A fireside chat
Large wildfires are a looming threat to US lakes

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Landscape Ecology
Forests, lakes, fire, climate

One day in the mountains

RESEARCH REVIEW

Do lakes feel the burn? Ecological consequences of increasing exposure of lakes to fire in the continental United States

Ian M. McCullough ✉, Kendra Spence Cheruvelil, Jean-François Lapierre, Noah R. Lottig, Max A. Moritz, Joseph Stachelek, Patricia A. Soranno

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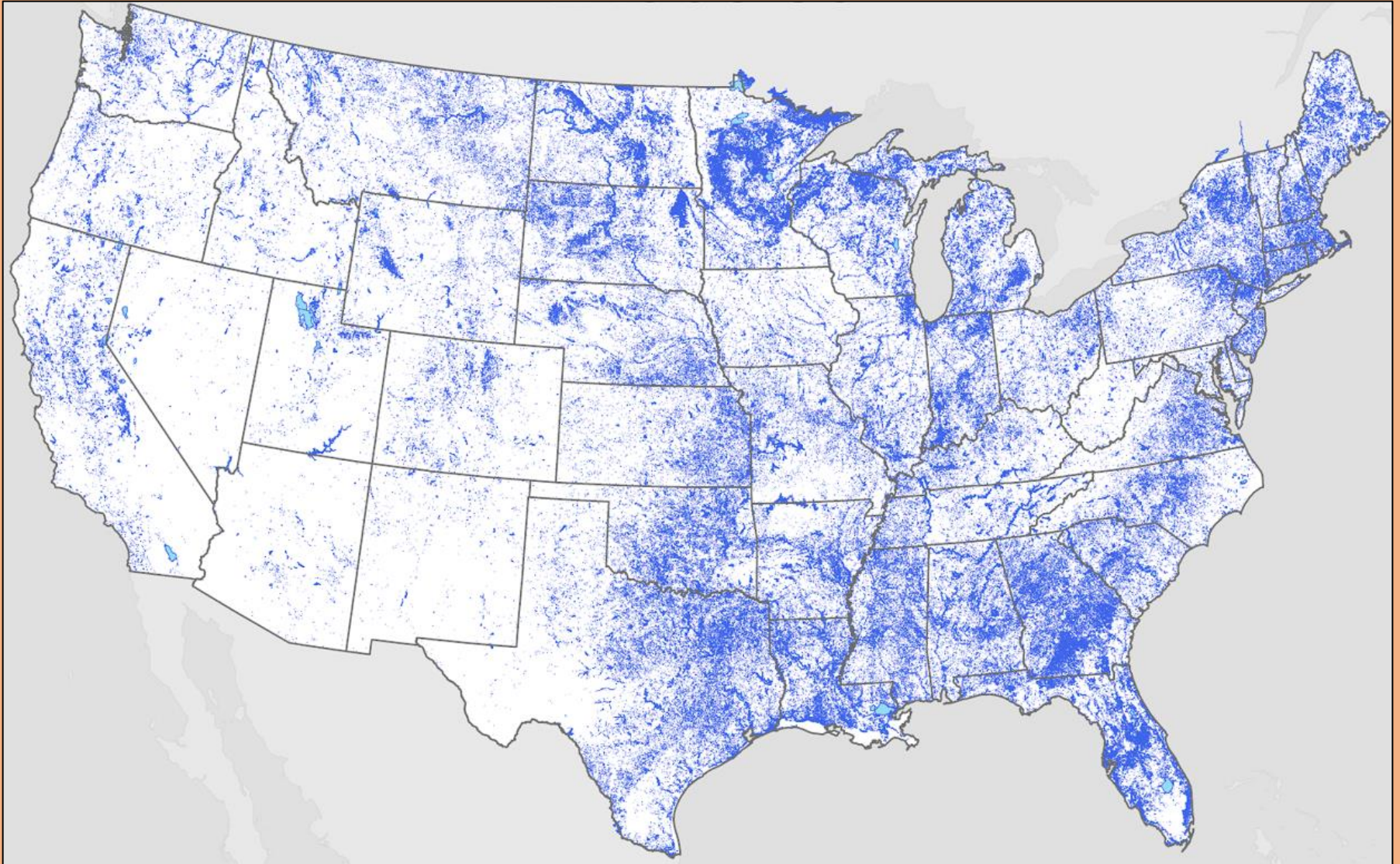
Lakes of the US: 479,950 ≥ 1 ha

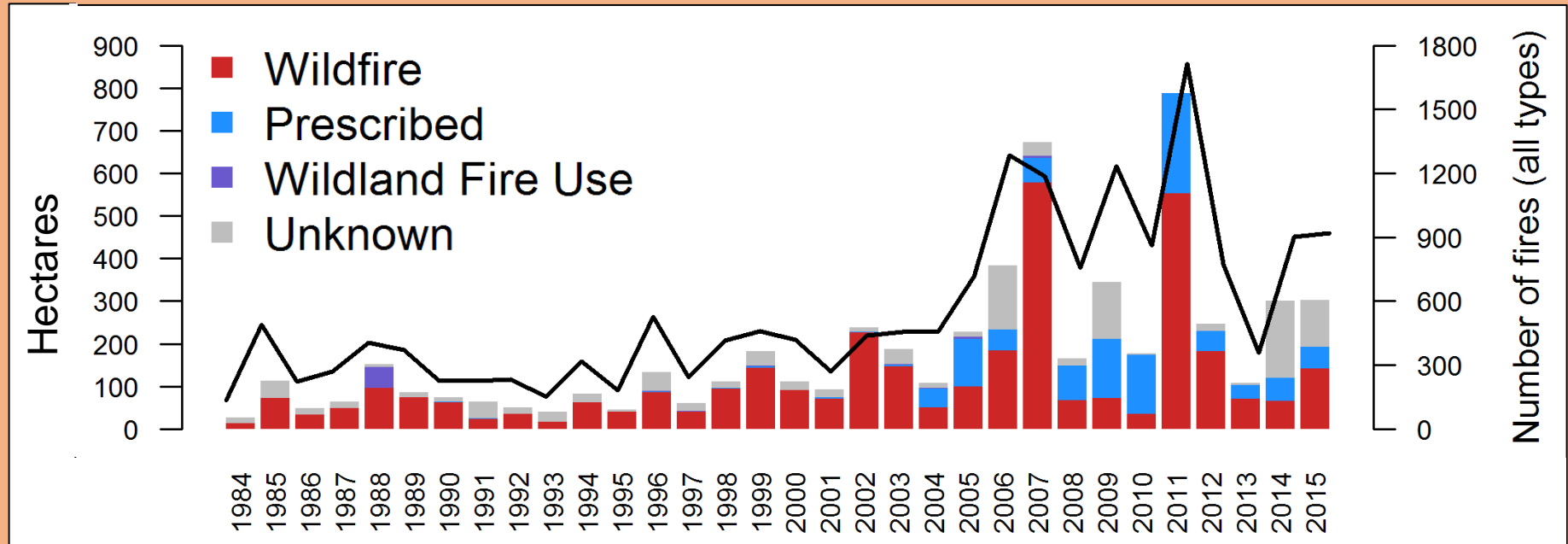# Wildfires of the US

Wildfire, 1984

369400 ha burned (Monitoring Trends in Burn Severity)

