

Fire History and Vegetation At Mesa Verde National Park

By Lisa Floyd-Hanna and Steve Budd-Jack

On July 8, 1989, a wildfire started on Long Mesa in Mesa Verde NP, and before the fire was controlled on July 27, it had burned 1,052 ha. As a result, several research agendas were pursued by the park staff and the Rocky Mountain Regional Office. Cultural resource personnel resurveyed the burn area, identified 9 new sites, and studied the effects of fire on surface and sub-surface artifacts. Additional research began in 1991 to determine the past fire history of Mesa Verde NP and the pinon-juniper/shrub association. Following is a short update and review of that research, with special thanks to Dr. Will Romme of Fort Lewis College in assisting with project details and contributing to the methodology.

Mesa Verde NP is known for its extraordinary cultural resource, but it also occurs in a striking ecological setting. The mesa spans elevations of 1883 to 2612 m, and thus supports an array of vegetation types that include dominant pinon-juniper and Douglas fir stands. The role of fire in ecosystem patterning, both prior to and during the Anasazi occupation, is not known for this area of southwestern Colorado. The woodland, shrub, and forest types standing on the mesa today

represent very different responses to fire. Ponderosa pine and Douglas fir may survive, and the shrub associations resprout vigorously after fire, their resprouting facilitated by frequent burning. Fire frequency and intensity have no doubt assisted in shaping the vegetation patterns found on Mesa Verde today. Such patterns are being used as keys to developing a fire history of the park.

In 1991, fire research focuses on two specific objectives. The first was to determine the vegetation patterns that have appeared since the 1989 fire on Long Mesa and in Long Canyon – a large fire impacted at least three different vegetation types; pinon/juniper woodland, shrub associations, and the Douglas fir/shrub association on the north escarpment. Three grid systems were established to sample vegetation that has resulted in each affected type.

The second objective for 1991 research was to develop a method for dating fires that occurred in the past. In southwest Colorado, Ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*) are species that form fire scars and can be used to reconstruct fire history by traditional scar analysis. Unfortunately, very few trees of these species occur in Mesa Verde NP, and no fire scars have been located. The most abundant trees within the southern half of the mesa are pinon pine and Utah juniper, both of which are killed by fires.

We tested a method in which shrubs, which resprout vigorously after fire, were aged by annual ring counts to determine their time of origin. Dominant shrubs, Gambels oak (*Quercus gambelii*), Serviceberry (*Aamelancheif utahensis*), Mountain mahogany (*Cercocarpus montanus*), and Fendlerbush (*Fendlera rubicola*), were sampled and aged in known historic fires (1934, 1959, 1972, and 1989). Although there is some variability within an individual as to the date of shoot emergence, we determined that by selecting the centermost shoot and restricting ourselves to the species *Quercus gambelii*, we are able to substantiate the known fire data within statistical reliability. *Fenlera rubicola* and *Cercocarpus montanus* also show promise for use in fire dating, but further analysis will be required to determine reliability of these dates.

During the 1991 field season, we will determine the stand origin dates of areas that are separated by clear discontinuities from adjacent vegetation. After incorporating the contribution of adaphic, exposure, or other factors, we will determine the date of potential fires resulting in each shrub community. The fire study will be closely tied to a vegetation community assessment, also to take place in 1992.

These two studies are complementary, since fire is a major shaper of vegetation patterning, and such patterning in turn influences fire behavior. Using aerial photos and other remotely sensed data, we will be preparing vegetation classification for field verification in 1992. Methods used to ground truth the unsupervised classification of Landsat imagery will be carried by the standard *releve* community analysis, similar to those being considered for general use in the Colorado Plateau national parks.

Dr. Floyd-Hanna is a biology professor at San Juan College in Farmington, NM and PI for two research projects at Mesa Verde; Budd-Jack is Resource Manager for Mesa Verda NP.