Fire history of the Huron Mountains Landscape

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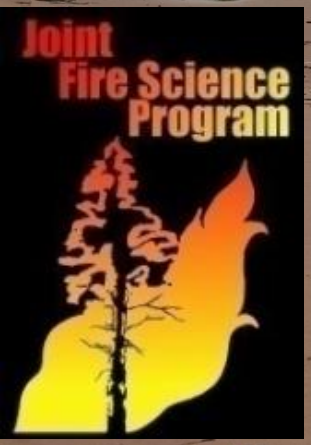
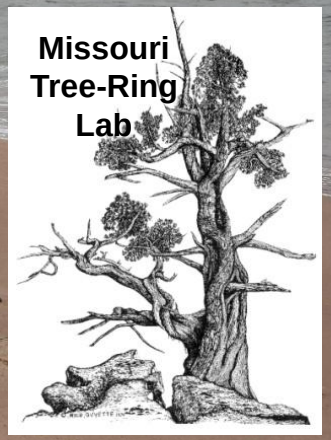
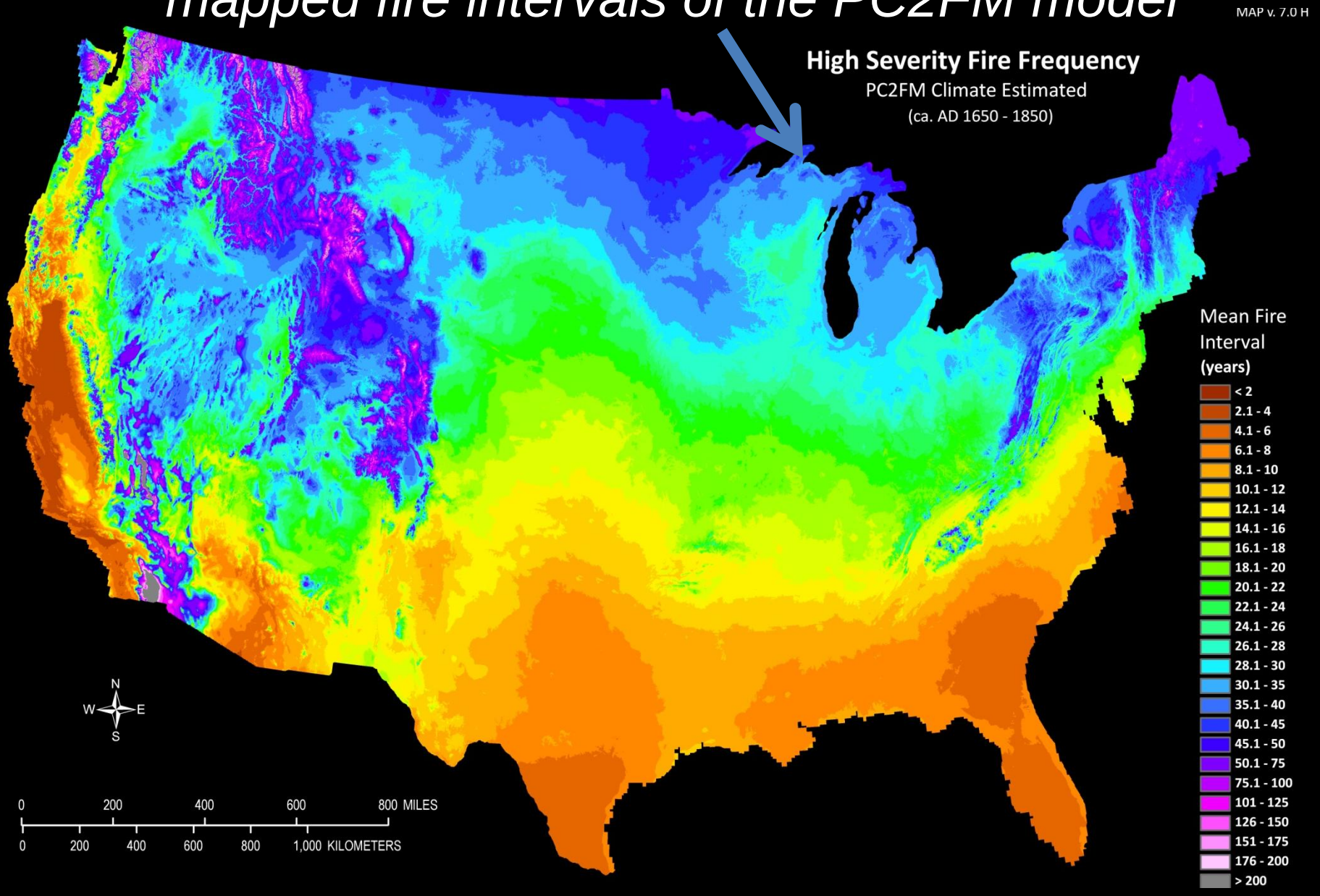
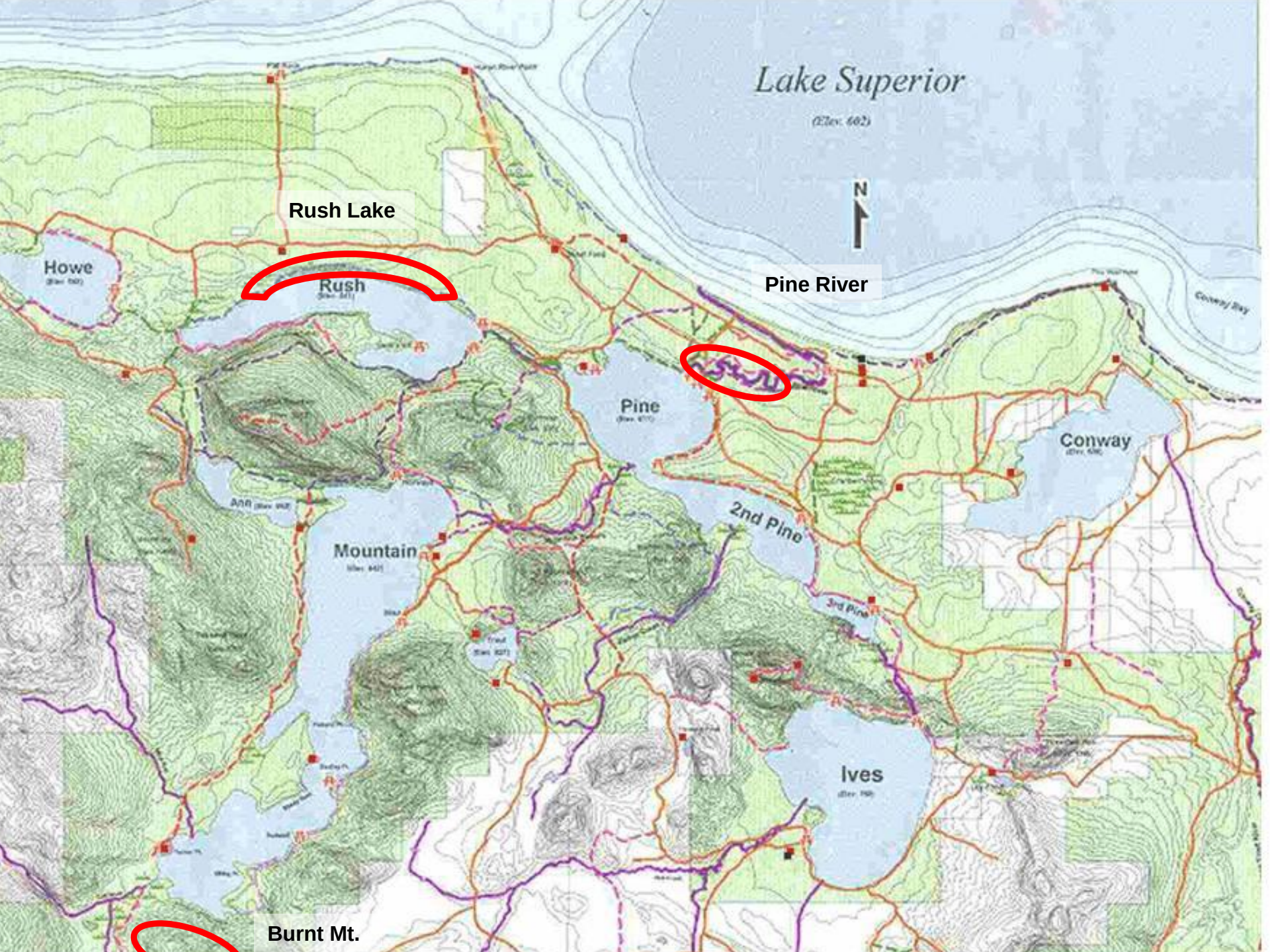


