Karuk Climate Adaptation Plan

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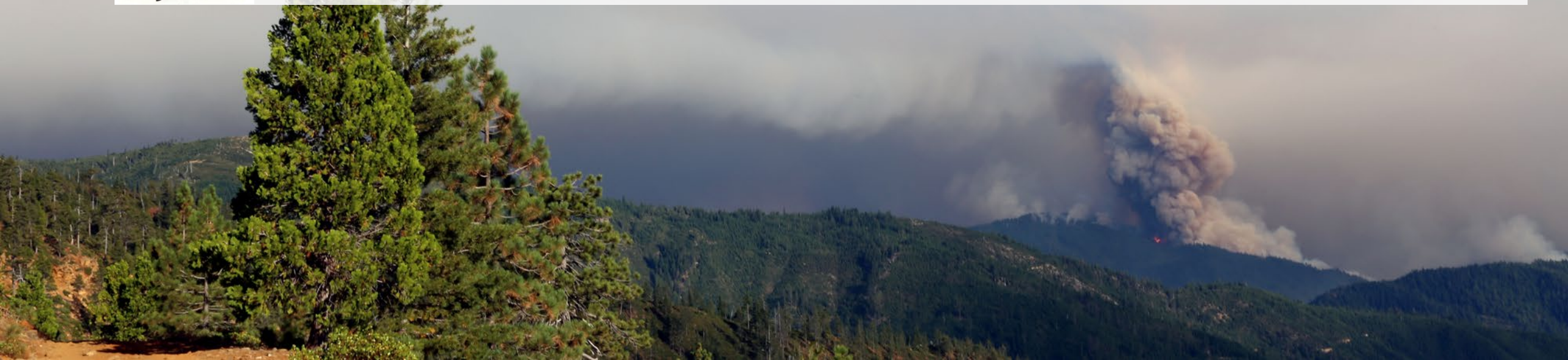
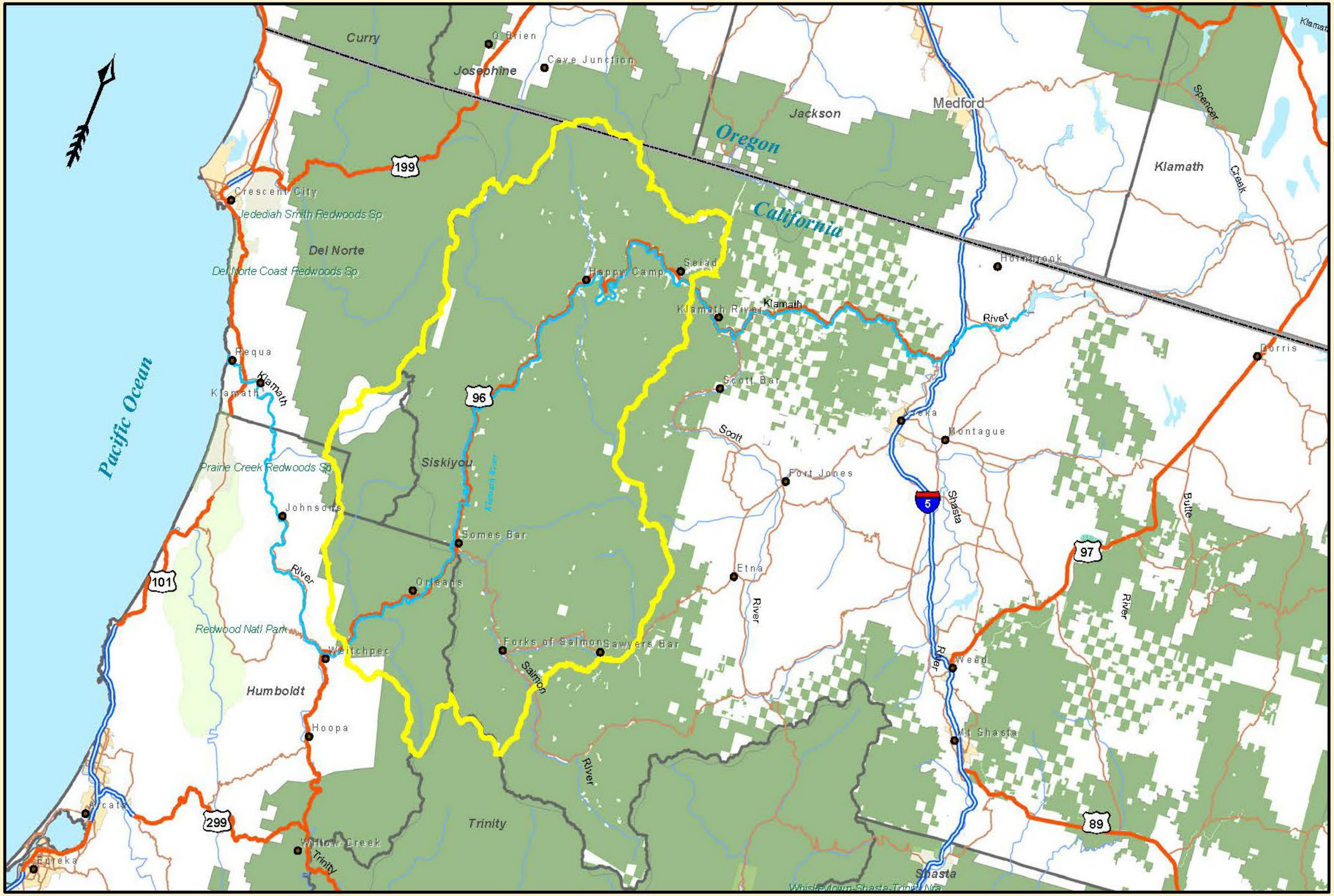
December 13, 2018

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Fort Jones
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Shasta
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Willow Creek
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Shasta
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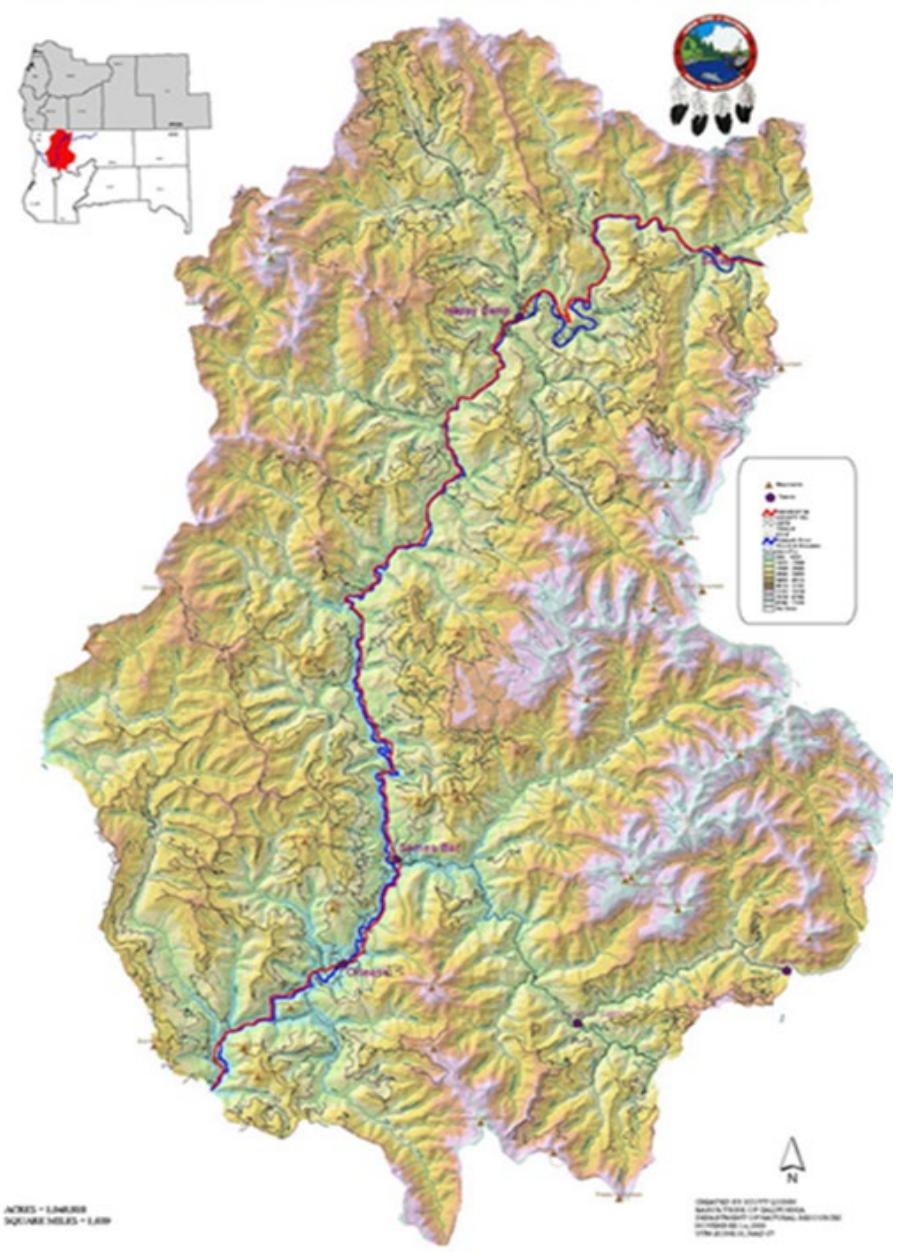
Karuk Tribe: History and Context

