

Indigenous perspectives on novel forests and ecosystem change

Yale Forest Forum: Understanding Climate-Smart Forestry

November 6, 2023

Mike Dockry, PhD

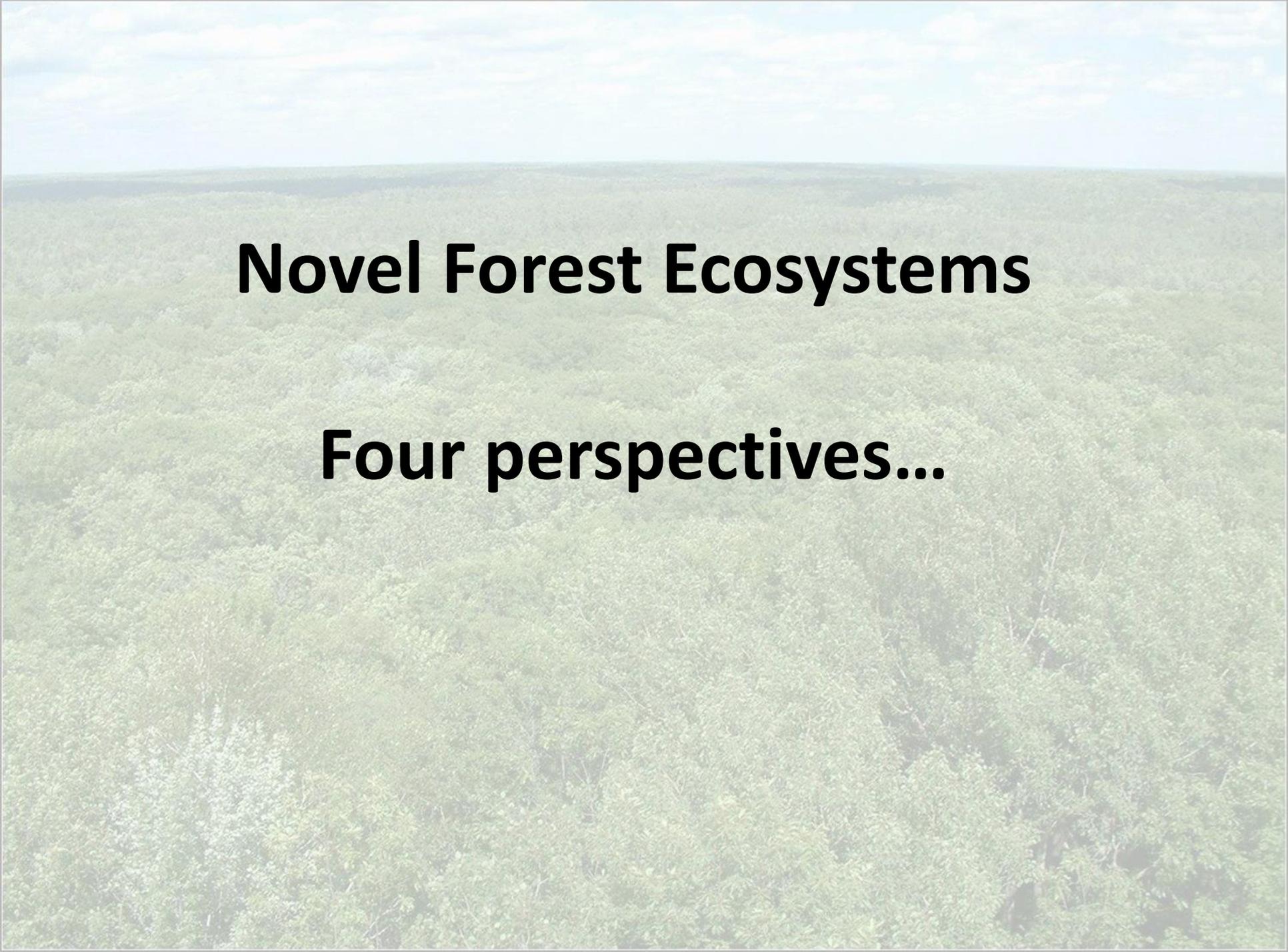
University of Minnesota

Acknowledgement of where I live and work

I live and work in the traditional, historical, and contemporary lands of the Dakota people. I am obligated to build relationships with Dakota and other Indigenous people of the region and to support their goals for natural resource management. I teach about and research tribal forest management so others can do so as well. This is one of the reasons I am speaking today.

