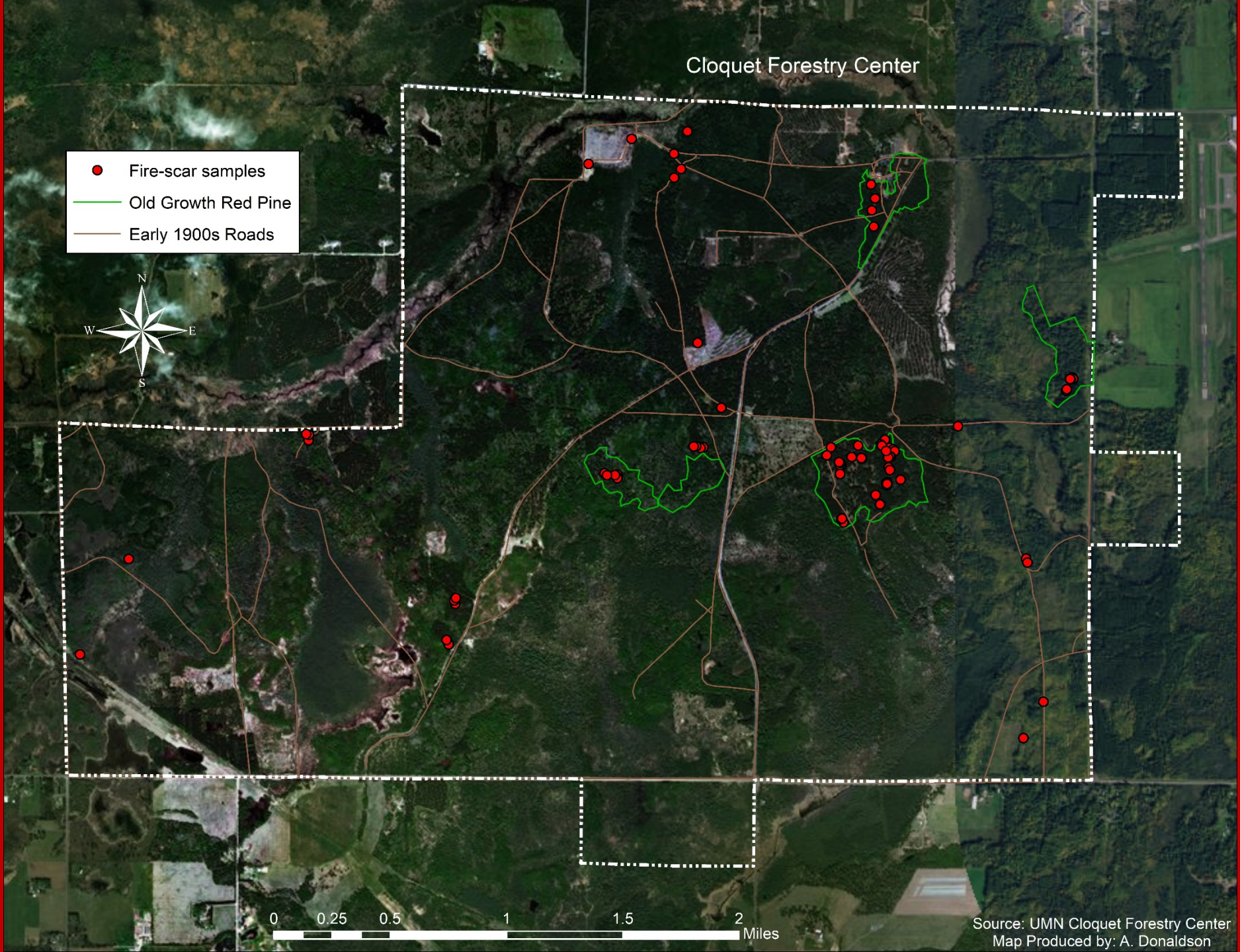


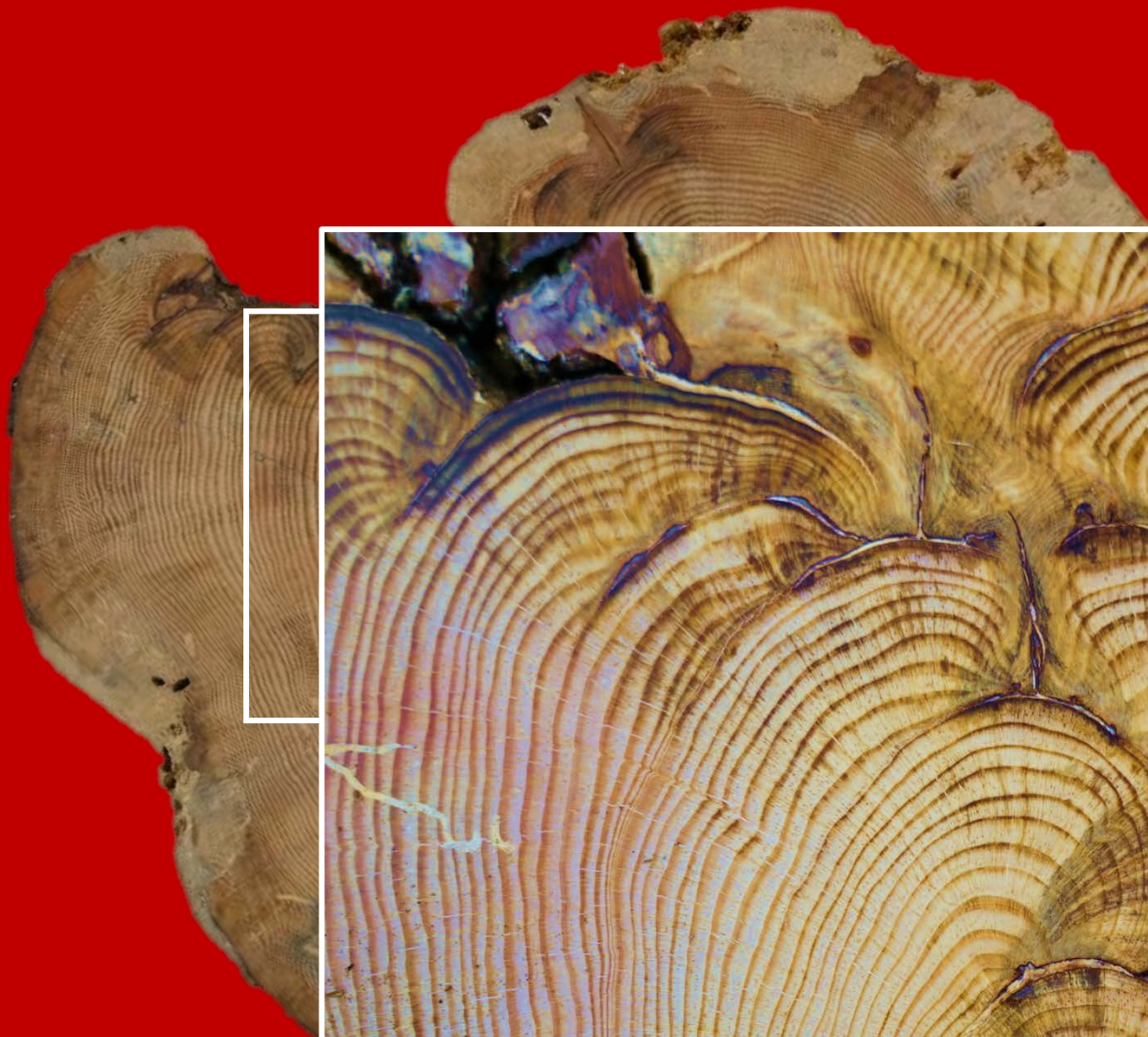
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- Fire-scar samples
- Old Growth Red Pine
- Early 1900s Roads



