AN ABSTRACT OF THE THESIS OF

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Abstract approved: Jerry F. Franklin
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Pseudotsuga menziesii dominates the forests of the Pacific Northwest. But though it is dominat, Tsuga heterophylla or Abies amabilis is usually climax. Many researchers have studied Pseudotsuga on the widespread mesic sites where it is seral, but few have examined the relatively rare ecosystems in which Pseudotsuga or its associate Libocedrus decurrens are the climax species. This is a study of the composition, structure and successional dynamics of climax Pseudotsuga and Libocedrus (dry site) forests in the central portion of the Western Cascades in Oregon.

The environment of dry site forests is characterized at seven reference stands (five dry sites) using predawn plant moisture stress (Waring and Cleary, 1967) and temperature growth index (Waring et. al., 1972). As expected, the study type is hotter and drier than adjacent Tsuga-climax sites. The data suggest that low moisture availability is more critical to the occurrence of Pseudotsuga-climax habitat than is high temperature.

Seventy-three vegetation plots are located throughout the study area, 56 in dry site stands. The location, composition, and soils of five plant communities, including two phases, are described based on this data set. Information from fire scars and tree ages on the vegetation plots indicates these forests burn at irregular intervals that average 100 years. Since initiation of the oldest cohort, most stands have experienced one or more fires which typically kill only a portion of the trees.

Stand history and successional processes are investigated on two intensive plots using primarily age structures and fire scars. These stands have each been burned twice by fires that consumed only a portion of the canopy. Regeneration following these fires was slow and continued for a century or more.

Height growth of 40 dry site Pseudotsuga is examined and found to start more slowly but continue at a greater rate later in life than Pseudotsgua on mesic sites.

These characteristics of dry site ecosystems have several management implications. A shelterwood silvicultural system is recommended on dry sites. The overstory will ameliorate the hot,dry environment and occupy the site during the long regeneration period. This silvicultural system approximates the natural functioning of these systems more closely than clear cutting.

Maximum mean annual increment occurs relatively later on dry sites due to the slow, prolonged height growth. Relatively slow reproduction further retards mean annual increment. Thus, if high volume

growth is a management goal, rotations must be longer than on mesic sites.

Due to relatively linear height growth curves and reverse J-shape diameter distributions on dry sites, McArdle et. al.'s (1961) site index curves and yield tables are not applicable.