Legacy Tree Monitoring in the Ashland Watershed

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Project Background and History

- **Pre-1910:** Average fire return interval in the Ashland Watershed and Klamath-Siskiyou mountain regions is 12 years.
- **1910 – present:** Fire suppression policies in the United States cause forests to grow denser and to develop thick understory fuels; fire return intervals increase and fires become larger and hotter.
- **2000's – present:** Partnership between the City of Ashland, the U.S. Forest Service, The Nature Conservancy, and the Lomakatsi Restoration Project results in Ashland Forest Resiliency Program (AFR), which introduces thinning and prescribed burning techniques into forest management.
- **2013:** Legacy Tree Monitoring begins; data is collected on tree health in treatment and control plots to assess AFR objectives.

Figure 1. Ashland is located in Southern Oregon, as part of the Klamath-Siskiyou eco-region.

Figure 2. Legacy tree in AFR burn unit.

AFR Objectives

Project goals: Treatments will not impact legacy tree growth rates, vigor, or mortality.

Pertinent indicators:

- Change in legacy tree basal area annual increment (BAI) after treatment compared to controls.
- Change in canopy fullness after treatment compared to controls.
- Significant change in legacy mortality rate after treatment compared to controls.

Research Project Objectives

1. Reassess AFR legacy trees by updating 2013 dataset and by collecting tree core samples.

2. Compare legacy tree characteristics and growth habits, as determined by data from surveys and from tree cores, to inform AFR's meeting of objectives related to legacy tree survival.

Field Protocols

Species of interest: 30 treated and 15 untreated trees sampled per species.

Figure 3. Four species included in this study, from right to left: Sugar Pine (*Pinus lambertiana*), Douglas Fir (*Pseudosuga menziesii*), Ponderosa Pine (*Pinus ponderosa*), and Madrone (*Arbutus menziesii*). Black Oak (*Quercus kellogii*) was also studied, though was not a focus of this project.

Methods:

1. Locate geo-referenced legacy trees using Avenza mapping technology.

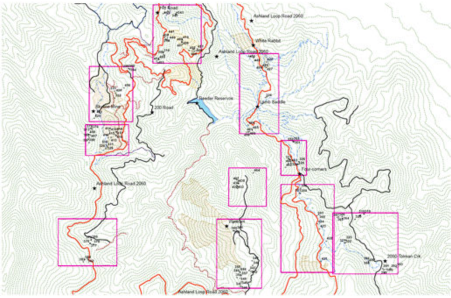

Figure 4. Map created in ArcGIS; featuring roads, trails, and colored tiles to aid in navigation and logistics of sampling.

2. Perform tree assessments and coring protocols at each tree and take photos at each location to document visible change in condition.

Data Type	Description
DBH	Diameter at breast height
Vigor	Vigor of the tree broken into four classes according to Keene's classification
Crown Dieback	Percent of crown no longer living
Insect presence	Insect codes for a variety of tree-dwelling insects

Table 1. A selection of the data recorded at each tree.

Results

Effects of thinning on tree growth:

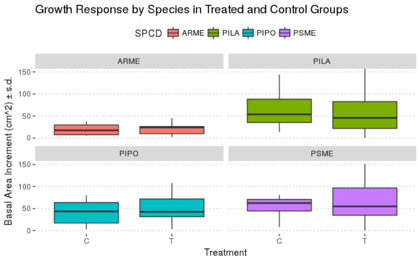

Figure 6. Basal area increment between species and among treated and control groups. Means were not statistically different between treated and control groups per species.

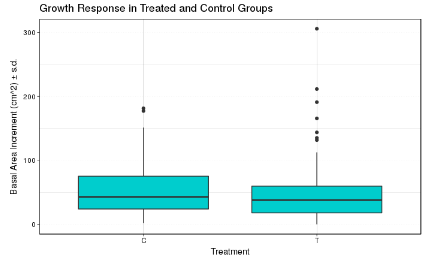

Figure 7. Growth response in treated and untreated groups show no difference in group means (t-test: $p = 0.3892$).

Discussion

Both AFR and Project objectives were met: there was no discernable difference in legacy tree growth rates between treated and control plots.

Continued inquiry:

- Why do treated trees exhibit a higher variation in response?
- What can tree cores tell us about tree response to treatment? Tree core samples will be processed, scanned, and measured to compare yearly growth between treatment groups. Additionally, tissue from cores will be used for stable carbon isotope analysis, which will provide insight into drought response and ecological conditions during tree growth.

Figure 8. Scanned image of mounted tree cores: *Pinus ponderosa* (top), *Arbutus menziesii* (middle), *Quercus kellogii* (bottom).

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References

1. Moritz, M. A., et al. 2014. Learning to coexist with wildfire. Nature volume 515, 58-66
2. Metlen, K., 2017. Ashland Forest Resiliency Stewardship Project Effectiveness Monitoring: Legacy Tree Protocol, The Nature Conservancy
3. Batham, A., Lajoie, J., 2014. Legacy Tree Monitoring in the Ashland Watershed with the Ashland Forest Resiliency Stewardship Project
4. Bucolo, O., Todd, A. 2018. The Response of California Black Oak (*Quercus kelloggii)* to AFR Fuels Treatments, Southern Oregon University
5. Metlen, K., et al. 2018. Regional and local controls on historical fire regimes of dry forests and woodlands in the Rogue River Basin, Oregon, USA. Forest Ecology and Management. volume 430, 43-58