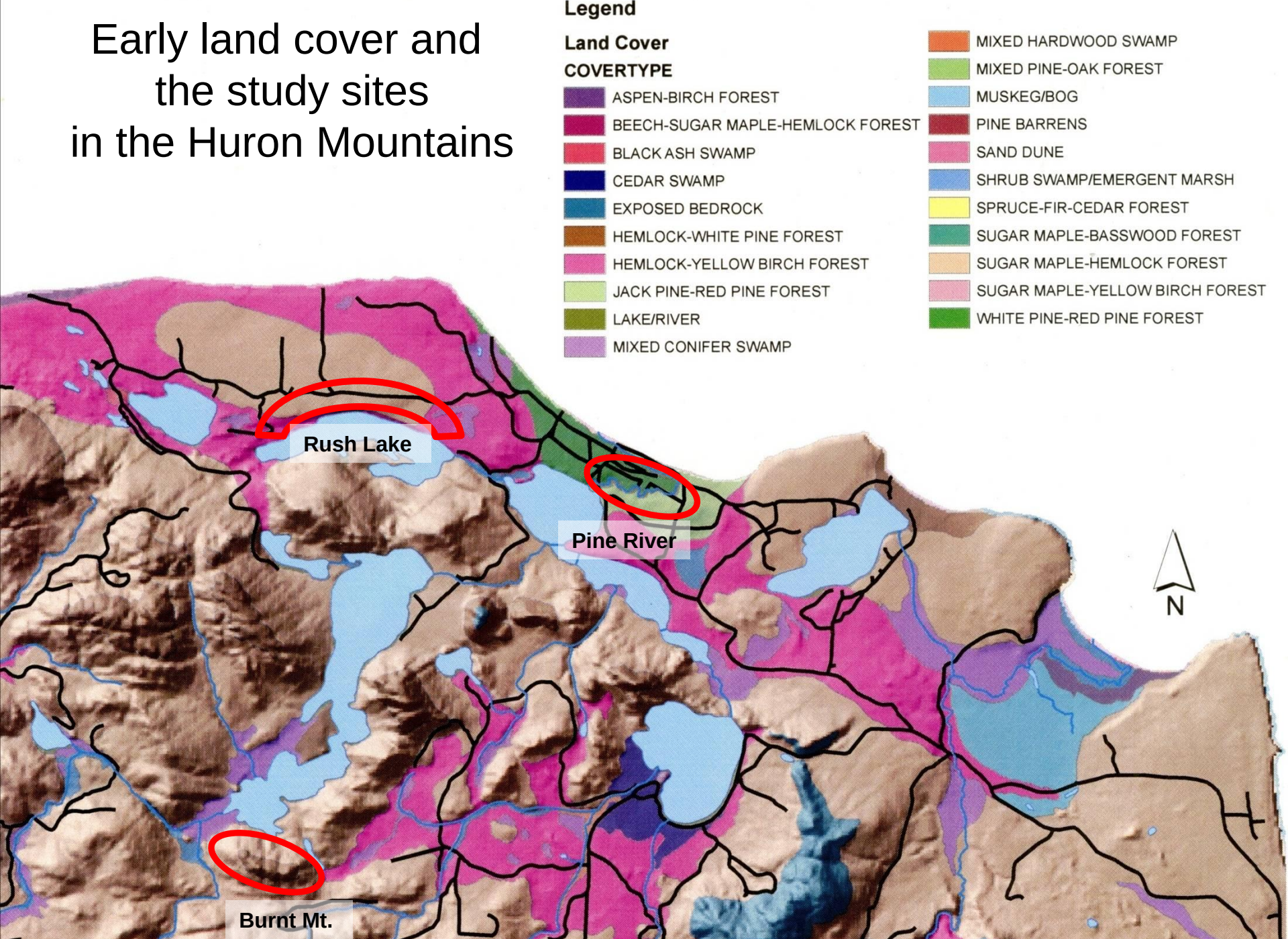


The Huron Mountains on the mapped fire intervals of the PC2FM model

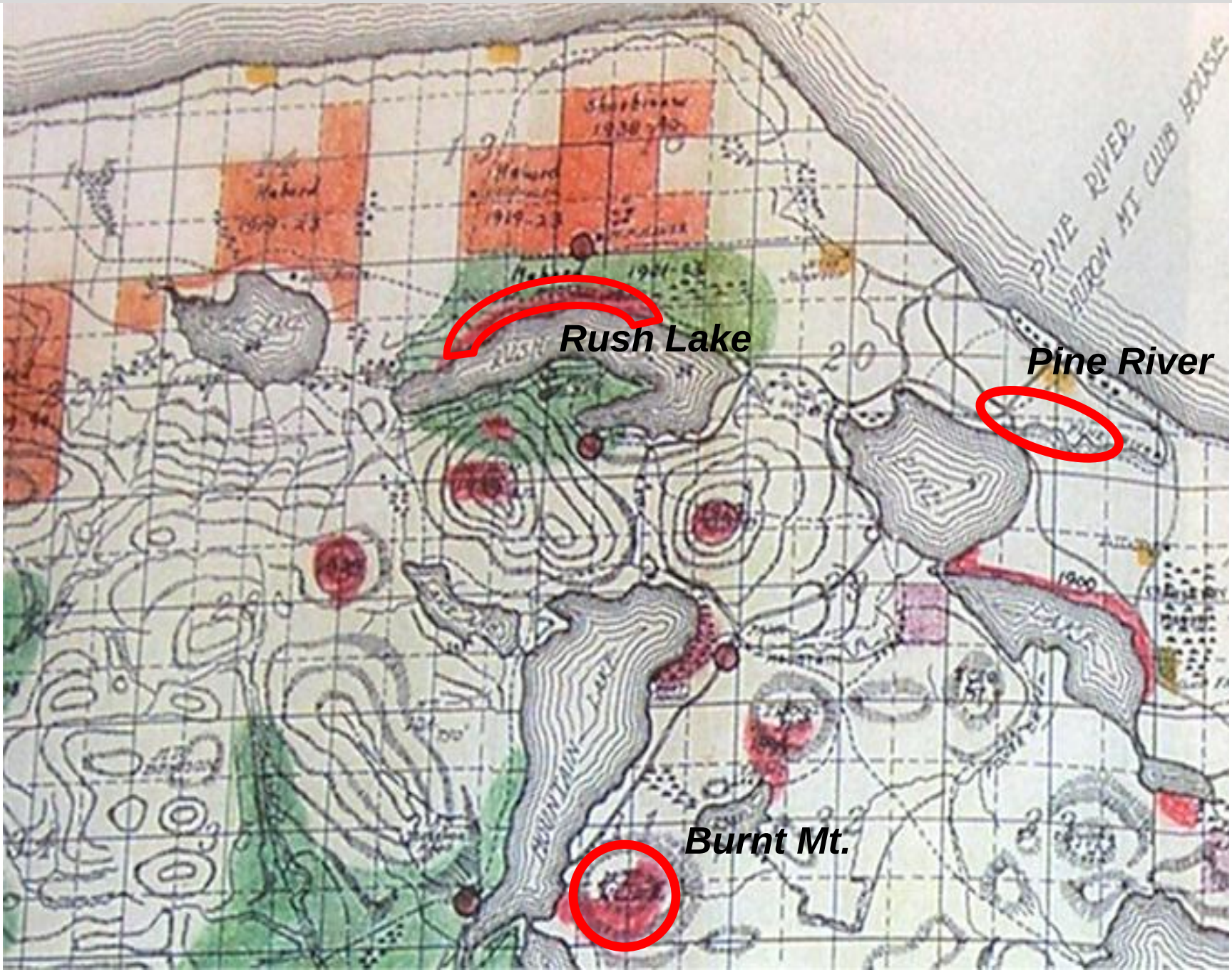



Lake Superior
Rush Lake
Pine River
Howe
Rush
Pine
Conway
Ann
Mountain
2nd Pine
3rd Pine
Ives
Burnt Mt.

Early land cover and the study sites in the Huron Mountains

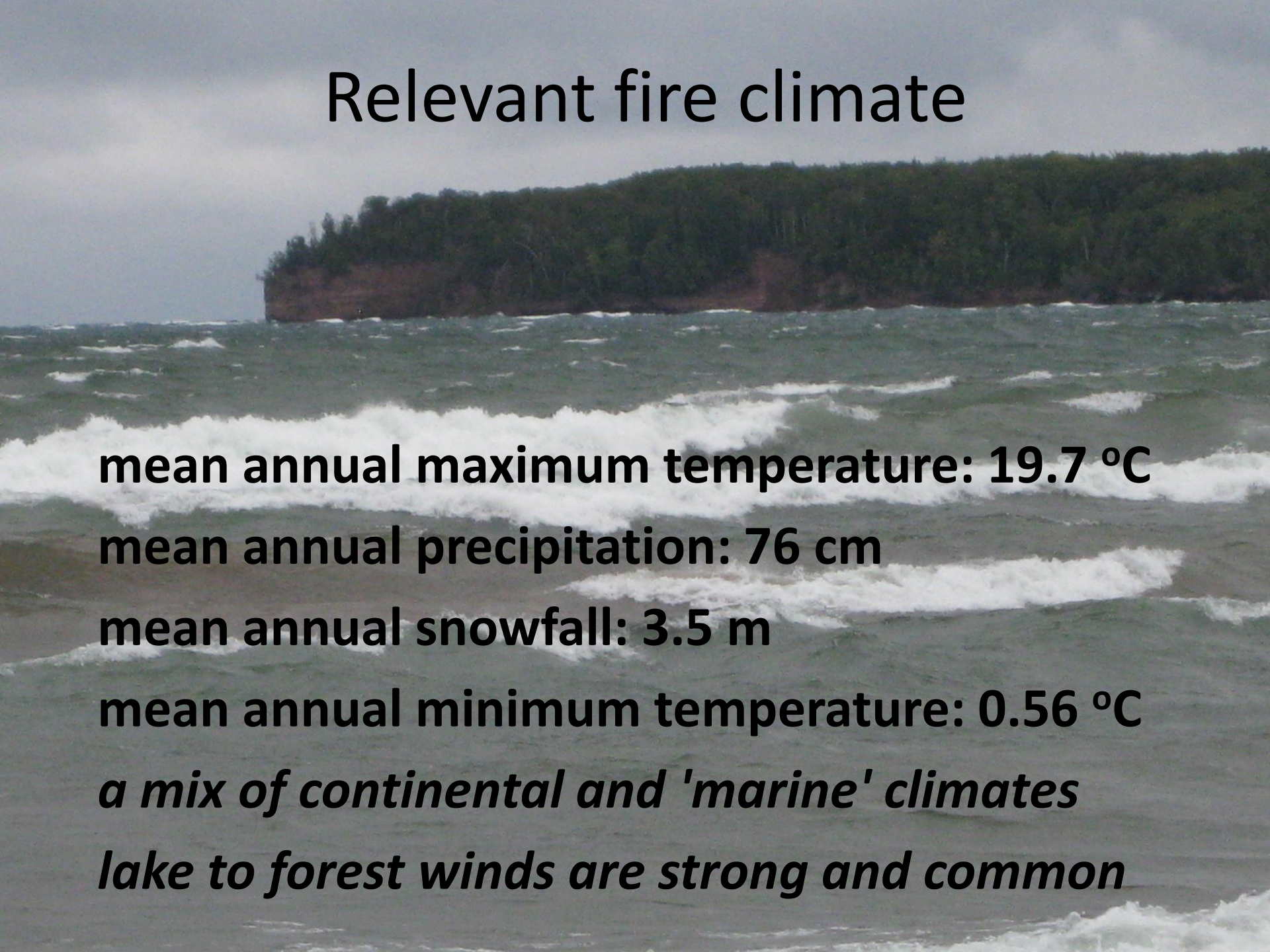


Study sites and recent (1890 to 1934) fires in the Huron Mountains, Michigan



Fire scars on red pine stumps and snags were identified, cross dated, and compiled