Neshnabek Bodcuszdmik



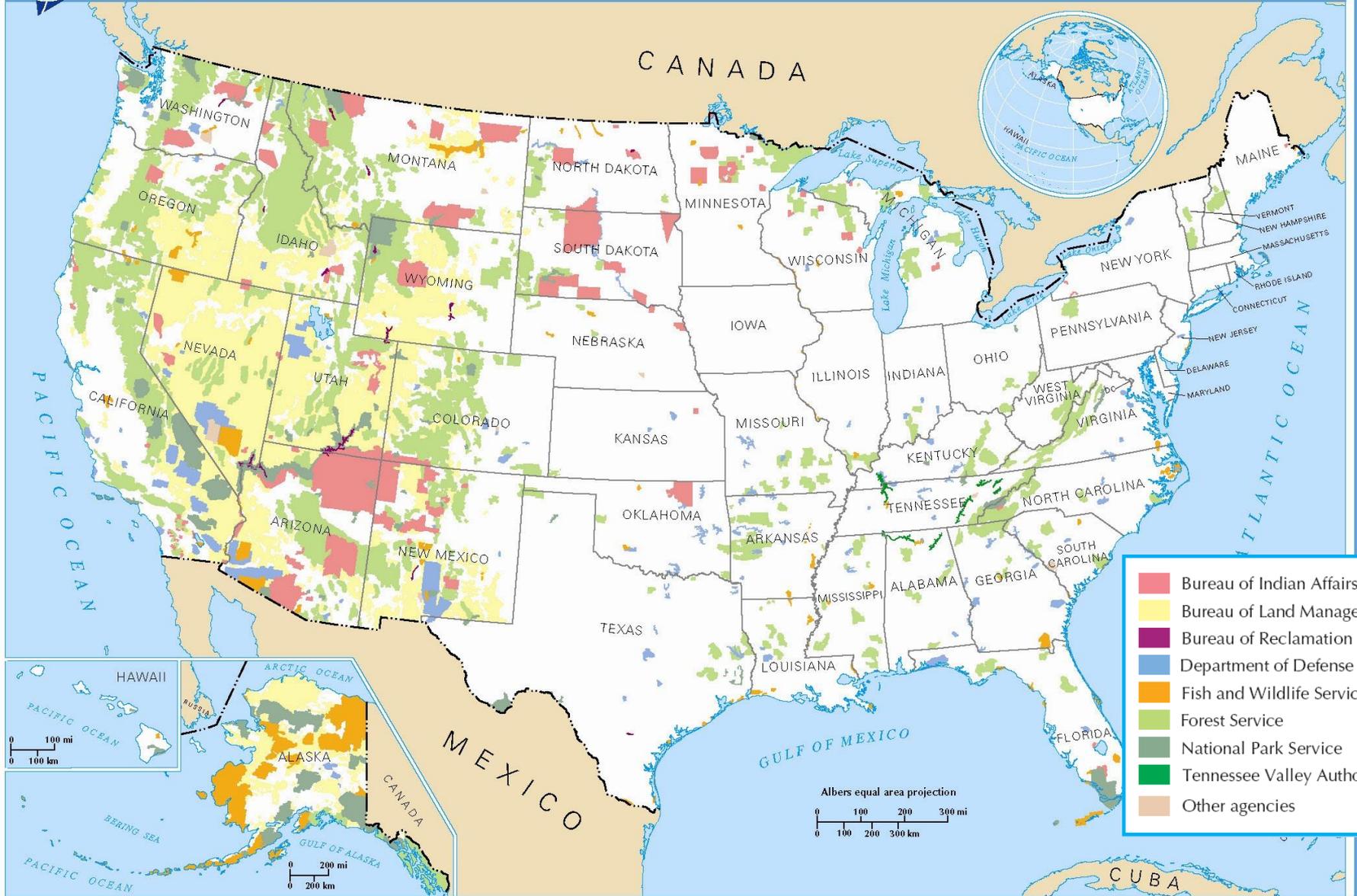


Novel Forest Ecosystems

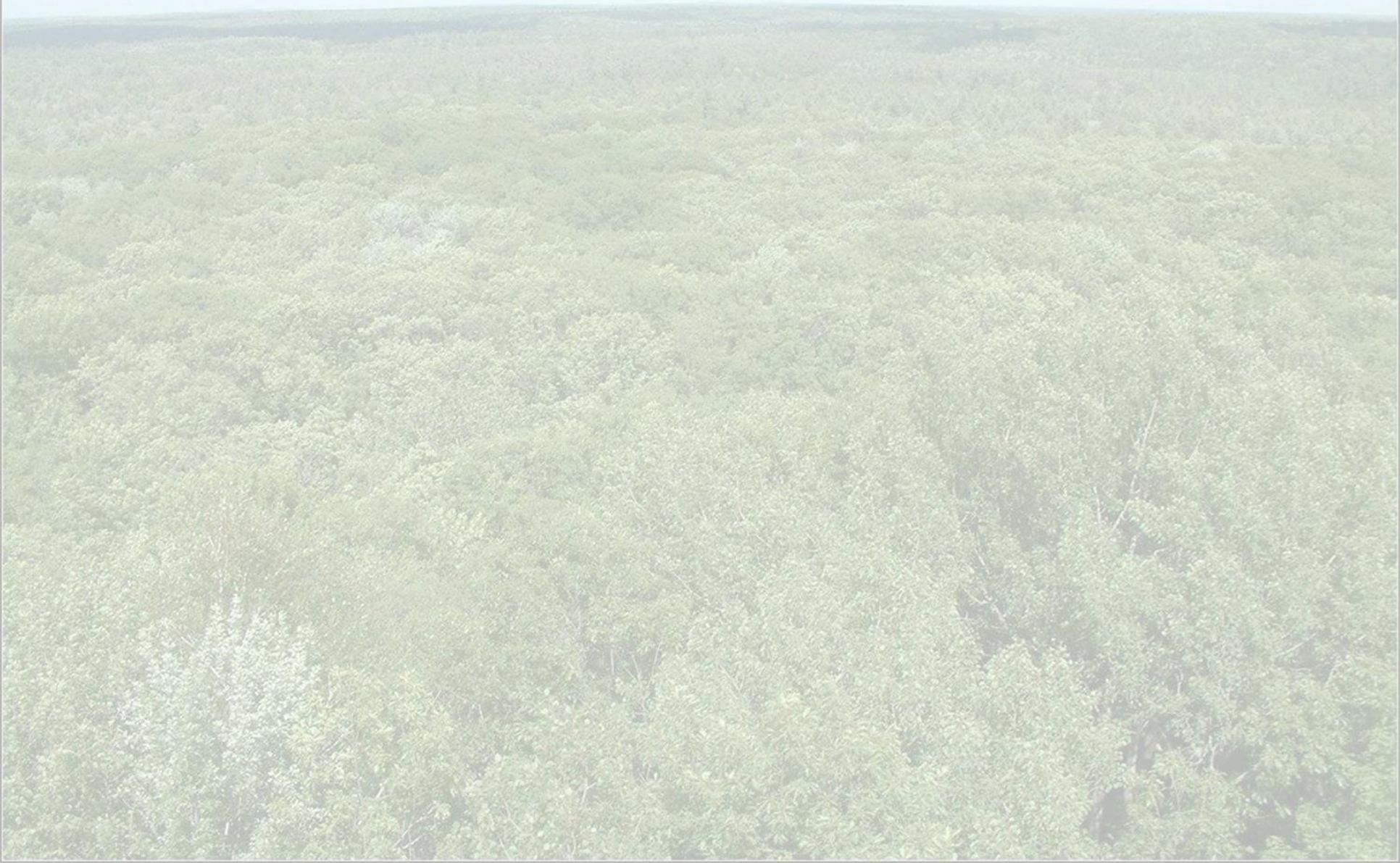
Four perspectives...



FEDERAL LANDS AND INDIAN RESERVATIONS

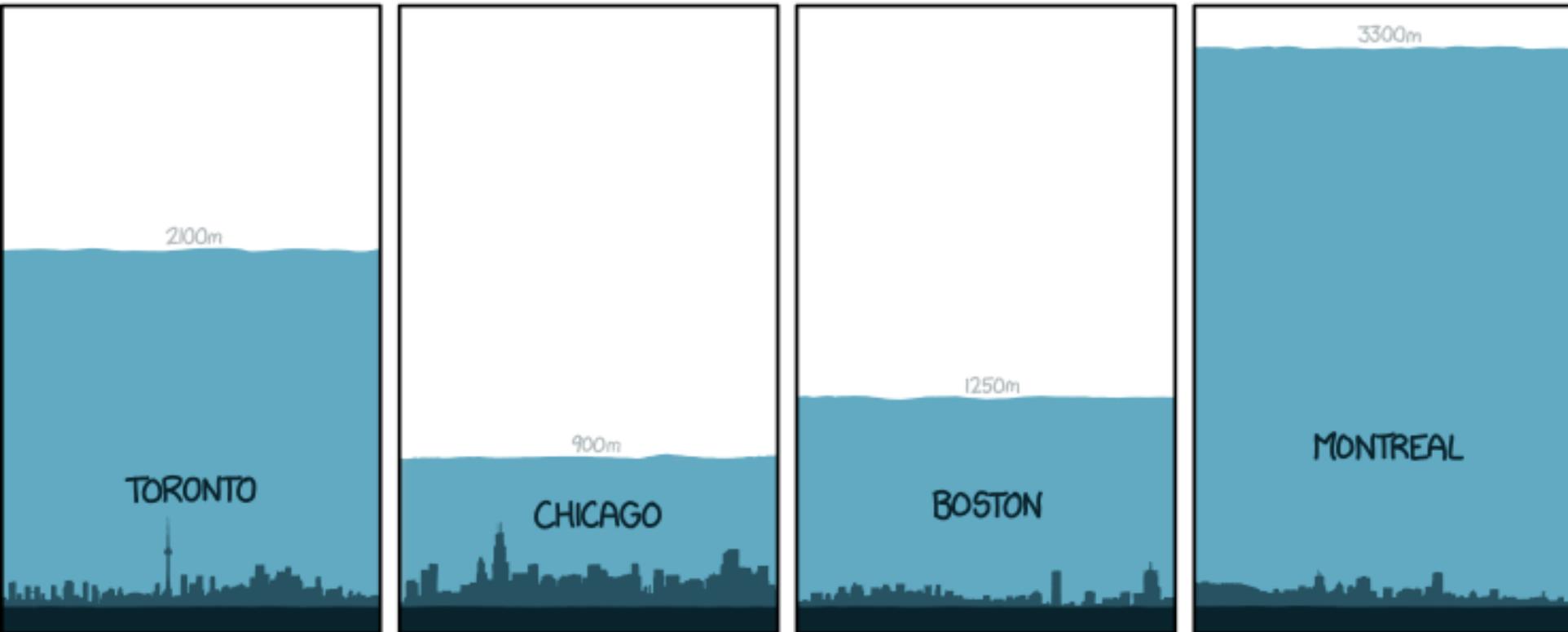


#1 Deep past



Deep past

THICKNESS OF THE ICE SHEETS
AT VARIOUS LOCATIONS
21,000 YEARS AGO
COMPARED WITH MODERN SKYLINES



Reid's Paradox of Rapid Plant Migration

Dispersal theory and interpretation of paleoecological records

James S. Clark, Chris Fastie, George Hurtt, Stephen T. Jackson, Carter Johnson, George A. King, Mark Lewis, Jason Lynch, Stephen Pacala, Colin Prentice, Eugene W. Schupp, Thompson Webb III, and Peter Wyckoff

The oak, to gain its present most northerly position in North Britain after being driven out by the cold probably had to travel fully six hundred miles, and this without external aid would take something like a million years. (Reid 1899)

Biologists have long regarded the natural dispersal of large seeds as an impediment to plant range expansion after glacial periods. Global maps predicting biome distributions under future climate change scenarios (e.g., VEMAP 1995)

A plausible explanation for how rapid migrations were achieved can guide forecasts for tree populations in the twenty-first century

struction remove sizable portions of

Although the rapid rates implied by past records bode well for plant populations themselves, the rates are far too high to have been produced by the dispersal mechanisms that are embodied in traditional notions of tree life history and restricted dispersal. We call this dilemma of rapid migration Reid's Paradox, as voiced by him in the opening quotation. Explaining rapid migration has challenged paleoecologists for a century and remains a point of debate (Davis 1987, Johnson and Webb 1989, Prentice 1988, Clark 1989, Webb 1989)

Range Shifts and Adaptive Responses to Quaternary Climate Change

MARGARET B. DAVIS AND RUTH G. SHAW [Authors Info & Affiliations](#)

SCIENCE • 27 Apr 2001 • Vol 292, Issue 5517 • pp. 673-679 • DOI: [10.1126/science.292.5517.673](https://doi.org/10.1126/science.292.5517.673)

These range extensions are called “migrations,” although individual plants, unlike animals, cannot move to follow changing climate. Rather, occupation of new regions occurs through passive seed dispersal and establishment of seedlings in sites where conditions permit.

