

**Inventory of *Astragalus barrii* Barneby (Barr's milkvetch)
in the Spring Creek Unit of Thunder Basin National Grassland**



Prepared for:

John Proctor
Medicine Bow/Routt National Forests
100 N. Main Street
Walden, CO 80480

Prepared by:

Bonnie Heidel
Wyoming Natural Diversity Database
University of Wyoming
Dept 3381, 1000 E. University Avenue
Laramie, WY 82071

January 2004

Abstract

Astragalus barrii Barneby (Barr's milkvetch) was surveyed in the Spring Creek Unit of Thunder Basin National Grassland in May 2003 to determine its status in the Unit, to develop and implement survey techniques, and to familiarize Forest Service personnel with the species and techniques. Surveys were developed using photo-interpretation and ground-truthing. Three occurrences were documented in the Spring Creek Unit and one directly adjoining the Unit. *Astragalus barrii* is highly restricted in the Unit and on the landscape, where it occurs only on ridges and knolls with calcareous soils that have limited profile development.

Acknowledgements

The interest, support, and information provided by John Proctor (Medicine Bow National Forest) are gratefully acknowledged. Katherine Zacharkevics (Black Hills National Forest) and Kurt Statton (Medicine Bow National Forest – Douglas District), and colleagues contributed their interest and expertise to this project. Peter Ebertowski, University of Wyoming graduate student, also contributed time and survey data. Carol Tolbert (Medicine Bow National Forest) provided the most current surface ownership data for the Spring Creek Unit. Rob Thurston (Wyoming Natural Diversity Database; WYNDD) created the GIS maps used in the interim and final reporting of project results. Tessa Dutcher (WYNDD) helped process the new element occurrence records.

This pilot study was conducted as a challenge cost-share between the Medicine Bow National Forest and Wyoming Natural Diversity Database.

Citation for this report:

Heidel, B. 2004. Inventory of Barr's milkvetch (*Astragalus barrii*) in the Spring Creek Unit of Thunder Basin National Grassland. Prepared for Medicine Bow National Forest, Wyoming Natural Diversity Database, Laramie.

Cover photo: *Astragalus barrii*, above Duck Creek, by B. Heidel

Table of Contents

Introduction.....	1
Study Area.....	1
Methods.....	4
Results.....	6
Discussion.....	17
Literature Cited.....	17

Figures

- Figure 1. Current distribution of *Astragalus barrii* (Barr's milkvetch) in Wyoming, including the results of the 2003 field season
- Figure 2. Documented distribution of *Astragalus barrii* (Barr's milkvetch) in the Spring Creek Unit of Thunder Basin National Grassland
- Figure 3. *Astragalus barrii* above Little Powder River
- Figure 4. Low ridge outcrop supporting *Astragalus barrii*
- Figure 5. Close-up of ridge outcrop habitat for *Astragalus barrii*
- Figure 6. *Astragalus barrii* above Duck Creek, with swallowtail visitor
- Figure 7. *Astragalus barrii* harsh habitat
- Figure 8. *Astragalus barrii* typical suite of habitats
- Figure 9. Field workshop in *Astragalus barrii* identification and survey techniques
- Figure 10. *Astragalus barrii* habitat above Duck Creek breaks
- Figure 11. Unimproved road through *Astragalus barrii* habitat above Duck Creek breaks
- Figure 12. *Astragalus hyalinus*, vegetative plant above Duck Creek breaks
- Figure 13. Close-up of *Astragalus hyalinus*, in flower

Appendix

- Appendix A. Color aerial photo of *Astragalus barrii* habitat, Spring Creek Unit (1:24,000)
- Appendix B. Shaded relief topographic maps were printed out from GIS files by John Proctor, Medicine Bow National Forest
- Appendix C. Medicine Bow National Forest Survey Summary Form
- Appendix D Plant Species of Concern Survey Form.
- Appendix E. New Element Occurrence Records for *Astragalus barrii* in the Spring Creek Unit of Thunder Basin National Grasslands

Inventory of Barr's milkvetch (*Astragalus barrii*) in the Spring Creek Unit of Thunder Basin National Grassland

Introduction

Astragalus barrii (Barr's milkvetch) is a sensitive species of the U.S. Forest Service in the Rocky Mountain Region (USDA Forest Service 2003). Systematic inventory of *Astragalus barrii* was conducted in the Spring Creek Unit of Thunder Basin National Grassland (TBNG) in 2003 to determine its status in the Spring Creek Unit, to develop and implement survey techniques, and to familiarize Forest Service personnel with the species and these techniques. The project is briefly described in this report, and accompanied by maps, photographs, and supporting documentation.

Study Area

The Spring Creek Unit of the Thunder Basin National Grassland (TBNG) is an outlying area north of the main part of the TBNG. It spans an area of 14x14 miles (196 miles²). This Unit and the entire TBNG represents a mosaic of federal, state, and private lands, once settled under the Homestead Act, with later land purchases authorized under the Bankhead-Jones Farm Tenant Act, and subsequent transfer of federal lands to the USDA Forest Service in 1954. The study area was defined as only those lands under Forest Service management.

The Spring Creek Unit lies within the Powder River Basin, and is located mainly in the drainage of the Little Powder River. It is situated entirely within Campbell County except for one half of one section in Crook County. The location of the Spring Creek Unit and the locations of newly-documented *Astragalus barrii* occurrences are presented in Figures 1 and 2.

The Powder River Basin contains the Fort Union and Wasatch Formations, which are Paleocene marine deposits of mudstones, siltstones, sandstones, and shale thousands of feet thick. The study area is mapped as the Lebo and Tullock members of the Fort Union Formation (Love and Christiansen 1985). These formations are very widespread across the Basin and the strata are in continuous planes over large areas, but the strata vary greatly with depth, and the diversity of substrates is exposed in an array of landforms carved by the forces of erosion.

