

2003 Funded Section 6 Plant Proposals – AZ

The following proposals were funded in 2003 (Segment 6). Award does not include administrative costs.

1) **A morphometric analysis of the Pima pineapple cactus**

Principal Investigator(s): **Dr. Marc Baker**, private

Award: \$25,455

Objective(s): Conduct an analysis of phenotypic variability to help clarify relationships between *C. robustispina* ssp. *robustispina* from Arizona and more widespread taxa from adjacent states of New Mexico and Texas.

Final report abstract: A preliminary phenetic analysis was done to evaluate the taxonomic relationships within *Coryphantha*, section *Robustispina*, which includes *C. robustispina* ssp. *robustispina*, *C. robustispina* ssp. *uncinata*, *C. robustispina* ssp. *scheeri*, and *C. poselgeriana*. ANOVA, PCA, and DA procedures were performed on ten continuous stem characters for 14 populations and 447 individuals. Of primary concern was the taxonomic validity of the subspecific taxa within *C. robustispina*, with *C. poselgeriana* serving as out-group comparison. Data indicated that the populations of *C. robustispina* ssp. *scheeri* represent a separate taxon and possibly a distinct species. Populations of both *C. robustispina* ssp. *uncinata* and *C. robustispina* ssp. *robustispina* are morphologically coherent within their respective taxa and are allopatric between the two taxa, thus indicating that they deserve taxonomic recognition. Individuals of *C. poselgeriana* were morphologically discrete from those of *C. robustispina*.

2) **Nomenclature recombination in *Echinocereus***

Principal Investigator(s): **Dr. Marc Baker**, private

Award: \$4,199,

Objective(s): Prepare a revised nomenclature for Section *Triglochidiatus* of the genus *Echinocereus*. Data from the most recent morphometric reports by the investigator will be analyzed statistically; subspecific taxa will be circumscribed based on the results. Herbarium specimens from ASU and U of A will be examined and identified to the appropriate subspecific taxon.

Final Report Abstract: A phenetic analysis of 21 morphological characters for 16 populations of *Echinocereus* (section *Triglochidiatus*) evidenced the validity of at least two subspecific taxa within *E. arizonicus*: *E. arizonicus* subsp. *arizonicus* and *E. arizonicus* subsp. *nigrihorridispinus*. Principle components analysis indicated that stem characters alone were useful in defining two distinct groups of populations, each including the type locality of one of the two subspecies. MANOVA indicated that most of the characters measured had means that differed significantly between the two subspecies. Discriminant

analysis showed a correct classification of 97% for individuals of *E. arizonicus* subsp. *arizonicus* and 94.7% for individuals of *E. arizonicus* subsp. *nigrihorridispinus*, compared to an overall 97.8% correct classification of individuals for all perfect-flowered taxa of section *Triglochidiatus* investigated.

3) Analysis of demographic data for *Pediocactus peeblesianus* var. *peeblesianus*

Principal Investigator(s): **Drs. Art and Barb Phillips**, private

Award: \$18,577

Objective(s): Compile monitoring data from 1998 – 2004 to update database on four monitoring plots established in 1985 and 1986; conduct statistical analyses of demographic trends; investigate correlations between climatic data and recruitment and survival; revise plot diagrams; and assess threats to the species and causes of mortality.

Final Report Abstract: Peebles Navajo cactus is a narrow endemic restricted to specialized and localized soils in Navajo county, Arizona. It was listed Endangered in 1979. Four monitoring plots established in 1985 and 1986 have been read annually through 2004, tracing the life history and reproductive success of several hundred plants. Germination events have occurred only every few years and are strongly correlated with rainfall. Growth rates are slow and plants do not reproduce until they are more than eight years old. Heavy plant mortality occurring between 1998 and 2001 is examined and possible causes are discussed in this report.

4) Status survey of *Erigeron rhizomatus*, *Pediocactus bradyi*, *Carex specuicola*, and *Astragalus beathii*

Principal Investigator(s): **Daniella Roth, Navajo Nation Natural Heritage Program**

Award: \$20,299

Objective(s): Provide updated information on the ranges and population sizes of *Erigeron rhizomatus*, *Pediocactus bradyi*, *Carex specuicola*, and *Astragalus beathii* on the Navajo Nation.

Final *Erigeron* Report Abstract: Surveys in potential habitat were conducted within 26 areas (including 5 known populations); population sizes were estimated for each location where plants were found. This survey identified ten new populations of *Erigeron rhizomatus* on the Navajo Nation for a total of fifteen known populations on the Navajo Nation. Perimeters of populations were mapped using hand held GPS and ArcGIS 8.3. A habitat description was compiled for each population and EOR forms filled in for all populations found. Photographs of individuals, habit, habitat, and substrate were taken at each population.

Final *Pediocactus* Report Abstract: Resurveys of Element Occurrence Records older than 6 years were conducted. In addition appropriate habitat was surveyed for *Pediocactus bradyi*.

From these surveys, it was determined that only a fraction of the available habitat is occupied by the cactus. Two new populations were located during the surveys. There are 11 total recorded populations on the Navajo Nation, five of which contain fewer than 25 individuals. A single population contains more than 100 individuals. All populations are potentially impacted by livestock trampling. Off-road vehicle traffic is a noted threat in four populations. Three sites had heavy impact from cattle or off road vehicles noted. Long term monitoring on 7 plots began in 1991 with 114 cacti recorded. In 2003 81 cacti were relocated, 16 had been killed by beetles; one seedling was found. In 2004 8 additional plants were found dead, one was not relocated, and four plants were recruited into the population. Of the plants found in 2004, 17 were flowering.

Final *Carex* Report Abstract: Surveys were conducted in appropriate habitat and known populations were resurveyed. As of 2004, 39 *Carex specuicola* populations have been located on the Navajo Nation; 11 new sites were found as a result of this survey effort. Four of the previously known sites could not be relocated, either due to mapping error or drying out of the hanging garden habitat. Eighty percent of the visited gardens are accessible to livestock, some of which had been heavily impacted by grazing and trampling. Thirty-seven percent of the gardens showed signs of drought stress, such as high mortality rates and no water discharge and slough off of vegetation mats. At eight known locations that were revisited, *Carex* could no longer be found; two of these sites may be misidentification. Only one of the three subpopulations designated as critical habitat is not impacted and threatened by livestock, and it is partially accessible to livestock.

Final *Astragalus* Report Abstract: Surveys were conducted in appropriate habitat and known populations were resurveyed. Of the eleven *Astragalus beathii* populations on record within Navajo Nation lands (one of which was newly discovered during these surveys), only three populations are currently extant and several were discovered to be misidentifications. Observations through two years of this study indicate that although the species is locally more abundant during wet springs, many of the seedling plants do not reach the reproductive stage and do not survive into the following year. Changes in plant numbers varied greatly between the two years of study (2003-2004) with 70-90% fewer plants found at the same three locations in 2004 over 2003. As a result of this report, it is proposed to be listed on the 2005 Navajo Endangered Species List in Group 4.