Menominee at glacial margins 12,000-13,000 years ago

Geoarchaeological Contexts for Late Pleistocene Archaeological Sites with Human-Modified Woolly Mammoth Remains in Southeastern Wisconsin, U.S.A.

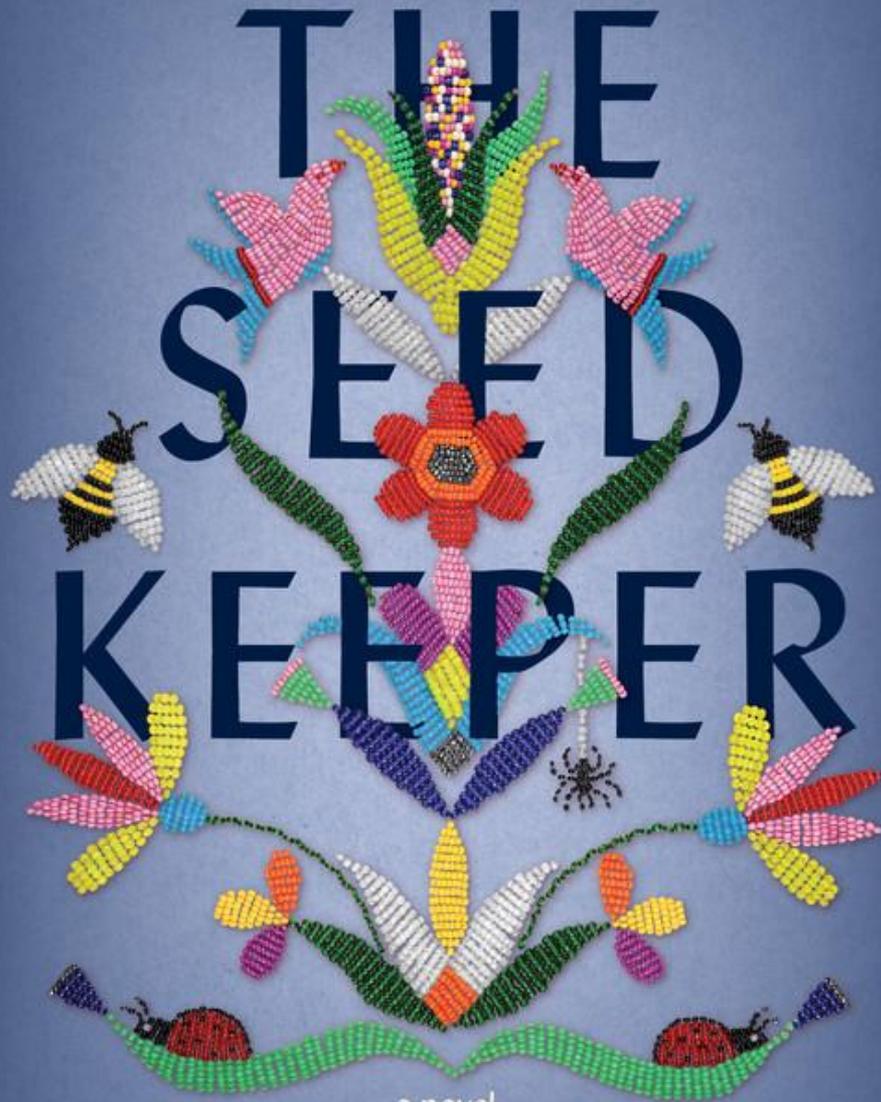
David F. Overstreet¹ and Michael F. Kolb²

¹*Archaeological Research Center, Marquette University, Milwaukee, Wisconsin
53233*

²*Strata Morph GeosExploration, Inc., 1648 Calico Court, Sun Prairie, Wisconsin
53590*

*2003. Geoarchaeology: An International
Journal, 18(1), pp.91-114*

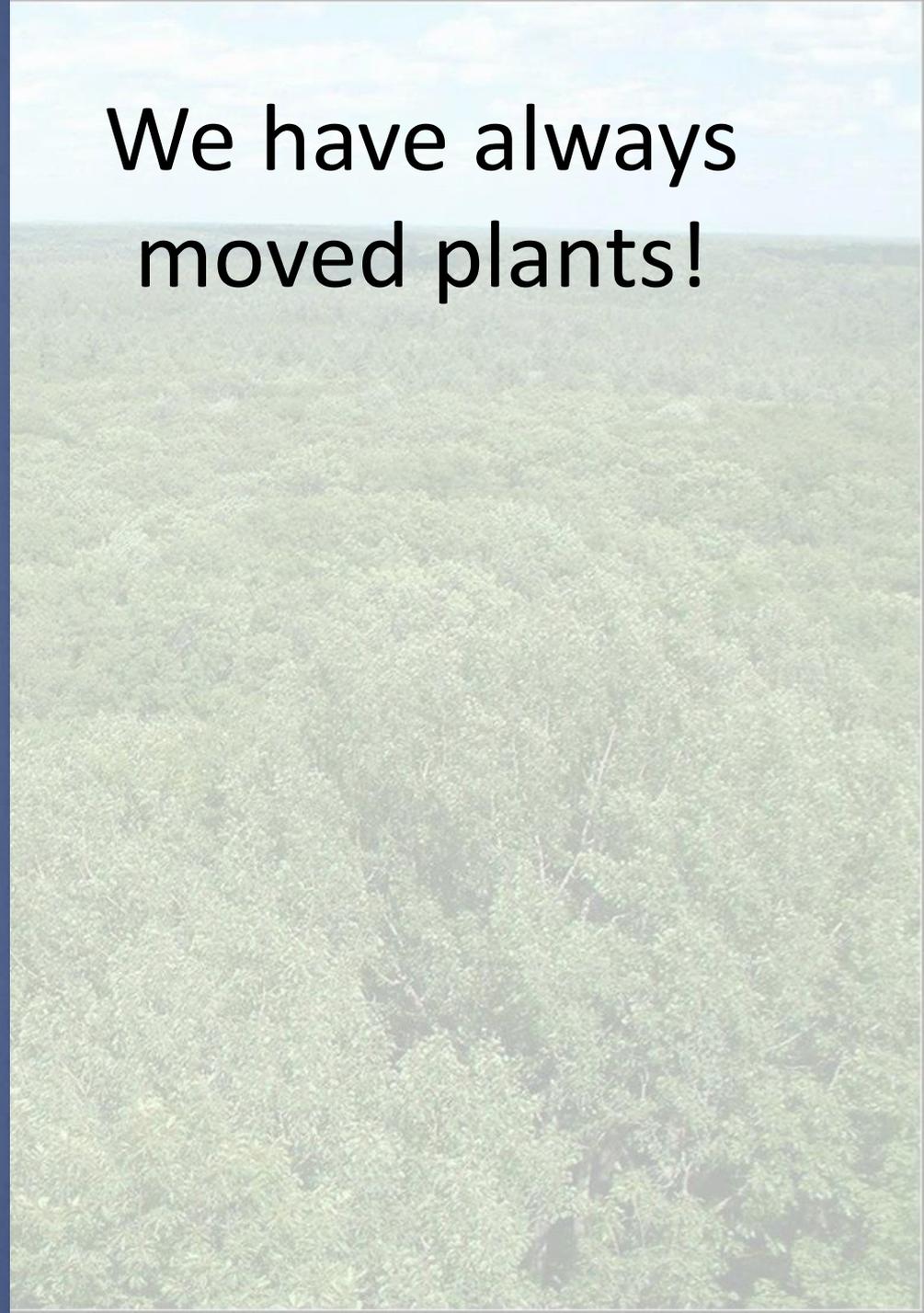
"Compelling . . . *The Seed Keeper* invokes the strength that women, land, and plants have shared with one another through the generations." — ROBIN WALL KIMMERER