Relevant fire climate



mean annual maximum temperature: 19.7 °C

mean annual precipitation: 76 cm

mean annual snowfall: 3.5 m

mean annual minimum temperature: 0.56 °C

a mix of continental and 'marine' climates

lake to forest winds are strong and common

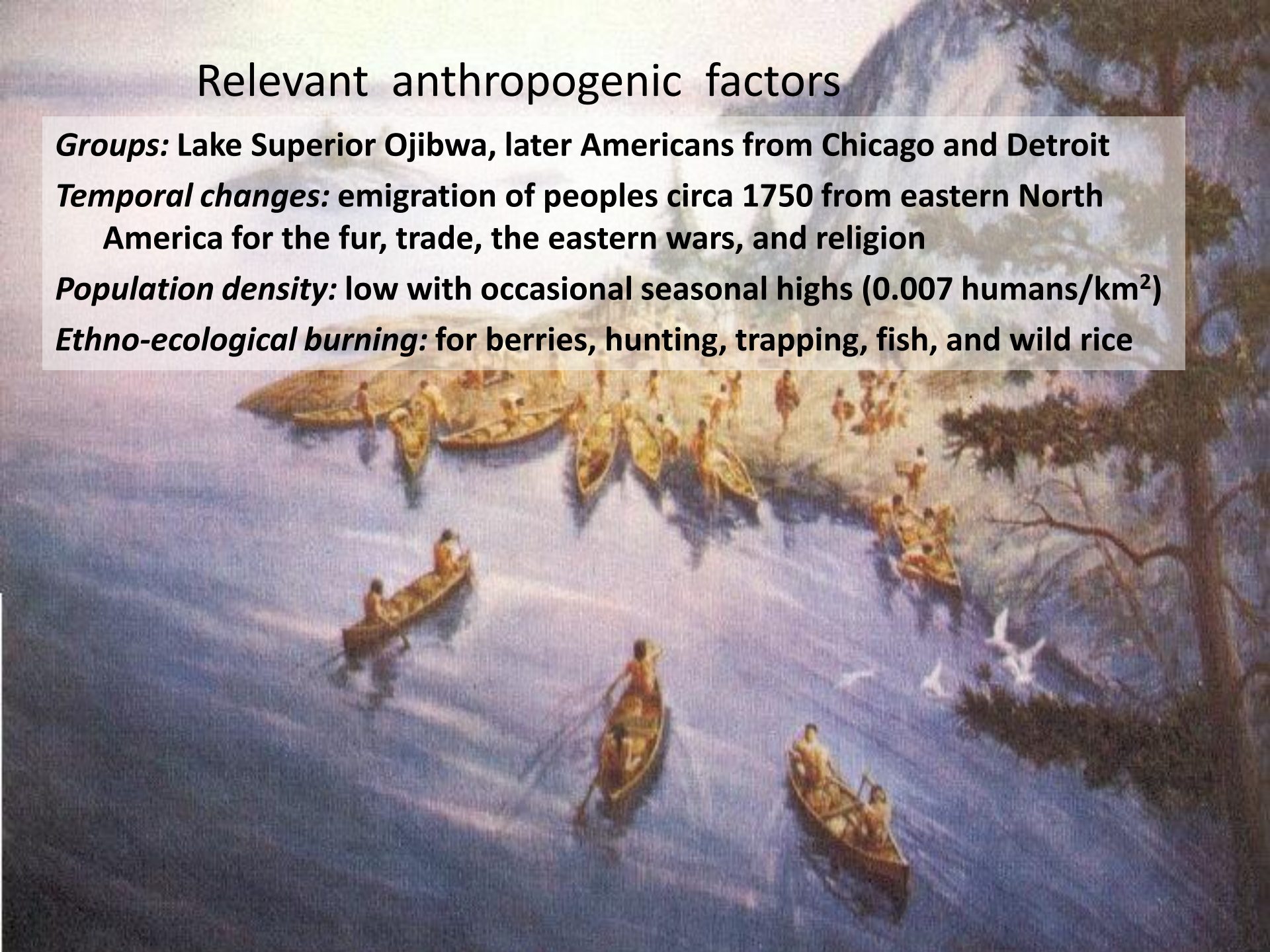
Relevant anthropogenic factors

Groups: **Lake Superior Ojibwa, later Americans from Chicago and Detroit**

Temporal changes: **emigration of peoples circa 1750 from eastern North America for the fur, trade, the eastern wars, and religion**

Population density: **low with occasional seasonal highs (0.007 humans/km^2)**

Ethno-ecological burning: **for berries, hunting, trapping, fish, and wild rice**



Relevant fire ecology

Lightning and human ignitions

Ignitions type is variable by landform

Topographic differences among sites

Elevation 183m to 700m

Sites on: paleo beaches (Pine River)

mountain tops (Burnt Mt.)

lake shores (Rush Lake)

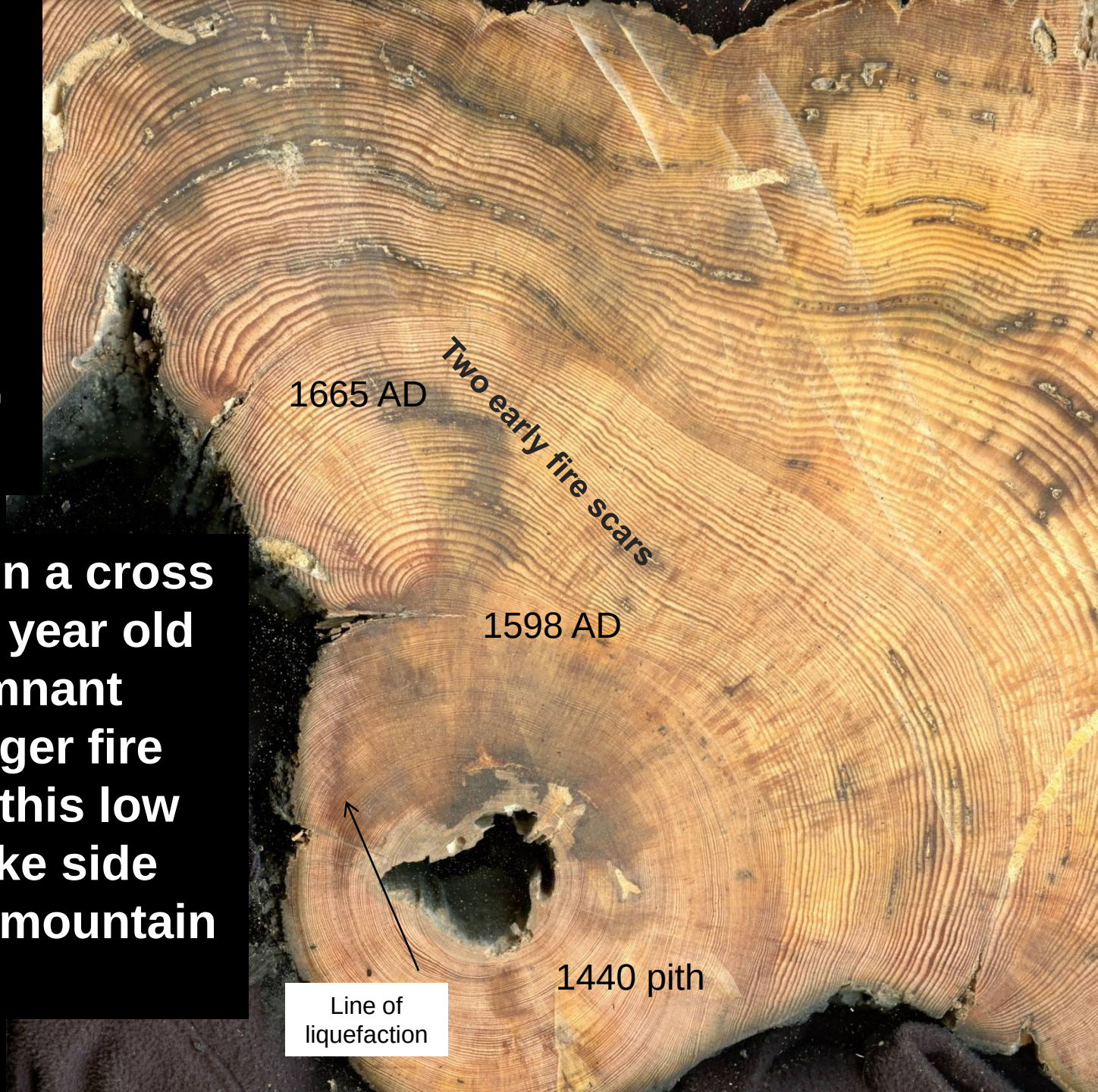

Rush Lake fire history


107 year old
red pine stumps
were the bulk
of our sample

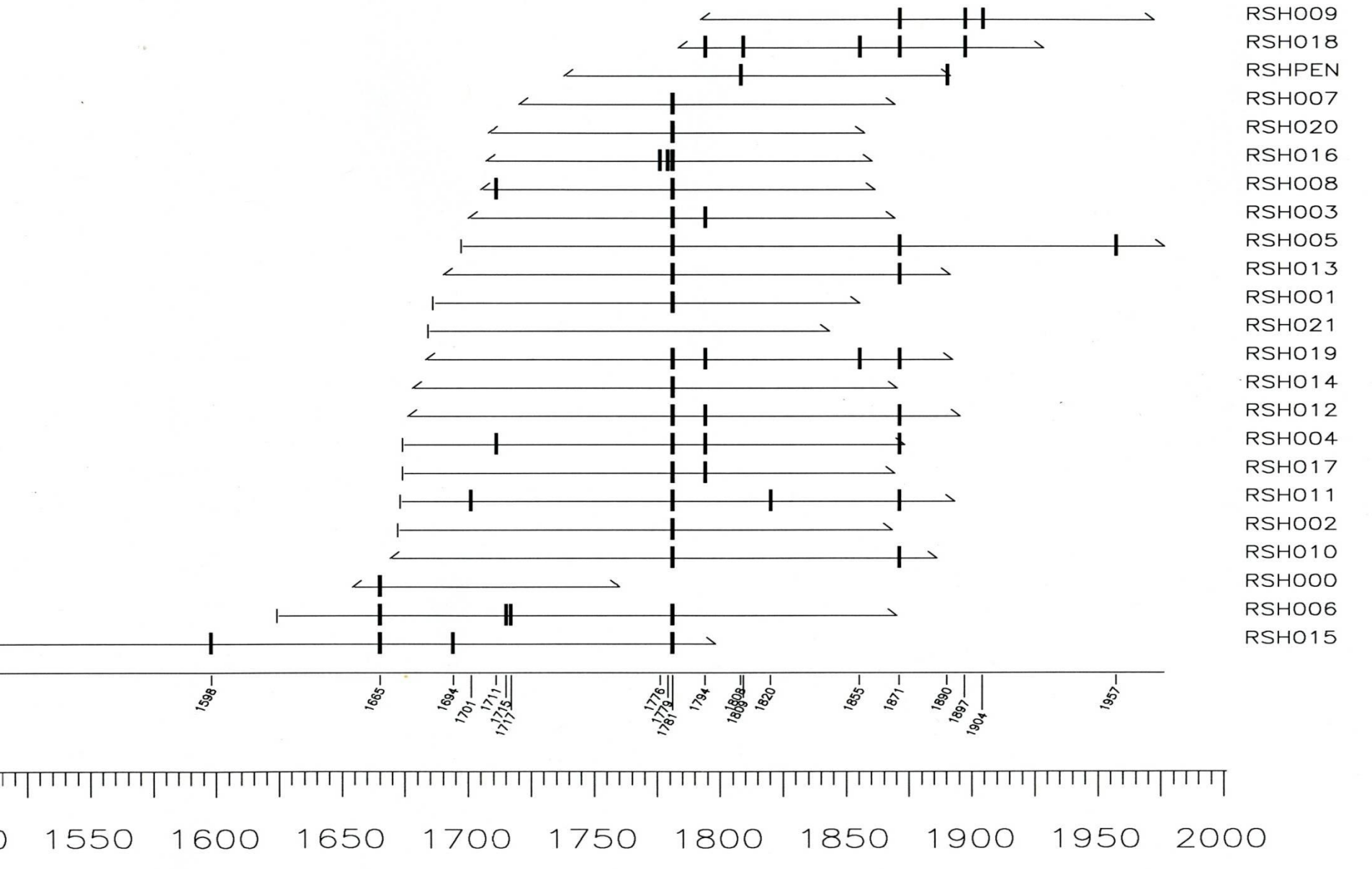
Live and dead fire scarred trees on the shore of Rush