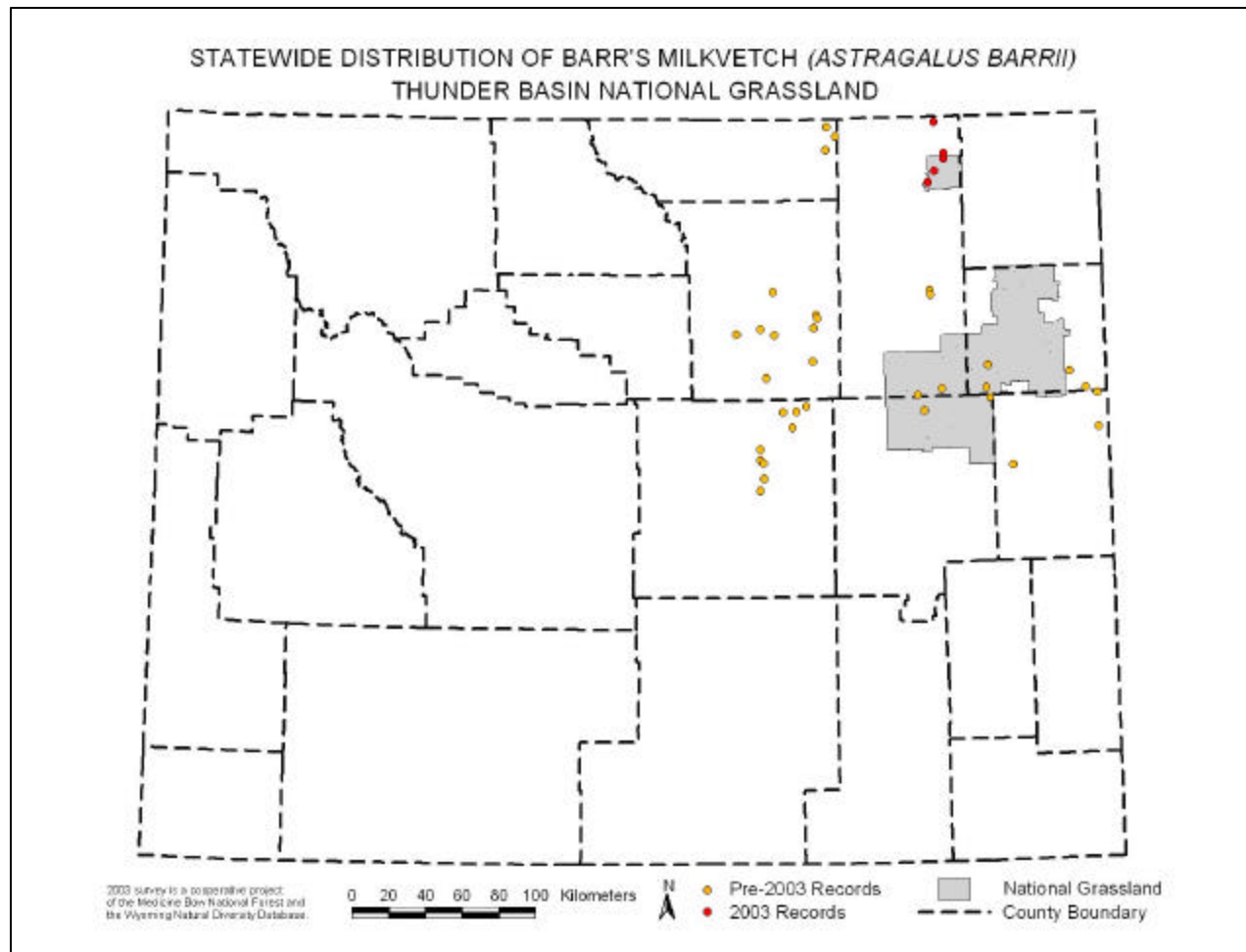


Figure 1. Current distribution of *Astragalus barrii* (Barr’s milkvetch) in Wyoming, including the results of the 2003 field season

Soils maps were not available for this study. Close correlations between *Astragalus barrii* habitat and particular combinations of soil series and topographic settings have been documented elsewhere (Schassberger 1988, Heidel and Marriott 1996, Fertig 2001, Heidel et al. 2002). The unifying characteristics are the upper- and mid-topographic positions, calcareous nature, and limited soil development. The soils often have a silt component but textures range from silty and thin clayey soils to sandy soils. Soil characteristics were considered on the ground even though soils maps were not available for identifying and sorting alternative field survey sites.