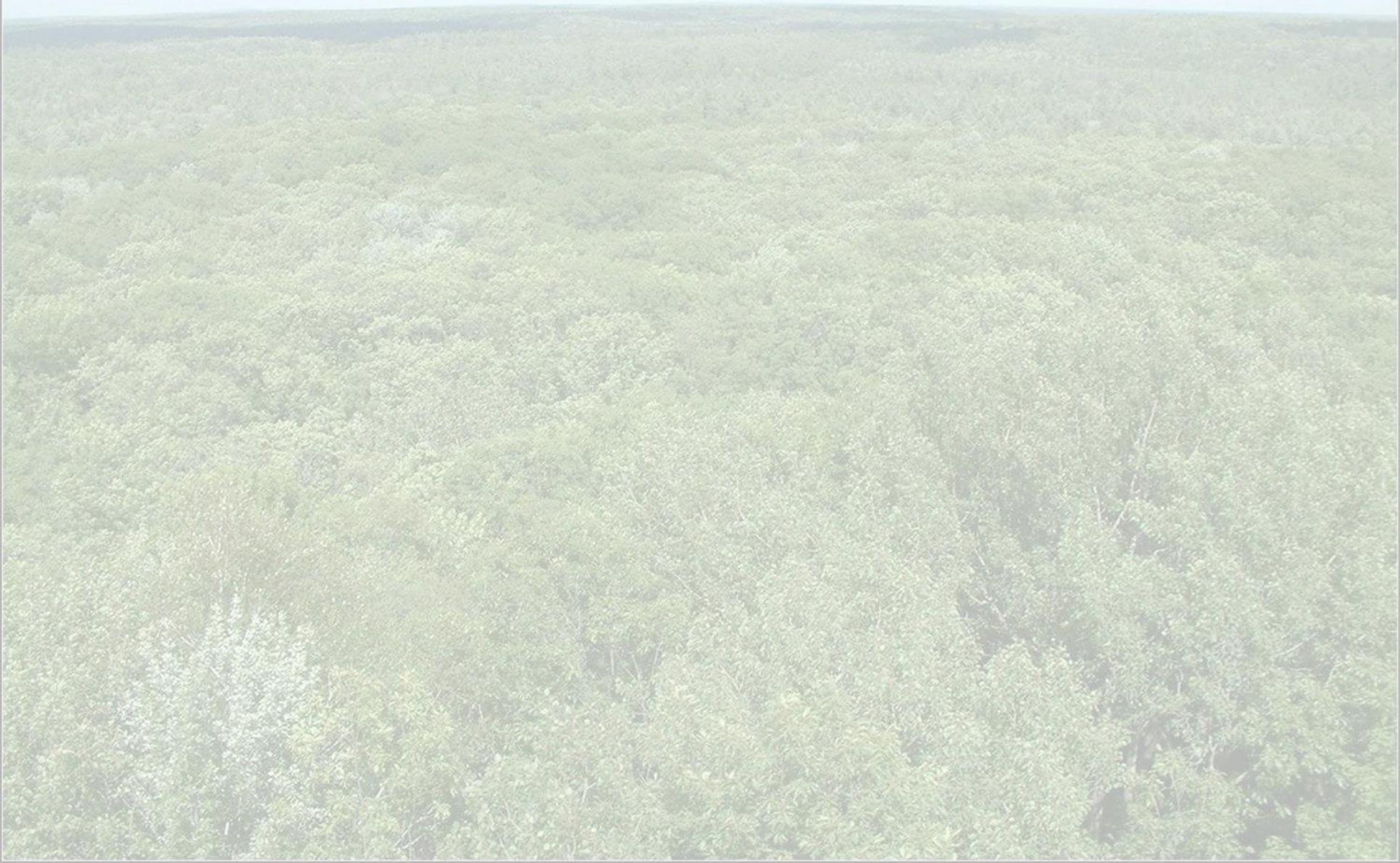
a novel

DIANE WILSON

We have always
moved plants!



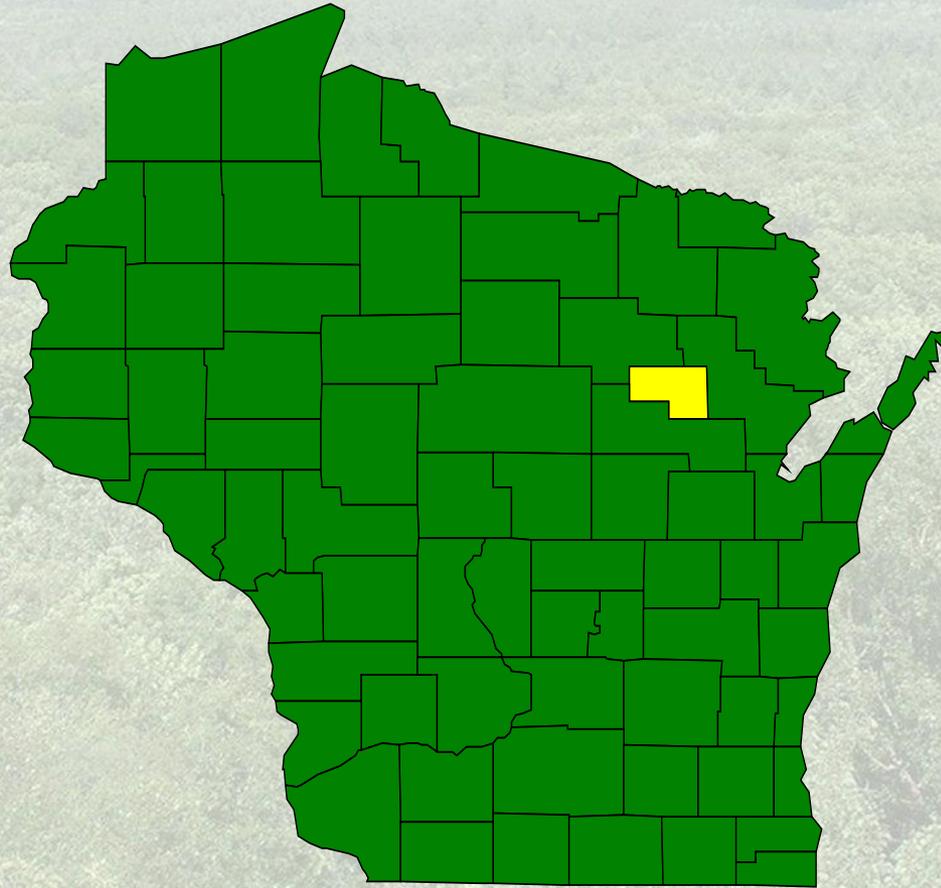
#2 Recent Past and Sustainability





**We know Indigenous forestry
perspectives work...**

Menominee Reservation is
235,000 acres and 95% forested.



Menominee Nation

From the time of the 1854 treaty until today, the Menominee have cut timber from their forest.



How do you define
Sustainable Forestry?





Image NOAA

Image USDA Farm Service Agency
Image © 2010 DigitalGlobe

©2009 Google

25.8 mi

Imagery Date: Mar 5, 2005

45°20'27.68" N 88°41'13.85" W elev 1359 ft

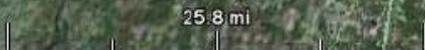
Eye alt 98.58 mi



Chambé

© 2010 Google

Image USDA Farm Service Agency
© 2010 Europa Technologies



25.8 mi

Imagery Date: Mar 5, 2005

45°20'27.68" N 88°41'13.85" W elev 1359 ft

©2009 Google

Eye alt 98.58 mi

“Start with the rising sun and work toward the setting sun, but take only the mature trees, the sick trees, and the trees that have fallen. When you reach the end of the reservation, turn and cut from the setting sun to the rising sun and the trees will last forever.”

Chief Oshkosh

Menominee Oral History



June 12, 1890.

CHAP. 418.—An act to authorize the sale of timber on certain lands reserved for the use of the Menomonee tribe of Indians, in the State of Wisconsin.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is hereby empowered to authorize the agent of the Menomonee tribe of Indians in Wisconsin to employ at a reasonable compensation said Indians to cut all or any portion of the timber on the lands reserved for the use of said Indians in that State into logs and haul the same to the banks of the rivers; and said logs shall be scaled and advertised, and after due notice all or any part thereof sold to the highest bidder or bidders for cash, in such manner and at such time and place as the Secretary of the Interior may direct; no sale to be valid until approved by said Secretary. In case said logs can not be sold where landed on the river at what the Secretary of the Interior considers a reasonable price, he shall cause said logs to be run down the river to market, to be sold in the manner he deems for the best interest of the Indians, employing Indians at all times when in his opinion practicable and for the benefit of the Indians in doing such work; and the Secretary of the Interior may appoint a competent man to superintend these Indians while logging, and fixing the rate of his compensation. The Secretary shall appoint an assistant superintendent, who shall be a practical logger and shall have full charge and direction of such logging operations under the superintendent, and who shall receive such compensation as the Secretary of the Interior shall determine: *Provided,* That not exceeding twenty millions of feet of timber shall be logged and sold in any one year.

Sale of timber from
Menomonee Indian
Reservation, Wis.
Agent to employ In-
dian loggers.
Compensation.

Sale, etc., of logs.

Indian employment.

Appointment of su-
perintendent.
Compensation.
Appointment of as-
sistant superintend-
ent.
Compensation.

Proviso.
Limitation.

June 12, 1890.

