

Ecological and cultural impacts of fire in pinyon-juniper woodlands



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- 1) **Fire trends in pinyon-juniper**
- 2) Pine Nut Mountains case study
- 3) Washoe Environmental Protection Department stewardship

Fire history studies in pinyon-juniper

Bauer & Weisberg, 2009. Fire history of a central Nevada pinyon-juniper woodland. *Canadian Journal of Forest Research* 39.

Kitchen, S.G., 2012. Historical fire regime and forest variability on two eastern Great Basin fire-sheds (USA). *Forest Ecology and Management* 285.

Biondi, Jamieson, Strachan, & Sibold, 2011. Dendroecological testing of the pyroclimatic hypothesis in the central Great Basin, Nevada, USA. *Ecosphere* 2.

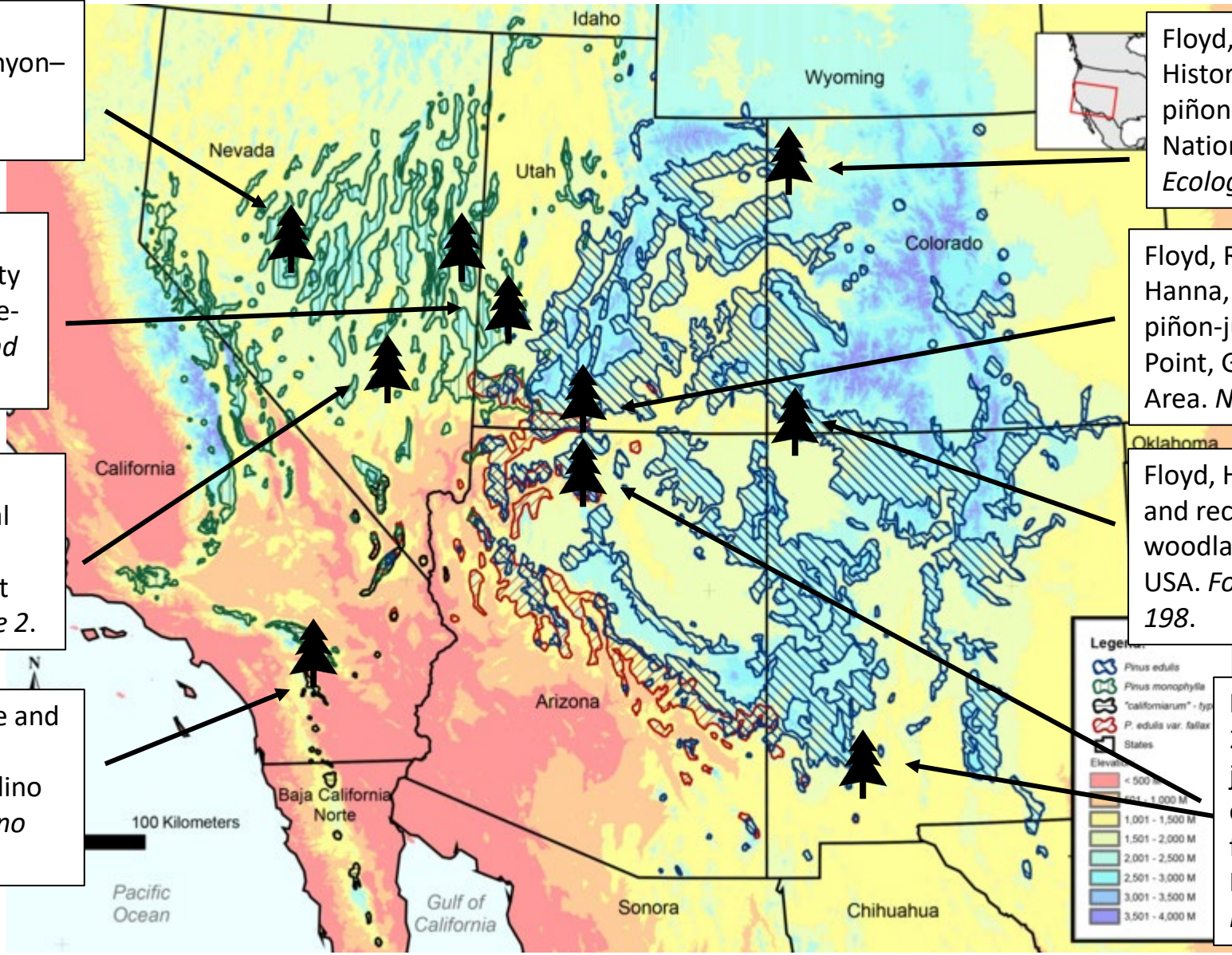
Wangler & Minnich, 1996. Fire and succession in pinyon-juniper woodlands of the San Bernardino Mountains, California. *Madrono* 43. [not tree-ring based]

Floyd, Romme, Hanna, Hanna, 2009. Historical and modern fire regimes in piñon-juniper woodlands, Dinosaur National Monument, USA. *Rangeland Ecology & Management* 70.

Floyd, Romme, Hanna, Winterowd, Hanna, & Spence, 2008. Fire history in piñon-juniper woodlands on Navajo Point, Glen Canyon National Recreation Area. *Natural Areas Journal* 28.

Floyd, Hanna, & Romme, 2004. Historical and recent fire regimes in piñon-juniper woodlands on Mesa Verde, Colorado, USA. *Forest Ecology and Management* 198.

Huffman, Fule, Pearson, & Crouse, 2008. Fire history of pinyon-juniper woodlands at upper ecotones with ponderosa pine forests in Arizona and New Mexico. *Canadian Journal of Forest Research* 38.



Historically: infrequent, patchy, high-severity fire in pinyon-juniper (but variable over space & time)



Historically: infrequent, patchy, high-severity fire in pinyon-juniper (but variable over space & time)



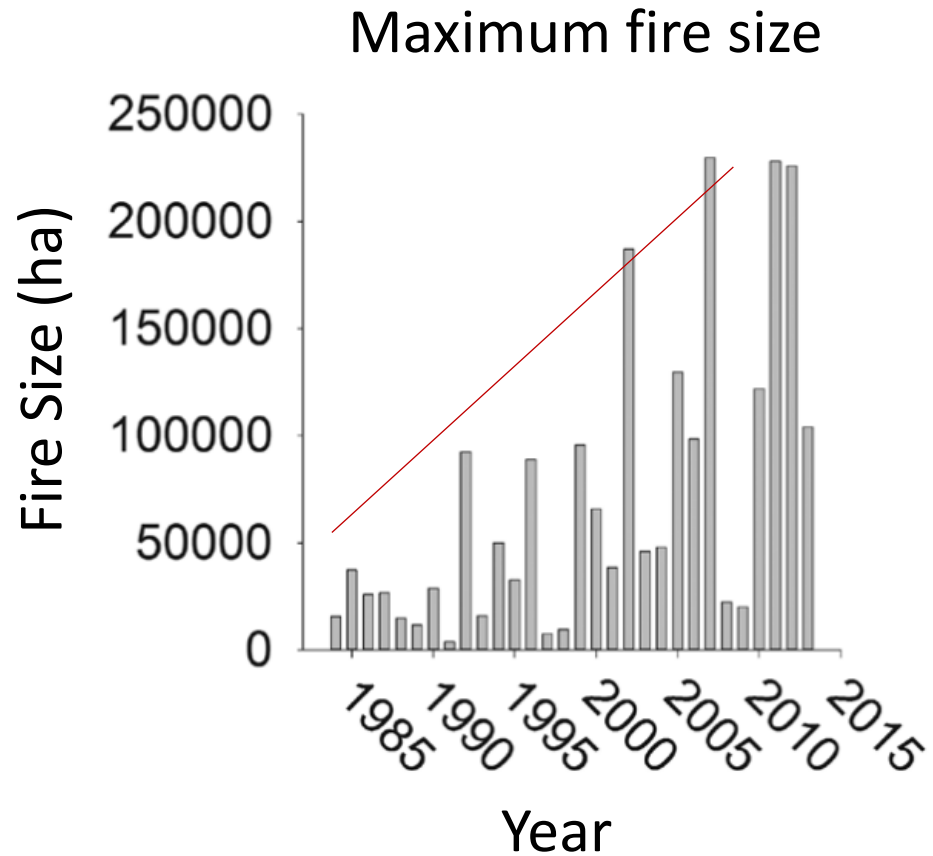
Photo: Jeanne Chambers



Cumulative effects of fires and other disturbances maintain *dynamic* vegetation mosaics