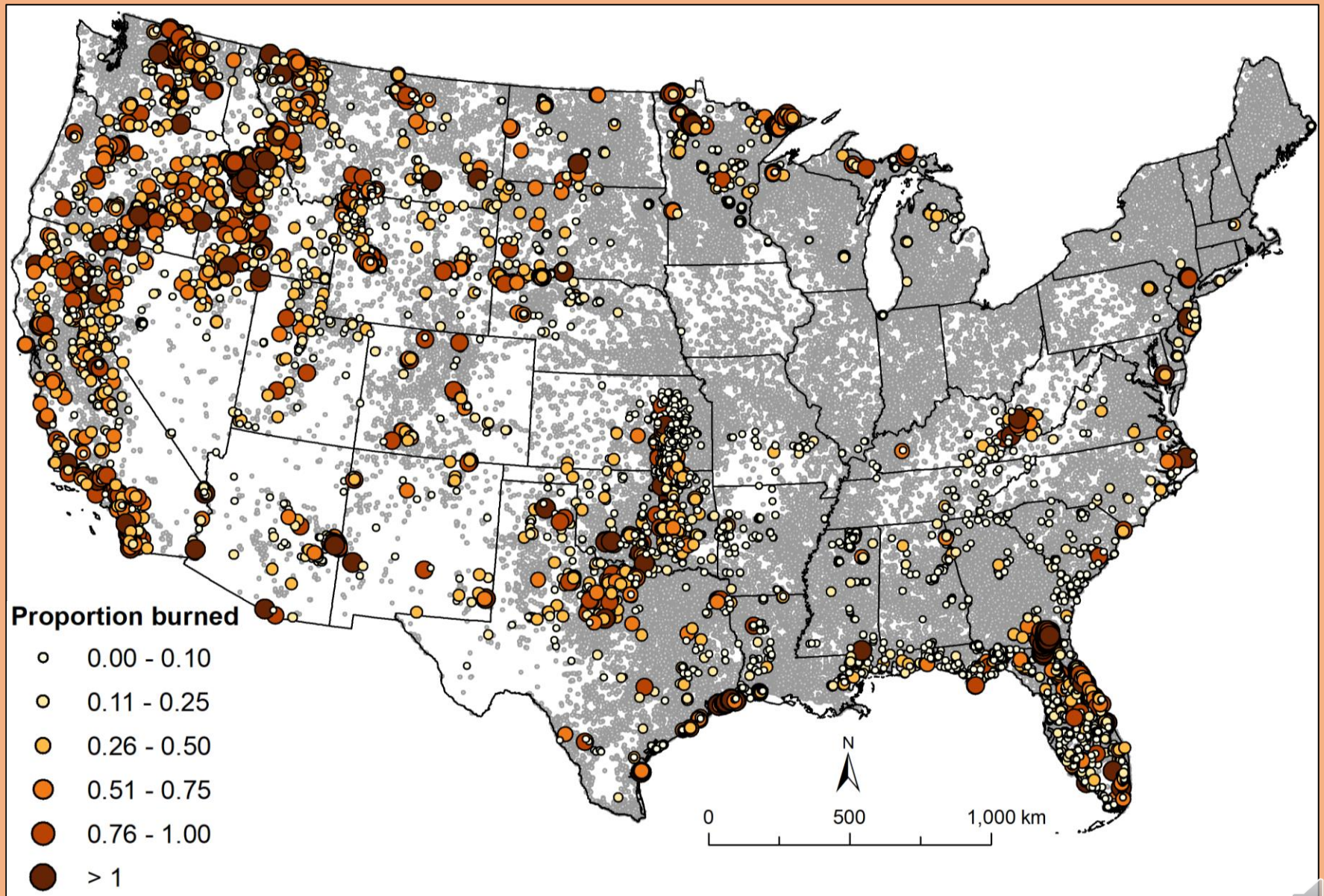# Increasing fire in US lake watersheds

McCullough et al. (2019). *Global Change Biology*.

