

## Project Year-End Summary Report

Title of Project: Plant Community Restoration using Connectivity Modifiers following Honey Mesquite Management in southern New Mexico

*Begin answering in the shaded box right beside or below each question and it will expand to accommodate as you type. Use up to a total of two and a half pages for questions 1-8. More detailed presentations, a final report, articles or posters are welcome separately\* (See final instructions at the end of this form.)*

1. Organization name or Individual who received the grant: Molly Reichenborn

2. Amount of Grant: \$2,000

4. Was additional outside funding obtained? (check box that applies) Yes  No   
Other funding source(s) if you checked "yes."

5. Briefly, how was the grant money from the Carter Conservation Fund used?

Funds were used to pay a New Mexico State University (NMSU) undergraduate technician to assist with plant community data collection in the field (30 hours x \$15/hour + fringe benefits = \$455). Additional funds were used to pay for field supplies to collect these data (\$55) and to cover the cost of travel with a NMSU vehicle to and from the field site (14 trips x 54 miles/trip x \$0.635/mile = \$480). The remaining funds (\$1,010) will support the undergraduate technician assisting with the collection and processing of plant litter and sediment samples (\$760) and associated travel costs to the field site to collect these samples (\$250).

6. Write an abstract or summary of the activities performed and the progress that was made this year on your project. (Save any conclusions, lessons learned, and benefits achieved for the final sections, 7&8.)

The primary objective of this project is to test the use of Connectivity Modifiers (ConMods) alongside herbicide treatment of Honey mesquite (*Prosopis glandulosa*) to aid in the restoration of native herbaceous species lost as a result of progressive mesquite encroachment. This was addressed by sampling plant recruitment within ConMods, which are essentially artificial nurse plants made up of two 12 x 6" hardware mesh panels assembled to make an "x" shape, that were installed in the spring of 2022 in bare soil areas or "interspaces" between mesquite shrub islands. ConMods can help retain ecosystem resources (soil, seeds, plant litter, etc.) that are typically lost to wind or water erosion in these areas, and in turn create abiotic conditions favorable to herbaceous species germination and establishment. Control interspaces (no ConMods added) were also sampled for comparison and both ConMod-added and control interspaces were sampled on plots previously treated or untreated with herbicide in late summer 2020 (8 of each treatment type; 16 plots total).

Funding from the Native Plant Society of New Mexico (NPSNM) supported the data collection effort associated with this project that took place during the fall of 2023, and is still ongoing. Sampling of the plant community in the ConMod-added and control interspaces was conducted between late September and early November, which was shifted from the planned start in early August due to the late onset of monsoon precipitation. The recipient and NMSU undergrad technician recorded all species present within the 0.3 m x 0.3 m "footprint" of ConMods and

rebar stakes (stakes were installed as reference points in control interspaces without ConMods) and estimated their abundances using a PVC frame that sectioned the sampling area into 5% squares for consistent estimation. Interspaces were subsampled by collecting data from 6 randomly selected units within each 12-unit interspace array (n = 768 units for the entire study) to reduce sampling time while still collecting representative data from each interspace. Subsampling in this manner, and the time of two volunteers who assisted with data collection, was done to conserve remaining funds for the upcoming plant litter and soil accumulation collection effort. The plant community data are currently being entered and will be ready for analysis by the end of the calendar year.

Samples of accumulated soil and plant litter will be collected from the same randomly selected units in December 2023. These samples will then be sieved to separate soil from plant litter, and both components will be dried and weighed to characterize the retention of ecosystem resources in the study interspaces. For cases in which ecosystem resources were lost instead of accumulated (i.e., erosion), the distance from a marked reference point indicating the soil surface level when the units were originally installed to the current soil surface will be measured. Plant litter and soil sample processing will take place in January and February 2024, with data entered and available for analysis by March of that year. The remaining NPSNM funds referenced in section 5 above will be used to support travel costs and the NMSU undergraduate technician's salary to assist with sample collection and processing.