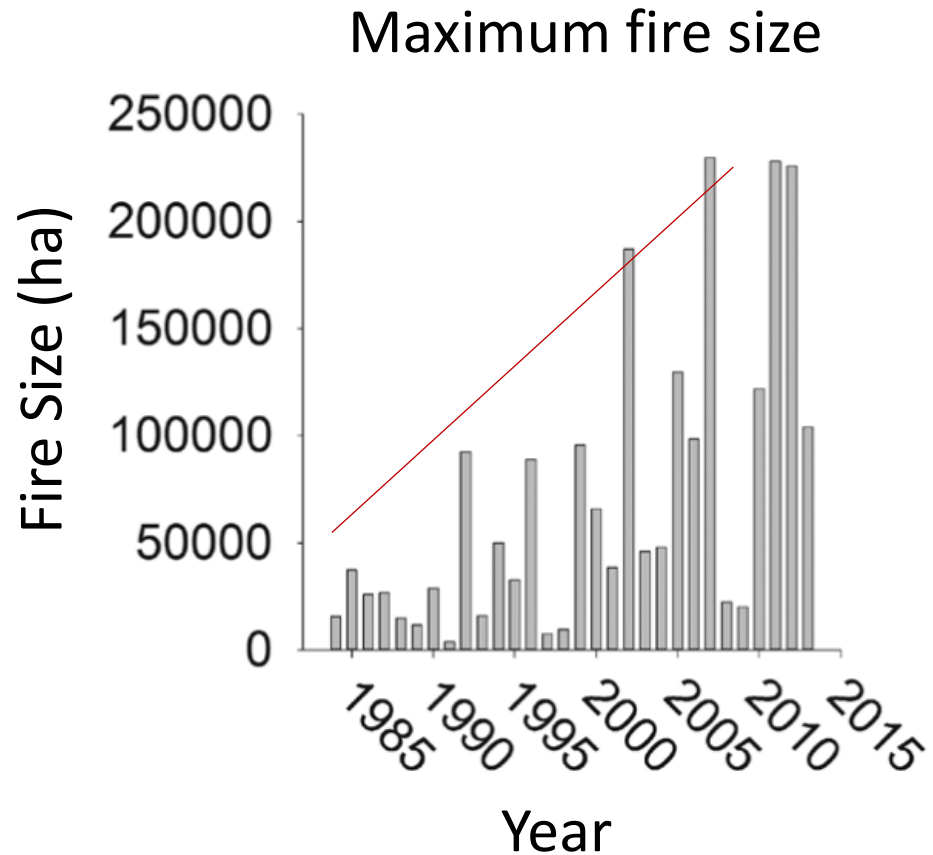
Increasing fire activity in pinyon-juniper woodlands



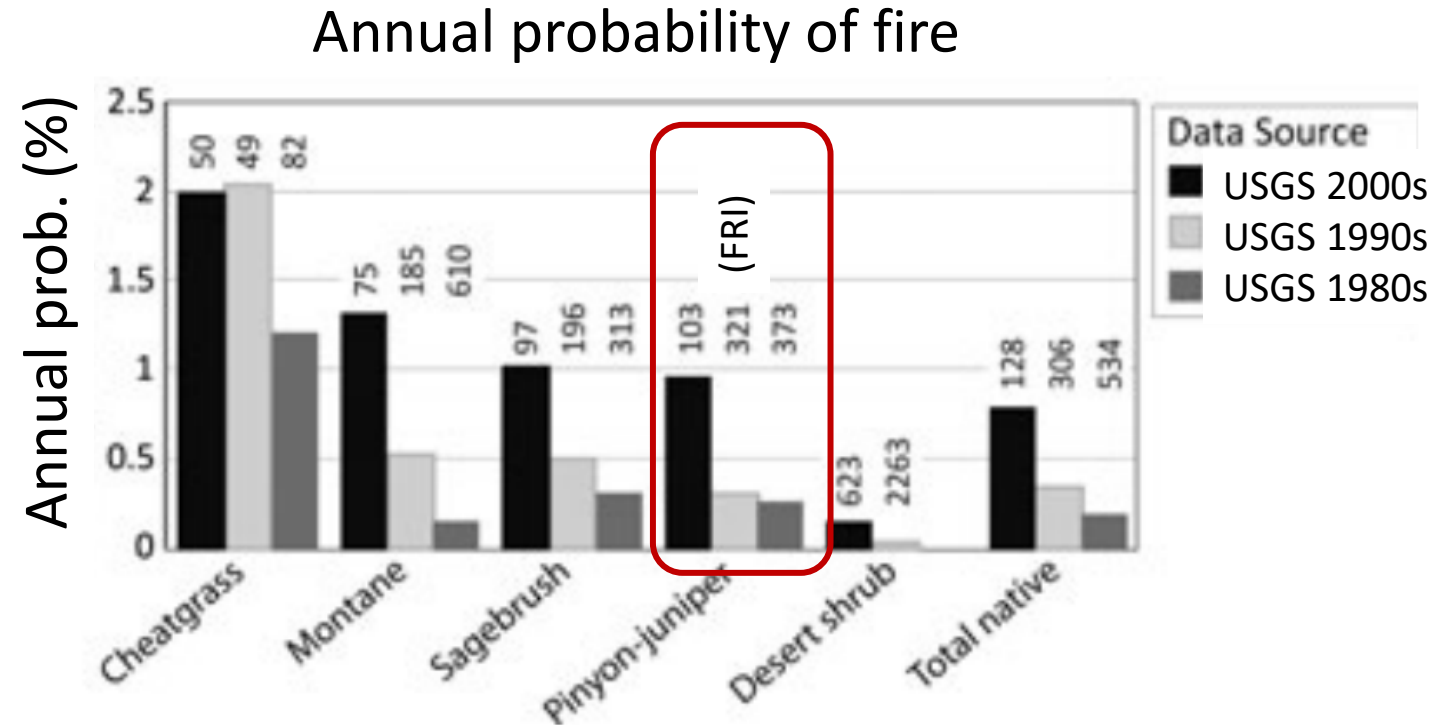
Board, Chambers, Miller, & Weisberg. 2018. Fire patterns in pinon and juniper land cover types in the Semiarid Western United States from 1984 through 2013. RMRS-GTR-372



Increasing fire activity in pinyon-juniper woodlands



Board, Chambers, Miller, & Weisberg. 2018. Fire patterns in pinon and juniper land cover types in the Semiarid Western United States from 1984 through 2013. RMRS-GTR-372



Balch, Bradley, D'Antonio, & Gomez-Dans. 2013. Introduced annual grass increases regional fire activity across the arid western USA. Global Change Biology 19:173-183.