Red Pine, Natural remnant, Rush Lake, Huron Mts., Michigan

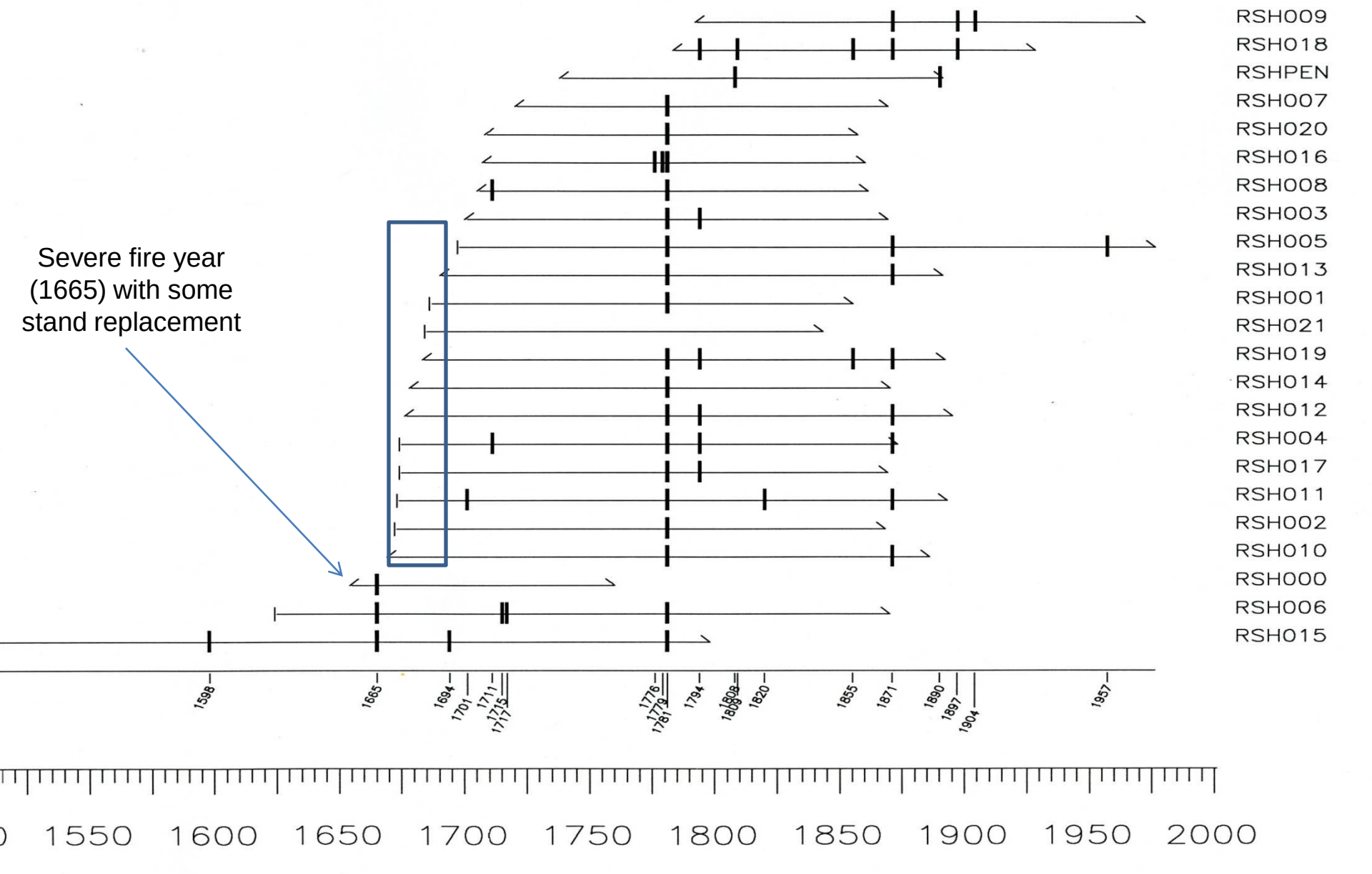
Fire scars on a cross dated 354+ year old red pine remnant indicate longer fire intervals at this low elevation lake side site than at mountain top sites



Rush Lake Fire History, Huron Mountains



Rush Lake Fire History, Huron Mountains



Rush Lake Fire History, Huron Mountains

Logged (1901)
Burned (1904)

RSH009
RSH018
RSHPEN
RSH007
RSH020
RSH016
RSH008
RSH003
RSH005
RSH013
RSH001
RSH021
RSH019
RSH014
RSH012
RSH004
RSH017
RSH011
RSH002
RSH010
RSH000
RSH006
RSH015

1598 1665 1694 1701 1711 1715 1717 1776 1779 1781 1784 1808 1809 1820 1855 1871 1890 1897 1904 1957

1550 1600 1650 1700 1750 1800 1850 1900 1950 2000

Rush Lake Fire History, Huron Mountains

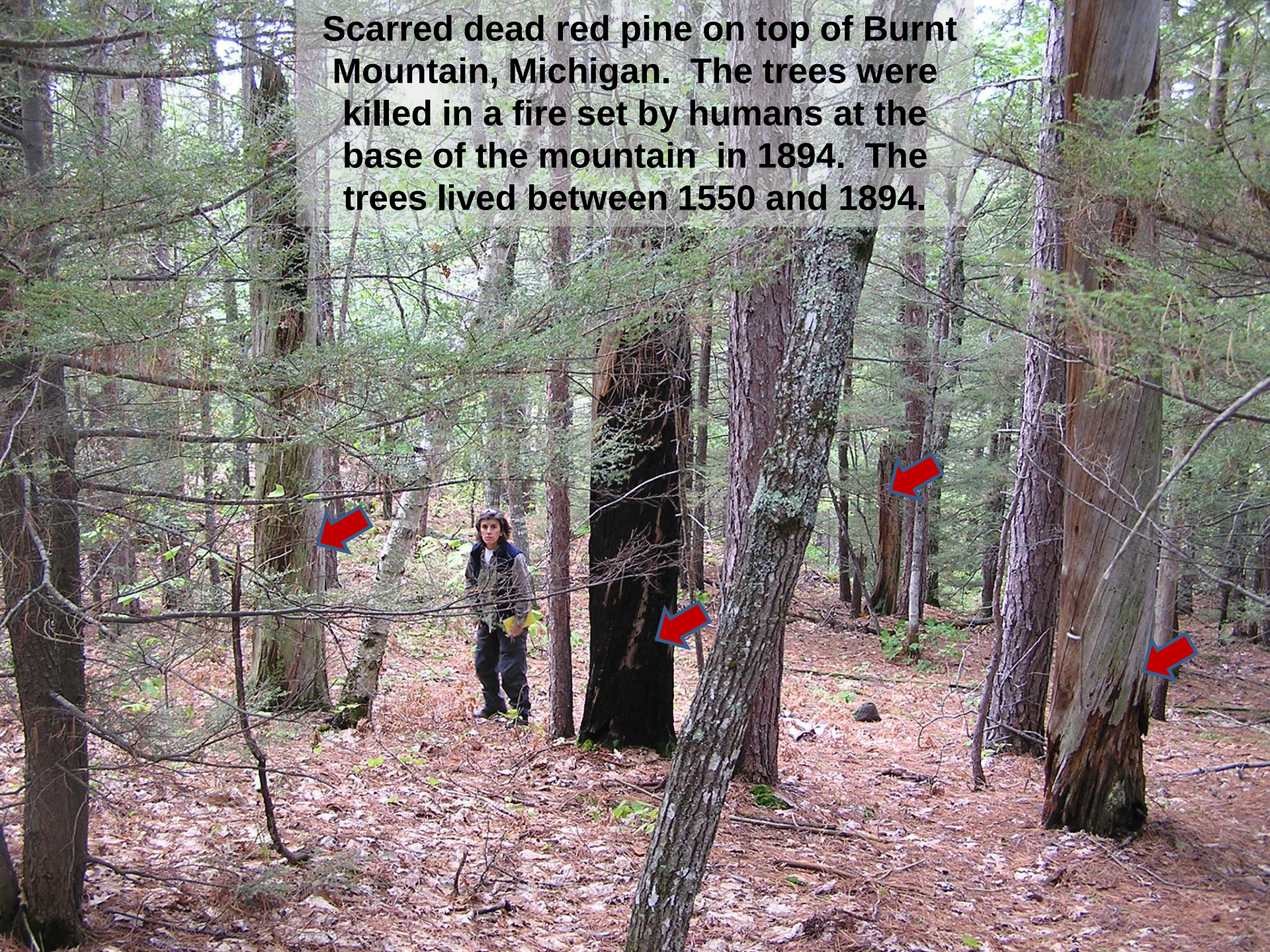
The second most severe fire year (1871) at Rush Lake occurred in the same year as the **Peshtigo, WI Fire** and the **Great Chicago Fire**

RSH009
RSH018
RSHPEN
RSH007
RSH020
RSH016
RSH008
RSH003
RSH005
RSH013
RSH001
RSH021
RSH019
RSH014
RSH012
RSH004
RSH017
RSH011
RSH002
RSH010
RSH000
RSH006
RSH015

1598 1665 1684 1701 1711 1715 1717 1776 1779 1781 1784 1808 1809 1820 1855 1871 1890 1897 1904 1957

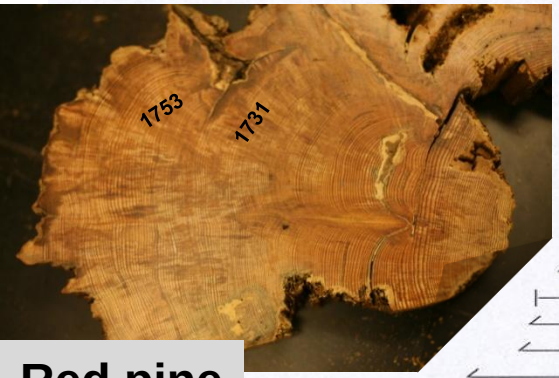
1550 1600 1650 1700 1750 1800 1850 1900 1950 2000

Burnt Mountain Fire History, Huron Mountains


Scarred dead red pine on top of Burnt Mountain, Michigan. The trees were killed in a fire set by humans at the base of the mountain in 1894. The trees lived between 1550 and 1894.

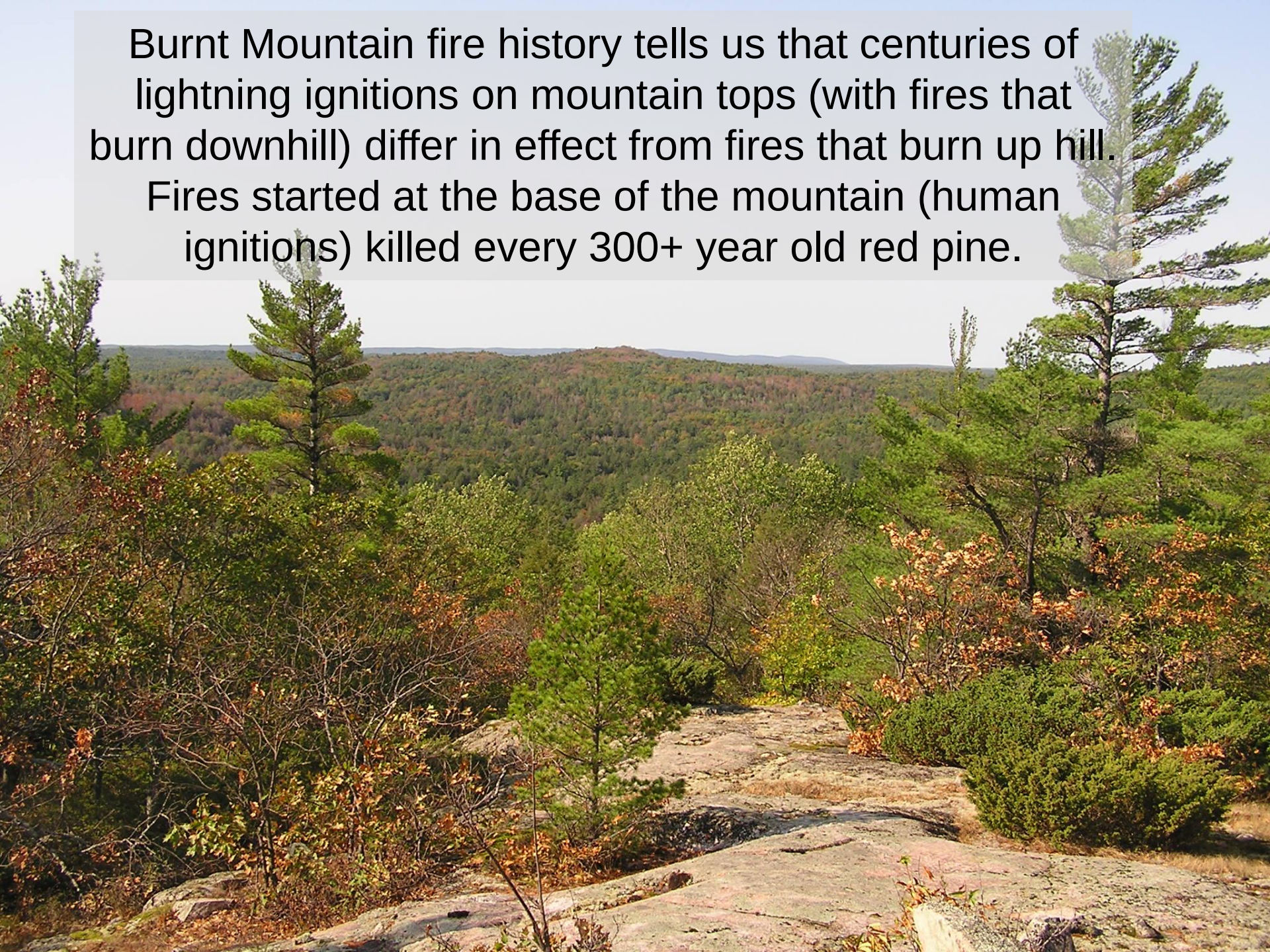
Growth release on sample BRT013 that coincides with a fire event and increased red pine recruitment. When the tree was 145 years old (in 1674), there was a rapid increase in growth (see arrow). Most likely this was caused by a fire event that also resulted in increased red pine recruitment .