CHAP. 418.—An act to authorize the sale of timber on certain lands reserved for the use of the Menomonee tribe of Indians, in the State of Wisconsin.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is hereby empowered to authorize the agent of the Menomonee tribe of Indians in Wisconsin to employ at a reasonable compensation said Indians to cut all or any portion of the timber on the lands reserved for the use of said Indians in that State into logs and haul the same to the banks of the rivers; and said logs shall be scaled and advertised, and after due notice all or any part thereof sold to the highest bidder or bidders for cash, in such manner and at such time and place as the Secretary of the Interior may direct; no sale to be valid until approved by said Secretary. In case said logs can not be sold where landed on the river at what the Secretary of the Interior considers a reasonable price, he shall cause said logs to be run down the river to market, to be sold in the manner he deems for the best interest of the Indians, employing Indians at all times when in his opinion practicable and for the benefit of the Indians in doing such work; and the Secretary of the Interior may appoint a competent man to superintend these Indians while logging, and fixing the rate of his compensation. The Secretary shall appoint an assistant superintendent, who shall be a practical logger and shall have full charge and direction of such logging operations under the superintendent, and who shall receive such compensation as the Secretary of the Interior shall determine: Provided, That not exceeding twenty millions of feet of timber shall be logged and sold in any one year.

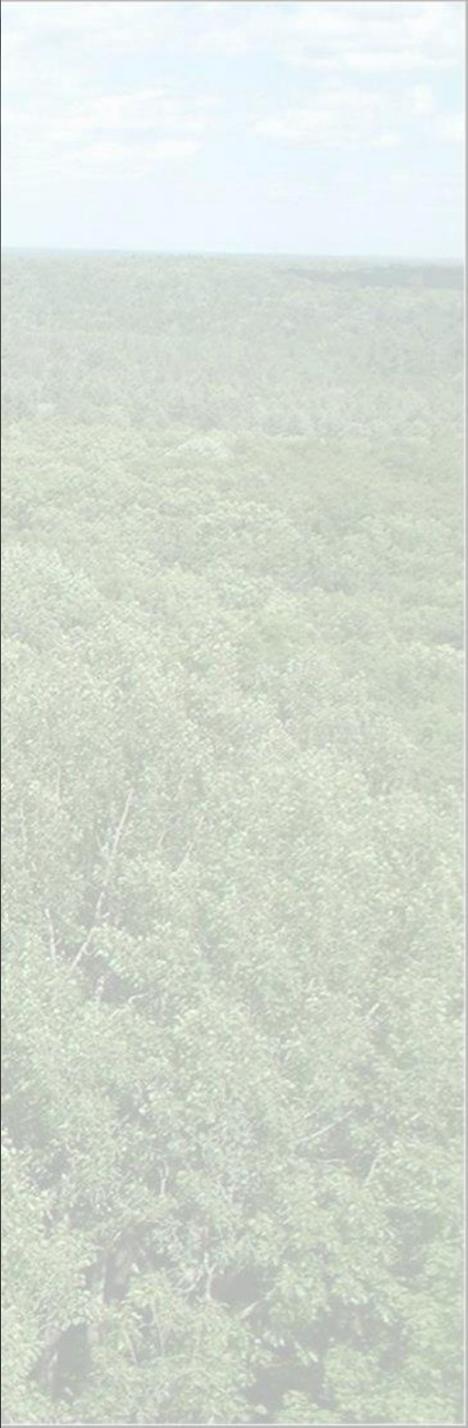
Sale of timber from
Menomonee Indian
Reservation, Wis.
Agent to employ In-
dian loggers.
Compensation.

Sale, etc., of logs.

Indian employment.

Appointment of su-
perintendent.
Compensation.
Appointment of as-
sistant superintend-
ent.
Compensation.

Proviso.
Limitation.



Menominee Indian Mills,





WENOMINEE BASKET WEAVER AND HER WARES - JUNE 1914

LAND OF THE
MENDIMINEE



MENDIMINEE
LAND OF THE





#3 Present – Moving Species for Sustainability

Emerald Ash Borer projects

Oak Wilt and Forest Health

Climate Adaptation Planning





Tribal Responses to EAB

- Outreach, meetings, workshops, and articles to increase awareness about the cultural and natural resource threat EAB poses.
- Forming Partnerships (Universities, State, Federal, NGOs, Tribes)
- Some tribes and tribal families are making videos of basket making and other cultural practices.
- Some tribes and tribal families are offering youth workshops to try and share the process with the next generations.



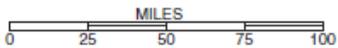
Also, collecting seeds and sharing resources!!!



FEDERAL LANDS AND INDIAN RESERVATIONS

- Bureau of Indian Affairs
- Department of Defense (includes Army Corps of Engineers lakes)
- Fish and Wildlife Service / Wilderness
- Forest Service / Wilderness
- National Park Service / Wilderness

Some small sites are not shown, especially in urban areas.



Albers equal area projection

Abbreviations

- IR Indian Reservation
- NF National Forest
- NP National Park
- NWR National Wildlife Refuge



Fond du Lac – Assisted Migration for Ash ecosystems

- 6 Common Garden Sites
- 40 trees of each species planted fall 2015
 - River Birch
 - Northern White Cedar
 - Balsam Poplar
 - Red Maple
 - Silver Maple
- 1,200 total seedlings!

Menominee – Oak Wilt Adaptation



Plant selection: Traditional Ecological Knowledge

Example plant list for some sites

Tree Species	Notes	Menominee Name	Meaning	Menominee Use
White Oak	60% of site	Askeqtemaehnak	Good for the eyes	medicinal/food
Black Oak	30% of site	Anipahkahkuehtek	Black inside	medicinal/food
Bur Oak	8% of site	Mahkemenah maeqtekomen	Biggest acorn	medicinal/food
Swamp Oak	1% of site	Maskik-askeqtemaeh	Found in swamp	medicinal/food
Post oak	1% of site			

Additional Tree Species

Black Walnut	Kentucky Bluegrass along side	Paskanaweh	Good tasting nut	medicinal/food
American Elm	Variety with higher resistance	Keckiwahtek	Elder Tree	medicinal
Shingle Oak	Hoping for shrublike effect			
Black Cherry	Earlier successional stage	Awaehsehsaekahtek	Little Bear tree	medicinal
Northern White-cedar	Medicine tree within stand	Kesaehkahtek	Medicine tree	medicinal/ ceremonial

<https://forestadaptation.org/>

Dibaginigaadeg Anishinaabe Ezhitwaad



A Tribal Climate Adaptation Menu
Caring for those who take care of us

<https://forestadaptation.org/tribal-climate-adaptation-menu>



Menu of Adaptation Strategies and Approaches (14 Total)

Strategy 1: Consider cultural practices and seek spiritual guidance

Strategy 3: Support tribal engagement in the environment

Strategy 4: Sustain fundamental ecological and cultural functions

Strategy 7: Establish, support, and recognize opportunities for beings or sites of concern to the community to withstand climate change

Strategy 10: Maintain and enhance genetic diversity

Strategy 11: Encourage community adjustments and transition while maintaining reciprocity and balance

Strategy 12: Support a new ecosystem balance after a major disturbance

Menu of Adaptation Strategies and Approaches (14 Total)

Strategy 1: Consider cultural practices and seek spiritual guidance

Strategy 3: Support tribal engagement in the environment

Strategy 4: Sustain fundamental ecological and cultural functions

Strategy 7: Establish, support, and recognize opportunities for beings or sites of concern to the community to withstand climate change

Strategy 10: Maintain and enhance genetic diversity

Strategy 11: Encourage community adjustments and transition while maintaining reciprocity and balance

Strategy 12: Support a new ecosystem balance after a major disturbance

Menu of Adaptation Strategies and Approaches (14 Total)

Strategy 1: Consider cultural practices and seek spiritual guidance

Strategy 3: Support tribal engagement in the environment

Strategy 4: Sustain fundamental ecological and cultural functions

Strategy 7: Establish, support, and recognize opportunities for beings or sites of concern to the community to withstand climate change

Strategy 10: Maintain and enhance genetic diversity

Strategy 11: Encourage community adjustments and transition while maintaining reciprocity and balance

Strategy 12: Support a new ecosystem balance after a major disturbance

Menu of Adaptation Strategies and Approaches (14 Total)

Strategy 1: Consider cultural practices and seek spiritual guidance

Strategy 3: Support tribal engagement in the environment

Strategy 4: Sustain fundamental ecological and cultural functions

Strategy 7: Establish, support, and recognize opportunities for beings or sites of concern to the community to withstand climate change

Strategy 10: Maintain and enhance genetic diversity

Strategy 11: Encourage community adjustments and transition while maintaining reciprocity and balance

Strategy 12: Support a new ecosystem balance after a major disturbance

Menu of Adaptation Strategies and Approaches (14 Total)

