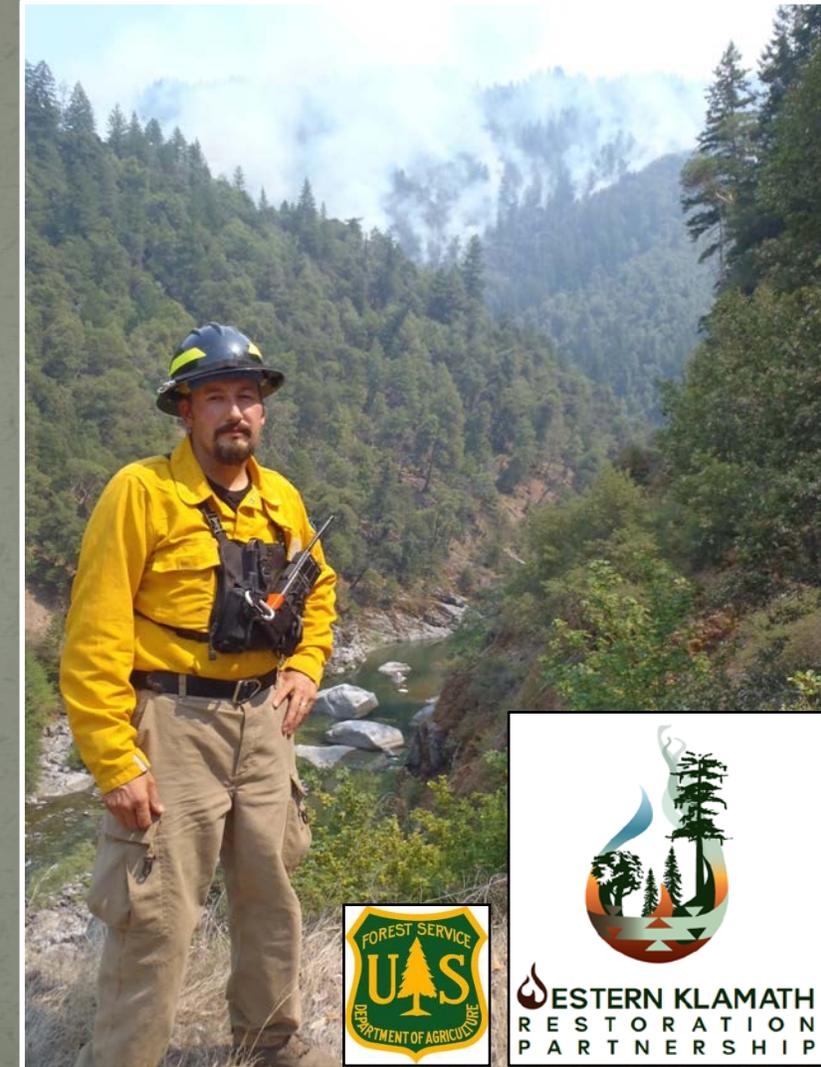


Collaborative Research Approaches for Aligning Landscape Restoration, Climate Change, Wildland Fire Management Strategies

Frank K. Lake

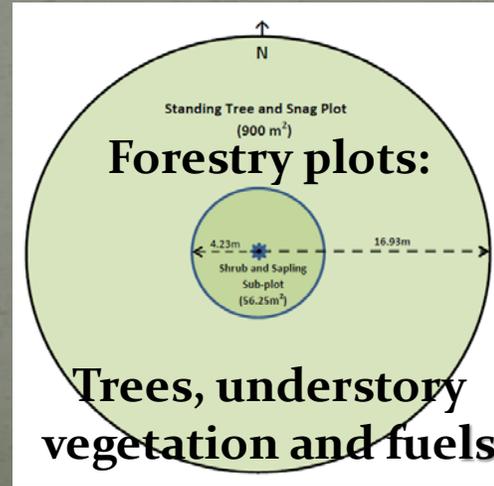
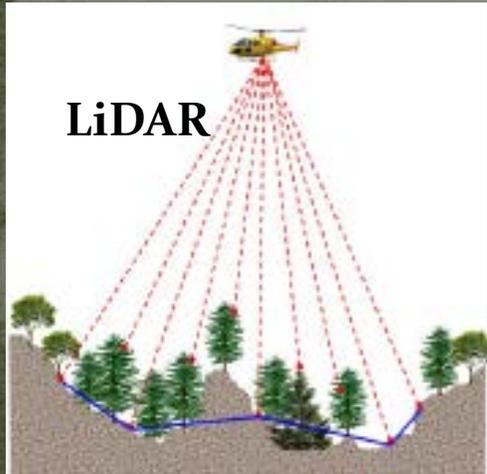
- **Education**
 - 1995 B.S. University of California, Davis.
 - 2007 Ph.D Oregon State University
- **USDA Forest Service-PSW Orleans/Redding, Ca.**
 - Fire and Fuels Program
- **Research**
 - Traditional Ecological Knowledge and Ethnobiology
 - Fire Effects and Climate Change Impacts to Tribally Valued Habitats and Resources
- **Management**
 - Resource Advisor on Wildfires
 - Interdisciplinary team assignments