21500 lakes with at least 1 watershed fire from 1984-2016

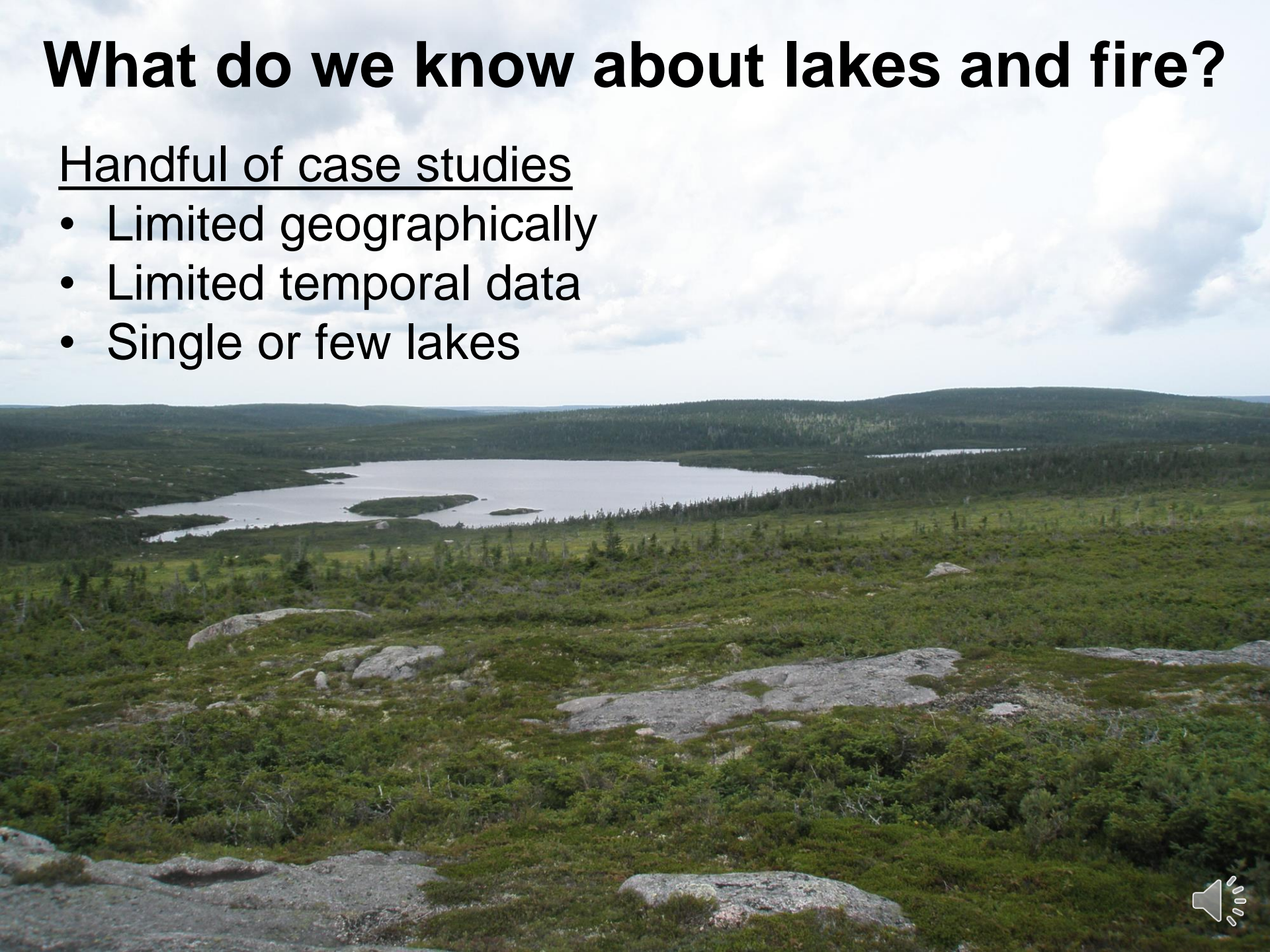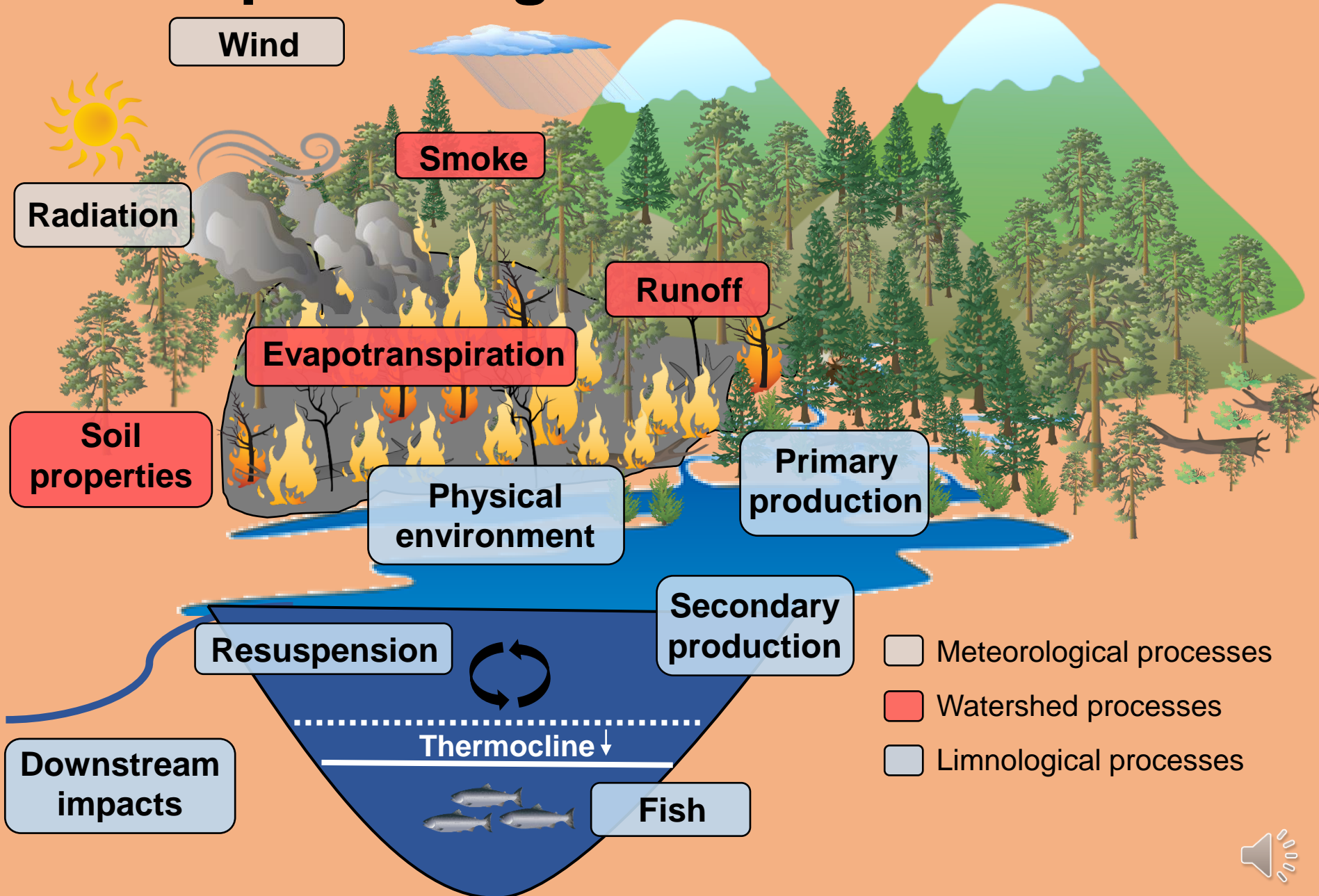# Increasing fire in US lake watersheds

Proportion burned

- ○ 0.00 - 0.10
- ○ 0.11 - 0.25
- ● 0.26 - 0.50
- ● 0.51 - 0.75
- ● 0.76 - 1.00
- ● > 1

N

0   500   1,000 km

What do we know about lakes and fire?

Handful of case studies
- Limited geographically
- Limited temporal data
- Single or few lakes
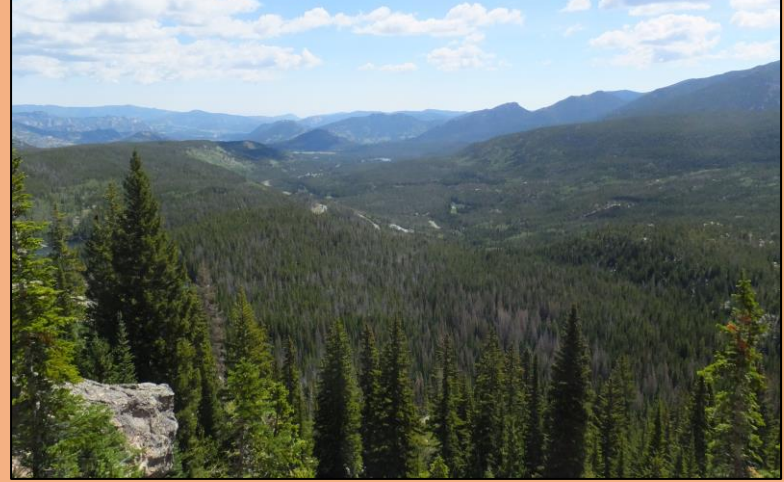
Conceptualizing effects of fire on lakes