Strategy 1: Consider cultural practices and seek spiritual guidance

Strategy 3: Support tribal engagement in the environment

Strategy 4: Sustain fundamental ecological and cultural functions

Strategy 7: Establish, support, and recognize opportunities for beings or sites of concern to the community to withstand climate change

Strategy 10: Maintain and enhance genetic diversity

Strategy 11: Encourage community adjustments and transition while maintaining reciprocity and balance

Strategy 12: Support a new ecosystem balance after a major disturbance

Menu of Adaptation Strategies and Approaches (14 Total)

Strategy 1: Consider cultural practices and seek spiritual guidance

Strategy 3: Support tribal engagement in the environment

Strategy 4: Sustain fundamental ecological and cultural functions

Strategy 7: Establish, support, and recognize opportunities for beings or sites of concern to the community to withstand climate change

Strategy 10: Maintain and enhance genetic diversity

Strategy 11: Encourage community adjustments and transition while maintaining reciprocity and balance

Strategy 12: Support a new ecosystem balance after a major disturbance

Menu of Adaptation Strategies and Approaches (14 Total)

Strategy 1: Consider cultural practices and seek spiritual guidance

Strategy 3: Support tribal engagement in the environment

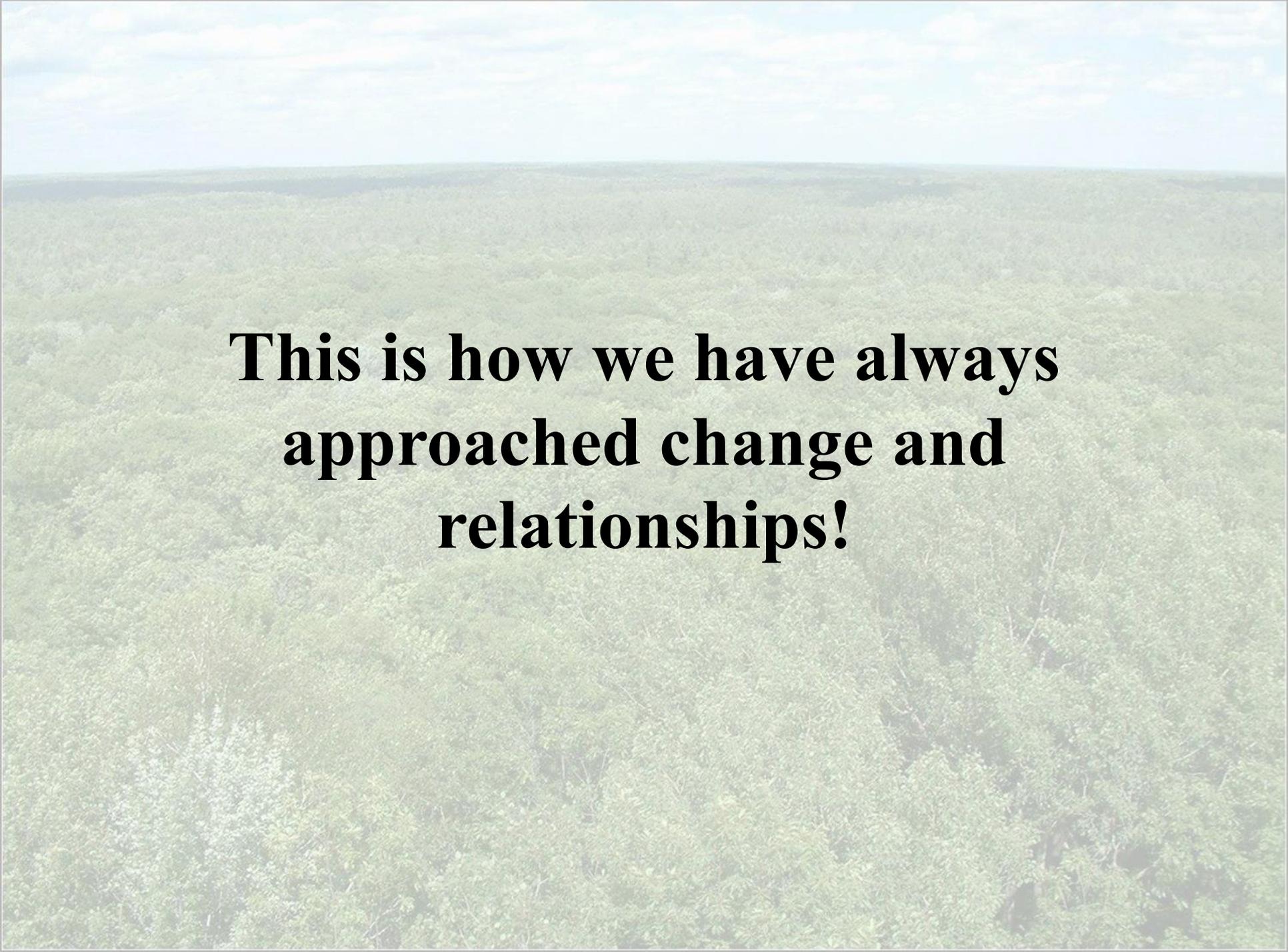
Strategy 4: Sustain fundamental ecological and cultural functions

Strategy 7: Establish, support, and recognize opportunities for beings or sites of concern to the community to withstand climate change

Strategy 10: Maintain and enhance genetic diversity

Strategy 11: Encourage community adjustments and transition while maintaining reciprocity and balance

Strategy 12: Support a new ecosystem balance after a major disturbance

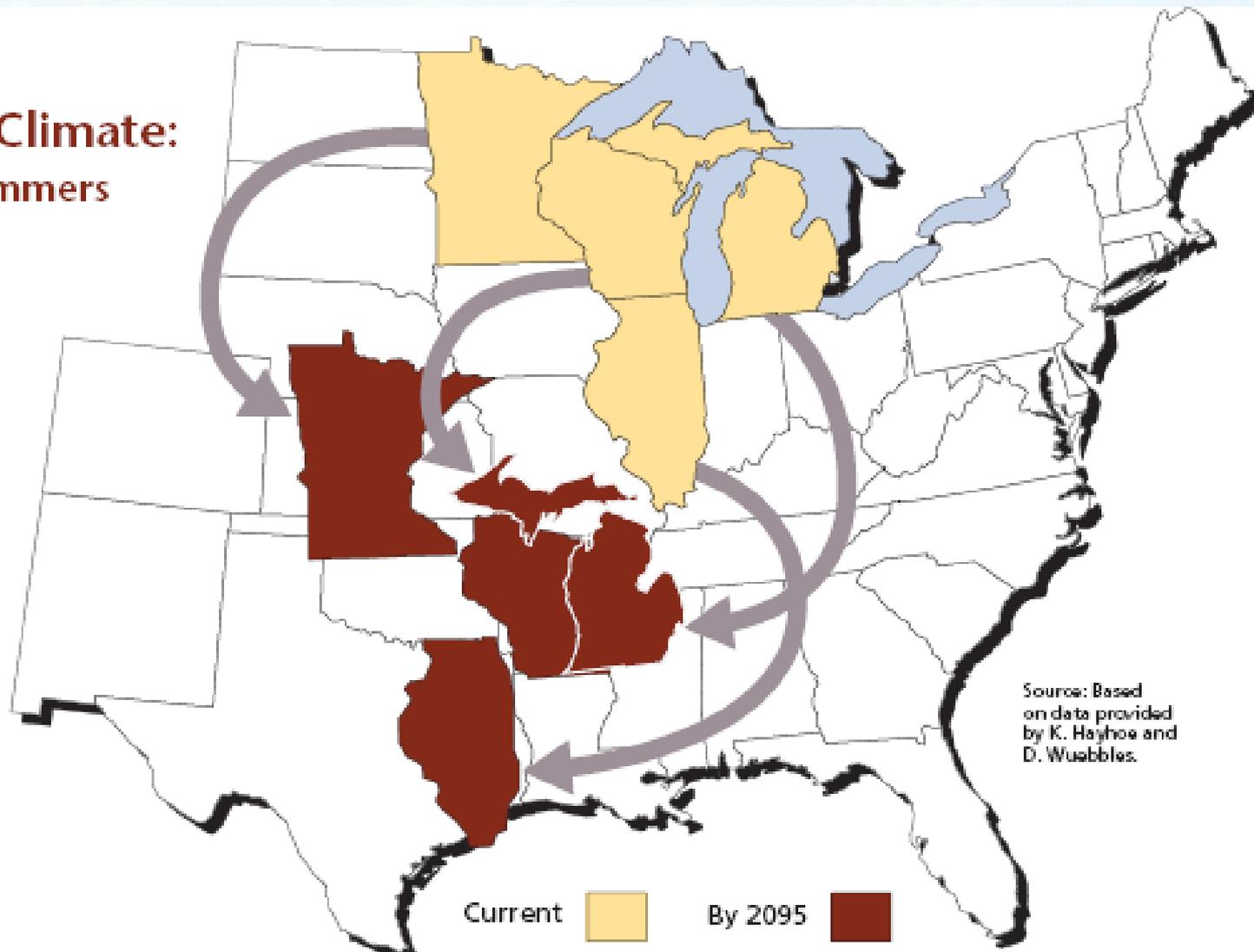
An aerial photograph of a vast, dense green forest stretching to the horizon under a blue sky with scattered white clouds. The text is centered over the forest.

