

Environmental Justice Webinar Series for Tribes and Indigenous Peoples

Food Forests – Food Sovereignty Mini-Series

August 31, 2023

* Please note that this webinar will be recorded and posted.



Panelists

- Ben Friton, The REED Center for Ecosystem Reintegration, Middletown, MD
 - Troy Wiipongwii, Director of Entrepreneurship & Innovation in Conservation, College of William & Mary, VA
 - Jonathan Long, Research Ecologist, Pacific Southwest Research Station, U.S. Forest Service
 - Jennifer Ballinger, Tribal Relations Specialist, Forest Products Laboratory, Northern Research Station, U.S. Forest Service
 - Rachel Riemann, Research Forester/Geographer, Northern Research Station, Forest Inventory and Analysis, U.S. Forest Service
 - Nanabah Lyndon, Acting National Program Lead for Tribal Research, U.S. Forest Service
 - Vincent Randall, Apache Culture Director, Yavapai-Apache Nation (Emory Oak Collaborative Tribal Restoration Initiative)
 - Danny Gogal and Ericka Farrell, Office of Environmental Justice and External Civil Rights, U.S. EPA (Facilitators)
- 

Benjamin F. Friton

The REED Center for Ecosystem Reintegration

Food Forests:
Human Perception & the Laws of Nature



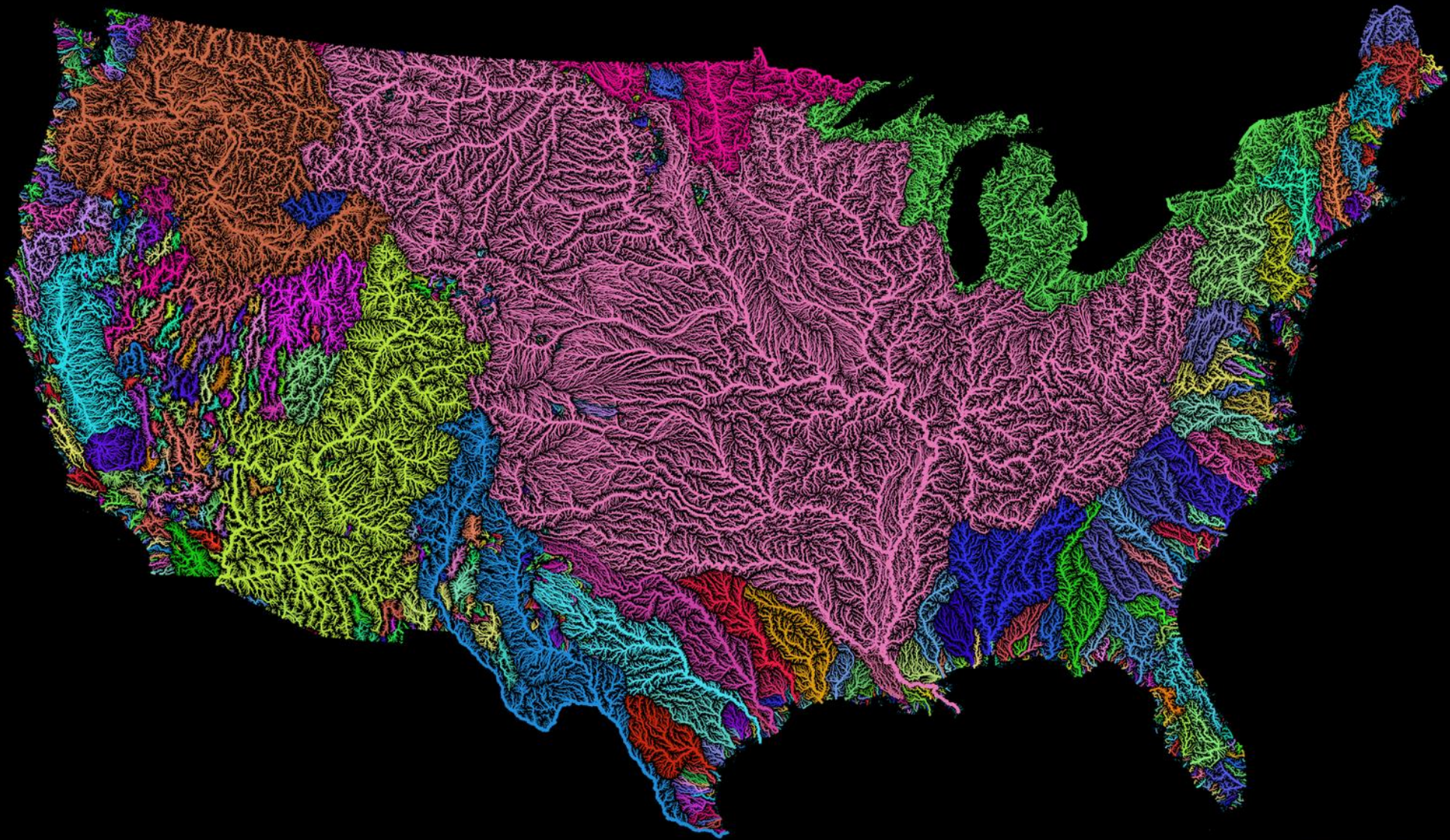
www.TheREEDCenter.org

Economic Efficiency

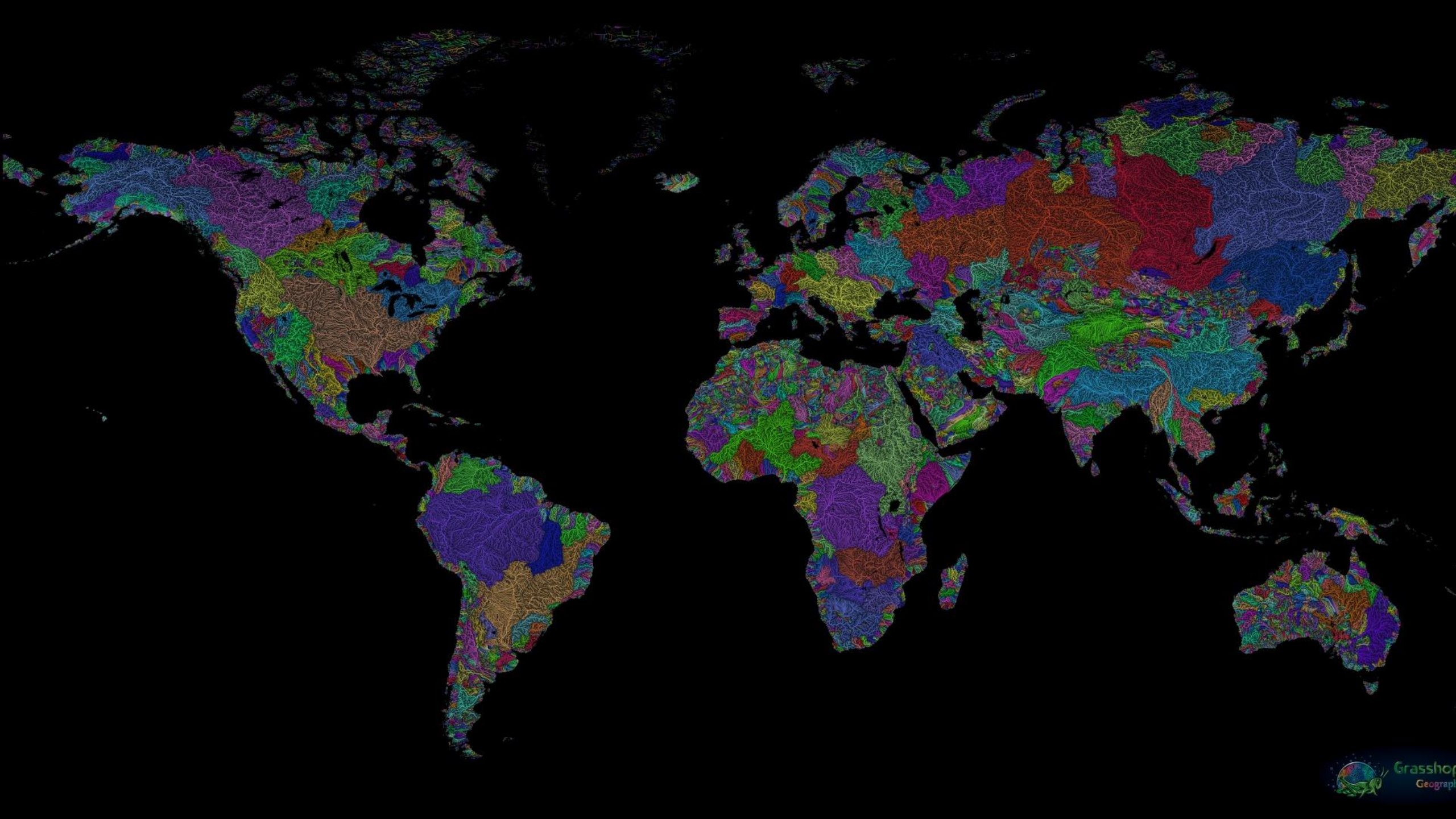
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image IBCAO

Google











Biomes



Mountain & Tundra ▶ **17** %



Boreal Forest ▶ **17** %



Desert & Scrub ▶ **22** %



Grassland & Savanna ▶ **23** %



Tropical & Temperate Forest ▶ **21** %

World Land ▲ **100** %



Biomes



Mountain & Tundra ▶ **17** %



Boreal Forest ▶ **17** %



Desert & Scrub ▶ **22** %



Agriculture ▶ **38** %

World Land ▲ **100** %



© Chris Boswell | Dreamstime.com



Homeland Security & Human Health

A faint, light-colored background image of a tree with a thick trunk and many roots. The text 'THE REED CENTER' is visible in a large, bold, sans-serif font, partially obscured by the tree's canopy and roots.

**Hyper-Localized; Perennialized; Densified; Resilient
Agro-ecoystsems**



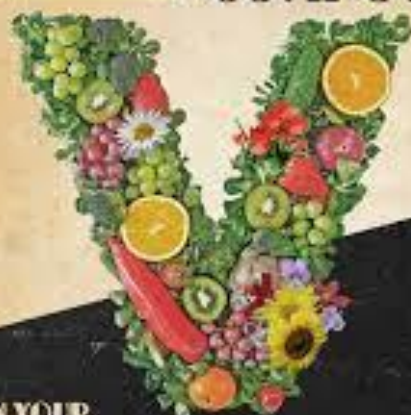
Ask the—
U.S. Department
For a FREE

Uncle Sam says -

GARDEN

To Cut Food Cost

SOIL LOVES COMPOST



IN YOUR
VICTORY GARDEN

US COMPOSTING COUNCIL AND INTERNATIONAL COMPOST AWARENESS WEEK



*Raised 'em myself
in my*
U.S. School Garden

ISSUED BY THE U. S. SCHOOL GARDEN ARMY BUREAU OF EDUCATION, DEPARTMENT OF INTERIOR,
WASHINGTON, D. C.

and for thought

Week 1



Week 3



Week 5



Growing
Pillars

www.CanYALove.org






CAN YA LOVE
Helping a child today become the sage of tomorrow.
Website:
www.canyalove.org
Contact:
info@canyalove.org

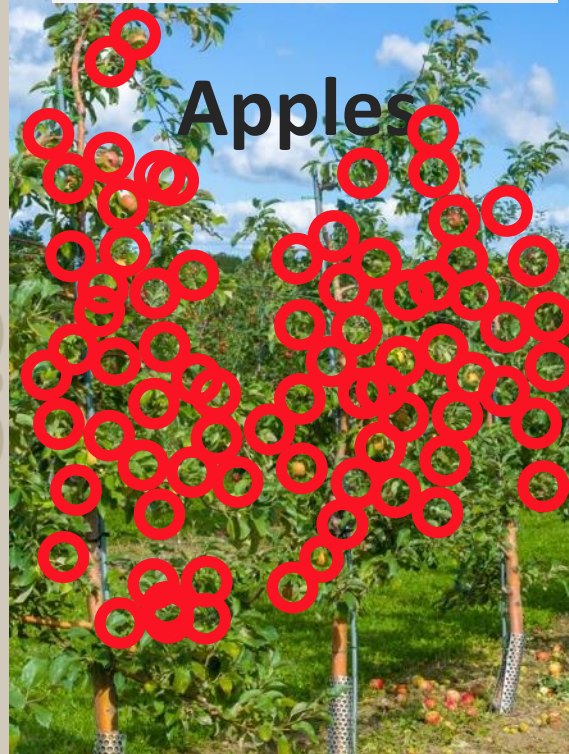
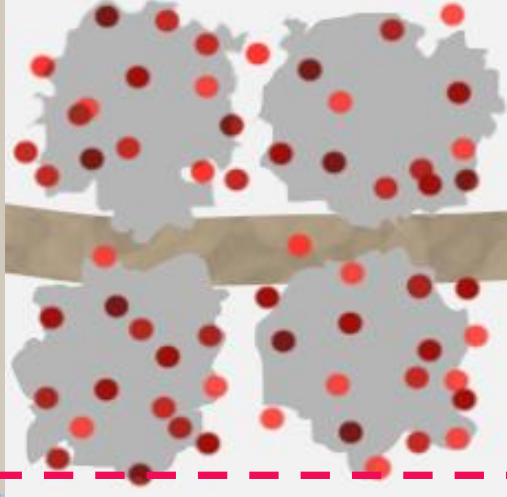


