

Western Ecological Research Center

Publication Brief for Resource Managers

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Plant Diversity and Fire Effects in Blackbrush Shrublands

The blackbrush vegetation type is characterized by high cover of *Coleogyne ramosissima* (blackbrush), which is thought to be so dominant that it prevents the coexistence of many other plant species. Fire can remove blackbrush cover, and possibly increase plant species diversity. Fire may also increase the frequency and cover of alien annual grasses, thereby increasing landscape flammability. These predictions were tested by comparing unburned and burned (6–14 years postfire) blackbrush at 3 sites spanning the range of this vegetation type in the Mojave Desert. The results of this study were reported in a recent journal article by USGS scientists Dr. Matt Brooks and J. R. Matchett.

Species richness in unburned blackbrush was similar to published values for other vegetation types in western North America, providing new evidence that plant species diversity in blackbrush may not be as low as previously thought. Richness values were highest for annual forbs, and declined in order from woody perennials, herbaceous perennials, annual grasses, cacti, to perennial grasses.

Species richness increased logarithmically between 1, 10, 100, and 1,000 m² scales, but this increase was much higher for natives than aliens. Apparently, the spatial distribution of the few alien species in this study was influenced more by environmental heterogeneity at the smaller scales, whereas the distribution of the many native species was affected more equitably by heterogeneity at all scales. Heterogeneity at 1 m² was due to the shrub-intershrub gradient, and at 1,000 m² by the microtopographic gradient from finer-textured soils of rainfall runoff areas (hummocks) to coarser-textured soils of run-on areas (washlets).

Fire reduced *Coleogyne* cover, thus increasing species evenness, but decreasing species richness. Total cover

Management Implications:

- Plant species richness is not necessarily low in blackbrush shrublands, and can be similar to other arid and semi-arid vegetation types.
- Fire reduces species richness, increases species evenness, and increases the dominance of alien annual plants in blackbrush shrublands.
- *Coleogyne ramosissima* may not necessarily prevent the coexistence of other species and reduce plant species diversity of blackbrush shrublands, although it may inhibit the dominance of coexisting species.
- Multiple-scale sampling methods should be used to accurately evaluate species diversity patterns in blackbrush shrublands.

was unaffected by fire because cover of woody perennials decreased, while cover of annual forbs, annual grasses, herbaceous perennials, and perennial grasses increased. Native species richness and cover decreased, whereas alien richness and cover increased after burning. Fire had no effect on frequency, and variable effects on cover of alien annual grasses.

The relative dominance of species other than blackbrush varied widely among sites, reflecting the variable nature of blackbrush communities. Species richness patterns also varied among spatial scales for different plant life forms and for alien vs. native species. These results caution against interpreting plant diversity patterns from data collected at single spatial scales, and suggest that multiple-scale sampling should be used in blackbrush and possibly other vegetation types in the Mojave Desert.

Brooks, M. L., and J. R. Matchett. 2003. Plant community patterns in unburned and burned blackbrush (Coleogyne ramosissima Torr.) shrublands in the Mojave Desert. Western North American Naturalist 63:283-298.