

Title: Ecology of Cryptogamic Communities in the Monument.

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Statement:

In so far as most of the Monument is composed of semi-arid ecosystems, it is anticipated that lichens are important ecosystem components, both as prominent members of cryptogamic crusts and rock-inhabiting communities. Secondarily they may be locally important as epiphytes on some shrubs and small trees. It is important to understand current distribution patterns as well as the influence of anticipated land management practices, such as the use of fire and livestock grazing, on these ecosystem components.

Accordingly, FY 04 would emphasize overall distribution of community patterns, FY 05 baseline investigations relative to fire manipulations (e.g. survivorship on burned plots in relation to controls), and FY 06 baseline plots relative to parts of the Monument relative to newly fenced areas (excluding livestock) in comparison to areas within the monument that have had no or very limited livestock grazing (e.g. isolated buttes).

Background information:

Throughout much of the Intermountain West, a cryptogamic or microbiotic crust covers some or all of the interspace between vascular plants (Nash, 1996a). The crust is composed of water-stable surface soil aggregates bound by algae, fungi, lichens, and moss (Johansen, 1993; St. Clair and Johansen, 1993). Lichens and moss are the largest and arguably, the most significant of the soil cryptogams.

Soil cryptogams play several roles in semi-arid regions (West 1990; Metting 1991; Belnap and Lange 2001). Soil cryptogams can stabilize the soil, reducing wind and water erosion (Metting 1991; Johansen 1993; Eldridge and Greene 1994). They contribute nitrogen (Harper and Pendleton 1993; Jeffries et al. 1992; Evans and Ehleringer 1993) and organic carbon (Johansen et al. 1993) to the soil. Some researchers have found an increase in water infiltration into the soil with cryptogamic soil crusts (Brotherson and Rushforth, 1983). Cryptogamic crusts play a significant role in ecosystem structure in the shrub-steppe. Recently, variation in seed banks was related to variation in cryptogamic crusts on the Monument (Boudell et al. 2002). Boudell et al. (2002) found significantly more seeds in the cracks surrounding soil surfaces covered by lichens and moss than beneath the lichens and moss. These intact cryptogamic crusts can enhance seedling establishment of some species in semi-arid ecosystems (Belnap 1994). In contrast, weedy, 'r' selected species are inhibited by intact cryptogamic crusts in arid ecosystems (Zaady et al. 1997). At the Monument, Boudell et al. (2002) observed significant numbers of *Bromus tectorum* (an 'r' selected species) seeds in the seedbank of intact soil crusts, but few established plants. Hawke et al. (1998) found a significant and negative correlation between cryptogamic crust cover and the cover of *Bromus tectorum*. We propose to examine relationships between cryptogamic crusts and vascular plant communities on the Monument.

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