Collaborative Restoration Workshop: Working Towards Resilience, Restoration as Science in Action-Integrating Science & Action Track



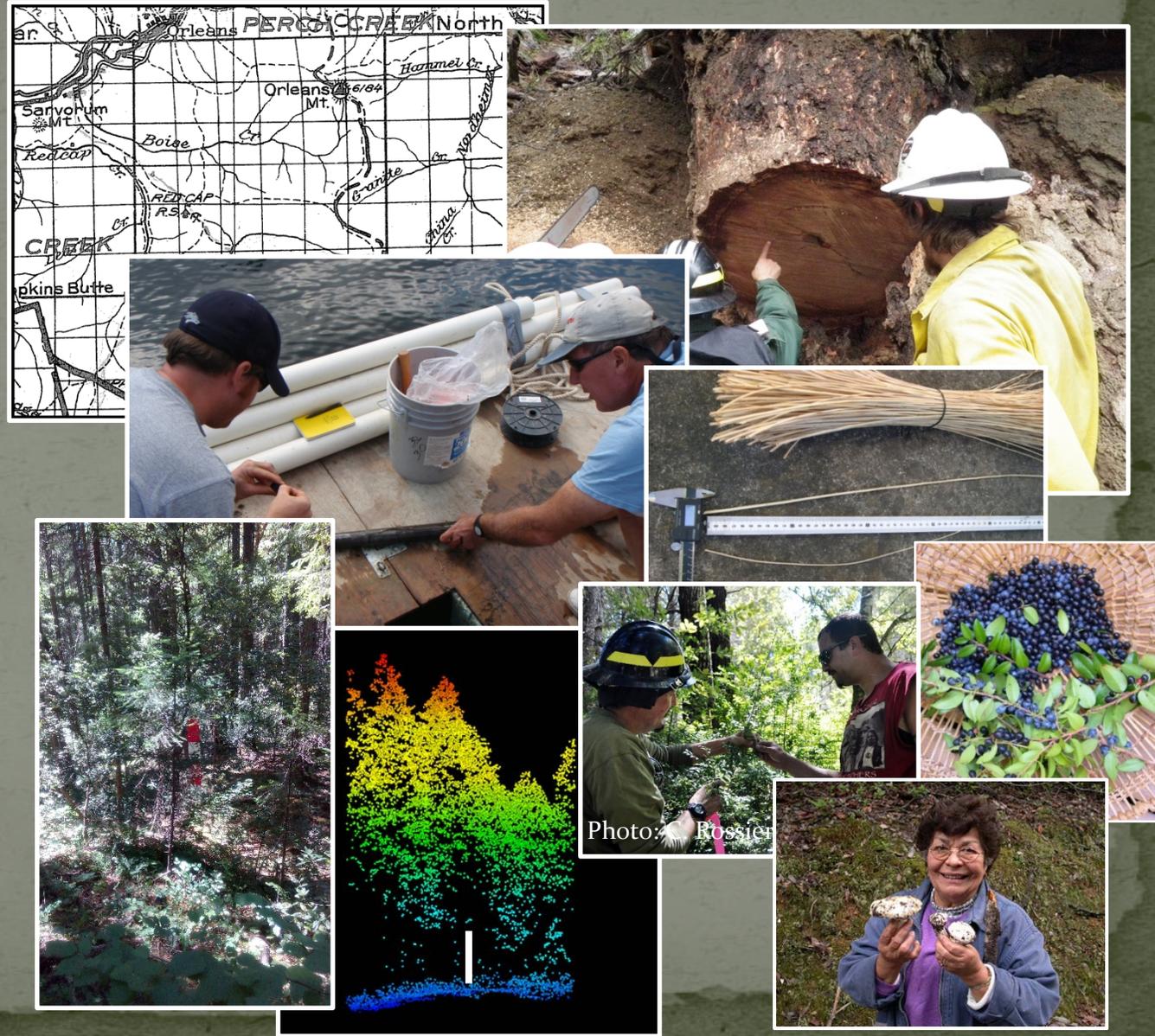
Developing a Research Framework

- At which scale to study forestry, fire, and climate effects?
- At which scale to evaluate wildland fire and fuels reduction practices on tribally valued habitats and resources?
- How to identify at what scale are the most applicable things to study?