Growing
Walls

www.CanYALove.org



www.CanYALove.org



Monoculture

 Polyculture





Wild Cherry

Winter Grape

White Pine

Paw paw

Spicebush

Nettles

Ostrich Fern

Goldenseal

Wintergreen



Paw paw

Sweetbay
Magnolia

Redbud

Purple Aster

Sunchokes

Rhubarb

French Sorrel

Ostrich Fern

Red Clover

Blueberry

Dandelion

Wine Cap Mushroom

 Polyculture

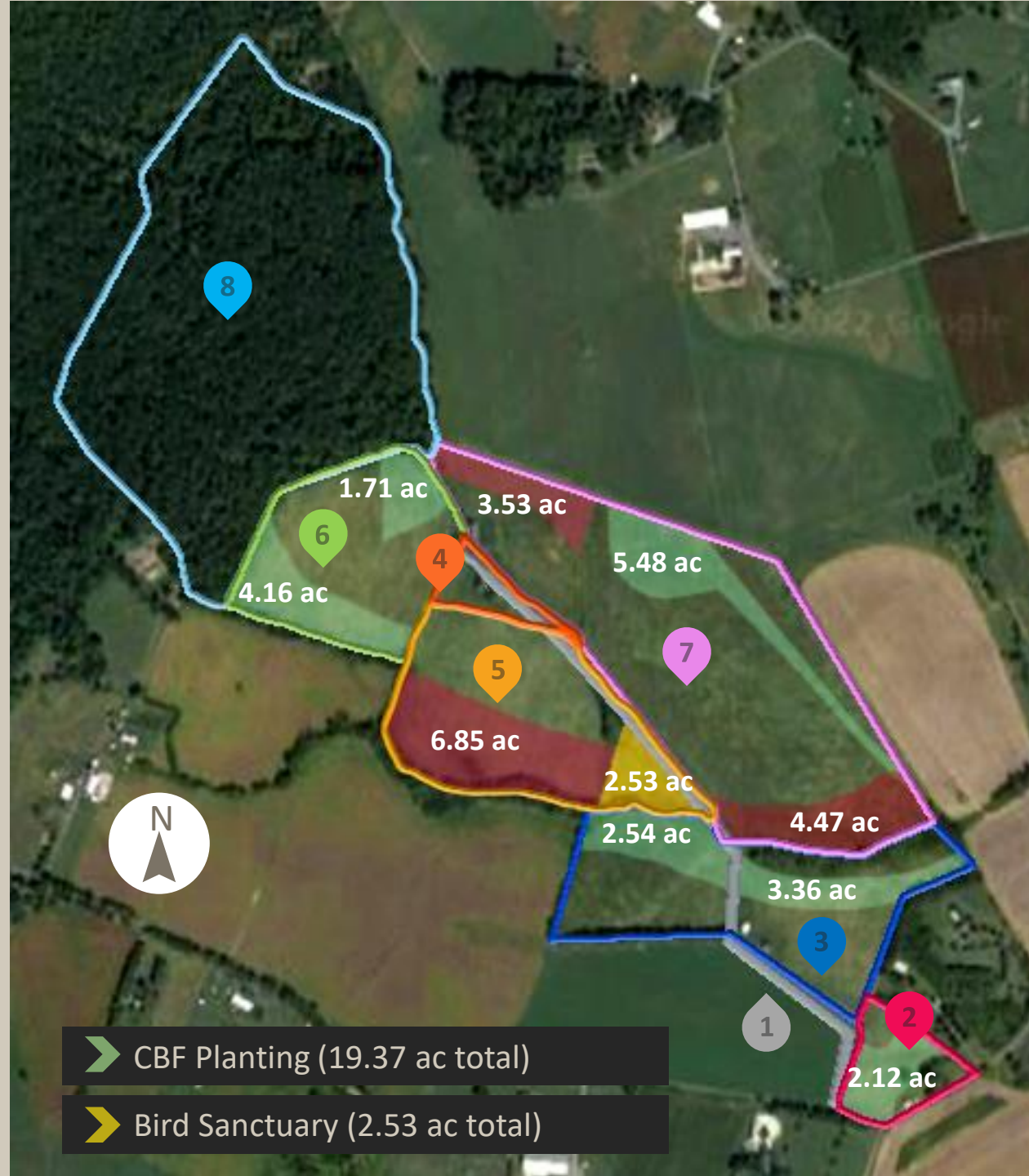


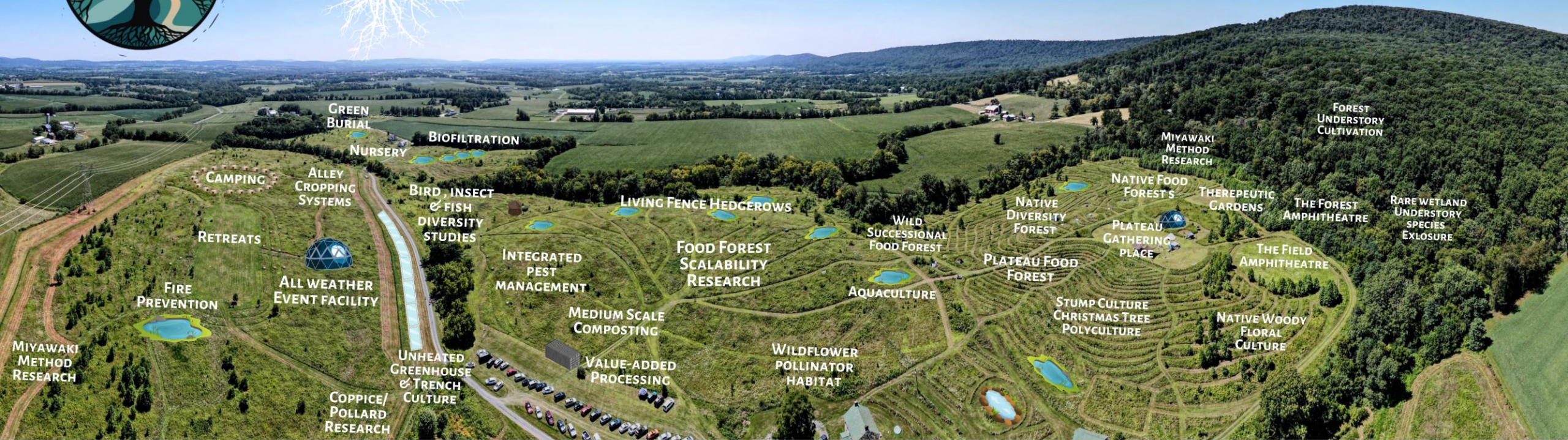




 Companion Planting



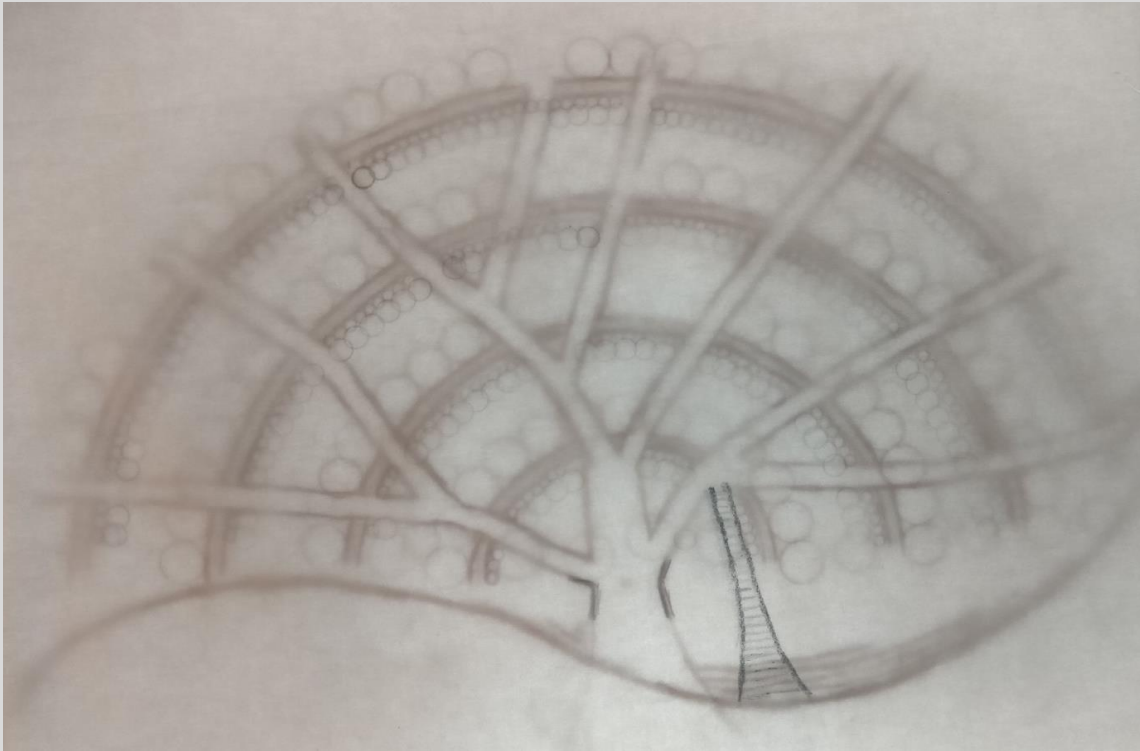












THE TREE OF LIFE PROJECT

APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER
DECEMBER THRU MARCH

FULL-SEASON
HARVEST
GARDEN

COMPOSTING, ROOT-
SYSTEM & SOIL
EDUCATIONAL SPACE

PROCESSING,
EQUIPMENT STORAGE
& CLASSROOM

NURSERY



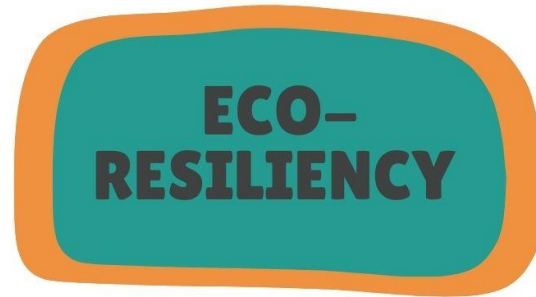
**ECONOMIC
RESILIENCE**

**ECOLOGICAL
RESILIENCE**

**4. WASTE/POLLUTION
REDUCTION**

**6. MARKET
OUTCOME
IMPROVEMENTS**

2. SOIL HEALTH



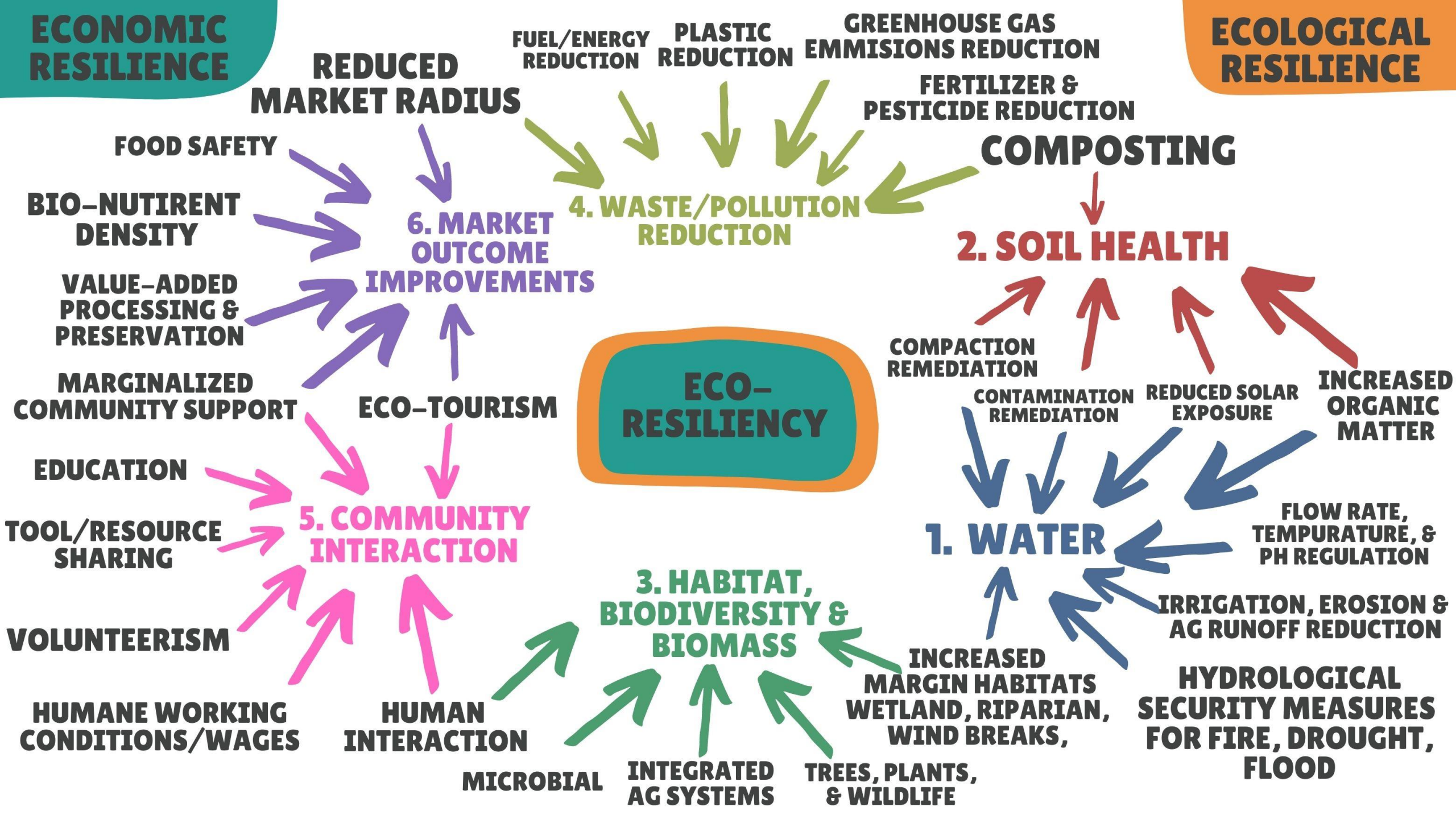
**5. COMMUNITY
INTERACTION**

**3. HABITAT
BIODIVERSITY &
BIOMASS**

1. WATER

ECONOMIC RESILIENCE

ECOLOGICAL RESILIENCE



Web3.0 Tools for Indigenous Food Sovereignty

Troy Wiipongwii, PhD, MPP

Global Research Institute, William
& Mary

Institute for Integrative
Conservation, William & Mary

ttwiipongwii@wm.edu

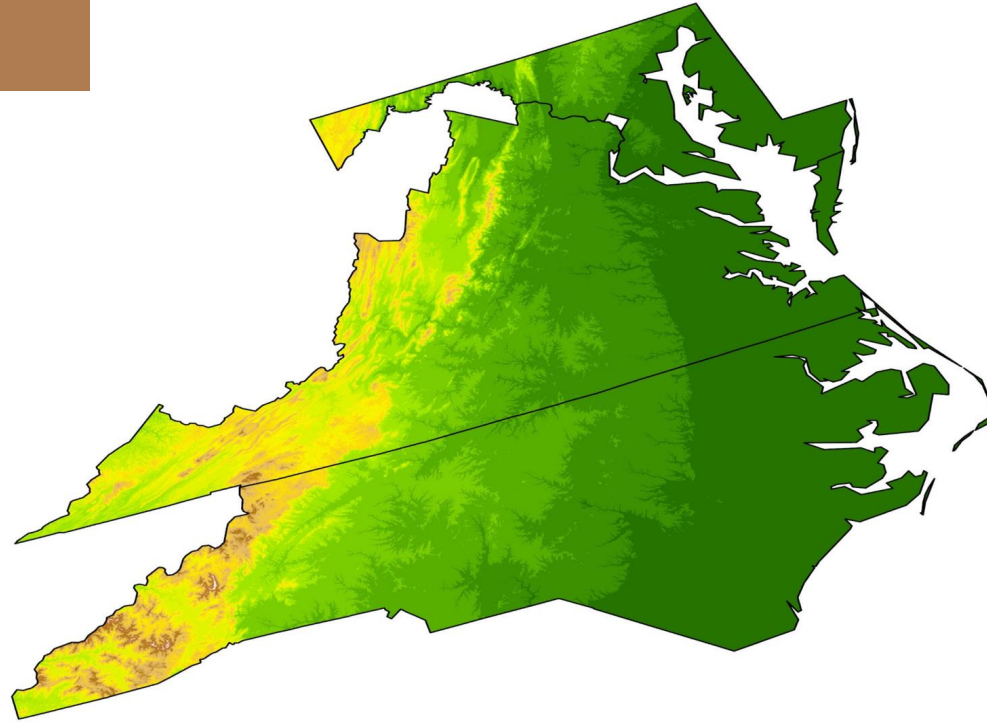




Intelligent Indigenous Food Sovereignty Software

Zach Conrad, PhD,
MPH

zsconrad@wm.edu

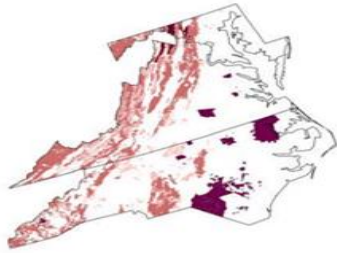


Matthias Leu, PhD

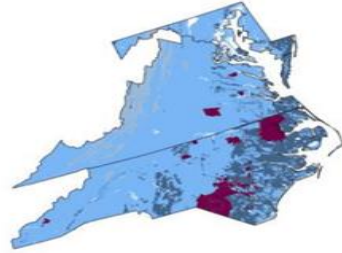
mleu@wm.edu

1. How many people can be fed a healthy diet from food produced on tribal lands in Maryland, Virginia, and North Carolina?
2. Where can this food be produced sustainably?
3. How much agricultural resources will be needed (land, fertilizer nutrients, pest management, and irrigation water)?

Where can sustainable food production be increased on tribal lands?



