2005 Funded Section 6 Plant Proposals – AZ

The following proposals were funded in 2005 (Segment 8). Award does not include administrative costs.

1) **A phonetic analysis of the acuña cactus, *Echinomastus erectocentrus* (Coulter) L. Benson var. *acunensis* and *E. johnsonii* (Parry) L. Benson.**
Principal Investigator(s): **Dr. Marc Baker**, private
Award: $25,682

Objective(s): Conduct a phonetic analysis of *Echinomastus erectocentrus* var. *acunensis* and its immediate relatives in order to ascertain whether any of its currently known populations are morphologically distinct from one another and whether any such distinction , if significant, reflects geographical range.

Final Report Abstract: Morphology was compared among populations of Acuña cactus, *Echinomastus erectocentrus* var. *acunensis* and its relatives: *E. erectocentrus* var. *erectocentrus*, *E. johnsonii* var. *johnsonii, E. johnsonii* var. *lutescens* in order to facilitate the circumscription of these taxa and to shed light on their evolutionary and phytogeographic relationships. Multivariate analyses of continuous characters were performed on 476 individuals within 15 populations, including three of the taxonomic outgroup, *E. intertextus*. The best defined group of individuals included those of *E. intertextus* and followed by four populations of *E. johnsonii* that included of three magenta-flowered populations *E. johnsonii* var. *johnsonii*) and one yellow-flowered population (*E. johnsonii* var. *lutescens*). Individuals within these groups were 100% correctly classified by Discriminant analysis (DA). Individuals within populations of *E. erectocentrus* var. *acunensis*, *E. erectocentrus* var. *erectocentrus*, and two populations of yellow-flowered *E. johnsonii* were 98, 99, and 94% correctly classified. The two yellow-flowered populations not associated with those of *E. johnsonii* var. *johnsonii* may be already represented by the name *E. arizonicus*. Unweighted pair group method with arithmetic mean (UPGMA), principle components analysis (PCA), and DA indicated that the two populations sampled for *E. arizonicus* are morphologically closer to those of *E. erectocentrus* var. *acunensis* than to those of *E. johnsonii* var. *johnsonii*. In light of these findings, new combinations are suggested that include placing *E. arizonicus* and the two varieties of *E. erectocentrus* as three additional infraspecific taxa under the oldest binomial, *E. johnsonii*. The name *E. johnsonii* var. *lutescens* would become a synonym of *E. johnsonii* var. *johnsonii*, since the type locality of the former falls within the geographic distribution of the latter. Evidence indicates a cline for several morphological characters between the northern Mojave Desert and the northern Sonoran Desert. The hypothesis is presented that populations of *E. johnsonii* migrated from the northern Mojave desert roughly southeastward evolving less numerous, shorter, and thinner spines.

2) **Huachuca water umbel ecology, introduction, and monitoring**
Principal Investigator(s): **Dr. John Titus and Priscilla Titus, SUNY**

Award: $15,438

Objective(s): To increase understanding of the ecology of Huachuca water umbel, to determine if it can be successfully introduced into new areas, and how to best develop and accomplish recovery goals for the species.

Final Report Abstract: Huachuca water umbel (HWU) (*Lilaeopsis schaffneriana* ssp. *recurva*) is a federally endangered aquatic perennial plant that is endemic to southeastern Arizona and northern Sonora, Mexico. The species was listed due to threats posed by the degradation and loss of wetlands throughout its limited range. Although the species is easily grown in a greenhouse setting, information regarding specific requirements that allow long-term persistence of HWU in natural habitats is lacking, and few efforts at re-introduction of this species have been attempted. Using greenhouse-propagated material, we introduced 128 individual HWU plugs within four spring-fed wetland sites near Elgin, Arizona. After two years of monitoring, survival of transplanted plugs was high and the area occupied had increased substantially. The study also documented the ability of transplanted HWU to withstand periodic drying, low-intensity disturbance due to scouring, sediment deposition, trampling, and the presence of viable seeds incorporated into the seedbank at the study location.

3) **Population status of four North Kaibab endemics**
Principal Investigator(s): **Drs. John Spence, Katrina Rogers, Nancy Morin, and Barb Phillips, The Arboretum at Flagstaff, Northern Arizona University, US Forest Service**
Award: $20,760

Objective(s): To determine the current status of the four species after 5 + years of regional drought, survey for new populations, establish long-term monitoring plots, provide information on biology and ecology, and collect additional seed for long-term storage.

Final Report Abstract: This report summarizes field work in the 2005-2006 season and discuss the findings. Surveys did not commence until July of 2005. Because of this late date, the *Astragalus* and *Lesquerella* were not surveyed as they flower and fruit earlier, primarily April-early June. The 2005 field work concentrated primarily on the *Castilleja*, although searches for the *Eremogone* were also carried out. Work in 2006 concentrated on *Lesquerella* and *Astragalus*. The primary impetus for determining the status of these four species is the drought that started in n. Arizona in 1998-1999 (Hereford et al. 2002). Despite a relatively wet 2004-2005 winter and spring, the effects of the previous several years of drought has likely caused changes in population sizes and distributions of the species. For all species, the most recent previous field work was on or before 1993. The *Eremogone* has never been systematically surveyed for in the North Kaibab region.

4) Status Report on two rare Mulhenbergias and associate critical habitat (*Muhlenbergia xerophila* and *Muhlenbergia dubioides*)

Principal Investigator(s): **Jennifer Johnson, Kathy Rice, Jessica Aquino, Desert Botanical Garden**

Award: $18,120

Objective(s): The primary objective of this project is to conduct an extensive survey for the two target species of *Muhlenbergia*. The survey will be initiated with a herbarium search, and a comprehensive listing of all historically documented sites. Field trips will be made, documenting all locations. Several permanent monitoring transects will be established to determine trends in changes in populations over time. Herbarium specimens will be made of associated species and uncommon plants documented. An experimental test will be conducted to determine if Simple Sequence techniques are effective.

Final Report Abstract: In 2005 and 2006 researchers searched for *Muhlenbergia dubioides* (Box Muhly) and *Muhlenbergia xerophila* (Sycamore Muhly). A search of the University of Arizona (ARIZ) herbarium records was conducted on 1st October 2006 using the Southwest Environmental Information Network (SEINet). Eight sites of documented historical occurrences were surveyed. Five of the sites visited were based on historical occurrences of *M. xerophila* and three of the sites visited were based on historical occurrences of *M. dubioides*. All site locations found at the University of Arizona herbarium (ARIZ) were visited with the exception of those in the Tohono O`odam Reservation and Saguaro National Park, Rincon Mountains. At each site visited, occurrences were documented with digital images and herbarium specimens.