Upscaling and Integrating Research Approaches to inform Collaborative Restoration Planning and Implementation Strategies

- Ethnographic and Oral Histories Data
 - Past to present tribal resource uses
- Paleoclimate and Fire History
 - Lake pollen/charcoal & Tree fire scars
- Ethnobotany [Basketry and Foods]
 - Individual plant traits linked to plots
- Forestry plots to characterize habitat and resource quality
- Remote sensing [LiDAR] to inform local interest to landscape conditions
- *Research needs and next steps:*
 - Interdisciplinary Cross-Scale Team



Cultural and Natural Fire Regimes of the Klamath-Siskiyou Mountains

- Ethnographic and archaeological data about tribal burning practices and villages
- Paleoclimate and fire history data provide geographically specific data

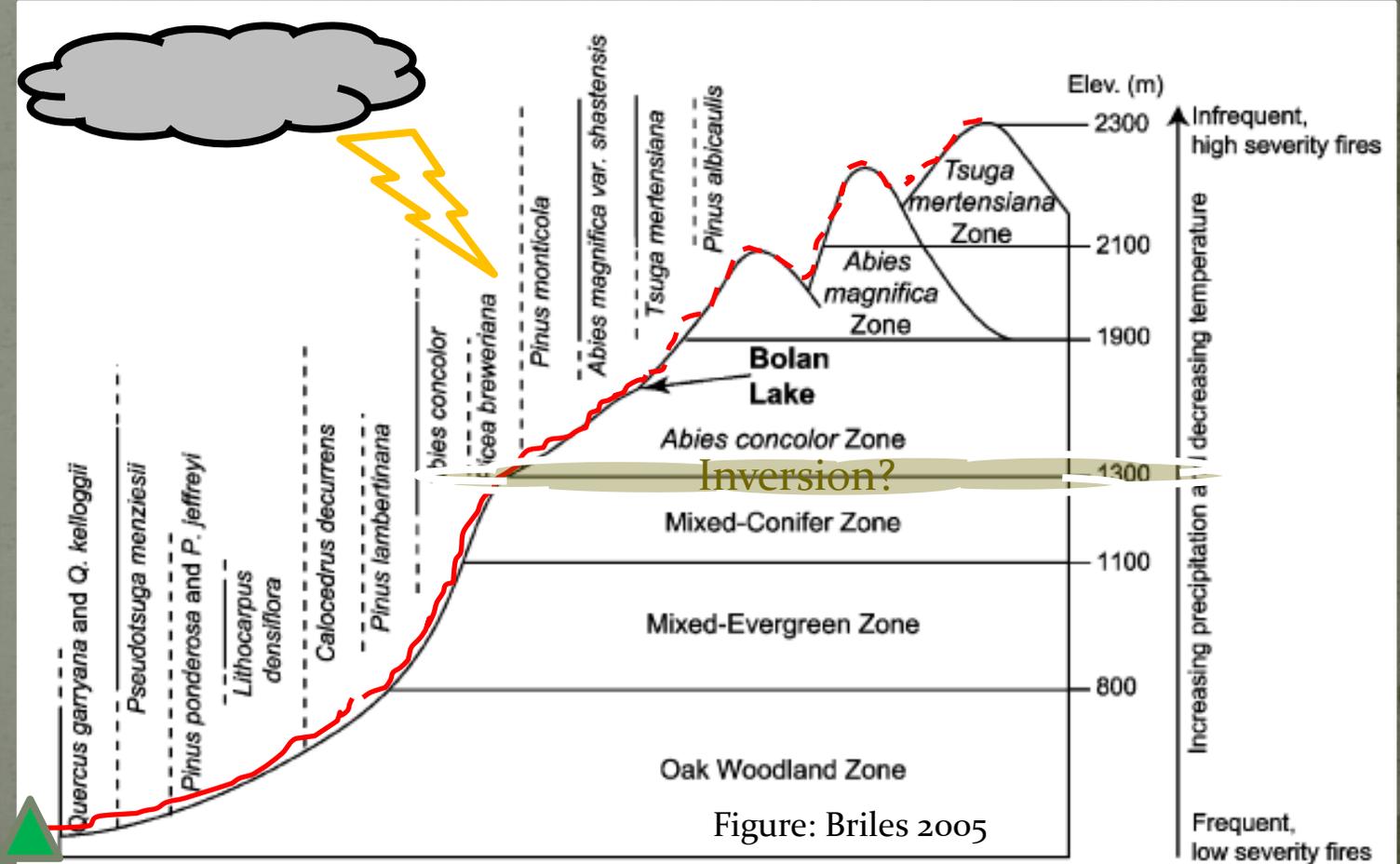
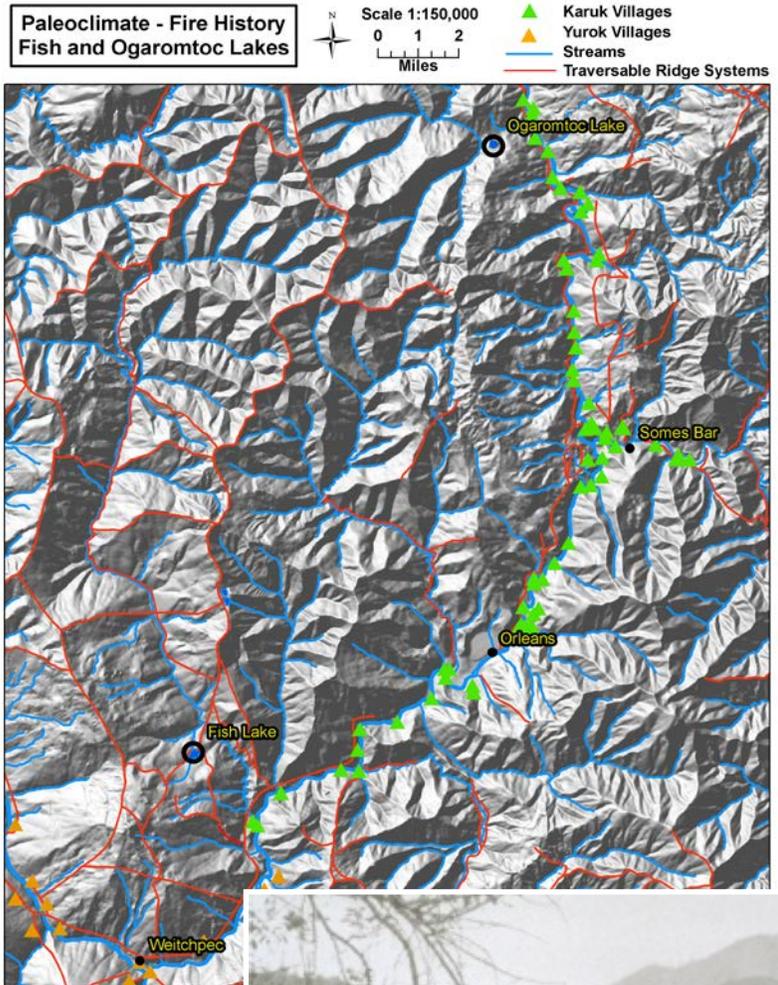