- Karuk Aboriginal Territory covers approximately 1.38 million acres in northern California
- Ancestral Karuk people resided in more than 100 village sites along the Klamath and Salmon Rivers and tributaries
- Colonization began in 1849 with the influx of Euro-American settlers during the California gold rush
- Tribe restored to federal recognition in 1979
- Today, Karuk is the second largest tribe in the state with more than 8,400 members and descendants
- The Karuk Department of Natural Resources works with a mission *to protect, enhance and restore the cultural/natural resources and ecological processes upon which Karuk people depend.*



Collaborative Partnerships

- Department of Energy
- University of Oregon
- Western Klamath Restoration Partnership
- Mid Klamath Watershed Council
- Salmon River Restoration Council
- Intertribal Timber Council
- Indigenous Peoples Burning Network
- The Nature Conservancy
- U.S. Forest Service
- Pacific Gas & Electric Co.
- UC Berkeley

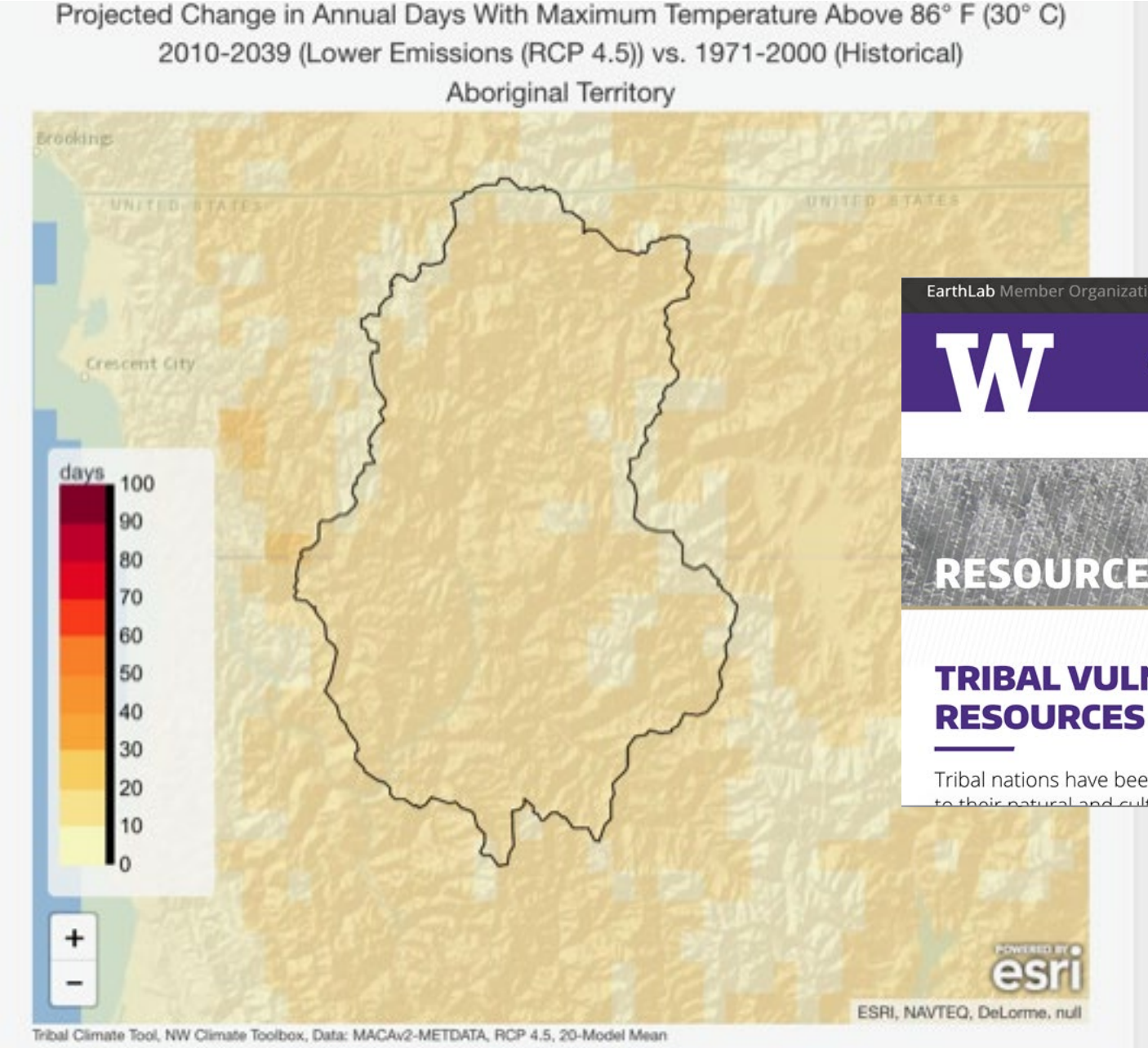
- Fire has been a central component of Karuk land stewardship and culture since time immemorial, used for tending, burning, and ceremony.
  - More than ¾ of Karuk traditional food and cultural use species are enhanced by fire
- Traditional management practices prevent the build-up of fuels that could lead to catastrophic fire events as well as manage for healthy stands of acorn bearing oaks, forage for large ungulates, and for other foods, fibers, and medicinal plants.

