EFFECTS OF CANOPY COVER ON NEAR-SURFACE TEMPERATURES: IMPLICATIONS FOR REGENERATION

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The Threat: Hotter Droughts

Hotter temperatures reduce tree's ability to survive and recover from drought

Reducing stand density to decrease competition among overstory trees

Reducing stand density to decrease competition among overstory trees

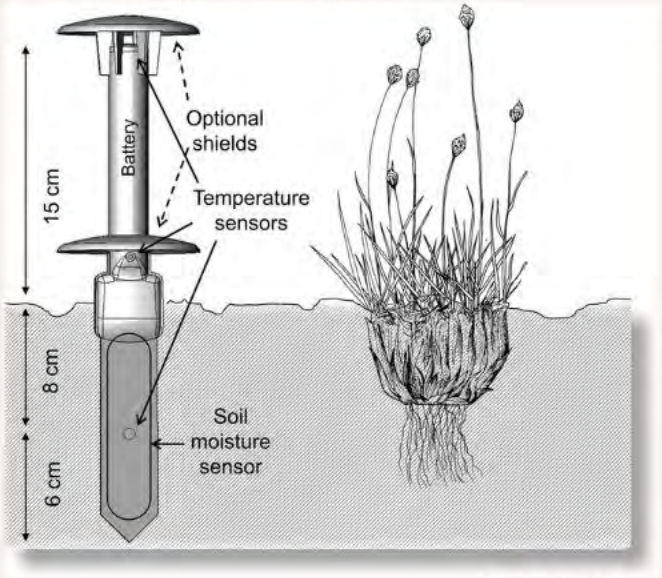
1. How do differing amounts of overstory retention effect near surface temperatures?

1. How do differing amounts of overstory retention effect near surface temperatures?

2. What does that mean for regeneration and other understory plants?

Study Design

- Measured temperature at 2cm across gradient of canopy cover in recently thinned even-aged stands
- Selected south facing aspect and mid-slope position



Wild et al., 2019

How to make climate data more ecologically relevant to regeneration?

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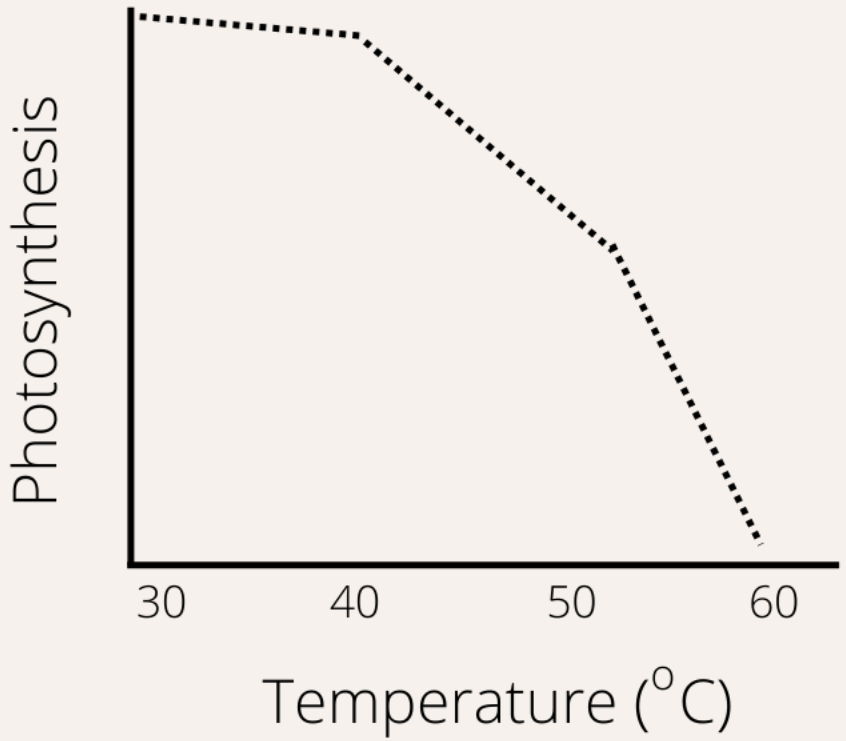

Modified from Jansen et al. 2016

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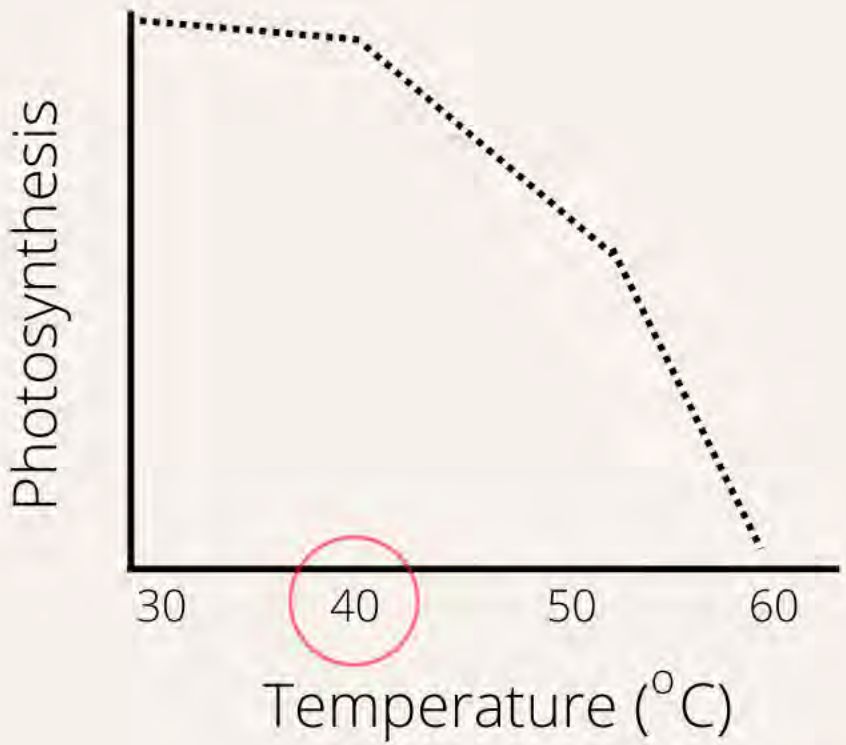