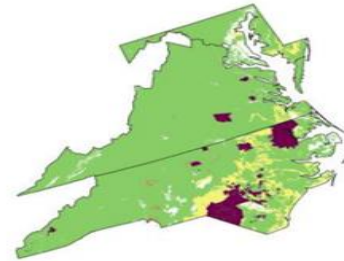
Soil depth



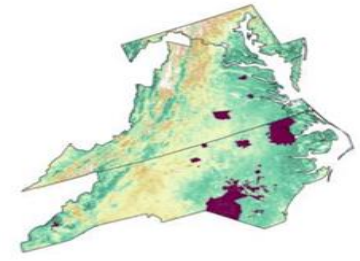
Soil drainage



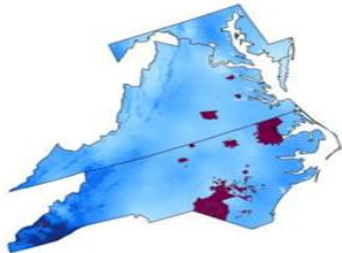
Soil salinity



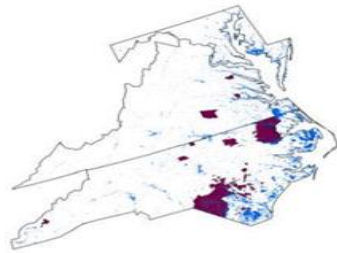
Soil texture



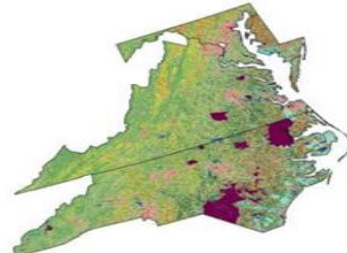
Soil pH



Precipitation



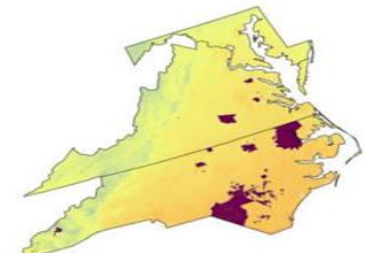
Riparian buffers



Land cover



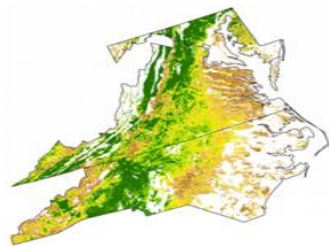
Slope



Temperature



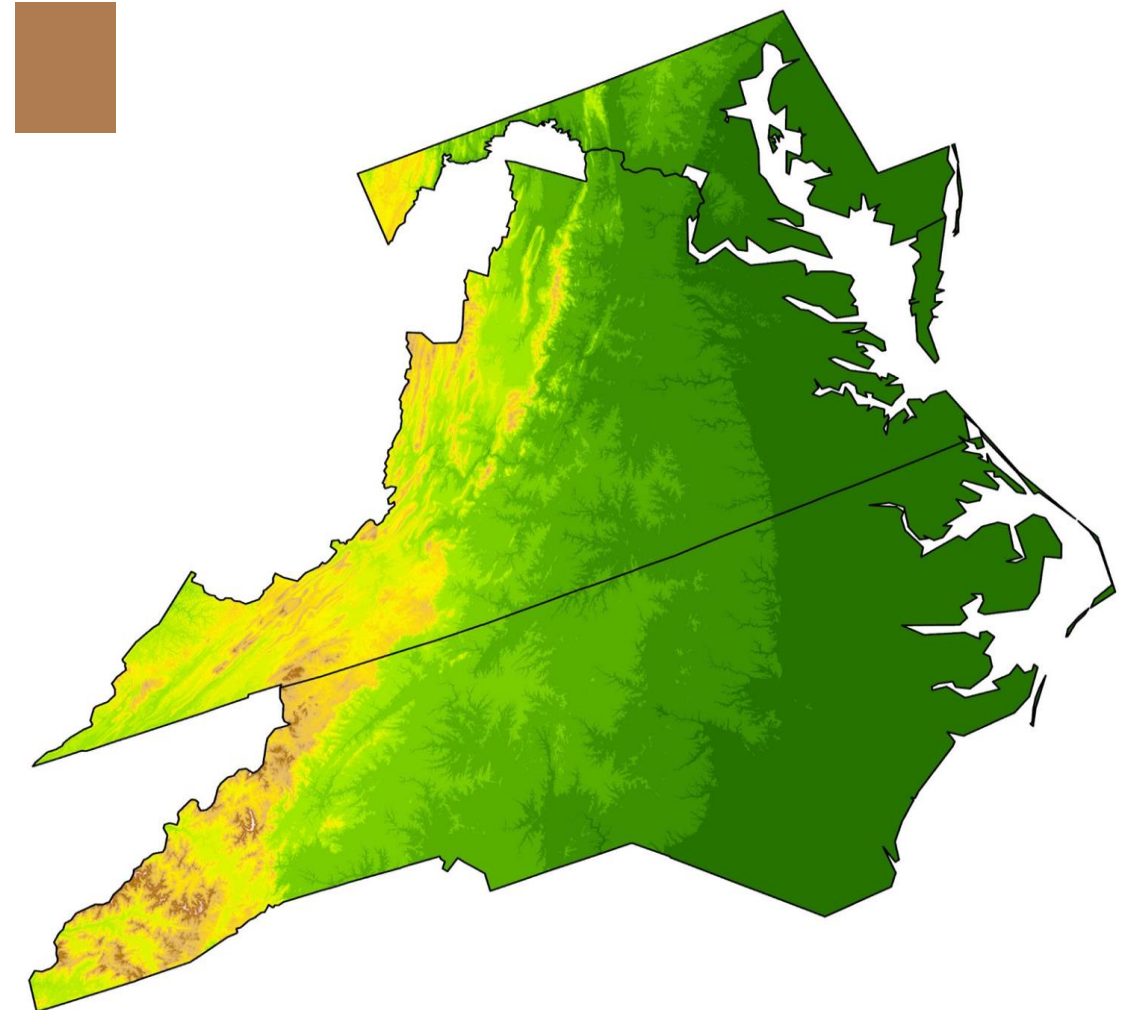
Elevation

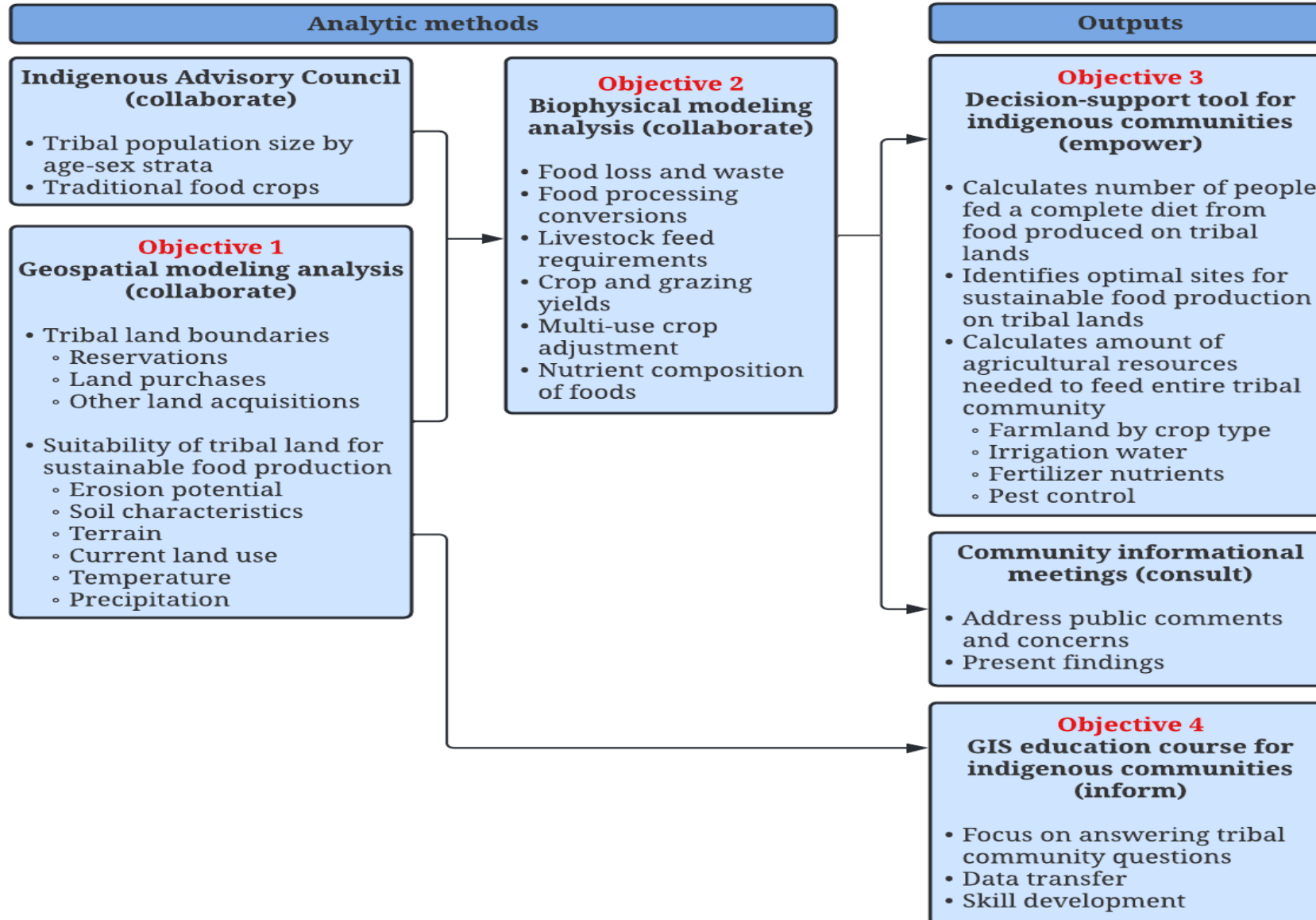


All

More Considerations

1. Beyond subsistence, what are the revenue goals of the tribal community?
2. How does leadership make decisions?
3. How should data be protected?
4. Which farming practices should be included for modeling?
5. Should the software be a pure planning tool or also real-time decision-support tool?







Web3.0

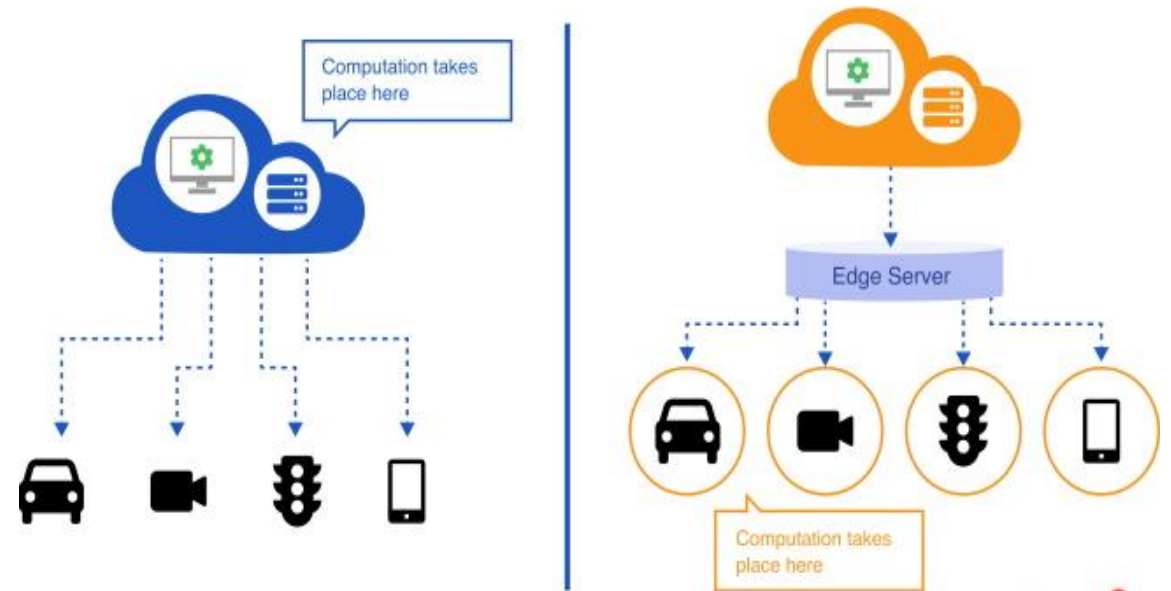
Web 3.0

“...Where Web 2.0 was driven by the advent of mobile, social and cloud, Web 3.0 is built largely on three new layers of technological innovation: **edge computing, decentralised data networks** and **artificial intelligence**.” - Fabric Ventures

Where Cloud Alone Fails

- By 2025 75% of data will need to be processed out of the cloud environment due to data being generated by IoT devices
- **Security**
- **Speed**
- **Cost**

Cloud Computing vs Edge Computing



Retrieved from: <https://www.orientsoftware.com/blog/edge-computing-vs-cloud-computing/>

Distributed data systems / Blockchain

To allow digital information to be recorded, distributed, and accessed without being tampered with.

- What information can recorded?
- Who wants what information recorded?
- Who can record the information?
- How is data recorded?
- How is data stored and distributed?
- How is data accessed?