Huron Mountains, Lake Superior, Burnt Mt., Michigan



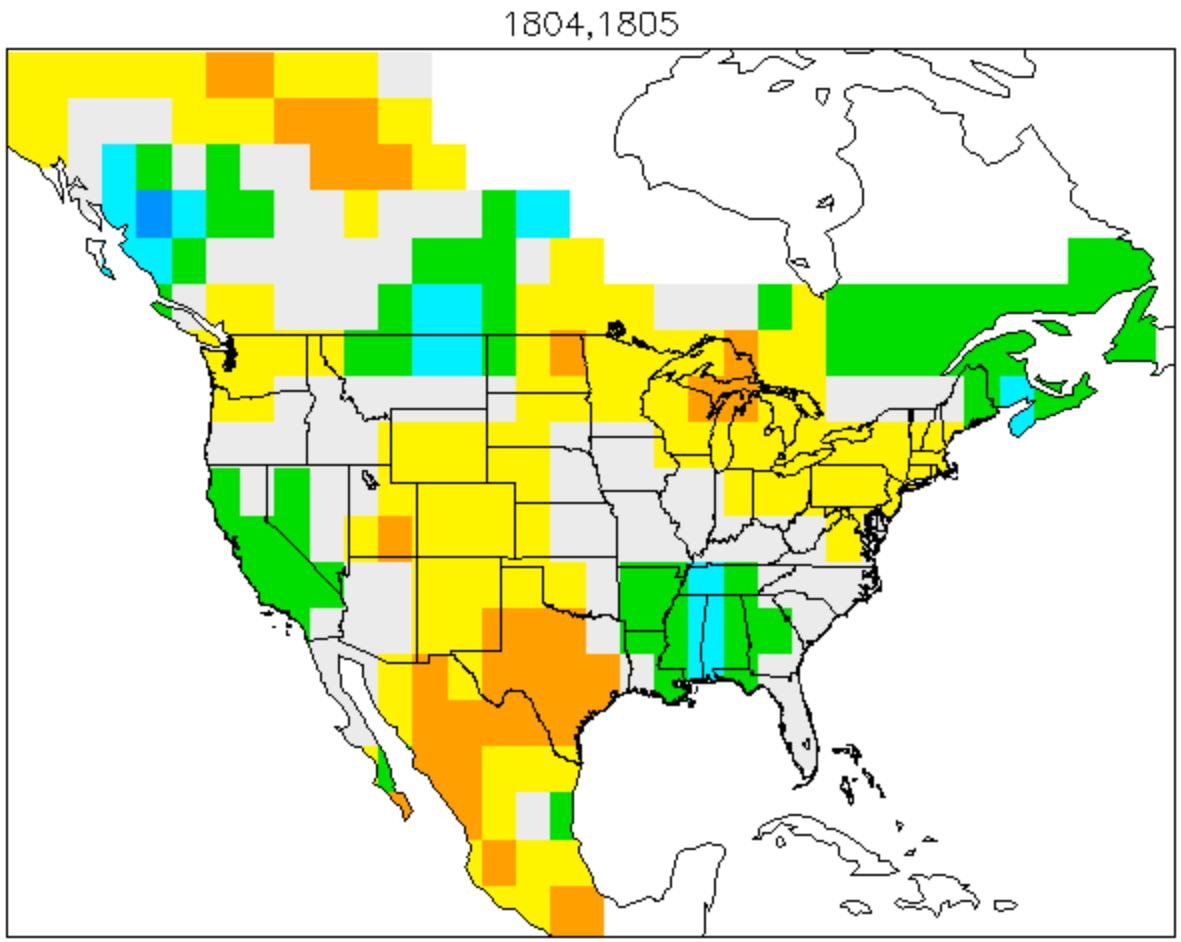
Red pine

Model importance:
1. cold-wet climate
2. mountain top lightning fire regime

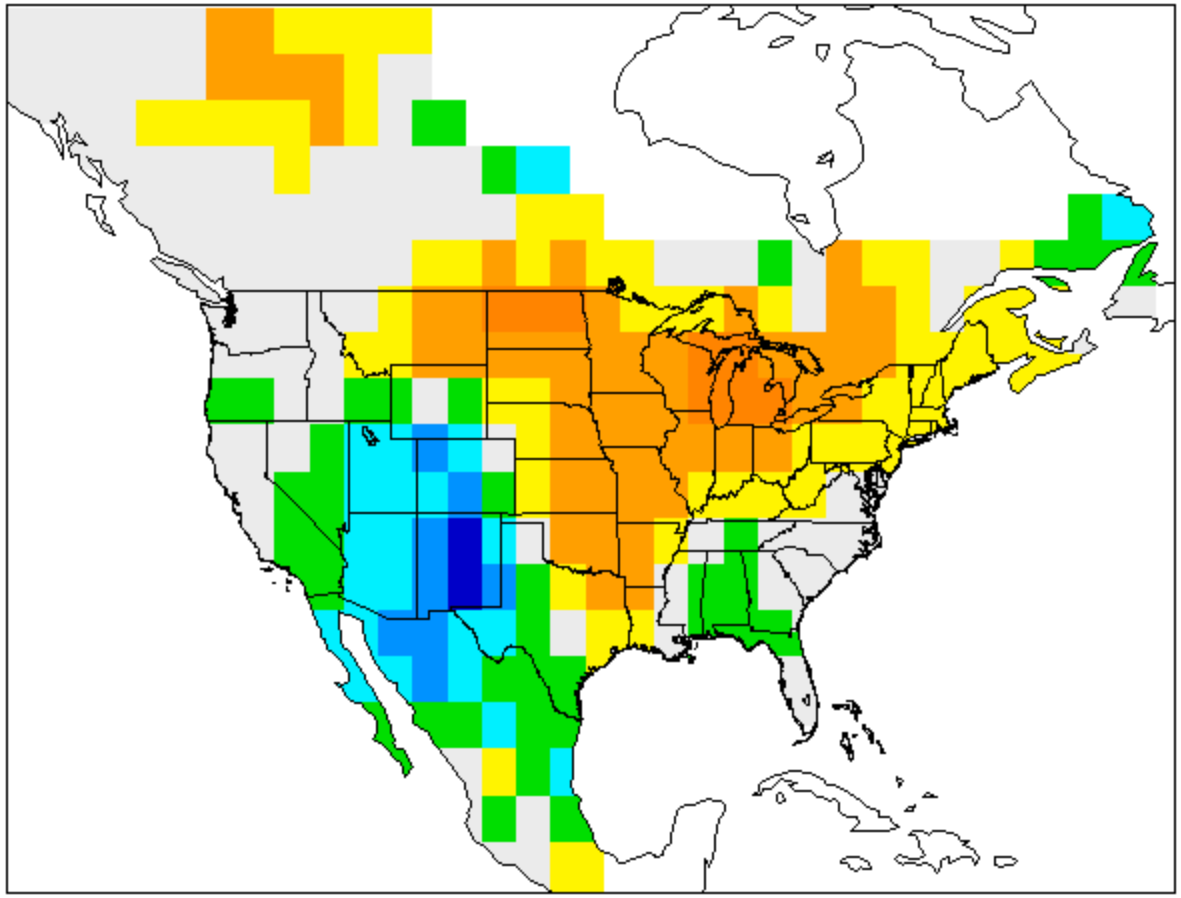


Burnt Mountain fire history tells us that centuries of lightning ignitions on mountain tops (with fires that burn downhill) differ in effect from fires that burn up hill. Fires started at the base of the mountain (human ignitions) killed every 300+ year old red pine.

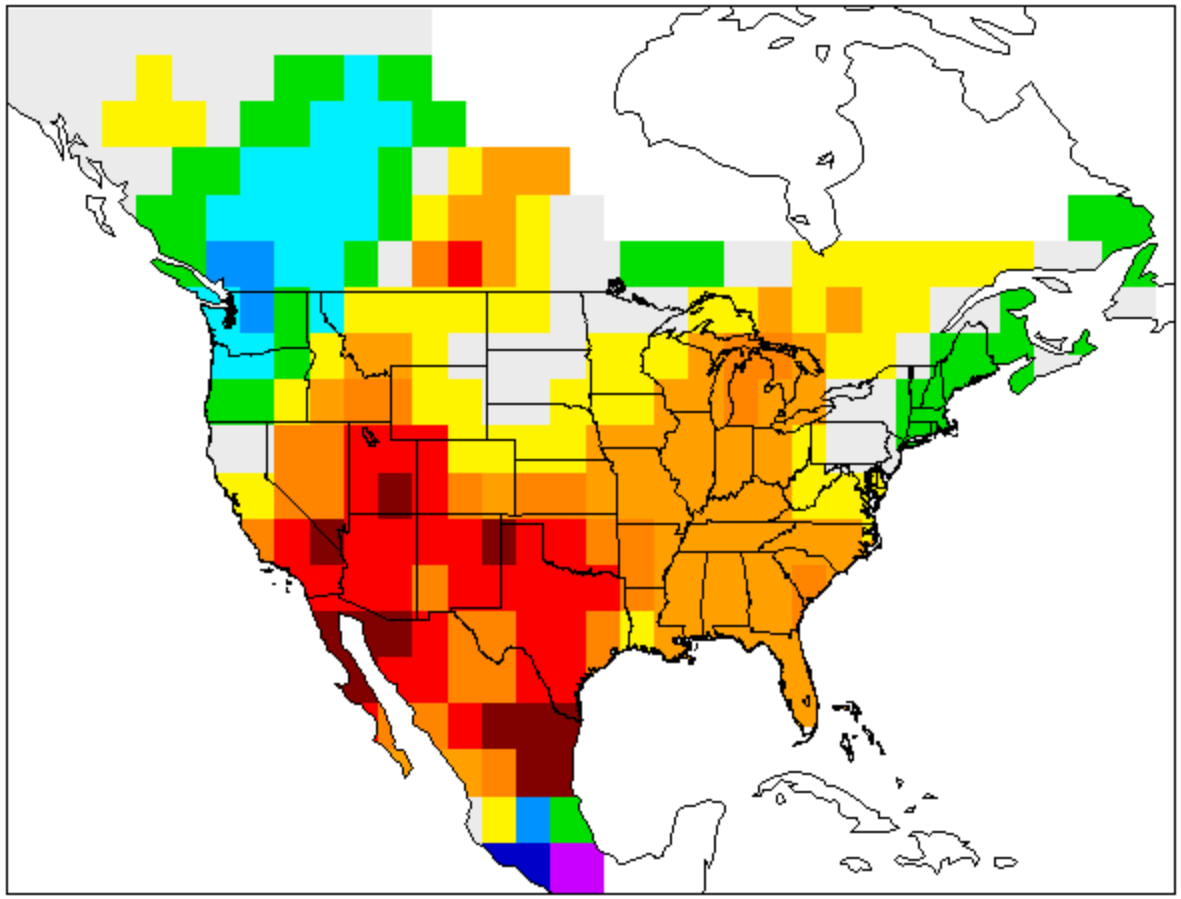
Pine River fire history on the paleo beaches of Lake Superior