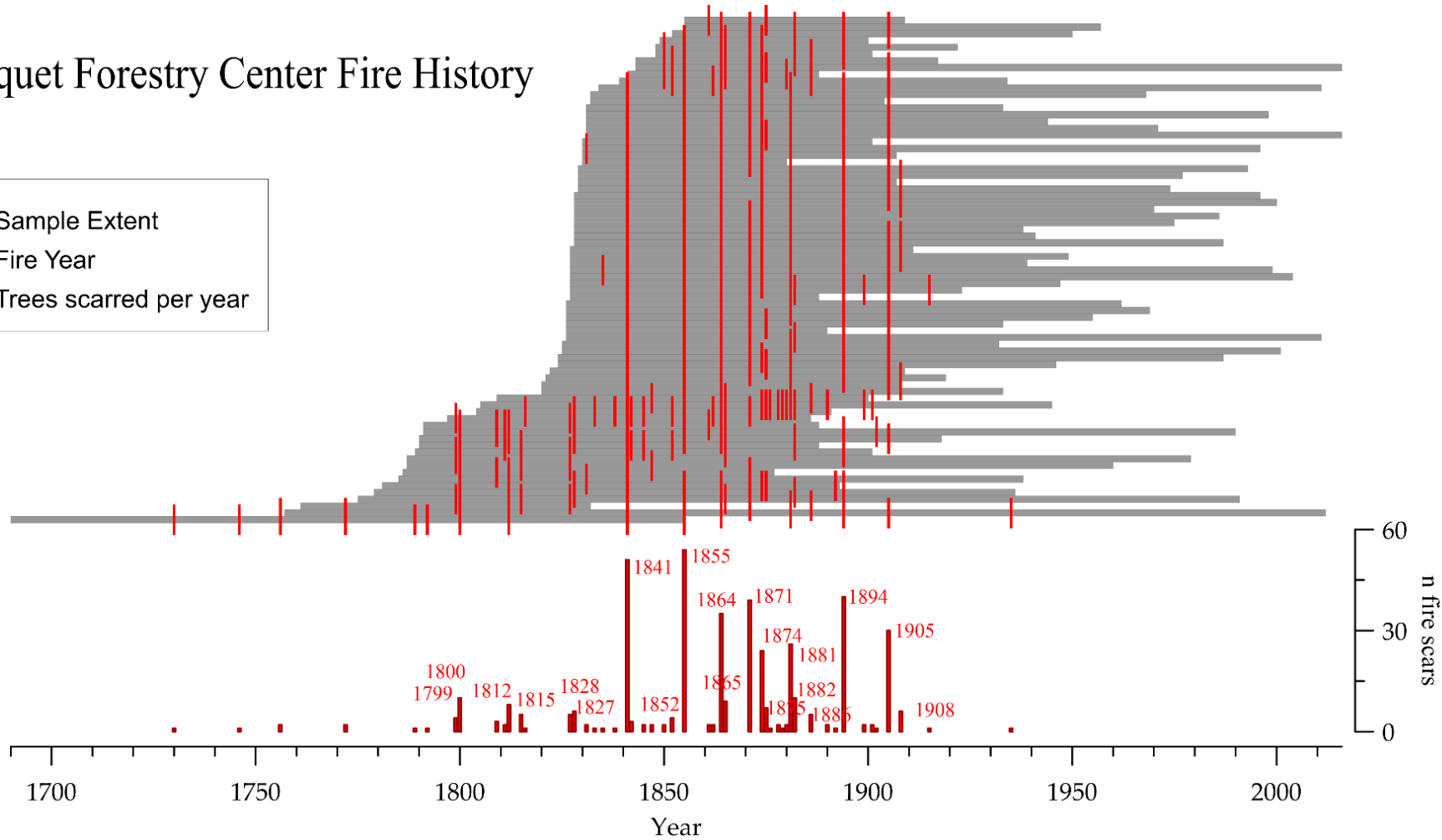
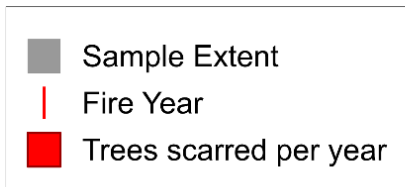
Source: UMN Cloquet Forestry Center
Map Produced by: A. Donaldson







