Drought and Change in Invasive Grass Fuels during an 18-Year Period in Rare Plant Habitat in the Mojave Desert

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Edaphic habitat islands formed by special soils with extreme chemical or physical properties frequently contain rare species and unique biotic communities that are priorities for conservation. However, uncertainty in the degree of stability or change that can be expected in these communities as environmental conditions change (e.g., shifting precipitation patterns) complicates the development of management strategies, including for invasive grasses as potential threats to native habitats. This paper reports the results of an 18-year study (2008 to 2025) of vegetation change on gypsum-associated habitats supporting rare native species on protected lands administered by the National Park Service (Lake Mead National Recreation Area) and the Bureau of Land Management (Southern Nevada District) in the Mojave Desert.

MANAGEMENT IMPLICATIONS

- Fuel abundance provided by non-native, annual grasses overall remained low within the 18-year study period on unique soils containing conservation-priority native species.
- This is a positive result in terms of protecting unique native desert communities from wildfires and potentially competitive effects from non-native grasses.
- Based on these results, we recommend: 1) continued monitoring, early detection, and treatment of incipient invasive populations to keep their abundance low and forestall new invasions; and 2) proactively working to develop strategic invasive grass fuel treatments, suitable to implement on special soils around rare native species populations, to have these treatments ready should the need arise such as in unusually wet years.

Three fuel-producing, non-native annual grasses were detected among 10 study sites during the study: red brome (*Bromus rubens*), cheatgrass (*Bromus tectorum*), and Mediterranean grass (*Schismus arabicus*). The unique properties and microtopographic conditions (e.g., washlets collecting water, small north-facing hillslopes) of gypsum-associated landscapes appear to enable fuel-producing, non-native Bromus spp. to be more abundant at lower elevations than on some other soil types. Regarding temporal variation, abundance of these grasses mirrored change in abundance of native annuals, increasing in years of favorable precipitation/temperature and being sparse or absent in years of minimal precipitation. No directional change was evident in abundance of these grasses, as instead, their abundance was contingent upon climatic conditions in any given year. However, further monitoring may help ensure that these grasses remain at low cover and below thresholds for carrying fire, given the likely sensitivity of the rare native communities to fire.

Concomitant with overall drought occurring during the study. two native, rare, conservation-priority, perennial forbs declined in abundance – sticky ringstem (*Anulocaulis leiosolenus*) and Las Vegas bearpoppy (*Arctomecon californica*). Many native shrubs also exhibited declines or dieback, especially after severe mid-2020-22 drought. However, the shrub indigo bush (*Psorothamnus fremontii)*, along with the perennial forb silverleaf sunray (*Encelopsis argophylla*), were the most drought-resistant native perennials and maintained cover with minimal dieback. These are recommended for further investigation for use in habitat restoration as potential foundational species able to persist and provide functions during environmental change on these unique soils.

Figure 1. Repeat photos from the same locations showing plant communities among three measurement years within an 18-year period on four example plots associated with gypsum soils, Mojave Desert, Nevada, USA. Photos were taken in spring (mid-April to early May) by SRA in 2008 and by University of Nevada, Las Vegas staff in 2020 and 2025.

Additional Information

This brief is based on the following article:
Abella, S.R., and L.P. Chiquoine. 2026. Stability and turnover in gypsum-associated plant communities during an 18-year period. Drylands 3:e11. https://www.cambridge.org/core/journals/cambridge-prisms-drylands/article/stability-and-turnover-in-gypsumassociated-plant-communities-during-an-18year-period/985088B6DA4983074BCAA9E34263DB36

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