What are the drivers of increasing fire trends?

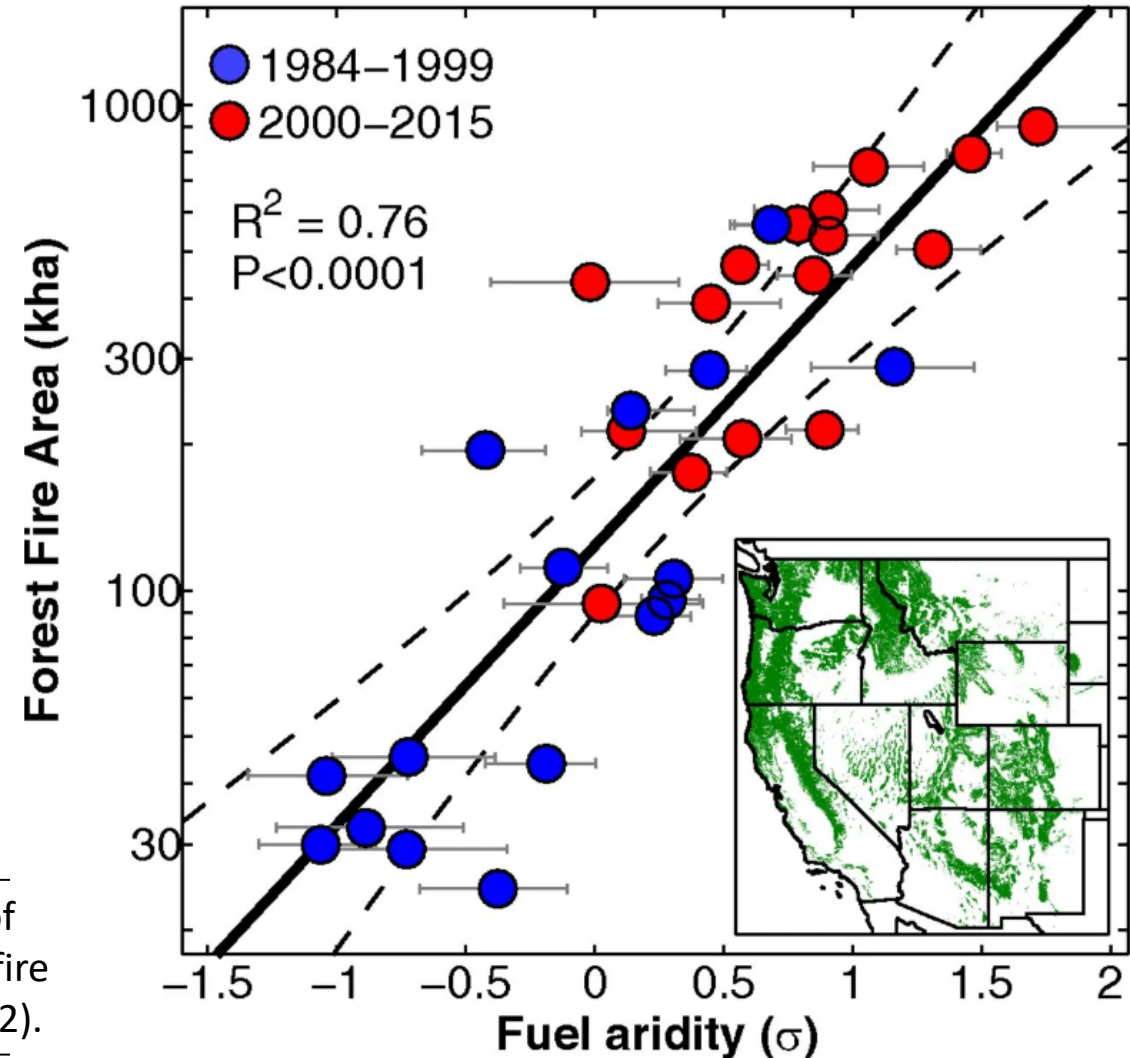


Large wildfire activity is associated with anthropogenic climate changes

- Increasing temperature
- Increased severity and frequency of drought
- Longer fire seasons



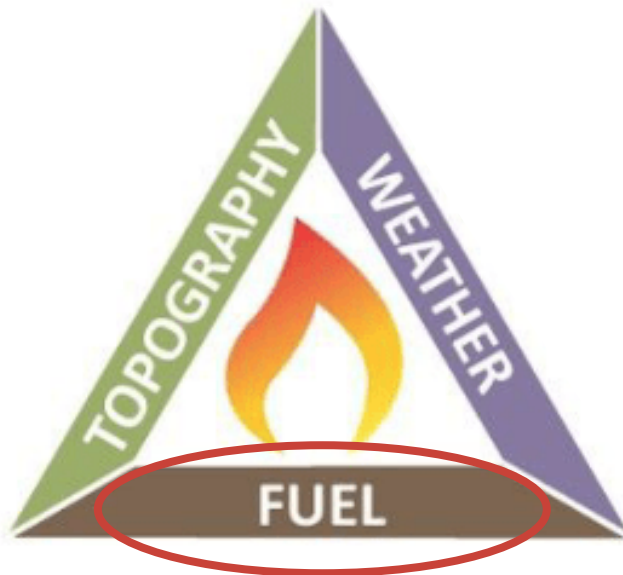
Abatzoglou & Williams. 2016. Impact of anthropogenic climate change on wildfire across western US forests. PNAS 113(42).



Invasive annual grasses: increased fine fuel availability

Fine fuels:

- Ignition probability
- Fire spread
- Fire frequency



Bradley, Curtis, Fusco, Abatzoglou, Balch, Dadashi, & Tuanmu, 2018. Cheatgrass (*Bromus tectorum*) distribution in the intermountain western US and its relationship to fire frequency, seasonality, and ignitions. *Biological Invasions* 20.



Fire-facilitated invasion:

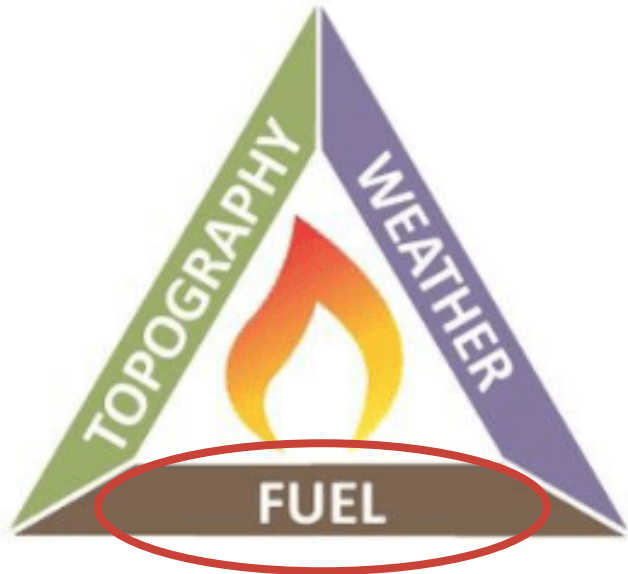
- Fire-adapted
- Dense pre-fire woodlands lack native competitors

Urza, Weisberg, Chambers, Board, & Flake, 2019. Seeding native species increases resistance to annual grass invasion following prescribed burning of semiarid woodlands. *Biological Invasions* 21.