We need broad-scale studies

Lake types

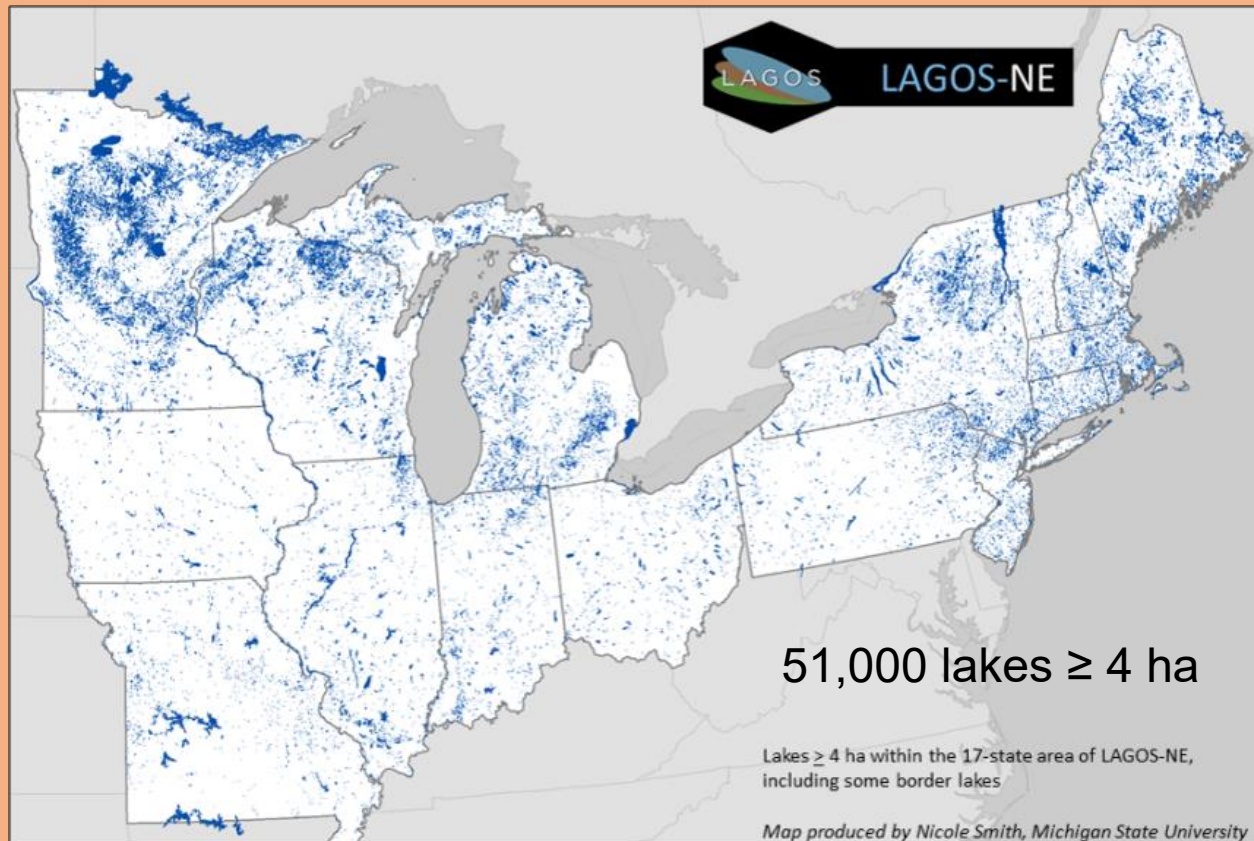**Landscape types**

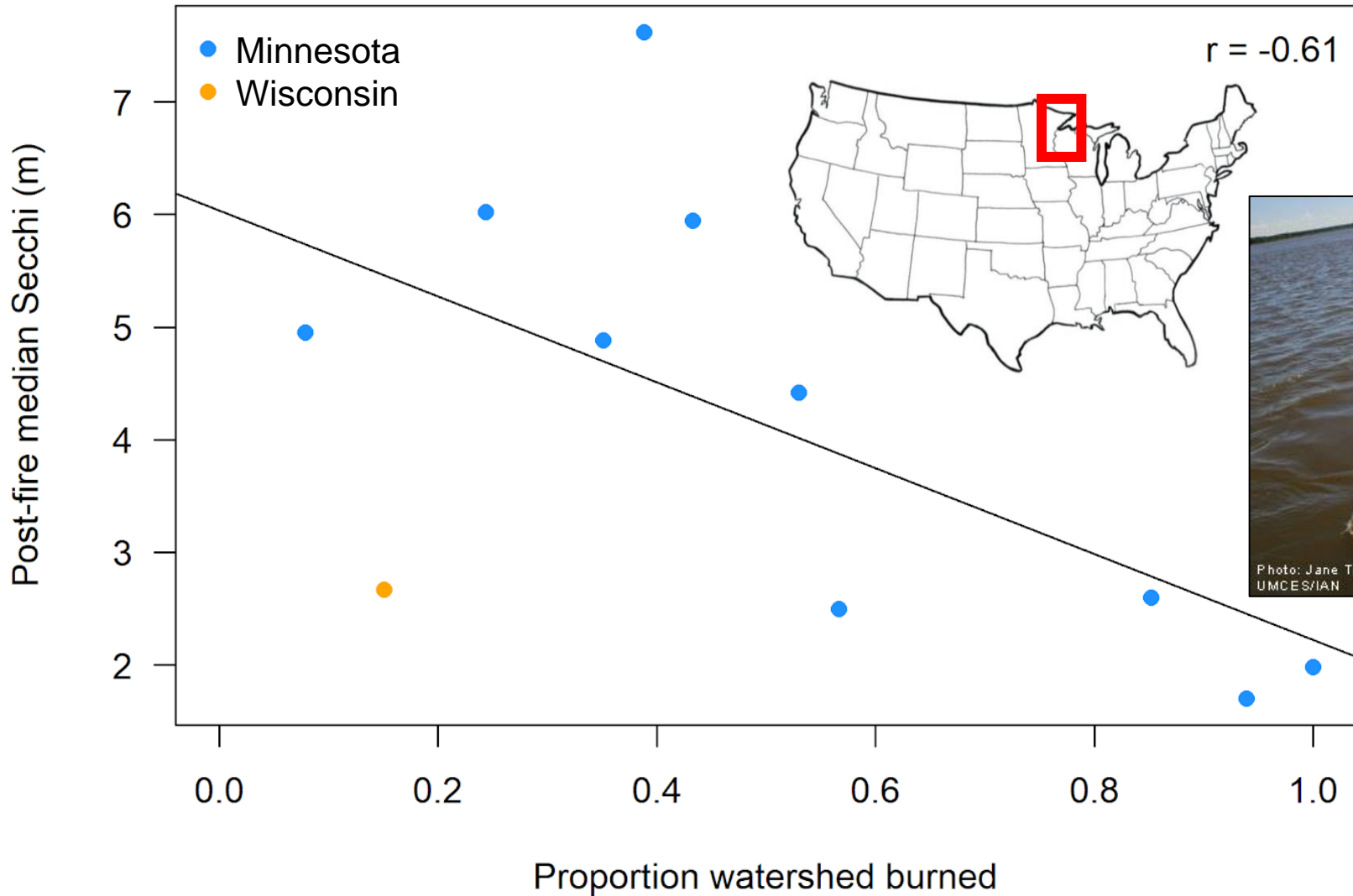**Fire regimes**

Now we need some data

Potential data sources

LAke multi-scaled GeOSpatial and temporal database

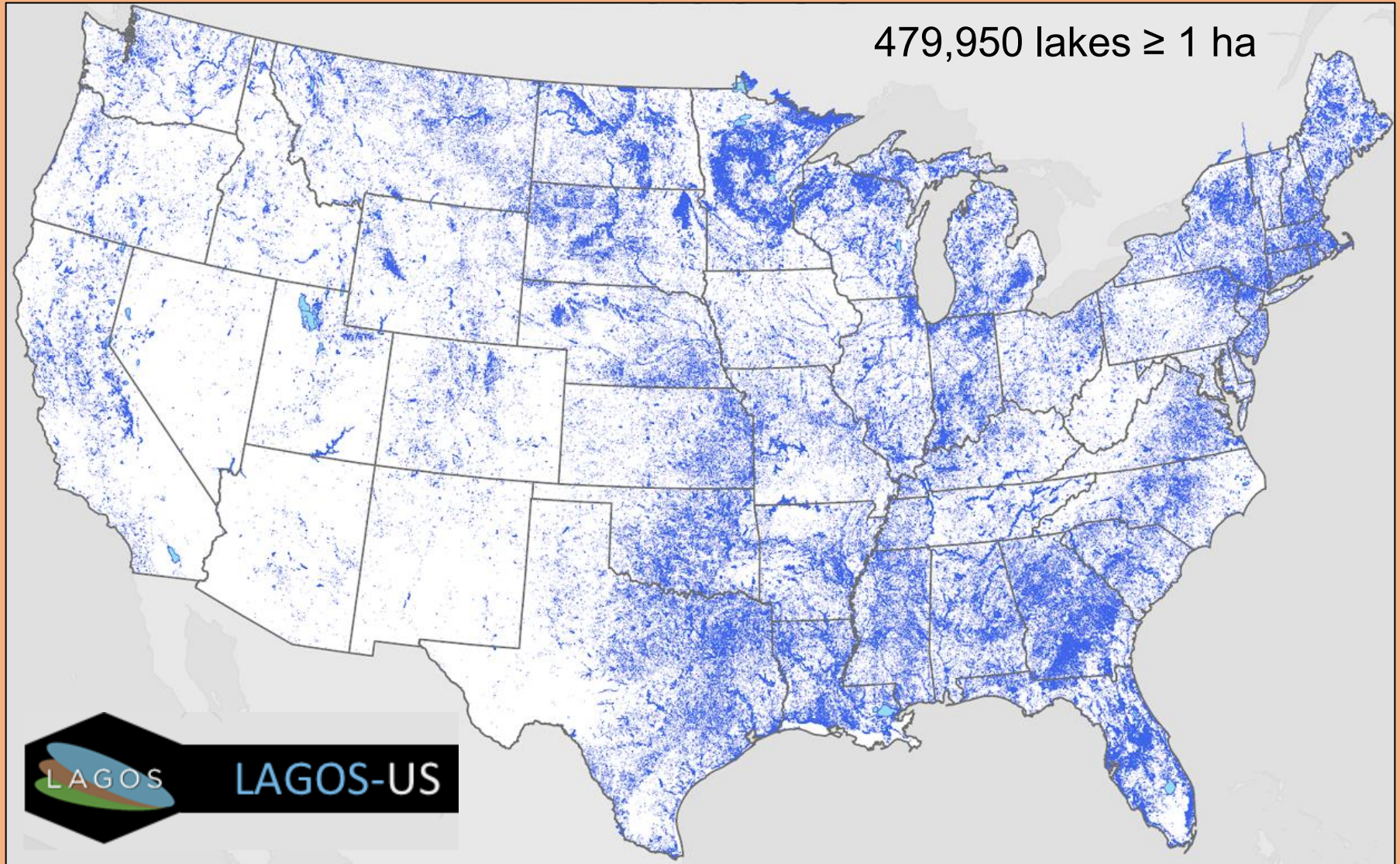Publicly accessible lake water quality database 17 US states

LAGOS-NE

51,000 lakes ≥ 4 ha

