

DENDROCHRONOLOGICAL STUDY OF FIRE REGIMES
IN THE CHIRICAHUA MOUNTAINS

A Preliminary Fire History of the
Rustler Park Area, 1800 - Present

A Study conducted during the 5th Dendroecological Field Week
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Southwestern Field Center, Portal, Arizona

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the vicinity of the Rustler Park Campground. Rustler Park is located approximately 4 kilometers (2.4 miles) from Onion Saddle on Forest Service Road 42D.

The Rustler Park site (RPK) is located in the same area as a concurrent study on stand dynamics (Gutierrez, et. al. 1994), approximately one kilometer south of a forest service work station at Long Park on the upper SE facing slope.. This site is in a *Pseudotsuga menziesii/Muhlenbergia virescens* habitat type with a multi-age overstory of predominantly *Pinus ponderosa* (ponderosa pine). Other overstory trees include *Pseudotsuga menziesii* (Douglas fir) and *Pinus strobiformis* (southwestern white pine). The understory is a patchy mosaic dominated by *Muhlenbergia virescens* (screwleaf muhly), a bunch grass, with local dominance of needle mats (under trees).

The Rustler Park North site (RPN) is located on a bench on the north facing slope above the Long Park area. The habitat type is a *Abies concolor/Berberis repens* h.t. This type is widespread throughout the southwest (U.S.F.S. 1987) with the diagnostic feature being a sparse understory in late successional stands. At this site, tree cover was dense and very few understory plants were observed. In openings, *Pteridium aquilinum* and *Thermopsis pinetorum* dominated the understory.

The Rustler Park South site (RPS) included two different habitat types. Following the general pattern of the area, the southeast facing slope is in a *Pseudotsuga menziesii/Muhlenbergia virescens* habitat type. Samples RPS 1 to 3 were collected in this site. Samples 4 and 5 were collected on the ridge of this slope, and the remaining samples were at the top of the slope on the north facing aspect in a *Abies concolor/Berberis repens* habitat type. These samples came from southwestern white pine logs, which is a seral species in this habitat indicating this stand was in a late successional stage. The tree cover at RPS was denser overall than at RPK, therefore the understory was dominated by a pine needle mat, with few herbs. Although these sites are both Douglas-fir/screwleaf muhly h.t., the difference in understory expression is due to stand density, possibly related to differences in logging history in this century.

METHODS

Cross sections were obtained from living trees, snags, dead and downed trees, and stumps from 23 individuals in the Rustler Park area using techniques described by Arno and Sneek (1977). All sections were labeled and wrapped with strapping tape to prevent breakage. For each sampled tree, a field form was completed containing a description of the tree, sample, and microsite characteristics. Each cross section was then

tions had 10 or more fire scars. Disk RPS-03, taken from a living ponderosa pine, had 264 rings and indicated 15 fire events between 1757 and 1886. The final master fire chronology showed that major fires (in which at least four trees were scarred) occurred in 1817, 1835, 1838, 1847, 1851, 1856, 1867, 1877, 1886.

We found over 80% of fires occurred during two ring structural phases, the period of dormancy (41.3%) and the middle-early phase (40.0%), suggesting most fires occurred prior to and early in the growing season. The Rustler Park seasonality pattern contrasts with that for the Mt. Graham area where the majority of fires occurred in the early-early phase with proportional reductions in percentage of events in the adjacent dormant and middle-early phases with the early-early period being most prominent. The middle early phase generally corresponds with summer monsoon events and is often reflected in a significant false ring.

The Mean Fire Interval (MFI) of all trees at the three sites was 3.0 years and the MFI of each individual tree was 8.7 years. At the RPS site the MFI of all trees was 5.0 years and 14.3 years for each individual tree. That means that the fires were mostly of small size with a patchy in distribution. At the RPK site the MFI of all trees was 3.3 years and 5.0 years for individual trees, suggesting fires were more extensive. This is

supported by the coincidence of fire dates and the greater number of scars.

A number of fire history studies for the southwestern United States suggest that fire regimes during the past three centuries are associated with climatic variables, principally precipitation. Does this study support these conclusions?