**This is how we have always
approached change and
relationships!**

#4 Future Sustainability



Migrating Climate: Changing Summers in the Region



Potawatomi "Trail of Death" march: Sept. - Nov. 1838

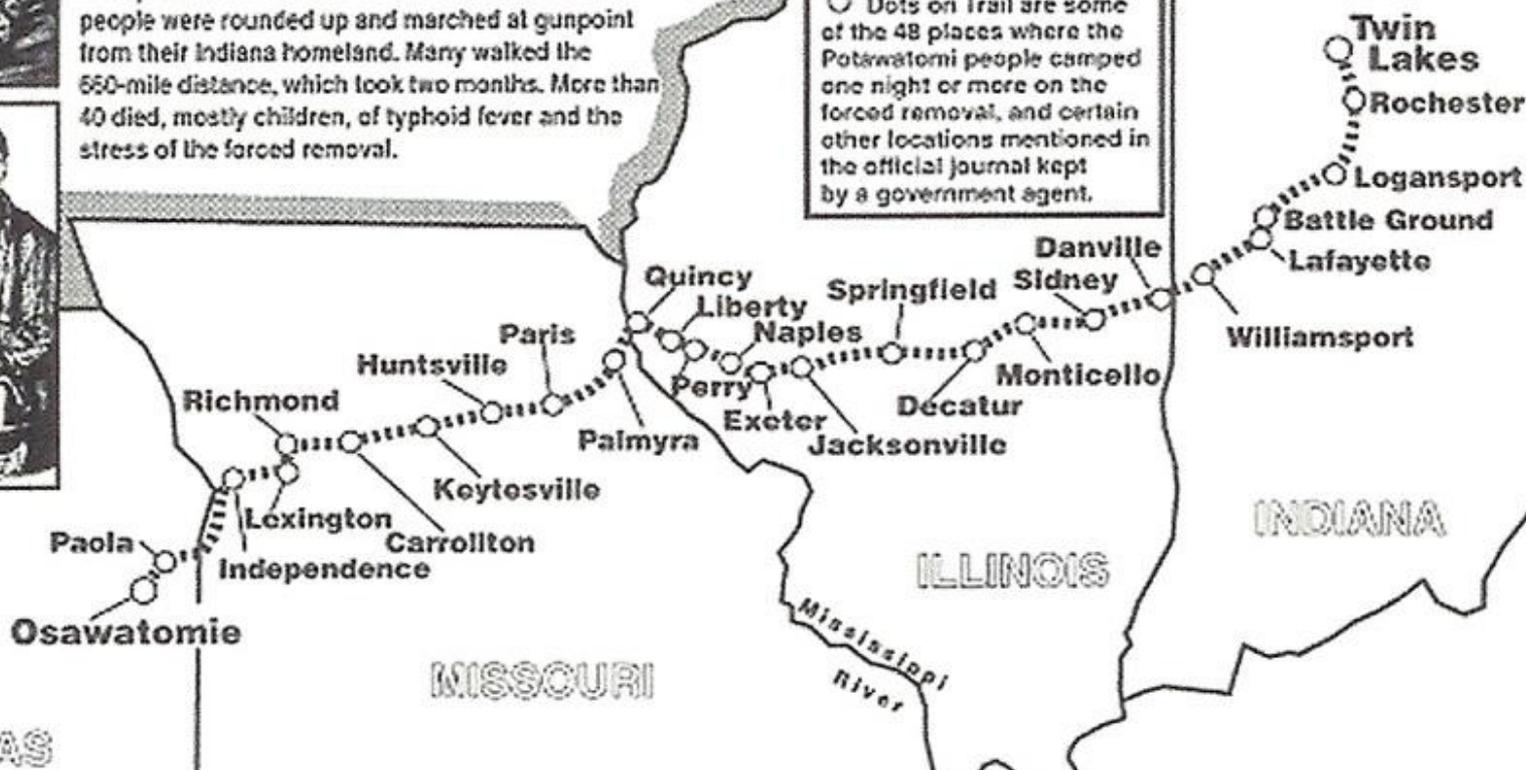


Designates 1838 Potawatomi "Trail of Death" route starting in Indiana, crossing Illinois and Missouri, and ending at present day Osawatomie, Kansas.

In September 1838 over 850 Potawatomi Indian people were rounded up and marched at gunpoint from their Indiana homeland. Many walked the 660-mile distance, which took two months. More than 40 died, mostly children, of typhoid fever and the stress of the forced removal.



○ Dots on Trail are some of the 48 places where the Potawatomi people camped one night or more on the forced removal, and certain other locations mentioned in the official journal kept by a government agent.



KANSAS

MISSOURI

ILLINOIS

INDIANA

MAJOR STOPPING PLACES

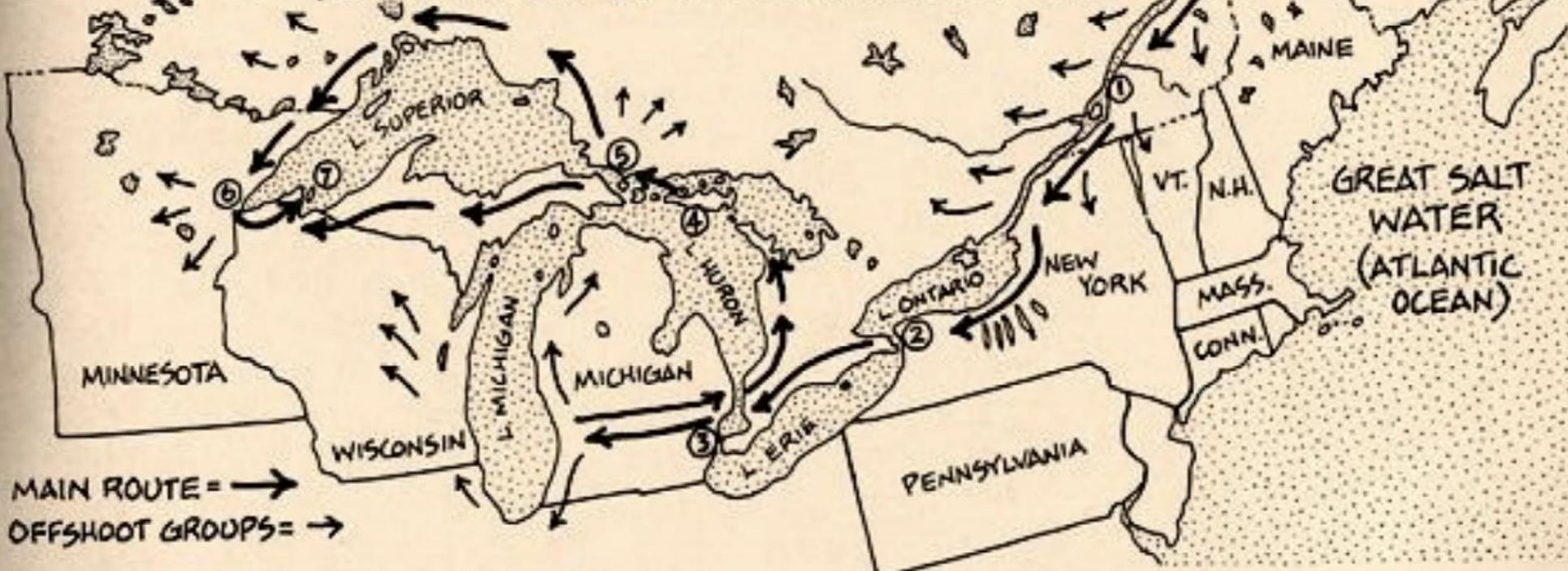
- ① TURTLE-SHAPED ISLAND
- ② KICHI-KA-BE-KONG' (NIAGARA FALLS)
- ③ DETROIT RIVER
- ④ MANITOULIN ISLAND
- ⑤ BAW-WA-TING' (SAULT STE. MARIE)
- ⑥ SPIRIT ISLAND (DULUTH)
- ⑦ MADELINE ISLAND