Lakes ≥ 4 ha within the 17-state area of LAGOS-NE, including some border lakes

Map produced by Nicole Smith, Michigan State University

Wildfires reduce Midwest lake clarity

Expanding across continental US

479,950 lakes ≥ 1 ha

LAGOS-US: lakes with Secchi data year following fire
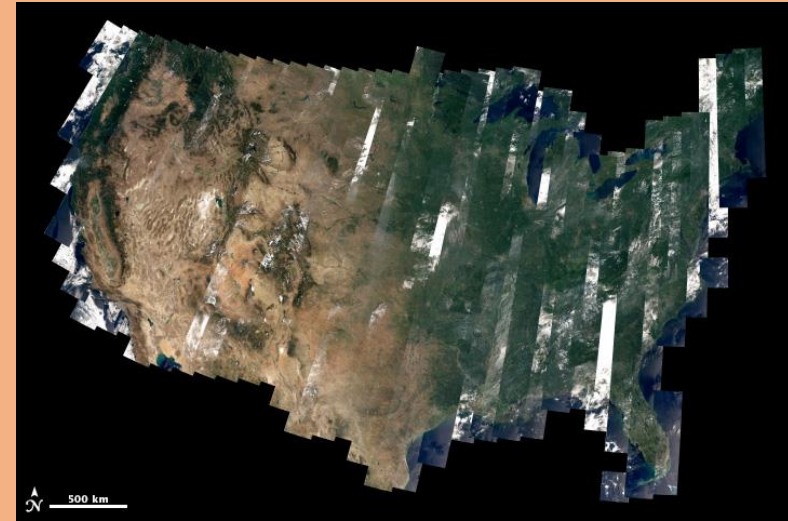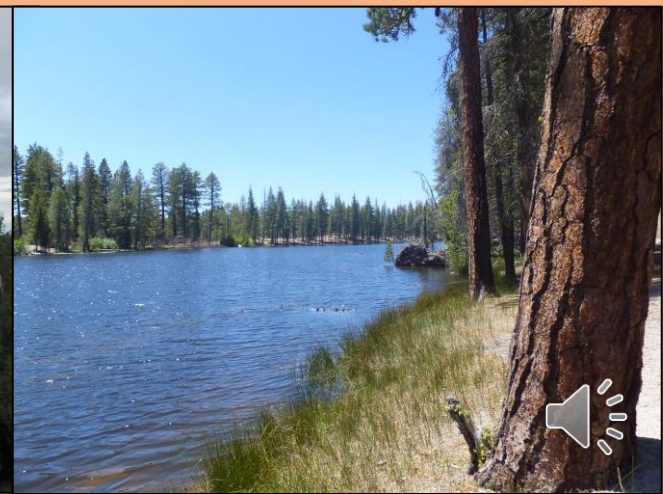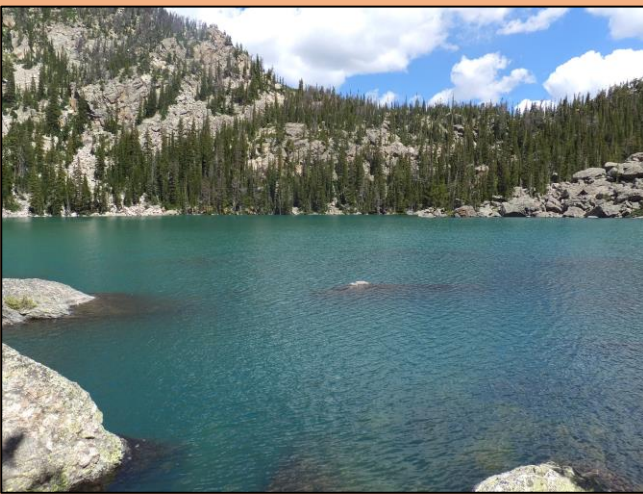