Figure: Briles 2005



Anderson 2007



Photo: Kroeber, Karuk Village

What are the Tribally Valued Resources and Habitats? With A Cultural Ecosystem Services Framework

- **Resources:**

- Tangible and Intangible elements of the environment
- Landscapes (Areas), Sites, Objects, State of Mind
- Past, Present and Future cultural knowledge and related practices
- Natural and Cultural Resources utilized to perpetuate tribal customs, practices and knowledge systems.

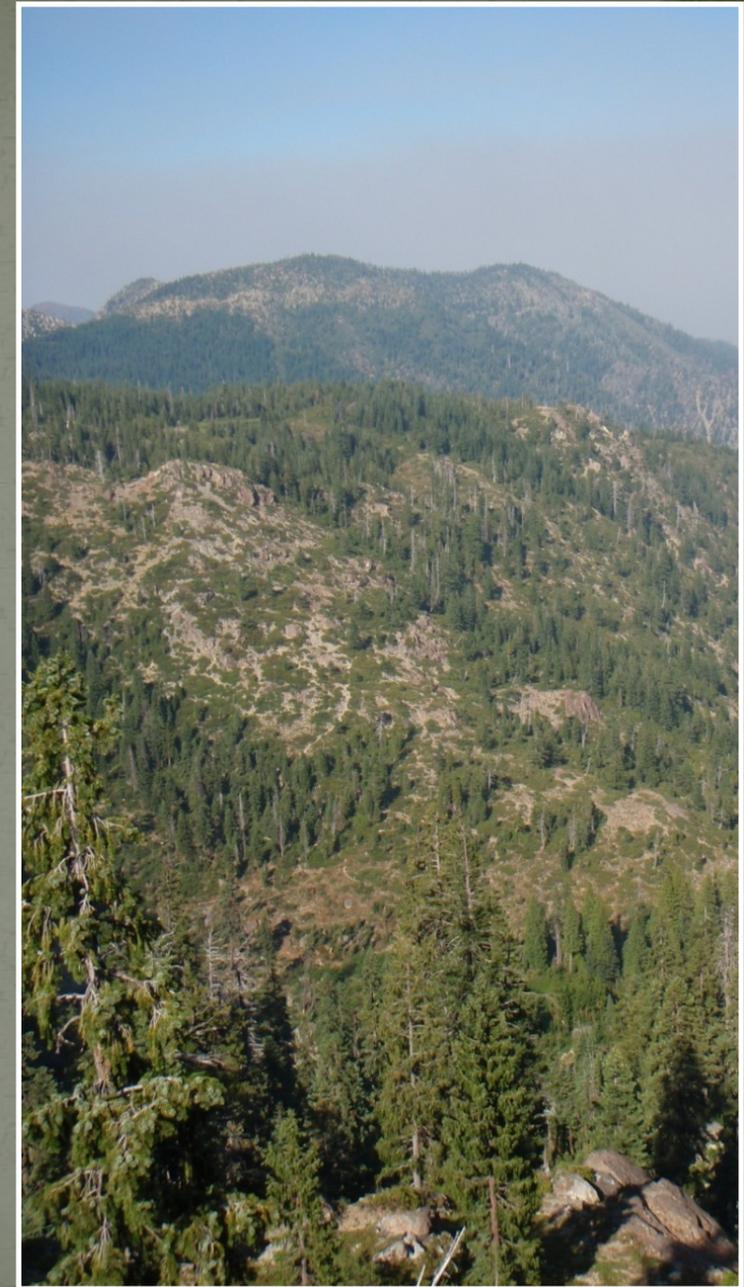
- **Habitats:**

- Landscapes or places that support tribal ceremonial and subsistence practices
- Bio-physically or Socio-Culturally defined site characteristics
- Places that support or potentially support a single or multiple resources of tribal value



Research to Inform our Understanding of Short- and Long-Term Climate and Fire Effects on Tribal Valued Resources: Landscape to Patches

- Resource abundance and quality changes over time at the site or across the area
- Different “patches” of similar resources can be maintained & geographically distributed
- Spatial and temporal resources availability
 - (E.g., Time since Fire by Severity or Treatment Type)
- How can understanding tribal resource needs be integrated with Climate Change and Landscape Restoration strategies?



Tribal and Rural Values to Metrics

- WUI & Valued habitats and resources
 - Protection of life, property and resources from undesired wildfires
 - Socio-cultural well-being and local economic factors (security)
- Food Security and Cultural Practices
 - Tribally valued food resources from different habitats [*Food as good medicine]
 - Access/Foraging efficiency
 - Quantity and quality of habitat and resources
- Hazardous Fuels Reduction and Wildland Fire Treatments
 - Understory thin and pile burning
 - Broadcast burning/Rx fire
 - Managed wildfires for resource benefit-
Desired fire effects on valued resources
 - Fire suppression where desired or required
 - No treatment-protected areas or longer FRIs



Linking wildland fire management and fire effects to tribal values



What's Good Fire?

Effective use of landscape restoration strategies to reduce undesired wildfire and climate impacts to communities

- Research methods inform managers about tribally valued habitats and resources.
- Strategic treatments at various locations in the landscape.
 - Land ownership: Public, Private and Tribal
 - Wildland-Urban Interface
 - Travel Routes & Ridges
 - Areas with high mutual interest and multiple values at risk
- Objectives of the treatments/Rx burns.
 - To protect Life, Property, (enhance) Resources



Aligning Communities Values with Landscape Restoration, Climate Change, and Wildland Fire Research and Management Strategies

