

## Summary

Researchers at USGS and NAU are teaming up to develop a network of restoration field trial sites covering the Colorado Plateau, Sonoran, Chihuahuan, and Mojave Deserts. The field trial network is a collaborative effort between scientists and land managers that systematically tests restoration techniques. This network will test the suitability of a broad range of species and seed mixes for restoration, coupled with a suite of restoration treatments to promote plant establishment and growth including ground modifications (e.g., soil amendments or types of mulch), seed coating technologies, seeding methods, seasonality of planting, successional planting, and inputs like herbicide treatments, fertilizer, and supplemental irrigation.

The distributed field trial network will:

- (1) Provide critical information to land managers on methods to improve restoration outcomes;
- (2) Assess the ecosystem services (e.g., forage, erosion control, soil fertility, pollination) provided by different species and communities, rather than just the growth and establishment of individual species; and
- (3) Be co-located with existing common gardens or other ongoing experiments, whenever possible, to complement existing knowledge on development of native plant materials and minimize costs of developing new infrastructure.

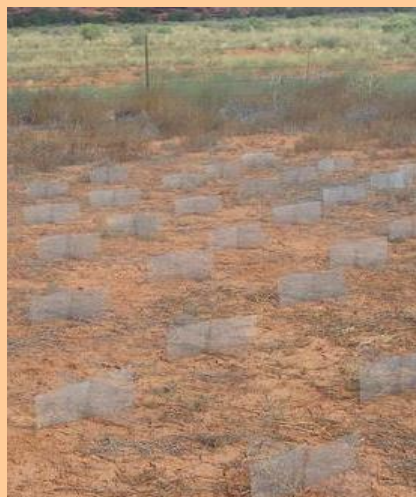


The field trial network will be used to showcase dryland restoration techniques at sites distributed across the Southwest. (Photo credit: Mike Duniway, USGS)

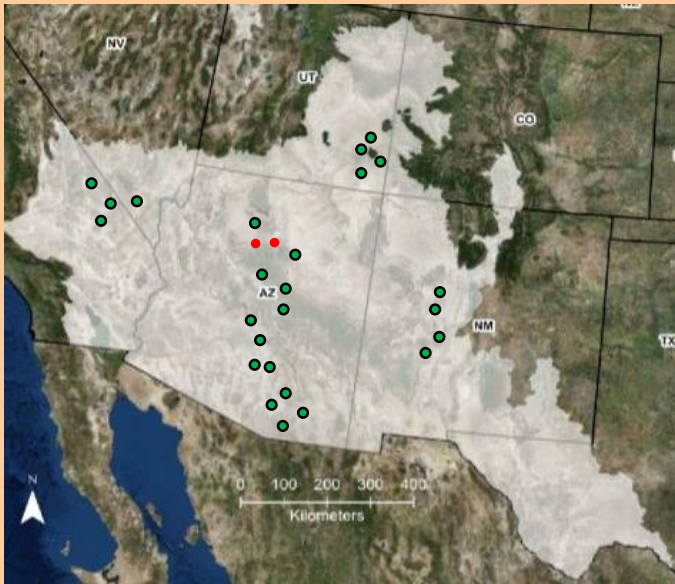
## Background

Recovery from disturbance represents a substantial challenge to agencies that manage large tracts of land in the Southwest. Despite the demand for restoration and rehabilitation, little information is available to help managers effectively reestablish native perennial vegetation and stabilize soils, especially given changing climate and disturbance regimes.

Forestry and agriculture have finely tuned their planting practices through the use of distributed networks of field trial, or “provenance” experiments. Ecological restoration outcomes could similarly be improved by adopting a field trial approach in which plots of different species and seed sources are established in monocultures and mixes, in combination with methods to improve their establishment, using a replicated, standardized approach within and across water-limited ecoregions.



Recovery of degraded arid landscapes can be facilitated by field trials that implement novel techniques, such as connectivity modifiers (ConMods). ConMods are small fence-like structures that inhibit wind and water erosion (left) and create microsites that increase native seedling establishment (right). ConMods can increase establishment by up to 90% when compared to control sites. (Photo credit: Rebecca Mann, USGS)



The map shows the range of the field trial network covering the desert Southwest. Green dots indicate potential and red dots are existing pilot field trial sites. (Imagery: Google Maps)

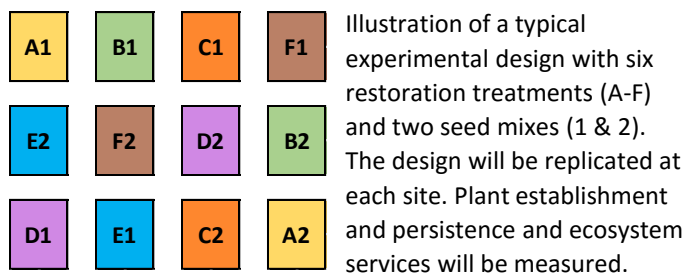
## Proposed Expansion of Network

The field trial network will integrate knowledge of plant responses to the environment with their effects on recovery of ecosystem services, allowing us to scale-up understanding of seed and native plant performance to restoration treatments. Conducting field trials at this intermediate scale provides a low-risk, high-reward setting for land managers to evaluate different seed sources and restoration treatments across a broad range of environmental conditions. We propose to coordinate and develop a network of field trial experiments across the Colorado Plateau, Sonoran, Chihuahuan, and Mojave Deserts. The field trials would provide novel insights into potential modifications or additions to priority species lists for restoration based on anticipated changes in climate, the performance of different seed resources and restoration treatments across environmental conditions, and how the interactive

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effects of site conditions and species composition influence ecosystem services. Field trials will fulfill dual-purpose research and management support goals, allowing both advances in restoration science and demonstrations for land managers to see on-the-ground variation in seeding success, restoration treatments, and resultant ecosystem services. Easily accessible demonstration sites are critical for buy-in from land managers and practitioners who may be wary to modify or adopt new practices without clear proof of concept.

The Restoration Assessment and Monitoring Program for the Southwest (RAMPS) will provide coordination for network development and synthesis among collaborators, as well as organize field trips and outreach activities to facilitate the transition from research to application.

## Conclusion

The field trial network is a collaborative effort between scientists and land managers that systematically tests restoration techniques. There is a suite of potential treatments that can be used at a restoration site, but this information can be anecdotal or difficult for a practitioner or land manager to access. The purpose of a new network of field trial sites is to synthesize existing knowledge on treatments and try new methods that can improve restoration outcomes. The results of these tests will bolster plant establishment, and erosion control along with other ecosystem services at restoration sites across the Southwest.



Restoration and Monitoring Program for the Southwest (RAMPS) is an inter-disciplinary network of scientists, land managers, and practitioners coordinated at USGS that strengthens restoration strategies and outcomes across the desert Southwest.  
<https://usgs.gov/sbsc/ramps>

