

# An evaluation of the relationship between fire history and cultural activities on Star Island, Cass Lake, Minnesota

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## Fire History Context

Recent research has identified substantially shorter intervals of fire events than expected in fire-dependent landscapes traditionally considered to be dominated by lightning-ignited fires. That is, fire intervals are much shorter than natural lightning ignitions alone might support. These augmented fires are most likely due to Native American land use in northern Minnesota as well as the upper Midwest more generally. The evidence suggests the use of fire as part of forest management strategies geared towards the enhancement and/or maintenance of habitats for plant and wildlife management. Star Island was selected for this study for a variety of reasons. The island includes old growth red pine stands that predate the formation of the Chippewa National Forest (1908) and includes historical and archaeological evidence for human occupation over the past 5000 years. The island is located within the Leach Lake Band of Ojibwe Reservation and it remains culturally significant to the Band.



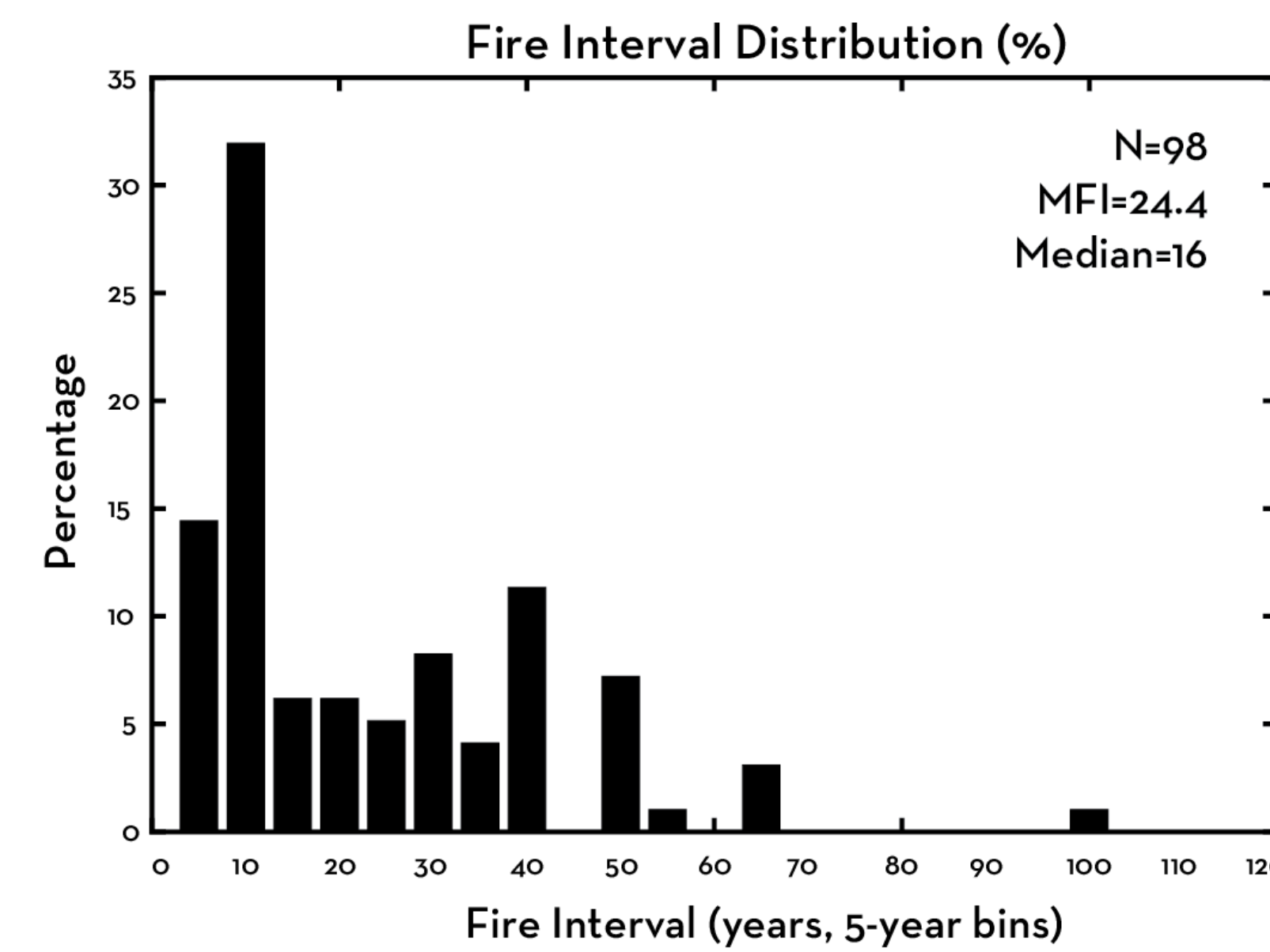
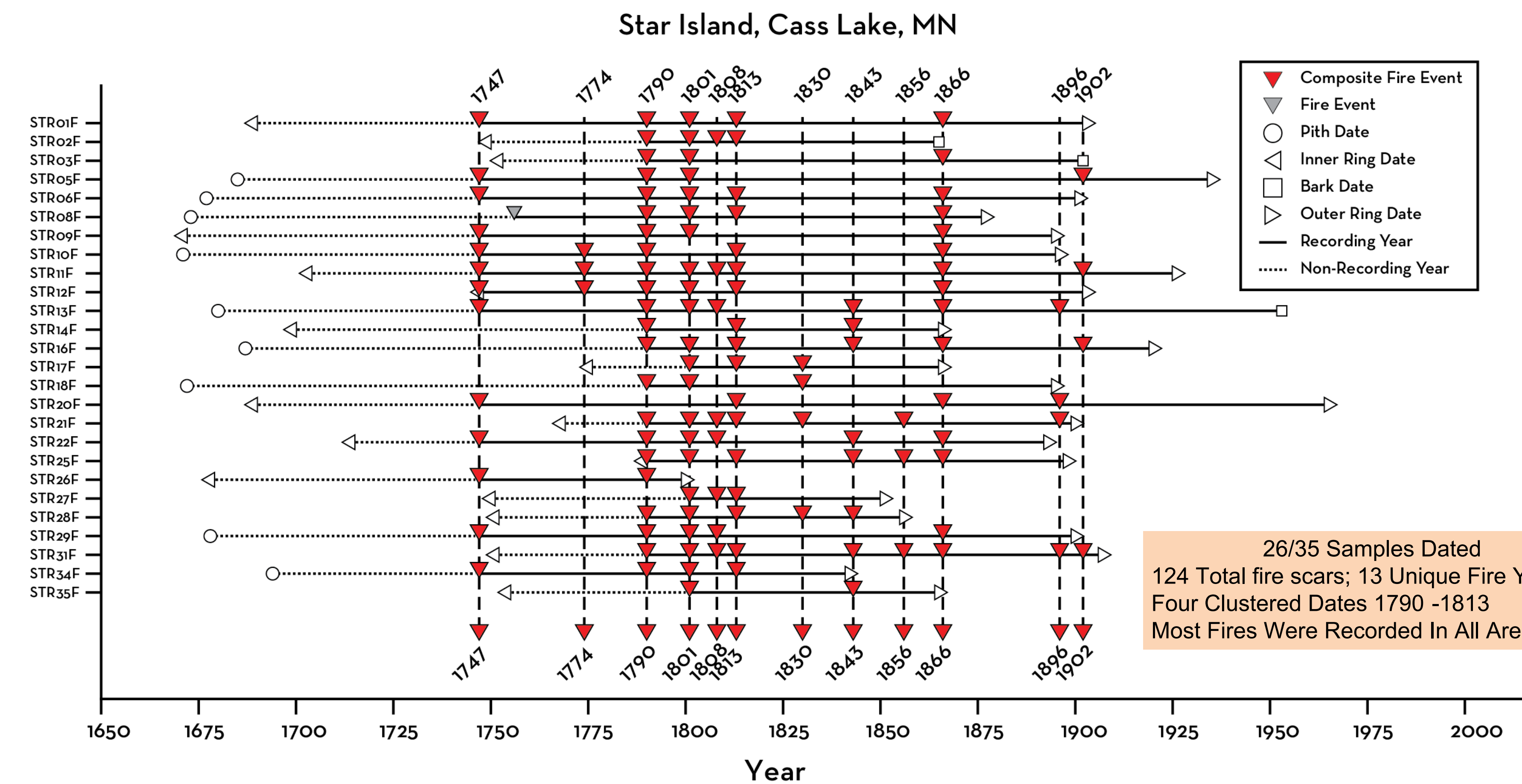
## Research Questions

- What are the historic fire intervals on Star Island and how do fire patterns vary spatially and temporally across the land?
- How does the timing on fire activity on the island relate to human land use patterns?
- How do fires influence ring-width patterns of living red pines?

