

Funded Section 6 Plant Proposals – AZ 2020 - Segment 26

Note: Summaries of all section 6 plant proposals funded since 2004 are available on-line at <https://cals.arizona.edu/herbarium/content/previous-awards>

This year we received 20 section 6 grant proposals totaling \$311,109. We were able to fund 8 proposals in full and 4 proposals in part with the \$122,193 available to distribute. Should any additional funding be made available, we request further funding the originally submitted proposal of Ibarra et al.: *Eryngium sparganophyllum* and *Cirsium wrightii* conservation work in Mexico. Their original proposal request is for \$20,050; they are receiving a much reduced \$1,391 with a reduced scope of work. After this, additional funding could go toward funding the Butler *Rumex orthoneuris* proposal more fully or the next highest ranked proposals. Please contact Julie Crawford in the Flagstaff Fish and Wildlife Service Office to discuss details.

The Section 6 Committee (Fish and Wildlife Service and the University of Arizona members) ranked the 20 proposals based on merit (e.g. the priority of the species for FWS 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, who were given the opportunity to review all proposals associated with their species. The proposals are listed below in order of ranking.

1) In vitro propagation and cultivation of the endangered orchid *Spiranthes delitescens* (Canelo Hills ladies' tresses)

Principal Investigator: **Steve Blackwell**, Desert Botanical Garden

Federal Share: \$7,769

Project Description: This project has four specific research objectives aimed at enabling future introduction efforts of the endangered *Spiranthes delitescens*, a rare orchid from southern Arizona. Objective 1. Initiate in vitro seed propagation of *Spiranthes delitescens*. Objective 2. Test methods for transitioning plants from in vitro to greenhouse conditions. Objective 3. Initiate seed propagation using fungus-inoculated media collected from remaining extant population. Objective 4. Produce 500-1000 viable plants for use in restoration projects and seed amplification.

2) Hydrogeologic study of the surface and groundwater supporting the critical wetland habitat of the endangered orchid *Spiranthes delitescens* (Canelo Hills ladies' tresses) at O'Donnell Creek Cienega

Principal Investigator: **Andrew Salywon**, Desert Botanical Garden

Federal Share: \$10,499

Project Description: The goal of this project is to determine the source and age of both surface and groundwater at O'Donnell Creek Cienega that is critical habitat for the Endangered orchid *Spiranthes delitescens* so that private landholders, NGO's and state and federal agencies can effectively monitor and manage this precious resource in order to preserve its biodiversity. Results will indicate if the water sustaining *S. delitescens* is derived from local and recent precipitation, ancient groundwater or a mixture of both. The implications for management decisions for this species are great. If the water sustaining *S. delitescens* is from

local and recent precipitation, then the water can be viewed as a renewable resource and habitat restoration is the most effective management solution. If the water sustaining *S. delitescens* is from ancient groundwater, then the water is non-renewable and management will require limiting water withdrawal from the aquifer.

3) Clarifying the niche and improving phenological data for the endangered *Echinocactus horizonthalonius* var. *nicholii* (Nichol's turk's head cactus) in the context of long-term monitoring

Principal Investigator: **Amy Boyd**, Warren Wilson College

Federal Share: \$11,765

Project Description: This project has six specific research objectives aimed at monitoring long-term plots and illuminating aspects of the niche and phenology of the endangered *Echinocactus horizonthalonius* var. *nicholii*, a rare cactus from southern Arizona. Objective 1. Continue long-term monitoring of mortality, recruitment, growth, and flowering in established and newly established plots. Objective 2. Characterize soil chemistry in the proximity of study plants vs. in similar areas within 0.1 km where the plants have not been observed. Objective 3. Quantify the density and robustness of soil crusts in proximity to mature plants and recruits. Objective 4. Expand phenological data relevant for population-level studies via three additional visits annually (May, July, October). Objective 5. Expand climate knowledge with the use of iButtons as data loggers to capture local temperature and humidity data on plots. Objective 6. Database and data conversion to the R software platform for future data entry, data sharing, and analyses.

4) Development of genetic markers for *Echinocactus horizonthalonius* var. *nicholii* (Nichol's Turk's Head cactus) to support achievement of recovery criteria

Principal Investigator: **Shannon Fehlberg**, Desert Botanical Garden

Federal Share: \$14,992

Project Description: Fine-scale genetic investigation of the relationship between the varieties of *Echinocactus horizonthalonius* is lacking. The ultimate goal of this project is to evaluate genetic variation in *E. horizonthalonius* var. *nicholii* across its range to provide information that will improve our knowledge of its biology and evolutionary history and its relationship to *E. horizonthalonius* var. *horizonthalonius*. This proposal enables the first step toward this goal, to develop novel, genus-specific genetic markers and test them in a minimum of three taxa and two populations. Population-level genetic data for *E. horizonthalonius* var. *nicholii* will allow description of the amount and geographic distribution of genetic variation within, among, and across populations; estimate the amount of gene flow among individuals and populations; and identify genetically unique populations.

5) Grassland Restoration for sub-populations of *Pectis imberbis* (beardless chinchweed) on the Coronado National Memorial

Principal Investigators: **Audrey Rader and Kurt Vaughn**, Borderlands Restoration Network

Federal Share: \$18,104

Project Description: The ultimate goal of the project is to increase the resiliency of extant *Pectis imberbis* subpopulations by improving native grassland habitat at the Coronado National Memorial. Up to 50 1m² quadrats and population mapping will establish baseline data for the *P. imberbis* subpopulations and encroaching non-native species. Researchers will them

remove and treat encroaching non-native bunchgrasses, collect and store native grass seed, implement restoration practices, and monitor plots post-restoration.

