



The Midden

The Resource Management Newsletter of Great Basin National Park

An 800-Year Fire History

by Stanley G. Kitchen, Forest Service
Rocky Mountain Research Station

“Fire in the woods!” The words are a real heart stopper. Yet in spite of its capacity to destroy, fire plays an essential role in shaping plant communities. Knowledge of the patterns of fire over long time periods is critical for understanding this role. Trees often retain evidence of non-lethal fires in the form of injuries or scars in the annual growth rings of their trunks. Careful analysis of these injuries and of tree recruitment and death dates (also determined from tree rings) can reveal a lot about the size, frequency, season, and severity of fire events over several centuries.

Rocky Mountain Research Station researchers recently completed a tree ring-based fire history for Mill Creek and Burnt Mill Canyons located in Great Basin National Park. Evidence was collected across an elevational gradient from pinyon-juniper woodlands to limber pine-Engelmann spruce forests (7,760-10,600 ft elevation). Using standard techniques, 378 fire scars from 110 trees were dated with annual accuracy. This fire chronology revealed 99 years in which fire occurred in the study area with the earliest in the year 1267 and the latest in 1909. More than half of the fires (64%) were classified as small (< 25 acres). Large fires (≥ 247 acres) occurred in 16 years with the largest (≥ 1220 acres) dated to 1632, 1691, 1709, 1751, 1782, 1794, 1824, and 1835. The last large fire was in 1865,



Smoke from Phillips Ranch fire rising over the South Snake Range in September 2000.

Photo by Stan Kitchen, RMRS.

about the time the first Euro-Americans settled in the area. Although large fires were less frequent than small fires, they accounted for nearly 80% of the area burned.

Fires were most frequent in ponderosa pine stands with average time between fires as short as 8 to 12 years in some places. Fire-free intervals were longest in rocky areas and in stands of pine-spruce forest where they sometimes exceeded 100 years.

Although fires occurred throughout the growing season, early- and late-season peaks in fire activity suggest that fire was most common in spring and late summer or fall. This differs from the seasonal pattern of modern fires which peak in mid- to late-summer. This seasonal shift can be viewed as evidence that many historic fires were intentionally set by Native Americans when lightning-caused fires were less common. In addition, shorter fire-free intervals (higher fire frequency) in Burnt Mill Canyon

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Editor's Note: Welcome to our tenth edition of The Midden!

To celebrate the treasure trove of information that has been preserved in this publication, we have an expanded edition with some articles that look at how different programs in resource management have changed over the past decade, along with an assortment of articles about other projects.

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(10 years) than in similar parts of Mill Creek Canyon (27 years) could indicate differences in indigenous burning practices meant to improve hunting success of bighorn sheep. There is growing evidence that fire was a common tool used by Native Americans and that it served many purposes from driving game to improving the growth of useful plants.

Fire severity is a measure of the impact a fire has on the ecosystem and is often measured by the percentage of mature trees killed. Low severity fires kill few mature trees. High severity fires leave few live trees. Moderate severity fire effects are intermediate. Severity often varies across the landscape. In such cases it is referred to as mixed. Evidence from this study suggests that mixed severity fire was common in mid-elevation, mixed-conifer stands resulting in a dynamic mosaic of different- and multi-aged stands of fir and pine. Fire also kept trees from establishing in large areas of mid-elevation shrub-grass steppe. During the last century these areas have been encroached by white fir, pinyon pine, and curlleaf mountain mahogany.

Without sufficient fire during the last 100+ years to periodically reduce dead and living fuels, this and similar landscapes have reached a point in



'Catface' on a ponderosa pine snag where scars in annual growth rings record multiple fire events.

Photo by Stan Kitchen, RMRS.



Cross sections of ponderosa pine showing injuries associated with multiple fires in relation to annual growth rings.

Photo by Stan Kitchen, RMRS.

which they are now at risk of large, high severity fires unlike anything recorded for several centuries. The high severity Phillips Ranch fire that burned 1,650 acres, including a major part of a large bristlecone pine stand on the west side of the Park in 2000 is an example of what can happen. The challenge for managers will be to

restore fire resilient vegetation using appropriate combinations of natural processes and active management. A passive management strategy is not recommended. Priority should be given to aspen, mixed-conifer stands, and montane steppe where post-settlement vegetation change has been the greatest.

*Past editions of The Midden can be found
on the park website: www.nps.gov/grba*