



THE LABORATORY OF TREE-RING RESEARCH

presents a talk by

Alan H. Taylor

(Department of Geography, The Pennsylvania State University)

The Influence and Interactions of Humans, Climate, and Fire on Mixed Conifer Forest Dynamics in the Sierra Nevada, USA

Thursday, April 30, 2015 - 3:00pm to 4:00pm

Room: Bannister 110

Fire is recognized as keystone process in Sierra Nevada dry mixed conifer forests and it has been drastically reduced by decades of fire exclusion. Frequent fire is thought have created a fire-grained mosaic of multi-aged forests that developed as a result of self-organizing processes where burn patterns and forest structure interact to maintain a fine-grained mosaic over time. Yet, recent research suggests that interactions between fire and forest structure may be more complex because fire regimes and fire effects are influenced by landscape controls such as topography or climate variability. Fire regimes, forest structure, and forest development in an old-growth mixed conifer forest landscape were reconstructed using dendro-ecology to identify controls on forest dynamics in forests with a functioning fire regime. Pre-fire exclusion forest conditions are then compared to contemporary forests to quantify fire exclusion effects on forest structure. The old-growth forest burned in 2013 providing a 'natural experiment' to determine if fire severity would increase as predicted by the fire exclusion-forest thickening vegetation change model for these forests. A random forest model using daily area burned, daily fire weather, and fuels and vegetation data from the pre fire exclusion and contemporary forest were used to identify controls on fire severity. Topography, tree species composition, and cover of forbs and shrubs, best explained fire severity. Fire exclusion alters fire-vegetation interactions, leading to uncharacteristically severe burns and potentially new fire-vegetation dynamics. Periods with distinct temporal patterns of area burned in the old-growth forest are also compared to those across the Sierra Nevada. Aboriginal depopulation and land use change strongly influenced fire regimes and modulated fire-climate interactions over the last four centuries.