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Fire Temperature Patterns and Effects on Annual Plants in the Mojave Desert

The physical characteristics and ecological effects of fire remain mostly unstudied in desert shrublands, primarily because native desert vegetation is sparse, limiting the ability of fire to spread. Recent decades have seen an increase in plant cover, especially of highly flammable alien annual grasses, and with these increased fuel loads has come increased fire frequency. The lack of information on desert fires makes predicting their ecological effects difficult. In a recent issue of the journal *Ecological Applications,* USGS scientist Dr. Matthew Brooks reports new information on temperature patterns during experimental fires, and the effects of these variable fire temperatures on annual plants in the Mojave Desert.

Fire temperatures were highest beneath the canopy of creosote bushes, where they exceeded levels that annual plant seeds could survive, resulting in dramatic declines in seedling biomass and species diversity. At the edge of the shrub canopy, fire temperatures were apparently below the mortality threshold of the soil seedbank. However, temperatures were high enough to stimulate increased availability of soil nitrogen, leading to an increased amount of annual plants following fire. Fire temperatures in interspaces were too low to heat the soil and did not affect postfire annual plant communities.

Responses of annual plant species to fire can differ greatly due to variation in the species composition of the seedling cohort, their microhabitat affinities, and their stage of development at the time of burning.

Management Implications:

- Seedbanks can be killed where desert fires are most intense beneath shrub canopies.
- Fire can reduce annual plant diversity by reducing populations of species that grow mostly beneath shrubs.
- Growth of alien annual plants can either increase or decrease after fires, depending on the microhabitat preferences of the species.
- Desert fire behavior and effects models must incorporate variation created by the shrub-intershrub fuel gradient.

Additional information on the microhabitat requirements and lethal temperature thresholds of individual species are needed to accurately predict the effects of fires on annual plants in the Mojave Desert.

Brooks, M. L. 2002. Peak fire temperatures and effects on annual plants in the Mojave Desert. Ecological Applications 12(4):1088-1102.