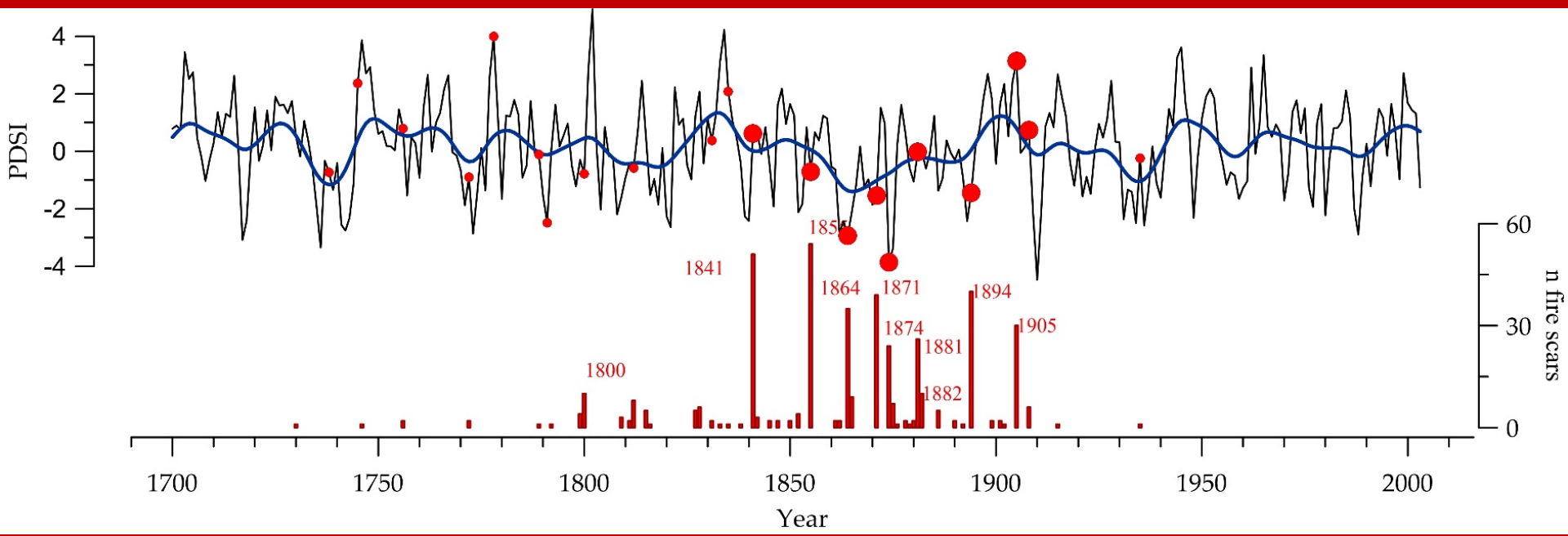
Cloquet Forestry Center Fire History



50 fire years 1730–1935 (205yrs)
 $205/49 = \text{Mean Fire Return Interval} = 4\text{yrs}$

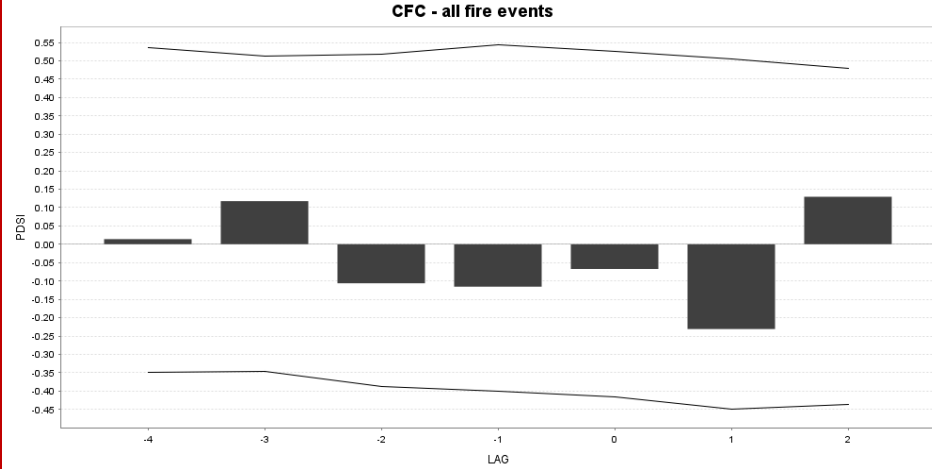
Result 1

Fire is *very* frequent... but why?