## Methods

Cross sections, partial cross sections, and core samples were taken from stumps and live trees as encountered in the field opportunistically around the island. These samples were transported back to the laboratory and processed using fine sanding techniques until individual tracheid cells were visible under magnification. To visually crossdate annual rings, skeleton plotting techniques were used, and fire-scarred lesions were able to be dated based on their placement within annual rings. A master dating chronology of core samples taken from living red pines was compiled from composite dating analysis from individual trees. This chronology was then compared with the fire-scar dates compiled from cross sections.

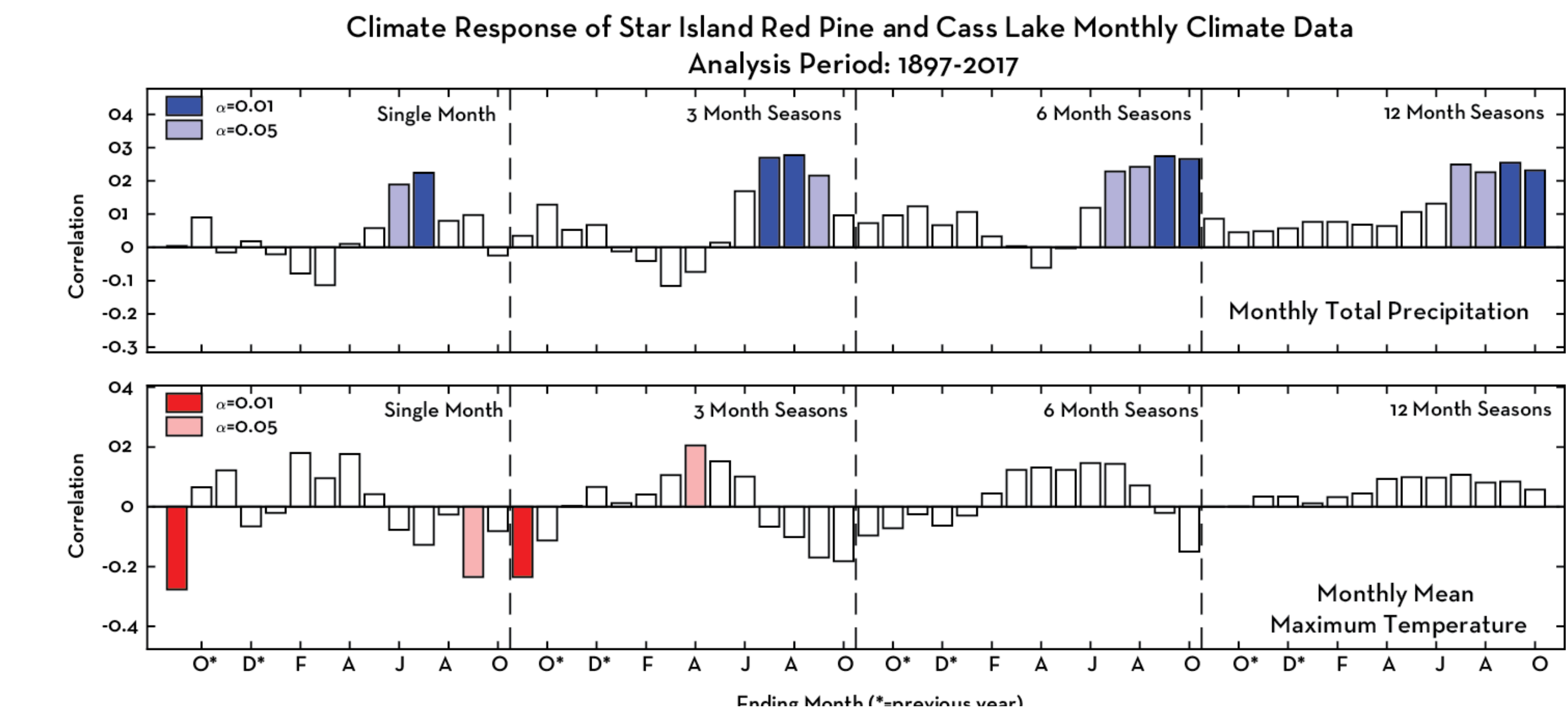
## Fire - Growth Relationships



## Conclusions

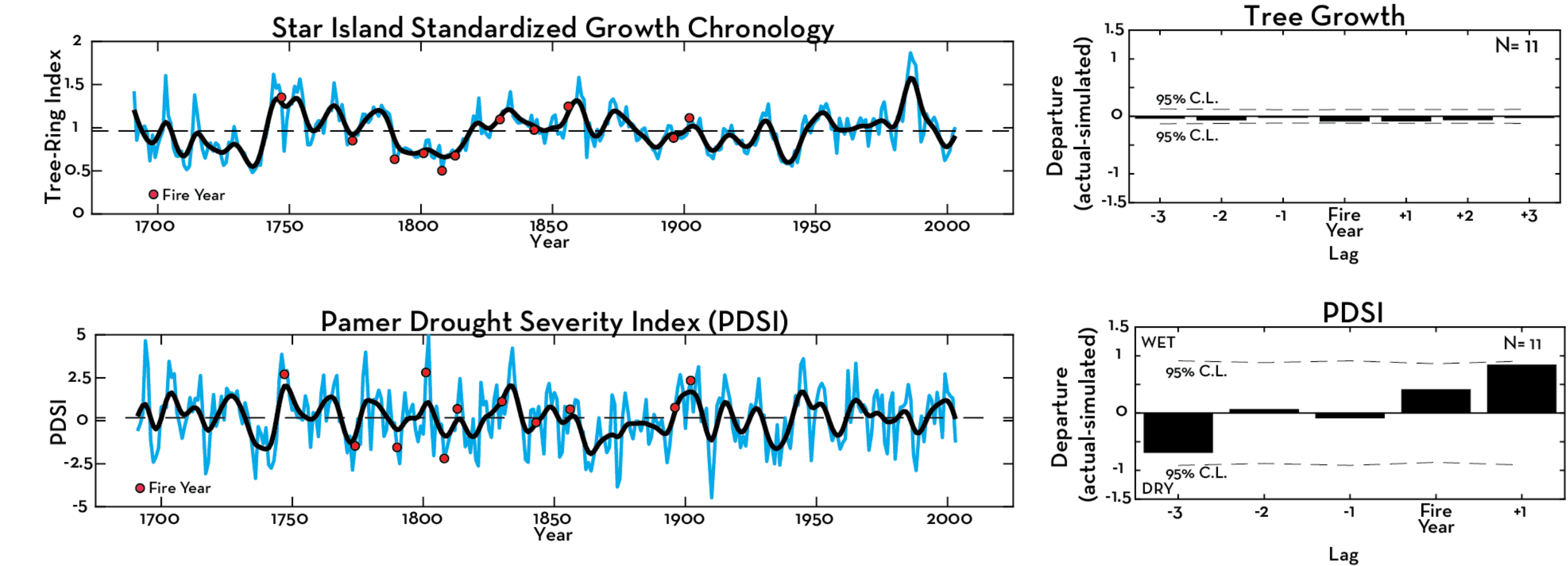
Consistent patterns of fire events are clustered within 1790 - 1813 throughout most sampled areas of Star Island. Using historic climate data and drought analysis, it can be concluded that no significant amount of fire events were ignited by lightning or other natural factors. Considering the heavy use of the land for Native American living within the time period of these fire events, it is more than likely the fires were used as land management practices by the Ojibwe. Cultural information provided by the Leech Lake Band of Ojibwe as well as historic travelers' journals suggest management practices include burning land for berry cultivation on the island, as well as for clearing brush as a safety management practice.

## Climate - Growth Relationships



## Findings

In general, growing season precipitation positively influences tree growth. The summer total precipitation from June and July significantly influences annual tree growth in the red pines of this study area. Significant inverse temperature identified in September prior to the growing season is unusual and requires additional investigation.



## Findings

Fire Events on Star Island are not significantly related to drought during summer seasons, and there were no significant impact on growth related to fire events. Anthropogenic ignitions tend to mask any potential climate influence, shown here.

## Acknowledgements

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