

Western Ecological Research Center

Publication Brief for Resource Managers

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Contact:
Dr. Jon E. Keeley

Phone:
559-565-3170

Email and web page:
jon_keeley@usgs.gov
<http://www.werc.usgs.gov/seki/keeley.asp>

Sequoia and Kings Canyon Field Station, USGS Western Ecological Research Center, 47050 Generals Highway #4, Three Rivers, CA 93271

Postfire Plant Demography and Functional Types

Out of necessity, resource managers often deal with broad generalizations about community structure and function. In the May issue of *Ecological Monographs*, USGS scientist Dr. Jon Keeley and colleagues Melanie Baer-Keeley from the National Park Service and C. J. Fotheringham from the University of California, Los Angeles, investigate the extent to which species-specific rather than broad functional type approaches are required to understand community responses to disturbance. This study used highly detailed demographic data to investigate vegetation recovery during the first five years after fire in southern California chaparral and sage scrub.

They found that common functional types with respect to postfire regeneration by resprouting or seeding were insufficient to characterize the postfire response and vulnerability to subsequent disturbances. When these regeneration types were stratified by life history type, however, common responses constituting similar functional types could be distinguished. These detailed demographic data also illustrate more precisely the degree to which many annual species are restricted to postfire conditions. Many of these fire endemics simply disappeared from all study sites after the second postfire year.

This study adds to a growing list of studies that contradict the long-standing generalization that the first postfire year in chaparral and sage scrub shrublands is the time of highest species diversity; the second year was the highest, a finding similar to that of several other studies in the literature. In this, and coincidentally other published studies, the second year was a year of higher precipitation and this may account for the greater diversity. However, other explanations such as the expansion of small, first-year populations could account for this pattern as well.

In this study, diversity declined after the second postfire year, not unlike most other studies. However, in the fifth, postfire diversity increased almost to the levels

Management Implications:

- In shrubland ecosystems routinely exposed to stand-replacing crown fires, the demography of individual species varies markedly and needs to be considered in determining community resilience.
- Knowing postfire responses such as obligate-seeding or obligate-resprouters does not provide sufficient information on community responses. Addition of life form comes much closer, but, ultimately, there are species-specific responses.
- Plant series such as chaparral and sage scrub share many dominant and subordinate species, and these classifications may not well reflect community structure or function.

reached in the first 1-2 years postfire, presumably in response to the extraordinary El Niño rains of the fifth year. Despite similarities in species diversity, sites differed substantially in species composition: a large number of postfire endemic species present in the first or second postfire year disappeared but were replaced in the fifth year by other species. The fifth year spike in diversity appears not to be due to colonization by species from outside the burned areas, but rather by population expansion of uncommon herbaceous species that occurred sporadically immediately after fire.

These detailed demographic data also shed light on the ecological reality of classification schemes designed to delineate different plant associations. The marked overlap in species of all growth forms between chaparral and sage scrub illustrates the continuous nature of species distributions and the importance of recognizing plant association names are merely abstractions of the real world.

Keeley, J. E., C. J. Fotheringham, and M. Baer-Keeley. 2006. Demographic patterns of postfire regeneration in mediterranean-climate shrublands of California. *Ecological Monographs* 76(2):235–255.