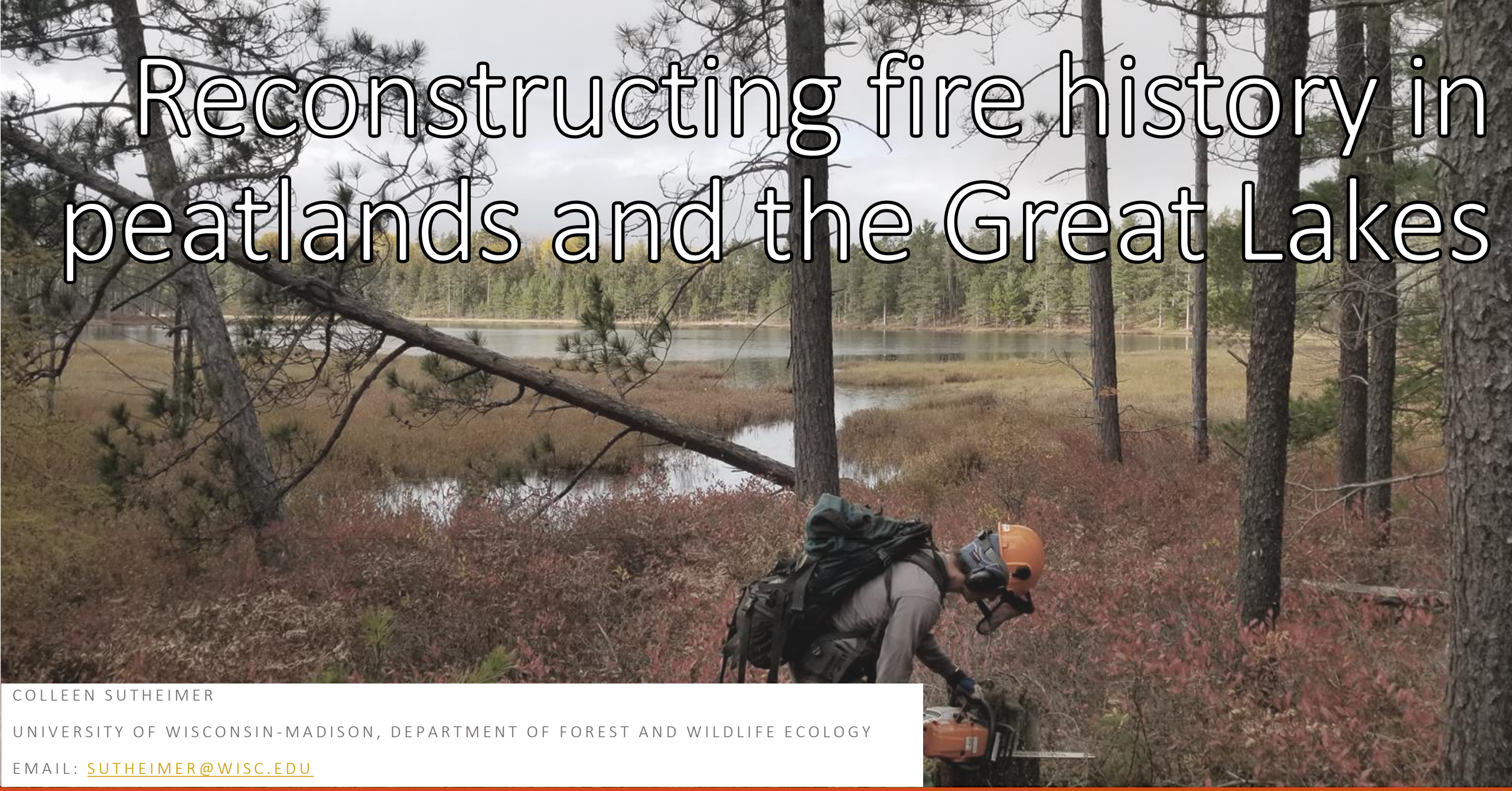
Reconstructing fire history in peatlands and the Great Lakes



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Rationale

- Lack of fire history information for the Great Lakes generally and peatlands specifically
- Fire history in peatlands and the Great Lakes has been primarily reconstructed using severe infrequent fire
- Using alternative methods like dendrochronology provides a more comprehensive fire history

