Effects of invasives on the distribution of keystone desert plants on military lands

08-411

Background:

Nonnative Lehmann lovegrass (*Eragrostis lehmanniana*) has invaded large areas of the Southwestern United States, and its impact on native plants is not fully understood. Palmer's agave (*Agave palmeri*), an important resource for many pollinators, including imperiled nectarivorous bats, is a key native plant potentially threatened by *E. lehmanniana*. Understanding potential impacts of *E. lehmanniana* on *A. palmeri* is critical for anticipating the future of the desert community where they coexist and for addressing management concerns about associated threatened and endangered species.

Sampling *Agave palmeri* pollinators on Fort Huachuca

Objective:

The overall objective of this project is to better understand the impacts of invasive species on key components of ecosystems and pollinator communities, in order to address management concerns for desert plant communities and their associated threatened and endangered species. Products from this study will assist with installation decisions to implement the best management practices for managing invasive grasses and imperiled species on training ranges throughout the southwest.

Summary of Approach:

To integrate aspects of invasive nonnative plant invasion with other ecological processes, we assessed the spatial effects of fire, soil type, and *E. lehmanniana* on the distribution and density of *A. palmeri*, and investigated changes in agave pollinator community composition and diversity in the presence of high *E. lehmanniana* abundance. We also implemented a network approach to describe and analyze how agave interacts through shared pollinators with other plants, and to detect any differences in the structures of these agave "ego networks" associated with low and high *E. lehmanniana* abundance.

Benefit:

The results of this research will aid in understanding the impacts of *E. lehmanniana* on the natural resources that support the military mission and provide wildlife habitat benefits. We evaluated the integrated relationships among nonnative plants, fire history, agave density, and agave pollinator diversity and abundance. A better understanding of these complex ecological relationships will enhance the ability of the DoD to access, evaluate, and utilize existing inventory data in combination with field surveys to promote management and, potentially, restoration of natural habitat and ecosystem services. This project has widespread regional significance, with particular importance for desert southwest installations where keystone plants, such as agaves, and their pollinators, may be threatened by such invasions.

Accomplishments:

The nonnative grass *E. lehmanniana* has negatively impacted the native plant *A. palmeri*, an important resource for many pollinators in the desert communities of the Southwestern United States. *E. lehmanniana* may exclude *A. palmeri*, as areas of high *E. lehmanniana* abundance were associated with significantly lower densities of *A. palmeri*, greater numbers of small/young *A. palmeri* plants, and lower pollinator network connectedness. Although *E. lehmanniana* abundance had no significant effect on fire frequency, medium and high density *A. palmeri* areas were associated with increased fire frequency, which can decrease overall nectar production through direct or indirect means. Because *E. lehmanniana* and *A. palmeri* are likely to continue be found in close association based on similar soil preferences, continued study and monitoring of the invasion and impacts of *E. lehmanniana* on desert communities and associated threatened and endangered species would benefit future management decisions.

Contact Information:

Denise L. Lindsay, Research Biologist
US Army Engineer Research and Development Center
3909 Halls Ferry Road, Vicksburg, Mississippi 39180
TEL 601-634-2362, FAX 601-634-4017
Denise.L.Lindsay@usace.army.mil