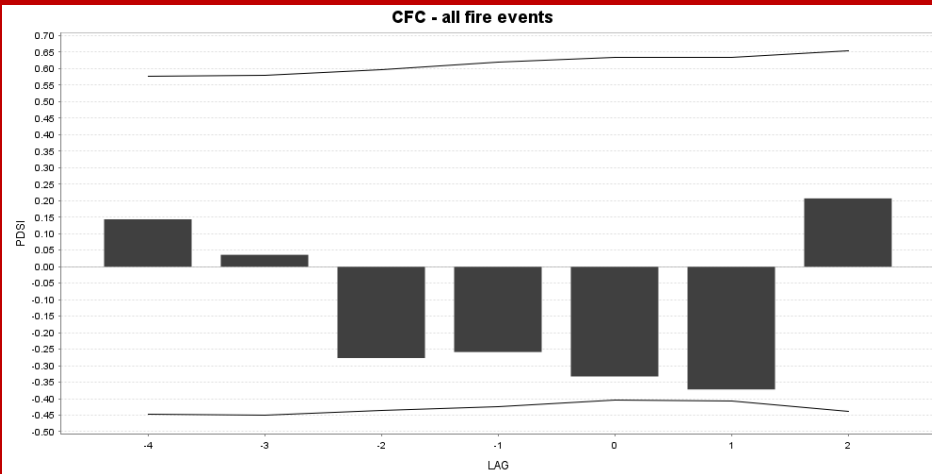


Superposed Epoch Analysis

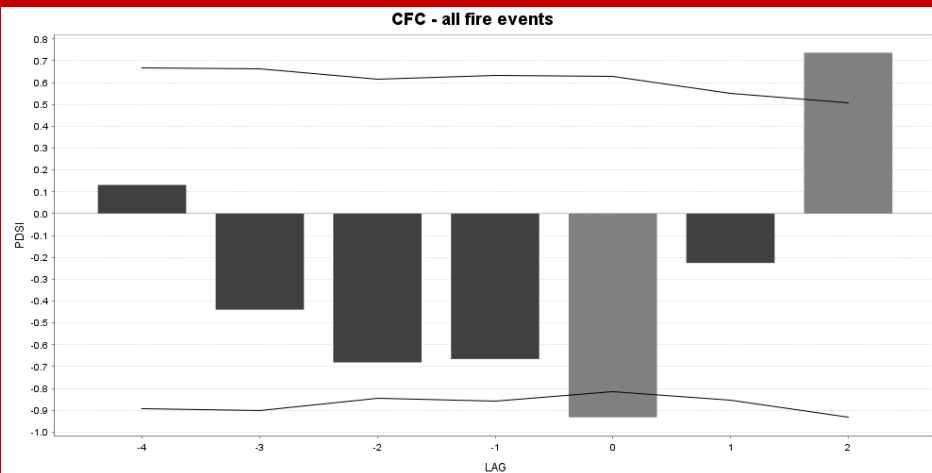
All years in record,
all scars in record



All years in record, for fires
scarring 2 or more trees



Fires scarring 4 or more trees
before 1900 vs. PDSI

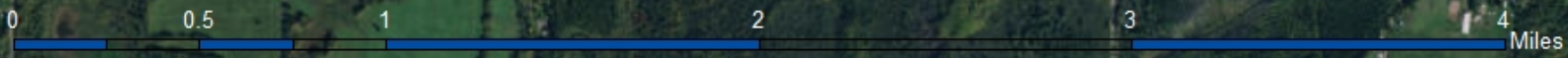
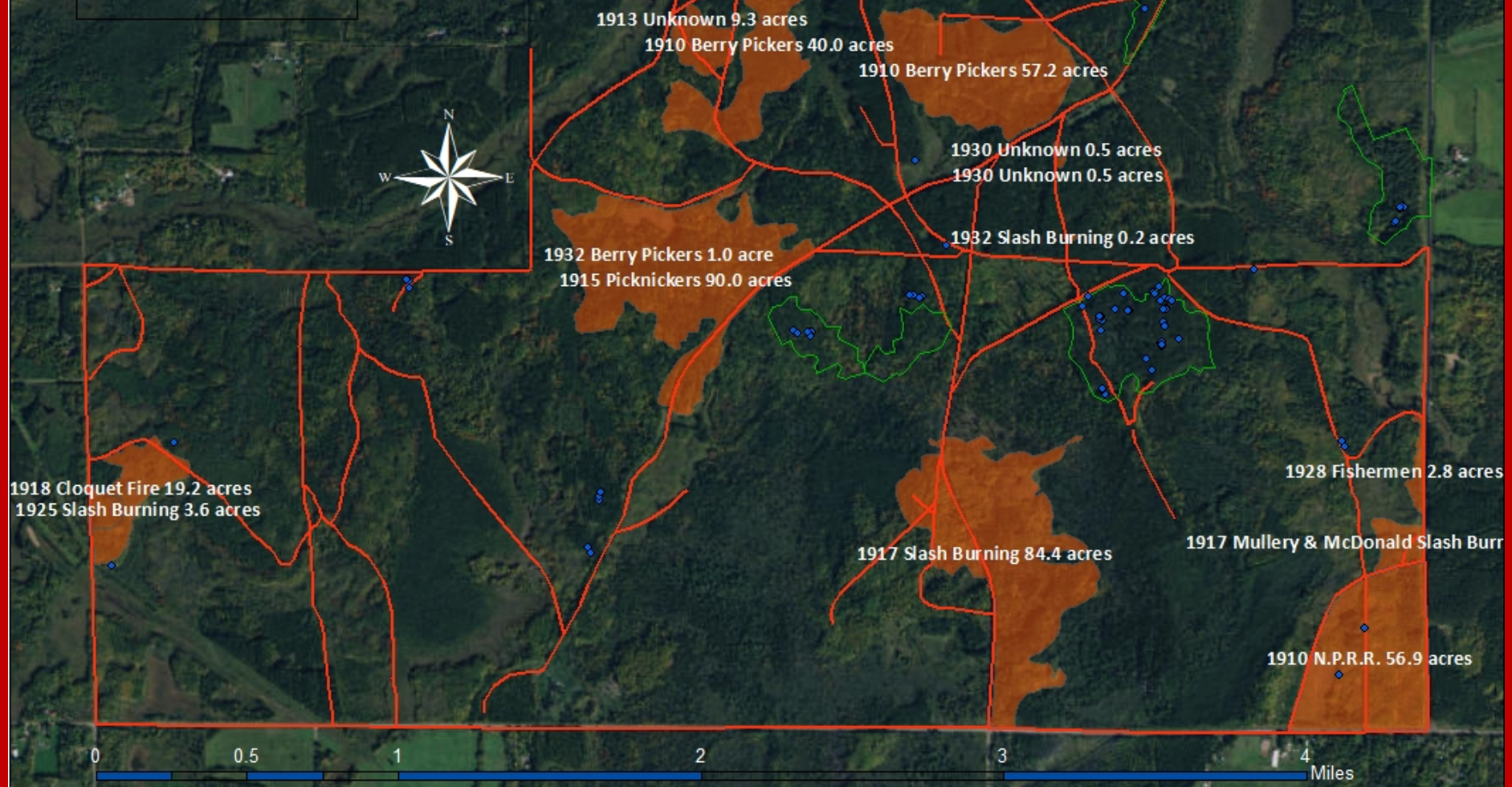


Result 2

Climate is important, but not the only factor.