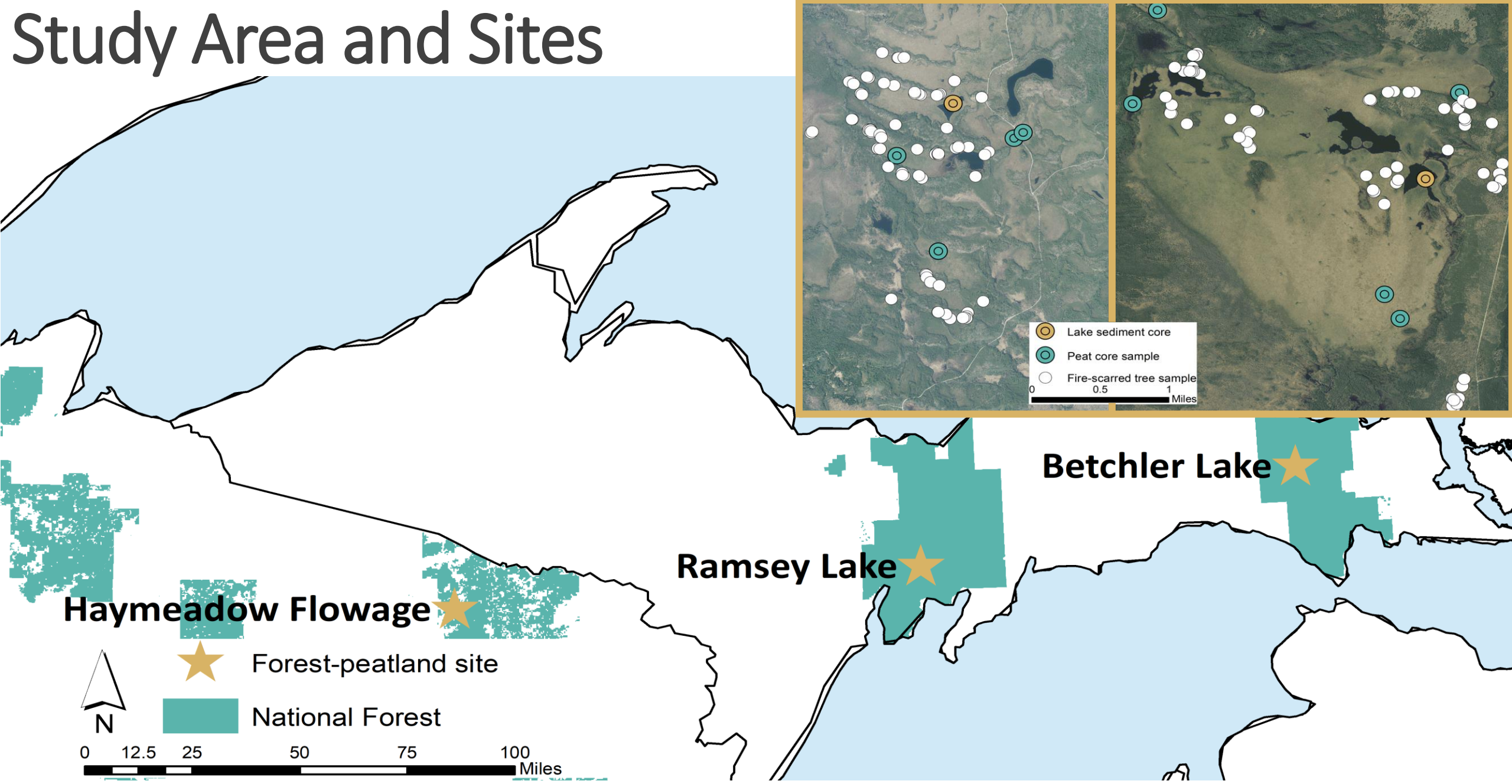
Objectives

- Determine frequency of low-severity fire (mean fire return intervals) in Great Lakes peatlands
- Reconstruct fire history across the Great Lakes region
- Inform fire management at relevant scales using regional datasets

Methods

- Sampled peatlands across Great Lakes region using multiple techniques
  - Dendrochronology (WDNR and UW-Madison)
  - Peat sediment core analysis (Michigan Tech University)
  - Lake sediment core analysis (WDNR and UW-Madison)

Study Area and Sites



Dendrochronology

- Identifies low-severity frequent fire
- Sample fire-scarred stumps (from the 1800s logging cutover) and trees
- Use tree rings and fire scars to determine the year and season of fire
- Finest scale of 100+ year fire history with 1-year resolution