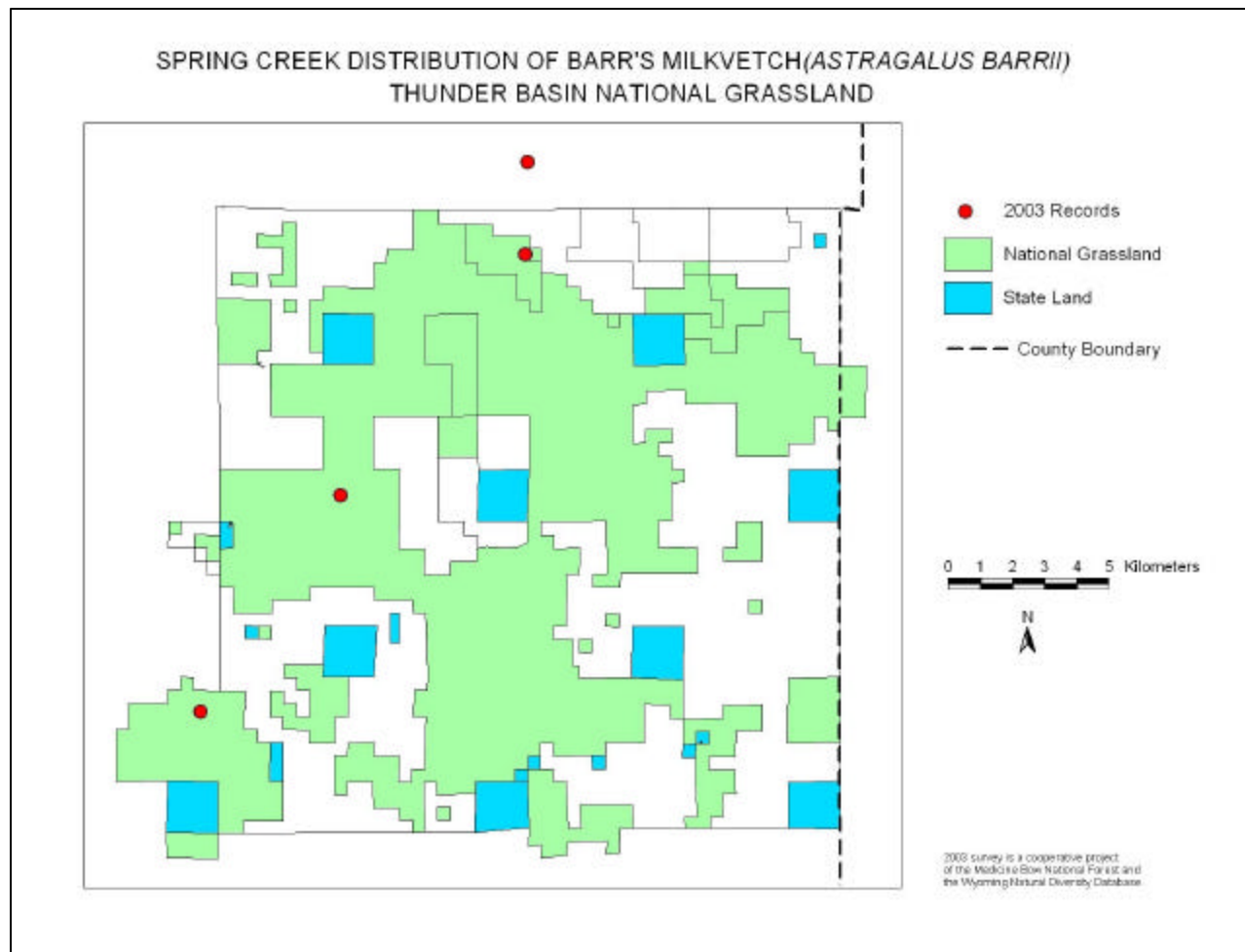


Figure 2. Documented distribution of *Astragalus barrii* (Barr’s milkvetch) in the Spring Creek Unit of Thunder Basin National Grassland

Vegetation of the TBNG is characterized as mixed grass prairie (Knight 1994), variously co-dominated by midheight grasses such as *Elymus smithii* (western wheatgrass) and *Stipa comata* (needle-and-thread), along with short grasses or graminoids such as *Bouteloua gracilis* (blue grama) and *Carex filifolia* (threadleaved sedge). There have been many different vegetation and botany studies on the TBNG but the first systematic effort to document the flora has only recently been undertaken (Ebertowski et al. in progress). Vegetation mapping was not available for the study area, much less at a scale for survey purposes. National Wetland Inventory mapping was carried as a reference in considering those rare species of northern Campbell County that are wetland species in particular.

Methods

Color aerial photos (1:24,000) of the study area were temporarily loaned by the U.S. Forest Service – Medicine Bow National Forest (MBNF) in Laramie. Each aerial photo copy was studied to identify the largest areas of outcrops and the range of topographic positions that contained outcrops across the study area. An example of the aerial photo is presented in Appendix A, with an arrow pointing to *Astragalus barrii* habitat. Outcrop outlines were sketched onto the Thunder Basin map (1:126,720) and cross-referenced to U.S.G.S. topographic maps (1:24,000). Twelve topographic maps encompassed the study area. Provisional survey areas were cross-checked against the revisions to the surface land management status provided by MBNF to consistently address U.S. Forest Service lands.

GIS maps with shaded relief and topographic contour lines were printed out in 4-section increments by MBNF and provided with survey forms for recording survey data (survey routes, findings or negative data) in all areas surveyed. An example of the shaded relief map is presented in Appendix B, along with the Medicine Bow survey form in Appendix C. A total of 23 ground-truthing surveys were conducted (traverses on foot ranging in distance from 0.1-3.5 miles) by the author, in addition to at least four surveys by other investigators. The WYNDD-generated survey form records are submitted separately from this report.

The survey was conducted by Bonnie Heidel, Wyoming Natural Diversity Database (WYNDD) from May 24-29, 2003, including the hosting of a field training workshop on May 28. The morning of the first day was spent in unsuccessful surveys that covered large portions of one of the most extensive ridge outcrop complexes south of ZV Creek. The afternoon of the first day covered one of the most heterogeneous outcrop systems, west of Weston, with over 500 feet of net topographic relief, contiguous with BLM-administered lands to west. Notes were taken on the substrate textures and appearance, and the associated sparse vegetation.