n = 11 lakes
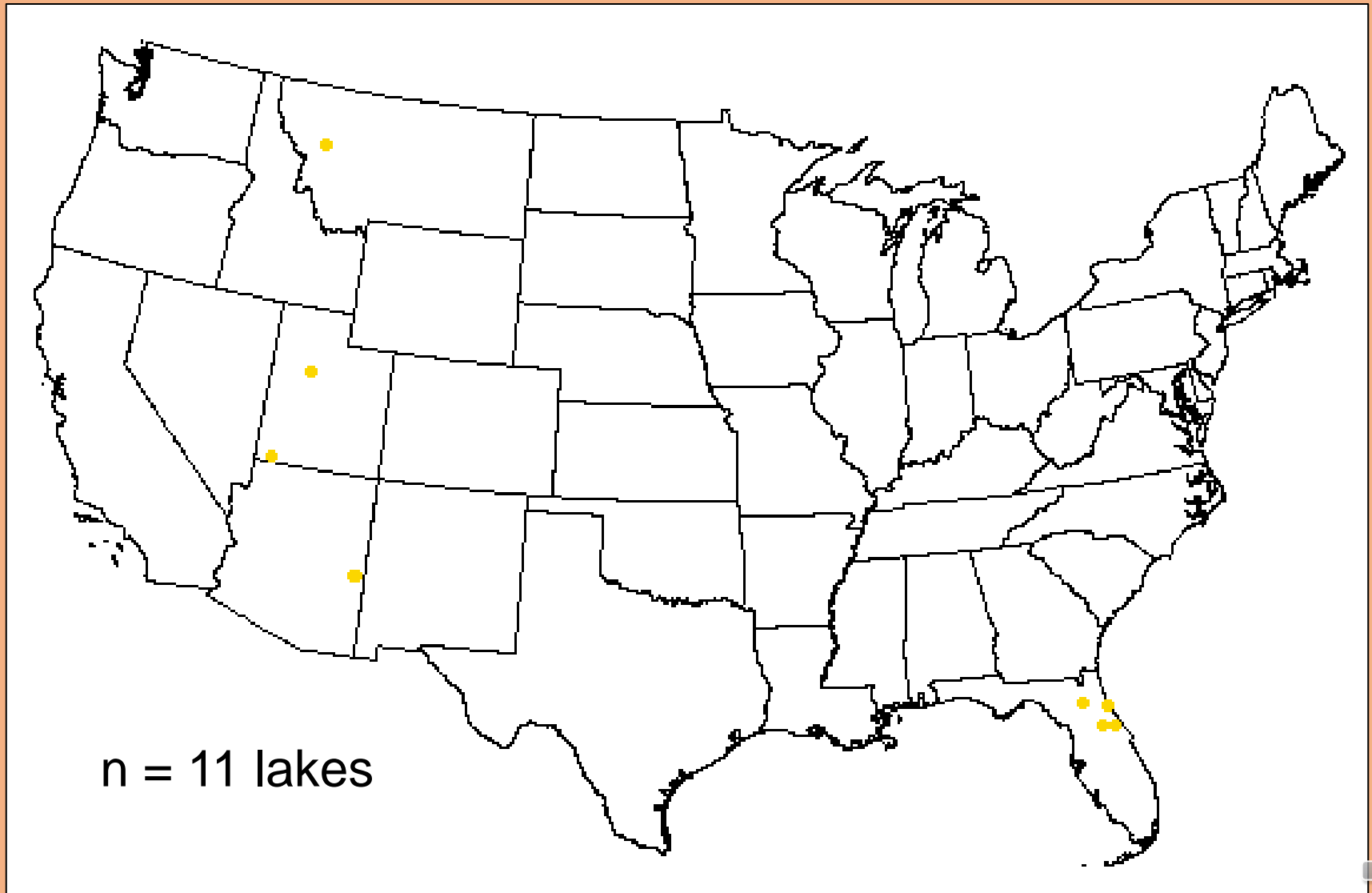
Water quality remote sensing

- Turbidity, chlorophyll-a, Secchi

- Temporal resolution

- Gradients of % watershed burned, burn severity
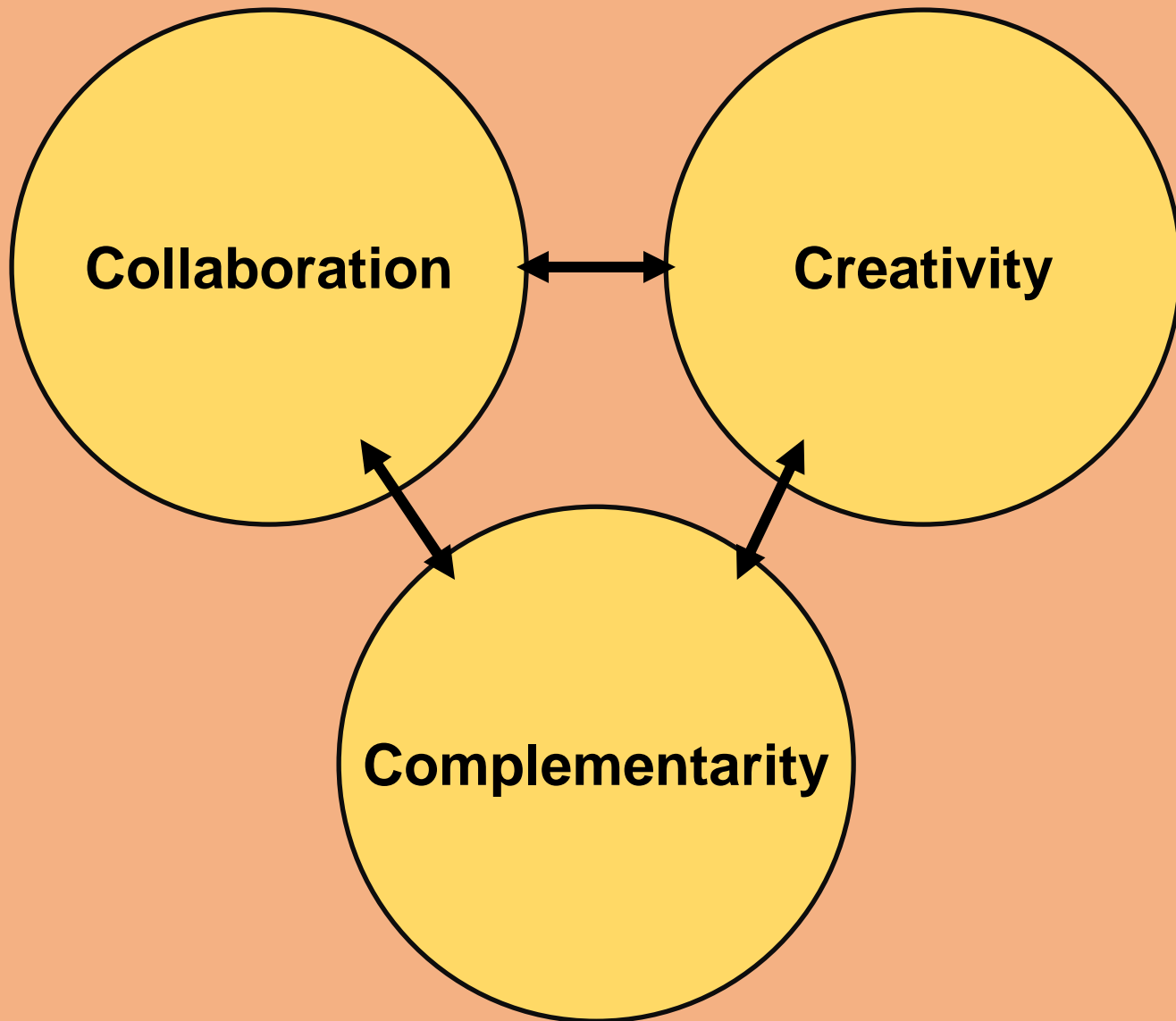
- Diversity of lakes, landscapes, fire regimes

