Project Summary

The funding provided through Notice of Funding Opportunity Number **F23AS00229** will enable the Arizona Department of Agriculture (AZDA) to fund subcontractors to conduct research, surveys, monitoring and restoration of Arizona's federally listed and other rare plants of concern. Subcontractors are given awards based on the merit of their proposals and the current listing and recovery needs of the Fish and Wildlife Service in Arizona. This work will enable recovery actions to commence and increase our knowledge about species current conditions, vulnerabilities, and management and recovery needs. The resulting reports will enable the Fish and Wildlife Service to better make informed decisions on listing, designating critical habitat, recovery actions, and down and de-listing criteria, as well as inform Species Status Assessments and 5-year Reviews.

This year we received 10 section 6 grant proposals totaling \$180,843.29. The AZDA will be able to fund seven proposals in full and one proposal in part with the \$136,454.31 available to distribute.

The Section 6 Committee, comprised Fish and Wildlife Service and the University of Arizona members, ranked the 10 proposals based on merit (e.g., the priority of the species for Fish and Wildlife Service work, the track record of the PI(s), clarity of the proposal, if the proposed work aids in species recovery, appropriateness of the budget, if the species is a listed entity, etc.) and incorporated feedback from species leads and other relevant species experts, who were given the opportunity to review all proposals associated with their species. Two of the AZDA grant staff provided administrative assistant during the ranking. Unfortunately, the highest ranked proposal, was withdrawn by the PI on March 22, 2023, due to not being granted access to the Tohono O'odham Nation for surveys. The proposals selected for funding are listed below in order of ranking and include a brief project summary.

1) : Surveys for *Amsonia kearneyana* (Kearney's blue-star) on the Tohono O'odham Nation, Arizona

Principal Investigator: **Jim Malusa**, private botanist Federal Share: \$11,891.76

Project Description: The primary objective of this research is to survey for previously documented, as well as undocumented, groups of *Amsonia kearneyana* on the Tohono O'odham Nation in the Baboquivari, Colote, and Quinlan Mountains, Pima County, Arizona. This is a field survey whereby the provided and included in the age structure, as well as the condition of the plants would be noted and included in a final report. Plant location information would be provided to the Tohono O'odham Nation.

2) Saving seeds from new populations of sentry milk-vetch (*Astragalus cremnophylax* var. *cremnophylax*)

Principal Investigators: **Sheila Murray**, The Arboretum at Flagstaff Federal Share: \$19,140.35

Project Description: The objectives of this work are to enhance the genetic vigor of *ex situ* seed collections of this *Astragalus* variety using the newly discovered north rim populations of *Astragalus cremnophylax* var. *cremnophylax*; seed vigor will also be examined. Some collected seeds will be sent to the National Laboratory for Genetic Resources Preservation in Fort Collins, CO for long-term storage. Resulting plants from seed vigor tests will be maintained in the Arboretum at Flagstaff greenhouse or gardens for educational purposes.

3) Quantifying abundance, phenology, and key species interactions for Nichol's Turk's head cactus (*Echinocactus horizonthalonius* var. *nicholii*)

Principal Investigators: Lucinda McDade, California Botanic Garden, Elizabeth Arnold, Margrit McIntosh, and Robert Steidl

Federal Share: \$15,822.35

Project Description: There are five main objectives to this research project: 1. Continue longterm monitoring of mortality, recruitment, growth, and flowering in established and newly established plots. 2. Use distance-sampling methods to quantify density and distribution of cacti within the Waterman Mountain region. 3. Identify arbuscular mycorrhizal fungi associated with the roots of the cactus. 4. Characterize the flowering phenology and relate it to weather conditions and capture and release floral visitors to attempt to identify pollinators. 5. Deploy motion-activated trail cameras at upper plots to document incursion by bighorn sheep and other mammals.

4) Using trained dogs to detect three *Pediocactus* taxa in northern Arizona

Principal Investigators: Steve Blackwell, Desert Botanical Garden, Lauralea Oliver, Wendy Hodgson, Andrew Salywon

Federal Share: \$25,858.82

Project Description: The *Pediocactus* spp. are sparsely distributed within northern Arizona. Because of their small size and spine coloration that is similar to their surrounding environment, species of *Pediocactus* grow cryptically amongst rocks and are nearly undetectable by the human eye - unless they are in flower. Two species, *P. bradyi* and *P. peeblesianus*, retract into the soil during dry periods and winter months, making them even more difficult to see. All together, these characteristics make *Pediocactus* ideal candidates for the use of dogs to locate new populations. There are five objectives to this work: 1) Train and test detection dogs at training facility using live specimens of *Pediocactus peeblesianus* subsp. *fickeiseniorum*. 2) Test the ability of detection dogs to discern between wild-collected *Pediocactus* and other cactus species. 3) Develop R-based niche models to identify areas most likely to harbor other populations of the three *Pediocactus*. 4) Conduct surveys for the three *Pediocactus* with detection dogs in field setting in areas where plants are known to occur. And 5) Conduct surveys for the three *Pediocactus* with detection dogs in areas where the model shows a high likelihood of the presence of plants to attempt to locate undocumented populations.

