Oregon State College of Forestry, Department of Forest Engineering and Resource Management

Changes in radial growth in Douglas-fir (Pseudotsuga menziesii) pre-and post drought following the 2015 drought event in Corvallis, Oregon.

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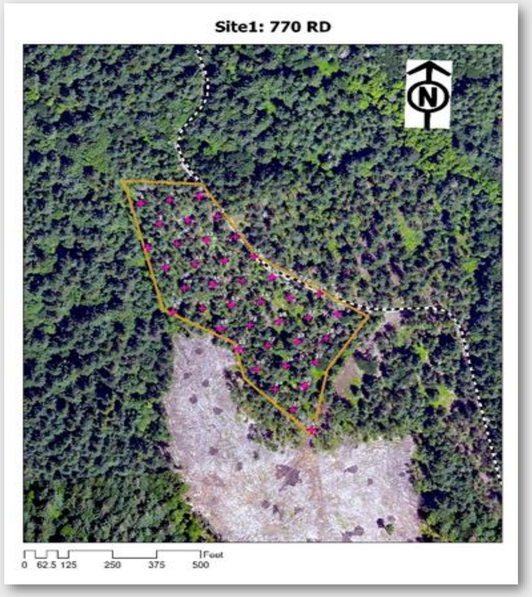

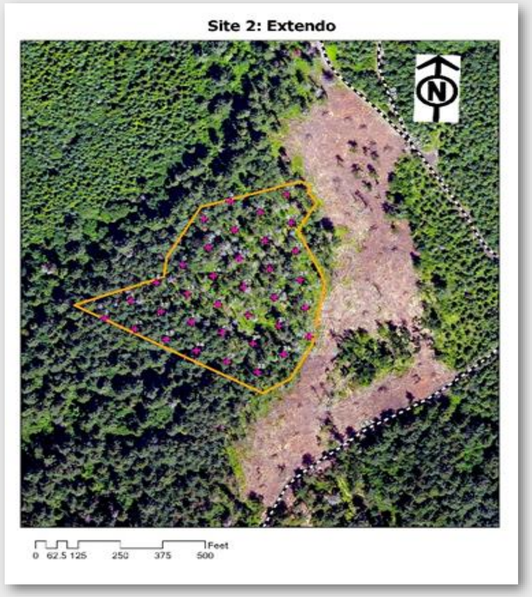

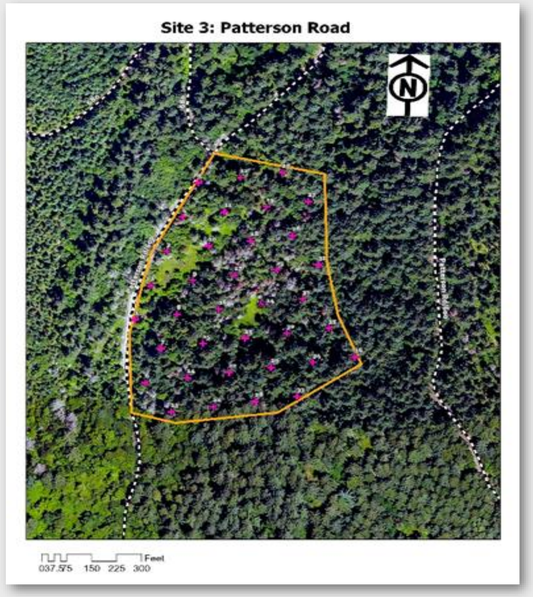

BACKGROUND:

The main purpose of the study is to examine pre- and post- drought radial growth trends in Douglas-fir (*Pseudotsuga menziesii*) in the McDonald Forest following the 2015 Corvallis drought event. With increased temperatures and decreased precipitation, trees in the Pacific Northwest are dying at an alarming rate. Exploring radial growth trends will help determine whether increased tree mortality is a direct consequence of the drought stress or the result of an undiscovered underlying issue. Moreover, comparing tree rings in both live and dead Douglas-fir trees sheds light on the severity of the drought stress and potential differences in tree health pre-drought.

HYPOTHESES AND ASSUMPTIONS:

Hypotheses

- We hypothesize that there will be decreased radial growth in all trees following the drought event.
- We also hypothesize that pre-drought the trees that died experienced less radial growth than the trees that survived the drought.

METHODS:

Plot Identification

- Located in the OSU McDonald Forest
- Identify sites and plots using ArcGIS
- Randomly select 4 plots within each site

Field Work

- Identify 5 live and 5 dead Douglas fir using 10 BAF factor at plot center
- Core selected trees at height of 4.5 feet
- Measure diameter (in) of selected trees for basal area of each tree and of total plot

Dendrochronology

- Measure radial growth from 2011-2015 (pre-drought) and 2016-2020 (post-drought) in samples

INTERPRETATION:

Scope of Inference

It is assumed that the sites chosen in the McDonald-Dunn Forest are primarily representative of Douglas-fir stands in transitional zones, rather than stands dominated by Douglas-fir in the Oregon Coast Range.

Expected Outcomes

We expect lesser radial growth pre-drought in dead trees, suggesting that they may have already been compromised in some way making them more susceptible to drought-induced mortality.

BROADER RELEVANCE:

With climate change and rising temperatures, drought events are becoming more common and can have drastic impacts on forests such as recreation and timber yields. Identifying differences in growth trends between surviving trees and cases of mortality can help shed light on whether it is solely drought stress that is killing trees. On the other hand, it is entirely possible that trees unable to survive drought were already experiencing limited growth, and may have had pre-existing deficiencies that, when confounded with drought led to their demise. Whatever the case, better understanding the causes of mortality can influence forest management practices to limit drought-induced mortality in the future. Pacific Northwest forests play a major role in multiple industries. Entire regions depend upon timber production for revenue and many worker's livelihoods. Conversely, recreationists rely on both the availability and safety of these greenspaces.

KEY TAKEAWAYS:

- Research comparing growth in live and dead trees pre- and post-drought is limited
- The 2015 drought event in the McDonald Forest provides an ideal model to perform these comparisons in Douglas-fir
- We expect that pre-drought growth in dead trees may have already been compromised.
- Identifying trees susceptible to drought-induced mortality can help improve management practices

REFERENCES:

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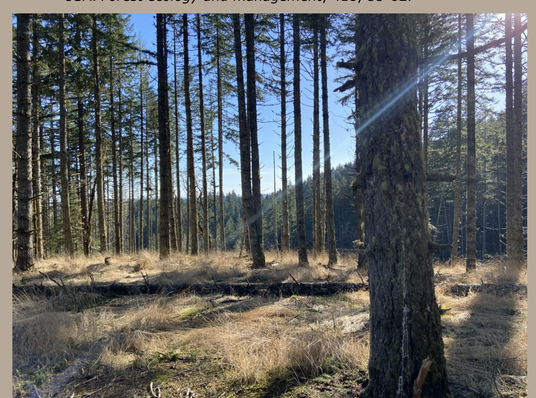

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