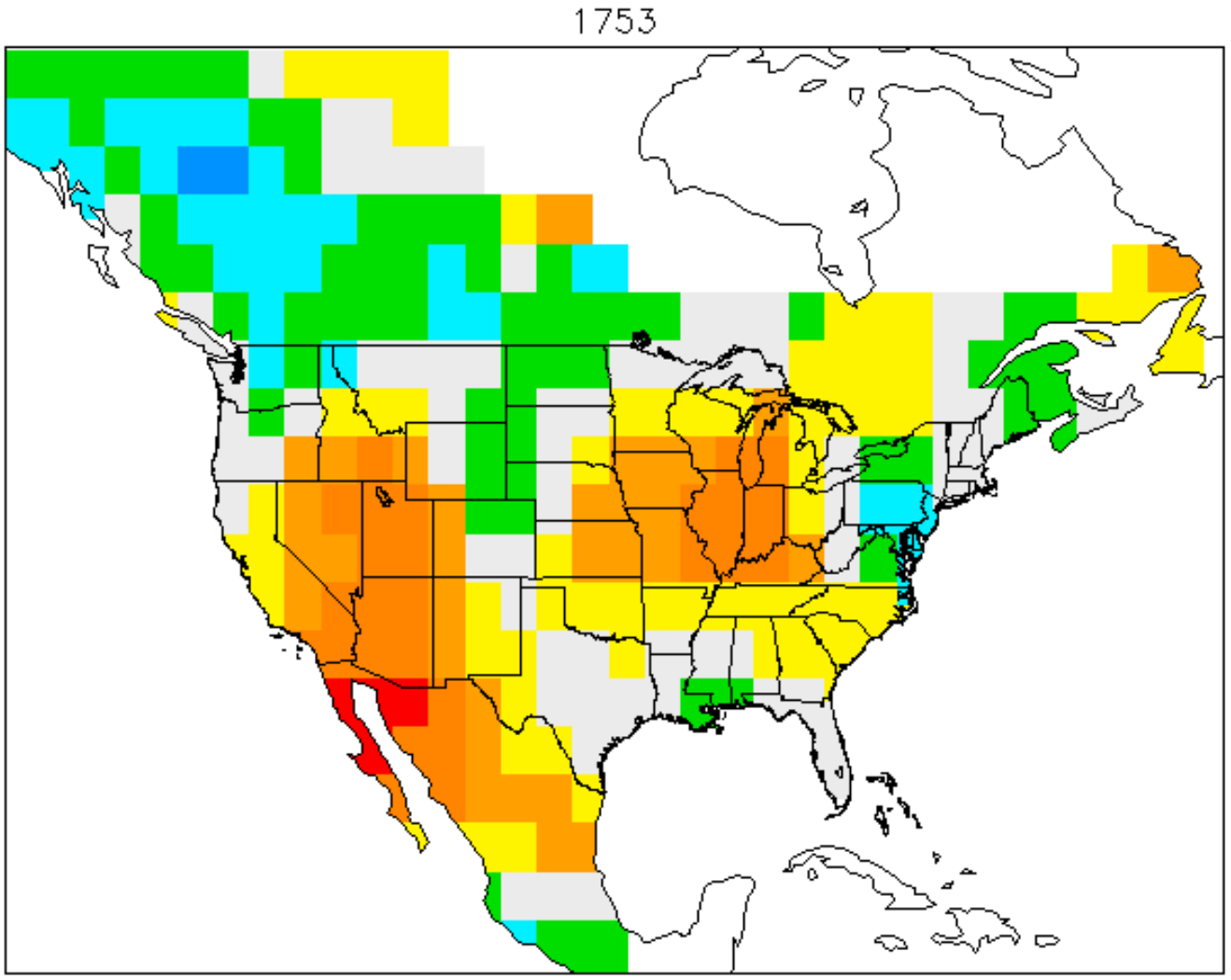

1804,1805

1689

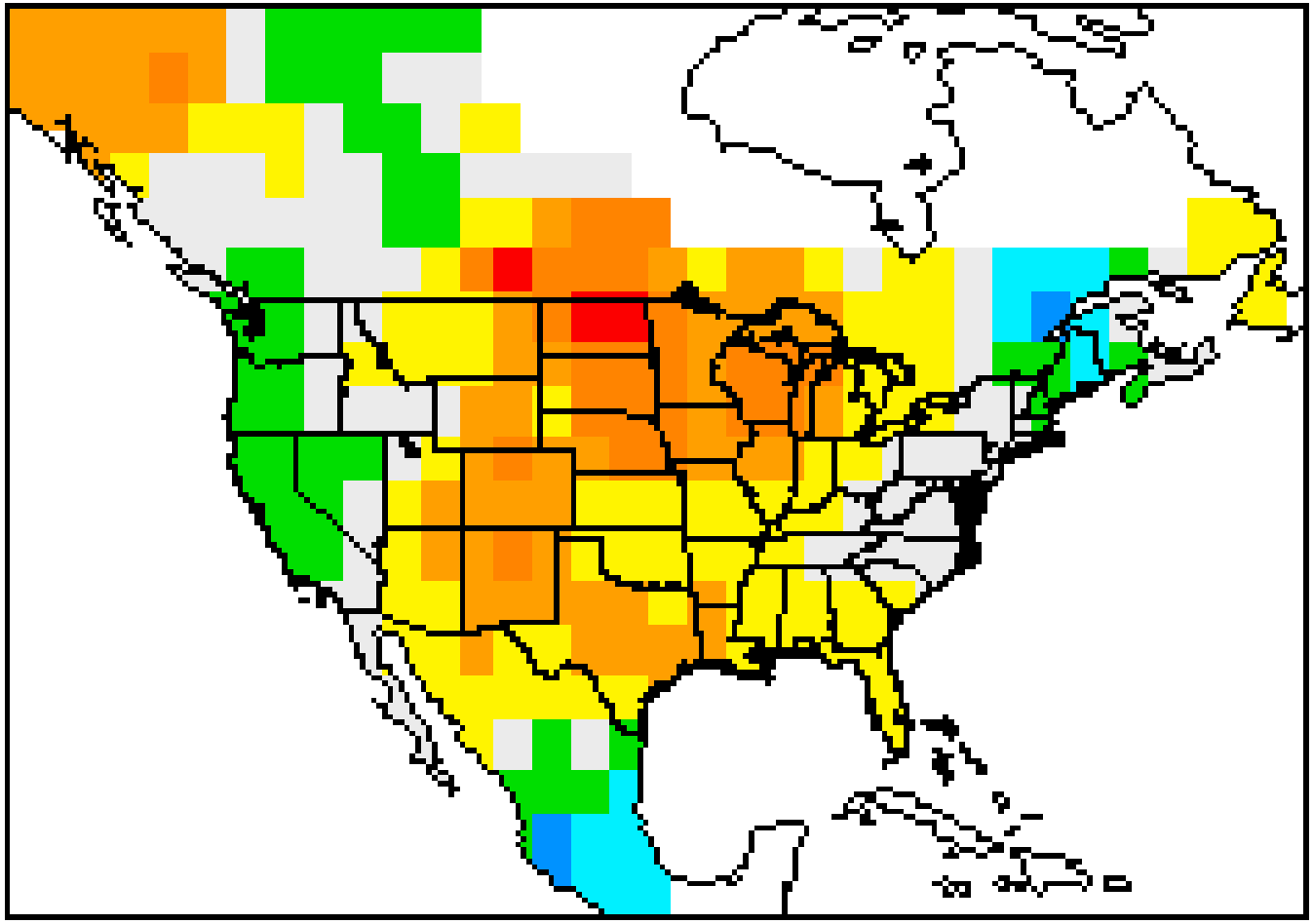


1752

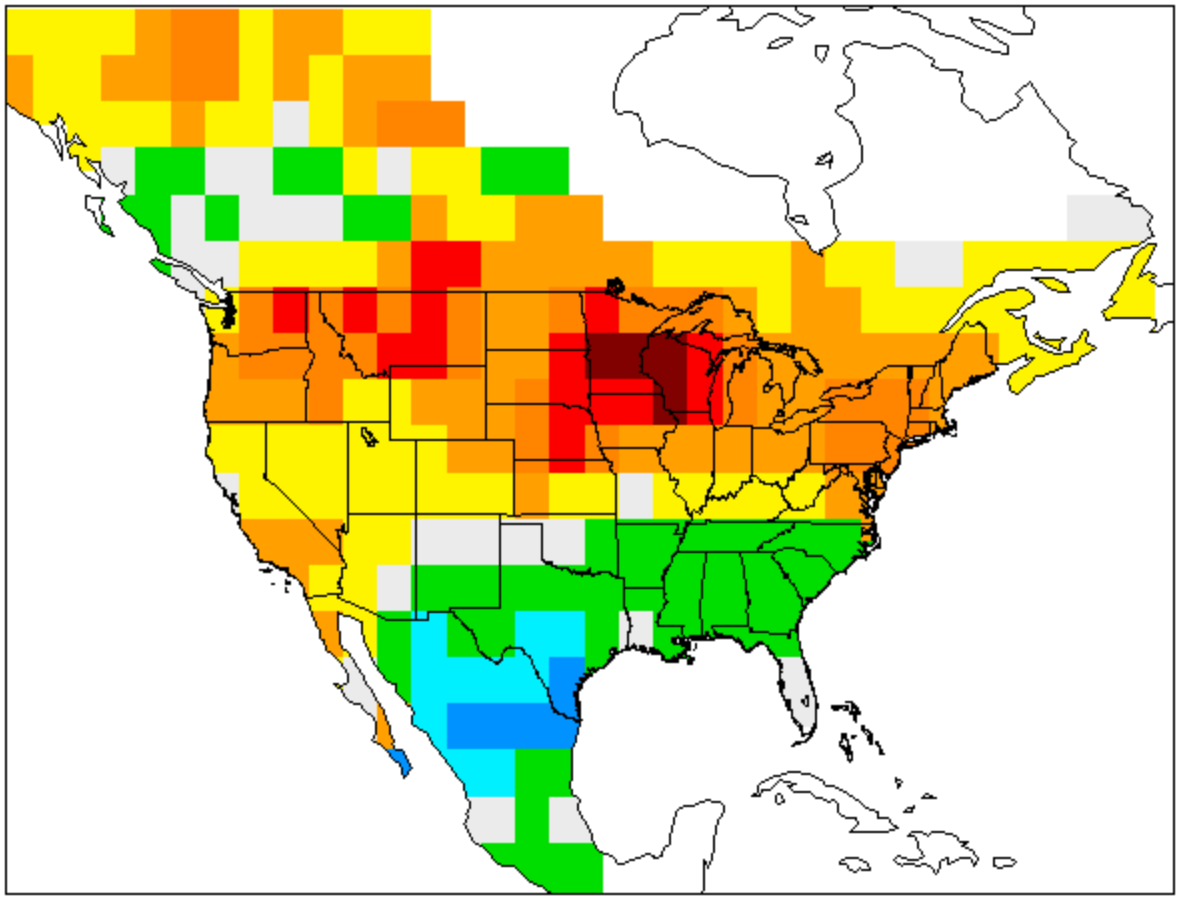



1753

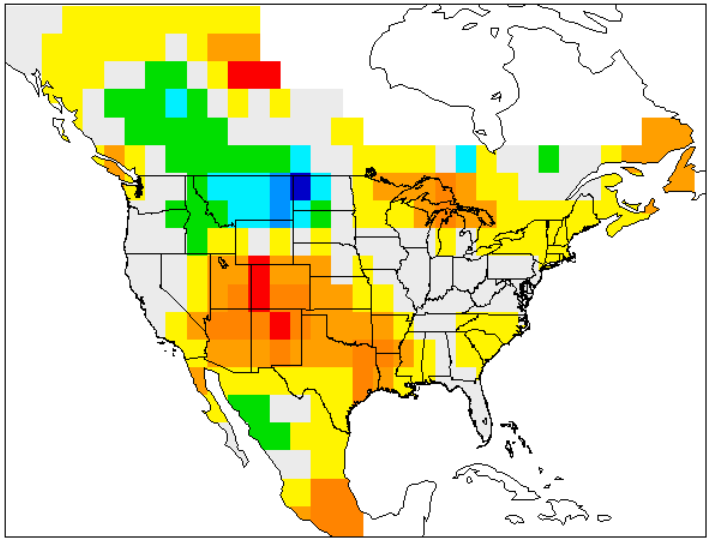
1664



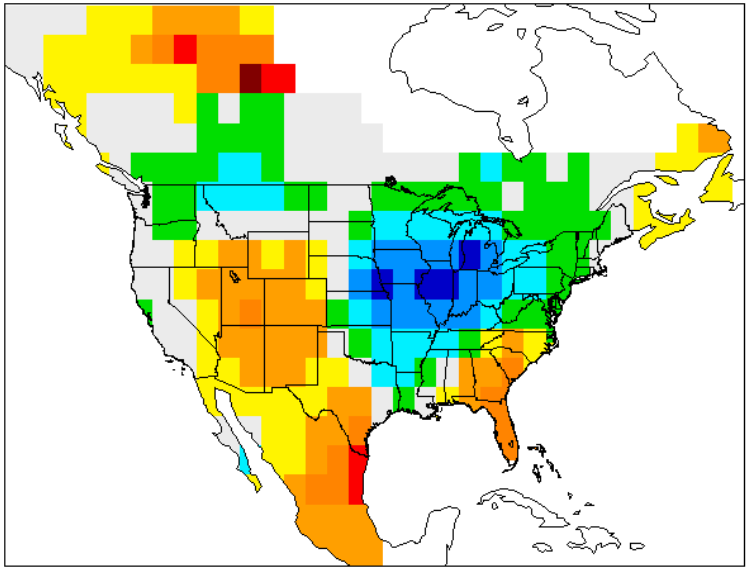
1665



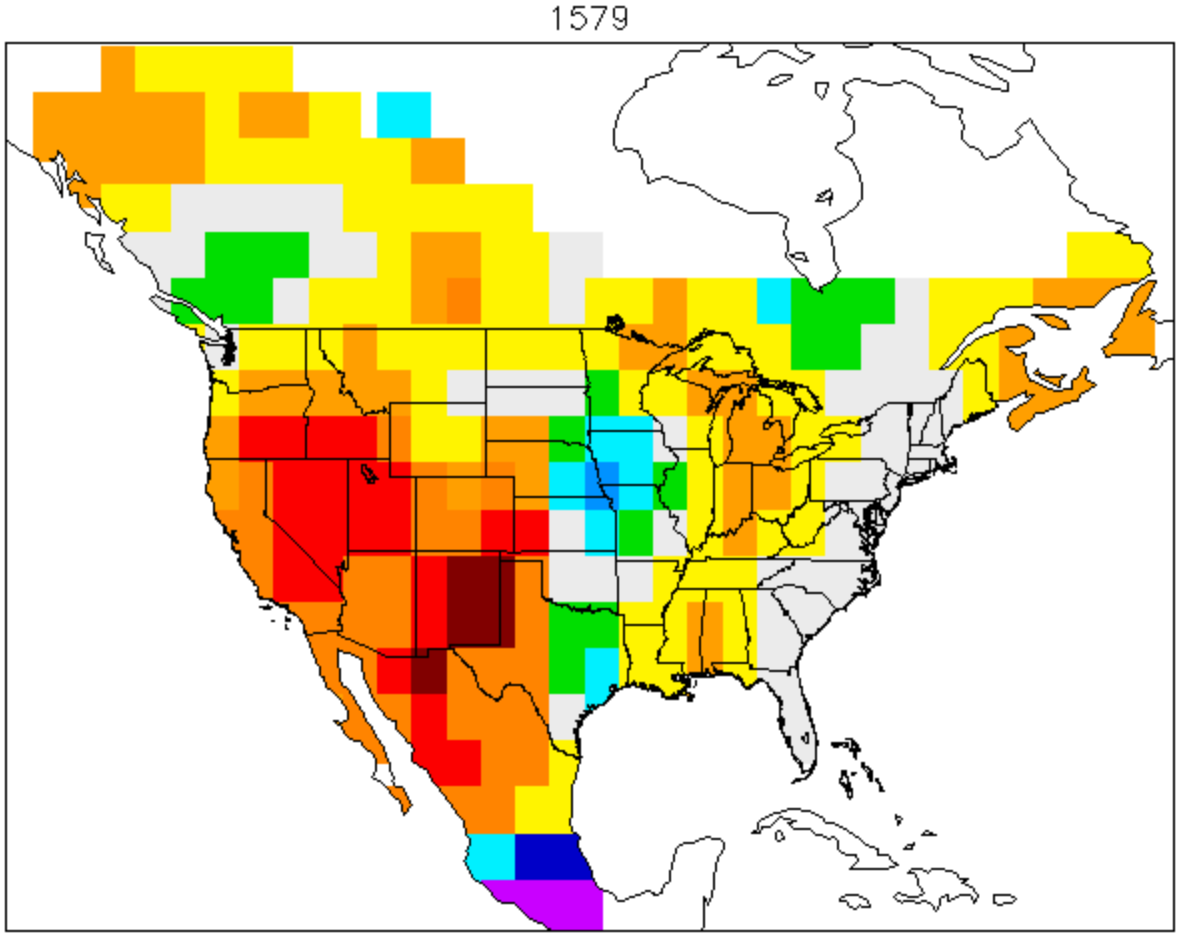
1780

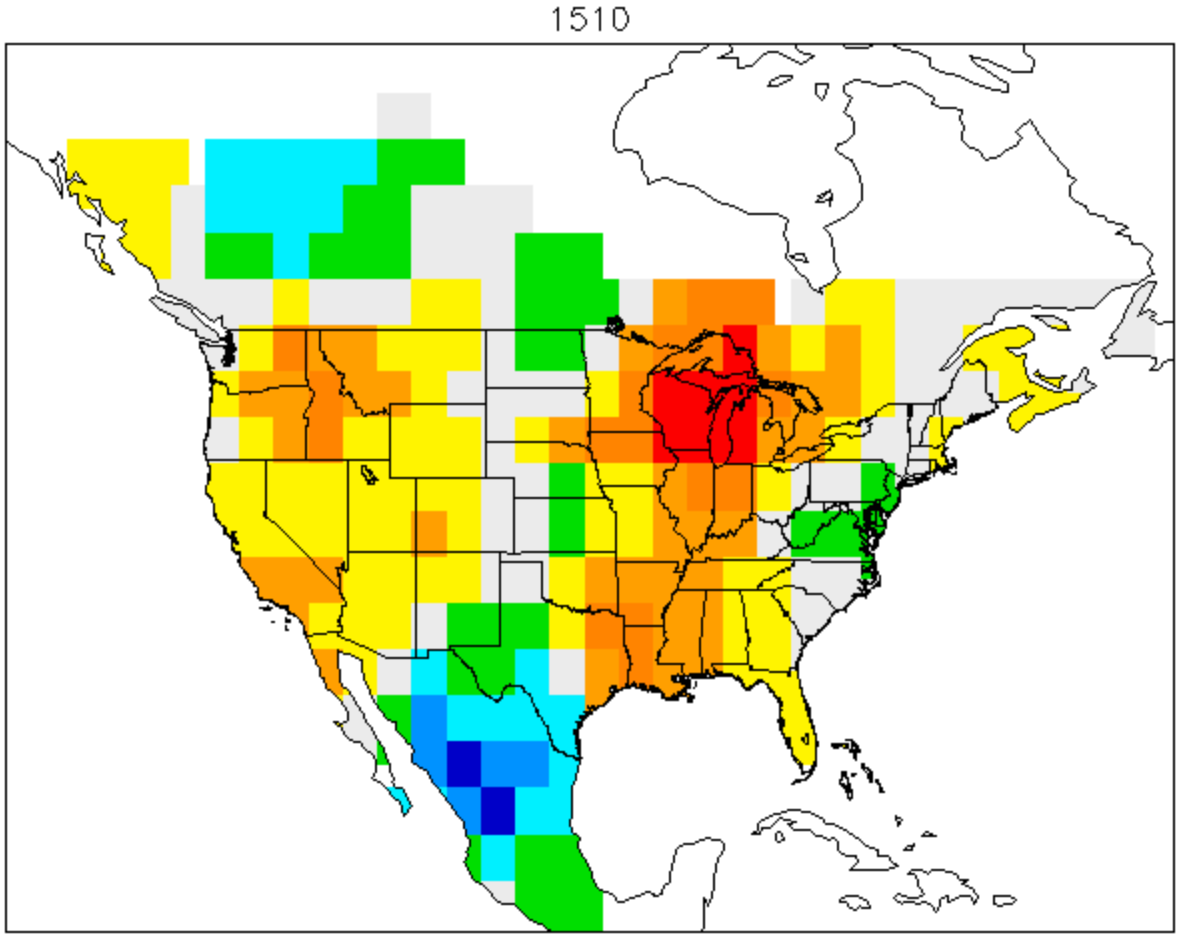


1781

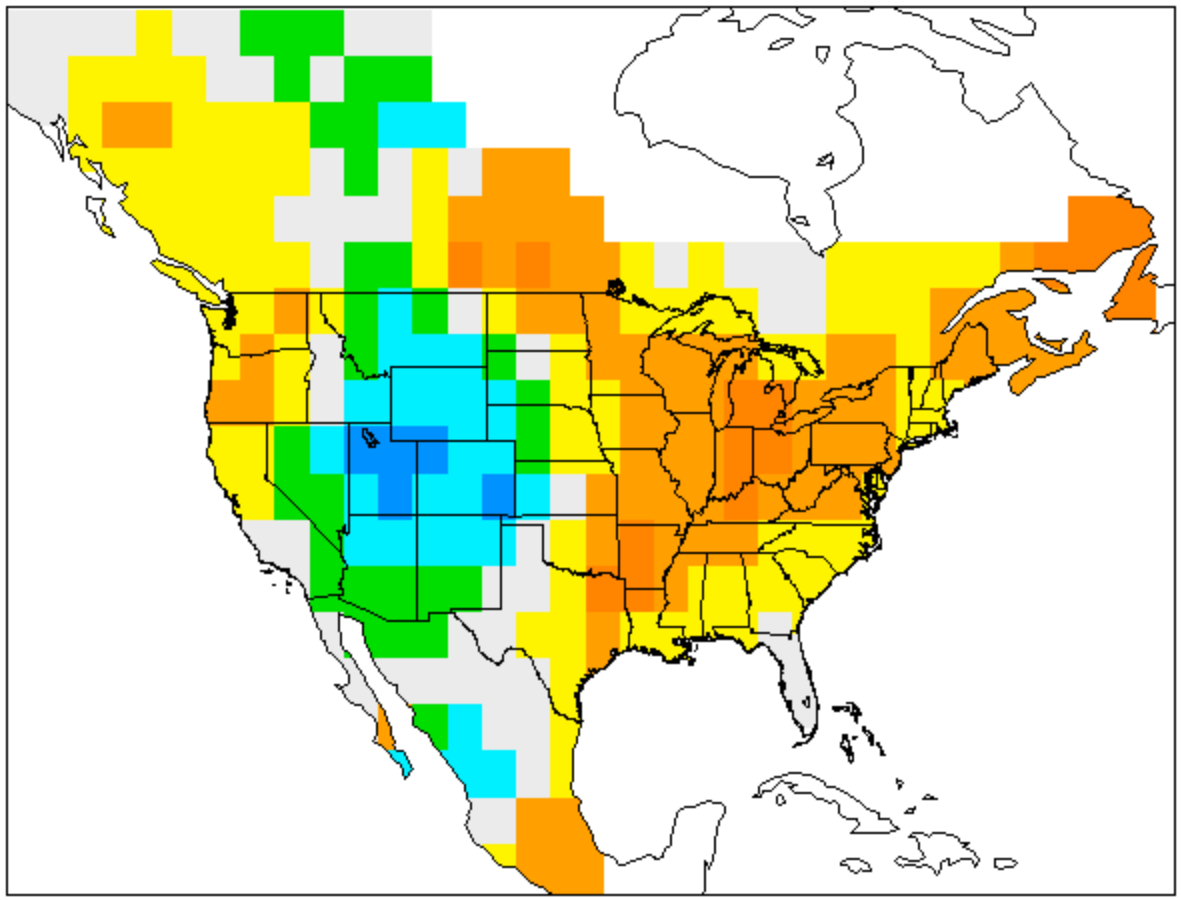


Pine River tree locations on the paleo beaches between Lake Superior and Pine Lake


1579


1510

1838,1839,1840,1841

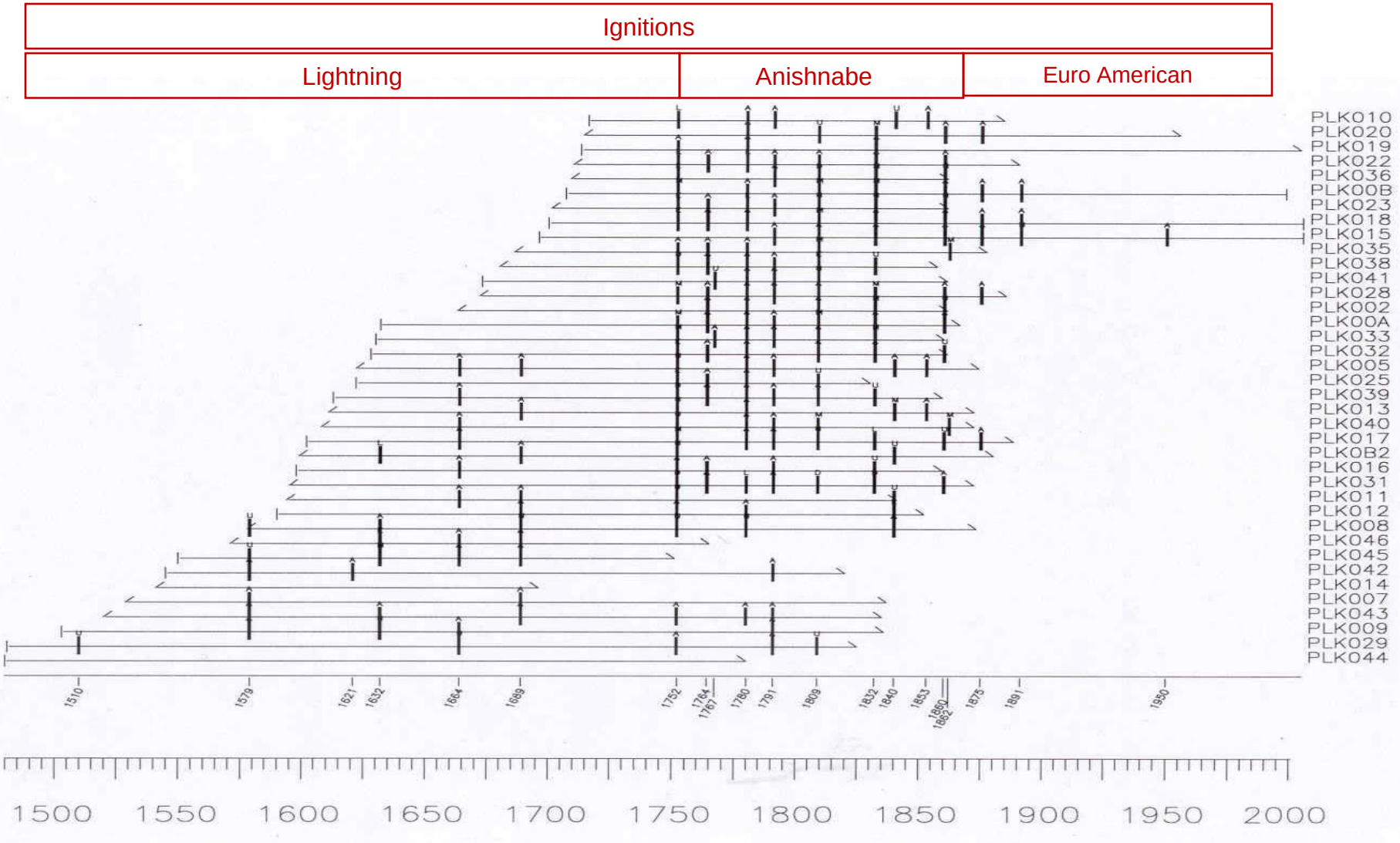