Above: A Karuk basketweaver holds up panyúrar (“beargrass” in English). Photo: Stormy Staats, Klamath-Salmon Media Collaborative

Below: Huckleberries burning, October 2015. Photo: Stormy Staats, Klamath-Salmon Media Collaborative


Photo: Scott Harding

Smoke From Wildfires – 2008


Projected Change in Annual Days With Maximum Temperature Above 86° F (30° C)
2010-2039 (Lower Emissions (RCP 4.5)) vs. 1971-2000 (Historical)
Aboriginal Territory
Brookings
UNITED STATES
Crescent City
days
100
90
80
70
60
50
40
30
20
10
0
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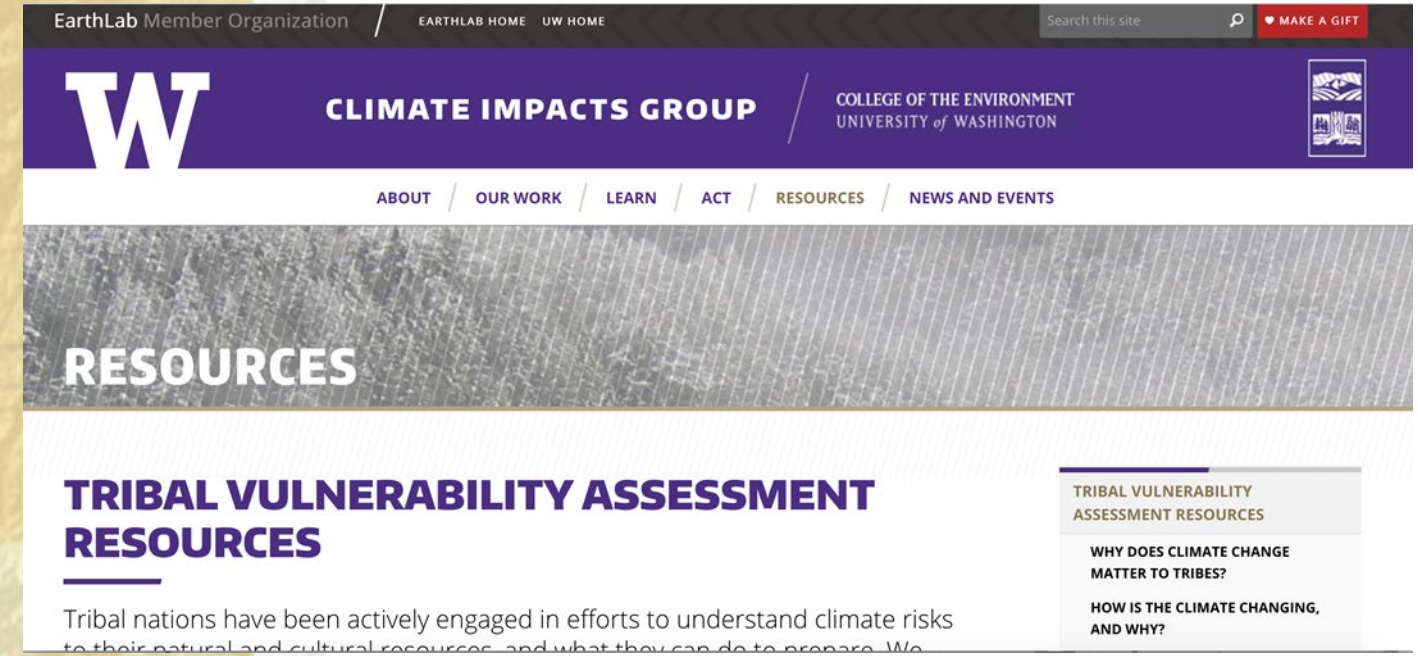
Tribal Climate Tool, NW Climate Toolbox, Data: MACAv2-METDATA, RCP 4.5, 20-Model Mean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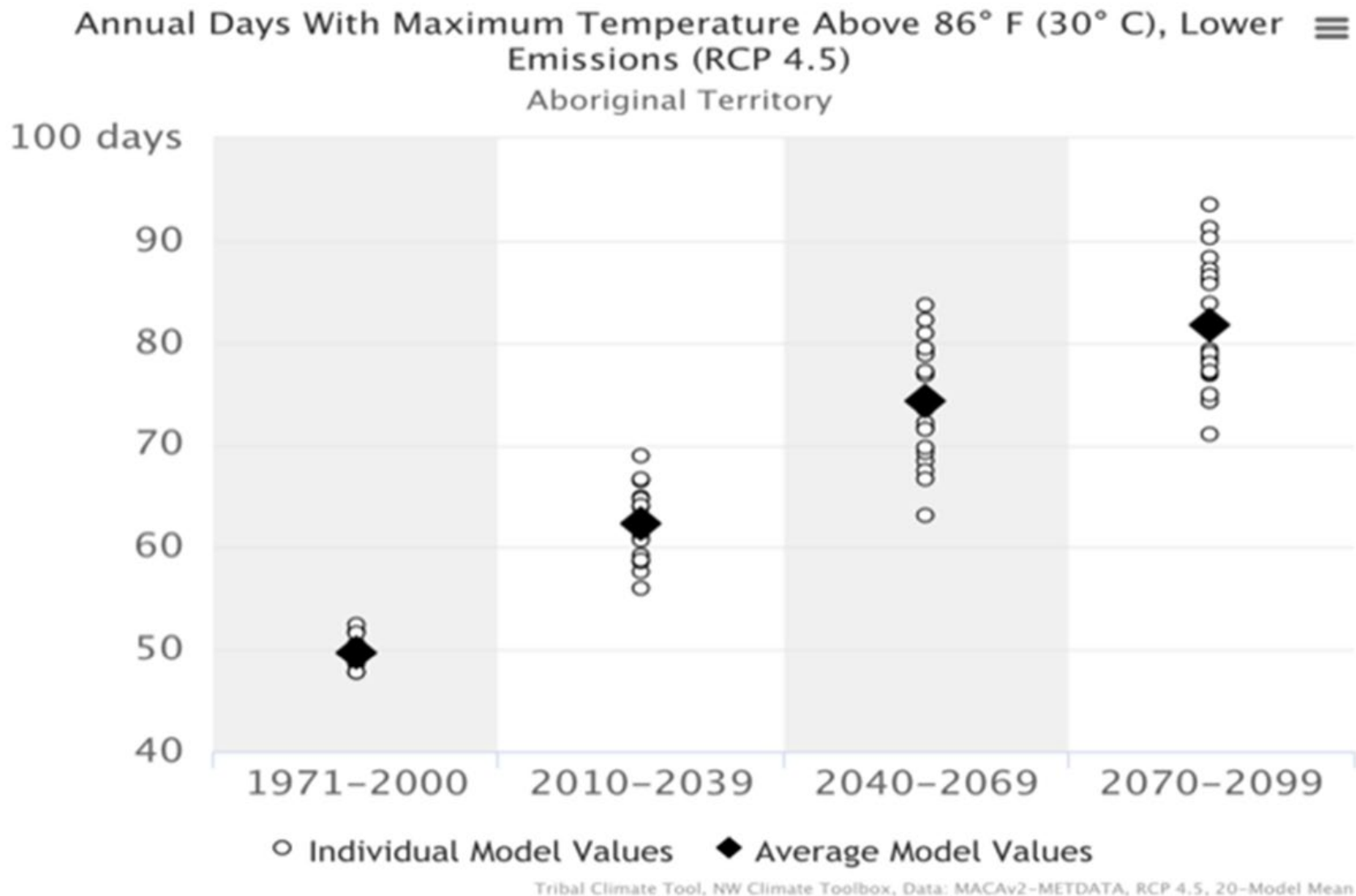
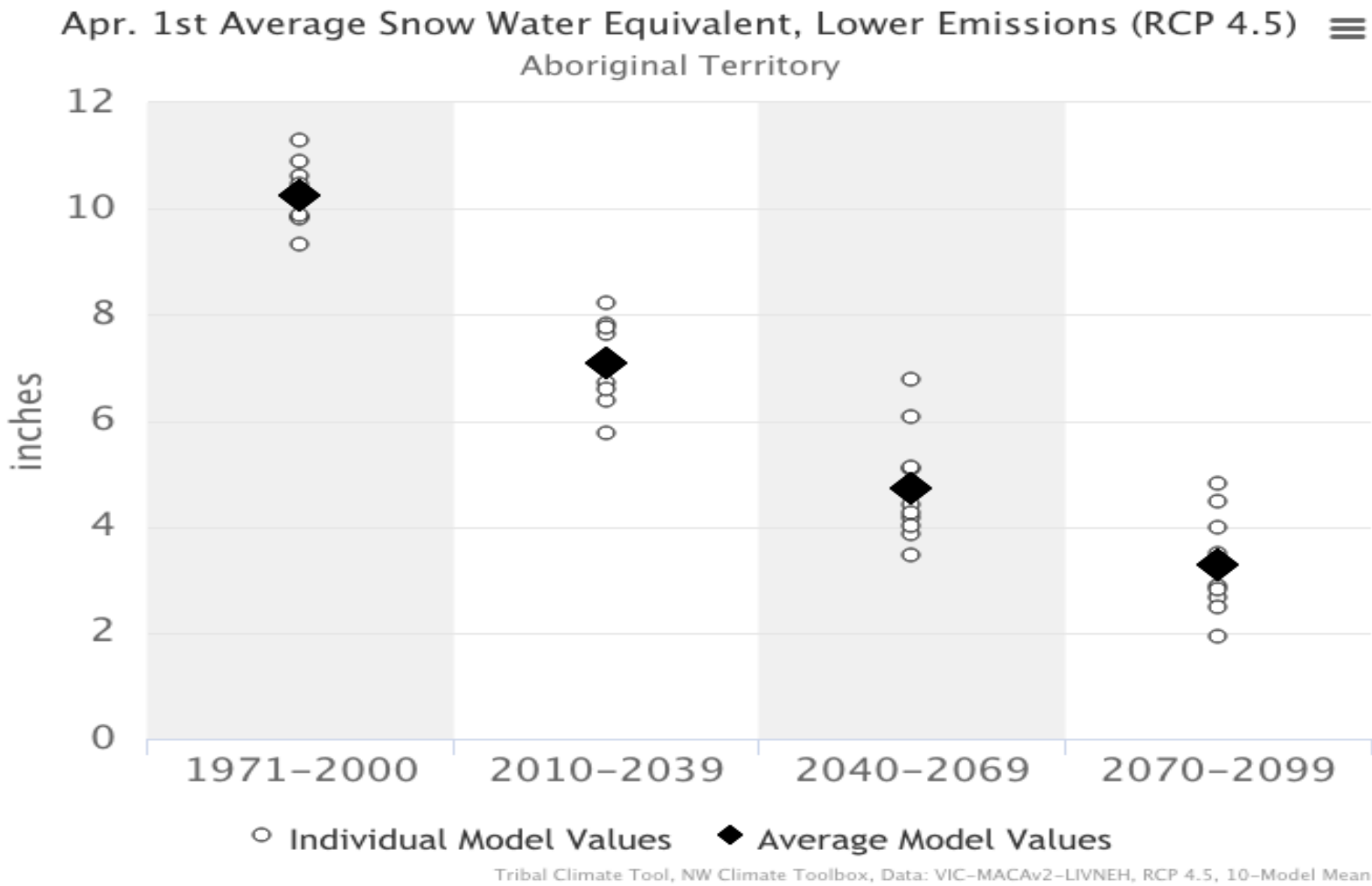
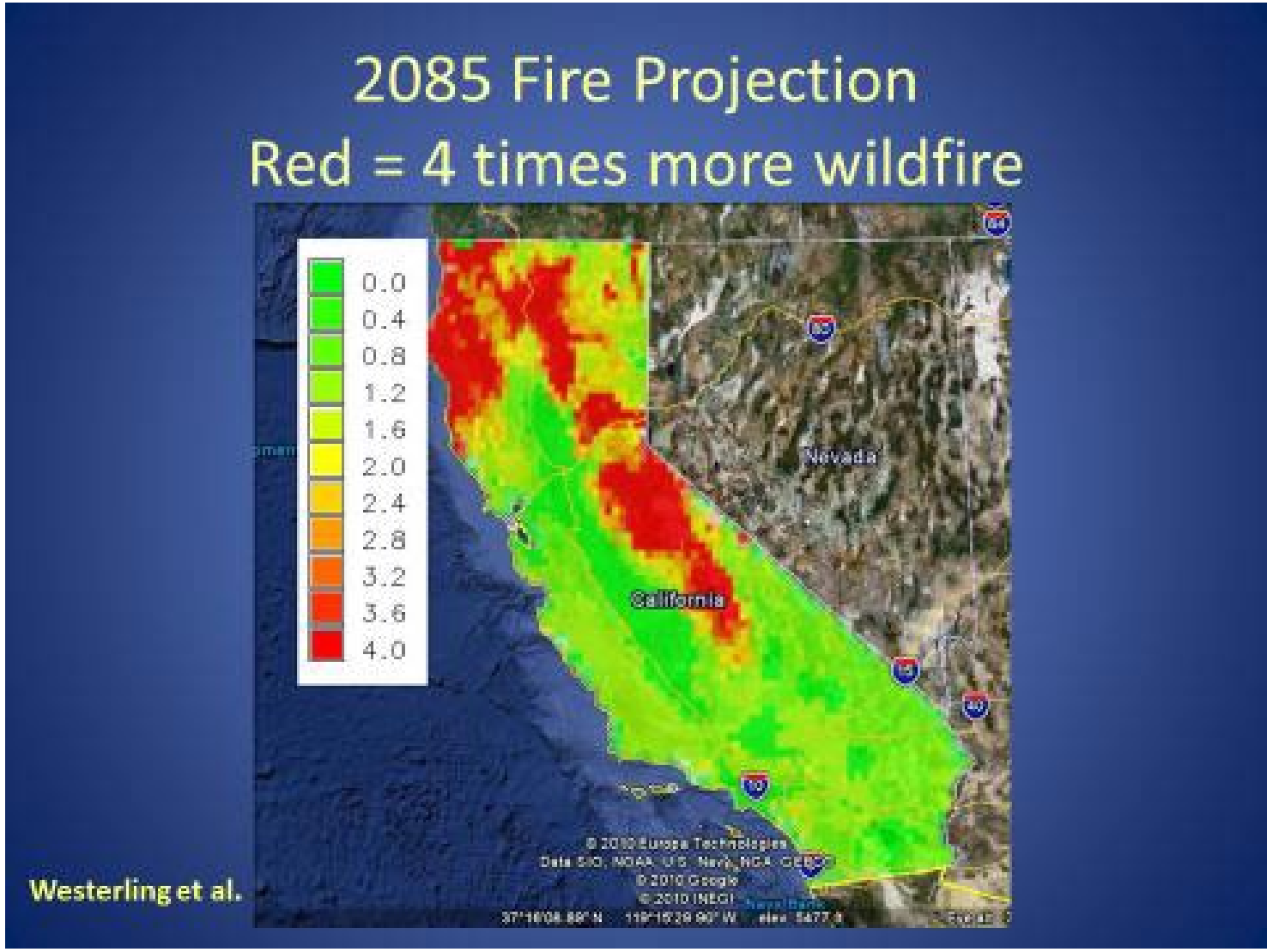
Tribal nations have been actively engaged in efforts to understand climate risks
TRIBAL VULNERABILITY ASSESSMENT RESOURCES
WHY DOES CLIMATE CHANGE MATTER TO TRIBES?
HOW IS THE CLIMATE CHANGING, AND WHY?


