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Saguaros Under Siege: Invasive Species and Fire

Wildfires in the Arizona Upland subdivision of the Sonoran Desert, historically rare, are now expected after single or successive winters of above-average precipitation, due to the effects of red brome, the alien annual grass that has been the cause of many serious fires in the northern Sonoran Desert. Abundant winter rains can lead to prolific growth by red brome, but buffelgrass, a perennial African grass that was imported and developed to increase livestock forage, is rapidly increasing in abundance and represents a serious future threat. Buffelgrass can grow during any season when sufficient moisture exists, producing fuel loads orders of magnitude greater than red brome in most years, and may burn in any season.

On May 8, 1994, a vehicle-ignited fire burned 1,200 ac in Saguaro National Park (including 340 ac of Arizona Upland desertscrub), providing an opportunity to examine the effects of a moderate-intensity fire on saguaros. A recent publication in *Desert Plants* by USGS scientists Drs. Todd Esque, Cecil Schwalbe, and William Halvorson, and Dustin Haines presents results of this study.

In 1994, 436 saguaros were randomly located on transects in the burned area and monitored for fire effects. In 1996, an additional 496 saguaros were permanently tagged in an adjacent unburned area with similar slope and aspect to the burned site. The researchers collected data on percent scorching, saguaro height, and mortality of saguaros in burned and unburned areas. They also re-located plots from a previous vegetation monitoring study that had been burned in the Mother's Day Fire to determine mortality of 4 additional perennial plant species.

They found that 6 % of the saguaros sampled in the burned area were dead within 6 weeks of the fire, all of them less than 1 m tall. By comparison, none of the similarly sized saguaros in the unburned area died in the first 2 years after the unburned transects were established. The greatest losses were recorded within a year of the fire; cumulative mortality of burned saguaros within 6 years was 24.8 %, 108 out of 436 saguaros. Annual saguaro mortality in the burned area gradually dropped until it matched that of the unburned area. Saguaros in both burned and unburned areas showed a parallel increase in mortality during 2 years, coincident with a regional drought.

Management Implications:

- Once established, alien grasses may contribute to a grass/fire cycle; a short fire return interval can cause local extinctions of saguaros.
- The perennial buffelgrass poses a more serious fire threat than do annual grasses like red brome, creating a great amount of fuel and burning during any season.
- Indirect effects of increased fire frequency can reduce density of shrubs and trees that provide microsites for germination and establishment of saguaros.
- The smallest size class (up to 1 m tall) of saguaros is the most sensitive to the effects of a moderate-intensity fire.
- A comparison of burned and unburned sites can reveal additional significant mortality statistics (e.g., deaths of large saguaros occurred on both burned and unburned sites during drought years).

Esque, T. C., C. R. Schwalbe, D. F. Haines, and W. L. Halvorson. 2004. Saguaros under siege: invasive species and fire. Desert Plants 20(1):49–55.