INTRODUCTION

Determineding the spatial pattern and abundance of large snags and logs, and their underlying mechanisms, plays a significant role in our management of carbon sequestration and the habitats of the region’s native flora and fauna. Patterns of fire and forest history, post-fire timber salvage, and topography can be important drivers of the fire-to-mid-scale spatial distribution and abundance of large dead wood in forest ecosystems. The effects of history and topography on dead wood patterns in forested landscapes have not previously been examined. We hypothesized that in a disturbance regime dominated by fire, variation in large (>30 cm) dead wood could be explained by pre-fire forest condition, post-fire salvage intensity, and topography.

OBJECTIVES

(1) Determine how topography is related to the spatial distribution and abundance of large snags and logs
(2) Estimate the contribution of legacy wood (originating from the past stand) to the total dead wood pool
(3) Assess pre-fire forest conditions, in trees per acre and basal area, based on legacy stump and snag populations, to establish a reference point for observed snag and log abundances
(4) Characterize the spatial extent and amount of post-fire timber salvage and snag felling

METHODS

We sampled three classes of dead wood: logs, snags, and legacy stumps, at 40 plots along a topographic gradient and according to fire history (Fig. 3) in a random stratified design.

Slope-corrected transects followed the slope contour. We used a 250 m line transect (150 m + 4 x 25 m) transects for logs, and a 10 x 150 m belt transect centered on the line transect for snags and stumps (Fig. 4).

We collected data for diameter, height (snags and stumps), length (logs), species, decay class, legacy status, presence and number in stream Jam logs), and transect location. Basal area measures of legacy stumps and snags and of current live trees indicated the natural propensity for large dead wood production. A historical aerial photograph chronosequence (1954-1970) provided post-fire snag falling and log removal data.

KEY FINDINGS

Human activities altered the dead wood production potential for the landscape by removing dead wood. All plots were salvaged after fire. Snag felling and post-fire log salvage occurred at moderate to high levels throughout the area, leaving residuals at very low to low levels (Fig. 5).

Most dead wood was legacy wood.

Legacy corriior logs were 81% of all dead wood volume and 89% of density per ha (Fig. 6). Biomass and carbon patterns were similar. Snags from the current stand were just 18% of total snag volume. Average carbon was 45.7 Mg/ha (s.e. 6.9), far below old-growth forest levels. Average biomass was 87.8 Mg/ha (s.e. 13.3).

Most dead wood occurred near streams. Variation within topographic position of dead wood was large (Fig. 8) but trends were observed. Higher log densities, volume, biomass, and carbon occurred in streams than at all other topographic positions, and at middle slope than at upper slopes (p<0.05; t-tests).

Legacy snags were less abundant at middle than at upper or stream positions (p<0.05; t-tests); else, snag characteristics did not differ according to topography.

Upper slopes were source areas for dead wood.

Legacy stump and snag basal areas were greatest at upper slopes (Fig. 9), indicating migration of logs down from upper slope positions. This likely occurred via a combination of salvage activities and natural processes.

Most log volume currently occurs in streams, but upper slopes served as source areas for the greatest proportion of log volume.

FURTHER RESEARCH

- Characterize variability and patterns of dead wood across other landscapes according to related processes in the Coast Range
- Combine our topography and history-rich data for landscapes with a collection of regional dead wood datasets to produce an integrated, multi-scale assessment and a scale-sensitive model of dead wood dynamics.