Annual Days With Maximum Temperature Above 86° F (30° C), Lower Emissions (RCP 4.5)
Aboriginal Territory
100 days
90
80
70
60
50
40
1971–2000
2010–2039
2040–2069
2070–2099
Individual Model Values
Average Model Values
Tribal Climate Tool, NW Climate Toolbox, Data: MACAv2-METDATA, RCP 4.5, 20-Model Mean


Apr. 1st Average Snow Water Equivalent, Lower Emissions (RCP 4.5)
Aboriginal Territory
12
10
8
6
4
2
0
inches
1971–2000
2010–2039
2040–2069
2070–2099
Individual Model Values
Average Model Values
Tribal Climate Tool, NW Climate Toolbox, Data: VIC–MACAv2–LIVNEH, RCP 4.5, 10–Model Mean

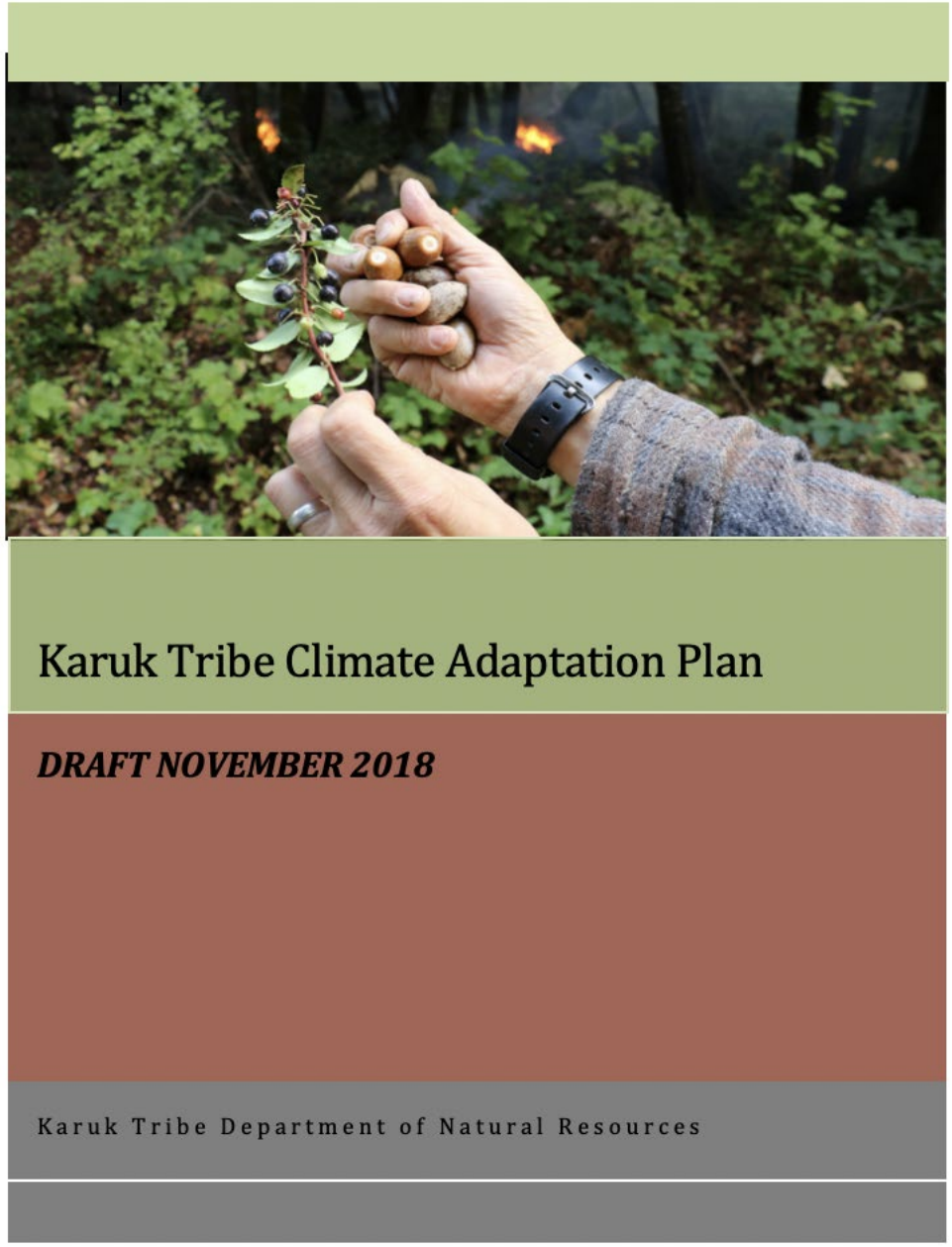
Within Karuk Aboriginal Territory there is an extreme threat of an increased trend of fire frequency and severity (Stephens et al 2014; Redsteer et al. 2013)



Objective 1: Develop Karuk Climate Adaptation Plan

- Adaptations for Traditional Foods-Cultural Use Species and Habitats
- Critical Infrastructure
- Program Capacity
- Tribal Sovereignty and Management Authority

Objective 2: Integrate Adaptation Plan into DNR Strategic Plan



Karuk Adaptation Plan General Approach

- Expand Tribal Traditional Management
- Strengthen Partnerships
- Public education
- Policy Change
- Increase self-sufficiency and create more redundancies: e.g. backup systems for power, data storage, food supplies, funding sources, information sources

Photo Scott Harding

Adaptations for Traditional Foods-Cultural Use Species and Habitat Types

- 21 focal species, 7 habitat types
- Traditional Ecological Knowledge
- Western Science
- What are these species trying to tell us?

Californiaherps.com


USFS Boise National Forest


Gerald and Buff Corsi © California Academy of Sciences nwplants.com


www.nwplants. com

“**Xunyêep** tanoak acorn is one of those staple food sources that is closely related to our fire regimes. . . There are specific times that we want to burn in a tanoak stand to maximize the quality and abundance of the acorn yield, not only for people but other species and that's including deer, elk and many, many birds. By using that cultural indicator to tell you when it is time to put some fire on the ground for that species, other benefits are achieved as well.”

- Bill Tripp, Deputy Director Eco-Cultural Revitalization

Kids picking up tan oak acorns in 2016 to process and eat. This forest burned in 2013. Photo: Stormy Staats, KSMC

Tanoak / Xunyêep / *Lithocarpus densiflorus*

oregonstate.edu

Cultural Importance

Xunyêep is an ecologically, culturally, and economically important species. Tanoaks acorns (xuntápan) are a staple Native food for many indigenous people and are also vital for numerous wildlife species. Additionally, the roots of tanoak trees support the growth of another important food, tanoak mushrooms.

Life Cycle & Habitat

Xunyêep is an evergreen hardwood tree endemic to California and southern Oregon. It is versatile and varies in form, from shrub to tree, depending on the environment. It can grow as an understory species, while also benefitting from extra light resulting from openings in the forest canopy. It can take 30 to 40 years for xunyêep to produce acorns in

Xunyêep and Fire

Xunyêep is very susceptible to high intensity fire (Karuk DNR 2010, OWIC 2016), but can benefit from cultural burning that decreases tree and acorn pests, and reduces competitive vegetation.

Effects of High Intensity Fire Across Time

Immediate	2-Year	Long-Term
• Fire may destroy entire groves that are critical to people and wildlife • When burned, tanoak generates thick smoke and particulate matter that can have health repercussions	• Vital species that depend on tanoak groves for habitat and food, such as tanoak mushrooms, black-tailed deer, various bird species, etc., may experience impacts as they cope with fire-related grove impacts.	• If able to regenerate, groves that have been lost to high intensity fire may take decades to once again produce acorns in abundance
Sources: Karuk DNR 2010	Sources:	Sources: Hillman 2016

Effects of Karuk Cultural Burning Across Time

Immediate	2-Year	Long-Term
• Promotes grove and acorn health by periodically reducing predatory insect populations	• Reduces competition from other tree species and brush, making grove more productive	• Healthy groves sustained by low intensity fires sustain other culturally vital species and ecosystem health
Sources: Hillman 2016, Karuk DNR 2010	Sources: Hillman 2016	Sources:

The Effects of Federal Fire Management Strategies on Species' Climate Change and Fire Resilience

Prior to Fire	During Fire	After Fire
• Suppression practices lead to overgrown understories that compete with tanoak • Suppression leads to fuel loads that increase future fire risk	• Fire lines cutting through tanoak stands may damage or destroy the tanoak's mycelium net.	
Sources:	Sources:	Sources:

Adaptations for Tanoak		
Increased frequency of high severity fire	- Fire may destroy entire groves that are critical to people and wildlife - Vital species that depend on tanoak groves for habitat and food, such as tanoak mushrooms, black-tailed deer, various bird species, etc., may experience impacts as they cope with fire-related grove impacts.	- Return historic fire intervals - Public education and outreach, surrounding prescribed fire as key tool - Policy work, e.g. Farm Bill USFS compacting ability, work with California legislature regarding liability
Changing Air Temperature Patterns	- Increased summer temperatures - Increased nighttime temperatures - Decreased summer snowpack	- Mitigate effects with restoration - Mitigate by reducing other stressors - Return historic fire intervals
Changing Precipitation patterns	- Decreased in stream flows - Increase in flooding - Changing timing of runoff	- Mitigate effects with restoration - Mitigate by reducing other stressors
Species Invasions	- Sudden Oak Death - Other forest pathogens?	Interagency coordination, research regarding potential use of prescribed fire, see Karuk SOD plan