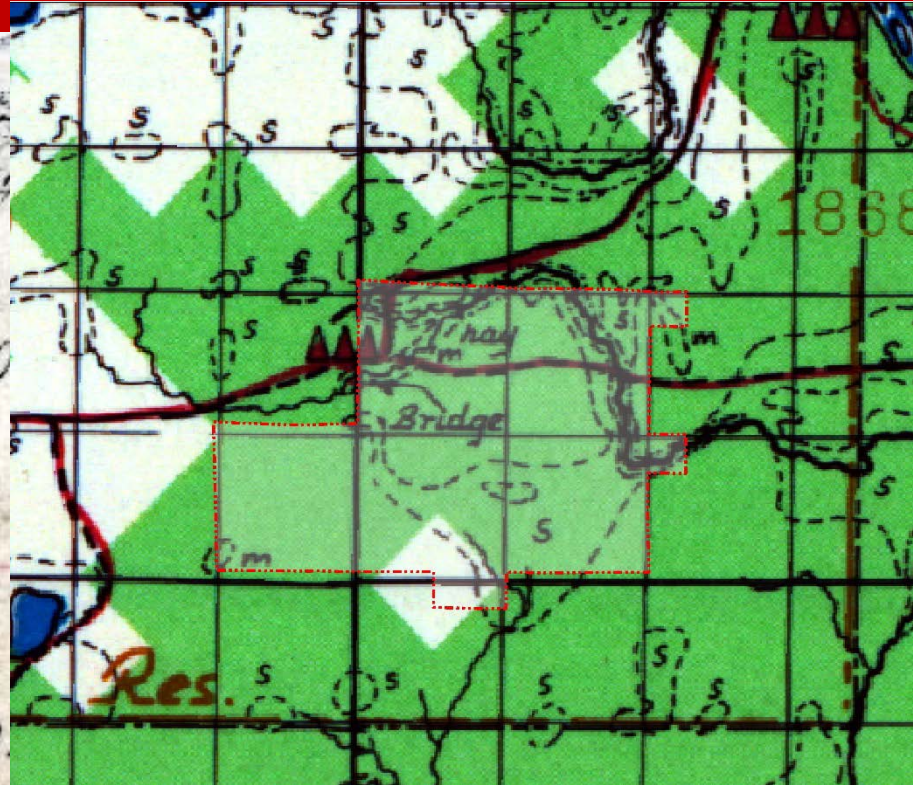
CFC Fire Atlas

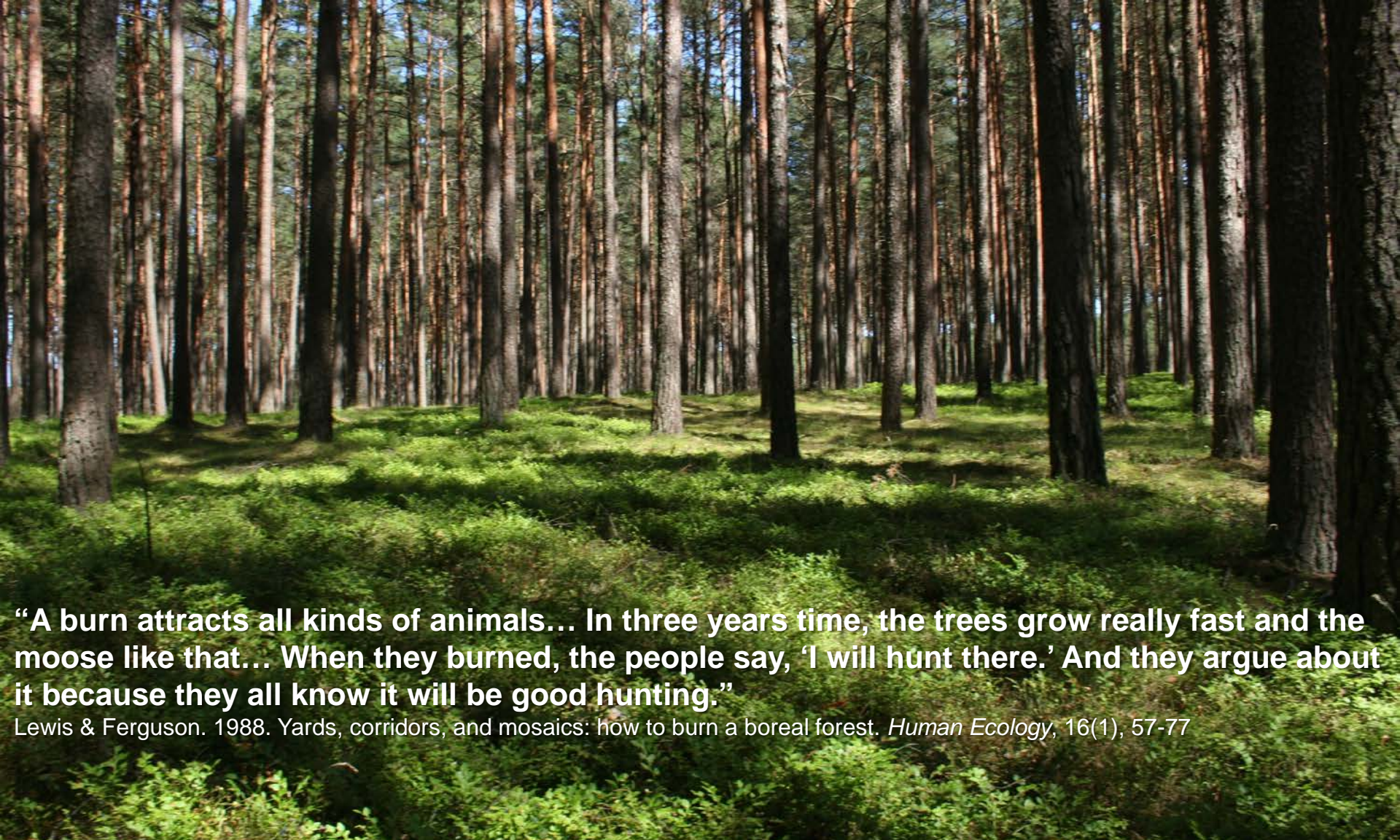
- Fire Perimeters
- Early 1900s Roads
- Old Growth Red Pine
- Samples



Source: UMN Cloquet Forestry Center
Map Produced by: A. Donaldson

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





“A burn attracts all kinds of animals... In three years time, the trees grow really fast and the moose like that... When they burned, the people say, ‘I will hunt there.’ And they argue about it because they all know it will be good hunting.”

Lewis & Ferguson. 1988. Yards, corridors, and mosaics: how to burn a boreal forest. *Human Ecology*, 16(1), 57-77

Fond du Lac Blueberry Interval = 5-7yrs
CFC MFRI = 4yrs

FOND DU LAC RESERVATION.

The Fond du Lac reservation of Chippewa Indians is situated in Carlton and St. Louis counties, Minnesota, and contains 100,121 acres. There are a few small lakes, viz; Big, Dead Fish, and Perch. The surface of the country is uneven, the land lying in ridges which are covered with pine or hard wood timber, with swampy land or lakes in the valleys between the ridges. There is considerable white and Norway pine on the reservation. Probably one-third of the land of the reservation is now suitable for agriculture. That on the pine ridges is somewhat sandy, and is not as good as that where hard wood timber grows. About 400 acres are now cultivated. The gardens are mainly fenced. There are about 120 acres fenced.

The crops raised are potatoes, turnips, squashes, and other vegetables, and also some corn and oats. These produce fairly well. The crops in the gardens are well cultivated. The houses are partly frame and partly log and have a tidy appearance. There are no wigwams. There are about 30 head of cattle on the reservation. The people make considerable butter, and many of the families raise potatoes to sell. It is reported that during the past year they raised 6,000 bushels of potatoes. The people have a few horses and swine and some domestic fowls. Only a very small proportion of the subsistence of the Indians of this band is obtained by hunting and fishing. During the year 1890 it is estimated that the Indians picked \$3,000 worth of blueberries. They also gather

IN

THE UNITED STATES

(EXCEPT ALASKA)

AT THE

ELEVENTH CENSUS: 1890.



WASHINGTON, D. C.:
GOVERNMENT PRINTING OFFICE.
1894.