Increased canopy fuel continuity

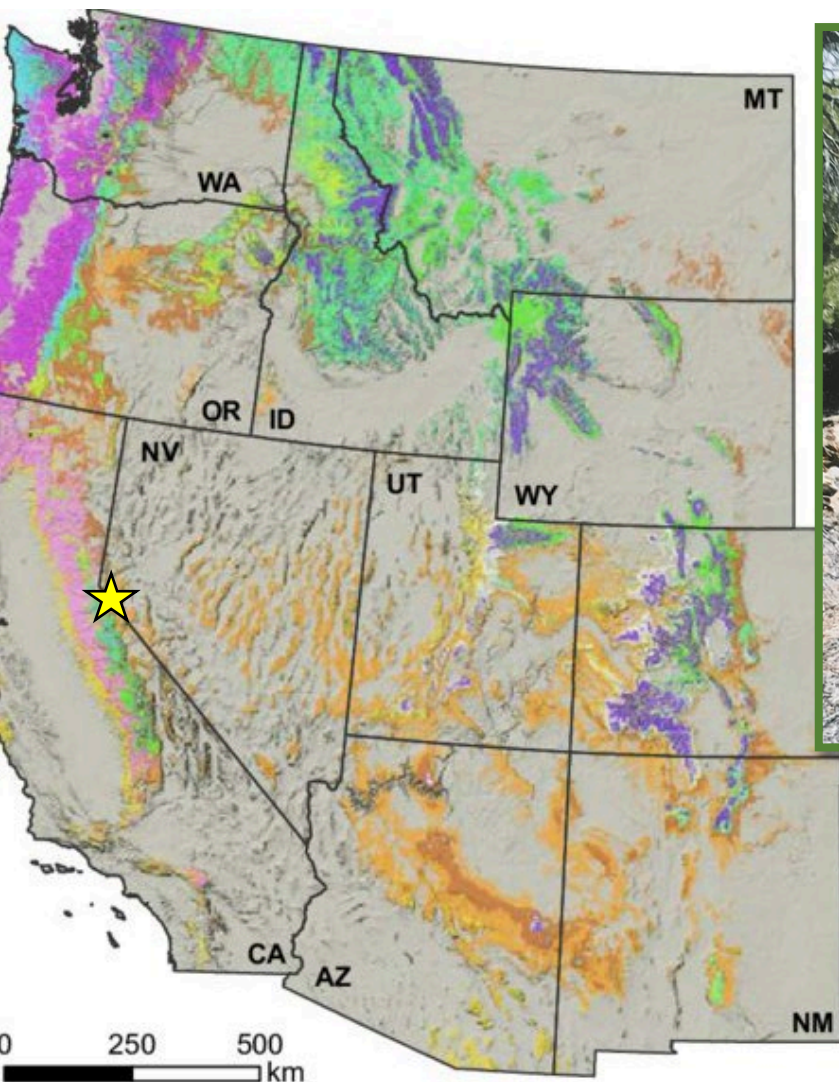
Loss of landscape heterogeneity increases susceptibility to large, continuous fire impacts

- Demographic changes
- Legacy of historical harvest
- Fire suppression
- Removal of people from landscape



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Pine Nut Mountains: case study

