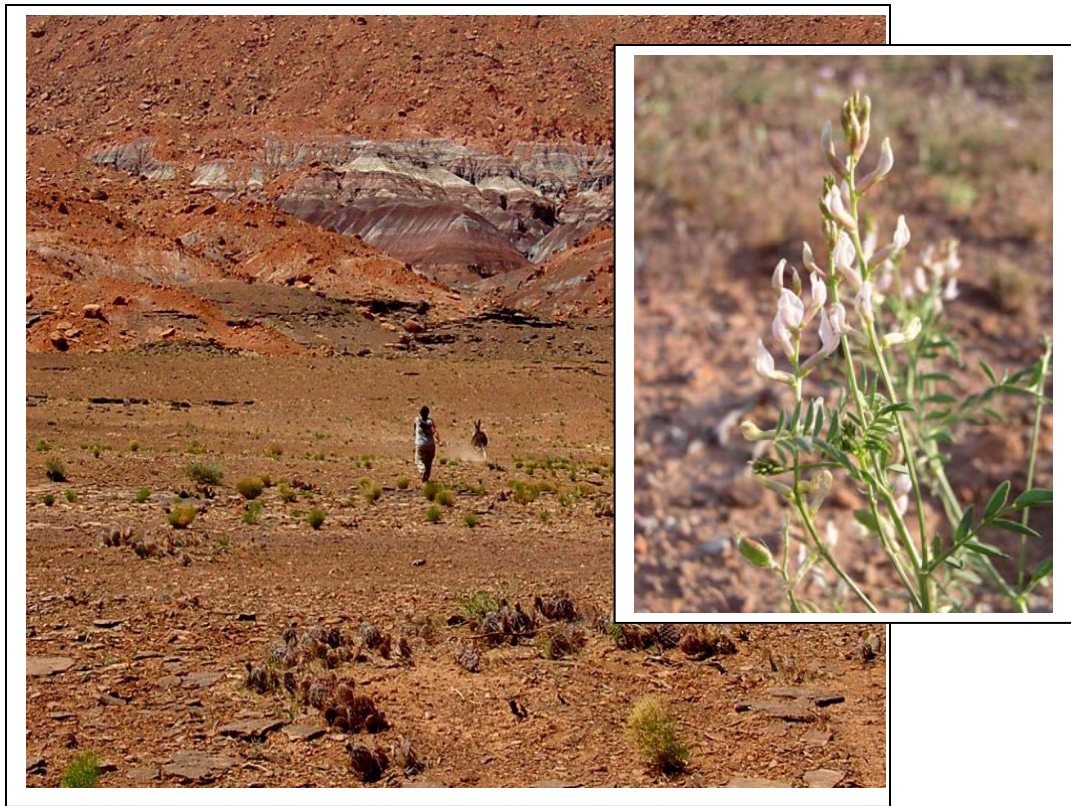


# Copper Canyon Milk-vetch (*Astragalus cutleri*)

Status and Monitoring Report  
**2009**



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## INTRODUCTION

The Copper Canyon Milk-vetch or Cutler Milk-vetch was first described by Rupert Barneby as *Astragalus preussii* A. Gray var. *cutleri* Barneby in 1986 (Great Basin Naturalist 46: 256, 1986) then later raised to species level by Stan Welsh to *Astragalus cutleri* (Barneby) Welsh (Great Basin Naturalist 58(1): 45 -53, 1998). It was named after Hugh C. Cutler, who collected the type specimen in 1938, 1 mile from the mouth of Copper Canyon.