- Landscape Restoration Strategies
 - Heterogeneity and Resilience considerations
 - SPLATs [Strategically Placed Landscape Area Treatments] Targeting *20-30% of the landscape planning area
- Climate Change Vulnerability Assessments and Adaptation Planning Efforts
 - Threats and Stressors to environment and community practices
 - Planning considerations for Cultural Ecosystem Services
- The National Cohesive Strategy for Wildland Fire Management Implementation
 - Resilient landscapes
 - Fire Adapted Communities
 - Wildland Fire Management Responses
- Linking to Tribal and Rural Community Values
 - Alignment of multiple resource objectives with community values for the reintroduction of fire [*Eco-cultural Restoration]
 - Adaptive research & management-Metrics and Indicators



Key science papers:

Hessburg et al. 2015: Restoring Fire Prone...Seven Core Principles
Hessburg et al. 2016: Tamm Review: Mix Severity Fire Regime Forests...

Western Klamath Restoration Partnership:

• Vision

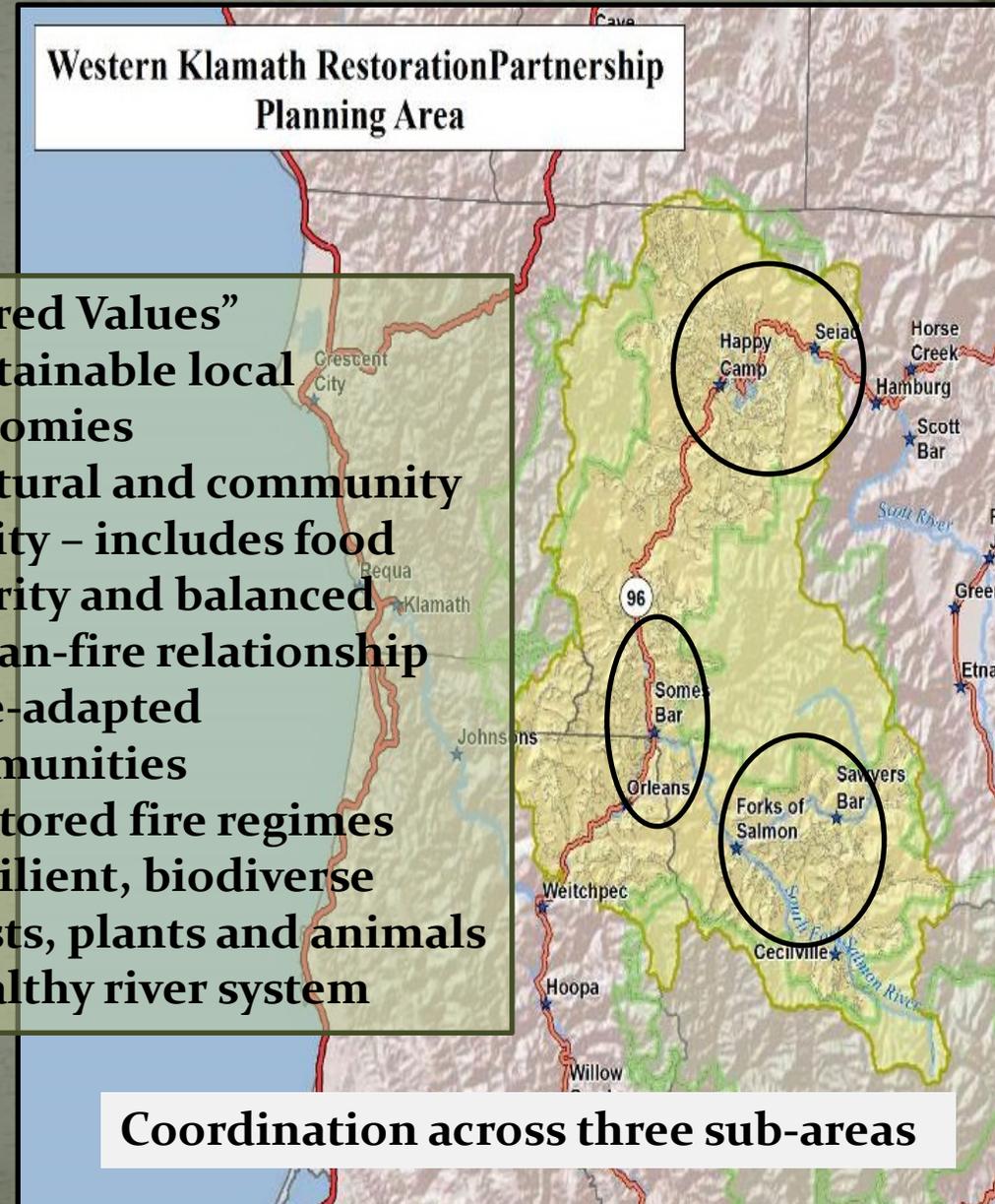
- Establish and maintain resilient ecosystems, communities, and economies guided by cultural and contemporary knowledge through a truly collaborative process that effectuates the revitalization of continual human relationships with our dynamic landscape.