- Who can access the information?

Artificial Intelligence

“Artificial intelligence (AI) is a set of technologies that enable computers to perform a variety of advanced functions, including the ability to see, understand and translate spoken and written language, analyze data, make recommendations, and more.” - Google Cloud

Different ways of classifying AI:

1. [ML](#)
2. [NLP](#)
3. Vision
4. [Expert Systems](#)
5. Speech
6. [Planning](#)
7. Robotics

Web 3.0 and Food Forests

- Indigenous Data Sovereignty
- Optimizing the configuration of the forest
- Monitoring of complex interactions within the ecosystem
- Biodiversity monitoring
- Human capital costs for harvesting
- Mechanizing permaculture harvests



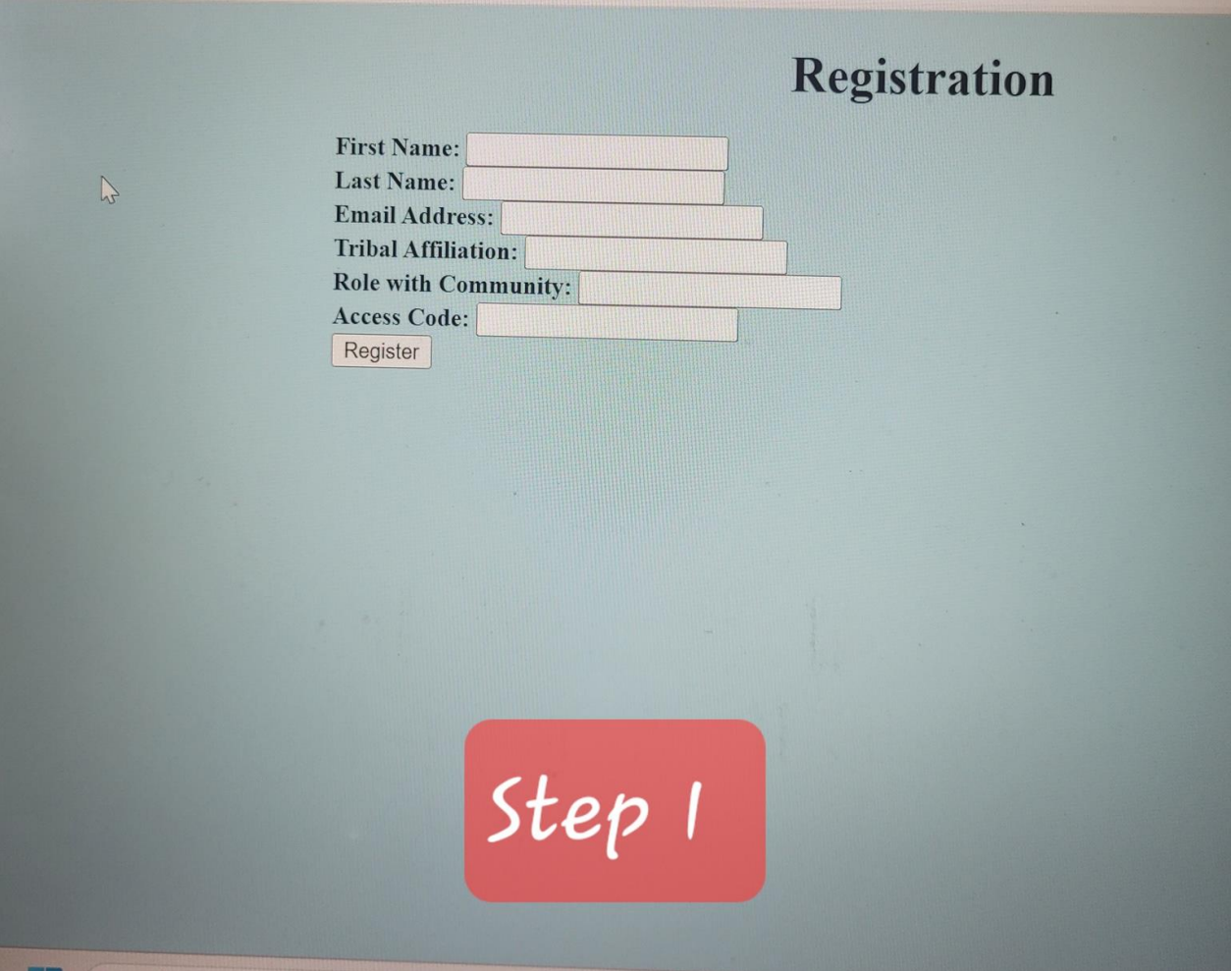
Retrieved from: <https://www.aftaweb.org/about/afta/136-2018-vol-24/2018-vol-24-no-1/231-food-forests-in-the-american-southwest.html>



The Software Proof of Concept

Registration and Blockchain

1. The access code is derived from elements of public-private key, tribal affiliation, and community role. This establishes access controls to specific tribal data.



The image shows a registration form titled "Registration" in a serif font. The form is set against a light blue background. It contains several input fields, each preceded by a label: "First Name:", "Last Name:", "Email Address:", "Tribal Affiliation:", "Role with Community:", and "Access Code:". Each label and its corresponding input field are enclosed in a light pink rectangular box. Below the "Access Code:" field is a "Register" button, also in a light pink box. A mouse cursor is visible near the "First Name:" field. In the bottom right corner of the form area, there is a red rounded rectangle containing the text "Step 1" in a white, handwritten-style font.