*Astragalus cutleri* is limited to warm desert shrub communities on sandy, seleniferous soils with level to moderate slopes, on the Shinarump and Chinle Formations. Mean annual rainfall over a 14-year period of consistent measurements at Monument Valley, AZ, is 4.20 inches/year with a recorded high of 6.07 inches (1996) and a low of 1.08 inches (1988). The majority of annual precipitation occurs during the monsoon months between July and October (Western Regional Climate Center 2008). Known populations of *Astragalus cutleri* occur from ca. 3700ft to 4700 ft elevation in the vicinity of the San Juan arm of Lake Powell in San Juan County, Utah. Management responsibilities lie with the Navajo Nation and the Glen Canyon National Recreational Area (National Park Service). Associated species include *Phacelia crenulata*, *Bromus rubens*, *Ephedra torreyana*, *Chaenactis stevioides*, *Eriogonum inflatum*, *Schismus arabicus*, *Gutierrezia sarothrae*, *Erodium cicutarium*, *Atriplex confertifolia*, *Psoralea fremontii*, *Astragalus amphioxys*, *Calochortus flexuosus*, *Sphaeralcea* and *Opuntia* sp.

Although the Copper Canyon Milk-vetch grows in very remote areas, it is severely impacted by feral burros that are ubiquitous in remote areas on the Navajo Nation, especially along the San Juan River corridor from Chinle Wash to Piute Canyon. Because of this immediate threat to the Navajo Nation populations, *Astragalus cutleri* was listed as endangered on the Navajo Nation Endangered Species List in 2005. It has a Global Heritage Rank of G4T1T2 and a Navajo Nation Natural Heritage Rank of S1 (Utah S1S2). It is not listed under the federal Endangered Species Act.

## TECHNICAL DESCRIPTION

**Plant Description:** Moderate, caulescent, short-lived perennial, often flowering as an annual, 10 – 35 cm tall, from a superficial caudex. Stems few to several, ascending to erect, forming bushy clumps. Stipules distinct, 2 – 6.5 mm long; leaves 3 – 13cm long, leaflets 5 – 17 (19), 3 – 17 (20) mm long, (3) 5 – 12 mm broad, elliptic to lanceolate, oblanceolate, or obovate, acute to obtuse or mucronulate, strigulose to glabrous below, glabrous above. Flowers 15 – 16 mm long, white or tinged (or drying) purplish. Pods ascending to erect, stipitate, the stipe 3 – 3.5 mm long, the inflated pod oblong-ellipsoid, 14 – 18 mm long, 9 – 11 mm thick, the valves thinly cartilaginous, greenish suffused (sometimes) with purple, unilocular, glabrous. Flowering and fruiting period is from mid April to early June.

**Similar Species:** Similar to *Astragalus preussii* but differing in a smaller stature, pallid, whitish flowers with a faint blue tinge, and fewer leaflets.

## **SURVEY HISTORY**

*Astragalus cutleri* is only known to occur in 3 locations in San Juan County, UT. Populations are restricted to the mouths of Copper and Nokai canyons on the San Juan River arm of Lake Powell on the Navajo Nation and to the mouth of Castle Creek, across the lake from the main populations, on lands managed by the Glen Canyon NRA. A collection N.D. Atwood from 1997 places this species also in the vicinity of the Clay Hills boat take-out near the San Juan River. The Navajo Nation site at the mouths of Nokai and Copper Canyons is the largest known population, likely containing 90% of the extant population.

A joint survey effort of the Utah Natural Heritage Program, the USFWS, Glen Canyon NRA and the Navajo Natural Heritage Program found ca. 300 plants in scattered populations in the vicinity of the mouths of Copper and Nokai canyons in 1990. This survey also located a few plants at the mouth of Castle Creek. No further surveys were conducted until 1998. Between 1998 and 2005, the Navajo Natural Heritage Program casually monitored this milk-vetch annually during the flowering period in April and May. In 1998, 6 small populations (up to 15 plants ea.) were found along the main dirt road within 3 miles of the mouth of Copper and Nokai canyons. In May of 1999 only one plant was located along the same stretch of road. This observation prompted a need for more detailed knowledge about population dynamics of this species. Following a relatively moist winter of 1999/2000 NNHP staff arrived at Copper Canyon in early May of 2000 to set up monitoring plots. No plants were found. No plants were found in 2000, 2001 or 2002 despite extensive survey efforts throughout the area. In April and May of 2003, after an another extensive search throughout the area, 2 plants were located widely scattered from each other near the mouth of Nokai Canyon and 4 plants were found on the east side of Copper Canyon. In May of 2004, 5 populations of *Astragalus cutleri* were found in various locations near the mouths of Copper and Nokai canyons, containing between 1 and 50 plants each.