Information on the nearest records of *Astragalus barrii* in Wyoming had been brought along for reference, but there were no known Wyoming populations within 40 miles of the Spring Creek Unit. There are populations known at about 20 miles distance across the state line in Montana (Heidel et al. 2002) and the nearest site with easy access was briefly revisited on the

following day to check phenology and determine whether the Montana habitat for the species has stratigraphic overlap with the Spring Creek Unit. There is limited public land between the Montana populations and the Spring Creek Unit, but *Astragalus barrii* was also documented in the far northeastern corner of Campbell County at one road right-of-way, on the return back to the Spring Creek Unit that day.

It appears that the highest outcrops of the Montana populations correspond with the lowest outcrops in the Little Powder River valley of Spring Creek. There are few national grassland tracts along the valley, but *Astragalus barrii* was found that same day on the substrate most similar to that of the Montana population that was visited. In documenting the Spring Creek Unit population, it was censused, associated species were recorded, its extent was mapped, environmental parameters were noted, and both specimens and photographs were taken for documentation. The detailed survey information was recorded on a Wyoming sensitive plant survey form (Appendix D). References used in the field included Dorn (2001) and Flora of the Great Plains (1986).

There are ten other species of concern that are known or suspected from northern Campbell County (Table 1). They were also considered during this survey, though the habitat focus and timing of survey were not well-suited for them.

Table 1. Plant Species of Concern in Campbell County (known or suspected)

Scientific name	Common name	GRANK	SRANK
<i>Cyperus acuminatus</i>	short-point flatsedge	G5	S1
<i>Physaria lanata</i>	Woolly twinpod	G5T2	S2
<i>Polygala verticillata</i>	whorled milkwort	G5	S1
<i>Psilocarphus brevissimus</i>	dwarf woollyheads	G5T4?	S1
<i>Schoenoplectus heterochaetus</i>	slender bulrush	G5	S1
<i>Sesuvium verrucosum</i>	sea purslane	G5	S1
<i>Spiranthes diluvialis</i>	Ute ladies-tresses	G2	S1
<i>Sporobolus compositus</i> var <i>compositus</i>	longleaf dropseed	G5T5	S1
<i>Talinum parviflorum</i>	Fameflower	G5	S1
<i>Triodanis leptocarpa</i>	slim-pod Venus' looking-glass	G5?	S1

On May 28, seven Forest Service employees and the University of Wyoming graduate student conducting floristic surveys met with the WYNDD botanist for a brief introduction to

identification of *Astragalus barrii* and survey techniques. By this time, there were two populations of *Astragalus barrii* that had been documented, but the group only had time to visit the original (closest) population. The diagnostic species characteristics as presented on the state species abstract handout were reviewed in the field. The microhabitat for the species in the array of local outcrop habitats were presented along with survey tips.

Finally, members of the group broke into teams to survey additional potential habitat. Survey by 1-3 botanists continued in the afternoon and in the next two days. Two additional populations were documented. In addition, the similar species, *Astragalus hyalinus*, was discovered.

Results

Three populations of *Astragalus barrii* were documented in the Spring Creek Unit of TBNG in the northwestern and northcentral sectors. One additional population was documented on directly adjoining public land as a direct result of this project (Figures 1 and 2). The four populations were in three topographic/stratigraphic settings. While only one of the three settings has been thoroughly surveyed, that in the Little Powder River valley, it appears that the species has limited potential habitat in the Spring Creek Unit. The three settings include a silty orange substrate on crests of low ridges in the Little Powder River valley, the finger ridge crests capped by a silty tan substrate in the shale ridge complex, and a silty white substrate on gentle knolls and breaks along Duck Creek. With completion of this project as well as floristic work elsewhere in TBNG, there are not 43 *Astragalus barrii* occurrences currently known in Wyoming. There are a total of 9 occurrences on TBNG, not including those on other public lands within or near administrative boundaries.

Voucher specimens were collected at the two WYNDD-documented populations on Little Powder River and Duck Creek (*Heidel 2279, 2280, 2281*). Photographs were taken of *Astragalus barrii* and its habitat. The largest known populations are the two on Duck Creek, both estimated at over 600 plants. They may in fact be part of a larger population complex. John Proctor documented the population on TBNG after a nearby population was discovered en route to TBNG,

located on contiguous BLM and state tracts adjoining the Spring Creek Unit. It is interesting to note that the Little Powder River population shows signs of being eroded out on its gently-sloping habitat, and the plants are generally much smaller, whether due to difference in age or vigor (Figure 3). The Little Powder River population is on an uncharacteristically gentle low ridge (Figure 4), and only a sparsely-vegetated segment of it supports the species (Figure 5).

The sparsely-vegetated slopes occupied by *Astragalus barrii* vary in composition over short distances, so an associated species list may vary depending on the distances used in drawing up the associates. Characteristic associates include *Artemisia tridentata* ssp. *wyomingensis* (Wyoming big sagebrush), *Elymus lanceolatus* (thickspike wheatgrass; often vegetative), *Stenotus acaulis* (cushion goldenweed), *Musineon divaricatum* (leafy musineon), *Gutierrezia sarothrae* (broom snakeweed), and *Hymenoxys richardsonii* (Richardson's hymenoxys). The associated species at the four occurrences in the study area are presented in Table 2. In addition, there is often, but not always *Xanthoparmelia* spp. lichen cover present. These foliose lichens are widespread on the plains and not confined to specific substrates.

The Duck Creek populations were on more exposed outcrops although the individual plants in these populations were considerably larger and apparently more vigorous than those in the Little Powder River population (Figures 6 and 7). They also occupied a suite of microhabitats on different slopes, positions, and aspects (Figure 8).

The training in field identification and survey techniques focused on the species in flower, its habitat, and use of the Forest Service color aerial photos (Figure 9). The following pages illustrate the species and habitat characteristics.