Registration

First Name:

Last Name:

Email Address:

Tribal Affiliation:

Role with Community:

Access Code:

Register

Step 1

Preliminary Input and Edge Computing

1. Tribal geospatial data, demographic information, climate conditions, etc. will be accessed from tribal repositories to convert this data into appropriate output
2. As an initial consultation the data and computing process are very manageable. As the tool moves from preliminary consultation to precision agriculture the need for edge computing becomes near mandatory

The image shows a screenshot of a digital 'Input Form' with a light blue background. A red rectangular box with the white text 'Step 2' is overlaid on the form. The form contains the following fields:

- Population:
- Will you be importing/exporting food from other communities? (Yes = 1 : No = 0):
- Amount of whole and green beans (oz):
- Amount of leafy green veggies (cups):
- Amount of red and orange vegetables (cups):
- Amount of dry beans, lentils, and peas (cups):
- Amount of starchy vegetables (cups):
- Amount of other vegetables (cups):
- Amount of fruit (cups):
- Amount of cow milk products (cups):
- Amount of fluid milk yogurt (cups):
- Amount of cheese and other dairy products (cups):
- Amount of soy milk (cups):
- Amount of nuts (meat oz equivalents):

AI and Output

Foodprint Output

The total population that can be fed based on this diet

Expand

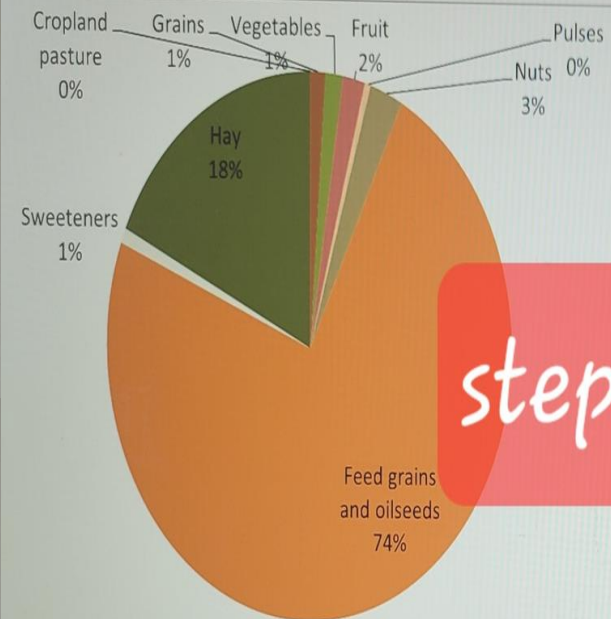
Carrying capacity	(persons)	(% of population)
Population fed	351,337,160	117%

The amount of land used to grow this diet

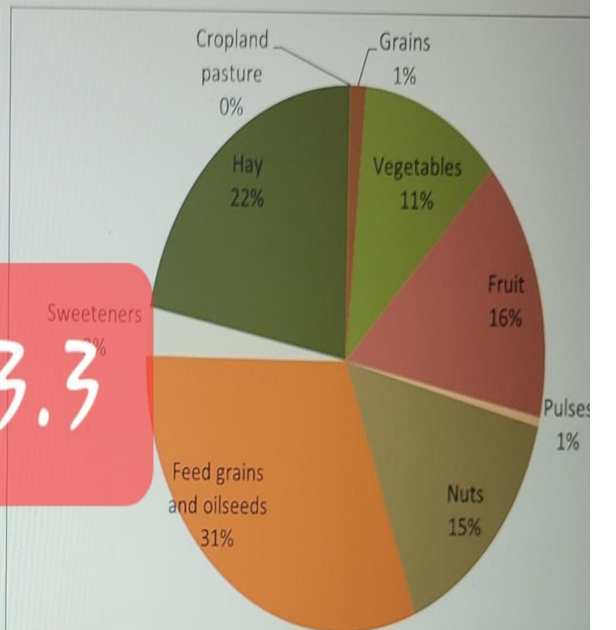
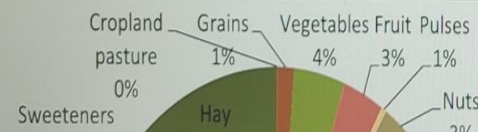
Expand

Land used	(acres)	(% of available)
Cultivated cropland	241,596,265	100%
Total cropland	284,855,759	87%
Grazing land	257,064,197	35%

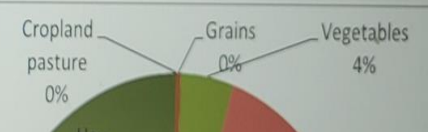
breakdown of inputs based on categories of foods



Cropland use by crop type



Irrigated water use by crop type



step 3.3

Forest Service Research on Indigenous Food Sovereignty

Presentation to Food Sovereignty
Subcommittee of the Native
American Working Group

Jonathan W. Long and Frank K.
Lake

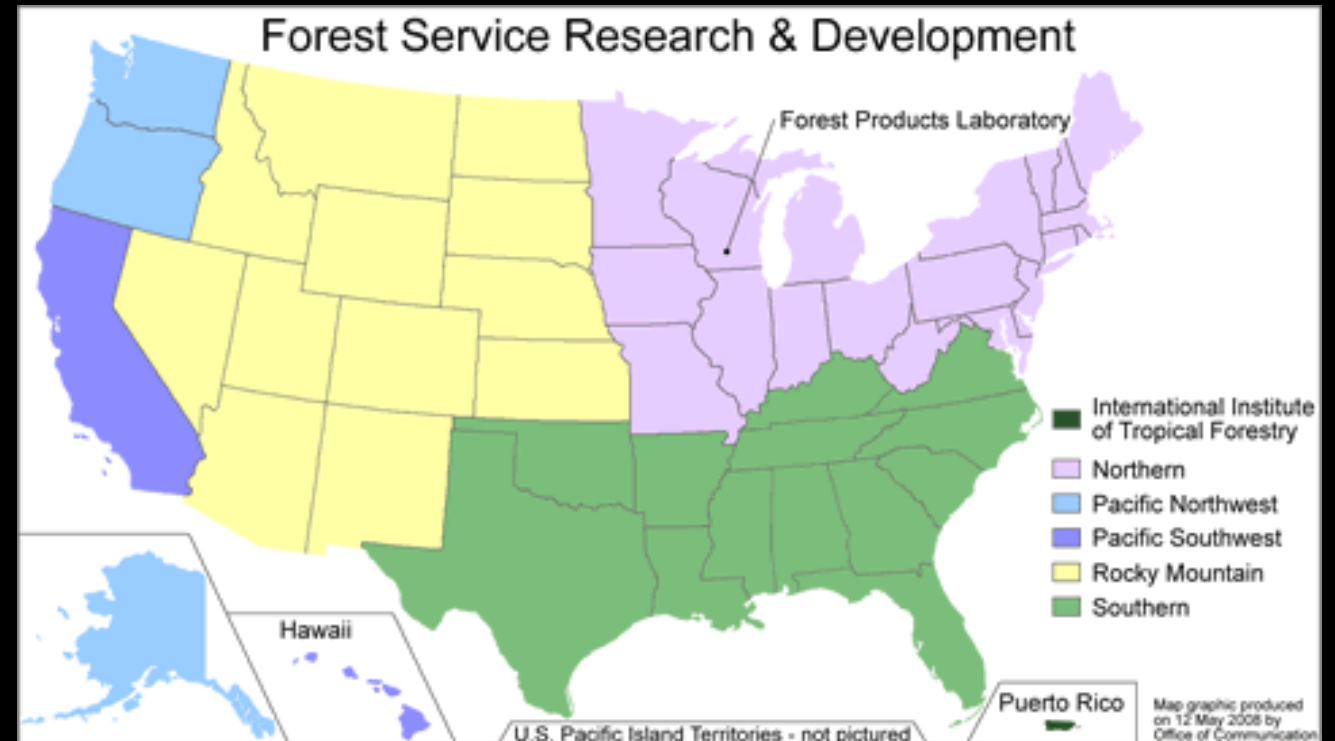
USDA Forest Service
Pacific Southwest Research
Station



Credit: Frank Lake



Credit: Colleen Rossier



- ❖ Partnering with tribal-serving organizations on projects to reimagine federal food and agriculture programs from an Indigenous perspective and inform future USDA programs and policies.

- ❖ Videos and Guides: Foraging, Harvesting, and Cooking Indigenous and Wild Plants
- ❖ Producer Handbook: Transitioning from Cattle to Bison
- ❖ USDA Native American Working Group Food Sovereignty Subcommittee
 - ❖ Coordinated by Jeffrey.Harris@usda.gov



USDA Indigenous Food Sovereignty Initiative

Climate Change Research on Traditional Tribal Food Species

- Identifying how species important to Tribes may be detrimentally impacted by climate change
- Many species important to Tribes do not necessarily rank as highly vulnerable to climate change
- Many Native Americans report insufficient access to traditional foods
- Recent degraded conditions are not an appropriate baseline
- Need to understand ecological and social-institutional barriers to food sovereignty



Paiute Tribal pinyon harvesting, 1912, Library of Congress

References

- Lynn, Kathy; Daigle, John; Hoffman, Jennie; Lake, Frank; Michelle, Natalie; Ranco, Darren; Viles, Carson; Voggesser, Garrit; Williams, Paul. 2013. [The impacts of climate change on tribal traditional foods](#)
- Long, Jonathan W.; Lake, Frank K.. 2018. [Escaping social-ecological traps through tribal stewardship on national forest lands in the Pacific Northwest, United States of America](#)

Degradation resulting from lack of stewardship has created vulnerable forest conditions

- Fire and stewardship exclusion—extreme wildfires killing mature forest food trees
- Proliferation of ungulates such as deer and elk
- Insect pests and diseases (e.g., chestnut blight, emerald ash borer, etc.)



California black oak overtopped by conifers



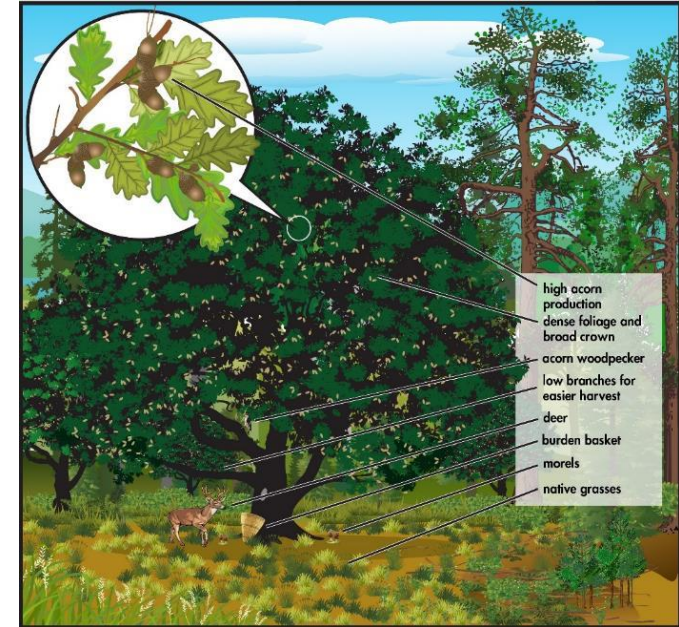
Oregon white oak overtopped by conifers

Examples of forest restoration to enhance acorn production



Margaret Baty with acorn harvest, Big Sandy Rancheria, 1925

- Restore shade-intolerant plant communities that have declined
- Curtail acorn weevils and worms
- Attenuate effects of future wildfires and support cultural burning
- Conserve habitat for old-forest wildlife



Restoring California black oak technical report (PSW-GTR-252)



Indiana Summit RNA Collaboration involving Traditional Food



- Paiute practitioners long harvested pandora moth larvae as traditional food source, using trenches around large Jeffrey pine trees
- Study found that the stewardship practices afforded protection to the trees from fire damage
- Slaton et al. 2019. *Traditional Ecological Knowledge Used in Forest Restoration Benefits Natural and Cultural Resources: The Intersection between Pandora Moths, Jeffrey Pine, People, and Fire*. Natural Areas Journal.

**Bole scorch less severe for trees
with cleaned trenches**



Credit Michele Slaton et al. 2019

Food Sovereignty Collaborative Research Karuk, Yurok, and Klamath Tribes, UC Berkeley, USFS PSWRS



- Used a community-based participatory research (CBPR) approach
- “The partnership’s shared goal was to enhance tribal health and food security and food sovereignty in the Klamath River Basin by building a healthy, sustainable, and culturally relevant food system.”
- Supported by the USDA-National Institute of Food and Agriculture-Agriculture and Food Research Initiative Food Security Grant
- **“our work aligns with emergent concepts of Indigenous food sovereignty, which emphasize decolonization, self-determination, and the inclusion of hunting, fishing, and gathering, as well as cultural and spiritual relations of exchange.”**
- Citation: Sowerwine, Jennifer ; Sarna-Wojcicki, Daniel ; Mucioki, Megan ; Hillman, Lisa ; Lake, Frank ; Friedman, Edith. 2019. Enhancing food sovereignty: A five-year collaborative tribal-university research and extension project in California and Oregon



Program Activities

- Integrated Native Foods and food sovereignty into food security research
- Developed Karuk Tribe K-12 Native American Food Security curriculum
- Established Karuk and Yurok Tribal herbaria
- Established the Píkyav Field Institute: a Tribally Led Academic and Vocational Education, Training, and Research Institute
- Integrated cultural values into extension, including Native food workshops
- Supported native foods and fire Ecology research
- Examples of research publications
 - **Tanoak:** Halpern et al. 2022. Prescribed fire reduces insect infestation in Karuk and Yurok acorn resource systems, Forest Ecology and Management
 - **Hazelnut:** Marks-Block et al. 2021. Revitalized Karuk and Yurok cultural burning to enhance California hazelnut for basketweaving in northwestern California, USA, Fire Ecology.