The winter of 2004/2005 was an unusually wet winter throughout northern Arizona and southern Utah and another attempt was made to establish monitoring plots in the Copper Canyon area. In May of 2005 *Astragalus cutleri* was found to be abundant near the mouths of Copper and Nokai canyons, scattered throughout in small to very large populations containing thousands of plants.

## **METHODS**

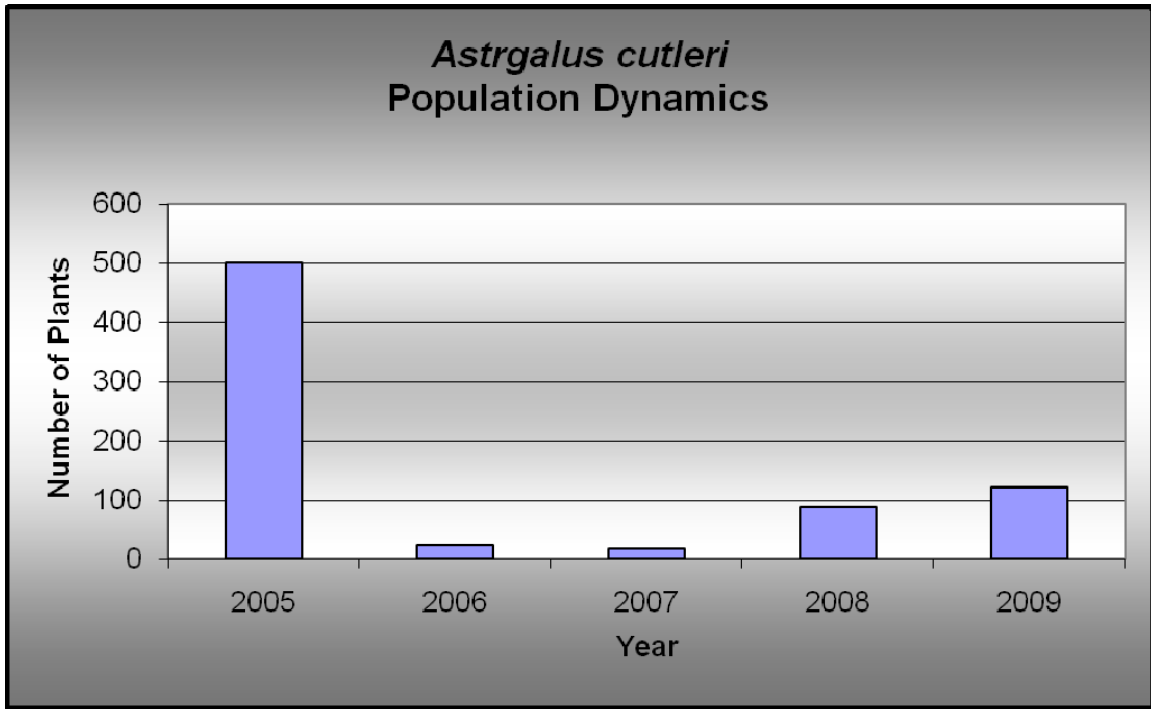
On May 5, 2005, two monitoring plots were established at the mouths of Copper and Nokai canyons, measuring approximately 0.5 acres each. All *Astragalus cutleri* plants were counted within the perimeter of the two monitoring plots. Noted were reproductive stage (flowering, fruiting, sterile), life stage (annual, perennial), the number of dead plants and various comments pertaining to the population inside the plots (associated species, grazing evidence, insect predation, other disturbances). Since 2005, plots are monitored annually during the first week of May.