\$75,000

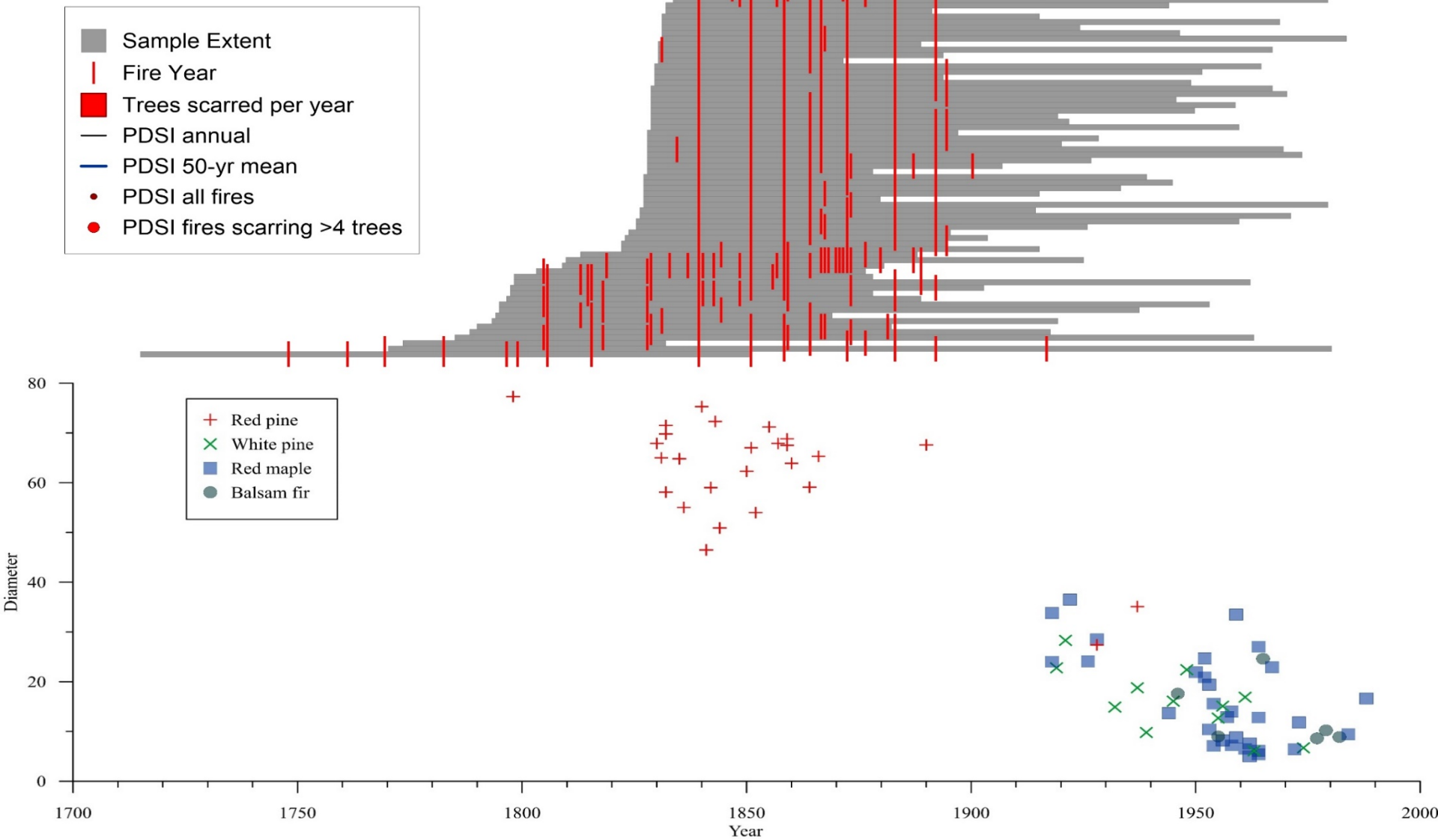
Result 3

People are an important ignition source here.

Do you like
swimming in
hazel
understory?



Cloquet Forestry Center Fire History





“Red pine (*Pinus resinosa* Ait.) is a fire-dependent species.”

Flannigan, M.D. 1993. Fire regime and the abundance of red pine. *International Journal of Wildland Fire*, 3(4), 241-247

Result 4

A decrease in fire occurrence coincided with decrease in red pine regeneration & increase in more mesic regeneration.

Where do these old growth pine stands expect fire to come from now?

Subjective Ignitions

- Humans
 - Prescribed
 - Railroad
 - Vehicles

Stochastic Ignitions

- Lightning
 - Does not ignite frequently enough in near-boreal forest
- Peat & other spontaneous combustion

Using the past to guide the future...

- The story of people and fire at and around our study site is still relevant today
- Historical MFRI of 4-7 yrs led to the development of today's old growth red pine stands
- History as a guide moving forward...



Thank you



Cloquet Forestry Center



UNIVERSITY OF MINNESOTA

Driven to DiscoverSM



UNIVERSITY OF WISCONSIN
PLATTEVILLE

TREE-RING, EARTH, AND ENVIRONMENTAL
SCIENCES LABORATORY

*Additional funding from the UW-Platteville
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