

Astragalus beathii

Beath's Milk-vetch

STATUS REPORT

2004

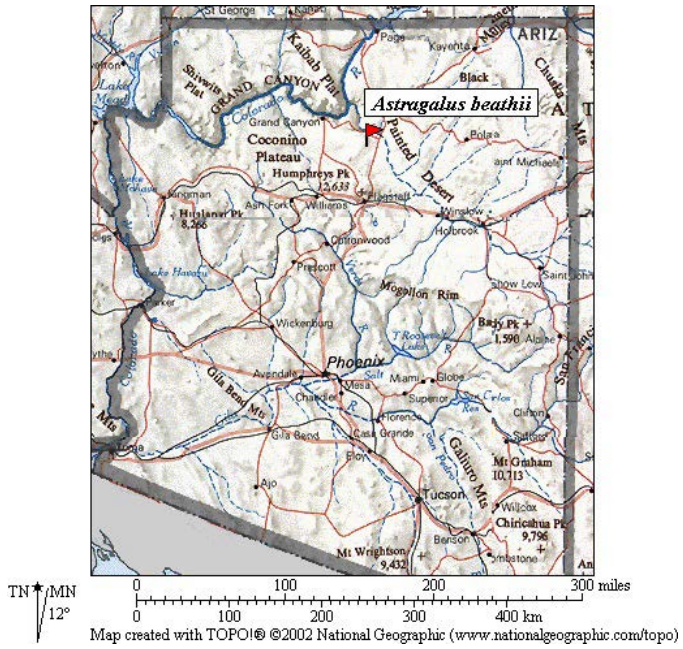


**Daniela Roth
Navajo Natural Heritage Program
P.O. Box 1480
Window Rock
AZ 86515**

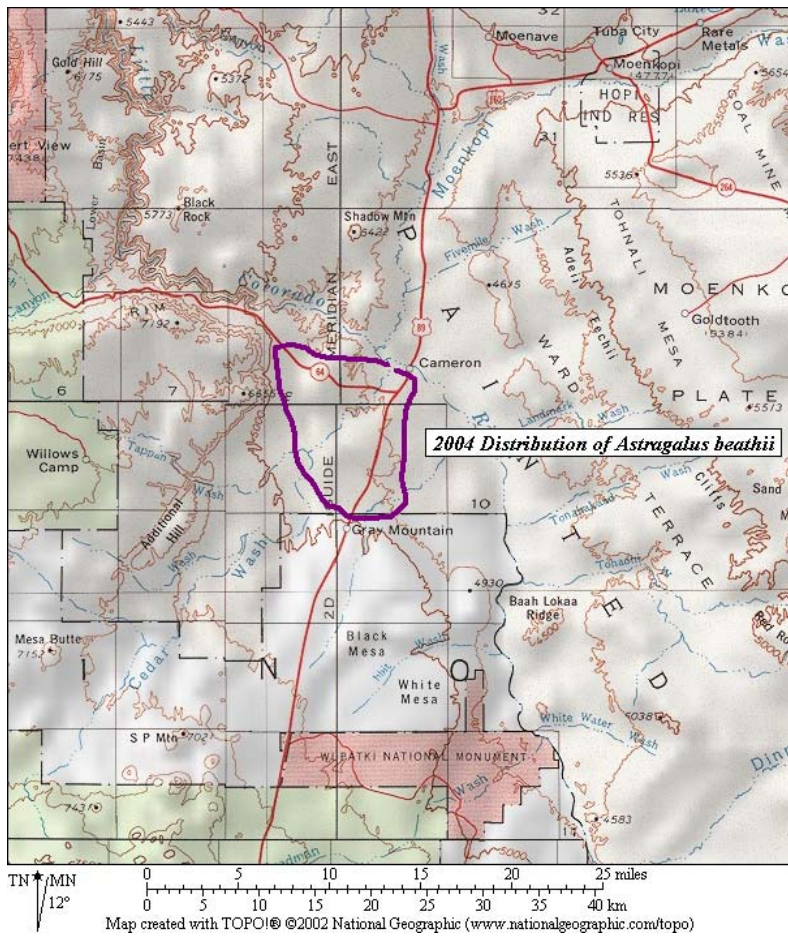
INTRODUCTION

The Beath milk-vetch (*Astragalus beathii* Porter) was first collected in 1939 and described by C.L. Porter in 1941 (Porter, 1941). It was named after the original discoverer of the species, Orville Andrew Beath, a research chemist at the University of Wyoming, noted for his work on selenium occurring in plants.