## RESULTS

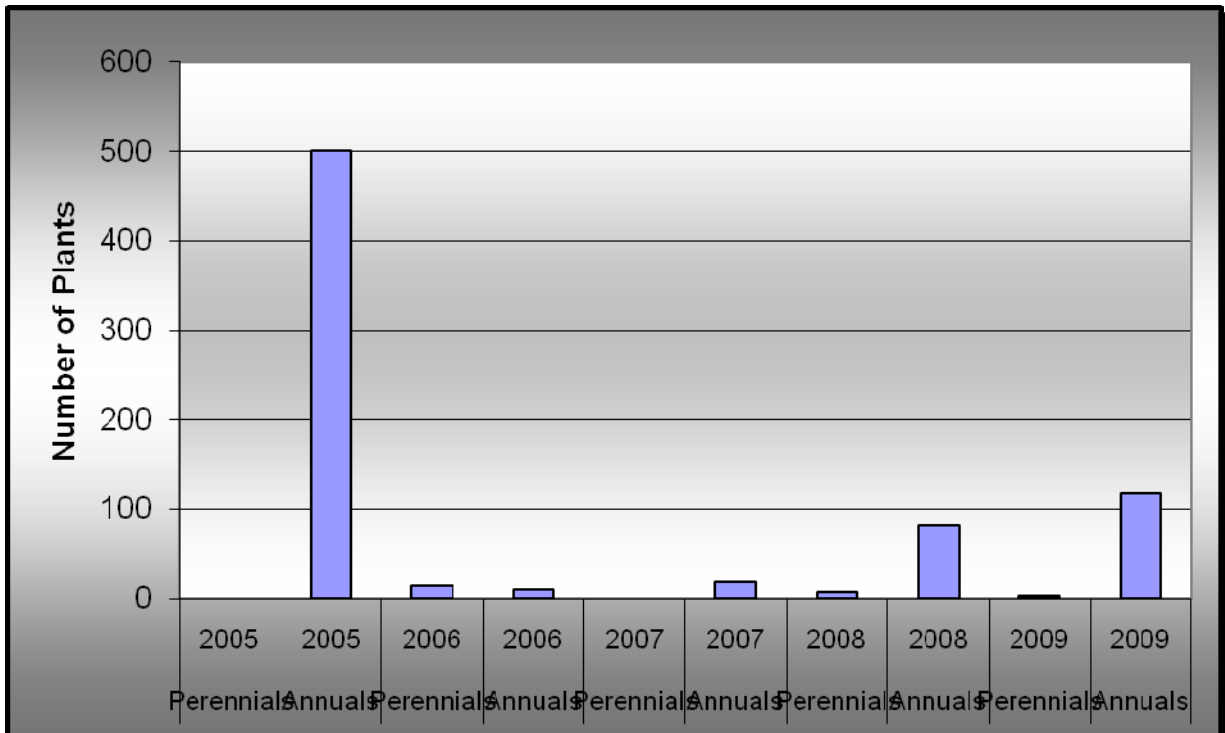
In 2005 a total of 501 plants were found within the 2 monitoring plots (Figure 1). Of those, none were considered perennial and 292 were reproductive (58%) (Figures 2 & 3). In 2006, only 25 plants were found to be alive in the 2 monitoring plots. Fourteen plants were considered to be perennials surviving from the previous year and 11 were considered to be annuals. Only 8 of the 25 plants found were reproductive (32%). By 2007, only 19 plants were counted in the monitoring plots, none of which were considered perennial plants. Of those 19 plants 9 were flowering (47%). Most plants were small or seedlings, only one plant was rated medium in size. In 2008 a total of 89 plants were found within the 2 monitoring plots, the majority of which were non-reproductive seedlings (88%). Seven plants were considered perennial and 11 were found flowering and/or fruiting.