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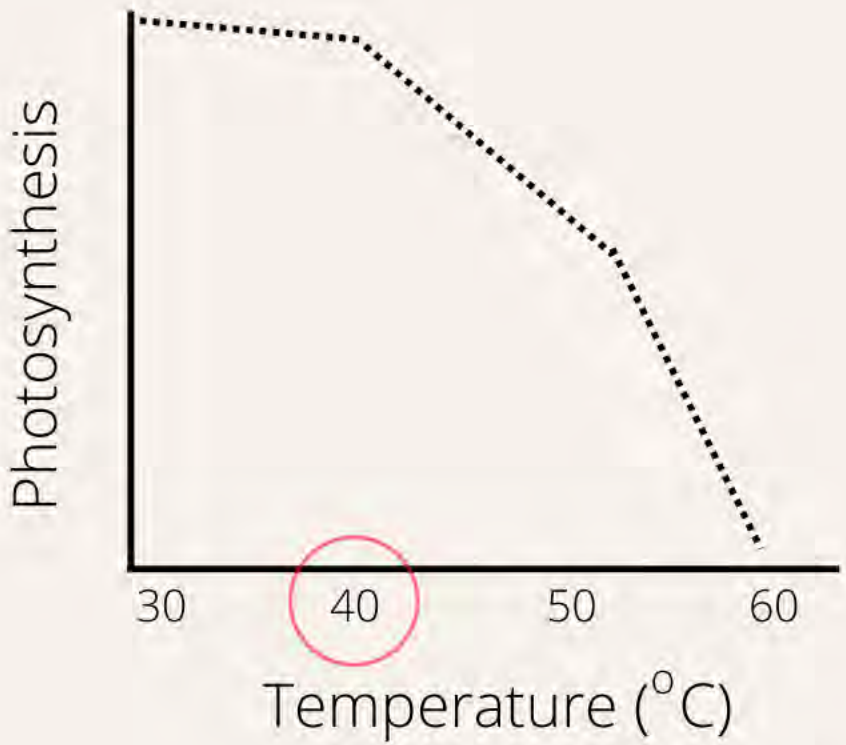

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