



Threats and Stressors to SAR and Ecological Systems, Practical Implications, and Management Strategies for Installations in Colorado and the Western U.S.

Project 14-770

Background:

Species and ecological systems face continued pressure from a variety of inter-related threats, including expanding urbanization, habitat degradation, climate change, and others. As threats to biodiversity continue, the Department of Defense (DoD) could find its installations shouldering more conservation responsibility in the future. To better understand evolving management challenges, the project team analyzed current and potential future threats to three ecological systems and five species-at-risk (SAR) on Fort Carson, Piñon Canyon Maneuver Site (PCMS), and the U.S. Air Force Academy (USAFA).

Objectives:

The objectives of this study were to:

- Analyze vulnerability of species and ecosystems to stressors at local and regional scales;
- Identify potential species declines that could adversely affect future training operations;
- Incorporate spatial data to evaluate possible distribution shifts and other species/ecosystems responses in relation to destabilizing events;
- Develop recommendations to scale down the ecosystem management concept and help halt species declines both on and off installations; and
- Document our process and lessons learned to facilitate similar analyses by other installations for their species and ecological systems.

Summary of Approach:

The study focused on the ecological systems that make up the physical environment within which the majority of training on Fort Carson and PCMS occurs: shortgrass prairie; pinyon-juniper woodlands; and cliffs and canyons. SAR included Pinyon Jay, Gray Vireo, Burrowing Owl, and Golden Eagle for Fort Carson and PCMS, and Preble's meadow jumping mouse for USAFA. For each of these targets, current information on distribution, status, ecological processes and life history was synthesized, and then potential impact to ecological systems from incompatible land uses was calculated using existing GIS layers. Existing models of potential distribution shift in response to climate change, and potential impacts from military training, were also included.

Benefit:

Study results help managers understand implications of multiple threats and stressors on the vulnerability of species and habitats, as well as anticipated changes to training environments and range sustainability at broad and installation-specific scales. The results have widespread application for DoD installations in the western U.S., including 26 Air Force, Army, Marine Corps, and National Guard installations occurring within the range of one or more of the target species/ecosystems.

Accomplishments:

All three ecological systems have significant potential for impact from incompatible land uses at a regional scale, based on proximity to mappable infrastructure. Across their distributions, only 11% of pinyon-juniper, 7% of shortgrass prairie, and 8% of cliffs/canyons is further than one mile from at least one incompatible land use.

Future climate conditions are likely to be very challenging for pinyon pine, but potentially beneficial for juniper species. If extent or health of pinyon pine deteriorate, impacts to Pinyon Jays could be significant. A variety of vulnerability assessment methods have been applied to shortgrass prairie, all with the same result: highly vulnerable. Cliffs and canyons are expected to experience effects similar to shortgrass, though with fewer impacts where they are sparsely vegetated. Climate change vulnerability assessments produced variable results for all the species included in this report, with the exception of Preble's meadow jumping mouse, which was ranked as extremely vulnerable.

Key recommendations include:

- Invest in planning and cross-boundary collaboration as a top priority
- Enhance internal collaboration and communication on Best Management Practices and data sharing
- Implement landscape-scale monitoring to support habitat management
- Manage for resiliency of natural processes and systems dynamics, including prairie dogs as a keystone species, in the context of drought.

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