Sediment core analyses

Identifies infrequent high-severity fire

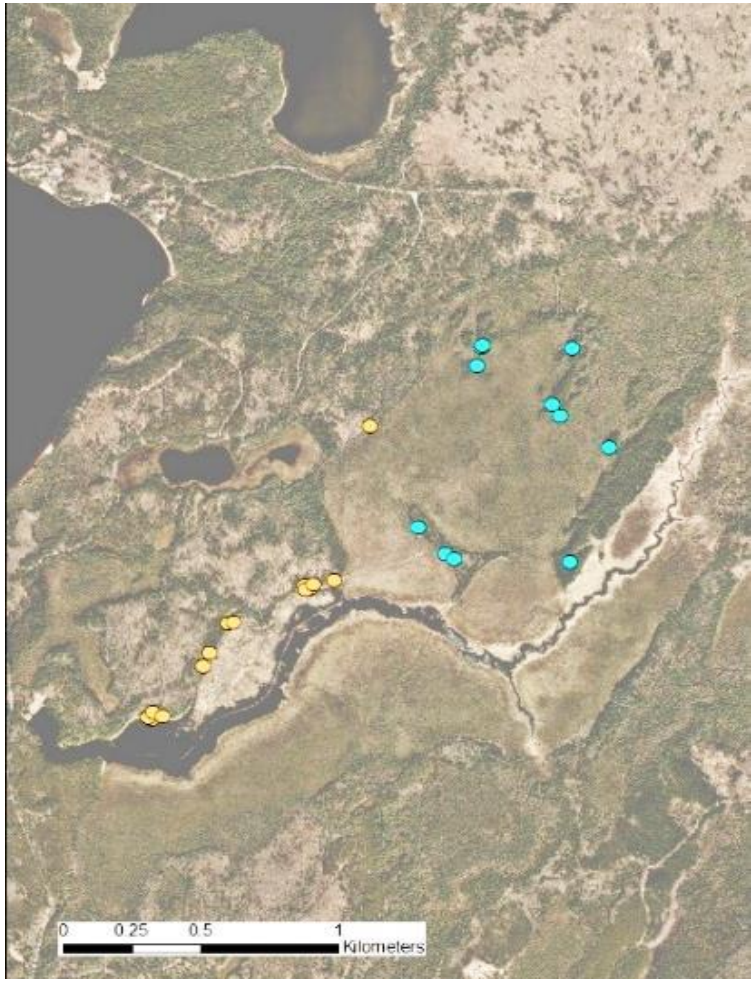
Peat

- Core into peat soil
- Identify bands of charcoal deposited during fires
- Broader scale of 500 to 1000-year fire history with 50-year resolution

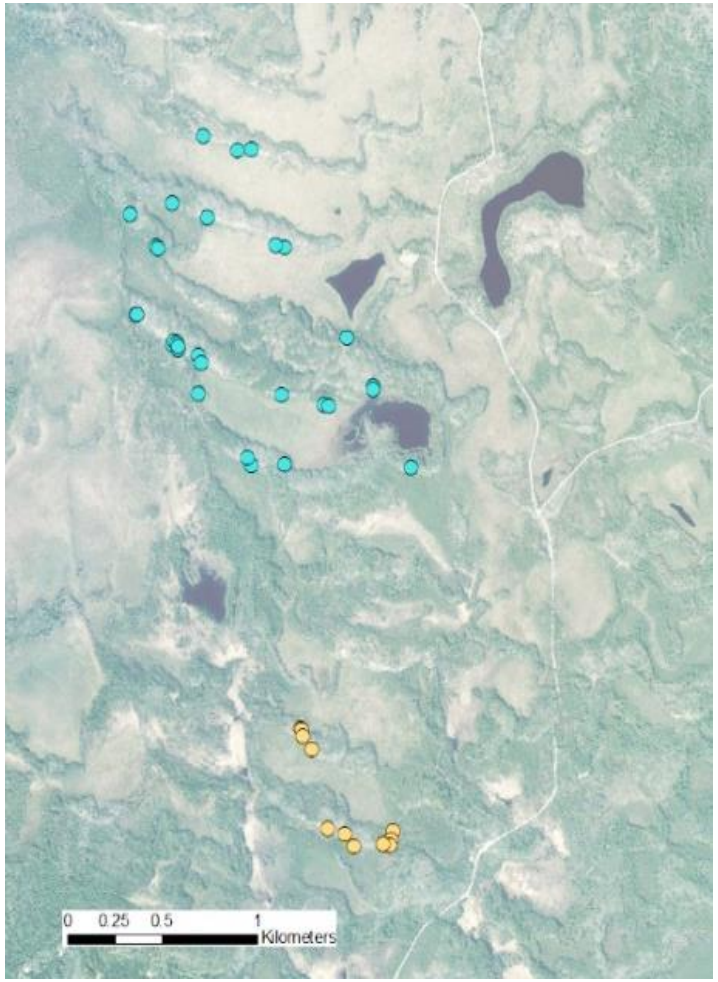
Lake

- Core into lake sediment
- Determine abundance of charcoal across time, peaks in charcoal indicate fire occurrence
- Broadest scale of over 1000+ year fire history with 10-year resolution