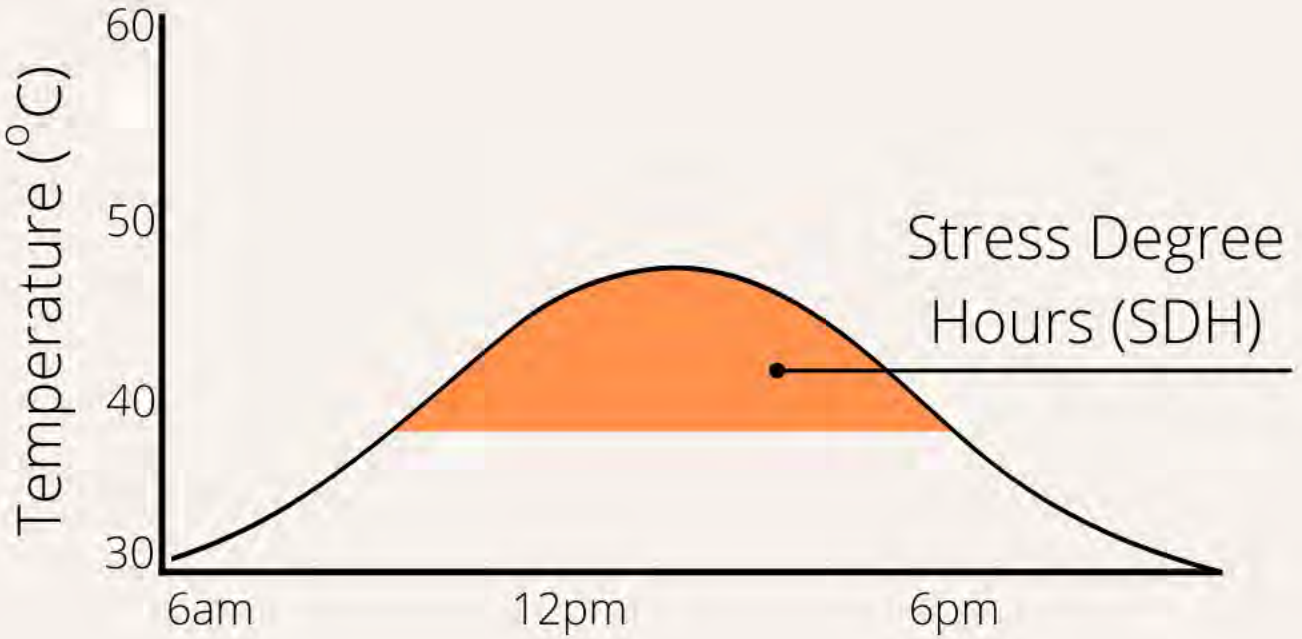
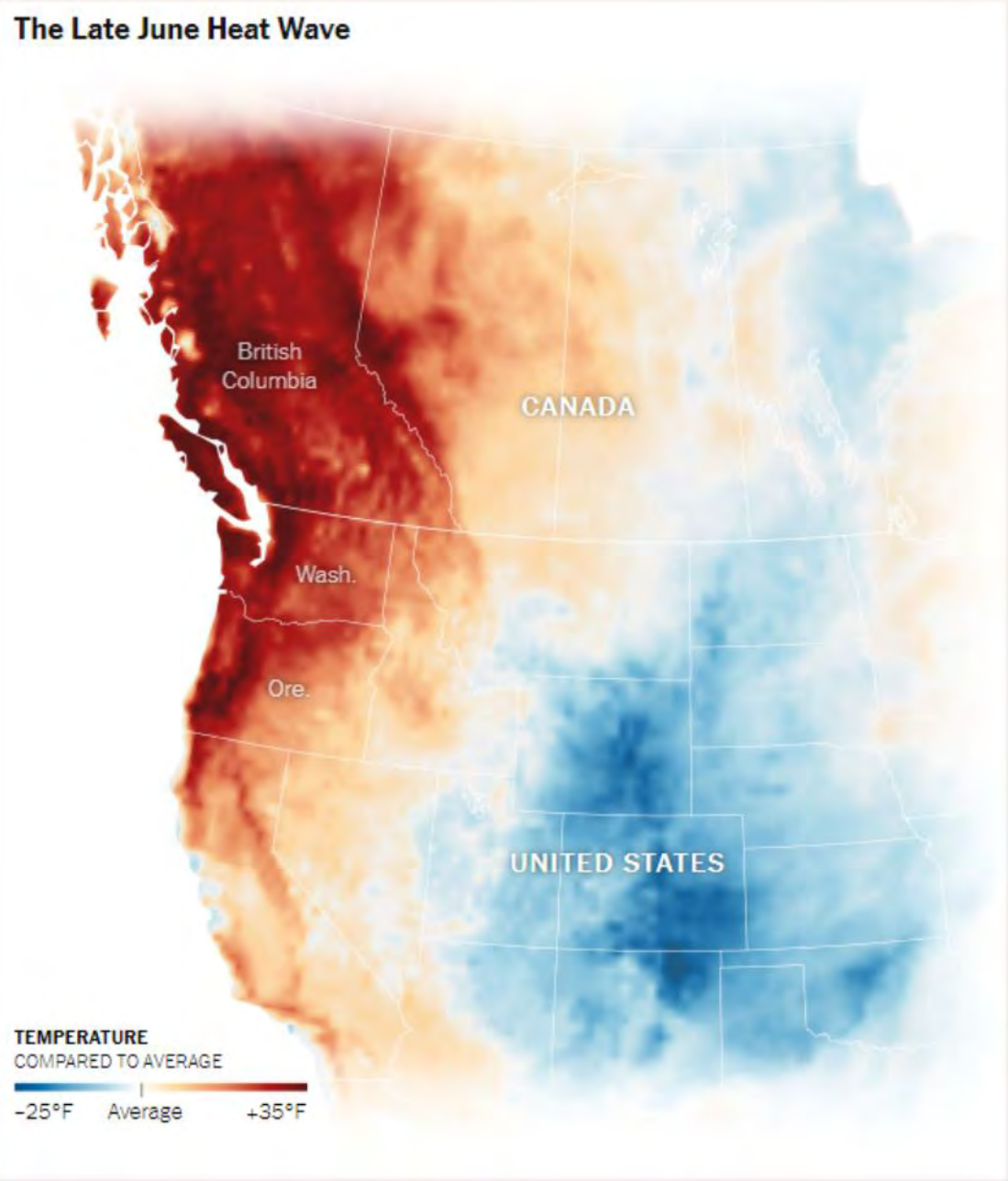
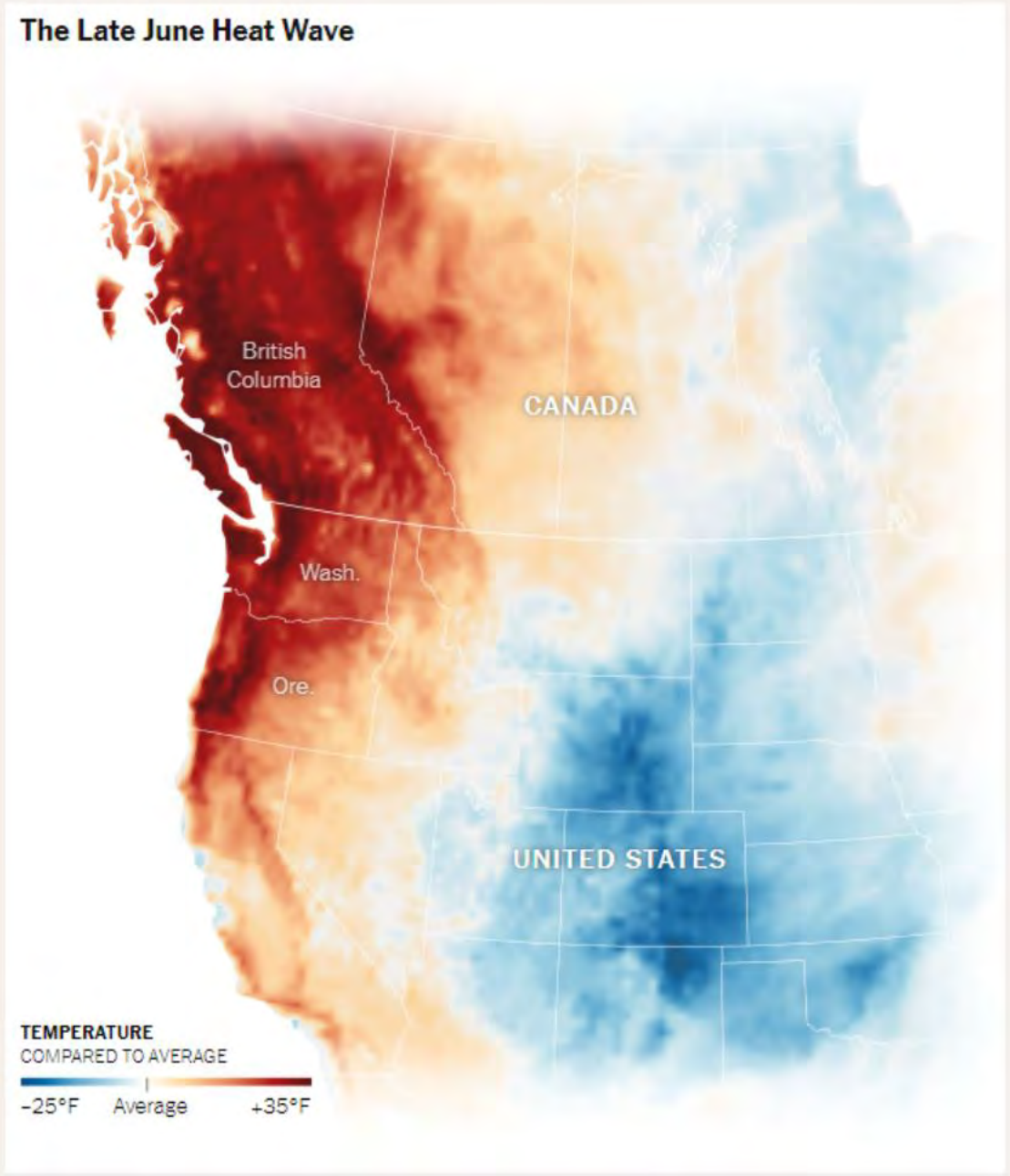