Photos: Jaime Van Leuven

Cherokee and Chestnut Restoration



- The Eastern Band of Cherokee Indians (EBCI) is engaging with multiple partners to restore ᏍᏏ, ᏌᏏᏌ, American chestnut, to the Qualla Boundary.
- EBCI citizens value restoring chestnut as a food source, for both humans and wildlife.
- USFS Southern Research Station is exploring relationships between the American Chestnut and Tribal Communities in North Carolina
- Contacts: Michelle Baumflek Southern Research Station, Tommy Cabe SRS & EBCI, Jaime Van Leuven, ORISE)



VOICES FROM MAPLE NATION: INDIGENOUS WOMEN'S CLIMATE SUMMIT



- Sugar maple (*Acer saccharum*) is **an ecological and cultural keystone species** in the region:
- Maple figures large in Indigenous stories and ceremonies, while maple syrup and sugar are important foods after the long, hungry months of winter.
- “Some food and medicine plants some are becoming increasingly hard to find when and/or where they are needed.”
- “These and other changes pose fundamental threats to food and health security, as well as Indigenous cultures.”

<https://www.fs.usda.gov/research/treearch/59171> (includes video)



Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Memorandum of Understanding

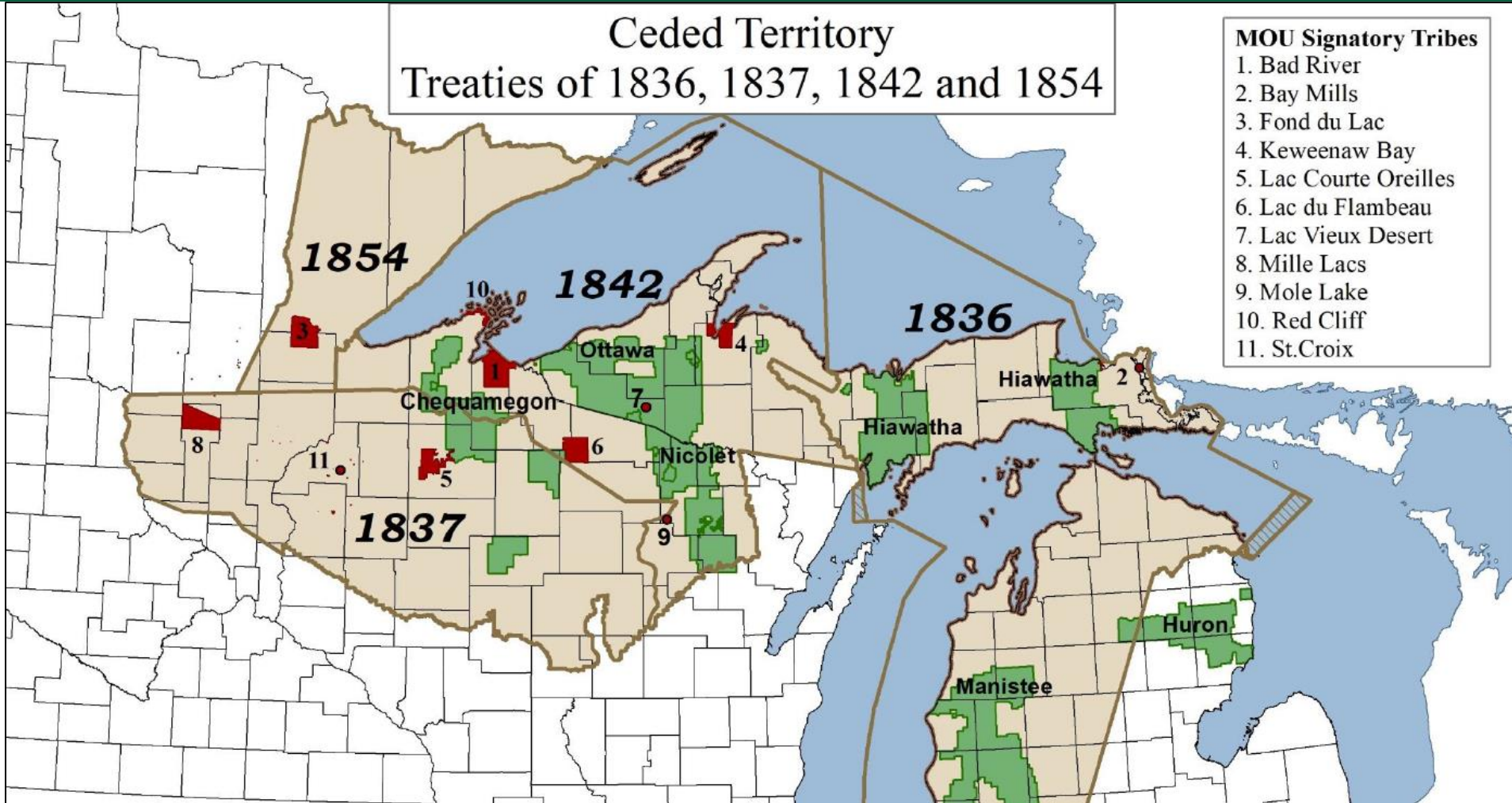
Tribal – USDA Forest Service Relations on National Forest Lands within the Ceded Territory in Treaties of 1836, 1837, and 1842

Jennifer Ballinger, Tribal Relations Specialist - Northern Research Station & Forest Products Laboratory

**Implements off-
reservation treaty rights
under tribal regulations**

**Establishes the
consultation process for
management decisions
that affect treaty rights**







Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Tribal Harvest of Wild Plants – Permit Types

Small Scale
Large Scale
Sugarbush
Timber
Camping



Small Scale Permits

Native American Game & Fish Applications (NAGFA™)

<https://glifwc.nagfa.net/license/index.php#viewlicense>



Great Lakes Indian Fish & Wildlife Commission

PO. Box 9 • Odanah, WI 54861
(715) 682-6619 • www.glifwc.org

2020-2021 Season

NAGFA ID #: 8041 **Tribe:** BRV

Name: JOHN P DOE

Address: 777 Traditional Way Odanah, WI 54861

Phone: 000-000-0000 **Hunter Safety #:**

Remote Registration (deer, bear, turkey, crane): 1-844-234-5439 or glifwc.nagfa.net/online/

More Information: data.glifwc.org/regulations/

GATHERING

*General Gathering

Stamp# 266659

GATHERING

Firewood

Stamp# 246845

GATHERING

Balsam Boughs

Stamp# 266658

CAMPING

National Forest Camping

Stamp# 246844

GATHERING

Bark

Stamp# 247832

Please submit all harvest reports in a timely manner!

I will not conduct wasteful, unsafe or inhumane practices while exercising my treaty rights and will abide by the regulations set forth by my tribe's conservation code.

Signature of Applicant: _____ Date: _____

In recognition of those who reserved the rights and to ensure harvest opportunities for the 7th generation, harvesters are encouraged to honor the traditions of the Anishinaabeg, which include the offering of asemaa (tobacco) to the manidoog (spirits) prior to harvesting.

Da-manaaji'indwaa gete-anishinaabebaneg gaa-ganawendangig i'lw akeyaa wenji-bimaadiziyang, inga-asemaakawaag nanaandomindwaa ingiw manidoog naa gaye wiindamaageyaan dabwaa-mamooyaan gegoo gemaa gaye giiwosaadamaan gegoo. Gaawiin inga-banaajitoosiin naa gaye gaawiin inga-nishwanaajitoosiin gegoo babaa-mamooyaan gemaa gaye babaa-giiwoseyaan. Inga-degwetawaag ingiw gaa-onaakonigegig eni-mamooyaan gegoo gemaa geye eni-giiwoseyaan.

Sugarbush Permits





Forest Service
U.S. DEPARTMENT OF AGRICULTURE



Rachel Riemann, U.S. Forest Service

Monitoring of Trees that Provide Culturally Important Food

- The Forest Inventory and Analysis research program (FIA)
 - Collects data on tree species size and health, forest area and location, ownership, tree growth and mortality
 - Plots sampled repeatedly every 5-10 years, across all lands
 - 1 plot every 6000 acres
- Provides analysis and reports, e.g.
 - Pinyon, Sugar Maple, 'Ohi'a lehua
- Conducts research supporting inventory and interpretation, e.g. pine nuts



SUGAR MAPLE (ININAATIG)

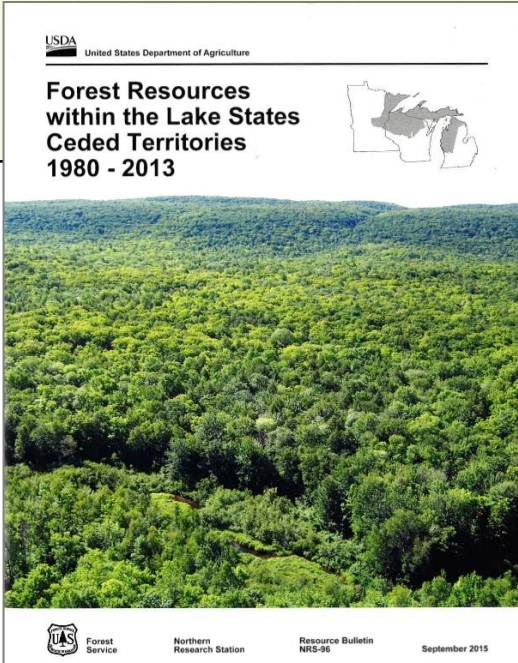
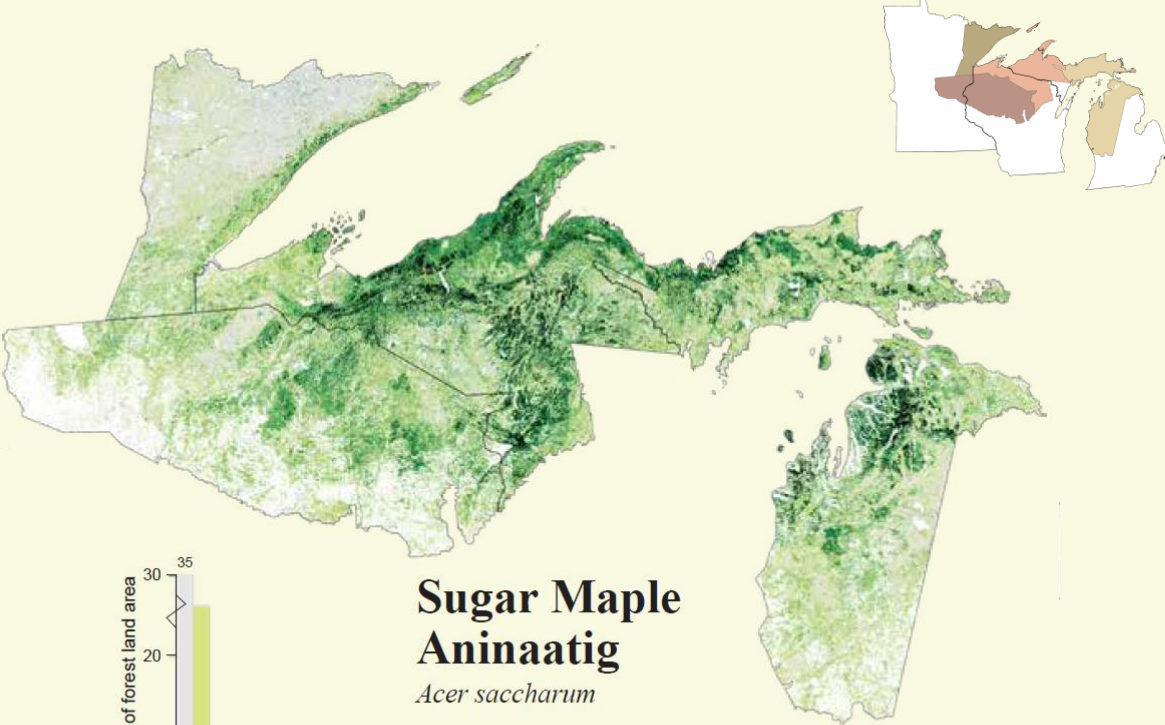
Acer saccharum

What we found

In 2013, 630 million sugar maple trees (5 inches and larger in diameter) were found on timberland in the LSCT. This represents a 10.6 percent increase from 1980 (Table 10). Since 1980, the number of trees increased in all size classes except the smallest (5.0 to 6.9 inches d.b.h.). Sugar maple is distributed unevenly throughout the ceded territories with the greatest abundance located in lands ceded in 1842 and the least in those ceded in 1854 (Fig. 30). Just over one-third of the sugar maple resource is on public forest lands. On both public and private lands, the number of large diameter (≥ 11 inches) sugar maple has increased (Fig. 31). The number of sugar maple trees 11 inches diameter and greater increased 75.9 percent on private land and by 163.8 percent on public land since 1980.