5) Arizona Hedgehog Cactus (*Echinocereus arizonicus* ssp. *arizonicus*) Habitat Description and Habitat Suitability Model

Update

Principal Investigators: Jesse Dillon, Cedar Creek Associates, Inc. Federal Share: \$22,117.65

Project Description: The objective of the study is to update the 1996 Conservation Plan and Assessment authored by Cedar Creek. This document was vital to initially defining the habitat and range of the Arizona Hedgehog Cactus. Since that document was published a lot of additional surveying has occurred and GIS technology with large scale data analysis has improved. Therefore, the PI will create a habitat suitability model to identify high- and lowquality habitat throughout its range and write a draft updated conservation plan.

6) Continued monitoring of Goodding's onion (*Allium gooddingii*) transects in the Apache Sitgreaves National Forests

Principal Investigator: Kirstin Phillips, Museum of Northern Arizona Federal Share: \$6,752.84

Project Description: The objectives of this project are to 1) resurvey Laurenzi and Warren's permanent transects of *Allium gooddingii* populations on the Apache-Sitgreaves National Forests and compare monitoring data to data collected before the Wallow Fire in 1987 and 1993 and after the Wallow Fire in 2016 and 2) to survey for *Allium goodingii* in areas identified by Rink (2019) where *Allium gooddingii* is possibly extirpated or needs further research. Revisiting these transect sites and continuing to survey in locations where *Allium gooddingii* may be extirpated will provide valuable information to land managers about the health of the species and its potential for recovery after fire.

7) Coordinating seed banking efforts across multiple National Forests for Goodding's onion (*Allium gooddingii*)

Principal Investigator: **Sheila Murray**, The Arboretum at Flagstaff Federal Share: \$13,3645.81

Project Description: The main objective of this project is to coordinate seed banking efforts across multiple Forests for Goodding's onion. There will be coordination of a virtual meeting with each Forest to discuss the objectives of this project. Site visits with each forest will then be scheduled to demonstrate conservation collection techniques, data gathering requirements, and potentially be able to make a collection during the visit. After the season is over, we can serve as liaison for each Forest to send any seed they collect, we can process the seed and send it into long-term storage at the National Center for Genetic Resources Preservation (NLGRP) in Fort Collins, CO.

8) Survey for *Coryphantha robbinsorum* (Cochise pincushion cactus) in areas of Mexico near to the only known location (in Arizona)

Principal Investigators: Glenn Rink, Far Out Botany

Federal Share: \$15,985.29

Project Description: The primary objective of this research is to find and document previously undocumented populations of *Coryphantha robbinsorum* in accessible areas of Permian age limestone in Sonora Mexico. Recent surveys throughout Cochise County, Arizona and Hidalgo County, New Mexico expanded the known range by a mere 2 km toward the south and Mexico. The range of the species may extend further south into Mexico, and if found there, that information may take some pressure off the sole well-documented population in Arizona.

9) Tonto Rare Plant Project – New hope for a large-scale, long-term rare plant community science project on the Tonto National Forest.

Principal Investigators: Lane Butler, Desert Botanical Garden and Raul Puente Federal Share: \$17,352.19 (of 31,614.12 requested)

Project Description: The Tonto Rare Plant Project is a rare plant community science project originating with Tonto National Forest Botanist Robert Madera in 2017. The Project, which seeks to expand on the currently limited botanical capacity of the Tonto National Forest (one Botanist for nearly 3 million acres) by training community scientists to survey for rare plants on the forest and accurately report their results, was under development by a multi-organizational team of experts from 2017-2019 and then began offering trainings and field orientations in 2020 and 2021. The objective of this project is to start a new chapter for the Project in October 2023 by utilizing the partnership, ground gained, and lessons learned in the years the coordinator has been coordinating. Citizen scientists will be trained during a day-long classroom event for overnight survey trips.