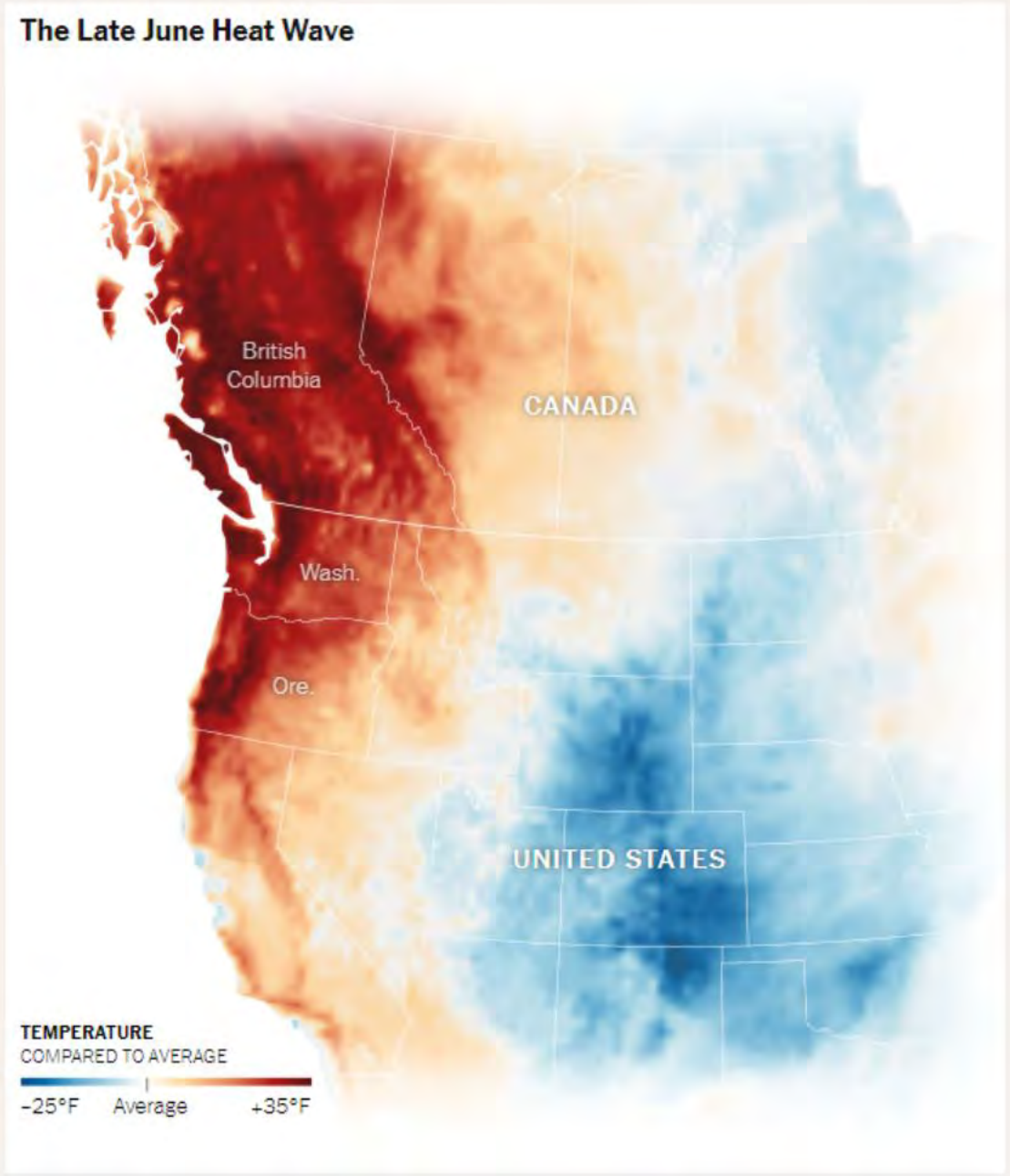
The Late June Heat Wave



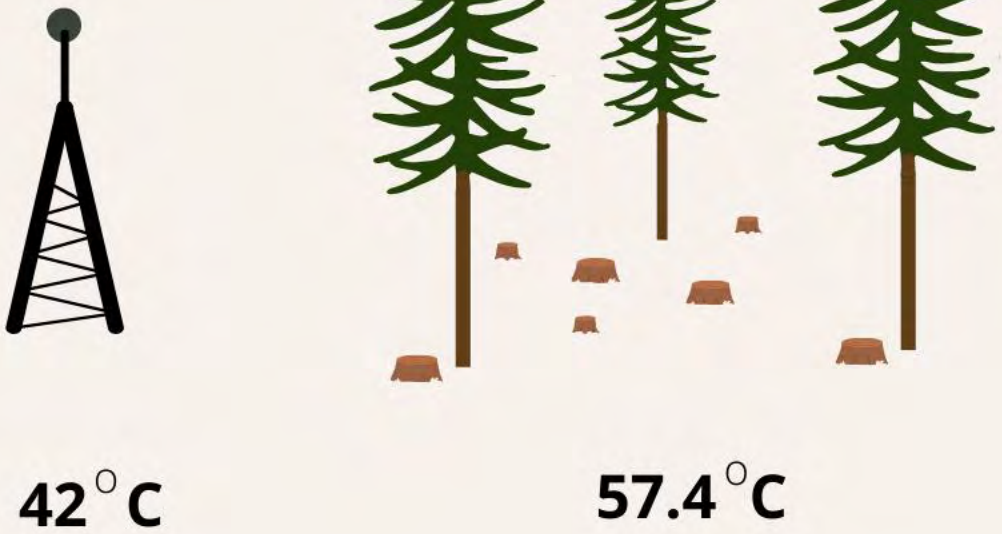


Observed Tmax

42°C

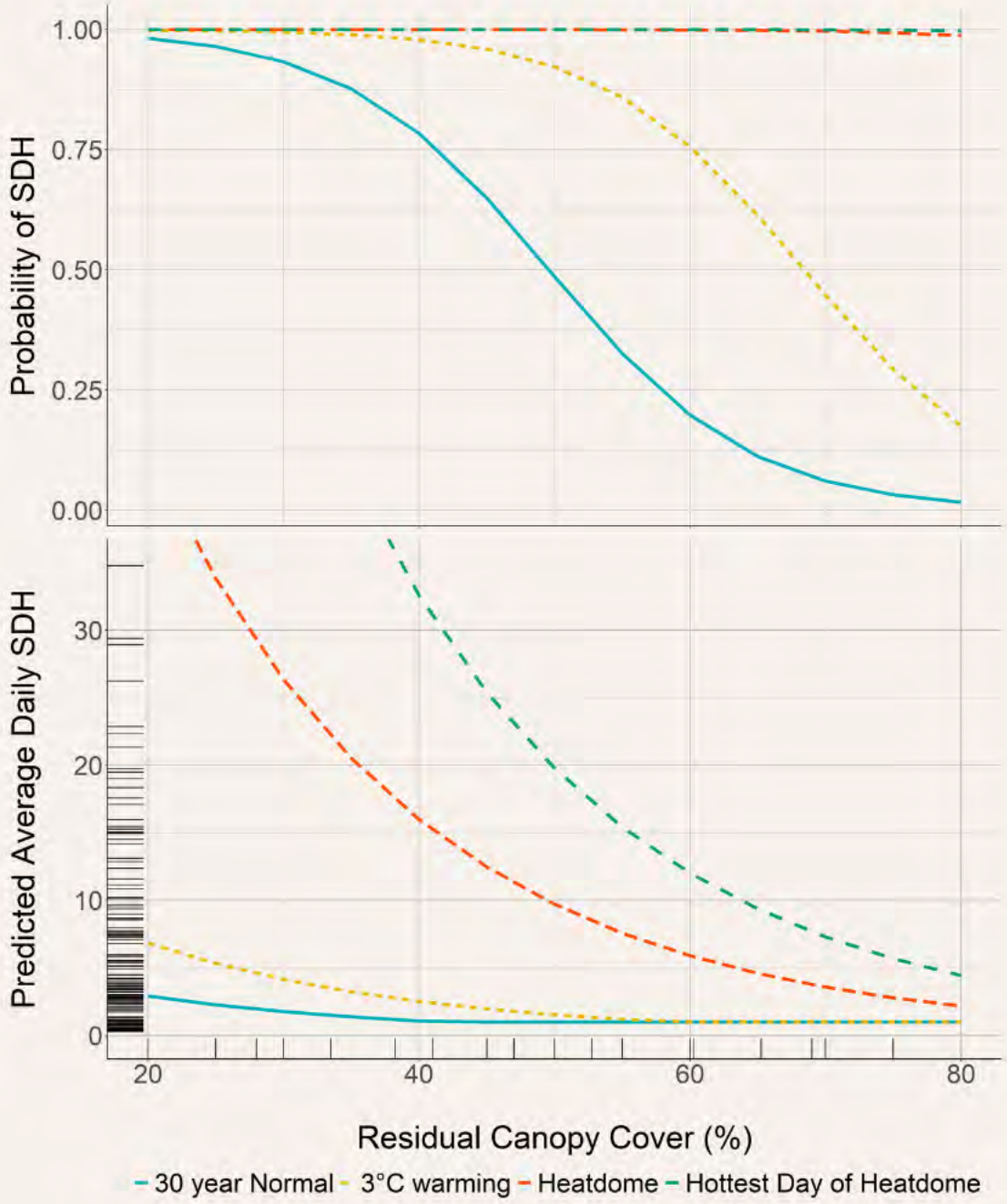


Observed Tmax



42°C

57.4°C


1.00
0.75
0.50
0.25
0.00
Probability of SDH
30
20
10
0
Predicted Average Daily SDH
20
40
60
80
Residual Canopy Cover (%)
30 year Normal
3°C warming
Heatdome
Hottest Day of Heatdome

Conclusion

-Typical conditions on south facing slopes will be unfavorable for regeneration under climate change and extreme heat events

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-Typical conditions on south facing slopes will be unfavorable for regeneration under climate change and extreme heat events

-The spatial variability in conditions as well as variability in species and individual responses to heat and moisture stress indicate that while growth and survival rates may decline a large-scale regeneration failure is unlikely

What can we do?

-Develop decision and risk analysis tools that can incorporate the buffering capacity of higher residuals and topography to create sufficient spatial variability in microclimate conditions for regeneration success to occur at the stand and landscape level


Thank you!
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kitahkinaani
‘Our Garden’

Presented by: Kayla Allen
Garden Co-Director
Miami University of Oxford, Ohio

Land Acknowledgement

Miami University carries the name of the Myaamia people who, along with the Shawnee, were forcibly removed from these homelands. Despite centuries of colonization, the Myaamia people preserve a deep connection to this land and are engaged in a vibrant resurgence of their heritage, language and culture.