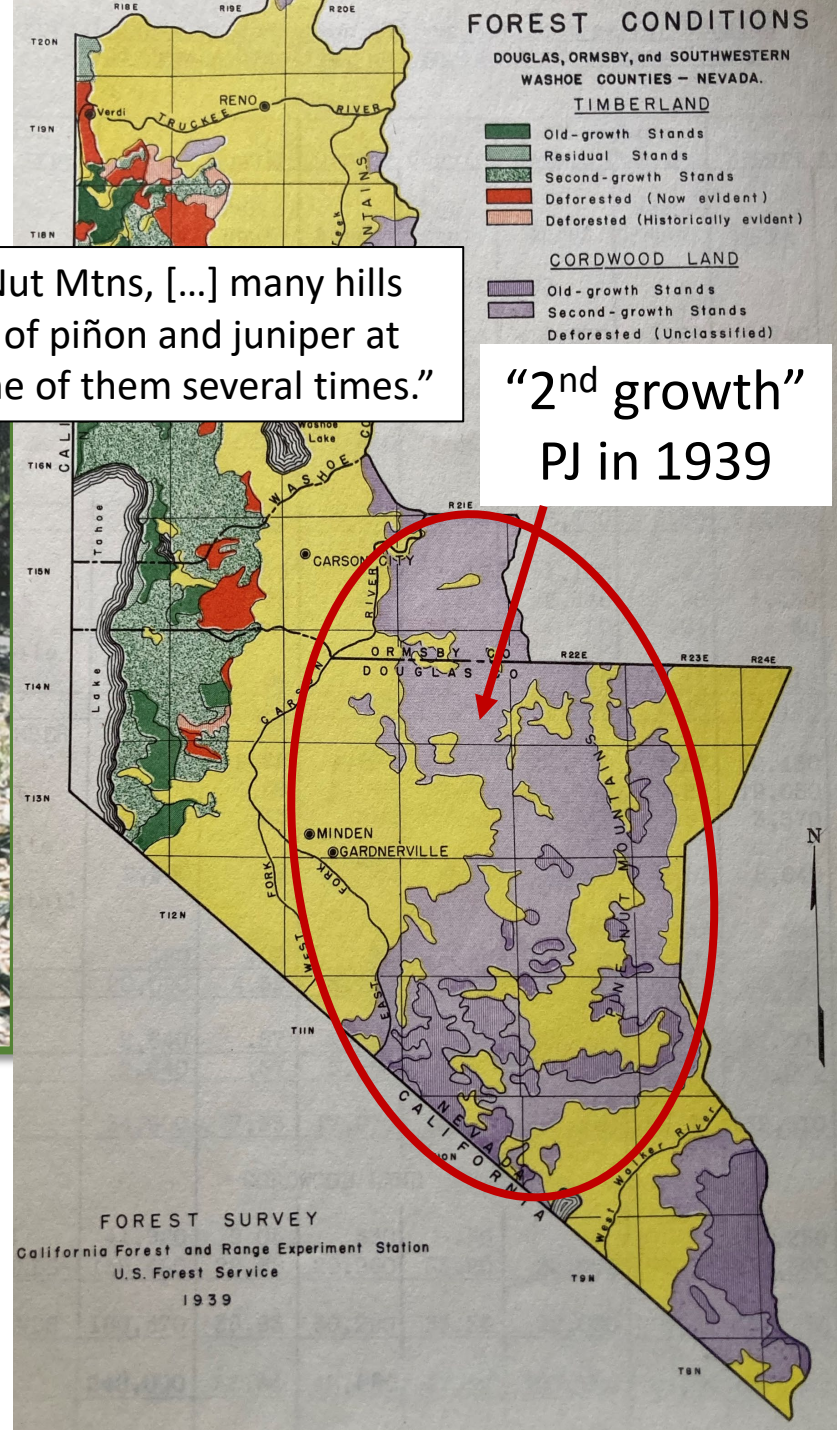


Traditional pinenut cache

Source: Washoe Tribe Cultural Resources Department

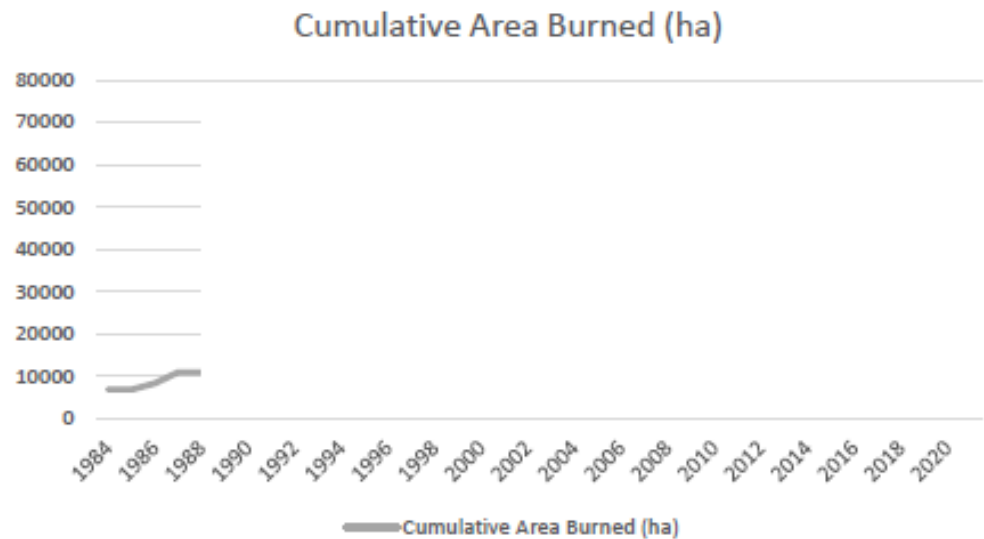
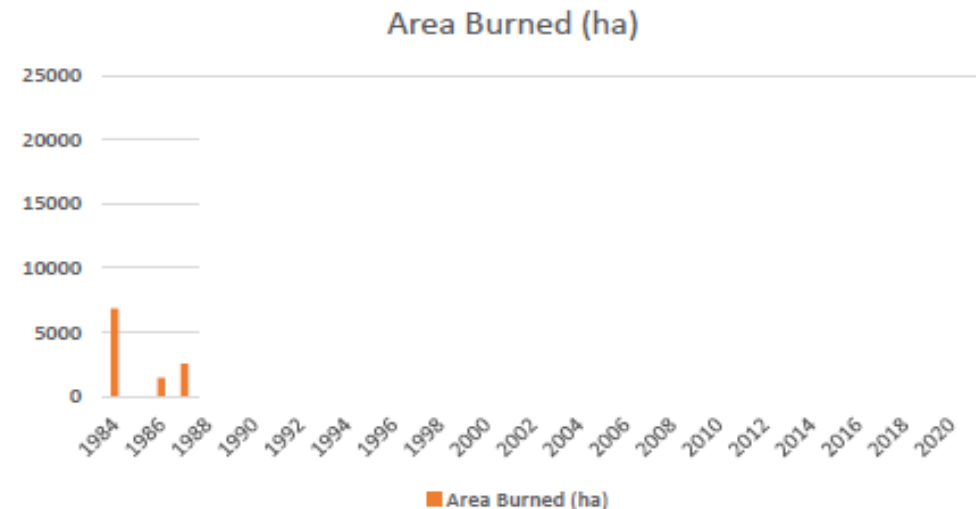
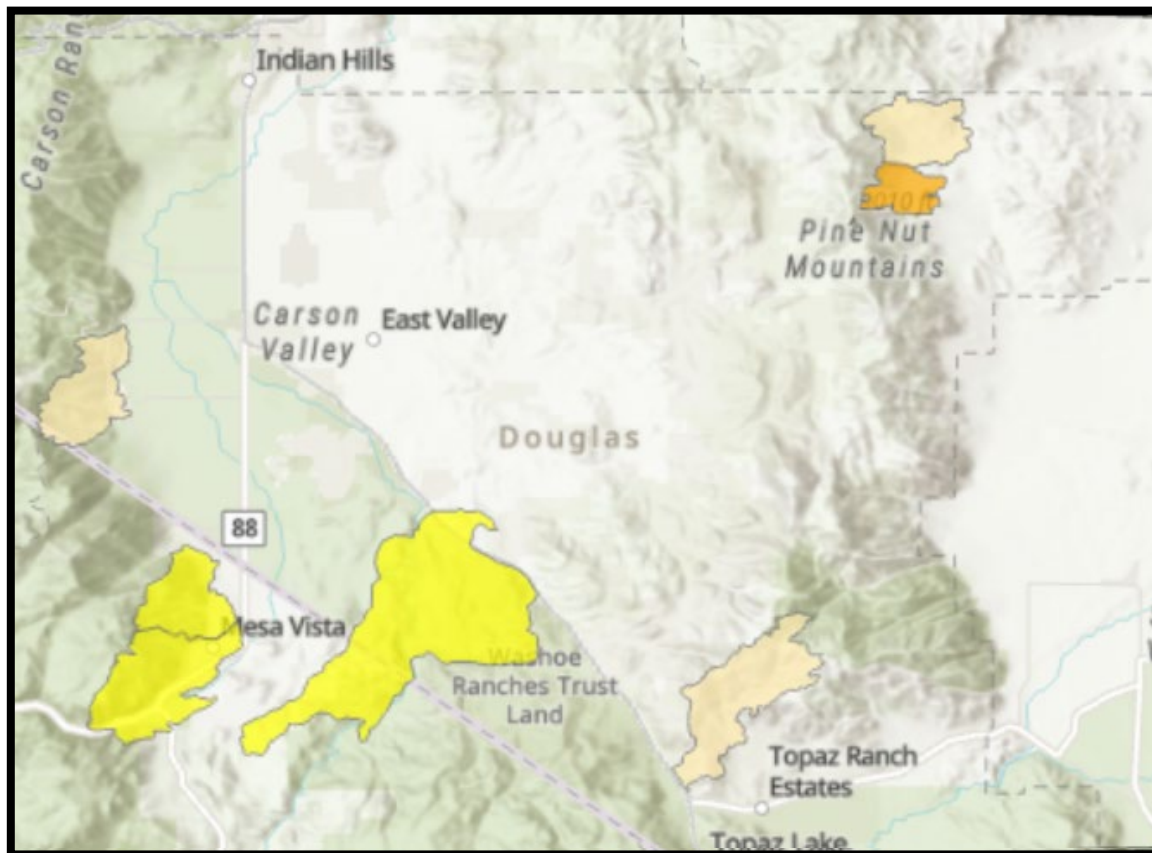
"In the Pine Nut Mtns, [...] many hills were cleared of piñon and juniper at least once, some of them several times."