When this red pine was 120 years old and 6 inches in diameter its growth rate increased greatly as its competition for light and nutrients was destroyed by the fires of 1748 and a large fire in 1752.

Red arrows indicate Jack pines about 110 years old that regenerated after the 1891 fire

Fire scars from the last fire in 1891 to 1752.

Pine River Fire History, Lake Superior, Michigan



Purposeful ignitions by humans

Lake Superior

Salmon Trout River

Fire was used:

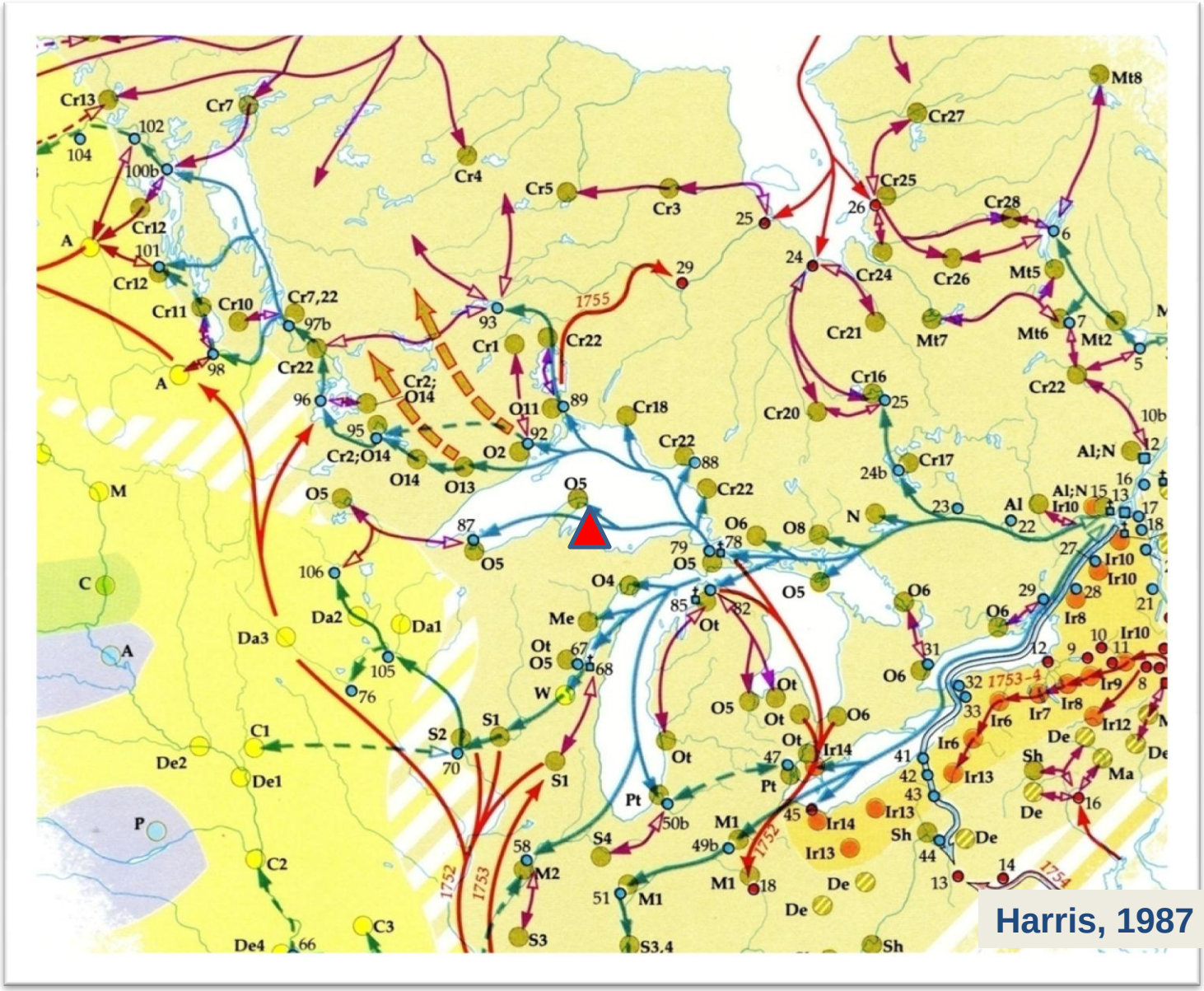
For processing fish

For culturing blueberry habitat and growth

For hunting and trapping

For wild rice

Fur Trade Routes and Native American Villages, Algonquin speakers near the Huron Mountains - 1750's



▲ = study site

Summary

- Irregularity in fire intervals and intensity are dictated by spatial heterogeneity
- Temporal variation in fire resulted from a combination of topography and human influences..
- Both human ignitions and lightning have been important ignition factors but are landscape dependent
- Red pine forest dynamics are influenced by variable fire regimes and site conditions..

Acknowledgements

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