Landsat 8 scenes

https://earthobservatory.nasa.gov/images/83099/landsat-8s-first-year

500 km

Concluding remarks

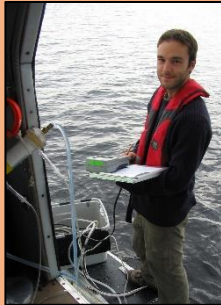**Collaboration** ↔ **Creativity**

Complementarity

Collaboration

- Disciplines, subdisciplines

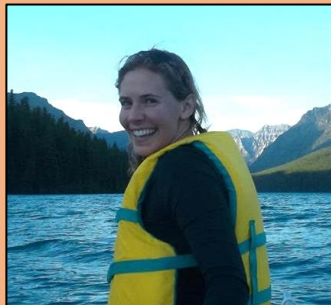**K. Cheruvelil** **J. Lapierre** **N. Lottig** **M. Moritz** **J. Stachelek** **P. Soranno**

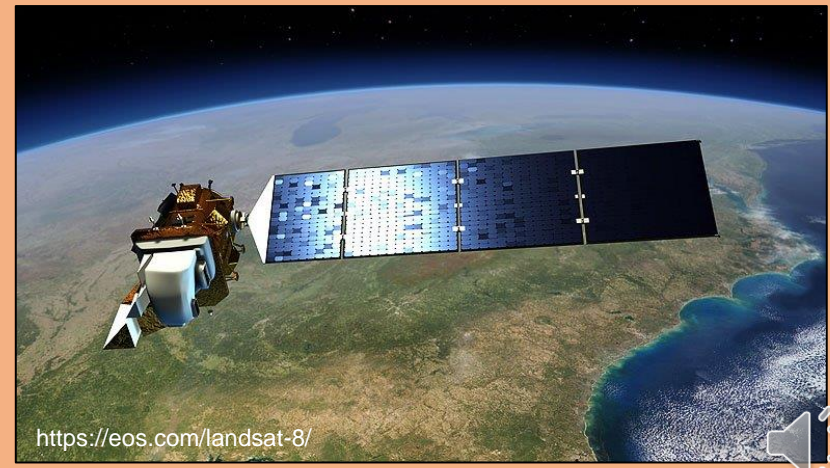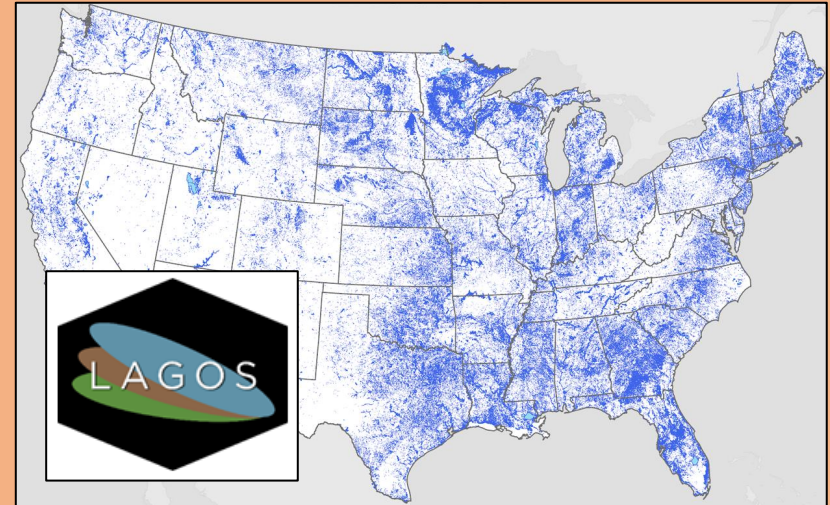- Researchers and managers
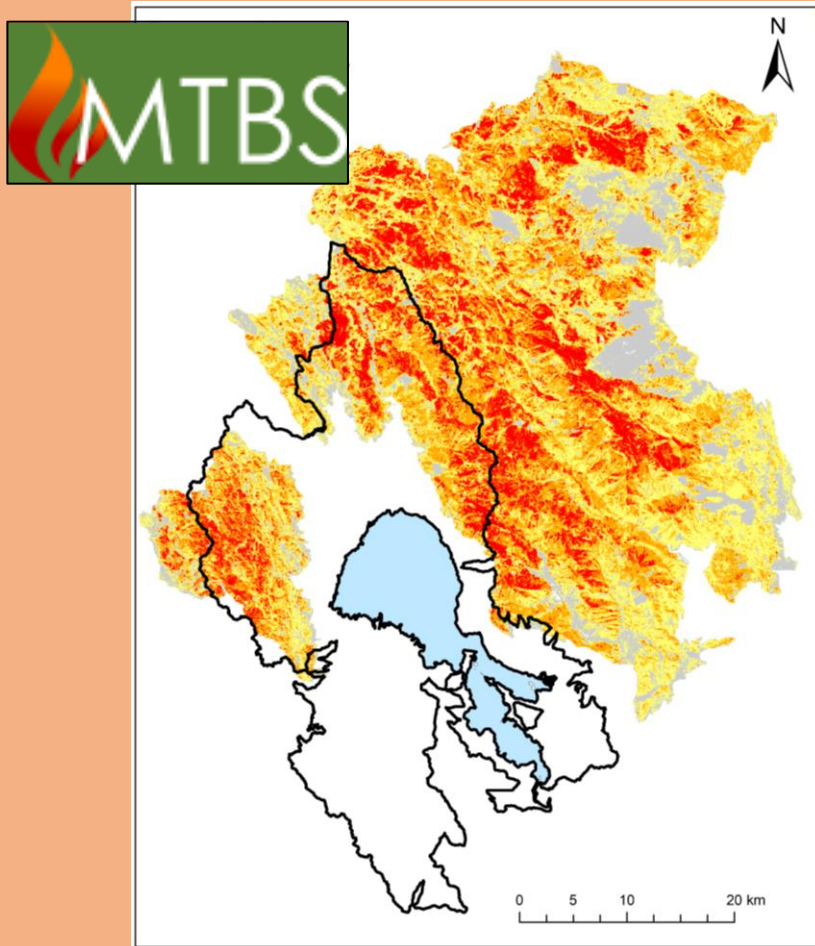
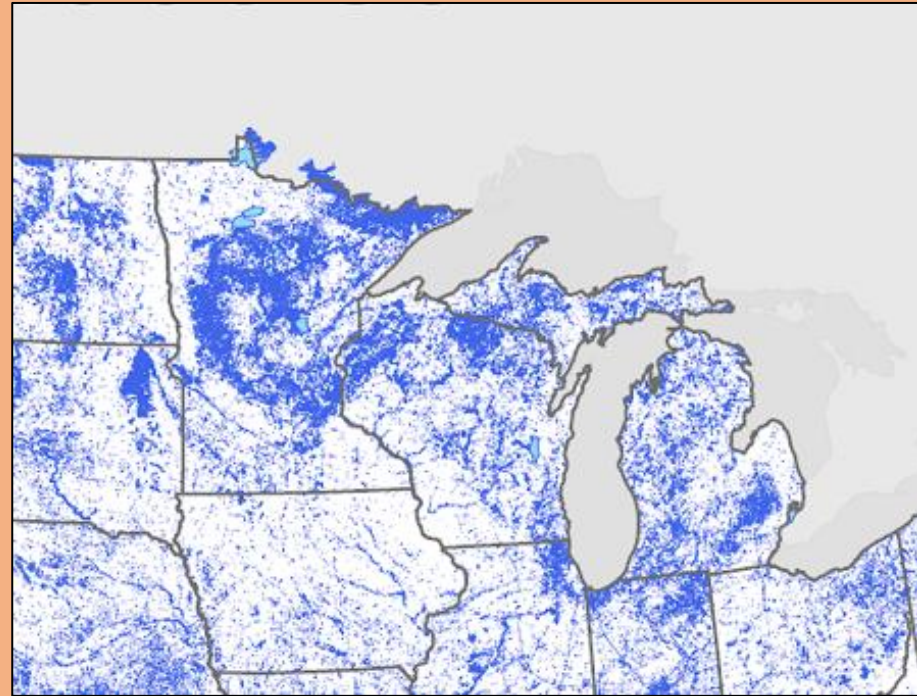**A. DePalma-Dow** **J. Brentrup** **M. Complex Fire**