"2nd growth"
PJ in 1939



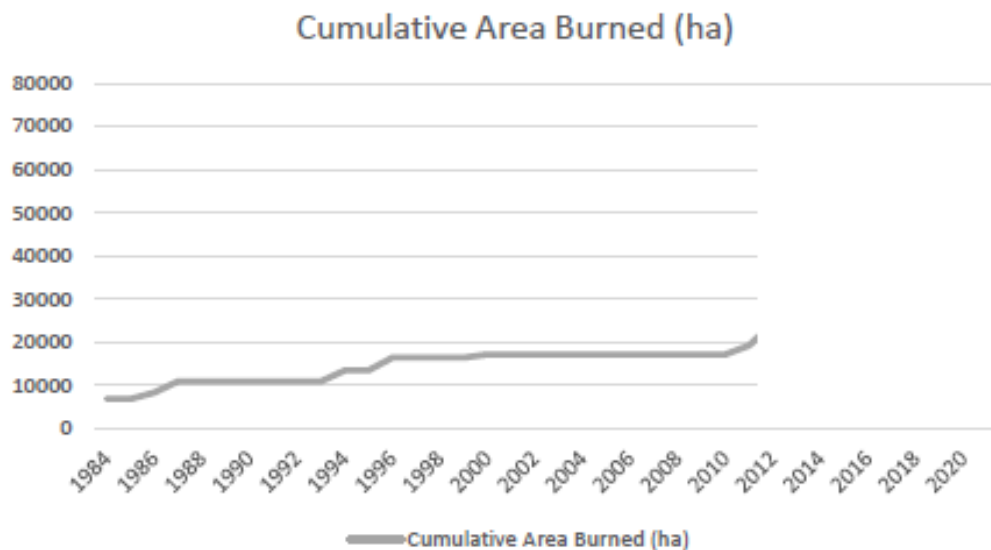
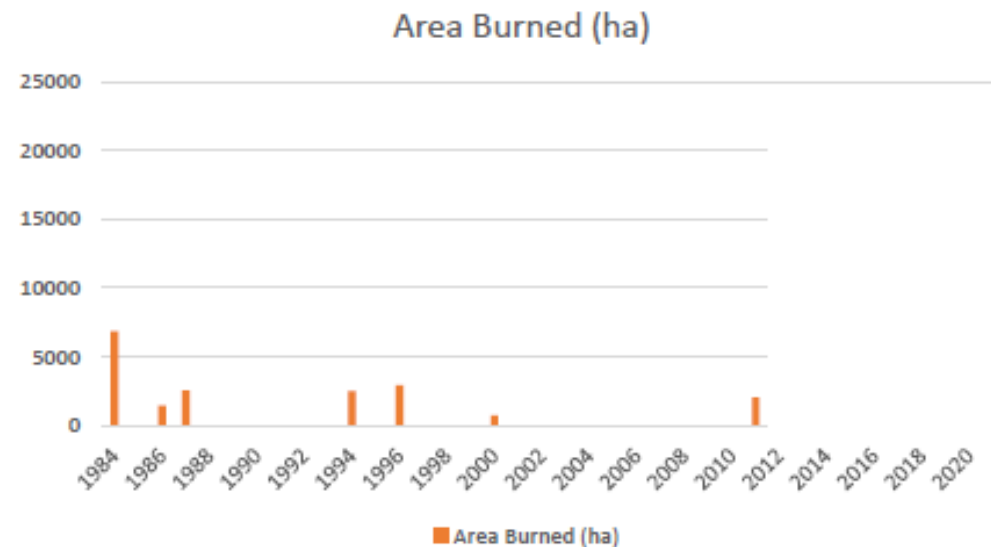
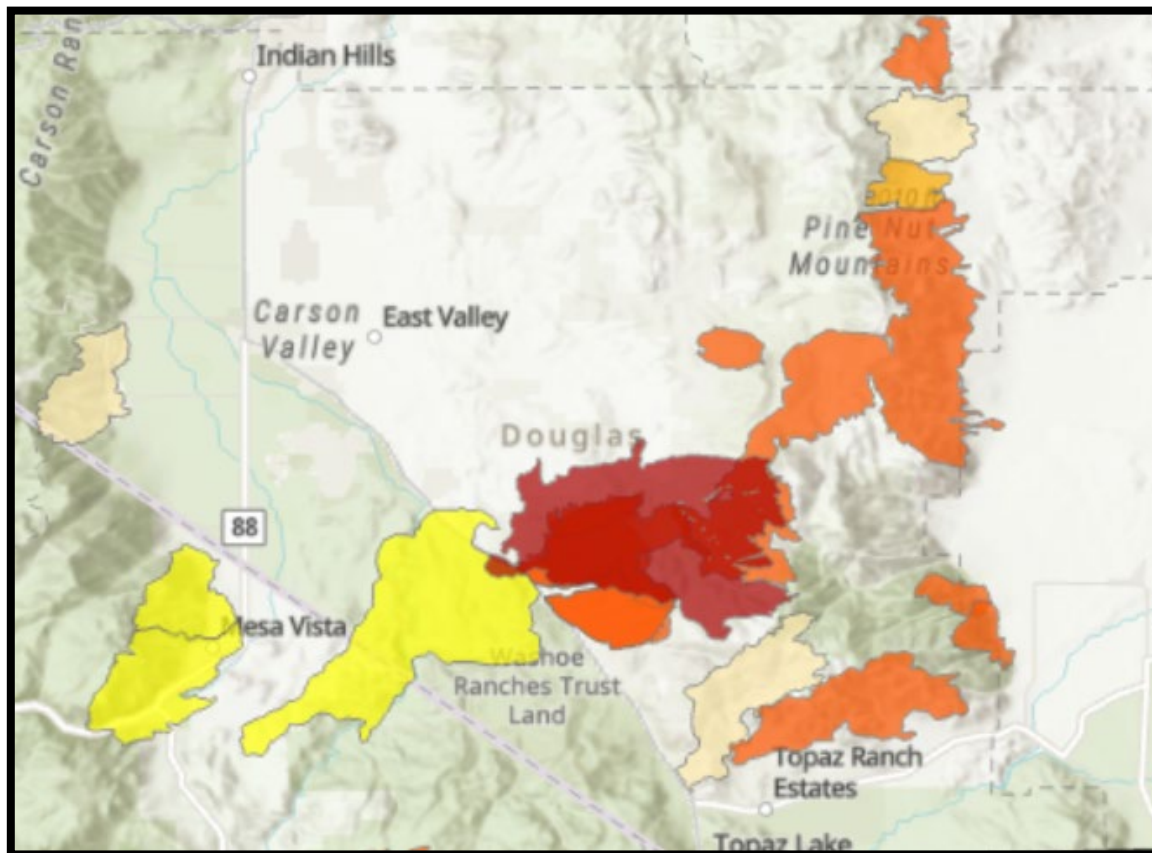
Pine Nut Mountains: repeated fires causing progressive loss of woodlands