The university maintains a strong reciprocal relationship with the Miami Tribe of Oklahoma grounded in our shared commitment to learning and each other.

Overview

Garden Details

1. Intro to GEODES and IES 474
2. Myaamia Center
3. Installation Progress
4. Symbolism
5. Ethnobotany

Broader Context

1. Educational Goals
2. Community Outreach
3. Weeyaakiteeheeyankwi neepwaantiiyankwi
4. Acknowledgements

G.E.O.D.E.S.

Global Education Outreach for
Diversifying the Earth Sciences

Equal - opportunity education

IES 474

Sustainability in Practice

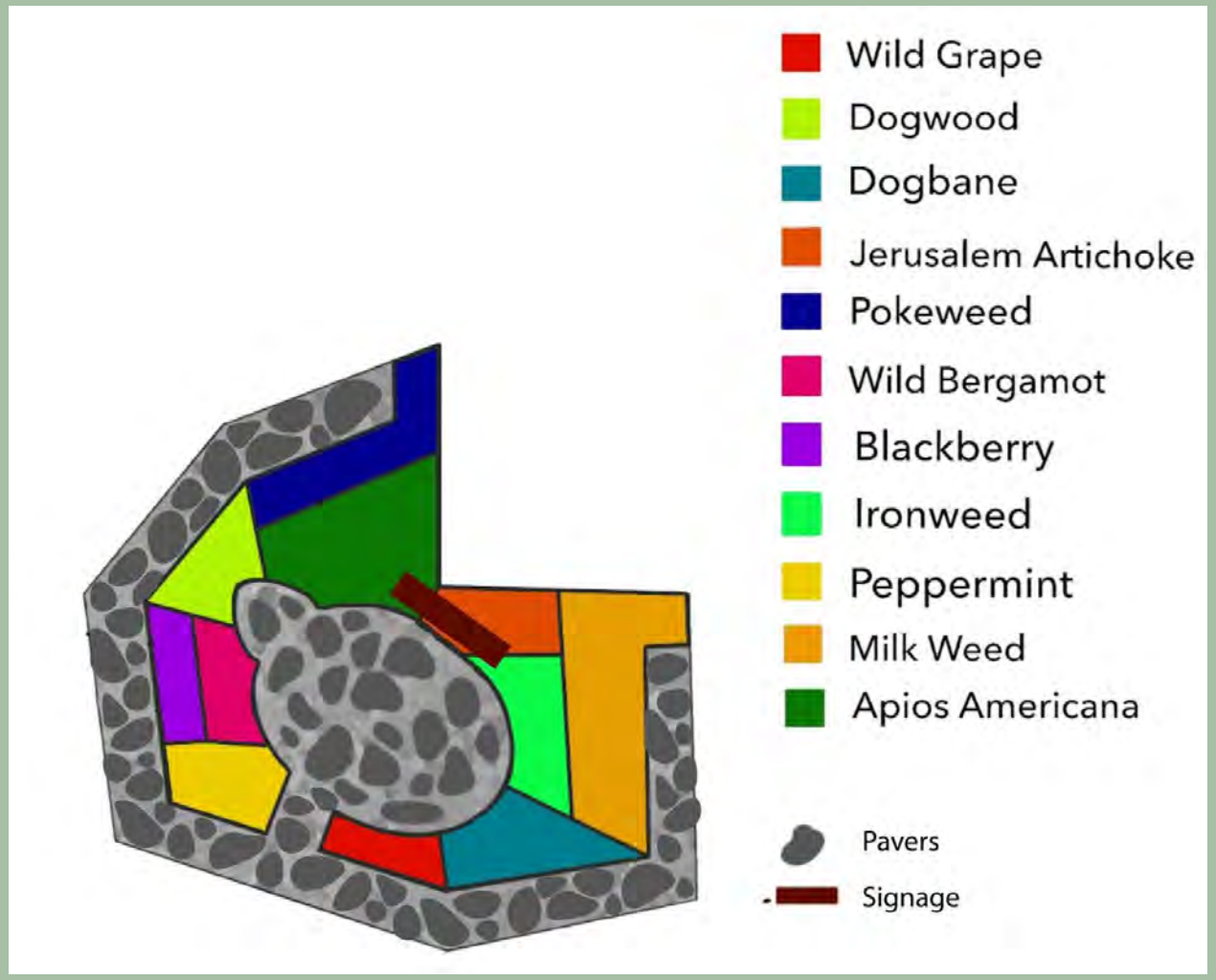
Real-life clients

Myaamia Center

Myaamia research and revitalization driven by Myaamia individuals

Installation Progress

Installation Progress



Future Bench Installation

Sitting and reflection space

Myaamia artist

Example: Eugene Brown, Myaamia artist, *“A Tribe Named Miami, A Surveyor's Stake, A Town Named Oxford”* sculpture at the Miami University Art Museum in October 2021.

kitahkinaani

'Our Garden'

HISTORY

kitahkinaani, or 'Our Garden,' is part of a broader effort between Miami University and the Miami Tribe of Oklahoma known as *neepwaantiiyankwi*, or 'Learning from Each Other.' The relationship between the Miami Tribe and Miami University is strengthened as members of these communities cooperate to establish and maintain *kitahkinaani*. This garden was established through the combined efforts of the Myaamia Center, Sustainability in Practice students, the Physical Facilities Department, and Boyd Greenhouse. *kitahkinaani* serves as a tribute to the continuing legacy of the Myaamia people and honors the relationship between the university and the nation from which its name is derived.