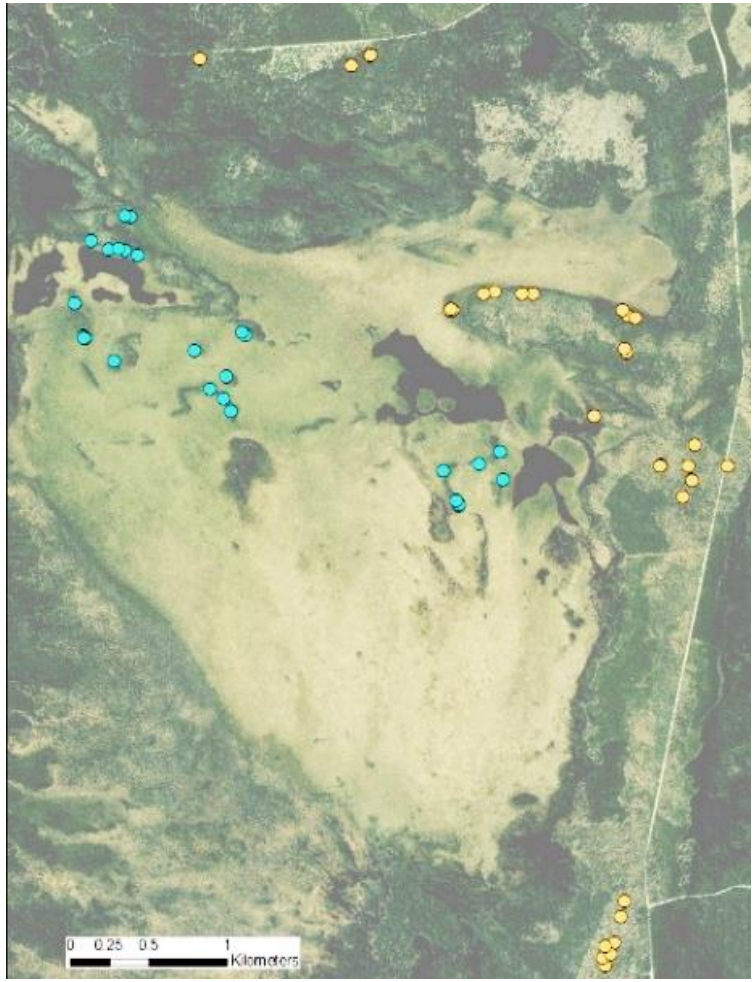
	No. samples	Area sampled (ha)	Unfiltered Mean Fire Return Interval (yr)	Filtered Mean Fire Return Interval (yr)	Time Span
Haymeadow Flowage	26	82	7	18	1697–2019
Ramsey Lake	41	278	8	24	1570–2018
Betchler Lake	62	1217	5	34	1520–2018