1988
1996
2000



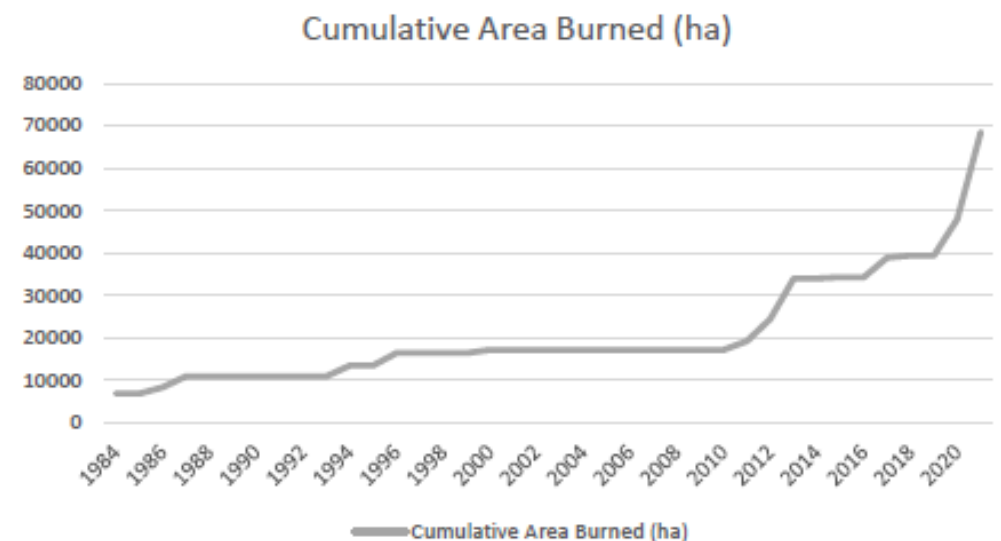
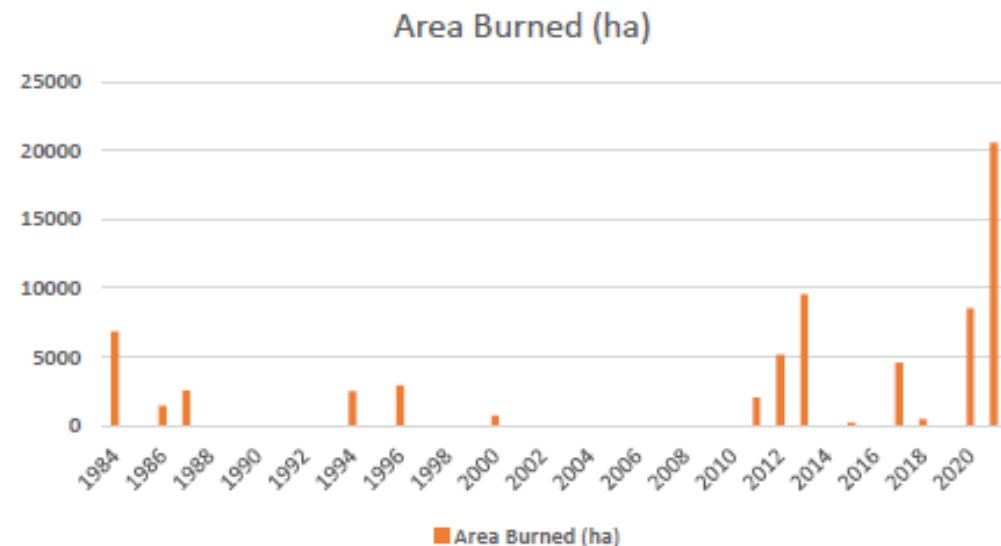
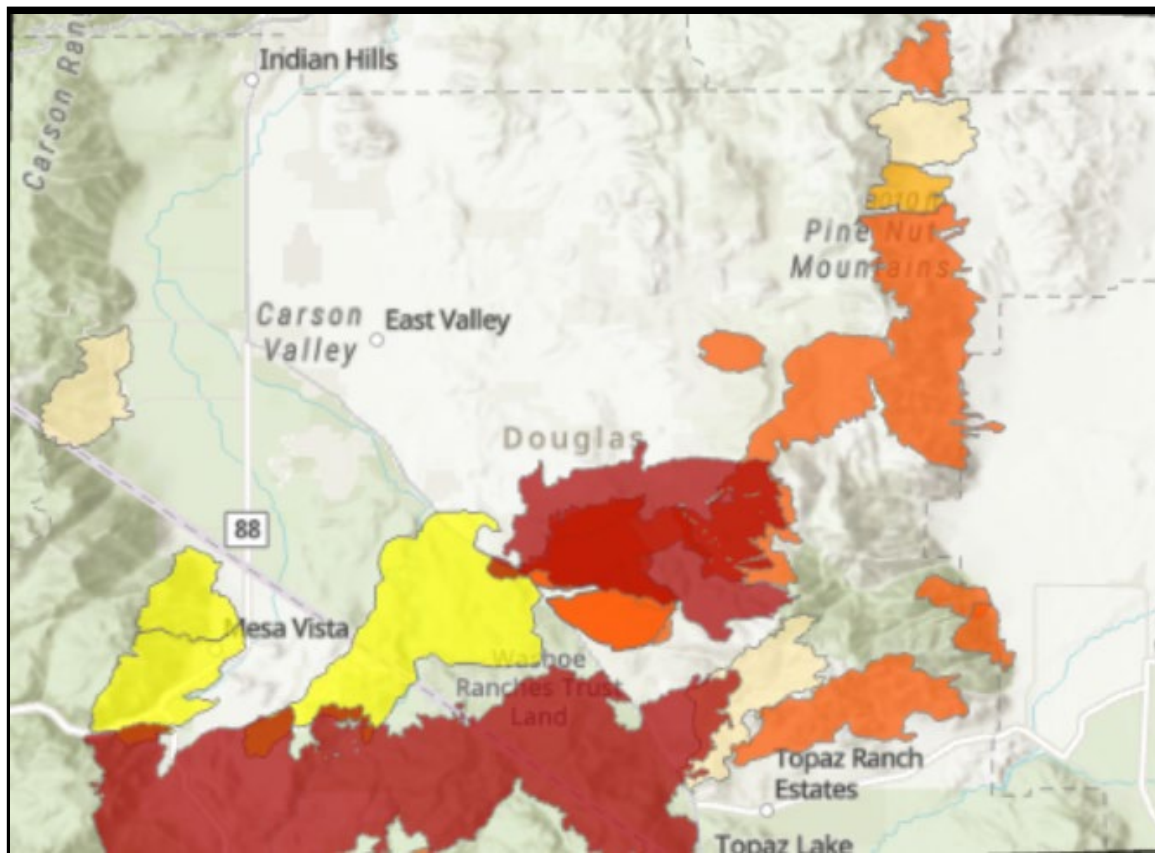
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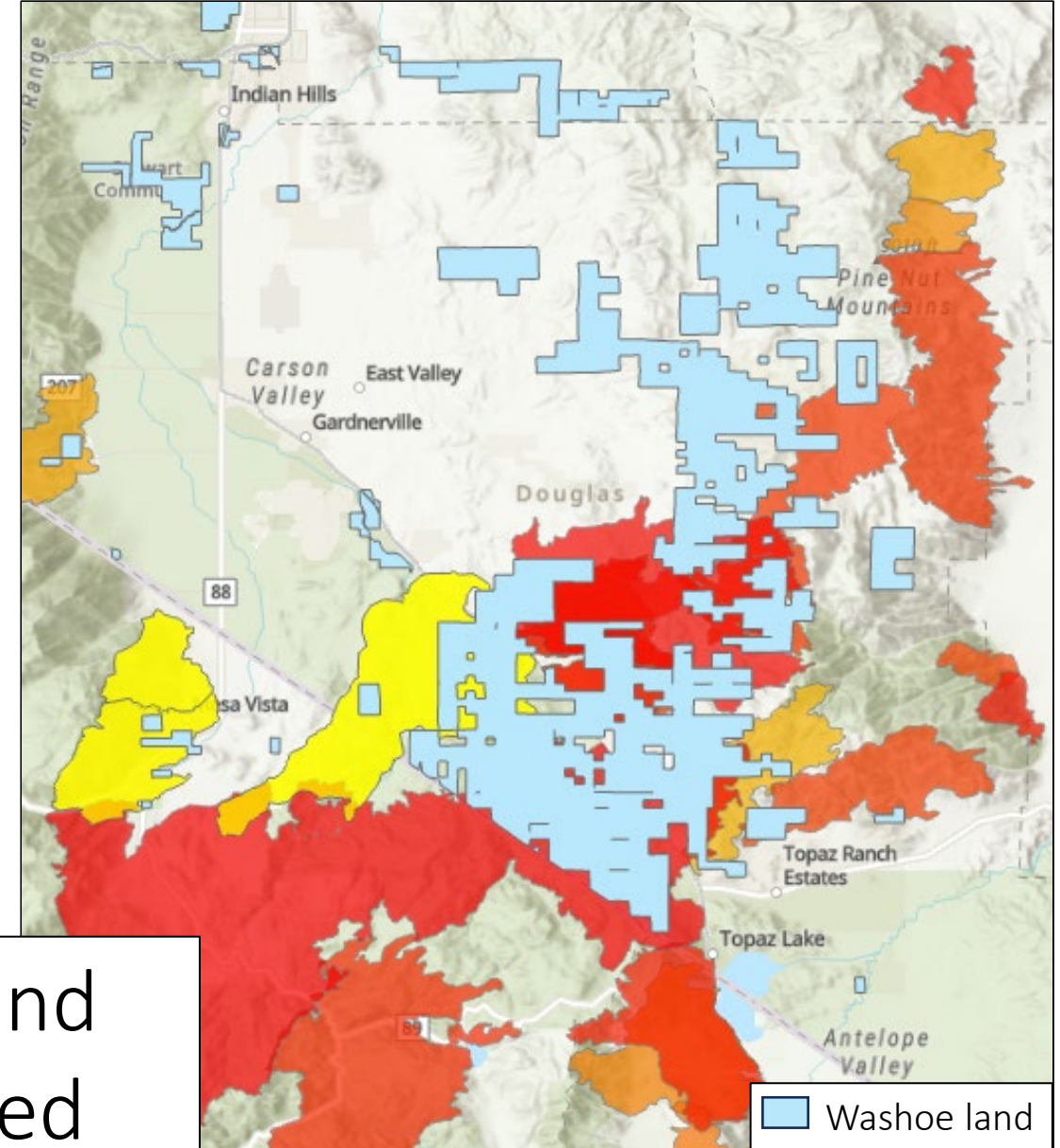
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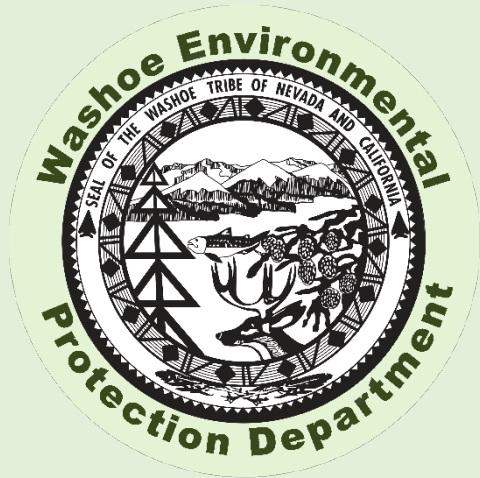