Adaptations for Critical Infrastructure

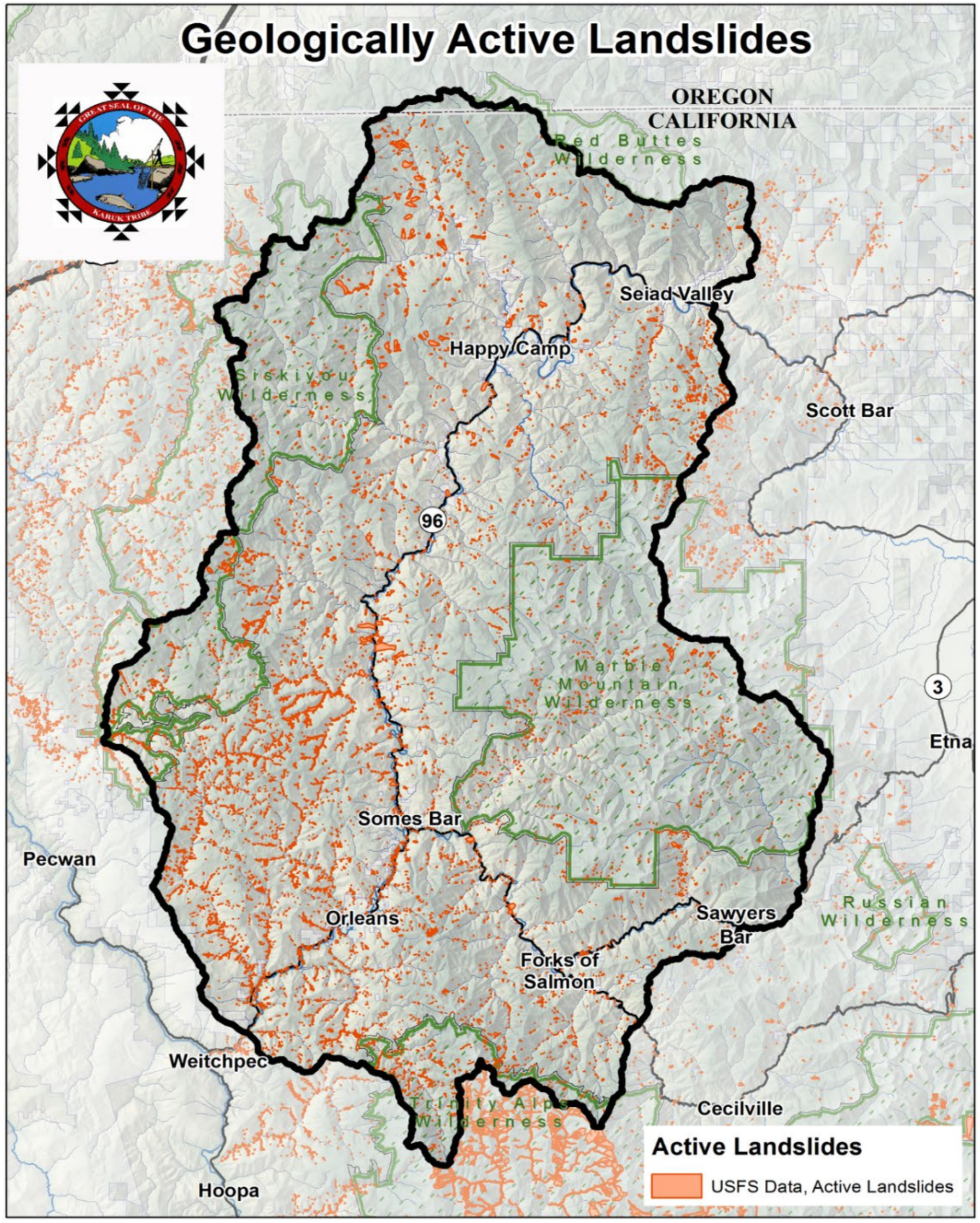
- Transportation and Roads
- Electricity
- Water Systems
- Communication
- Emergency Services

Photo: Karuk Tribe

- Increased frequency of high severity fire
- More variable precipitation
- Rain on Snow events

. . . All lead to more flooding and hence more potential road closures

- Mapping of active landslides




Somes Bar
Orleans
Forks
Salm

Climatic Event	***Proximate Consequence***	***Infrastructure Impact***	***Adaptation***
Increasing microburst, Increase rain on snow events, aftermath of high severity fire	Landslides/flooding causes roads to fail after heavy rains	Roads Closures	Increase maintenance of alternate routes
			Strategic road decommissioning
			Culvert remediation: Culvert repair and upgrade, Increase culvert sizes as needed
			Emergency bypass roads
			Public awareness campaigns

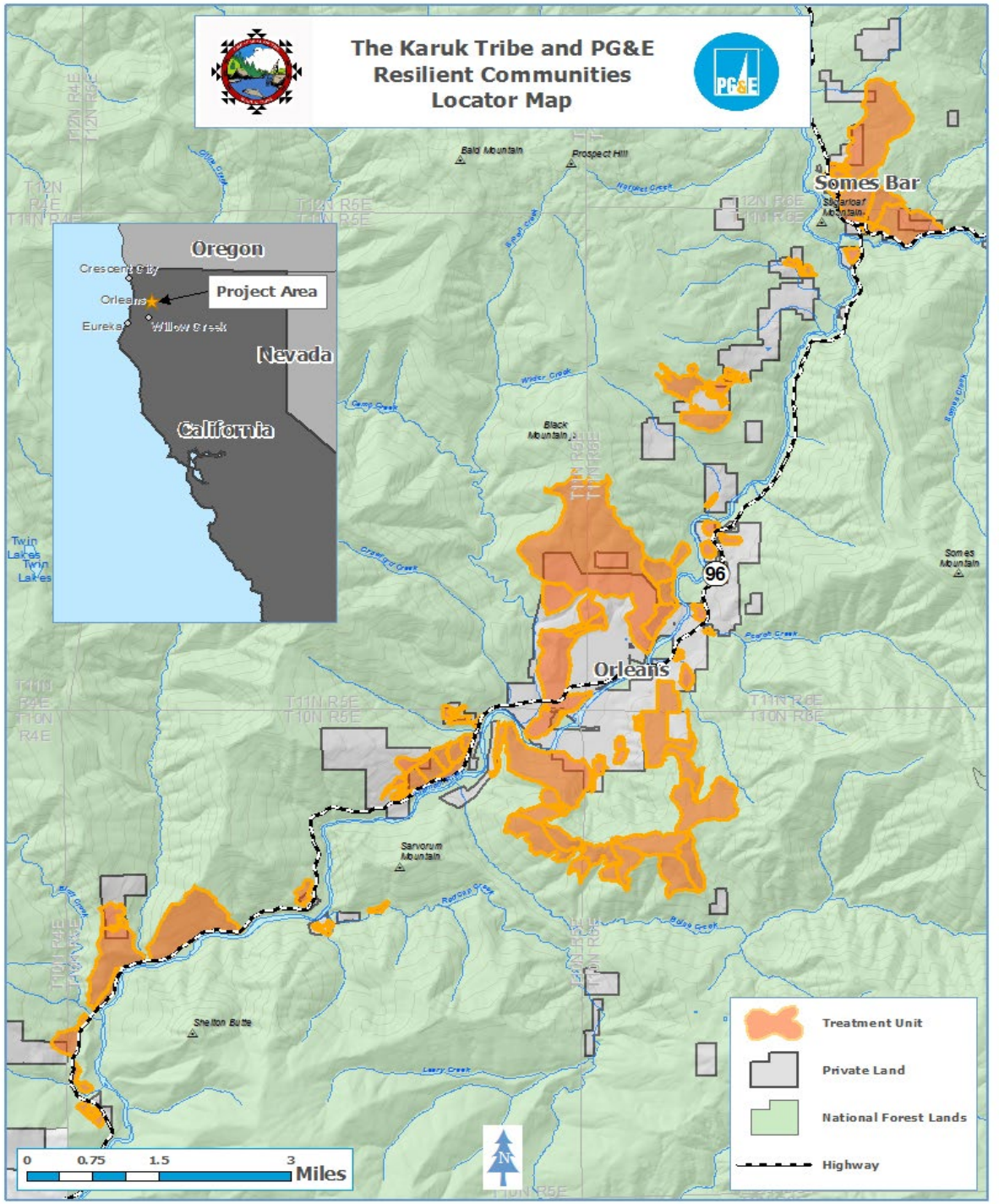
Drought, increasing temperatures and Increasing and changing wind patterns all increase risk of powerline ignitions