SIGNIFICANCE

This garden was designed in the shape of the Myaamia Heritage Turtle Logo. The turtle is culturally significant to both Miami University and the Miami Tribe of Oklahoma. Miami University students have a longstanding tradition of rubbing the heads of the turtles below the sundial in Central Quad for good luck. In addition, the Miami Tribe of Oklahoma incorporates a turtle into its seal. The Myaamia Heritage Turtle Logo, pictured to the right, is an extension of the Miami Tribe's Heritage Logo, which symbolizes the growing relationship between Miami University and the Miami Tribe of Oklahoma. The Heritage Logo, which borders this sign and sits at the center of the turtle, resembles ribbonwork- a

myaamia miami

The names of this garden and its plants are provided in both *Myaamiataweenki* (the language of the Myaamia people) and English. *kitahkinaani* is designed to

age revitalizat
people. The
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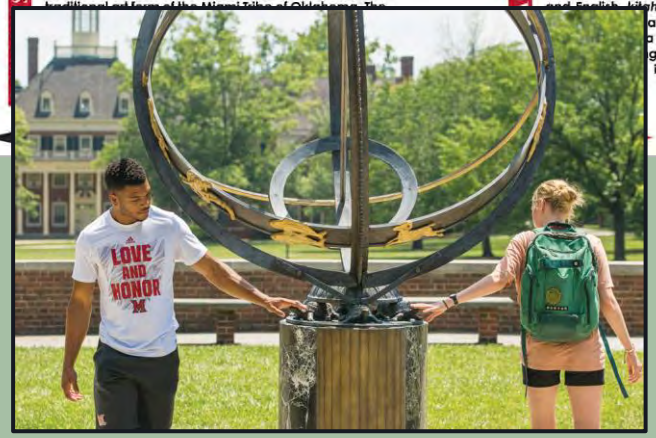
increase us
of the

ETHNOBOTANY

kitahkinaani highlights the ethnobotanical traditions of the Myaamia people by displaying several species of native plants that are culturally significant to the Miami Tribe. The plants in this garden have many uses, some of which include medicinal benefits, as well as a natural source of food. More information on these plants can be accessed through the QR codes on the individual signs distributed throughout *kitahkinaani*. The QR code links to *Mahkihkiwa*, the Myaamia Ethnobotanical Database, which is an extensive collection of relevant cultural, historical, and botanical information on plants of ethnobotanical importance to the Miami Tribe.

ECOLOGY

As a demonstration garden consisting entirely of native Ohioan plant species, *kitahkinaani* also serves a vital ecological role in Oxford's environment. In addition to providing a space for pollinators, the garden establishes a consistent food source for insects. While some species of insects act as generalists that can eat a wide variety of plants, including non-natives, many specialist species of insects are incapable of consuming invasive plants that were introduced either on purpose or accidentally. When native plant populations decline, the insects that need to eat them also decline. This threatens some larger animal populations, such as birds, that are dependent on those insects for food. Native plants are also a feature of sustainable gardening. They reduce the need for pesticides and herbicides, which diminish soil quality and can result in the pollution of soil and water resources.



Ethnobotany

peetihsahki
Peppermint
Tea, raw snack, candy from juice, diuretic, treat muscle spasms

leninši
Milkweed
Spring greens, flour, soup, potato substitute, treat warts, fish nets

ahsapa
Dogbane
Cordage, fish and beaver nets, *ahsapa tawaani*

aahsanteepakwi
Wild Grape
Treat boils and skin disorders, fish weirs, eaten, beer, cobbler

oonsaapeehkateeki
Jerusalem Artichoke
Oil for skin, grown with watermelons and gourds, tubers eaten spring and fall

makiinkweemiši
Blackberry
Asthma remedy, treat diarrhea, fruit source, cornbread, jelly

maamilaneewiaahkwia
Pokeweed
Important green, spring tonic (only before 15 in height), berries for paint and deworming dogs

eepiihkaanita
Ground Nut
Food source, named similar to peace beads, aka ground cherry

n/a
Wild Bergamot
Food source, good general medicine

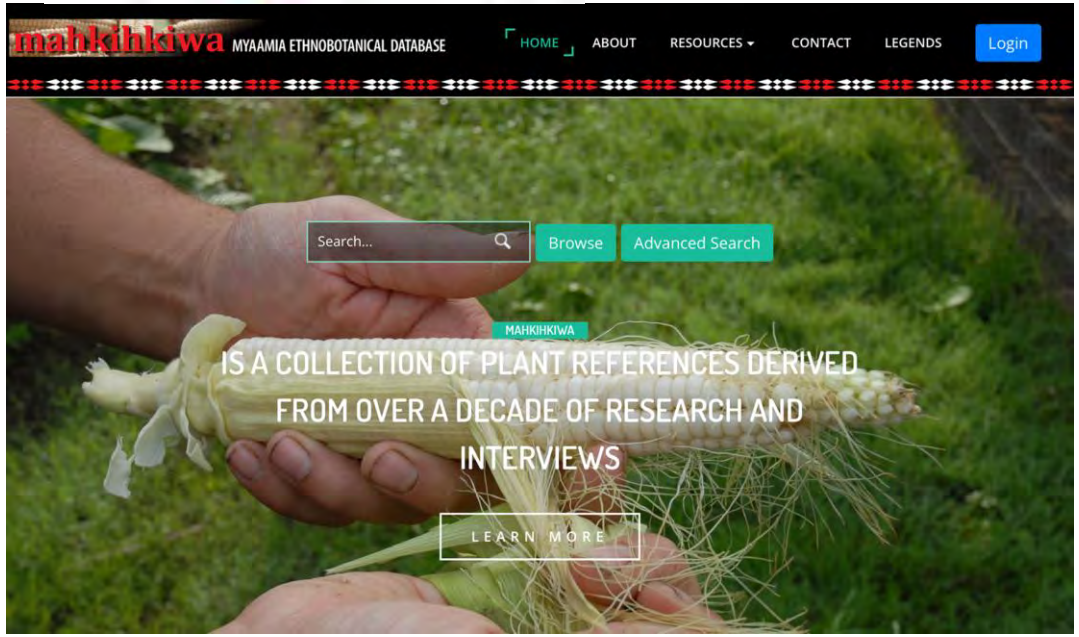
neehpikaahkwi
Red Osier Dogwood
Inner bark used for tobacco mix, *killinkinnick*

kiišiinkwia
Ironweed
Leaves make medicine for skin sores, tea believed to cleanse the blood