Table 10.—Number of live sugar maple trees on timberland by diameter class and inventory year, Lake States ceded territories

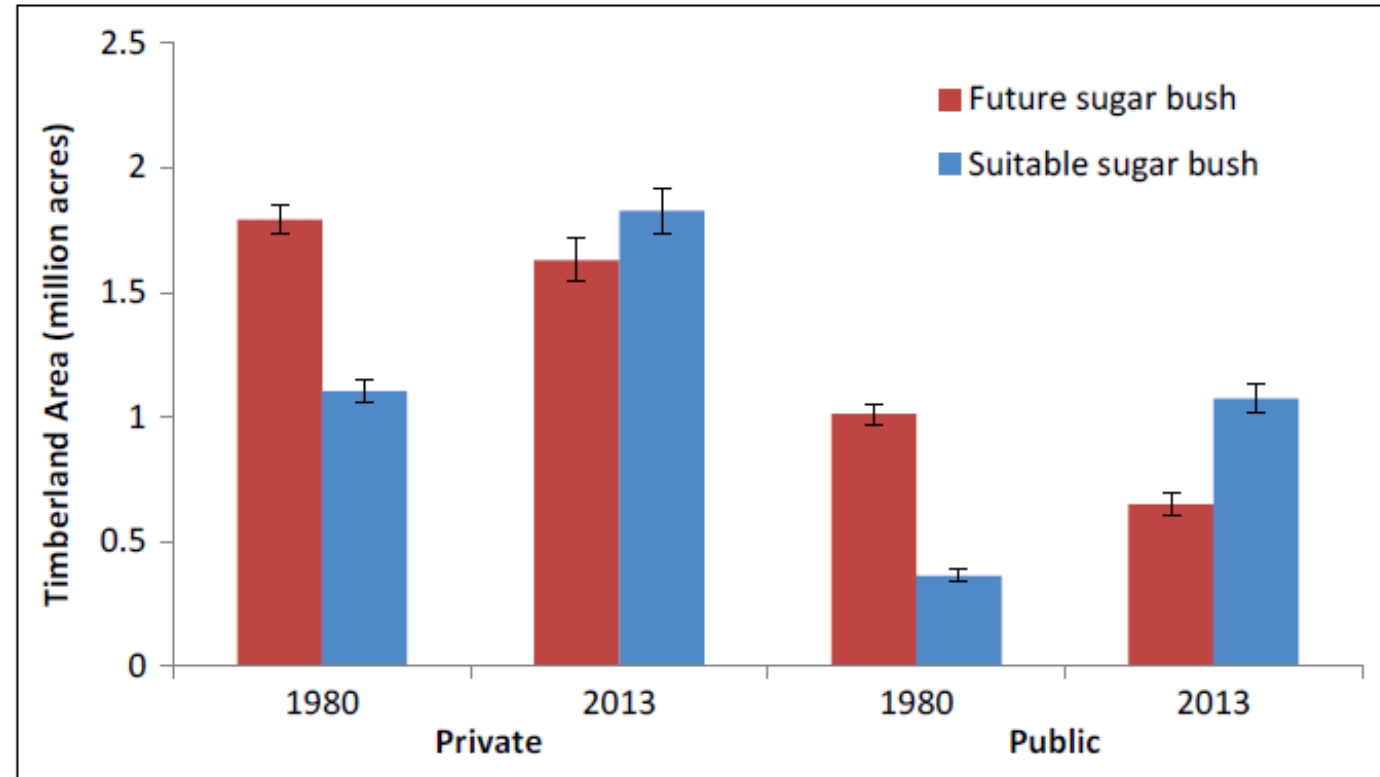
Diameter class (inches)	1980	1990	2008	2013	Percent change 1980 - 2013
	----- millions -----				
5.0-6.9	279.9	317.0	219.9	208.1	-25.6
7.0-8.9	143.6	179.6	164.4	156.2	8.8
9.0-10.9	68.9	105.6	113.3	111.4	61.8
11.0-12.9	33.7	54.7	67.5	71.8	112.8
13.0-14.9	19.3	28.4	34.8	41.4	115.1
15.0-16.9	11.7	16.0	17.2	20.6	75.2
17.0-18.9	6.4	9.0	9.2	11.0	71.5
19.0-20.9	3.2	4.9	4.1	4.8	50.2
21.0-28.9	2.7	4.6	4.2	4.4	60.9
29.0+	0.1	0.2	0.2	0.2	42.9
All sizes	569.6	720.1	634.8	629.9	10.6



Sugar bush

- Analysis of suitable and future sugar bush by public vs. private ownership
- Definition of sugar bush used was identified from tribal sources through collaborative discussion
- Public ownerships within Ceded Territories represent opportunities for potential sugar camp sites.

In 2002 GLIFWC staff, working with elders from member tribes, identified a number of potential sugarbushes on national forest lands in the ceded territories in addition to stands on tribal lands (Danielsen 2002a). This extends opportunities for sugaring off reservation lands.



- The potential for a forest stand to be utilized as a sugar bush for the production of syrup was based on the size and number of sugar maple trees in the stand.
- Suitable sugar bushes were those that currently meet criteria⁴ and potential stands are those that with growth and management will meet these criteria in ten years or less.

New Mexico's Forest Resources, 2008-2012

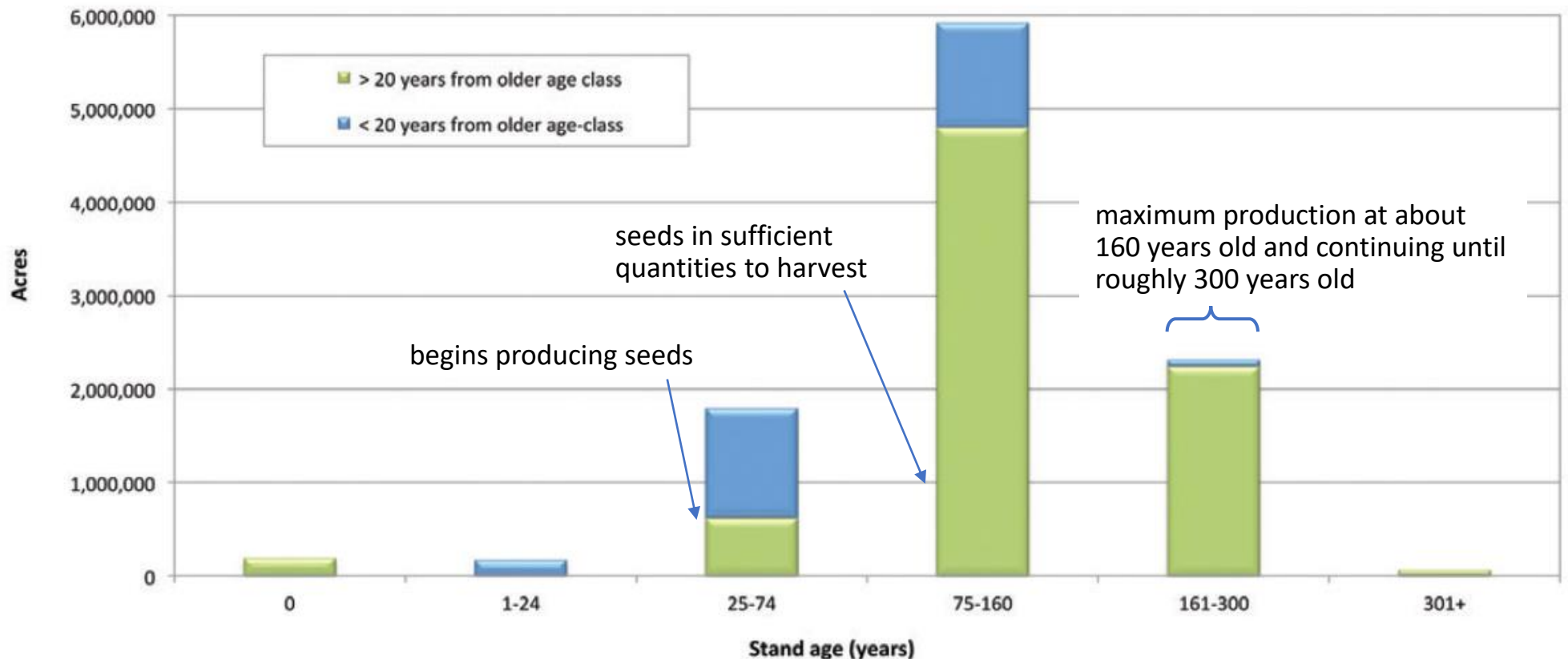
Sara A. Goeking, John D. Shaw, Chris Witt,
Michael T. Thompson, Charles E. Werstak, Jr.,
Michael C. Amacher, Mary Stuever, Todd A. Morgan,
Colin B. Sorenson, Steven W. Hayes, and Chelsea P. McIver

Traditional Forest Uses



New Mexico is home to not only diverse forests, but also to diverse groups of people who value the State's forests in different ways. Two traditional forest resources in New Mexico include pine nuts and lichens. Pine nuts are harvested as a food source and provide income to commercial pine nut gatherers, and lichens include dozens of species that may be used for dyes, food, fiber, or medicine. The current status of New Mexico's pine nut and lichen resources is summarized below.

New Mexico



Pinyon

Area of pinyon/juniper forest type, by age-class groups that reflect the varying seed productivity levels, New Mexico 2008-2012.

Research on pinyon cone productivity

In 2021, started collecting cone productivity data to identify areas that are currently or have recently produced a seed crop.

Because Pinyon tend to mast every 3-7 years, this info would help native peoples know with some certainty where *not* to look for good seed production in a given year, as stands rarely mast two years in a row.



Aborted current year cone. Note small size (< 1 in.), closed scales, dark brown color (code = 1)

Aborted conelet. Note small size, light brown/yellow color (Code = 1), and presence of mature current year cones.

Last years' cone. Note open scales, dark brown color, lack of sap or seeds. (Code = 2)

Current years' cone. Note open scales, light brown/green color, and seeds (Code = 3)



Estimated number of tree stems (≥ 1 " d.b.h.) by forest land status

(e) = endemic, (p) = Polynesian-introduced species

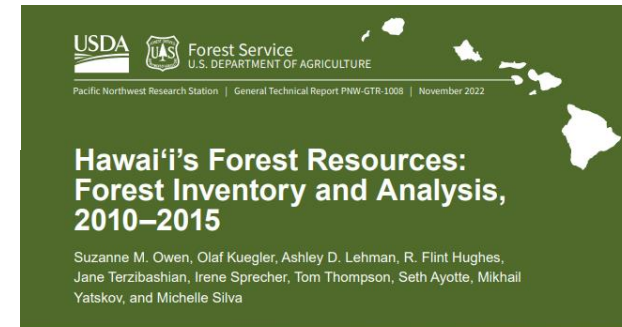
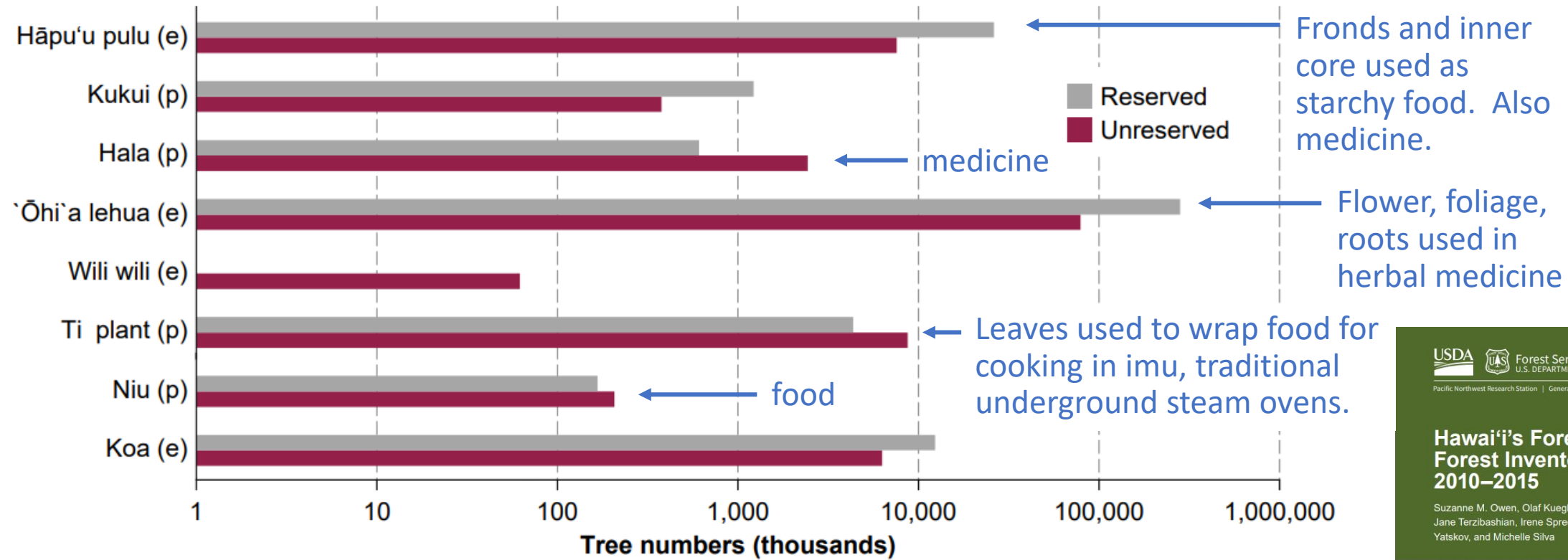


Figure 54—'Ōhi'a lehua (*Metrosideros polymorpha*) with prominent red flowers is a critically important endemic tree in Hawaiian forests.