Astragalus barrii above Little Powder River



Figure 3. *Astragalus barrii* above Little Powder River.
Note the small stature and erosion undercutting compared to cover photo.
Photo by B. Heidel

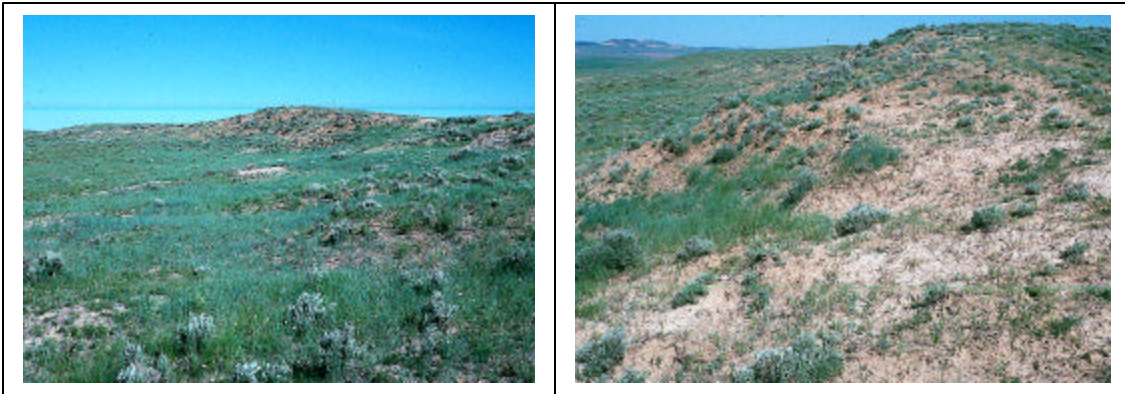


Figure 4. Low ridge outcrop supporting
Astragalus barrii (center, on horizon).
Photo by B. Heidel

Figure 5. Close-up of ridge outcrop habitat
for *Astragalus barrii*, as shown in Figure 6.
Note whitish orange color, silty texture.
Photo by B. Heidel

Astragalus barrii above Duck Creek



Figure 6. *Astragalus barrii* above Duck Creek, with swallowtail visitor
Photo by B. Heidel

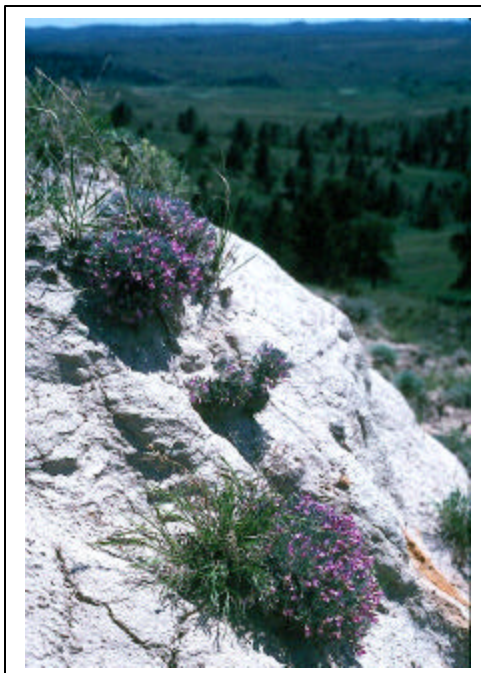


Figure 7.
Astragalus barrii does not occupy highly-eroded slopes or south-facing slopes, but it does occupy slope segments that may be very harsh habitat. Photo by B. Heidel