Table 2: Primary and Secondary Impacts of Powerline Ignitions
(adapted from the California Adaptation Planning Guide Sensitivity Checklist)

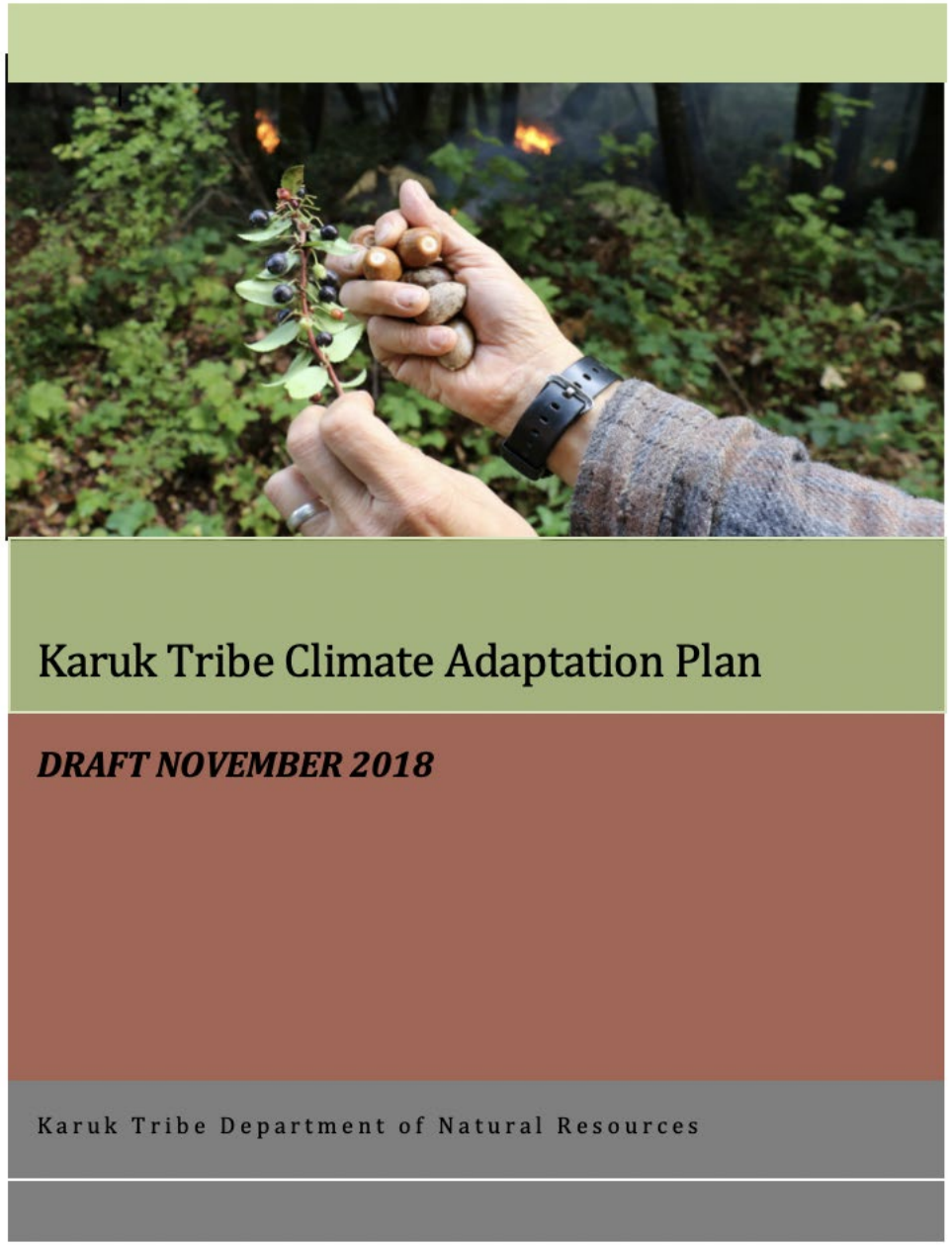
Primary Impact	Secondary Impact
Loss of electrical power	Government functionality and communications
	Emergency functionality and communications
	Cooling and air purifying for smoke
Road Closure	Loss of transportation access
	Lack of Escape route
	Emergency services cannot access
Smoke	Health impacts
	Fatigue and stress

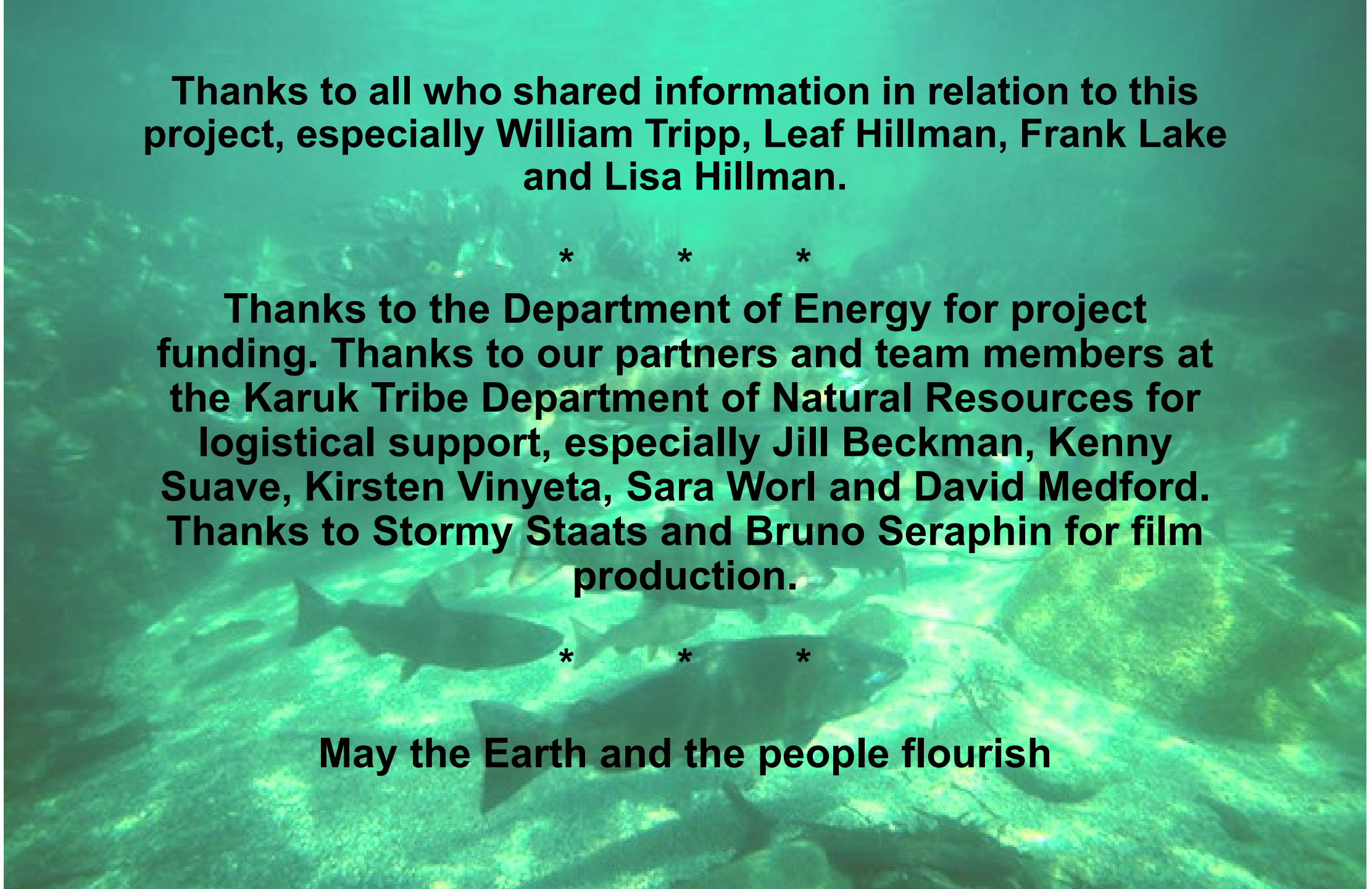
Prioritization Matrix for prescribed fire as protection from electrical ignitions