## CONCLUSION

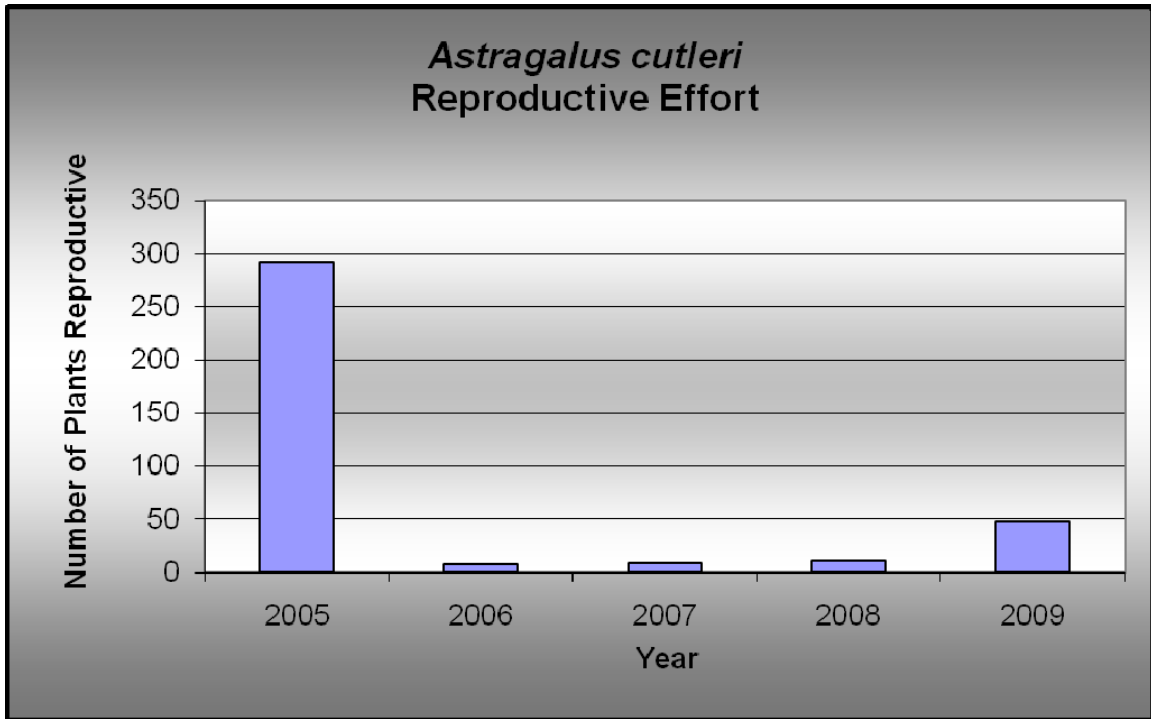
*Astragalus cutleri* is a weak perennial or annual plant that responds strongly to rainfall amount and timing. Apparently it can reside in the seed bank in the form of seeds for years with no or almost no plants visible over the entire known range of the species, then come out in the thousands when conditions are favorable. Unfortunately, *Astragalus cutleri* is an early spring species, often greening up and flowering when little or no other forage is available to feral burros. Burros were blamed for the disappearance of the species from the Copper Canyon area from 2000 to 2003. *Astragalus* species are generally considered toxic to livestock but can become addictive once grazed. Other threats include competition with annual invasive plant species such as *Bromus rubens*, *Schismus arabicus* and *Erodium cicutarium*. All of these are abundant in the area, neither of which appear palatable to feral burros. Demographic changes brought on by global climate change are as of yet unpredictable but may negatively impact this species and many other rare species that live in a very delicate balance with nature. Removal and management of feral burros in the Copper and Nokai canyon areas is essential to maintain populations of *Astragalus cutleri* on the Navajo Nation. Long term continued monitoring is necessary to fully understand the population dynamics of *Astragalus cutleri* and to evaluate the potential impacts from feral burros, exotic species and global climate change.



**Figure 1.** Number of *Astragalus cutleri* plants in 2 monitoring plots at Copper and Nokai canyons, San Juan County, UT, 2005 – 2009.



**Figure 2.** Life stages of *Astragalus cutleri* plants in 2 monitoring plots at Copper and Nokai canyons, San Juan County, UT, 2005 – 2009.



**Figure 3.** Reproductive effort of *Astragalus cutleri* plants in 2 monitoring plots at Copper and Nokai canyons, San Juan County, UT, 2005 – 2009.

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