A. beathii was listed as a Candidate Species, Category Two, in 1980 (Fed. Reg. 45 (242)). A status report by Brian and Phillips (1982) did not recommend this species for listing because of the abundance of habitat and the difficulty in determining the population sizes. No further survey work has been done since this time. However, casual observations in the habitat of Beath's milkvetch and the evident misidentification of specimens in local herbaria have let us to question the status of this species. *Astragalus beathii* is a weak perennial or annual which responds strongly to rainfall. It was reported to be abundant in wet years and rare during less favorable springs. It appears to be restricted to seleniferous soils derived from Moenkopi shale. Although there is a large area of this substrate exposed between Gray Mountain and Marble Canyon, existing information indicated that the same populations along the roadside were sampled repeatedly and there was little evidence of its existence away from major highways. This study was proposed to get a better understanding of the abundance and distribution of *Astragalus beathii* over a 2 year period, documenting populations through different spring rainfall events.



2004 global distribution of *Astragalus beathii*



Arizona map detail

TECHNICAL DESCRIPTION

Family: Fabaceae

Synonyms: none

Plant Description

Astragalus beathii is a coarsely robust, weak perennial, with stiff appressed hairs when young but becoming glabrous with age. Stems are several to numerous from 2 – 6 dm long. The leaves are pinnate, 6 – 12cm long, shortly petioled with 11 – 21 narrowly elliptic-oblong to oblong obovate leaflets, 5 – 25mm long. The racemes are 10 – 27 flowered, rather dense at anthesis. Flowers 20 to 25mm long, petals are bright purple, the wing tips paler or often white. Pods deflexed, sessile or nearly so, oblong-ellipsoid, leathery, hairless, straight, 2.5 – 3.9mm long, 7 – 11mm in diameter.

Similar Species:

Astragalus beathii resembles *A. preussii* in stature and flower size. The closest known populations of *A. preussii* is in northern Coconino Co., in the vicinity of Navajo Bridge at Marble Canyon. The pods of *A. preussii* are stipitate and are erect or ascending

Phenology:

Flowering takes place from mid March to early May. Some plants may also germinate and flower during the monsoon season in late July and August.

Habitat:

Astragalus beathii grows on red clay knolls and gullied washes on selenium rich soils derived from Moenkopi sandstone at 4000 to 4800ft.

Associated species: *Ephedra torreyana*, *Gutierrezia sarothrae*, *Chrysothamnus sp.*, *Atriplex confertifolia*, *Stanleya pinnata*.

Associated sensitive or rare species: *Phacelia welshii*, *Cympterus megacephalus*, *Amsonia peeblesii*, *Astragalus sophoroides*.

Distribution

Astragalus beathii is only known from a few locations in central Coconino County, AZ, on Navajo Nation lands.

Responsible Agencies:

Navajo Nation, ADOT

STATUS

Astragalus beathii has no federal status. As a result of this report, it is proposed to be listed on the 2005 Navajo Endangered Species List in Group 4 (G4, candidate).

GENERAL ASSESSMENT

METHODS

Surveys were conducted during April and May in 2003 and 2004. In 2003, all Element Occurrence Records and herbarium records were re-surveyed. The three extant populations were again surveyed in 2004 to get an understanding of population variability through time. In addition, appropriate habitat was surveyed just north and northwest of Gray Mountain to south of Cedar Ridge and again in the vicinity of Marble Canyon south of Navajo Bridge. The objective was to determine the distribution of *Astragalus beathii* on the Navajo Nation, estimate population size and parameters, biotic and abiotic habitat characteristics as well as potential threats. Survey boundaries were determined by potential habitat. Herbarium surveys were conducted at Northern Arizona University (ASC), the Navajo Nation Herbarium (NAVA), and the Museum of Northern Arizona (MNA).

RESULTS

Eleven populations are on record with the Navajo Natural Heritage Program, one of these is a new record from 2003/2004 surveys. All known sites were re-located to the extent possible in 2003 and 2004. Surveys at six known locations were negative, three of which were determined to be incorrect identifications. 2 locations were too vague for resurveys and should perhaps be combined with more detailed reports. 3 populations were located during the surveys, one of which was new.

Surveys during the wet spring of 2003 and herbarium research have found that populations reported from the Navajo Bridge/Marble Canyon area were misidentified *Astragalus preussii*. Only *A. preussii* was found in the Marble Canyon area and three Museum of Northern AZ herbarium specimens from Marble Canyon were annotated to *A. preussii*. Two other reported and vouchered sites were determined to have been misidentified from herbarium specimens (NAVA, ASC). Both were located north of Cameron. Several attempts to relocate a properly identified and mapped population northwest of Cameron have failed. There appears to be only three currently extant populations, one of which was newly recorded in 2003. Extant populations are located between Gray Mountain and Cameron along US HWY 89 and ca. 5 miles west of Cameron along State HWY 64. One new population was found SW of Cameron off the highway.