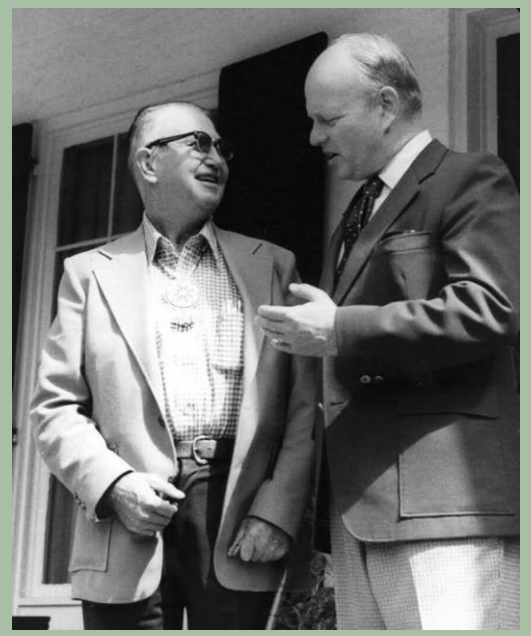
wiinaahkatwi
Spicebush
Helps with energy and aches, tonic/tea from stems, dried fruit for seasoning

Educational Goals

- Mahkihkiwa
  - Ethnobotanical Database
- Myaamia history
  - Horticulture
  - Language revitalization
  - Social sustainability
- Native flora
  - Ecological restoration
  - Environmental sustainability



Future Student Organization Outreach



Weeyaakiteeheeyankwi neepwaantiiyankwi

Mihši neewe:

- **Kara Strass** & **Andy Sawyer** from the Myaamia Center
- **Jay Hammer** & **Megan Croswell** from Physical Facilities
- **Frankie Clark** from Boyd Greenhouse
- **Dr. Mike Gonella**, myaamia ethnobotanist
- **Sarah Dumyahn** & **Kenzie Hatton** from IES 474
- **Kailyn Bost**, **Sabrina Dunlap**, **Sloane Lewis**, and **Hailey Matthews** from IES 474
- **Gretchen Spenn**, kitahkinaani myaamia Co-Coordinator
- **Jeremy Pinto** & **Paula Silva** from the US Forest Service
- **All of you!**

Questions?

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Creating Culturally Relevant Pathways to Reforestation [and Restoration] for Indigenous Youth

Susannah Howard

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SUNY College of Environmental Science & Forestry
MS Student in Environmental Science
Center for Native Peoples and the Environment
Sloan Indigenous Graduate Partnership

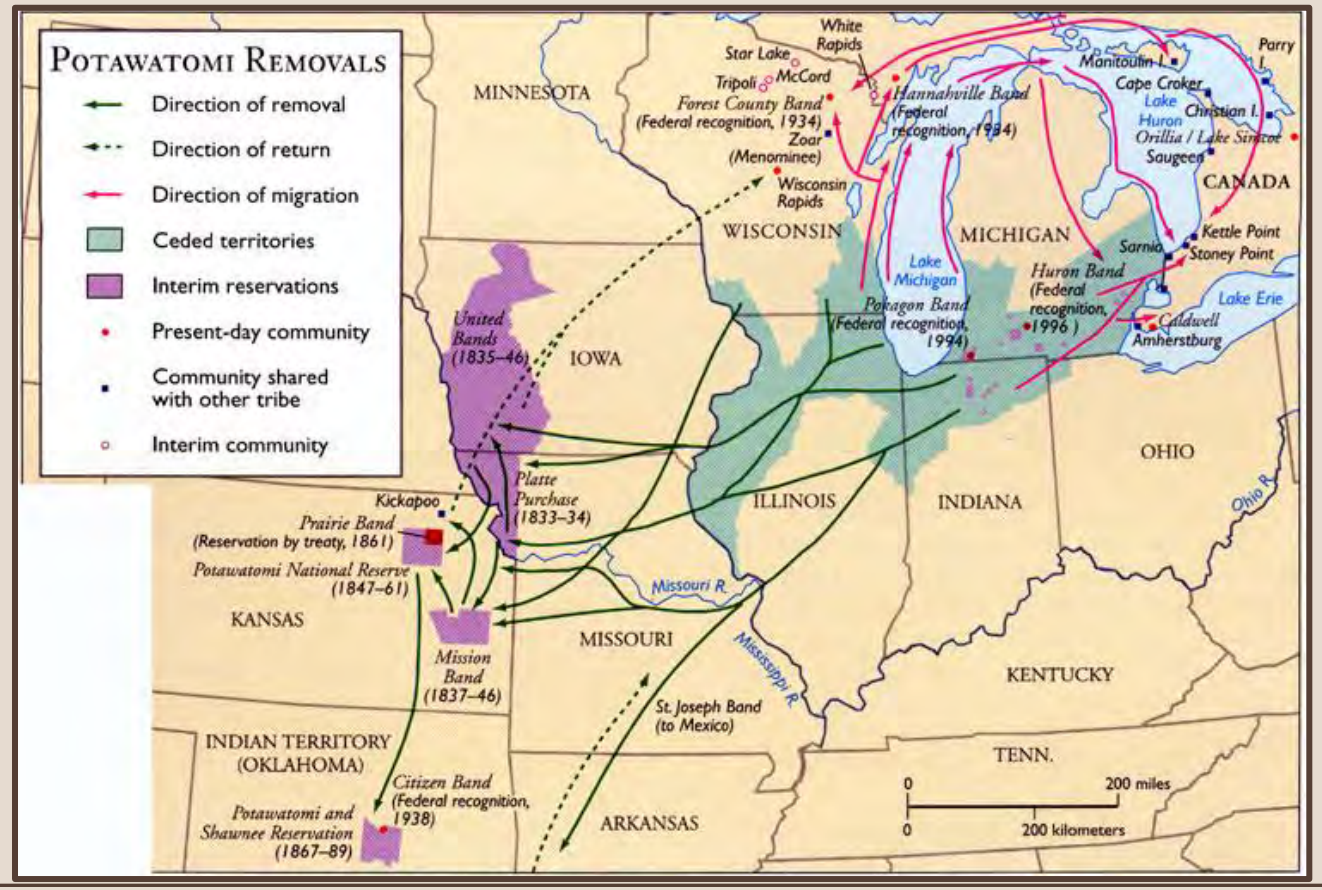
Introduction

SMITH COLLEGE

ESF State University of New York College of Environmental Science and Forestry

Center for Native Peoples and the Environment

How can we build climate adaptive cultural revitalization programs for Indigenous Nations experiencing diaspora?