Astragalus barrii habitat above Duck Creek

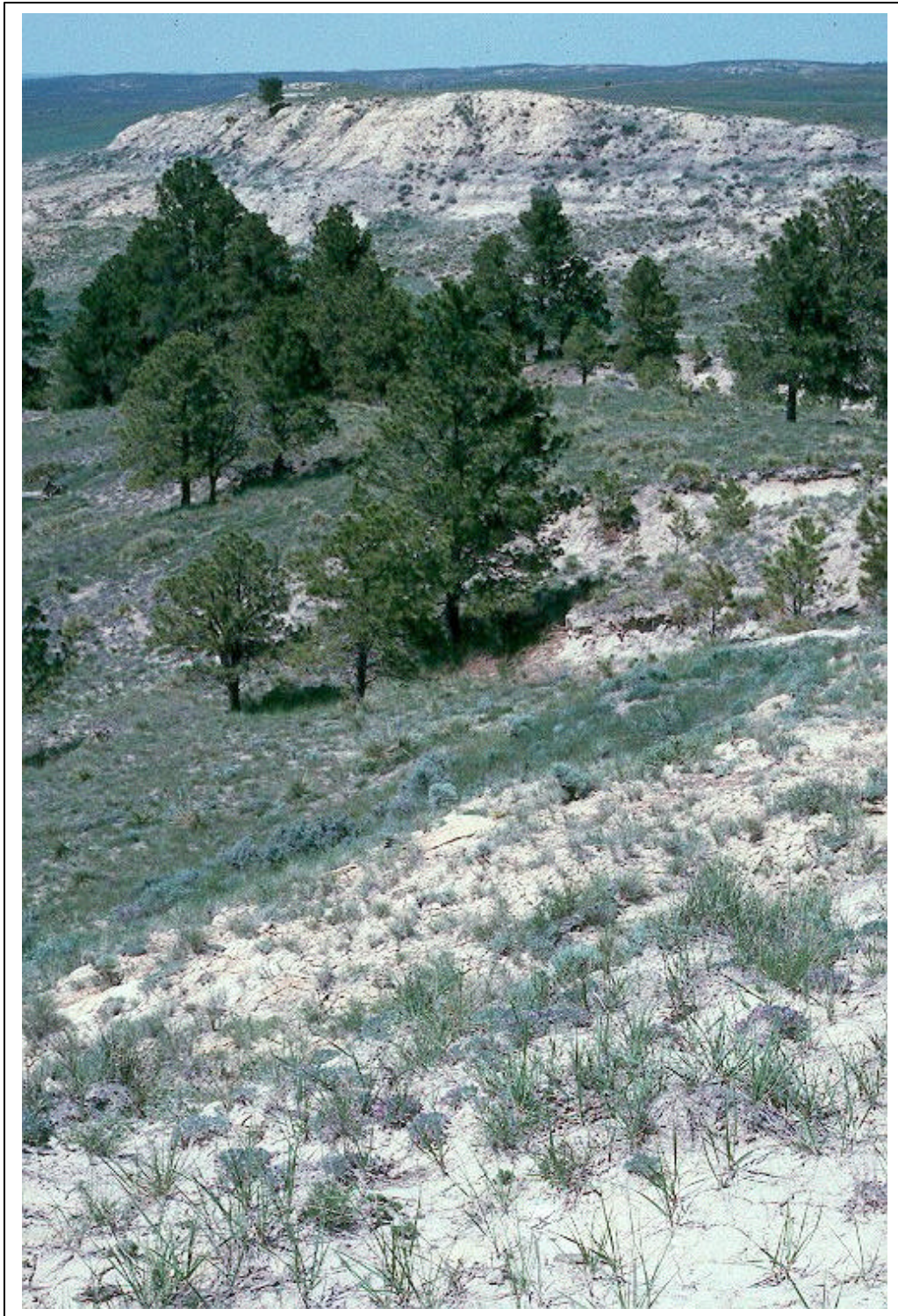


Figure 8. *Astragalus barrii* typical suite of habitats, including the gently-sloping northwest-facing ridge in the foreground, at the abrupt slope crest in the background, and on the background ridgetop. Photo by B. Heidel



Figure 9. Field workshop in *Astragalus barrii* identification and survey techniques, in *Astragalus barrii* habitat above the Little Powder River. Photo by B. Heidel

Note the ridgeline on the horizon of this photo. It has extensive shale outcrop habitat, but is a higher strata than the foreground. The only suitable habitat for *Astragalus barrii* on the ridgeline is on top one or few finger ridges. *Astragalus barrii* was later located there by Peter Ebertowski.

Subsequent expansion of *Astragalus barrii* records above Duck Creek breaks



Figure 10. *Astragalus barrii* habitat above Duck Creek breaks (at horizon).
Photo by John Proctor



Figure 11. Unimproved road through *Astragalus barrii* habitat above Duck Creek breaks
Photo by John Proctor

One of the special challenges of this project was the documented presence of the similar species, *Astragalus hyalinus* in the Spring Creek Unit (Figure 14). It is known from Campbell County (Dorn 2001, Hartman and Nelson 2003), but was not known from the Spring Creek Unit until the field training time. This is a species with a cream flower color and that flowers in late June, but resembles *A. barrii* in vegetative condition. They may be further distinguished by calyx length (3.5-5mm vs. 5.5-7) and peduncle length (7-24 vs. 0-3.5) if vestiges of fruits are available. Figure 14 was taken by Katherine Zacharkevics in the Spring Creek Unit, and Figure 15 was taken of the species in flower elsewhere in its range a month later. The photo by Zacharkevics was accompanied by a specimen with a fruit remnant that had a calyx of 6 mm and no peduncle remnant; it is unusual to find vestiges of fruits from the previous growing season so the taxonomic status of this record in T55N R70W Section 19 is not resolved with certainty and requires revisit during flowering for resolution. The complete set of traits for distinguishing the two species is presented in Table 3 (from Heidel and Marriott 1996). In general, *A. hyalinus* forms flat-topped mats that may be larger in diameter than *A. barrii*, and has a habitat preference for generally coarser sandy soils, but it is not possible to make the distinction with certainty when only vegetative material is available. The distinction is further complicated by the fact that morphological intermediates are occasionally found among populations of one or the other. The northernmost Duck Creek population had at least two cream-colored flowering milkvetch individuals among the population of *Astragalus barrii*, and a portion of one such plant was collected as a voucher for further evaluation (Heidel 2281).

Astragalus hyalinus



Figure 12. *Astragalus hyalinus* , vegetative plant above Duck Creek breaks
Note the sandstone substrate.

Photo by Katherine Zackarkevics



Figure 13. Close-up of
Astragalus hyalinus,
in flower

Photo by B. Heidel

Table 2. Characteristic associated species of *Astragalus barrii*, Spring Creek Unit

Site	EO Number	Associated Species
Little Powder River valley	038	<i>Musineon divaricatum</i> , <i>Stenotus acaulis</i> , <i>Astragalus gilviflorus</i> , <i>Elymus lanceolatus</i> , <i>Artemisia tridentat ssp wyomingensis</i> , <i>Machaeranthera grindelioides</i> , <i>Allium textile</i> , <i>Lesquerella arenosa var arenosa</i> , <i>Hymenoxys richardsonii</i> , <i>Antemmaria dimorpha</i> , <i>Carex filifolia</i> , <i>Elymus spicatus</i> .
Duck Creek (northern; on BLM and state lands)	039	<i>Eriogonum pauciflorum</i> , <i>Elymus lanceolatus</i> , <i>Artemisia tridentate ssp wyomingensis</i> , <i>Astragalus spathulatus</i> , <i>Stenotus acaulis</i> , <i>Phlox hoodii</i> , <i>Gutierrezia sarothrae</i> , <i>Allium textile</i> , <i>Commandra umbellata</i> , <i>Elymus spicatus</i> , <i>Erigeron pumilis</i> , <i>Lesquerella alpina</i>
Shale ridge south of ZV Creek	040	<i>Elymus spicatus</i> , <i>Commandra umbellata</i> , <i>Haplopappus grindelioides</i> , <i>Cryptantha spp</i> , <i>Musineon spp</i>
Duck Creek (southern)	041	<i>Elymus spicatus</i> , <i>Artemisia tridentata</i> , <i>Chrysothamnus nauseosus</i> , <i>Koeleria macrantha</i> , <i>Penstemon albidus</i> , <i>Erigeron pumilis</i> , <i>Machaeranthera grindelioides</i> , <i>Astragalus spathulatus</i> , <i>Allium textile</i> , <i>Kraschennikovia lanata</i> , <i>Gutierrezia sarothrae</i> , <i>Musineon divaricatum</i>