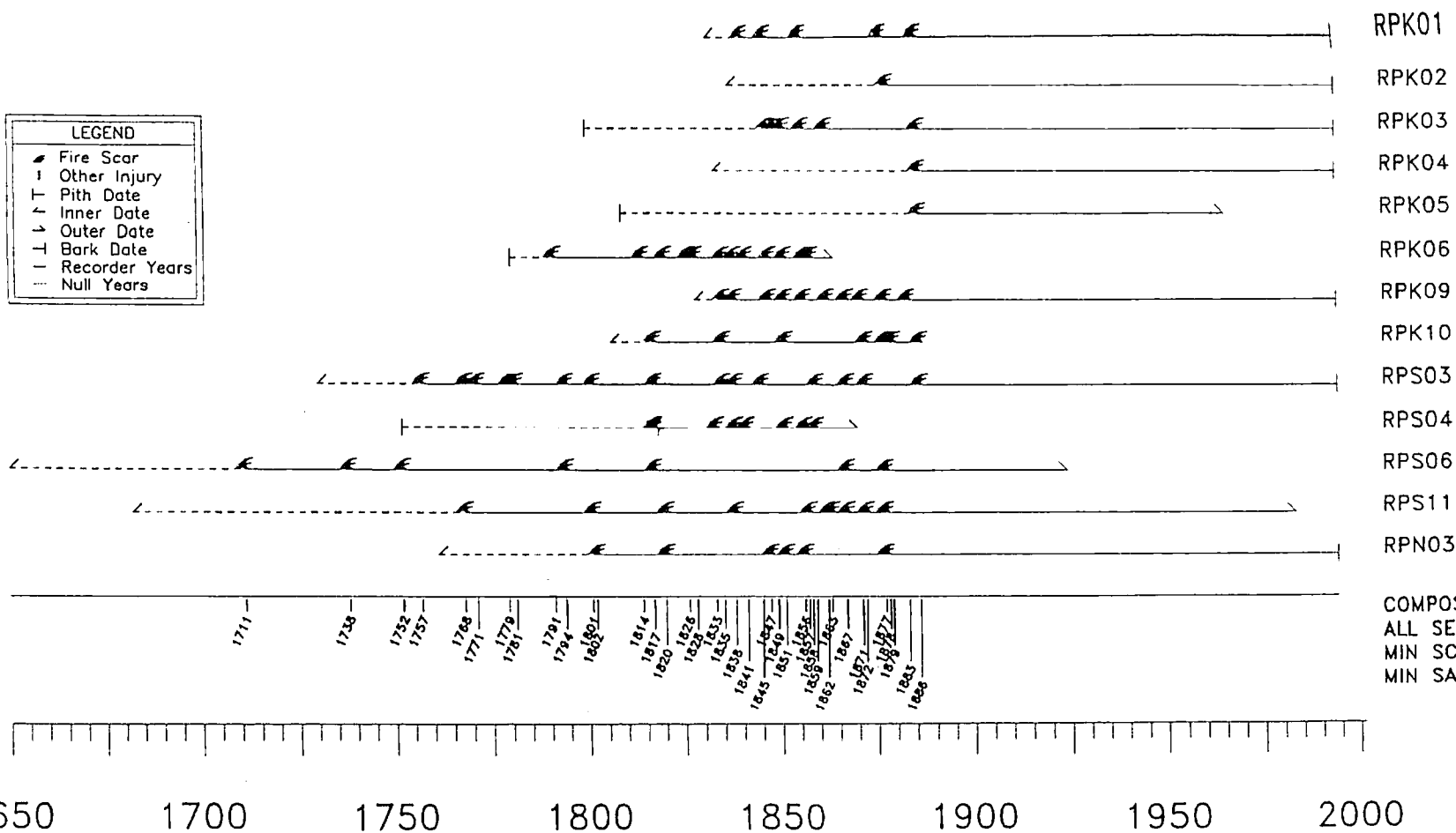
When the Chiricahua data set, which at present only encompasses 13 samples, is compared with the 90 samples from a fire history study of Mt. Graham, some 50 miles to the northwest of the Chiricahua study sites, the respective Mean Fire Intervals of 3.0 years and 4.2 years indicate significantly different frequencies in the number of fire events at each study area. The extremely high number of events in the small Chiricahua data set suggests some factor other than fire and climate variables are at play.

The Chiricahua Range is a 'sky island' reposing in a desert sea. Covering an area of approximately 40 miles by 20 miles, the area contains substantial evidence of aboriginal occupation dating back 10,000 years. Renowned for its abundant game, including the white tailed deer, the forested slopes and canyons of the Chiricahua Mountains would have been an attractive homeland for the Apache Indians. The data show that no fires occurred after 1886, the year in which the two renegade Chiricahua Apache chiefs,

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Rustler Park Preliminary Fire Chronology

LEGEND	
▬	Fire Scar
⊥	Other Injury
T	Pith Date
⊥	Inner Date
⊥	Outer Date
⊥	Bark Date
—	Recorder Years
---	Null Years



COMPOSITE
ALL SERIES
MIN SCARS = 1
MIN SAMP = 1

Seasonality of Fires