• Strategies

- Develop and implement landscape level strategic fuels reduction treatments
- Increase use of fire to restore & maintain Pre-European conditions in a contemporary context
- Increase local restoration capacity
- Create sustainable diverse revenue streams to address all threats and values
- Accelerate development of Fire Adapted Communities
- Integrate food security into forest management actions
- Advocate for and support implementing existing fisheries restoration plans
- Develop integrated, inter-generational education programs and activities that complement our identified strategies
- Develop inclusive partnerships for implementing zones of agreement (formerly - Improve inter-governmental and community coordination and communication efforts)

“Shared Values”

- Sustainable local economies
- Cultural and community vitality – includes food security and balanced human-fire relationship
- Fire-adapted communities
- Restored fire regimes
- Resilient, biodiverse forests, plants and animals
- Healthy river system



Coordination across three sub-areas

Moving from historical to contemporary values across the landscape

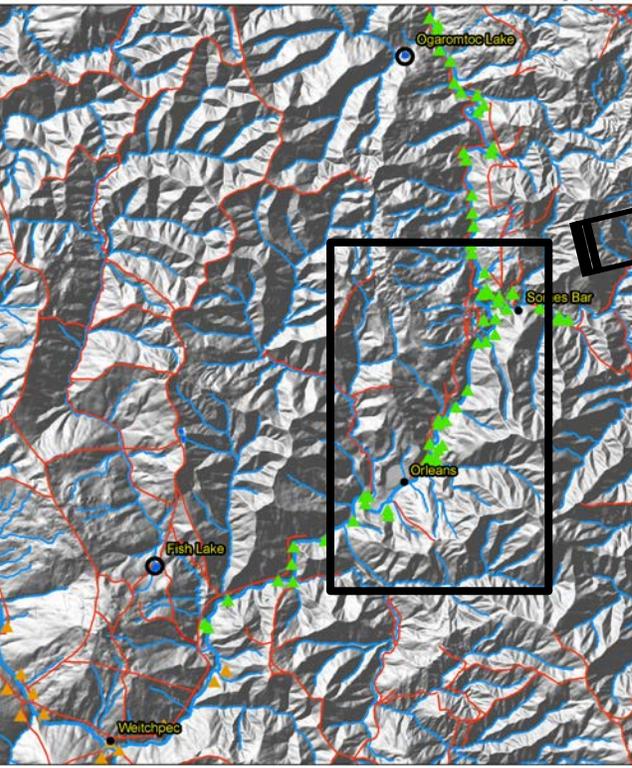
Highest valued areas for geographic “Zones of Agreement” reflecting multiple values and interest on the landscape depicted in red to lower ranked area with yellow-green color. Moving forward with Principles in Practice

Western Klamath Restoration Partnership
Orleans - Somes Bar Overlay Assessment



Zones of Agreement to Principles in Practice which align with areas of the landscape that tribes formerly managed with fire, and have contemporary interest for reintroducing fire today with fire adapted communities

Paleoclimate - Fire History
Fish and Ogaromtoe Lakes



Map Created by:
Karuk Tribe Emergency Preparedness Dept

How can tribal community's TEK inform Climate Adaptation Strategies?

- Coping with vs. Preparing for the future?
- Traditional and Modern approaches for mitigation activities and adaptation strategies
- Local to regional tribal approaches as up-scaled models or frameworks
- Landscape restoration strategies that increasing heterogeneity and resilience for valued resources and habitats
- Eco-cultural revitalization processes



USDA Climate [SMART] Change Planning Approaches: Working with or supporting tribes shall consider?