FIA also tracks pests and diseases affecting forest species, such as the two fungal species which cause rapid 'Ōhi'a death (ROD), a forest disease driving extensive and rapid tree mortality.

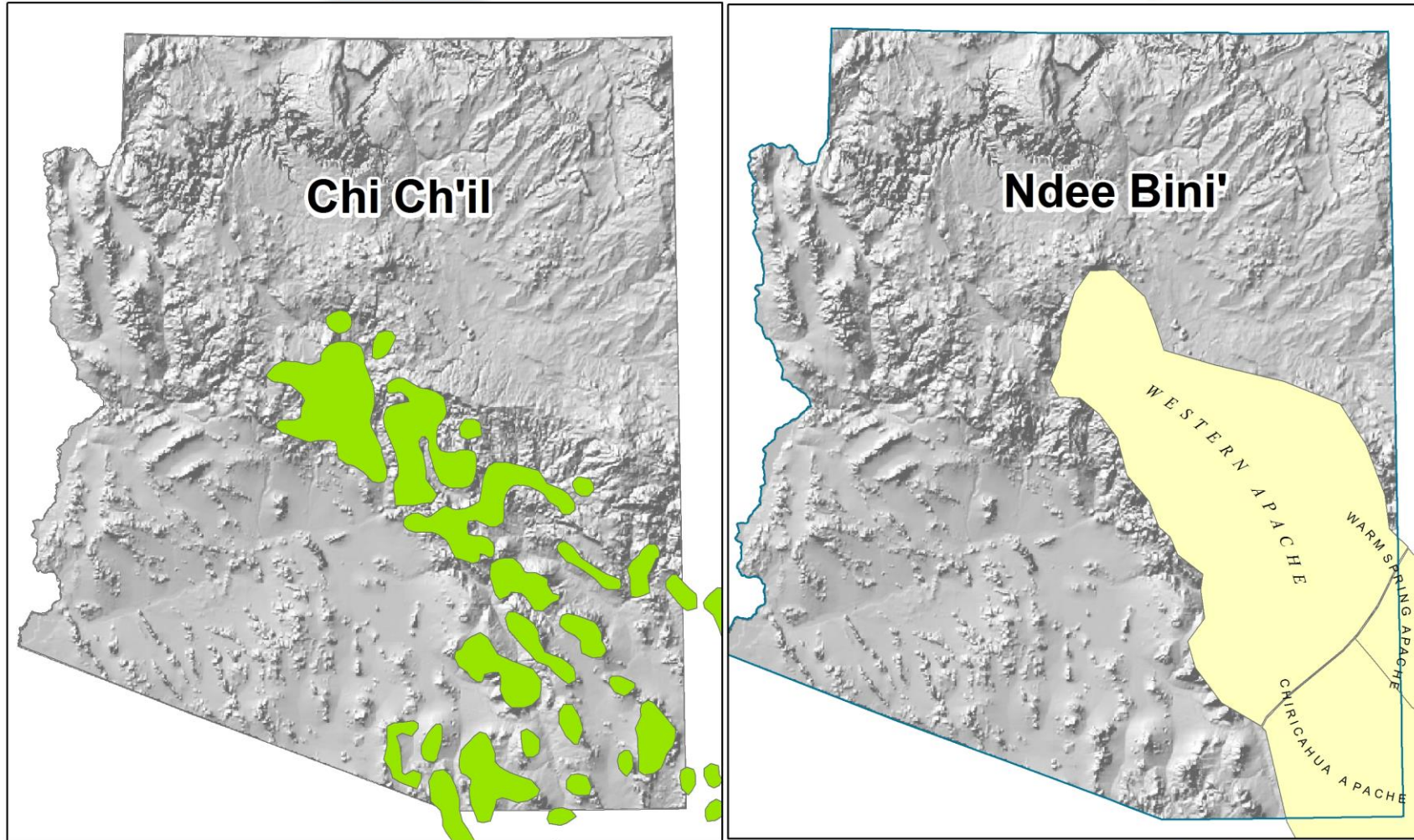


Emory Oak Tribal Collaborative Tribal Restoration Initiative

- ◆ Vincent Randall, Apache Culture Director, Yavapai-Apache Nation
- ◆ Nanebah Nez Lyndon, Tribal Relations Staff Officer, Kaibab National Forest



ACORN NATION



0 100
Miles



Project Mission

Mission: Restore and ensure the long-term persistence of Emory oak (*Quercus emoryi* Torr.) and other traditional subsistence foods for present and future generations.

Emory oak trees are not replacing themselves, “because of what humans have done to the land.” The EOCTRI seeks to mitigate the impacts of human influence on the environment to provide a safe environment for young trees to come back





Project Partners

- ◆ **Tribes:** San Carlos Apache Tribe, Tonto Apache Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation
- ◆ **USDA Forest Service:** Coconino National Forest & Tonto National Forest
- ◆ **Northern Arizona University**
- ◆ **Funding Proponents:** Resolution Copper Mine, LLC., AZ State Forestry, Rocky Mountain Elk Foundation



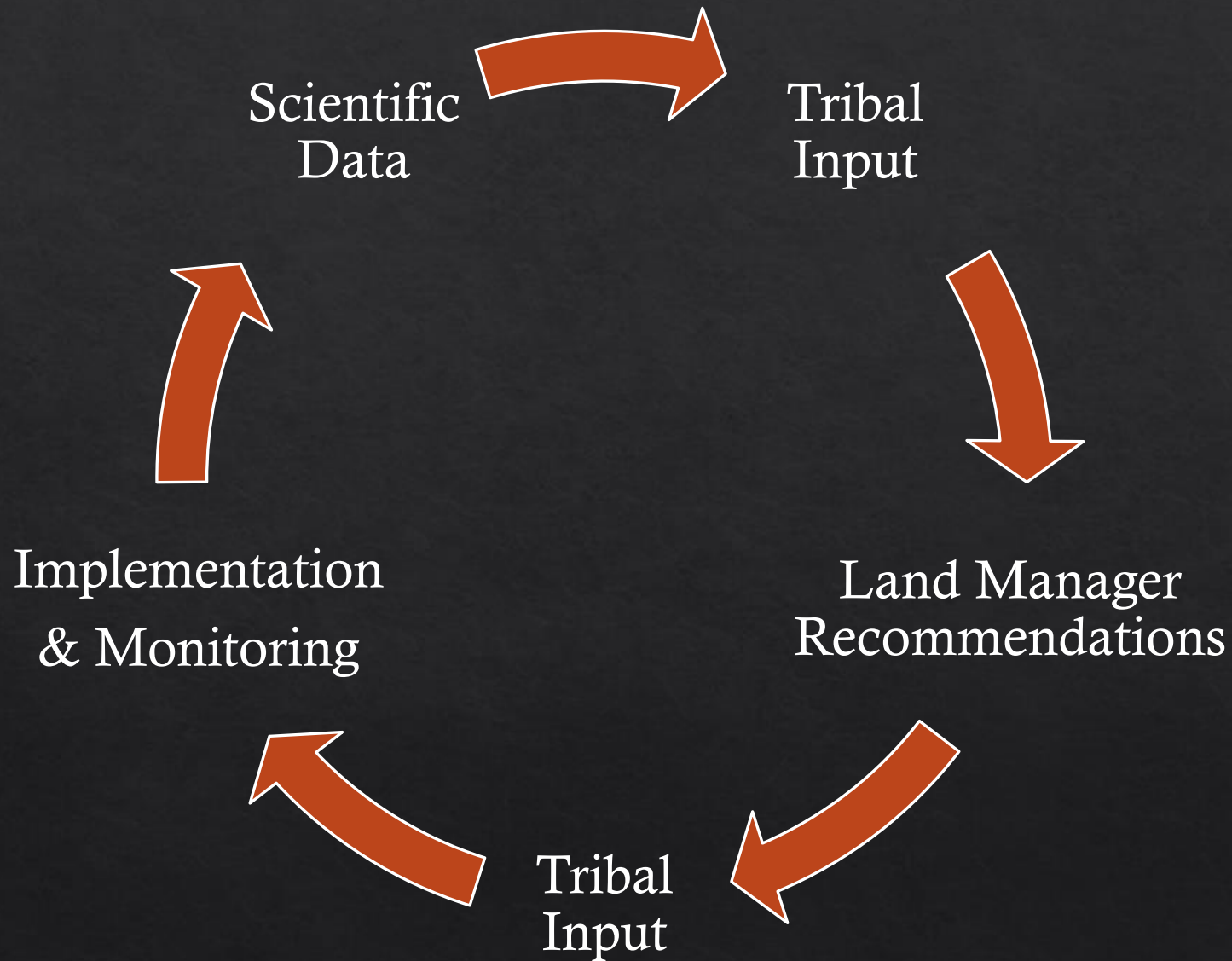
Project Guidelines

- ◆ Identify, restore, and protect Emory oak groves and other culturally utilized plants;
- ◆ Learn about Emory oak, including best practices for co-management and restoration;
- ◆ Incorporate Traditional Ecological Knowledge into research efforts, treatments, and decision-making;
- ◆ Reconnect tribal communities to ancestral lands;
- ◆ Influence land management practices for a broader impact;
- ◆ Support tribal training, employment, capacity building, and youth education; and provide opportunities for elders and youth to share their cultural traditions.



Tribal Advisory Board

- ◆ “Chi’chil Advisory Board”
- ◆ Regular Meaningful Communication
- ◆ Clearinghouse for Project Decisions



Tribal Input Leads Decision-Making

- Grove Selection
- Restoration Actions
- Public Information & Messaging
- Etc.

Restoration Treatments

- ◆ Fuels reduction / stand thinning via mastication and hand thinning
- ◆ Prescribed burns
- ◆ Livestock exclusion
- ◆ Seed augmentation (still in consideration)



Apache Perspective

- ◇ *“Acorns, eagles, and otters are an indication of environmental health to the Apache people. . . . Chí’chil (acorns) are the single most important traditional food today. Chí’chil are vital to almost every Apache social and ceremonial function.” – Vincent Randall*
- ◇ *“Anything we do as Ndee people is geared toward improving the world for Apache children that are here and yet to be born” – Victoria Wesley, San Carlos Apache Tribe & Arnold Beach, White Mountain Apache Tribe*



Questions and Answers Period

- **Evaluation:** <https://forms.gle/YQVQDAdm5ThMirya8>

Ben Friton, The REED Center for Ecosystem Reintegration, Middletown, MD, Ben Friton
ben@thereedcenter.org

Troy Wiipongwii, Director of Entrepreneurship & Innovation in Conservation, College of William & Mary, VA, ttwiipongwii@wm.edu

Nanebah Lyndon, Tribal Relations Staff Officer, Kaibab National Forest, U.S. Forest Service,
nanebah.nezlyndon@usda.gov

Vincent Randall, Apache Culture Director, Yavapai-Apache Nation, vrandall@yan-tribe.org

Rachel Riemann, Research Forester/Geographer, Northern Research Station, Forest Inventory and Analysis

Jennifer Ballinger, Tribal Relations Specialist, Forest Products Laboratory, Northern Research Station, U.S. Forest Service, Jennifer.Ballinger@usda.gov

Jonathan Long, Research Ecologist, Pacific Southwest Research Station, U.S. Forest Service,
jonathan.w.long@usda.gov

Frank Lake, Research Ecologist, Pacific Southwest Research Station, U.S. Forest Service,
frank.lake@usda.gov

Danny Gogal, Tribal and Indigenous Peoples Program Manager, Program Development and Learning Division, Office of Environmental Justice and External Civil Rights,
gogal.danny@epa.gov

Ericka Farrell, Environmental Protection Specialist, Office of Community Support, Office of Environmental Justice and External Civil Rights, farrell.ericka@epa.gov