

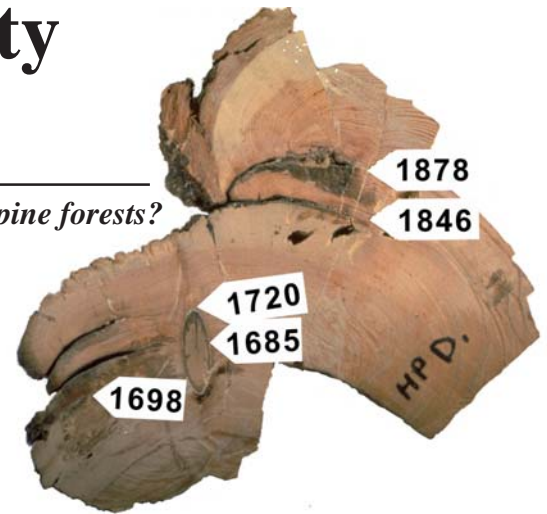


Rocky Mountain National Park

Fire Frequency and Intensity in Ponderosa Pine Forests

The Question: *What is the fire history regime of the park's ponderosa pine forests?*

A common perception of western U.S. fire history is that prior to the late 19th century, frequent surface fires maintained open, park-like forests. This model is well-supported by data on southwestern ponderosa pine forests but had not been widely tested in other western areas. The researchers, Dr. Rosemary Sherriff and Dr. Tom Veblen (University Colorado-Boulder), asked whether the fire history of Front Range ponderosa pine forests fit the southwestern model. Since one goal of the National Park Service is to maintain forests in their “natural” condition, understanding the historic fire regime (i.e., frequency and intensity of fire events) is important for guiding park fire and forest management decisions.



The Project: *Use cross sections of trees containing fire scars to determine dates and intensity of past fires.*

In this study, the researchers investigated fire frequency and fire intensity (i.e., surface vs. crown fires; small fires vs. stand-replacing fires) across the elevational range of ponderosa pine in the northern Colorado Front Range. They cut non-destructive cross sections containing fire scars from live and dead trees at seventeen search areas, including seven areas within the park, at elevations from 6266 ft (1910 m) to 9087 ft (2770 m). Dominant forest cover type varied from grassland-ponderosa, ponderosa pine, ponderosa pine-Douglas fir, to ponderosa pine-mixed conifer species. They analyzed scars using standard methods to provide dates of fire events. They qualified intensity of fire events by noting events with > 2 trees scarred in a search area and/or $> 10\%$ trees scarred.

The Results: *Higher elevation Front Range ponderosa forests have longer fire return intervals and higher intensity fires than ponderosa forests in the Southwest. Analysis suggests that park ponderosa forests may not been significantly affected by fire suppression efforts.*

Based on this study, the southwestern model of frequent (< 30 years mean fire interval), low-intensity surface fires fit only a small portion ($\sim 20\%$) of the Front Range ponderosa pine zone. Only at the very lowest elevation (below 6890 ft or 2100 m) did these forests historically exist in the savannah-like condition seen in ponderosa forest in the southwest. As elevation increases, ponderosa stands become increasingly dense and mixed with Douglas fir, aspen, and lodgepole. The mean fire interval at intermediate elevations (between 6890 and 7218 ft) is variable ranging from < 30 years to > 40 years. In addition to elevation, other factors influencing fire interval include aspect, distance to grasslands, and distance to a ravine.



Above, in Rocky Mountain National Park ponderosa pine typically occurs in multi-species forests that burn infrequently.

Above 7218 ft (2200 m) Front Range ponderosa forests were historically typified by a longer fire return interval (> 40 years) and stand-replacing fires. All the ponderosa forests in the park fall into this category. (The lowest elevation in the park is 7640 ft or 2330 m.) Evidence suggests that these higher elevation stands have not been significantly affected by fire suppression efforts and may be within normal variation for fire return interval.

Based on this study, park forests are unlikely to have accumulated an “unnatural” amount of fuel due to fire suppression. The results also suggest that, in periods of drought, large, stand-replacing fires are the norm in the park's ponderosa forests.