6) Monitoring *Carex specuicola* (Navajo sedge)

Principal Investigators: **Glenn Rink**, Far Out Botany and **Andrea Hazelton**, private

Federal Share: \$13,582

Project Description: Rink and Hazelton previously designed a monitoring program to track *Carex specuicola* population trends and habitat condition, and used it to establish nine monitoring sites on the Navajo Nation in 2013-2014. The primary objective of the current research is to re-read established plots and expand the existing monitoring program to include four additional sites. This monitoring scheme will better represent the species' full geographic range and ecological amplitude, and begin to fulfill the amended recovery criteria.

7) Survey for an Arizona edaphic endemic *Coryphantha robbinsorum* (Cochise pincushion cactus)

Principal Investigator: **Glenn Rink**, Far Out Botany

Federal Share: \$15,839

Project Description: The endangered *Coryphantha robbinsorum* is a rare cactus known from a restricted area in southeastern Arizona with limited public access. 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 Cochise County. The research will also identify possible introduction sites for future recovery efforts.

8) Cryopreserved collections of *Salix arizonica* (Arizona willow) for conservation

Principal Investigator: **Sheila Murray**, The Arboretum at Flagstaff

Federal Share: \$19,898 requested; \$8,541 made available and proposal adjusted to allow USGS researchers to collect samples and save on cost of fieldwork. No additional funding is required.

Project Description: *Salix arizonica* populations are exposed to multiple threats including reduced habitat, grazing pressure, disease (particularly infection by a fungal pathogen belonging to the species complex *Melampsora epitea*), and climate change. While seed banking has proven unfruitful in the past, relatively new techniques for cryopreservation developed by the National Laboratory for Genetic Resources Preservation of *Salix* twigs gives an opportunity to bank the genome across the range. This work includes propagating stem cuttings from 30 populations across the four state range of this species and harvesting dormant buds to send for cryopreservation.

9) Sonoran Desert threats and protection mapping for rare, threatened, and endangered plant species

Principal Investigator: **Helen Rowe**, private

Federal Share: \$12,532 requested; \$9,416 made available and proposal adjusted with the in-person workshop changed to an on-line workshop. Pending continuation of the Covid 19 condition, additional funds may or may not be needed to fully fund this project should additional funding become available.

Project Description: The objective of this project is to start the process of developing a threats map for land use change and protections by mapping current land use, including public lands protected by different federal, state, and local public jurisdictions, and adding proposed development such as mining and new roads. The map will provide a spatial tool to quickly assess the threat of habitat loss, fragmentation, and land degradation to federally listed and rare plant species in the Sonoran Desert. In addition to mapping threats, an on-line expert workshop will be held in which local land managers and conservation scientists with a wide knowledge of threats in their region, can indicate additional threats on the map and a revised map will be created.

10) Monitoring population dynamics and assessing restoration success of *Eryngium sparganophyllum* (Arizona eryngo) in Arizona

Principal Investigator: **Max Li**, Arizona-Sonora Desert Museum

Federal Share: \$6,025

Project Description: This work is a continuation of previously funded section 6 work on *Eryngium sparganophyllum*, a rare wetland plant of southern Arizona. There are two primary objectives to this work. Objective 1. Continue monitoring population dynamics in the established plots to obtain reliable demographic data over time. Measurements include recruitment rate, mortality rate of seedlings and adults, and individual growth rate of the two populations. Objective 2. Monitor the restoration of *E. sparganophyllum* in Agua Caliente Park and Canoa Ranch and provide scientific advice to Pima County personnel.

11) Assessment and status of *Rumex orthoneurus* (Chiricahua Mountain dock) – a rare and vulnerable Forest Service Sensitive species

Principal Investigator: **Lane Butler**, Desert Botanical Garden

Federal Share: \$13,459 requested; \$4,271 made available and proposal adjusted to reduce number of trips and number of hours worked by key personnel. Should additional funding be available beyond fully funding proposal 12 (currently unfunded), we would like this proposal to be funded further.

Project Description: There are four primary objectives of this work. Objective 1. Compile all existing and current Forest Service data for *Rumex orthoneurus* including: survey data, GIS data, status reports, monitoring reports, and other relevant literature. Objective 2. Summarize monitoring data and identify where revisits and monitoring are most needed. Objective 3. Reach out to others to request their syntheses of *R. orthoneurus* data for the lands they administer. Objective 4. Conduct onsite assessments of the status of the three highest priority transplanted populations and/or natural populations on the Tonto National Forest.

12) Rare Species Community Monitoring Network establishment for *Eryngium sparganophyllum* and *Cirsium wrightii* as a citizen science strategy for habitat conservation

Principal Investigators: **Lea Ibarra Wenglas**, **Valeria Cañedo Montaña**, **David Gastelum Gurrola**, Colectivo Sonora Silvestre and **Francesca Claverie**, Borderlands Restoration Network
Federal Share: \$1,391; should any additional funding become available, we would like this project funded more fully with project plan adjusted accordingly, as it is for conservation of two rare wetland species that are currently being considered for listing under the ESA.

Project Description: The aim of the project is to establish a monitoring network with landowners where *C. wrightii* and /or *E. sparganophyllum* populations are found and collect information about the presence and absence of these species. The network will be formed by the owners and administrators of the properties together with the administrators and collaborators of this project. The project will raise awareness in society about the importance of the ecological role of rare species and be used to collect demographic information on rare species populations as a resource for decision making and environmental management plans.