Routes of Potawatomi Diaspora (1800-1890)

Shenamesh/Sugar Maple

Demen/Strawberry

Menomen/Wild Rice

Wîgwa'samîc/Paper Birch

Some Inclusion Barriers for Indigenous Youth

- **access to land (especially homelands)**
  - to learn from, subsist from, live on
- **access to education**
  - *Including traditional and western*
  - cultural knowledge loss due to colonization
  - accessibility of higher education
  - disconnection between tribal and western values and land ethics
- **role models**
  - who has similar lived experiences in all tiers across all sectors that can act as mentors?

Consider….

- **what experiences did you have as a young person that led you to the field?**
  - in the natural world? while recreating?
  - in the garden? in a greenhouse?
  - at a summer camp?

- **what skills were useful to have when you entered your program or job?**
  - sowing seeds? transplanting? self confidence? plant id?

How does your career support your identity?

Existing Cultural Revitalization Models for Tribal Youth on the Pathway to Restoration and Reforestation

Early Childhood

community/school garden or forest garden/plant walk

- teach basic seed sowing, transplanting, weeding, care, harvest, preservation; teach restoration and TEK around familiar cultural plants

- grow food for the school/elders**;** intergenerational knowledge sharing and relationship building; food security and food sovereignty bolstered

- plant seeds of interest in pursuing home gardens or potentially working for the tribe

Cheyenne River Youth Project

NAYA Intertribal Gathering Garden, Portland, OR

Community Gardens

Areas of potential need/support

- **access to seed**
  - botanic gardens, research, archaeological collections
- **access to equipment**
  - storage, greenhouses, soil, tools, dehydrators, canneries/kitchens
- **access to land**
- **access to rootstock for restoration**
  - if not present on tribal lands

Cheyenne River Youth Project

NAYA Intertribal Gathering Garden, Portland, OR

Teens/Young Adults

seasonal or summer camps

- harvesting with family or among community members (wild game, foraging, crops)
- teaching honorable harvesting and traditional preservation/preparation methods

summer jobs/job shadows

- interning at environmental or tribal lands
- workforce development
- career planning/resume building

Salmon camp on the Columbia River
Hosted by Columbia River Inter-tribal Fish Commission

Pomo basket weaving class

Native Earth Environmental Youth Camp

Students learn traditional fire starting techniques

Picking sweetgrass.

Location: Haudenosaunee Territory (central NY)

Partners:

- Haudenosaunee Environmental Task Force
- SUNY ESF/Center for Native Peoples and the Environment

Longevity: 2009-Present

Age: high schoolers from Northeast

Primary Goals:

- learning about the beings referenced in the Thanksgiving Address each day
- introduce concept of braiding TEK and SEK together to address environmental issues in the Northeast
- introduce young Indigenous leaders to diplomacy (trip to UN)
- introduction to other Indigenous college students and faculty

Camps & Internships

Areas for support

- hosting interns, job shadows, field trips, and mentees
- community project support- labs, properties, expertise

Options

- Work with existing programs
- support recruitment to outside programs
- Support the creation of new ones with intertribal organizations, tribal councils and departments, and tribal members

Salmon camp on the Columbia River (hosted by Columbia River Inter-tribal Fish Commission

Pomo basket weaving class

Post Secondary Pathways to Restoration

Continuing Education

- Tribal Colleges and Universities
- Community colleges
- Technical programs
- Native American studies departments
- Biocultural restoration foci in ecology/conservation departments
- Apprenticeships
- Community gardens/clubs

Conferences and Professional Development Opportunities

- fellowships (research, leadership, policy)
- conference funding
- mentorship opportunities

Summer programs

- REUs
- Internships at tribes
- Pathways internships with federal agencies

Job Offers

- ability to move up
- tribal/intertribal options
- good pay/benefits

Where can we go from here?

Core Tenets of Indigenous Relationships

- RESPECT: respect cultural integrity
- RESPONSIBILITY: provide educational opportunities that are relevant to the people and community
- RECIPROCAL: foster reciprocal relationships
- RESPONSIBILITY: demonstrate responsibility through participation

adapted from Kirkness and Bernhardt, 1991

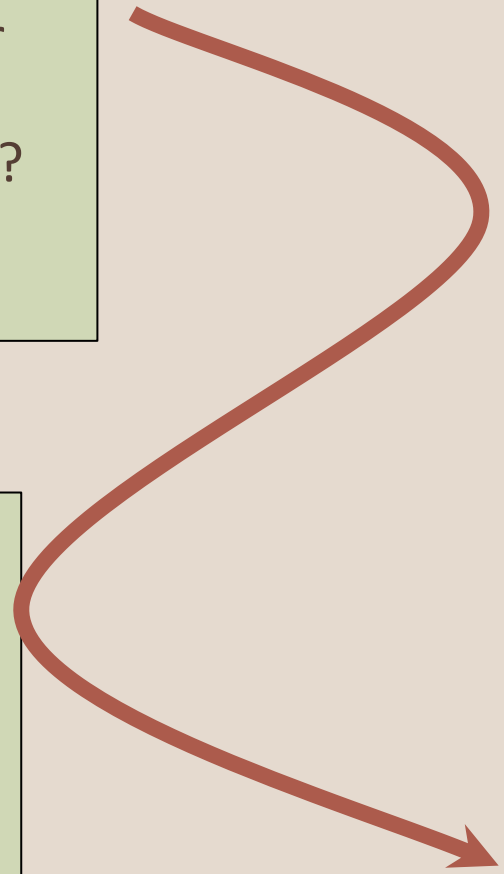
Where do you fit?

What are the needs or wants?

- where is there common ground?
- what impediments are present for relationship building?
- what's your plan for building trust?
- how are you going to sustain partnerships?

What Potential Partnerships can you facilitate?

- educational institutions
- governmental agencies
- non-profit land conservancies
- private industry?



Are you an Insider or an Outsider?

- Where can you do the most good?
  - Mentorship?
  - Consulting?
  - Research leadership?
  - Lab access?
  - Land Access?
  - financial support?
  - grant support for infrastructure?

Key Takeaways

- **Consider all ages and combinations of peoples, places, and species**

- **Keep the 4 Rs in mind**
  - Develop programs and opportunities that support cultural revitalization and land protection
  - Work at the speed of trust & be willing to adjust with feedback

- **Don’t assume what the priorities of the Nation are:**
  - Ask what they need
  - Consider partnerships with intertribal representative groups

- **Be creative and generous with support**

Miigwetch!
Thank you!

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