Source: NPR

Creativity

- Leverage big data, existing data, remote sensing, others

https://eos.com/landsat-8/

Complementarity

- Local-scale and broad-scale studies
  go hand-in-hand

Acknowledgements
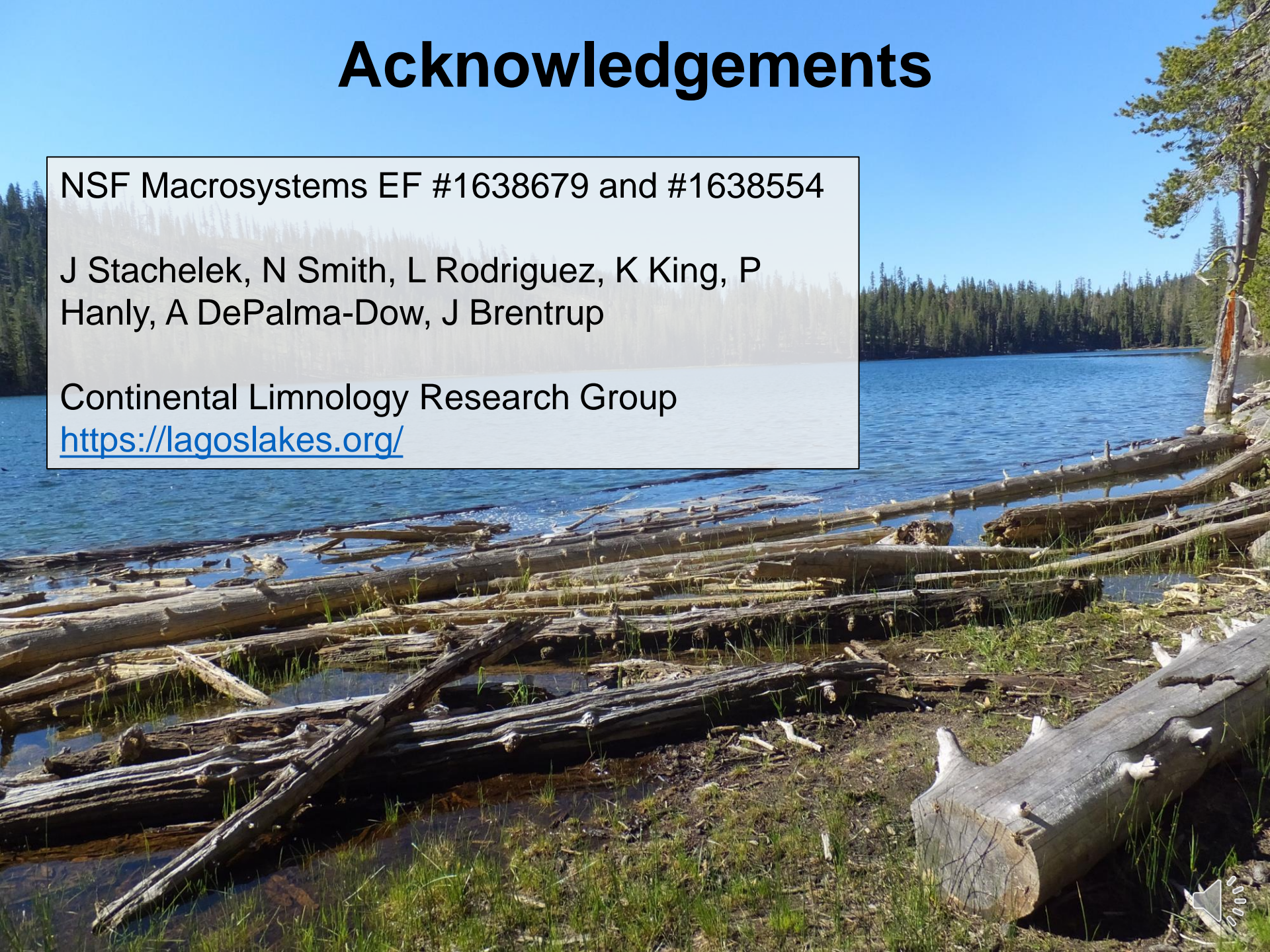
Thank you for watching
immccull@gmail.com