Haymeadow Flowage

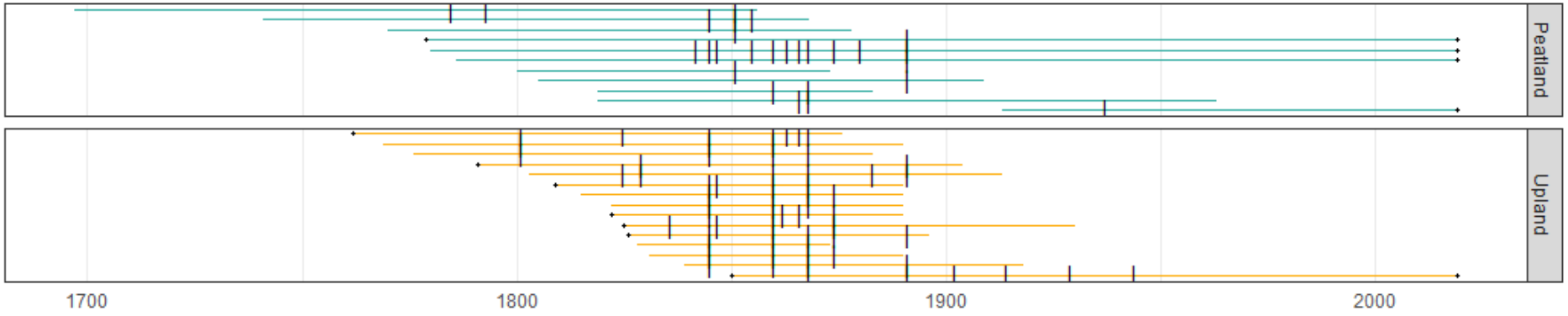


Ramsey Lake



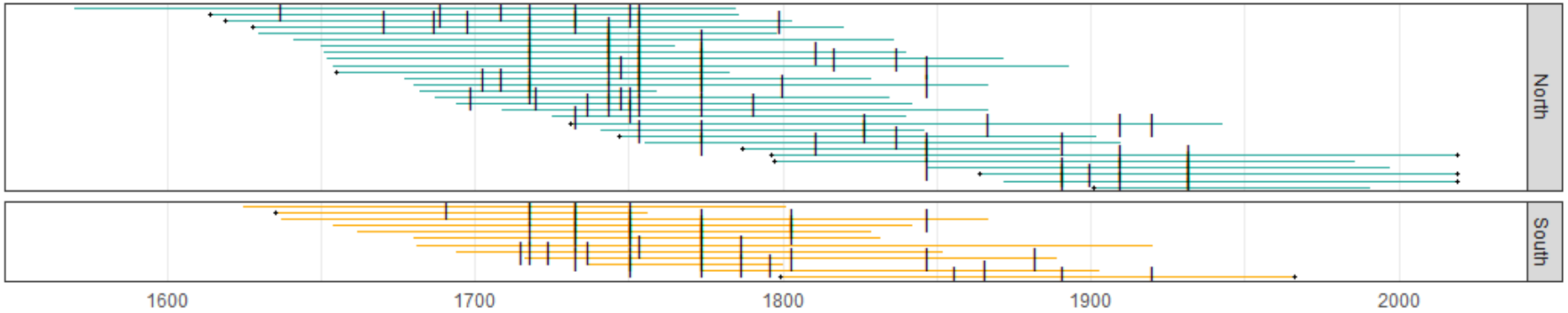
Betchler Lake

Haymeadow Flowage(a)



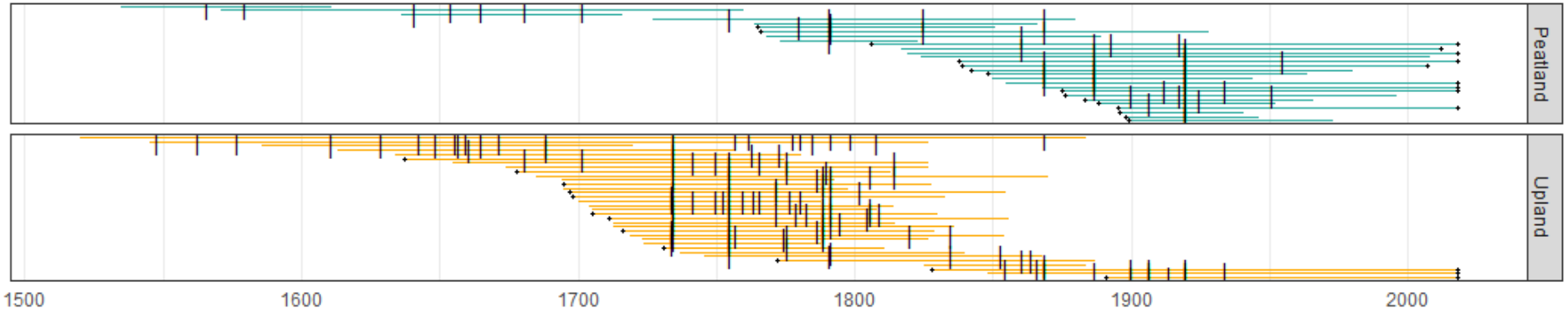
Synchronous fire years: 1845, 1847, 1860, 1863, 1866, 1868, 1874, and 1891

Ramsey Lake(b)



Synchronous fire years: 1665, 1681, 1702, 1755, 1791, 1792, 1869, 1887, 1900, 1907, 1920, and 1934

Betchler Lake(c)