The condition of plants in the study area during the time of the plant community data collection was poor, and teaching and course commitments of the applicant and the NMSU undergraduate technician respectively restricted time available to search for acceptable voucher specimens. The recipient discussed this issue with Dr. Sara Fuentes-Soriano, who directs the NMSU Herbaria where specimens would ultimately be deposited, and received her approval to collect voucher specimens when the recipient would be able to collect during optimum conditions in 2024.

7. How does your project further a Native Plant Society mission area, namely: *plant or ecological education; conservation/restoration of native plants and/or their habitats; adds to botanical research; promotes appropriate use of native plants to conserve water, land and/or wildlife.*

This project supports the NPSNM mission to restore native plants and their habitats in addition to supporting needed ecological research. Though mesquite is a species that is native to the southwestern United States, its encroachment into grasslands where its presence was previously limited or entirely absent has led to a significant loss of native herbaceous species diversity and a cascading effect on the ecosystem services (e.g., soil retention) these species provide. The transition from grassland to mesquite-dominated shrublands is perpetuated by a number of interacting factors, including those that land managers can (e.g., livestock grazing practices) and can't control (e.g., drought), and our understanding of how to effectively restore native herbaceous species diversity in the face of these factors is still lacking. Investigating the use of ConMods to help reduce the loss of soil, seeds, and plant litter from mesquite-encroached ecosystems, in combination with the practice of herbicide application to reduce mesquite abundance commonly used by land managers, can help us better understand how we can restore the diverse, historically dominant native grass and forb communities and the ecosystem services these communities provide.

8. Any other conclusions., lessons learned, benefits to you, the community or the environment hopefully result from your work as assisted by this grant.

Support for this project by the NPSNM has enabled research that contributes to our understanding of effective ecological restoration strategies for environmental issues relevant to our local communities. The loss of native herbaceous species with woody plant encroachment impacts the ability of our local communities to provide forage for livestock, maintain air quality during high wind events (i.e. dust from soils unprotected by vegetation), and preserve the native species in these grassland ecosystems for current and future generations to enjoy.

Though the conclusions from the research itself are still forthcoming given the data are still be collected and prepared for analysis, these will be shared with the NPSNM membership as indicated in the following section. This project has also served as a great opportunity for the applicant to guide an upcoming undergraduate scientist through the research process, share enthusiasm for native plant ecology and restoration, and develop their skills as a mentor.

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### **Final Instructions**

**Please send your completed form as pdf as an email attachment to [cartergrantapps@gmail.com](mailto:cartergrantapps@gmail.com) by December 1.**

*\* To remain in good standing for any future funding from the Native Plant Society of New Mexico, we ask that you educate our membership more fully in some way. This could be an article (250 words minimum, at least 1 high resolution illustration or photo) for our newsletter, **ora** paper or electronic copy or link to a published article connected with the past year's work, **or** by making an educational and visual presentation to one of our chapters. Contact information for our 7 area chapters is found on our website at [www.npsnm.org](http://www.npsnm.org) under the Chapters tab.*

*What are your intentions in this regard? I (recipient, Molly Reichenborn) will reach out to the Las Cruces chapter of NPSNM in January to offer a presentation on this project in the spring or summer of 2024, pending interest of the chapter and availability to do so within their monthly meeting schedule. If that is not possible, I will contact the NPSNM editor to write an article for the newsletter and make sure the results of this work is shared with NPSNM membership in some way. I will happily share the peer-reviewed journal article with NPSNM resulting from this work once it's available as well (may not be available until early 2025 pending the time required for peer review and publication).*

This year end report is submitted by (Type your name) Molly Reichenborn

My typed name is equal to my handwritten signature in testifying to the accuracy and truth of this report to the best of my knowledge today.

eMail address [mreichen@nmsu.edu](mailto:mreichen@nmsu.edu)

Date 12/03/2023

*Please contact us again at [cartergrantapps@gmail.com](mailto:cartergrantapps@gmail.com) if you have any questions or alternate suggestions.*