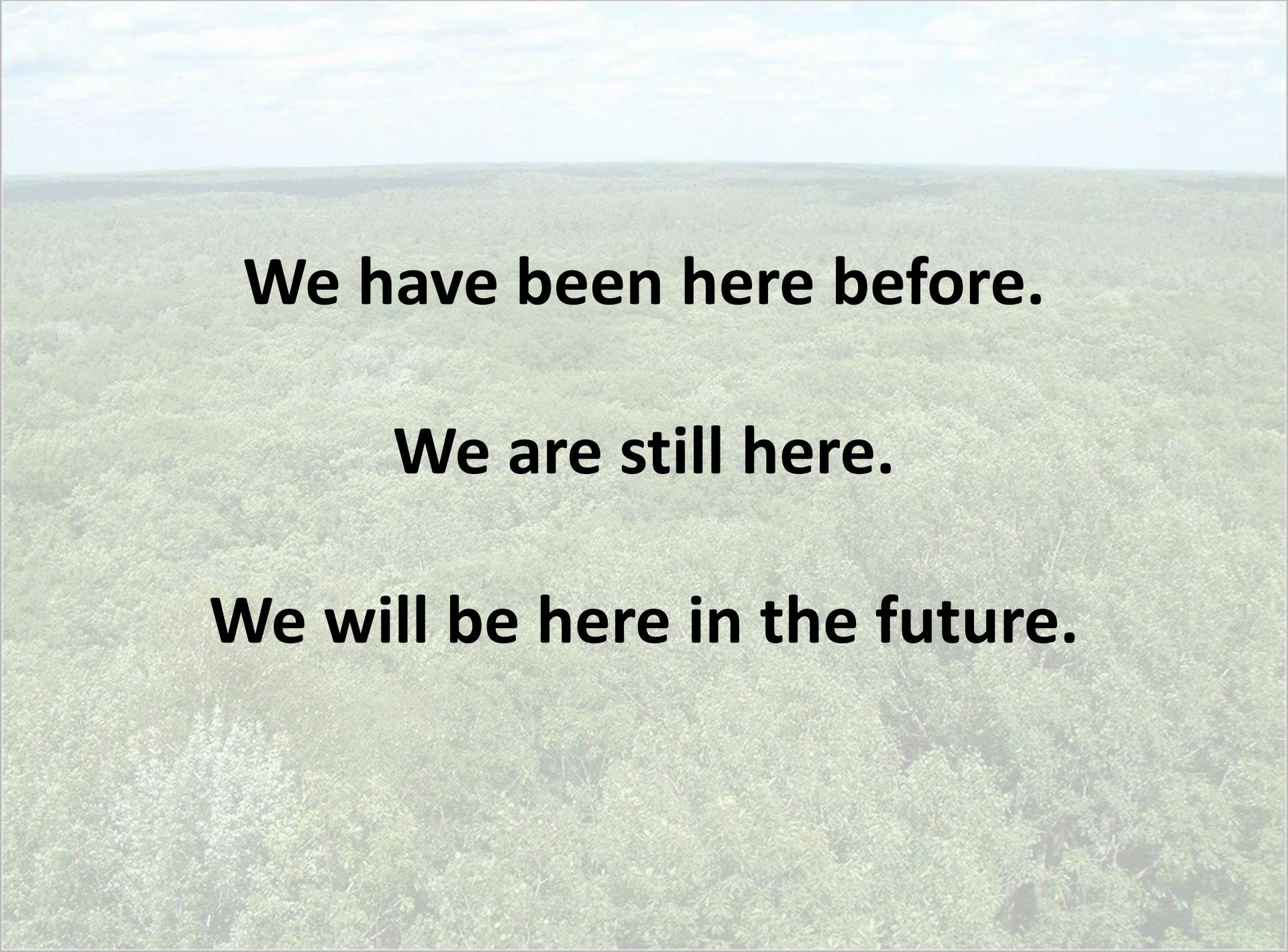


GWEE-GEE-GING'
(CANADA)

QUEBEC

THE MIGRATION OF THE ANISHINABE SHOWING PRESENT-DAY STATE + NATIONAL BOUNDARIES





We have been here before.

We are still here.

We will be here in the future.

Indigenous approaches to climate change are motivated through dialogic narratives with descendants and ancestors.

Anishinaabe/Neshnabé peoples often relate their histories through concepts of constant migration and motion occurring at different scales.

-Kyle Whyte

Indigenous science (fiction) for the Anthropocene: Ancestral dystopias and fantasies of climate change crises. 2018. *Environment and Planning E: Nature and Space*, 1(1-2), 224-242.

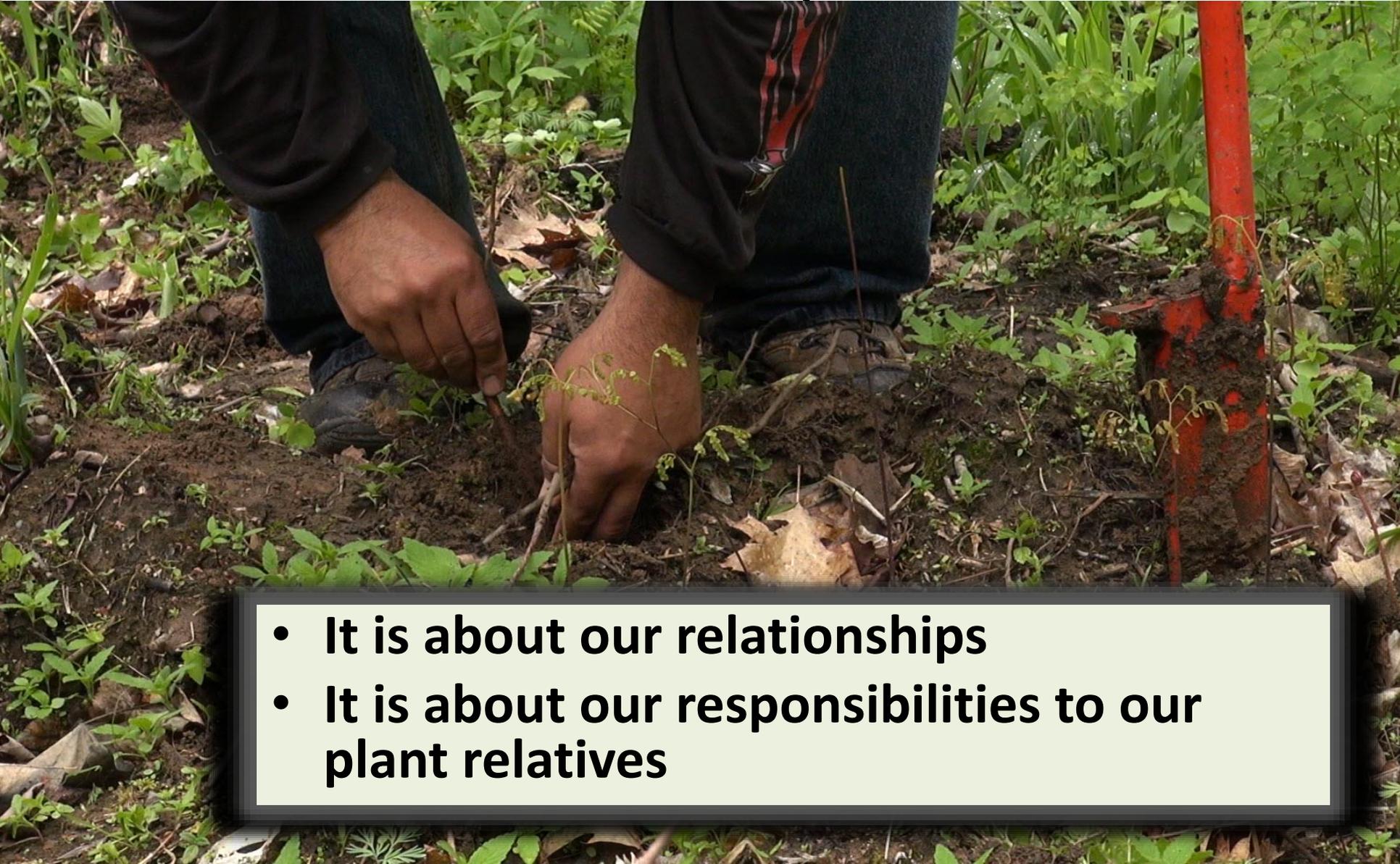


No one tribal voice



Tribes need to be involved

We have always moved plants.
Our forests have always been “novel”



- It is about our relationships
- It is about our responsibilities to our plant relatives

This is a time for...

Indigenous
experiences

Indigenous
knowledges

Indigenous
leadership



Migwetch/thank you

Discussion/Comments/Questions

