



*Fuel reduction treatments induced a growth release 2-3 years after implementation, with peak growth in 2015, the final year of a regional multi-year drought. These findings may suggest increased drought resilience in large ponderosa pines after thinning within the North 49 project area.*

## Impacts of forest thinning on radial tree growth in large ponderosa pine

The purpose of this project was to evaluate the impact of two forest density reduction treatments on the radial growth of large (> 25” dbh) ponderosa pine within the North 49 project area. We asked two specific questions:

1. To what extent do group selection and diversity thinning treatments impact radial tree growth in large (> 25” dbh) ponderosa pine?
2. What are the historical relations of annual radial growth in ponderosa pine to temperature, precipitation, and streamflow in the North 49 project area?

### Key Findings

#### 1. Impacts to Basal Area Increment (BAI)

- Group selection **increased** mean **BAI** by **100-200%** over pre-treatment BAI
- Diversity thinning **increased** mean **BAI** by **50-100%** over pre-treatment BAI
- Mean **BAI** in **unthinned forest** increased by **10-20%** over same period

#### 2. Historical Growth – Hydroclimate Relations

- Radial growth in study trees exhibited **positive correlations** to:
  - ◇ **Winter and spring** air temperature
  - ◇ **Fall and winter** precipitation
  - ◇ **Fall** stream flow in Hat Creek
- And indicated **negative correlations** to:
  - ◇ **Summer** air temperature



*Ben turns an increment borer to collect a tree core from a focal tree in the unthinned forest.*

**For more information, follow the link below:**

<https://unr.idm.oclc.org/login?url=https://www-proquest-com.unr.idm.oclc.org/docview/2445937369?accountid=452>



# Project Overview

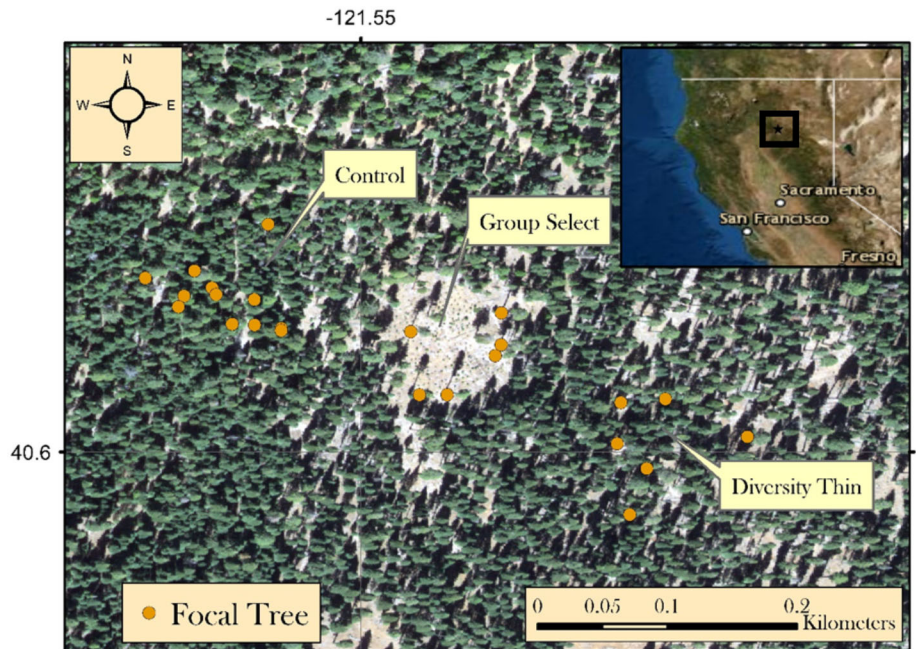
Radial tree growth is a primary indicator of tree health and forest productivity, and it can also exhibit significant correlations to hydroclimatic factors. We collected, measured, and analyzed tree cores within group selection (n=12), diversity thinning (n=12), and unthinned (n=24) treatment units in the North 49 project area to evaluate the impact of the thinning treatments on radial growth in large (> 25" dbh) ponderosa pine. We found that both treatments prompted increased radial growth rates relative to the reduction in tree-to-tree competition induced by the treatments. Our analyses also indicated that radial growth historically increased in response to increased winter and spring temperatures, fall and winter precipitation, and summer base flows in Hat Creek. In contrast, radial growth historically decreased with increasing summer temperature. Future monitoring projects should sample large ponderosa and sugar pines in all five North 49 thinning treatments and on a variety of slopes and aspects to evaluate if the growth response is consistent across gradients of thinning intensity, slope, and aspect.



Mounted and sanded tree cores awaiting ring width measurement in the Nevada Paleoenvironmental Analysis Laboratory at UNR.

### Management Implications:

- Both thinning treatments **increased productivity** in large ponderosa pine
- Treatment induced growth releases during multi-year drought suggests the treatments **increased drought resistance** among large ponderosa pine
- Results suggest we may expect **increased growth rates** with projected warming trends in the project area.



Overview map showing the location of focal trees sampled and analyzed in the project (orange circles).

This project addressed the following monitoring question from the Burney Hat Creek CFLRP Ecological Monitoring Strategy:

FOR.1.2. How do large (>25" dbh) pines respond to radial and area (stand-level) thinning treatments?