ASPEN DYNAMICS IN THE WARNER MOUNTAINS OF CALIFORNIA

Mary Rasmussen-Flores and Dr. James Laacke
US Forest Service, Modoc National Forest and
Pacific Southwest Research Station, retired

Aspen (Populus tremuloides) has been termed a "keystone species" by Campbell, Jr. and Bartos (2001). Aspen truly is a core part of reproductive and foraging habitat for over 75 vertebrate species on the Warner Mountains based on observations (utilizing mist nets, point counts, and Sherman live trapping) as well as various authors (Johnson 1970, Winkler and Dana 1977, Williams 1984). During the development of a fuzzy logic model to ascertain the distribution of northern goshawk (Accipiter gentilis) nesting habitat, the presence of aspen was a key indicator of habitat quality even though nesting habitat is tied directly to dense mixed conifer.

Numerous studies have documented significant declines in aspen distribution throughout the western United States (Bartos and Campbell 1998, Bartos 2001). The trend for the Warner Mountain Ranger District in northeastern California appears to be similar. We tested field observations utilizing the following data vegetation mapping from 1917, 1930 and 1978; repeat photography; and modeling with IDRISI (a GIS software package).

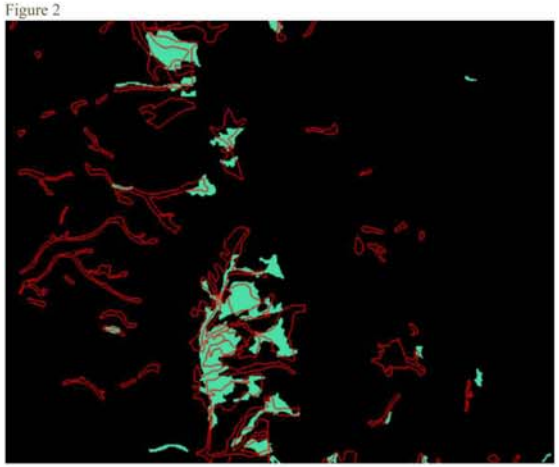
Figure 1

In the 1930's, vegetation was still delineated using forage quality as a basis. However, these polygons appear to be much more complete based on current aspen distribution (e.g. aspen throughout the District including steep cliff complexes was typed). This data set also had the added benefit of significant detailing of associated vegetation, thereby making it a good foundation for our analysis (Figure 1).

The final data set, DWRIS, is a Forest Service planning tool developed from 1978 to 1983. Although mapping merchantable timber was the focus of this typing, other vegetation including aspen was delineated. Since many stands of aspen were embedded within coniferous matrices, aspen stands were not totally represented within the landscape. There is also the ambiguity of stand boundaries between the 1930 and DWRIS data set that could not be fully explained.

For this reason, the GIS analysis was based on locations where at least 50% of the DWRIS identified stand was included within the boundary of the 1930's polygons (Figure 2). This subset of stand locations was assumed to be validated, and became the basis for the trend data presented below. The red polygons in Figure 2 are the 1930's data and the solid green polygons are the DWRIS data.

Figure 2



Comparison of vegetation data from 1930 and DWRIS indicate that the Warner Mountains sustained a 42% decline, when using the methodology described above (as opposed to 85% declines on the gross acreages). Given the presence of aspen trees, snags, and logs within stands currently dominated by conifers, this value appears to be conservative yet supportable. Our analysis indicates that 28% of the acres changed to mixed conifer, 11% acres to white fir (Abies concolor), and 2% pine (Pinus ponderosa, Pinus jeffreyi, or Pinus washoensis). As can be seen to the right, these changes sometimes took place over a matter of years.

Field verification utilizing 2 repeat photo points and 1 site where live aspen no longer exist provided a measure of changes in the stands over time. Photo series dates included 1947, 1961, and 2004.

South Fork of Deep Creek
The area within the aspen stand was 25 acres in the 1930 data. Currently, the stand is roughly 7 acres with numerous fir inclusions. Note the increase of sage within and adjacent to the riparian area from Figure 3, Figure 4, and Figure 5.

Figure 3 - 1947

Figure 4 - 1961

Figure 5 - 2004

Head of Granger Canyon
The area within the aspen stand was 40 acres according to the 1930's data. Currently, the stand is roughly 8 acres in area with conifer inclusions. Note the change in the stand density in 14 years between Figure 6 and Figure 7.

Figure 6 - 1947

Figure 7 - 1961

Figure 8 - 2004

Figure 9 - Overview of current stand, 2004.

A northern fork of Willow Spring Canyon
This site was on the edge of an aspen stand that was 68 acres in the 1930's. Tree ages were determined by taking cores at the base of selected white fir trees using an increment borer. The prominent fir (1) in Figure 10 was 76 years; the suppressed fir (2) was 48 years. Note white fir matrix in Figures 10, 11 and 12.

Figure 10 - 2004

Figure 11 - 2004

Figure 12 - 2004

In order to combat the loss of aspen, the District went from a piecemeal approach to an integrated program of treatment and monitoring under the Warner Mountain Rangeland Project. Changes in grazing, establishment of benchmarks to detect trends in aspen as well as conifer removal have been and continue to be implemented. By analyzing the current vegetation across the entire landscape in conjunction with historical data helps managers to target which stands to treat. Monitoring is the key to not only successful implementation, but also enables managers to adjust prescriptions site specifically.

Figure 13 - 1999

Figure 14 - 2003

Figure 15 - 2003

Figure 16 - 1999

Figure 17

Literature Cited

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