~45% of Washoe Tribal and
allotment land has burned



was Siw'itlaet (Washneetlaet) — the Land of the Peoples from
Here”

WASHOE ENVIRONMENTAL PROTECTION DEPARTMENT



WASHOE TRIBE OF NEVADA AND CALIFORNIA

T'agim (Pinyon pine) is one of the most important cultural resources to the Washoe People, we are losing this resource due to wildfire, drought, and disease. As we lose our cultural resources, we lose our ceremonies, our connection to the land, and part of who we are as Indigenous people.



How it started...

- **1877:** September 13, 1877 - Territorial Enterprise (Virginia City)-The Indians are preparing to go out into the mountains in search of pine nuts. Pine Nut Valley is the nearest point where they can hope to gather much of a harvest, and even there the charcoal burners are fast sweeping away the trees.
- **1880:** April 11, 1888, Captain Jim, Captain Pete, and Captain Walker met and prepared a petition to Governor Kinkead of Nevada requesting that he stop the destruction of pine nut trees and also the depletion of fish in Lake Tahoe...



147 years later...



- In 2021 UNR donated 1,000 pinyon pine for out planting on Washoe Tribal lands in 2 burned areas
- The Washoe Tribe entered into a Pinyon Pine Stewardship group with UNR, USFS, and other University Researchers, Foresters, and Natural Resource Land Manager Staff
- The Washoe Tribe has been making efforts ever since to speak on behalf of Pinyon conservation and have applied for funding to continue this crucial cultural work.



How its going...



- The Tribe received a Tribal Wildlife grant and a National Forest Foundation grant to support Tribal Involvement in Pinyon Conservation and Restoration
- The Tribe started a Resilience Garden which was a special section of our 2019 Climate Adaptation Plan
- 2023-current- The Tribe is constructing Five additional hoop houses to propagate pinyon pine



PINYON PINE AND THE WASHOE PEOPLE

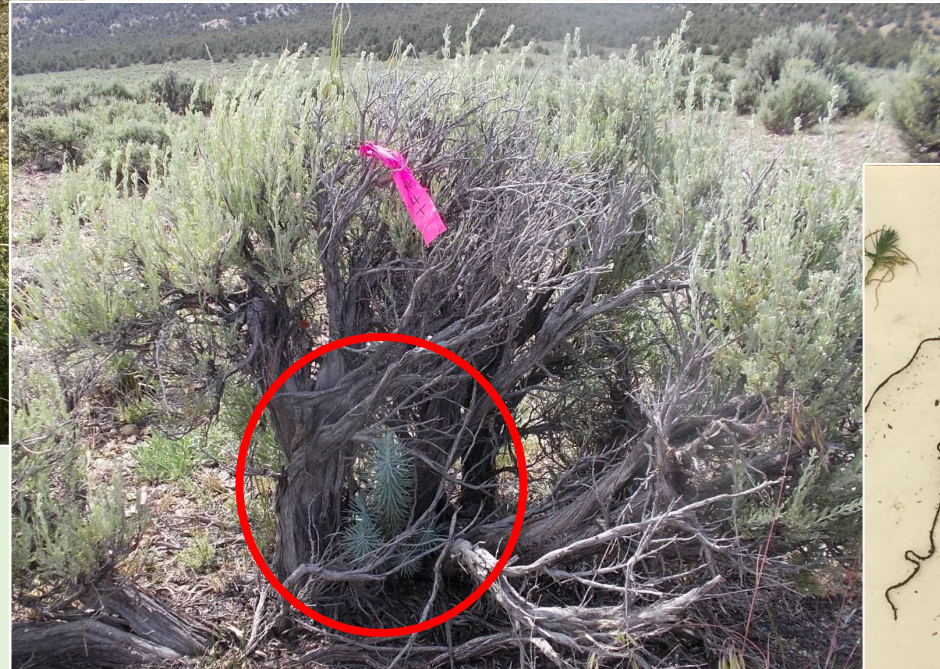


Our Vision of a Vibrant and Resilient Future
Climate Change and the Washoe People
Adaptation Options
Pilot Projects
Multi-Generational Engagement

2
4
6
8
10

Can we speed woodland recovery by planting trees?

- Develop, implement, and evaluate woodland restoration practices
- Using ecological and traditional knowledge of pinyon pine



How its going...



- Engaging in Bi-State Sage Grouse meetings to speak on behalf of Pinyon conservation and learn what other efforts are being made to conserve pinyon
- Engaging in Pinyon Jay Monitoring and working with Great Basin Bird Observatory (GBBO) to collect citizen science observations of Pinyon Jay on Tribal and allotment lands
- Have engaged with Pinyon Community Climate Action (PICCA) project to further boost conservation efforts for Pinyon pine and monitor Pinyon pine health and abundance on Tribal lands.



Where we are headed...



- The Washoe Tribe is working towards a declaration for a state of emergency for Pinyon pine.
- Seeking Intertribal Council of Nevada support for the resolution and work with other Nevada Tribes to create a united front for Pinyon conservation
- Seeking BLM and partner agency support in Washoe Tribe goals to conserve and protect pinyon pine across jurisdictional boundaries