Table 3. Summary of characters for *Astragalus barrii*, *A. hyalinus*, and small-flowered population of *A. hyalinus* found in Custer National Forest study area (from Heidel and Marriott 1996).

	<i>Astragalus barrii</i>	<i>Astragalus hyalinus</i>	<i>Marriott 11545</i>
stipule pubescence	ciliate on margins	ciliate on margins	ciliate on margins
peduncle length	7-24 mm	none - 3.5 mm	none to very short
calyx tube	3.5-5 mm	5.5-7 mm	5 mm
banner length	10-16 mm	12-18 mm	10.5 mm
banner color	purple with light purple veins*	whitish corolla with purplish tips	yellowish-cream with purple veins
banner pubescence	very sparse dorsally to glabrous*	villous dorsally	strigose dorsally
wing length	9-13 mm	10-17 mm	slightly <10 mm
keel length	7.5-10 mm	10-13 mm	8.5 mm

All character descriptions for *A. barrii* and *A. hyalinus* are from Great Plains Flora Association (1986), with the exception of those with an asterisk (*), which are based on personal observations in the study area. All measurements of *Marriott 11545*, other than keel and banner length, were made on fresh material; these two characters were measured after specimens had dried.

The flowering periods of these two species are usually separated by at least three weeks. The timing varies by locale but *Astragalus barrii* usually flowers sometime within late May-early June and *A. hyalinus* within late June-early July.

Discussion

This project fills a gap in the known distribution of *Astragalus barrii* in Wyoming. The Spring Creek Unit contains less than 10% of the known *A. barrii* occurrences in Wyoming, and only the Duck Creek occurrences support a significant population size. However, they may be part of larger populations on the landscape, extending beyond TBNG boundaries. The information collected in this project is also being used to update the state species abstract for *A. barrii* (Fertig 2001).

The project purpose was not to evaluate potential threats to *Astragalus barrii*, although signs of recreational use (glass shards, nearby ORV use) were noted at the Little Powder River valley site, and an undeveloped 2-track road cuts through the southern Duck Creek site. In general, *A. barrii* habitat with its topographic position and soil conditions are generally not directly affected by land management practices. Noxious weeds and competing exotic species were not associated with *A. barrii* at the four documented sites, though they are present in the vicinity and have been noted as potential concerns to the species elsewhere (Heidel et al. 2002). The exotics that might be most competitive in its sparsely-vegetated habitat are annuals and nitrogen-fixing perennials that potentially shift the course of succession.

This project provides a springboard for conducting systematic *Astragalus barrii* surveys elsewhere in the TBNG and the state, evaluating whether there are potential threats to *A. barrii* locally and rangewide, and pursuing priorities for baseline surveys among other species of concern in the Spring Creek Unit.

Literature Cited

- Dorn, R.D. 2001. Vascular Plants of Wyoming, third edition. Mountain West Publishing, Cheyenne, WY.
- Ebertowski, P., B.E. Nelson and R. Hartman. In progress. Floristic survey of Thunder Basin National Grassland. To be submitted to Medicine Bow National Forest. University of Wyoming, Laramie.

Fertig, W. 2001. State Species Abstract: *Astragalus barrii*. Wyoming Natural Diversity Database. Available on the internet at www.uwyo.edu/wyndd . Updated in 2003 by B. Heidel

Great Plains Flora Association. 1986. Flora of the Great Plains. University of Kansas Press, Lawrence.

Hartman and Nelson 1998. Atlas of the Flora of Wyoming. Posted electronically through 1998 at: <http://www.esb.utexas.edu/tchumley/wyomap/> . Rocky Mountain Herbarium, Laramie, WY.

Heidel, B. L. and H. Marriott. 1996. Sensitive plant species survey of the Ashland District, Custer National Forest, Powder River and Rosebud counties, MT. Prepared for Custer National Forest, Montana Natural Heritage Program, Helena.

Heidel, B., C. Jean and S. Crispin. 2002. Plant species of concern and Plant associations of Powder River County, Montana. Prepared for the Bureau of Land Management. Montana Natural Heritage Program, Helena.

Knight, D. 1996. Mountains and Plains – The Ecology of Wyoming Landscapes. Yale University Press, New Haven, CT.

Love, J.D. and A.C. Christiansen. 1985. Geologic map of Wyoming. US Geologic Survey.

Marriott, H.J. 1992. Field survey for *Aster mollis*, *Astragalus barrii* and *Lesquerella arenosa* var. *argillosa* in northeast and central Wyoming. Prepared for the Bureau of Land Management. Wyoming Natural Diversity Database, Laramie.

Schassberger, L.A. 1990. Report on the conservation status of *Astragalus barrii*, a candidate Threatened species. Prepared for the U.S. Fish and Wildlife Service by the Montana Natural Heritage Program, Helena.