- Consider: Cultural Ecosystem Services regrading ecological and cultural processes, influences on habitat quality, and access to desired quantity and quality of valued resources through tribal adaptive practices as various cross-scale *Strategies*.
- Adaptation Strategies [Tribal and Rural]:
 - **Resistance to-**
 - [Political, Socio-Cultural, Economic Threats and Stressors]
 - **Resilience for-**
 - [Landscapes and Cultural Processes that reduce vulnerability]
 - **Response of-**
 - [Individual, Family, Community, and Governance as successful adaptation and mitigation approaches]



The role of tribes in collaborative landscape restoration preparing for Climate Change: Sharing knowledge-*All Lands, All Hands* stewardship approaches aligned with the Cohesive Strategy

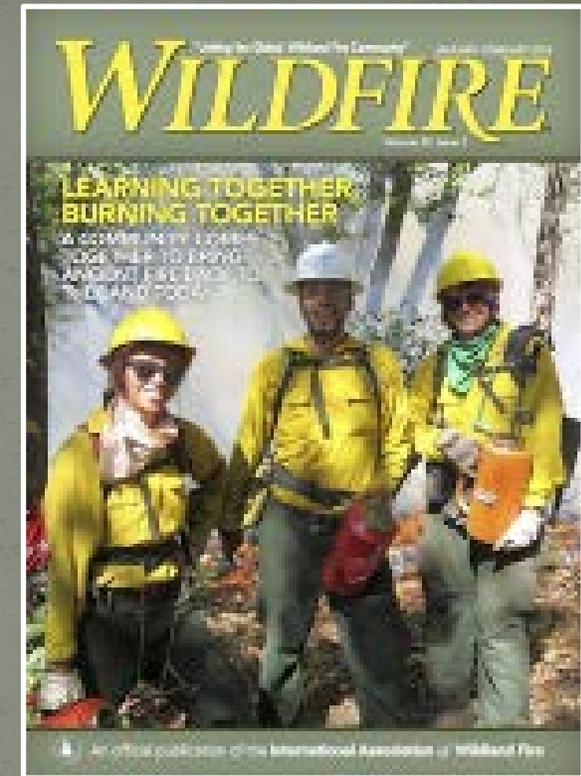
Cross Walking Forestry-Fire and Cultural Variables

Forestry - Fire	Variable(s) & metric(s)	Cultural-Tribal Values	Variable(s)	Restoration treatments
Forest and understory plant diversity	Species per area, diversity index	Higher density of foods, material, medicinal plants	Increase seasonal use for multiple purposes	Thinning different tree and shrub types, wildland fire
Tree diameter or size ranges	Dia. Breast Height (dbh), basal area, site index	Larger full crown, structurally diverse trees, fewer per area	Older/mature forest with favored tree species	Thinning different trees types, wildland fire
Crown fire initiation, ladder fuels, canopy-tree volume & density	Ground to Crown height, Torching index	Increased mobility, foraging and viewing	Walking and searching quality; site quality for valued species	Limb up larger trees, remove smaller trees, Remove selective trees thinning above
Brown's fuels transects, surface fuel loading	Tons/area by fuels size classes	Increased mobility, foraging and viewing; % duff for fungi and herbs	Walking and searching quality	Removal of surface fuel by manual, mechanical or wildland fire
Canopy Cover/Closure	Density of tree crowns (bulk density), amount of sun light at plot	Filtered or partial sunlight for fruiting and understory plants (shrubs, forbs, ferns, grasses)	Quality & Quantity of fruit, or light for understory plants	Manual or mechanical thinning different trees types, Single tree treatments



TEK – Restoration of Forests, Fire Regimes, and Cultural Practices: *A form of Climate Adaptation?*

- Primary objectives are to restore cultural fire regimes which will
 - Restore structure, composition, and ecological and culturally valuable functions of forest, shrub, and grassland habitats.
 - *Teaching TEK and fire ecology to tribal youth
- Initial fuels reduction and prescribed fire treatments located near communities (WUI) and critical road systems.
 - Key habitats are montane meadow, oak-pine, mixed conifer-hardwood, and grassland environments where fire has been absent. (*Formerly tribal burned areas)
- Examples: TNC-TREX support of local tribes, Fire Safe Councils, and community members. BIA-Tribal Reserved Treaty Lands Program with agreements for tribal burning across all jurisdictions in partnership.



TNC-Karuk Tribe -MKWC
Klamath River TREX 2015

Creating the best available science with Tribes

- Tribes and tribal organizations as research partners
- Learn of tribal researchable questions and science support needs
- Develop and implement national and regional scale research initiatives or programs (Govt. to Govt. Agreements & Compacts for federal agency budget allocations & fiduciary Trust responsibility to tribes)
- Tribal input to, participation with, oversight and review with research methods, analysis, results, and how “data” is shared with the public.
- Tribal participation assisting with the creation of the best available science to inform policy development and management of landscapes and resources



Collaborative research



Collaborative data reporting