Synchronous fire years: 1718, 1733, 1737, 1751, 1754, 1774, 1847, 1891, and 1920

Conclusions

Historically, low-severity fire was frequent in peatlands of the Great Lakes

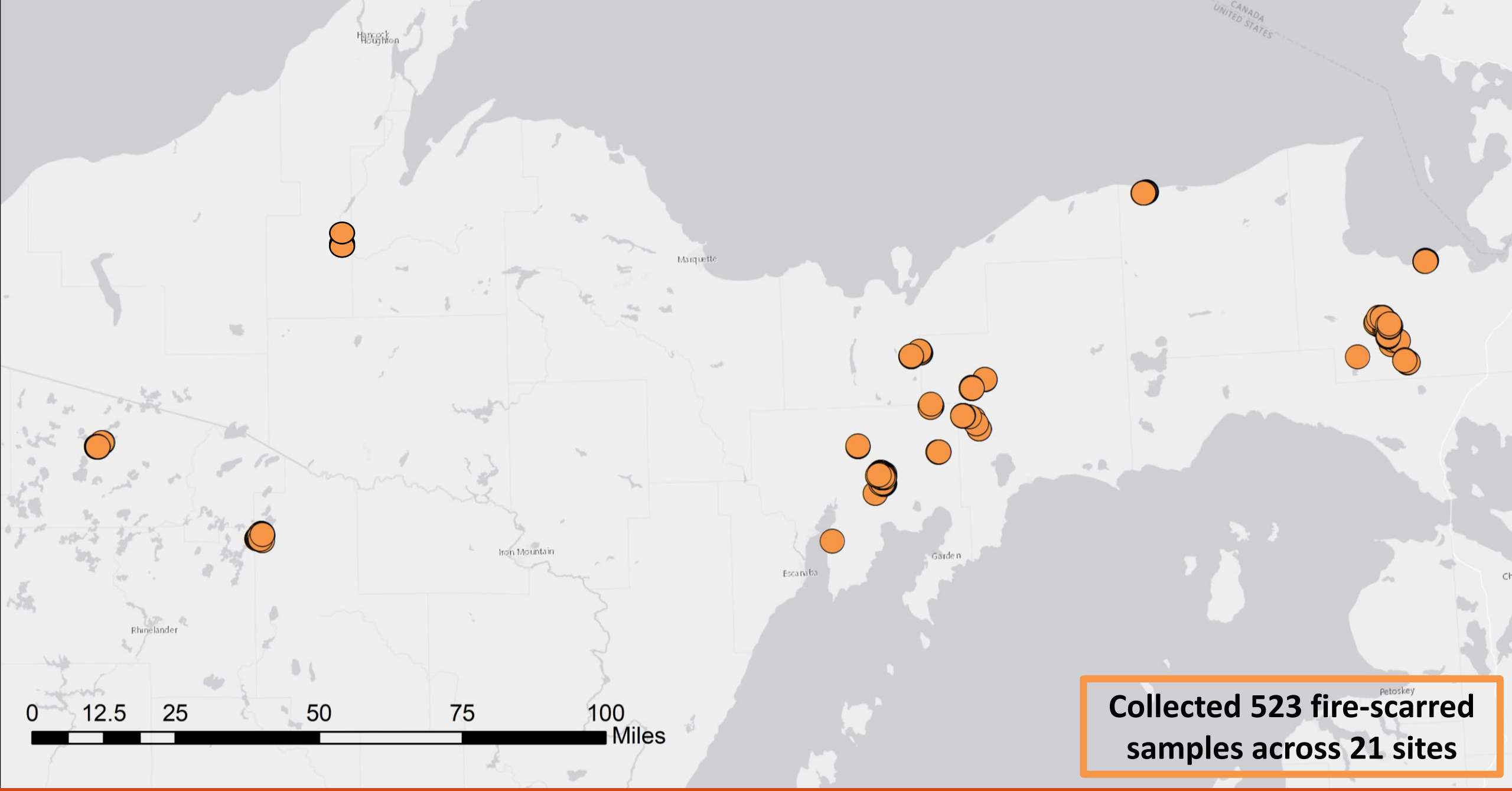
Frequent low-severity fire was historically an important process and could be necessary to preserve peatlands

We found evidence fires originated in peatland fuels and spread to forested islands and ridges

Reconstructing fire history using multiple methods contributes to a more complete understanding of fire's role in the Great Lakes

We are continuing to add sites across the Great Lakes to reconstruct a regional fire history that accounts for low-severity fires

Hiawatha National Forest-USFS



Collected 523 fire-scarred samples across 21 sites

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LANDFIRE

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