Observations through the 2 survey years indicate that although the species is locally much more abundant during wet springs, many of the seedling plants do not reach the reproductive stage and do not survive into the following year. Estimated change in plant numbers from 2003 to 2004 is 70 – 90% fewer individuals in 2004 over 2003 at all three sites.

THREATS

A. Habitat Destruction or Modification:

Habitat modifications are possible through road construction and the introduction of invasive species. Tamarisk (*Tamarix sp.*), Russian thistle (*Salsola kali*), Camelthorn (*Alhagi maurorum*) and diffuse knapweed (*Centaurea diffusa*) have been observed in close proximity of *Astragalus beathii*.

B. Disease or Predation:

No predation of plants was observed in the field. Seeds pods contained a species of weevil which was eating the seeds. No livestock damage other than trampling was observed. A fungus apparently obliterated a population of *A. beathii* west of Cameron. Future fungus outbreaks could impact the continued existence of this species because the three extant populations lie within 5 miles of each other.

C. Over utilization for commercial, sporting or scientific purposes:

None known

D. Inadequacy of existing regulatory mechanisms:

Astragalus beathii is currently not protected by federal, state or tribal laws.

E. Other natural or manmade threats

Two of the three known populations are bisected by paved roads, one of which is scheduled to be widened within the next several years. Off-road vehicle traffic will likely impact all populations in the future due to the proximity of human inhabitations. Effects of drought and global climate change are at this point not quantifiable.

CONCLUSION & RECOMMENDATIONS

This survey has resulted in substantially shrinking the known range for *Astragalus beathii*. Previously reported populations from Marble Canyon turned out to be misidentifications. No populations were found north of Cameron. Repeated efforts in trying to relocate a population north of the Little Colorado River failed despite excellent location and habitat information and the presence of a properly identified specimen.

Even though individual plants can number in the thousands during a wet year, only 3 populations of *A. beathii* were found during the 2 survey years. Plant numbers varied widely within the three populations from one year to the other. *A. beathii* appears to be highly restricted to shallow washes and benches composed of red Moenkopi Shale. It is unclear what happened to the 3 vouchered locations that could not be relocated. Two were along roads and could have been impacted by roadside herbicide spraying. One of the populations was reported to have succumbed to a fungus. One population north of the Little Colorado River was located in a low impact, remote site. Perhaps some of these were founder populations that came in during wetter years but failed to establish new populations. Long term monitoring studies are highly recommended to track the fate of populations through time.

REFERENCES

Brian, N.J. and B.J. Phillips. 1982. Status report: *Astragalus beathii* Porter. Submitted to the Office of Endangered Species, USDI, U.S. Fish & Wildlife Service, Albuquerque, NM. 12pp.

Barneby, R.C. 1964. Atlas of the North American *Astragalus*, Part I. Memoirs of the New York Botanical Garden Vol. 13. New York Botanical Garden, Bronx, NY.

Porter, C.L. 1941. A new species of *Astragalus* from Arizona. Madroño Vol. 6: 18-22.

Table 1. Summarized results of surveys for *Astragalus beathii* on the Navajo Nation.

EOR #	Surveys		Status					
	First	Last	P	A	V	T	I	X
1	1981	2003	N					
2	1939	2004	X	H	V	R, G	M	X
3	1957	2004	N					
4	1985	2004	N					
5	1978	2004	N					
6	1972	2004	N					
7	1994	2004	N					
8	1994	2003	X	M	V	R,G	M	N
9	1973	2003	N					
10	1997	2003	N					
11	2003	2004	X	H	V	R, O, G	M	N

Key:

EOR# = element occurrence record number

First = year site was first surveyed

Last = year site was last surveyed

P = presence: extant (X), absent (N)

V = vigor: vigorous (V), not vigorous (N)

A = abundance: > 1000 plants (H), 500 - 999 plants (M), 100 - 499 plants (L), < 100 plants (VL)

T = Threats: R = proximity of road, O - off-road vehicle traffic, G = grazing/trampling

I = Impacts: heavy (H), medium (M), light (L)

X = invasive species noted: yes (X), no (N)

Appendix I. *Astragalus beathii* phenology and habitat



Astragalus beathii, flowers & maturing seed pods



Mature plant with seed pods and flowers



Juvenile flowering plants



Juvenile flowering plant



Astragalus beathii habitat