- Proposed 104 prescribed fire burn units
- Ranked in order of potential ignition source risk and community vulnerability
- Potential funding mechanisms



- Project Status/Accomplishments to date
  - Draft Climate Adaptation Plan for review (end of December)
  - One 6 minute video
- Activities yet to be completed:
  - Circulate draft/solicit input from regional experts for review
  - Integrate Plan into DNR Strategic Plan
  - Produce two more (short) films
- Lessons Learned
  - Significance of internal and external collaborative partnership to address the urgency of climate change





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* * *

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* * *

May the Earth and the people flourish

Yôotva!

Questions?

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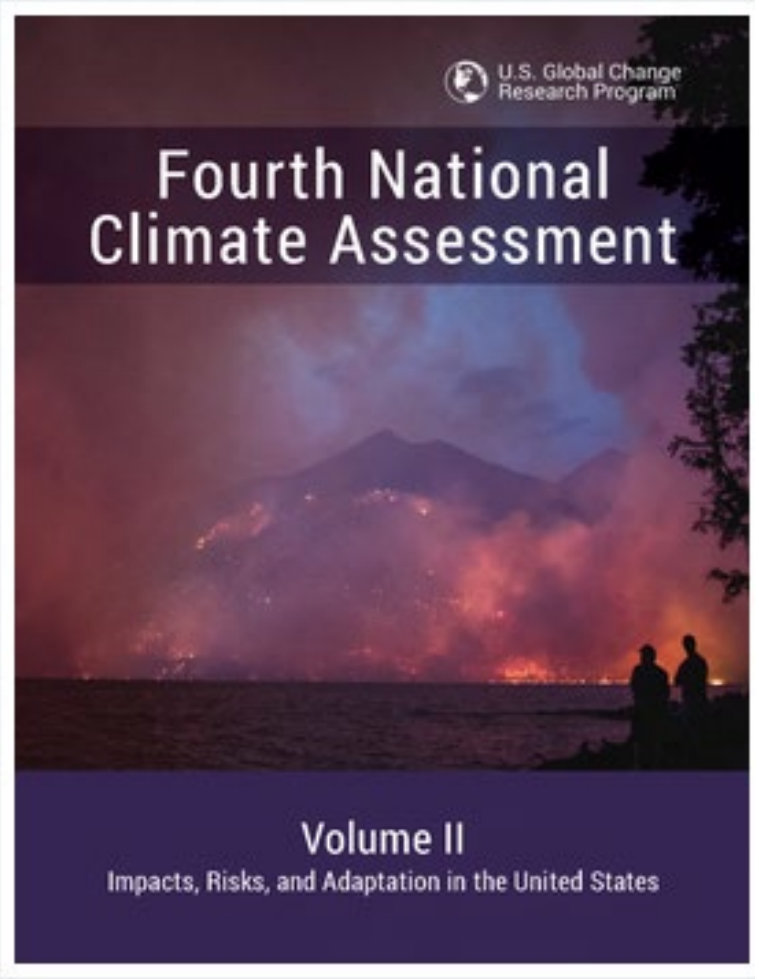
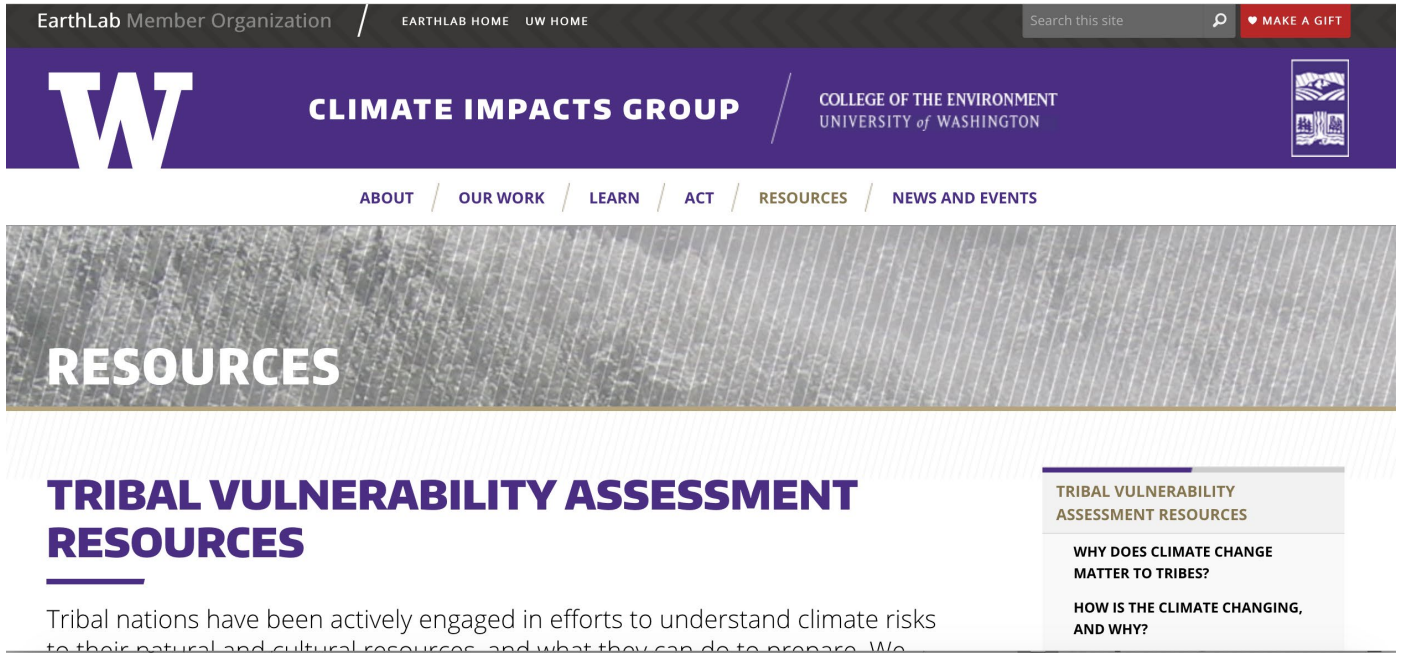
Data Sources

- National Climate Assessment
- California Climate Assessment
- **Tribal Climate Adaptation Guidebook**
- University of Washington Climate Impacts Group





Resources

- Karuk Tribe Climate Change Projects (URL: https://karuktribeclimatechangeprojects.wordpress.com/)
  - Final 2016 Climate Vulnerability Assessment available online as a PDF
  - 2016 CVA will be updated to include findings from current DOE project