USDA Forest Service. 2003. Forest Service Manual, Title 2600-Wildlife, Fish and Sensitive Plant Habitat Management; Region 2 supplement 2600-2003-01. Posted electronically at the FS www at: <http://www.fs.fed.us/im/directives/field/r2/fsm/2600/2670.doc>



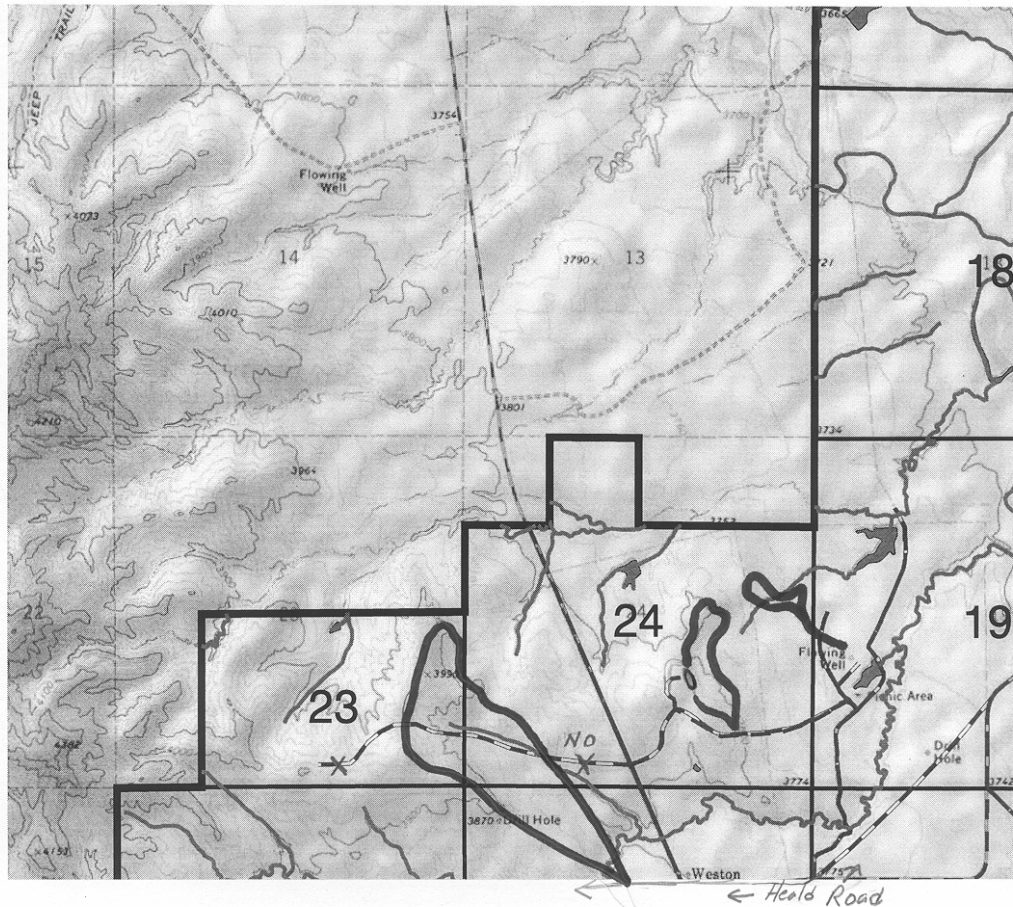
Appendix A. Color aerial photo of *Astragalus barrii* habitat, Spring Creek Unit (1:24,000)

The junction in the center marks the intersection of Wyoming Highway 59 and the Heald Road. The Little Powder River is to the right (east).

All major areas of outcrop and the full elevation ranges of outcrop on this image on national grassland were surveyed on foot.

Only a portion of the low ridge outcrop that is highlighted by an arrow supports a small population of *Astragalus barrii*. This outcrop is texturally different from the rest of the ridge.

SPRING CREEK ANALYSIS T54N R71W Sec 23, 24



Appendix B. Shaded relief topographic maps were printed out from GIS files by John Proctor, Medicine Bow National Forest. The area above corresponds with the northern portion of the aerial photo on the preceding page.

The routes taken on foot in surveying for *Astagalus barrii* were recorded onto this map, and the annotated map was appended to the Medicine Bow National Forest Survey Summary Form (lower right corner on the next page).

Appendix C. Medicine Bow National Forest Survey Summary Form

Vascular Plants Lichens/Bryophytes Fall Fungi Spring Fungi

SPECIAL STATUS PLANT SURVEY REPORT

The following project has been surveyed for Special Status Plants :

Aerial Photo: Yr 01 # 601-
80

Unit/Project Name	TWP	RGE	SEC	Loc #	Site #	ACRES
Spring Creek	54N	71W	(23)			
			(24)			

Type of treatment :

- timber sale
 site prep
 maintenance
 pct
 watershed

RESULTS :

To the best of my knowledge and belief, no special plant species were found within the project area.

Special status plant species found within the project area (list) : Astragalus barrii

Signature: Bonnie A. Heidel

Date: 11 June 2003

Survey Dates:

Dat 25/27 May

By: B. Heidel

Dat _____

By: _____

Dat _____

By: _____

Dat _____

By: _____

Dat _____

By: _____

Dat _____

By: _____

Approximate Scale 1" = 1000'

Appendix D. Plant Species of Concern Survey Form. Data were recorded in field notebooks and on the following survey form to document location, population numbers and extent, associated species, setting, and land uses, and to cross-reference to other forms of documentation (photographs, voucher specimens).

DATE OF SURVEY: 5/25/03 OBSERVER(S): B. Heidel

PLANT SPECIES OF SPECIAL CONCERN SURVEY FORM
 Wyoming Natural Diversity Database
 P.O. Box 3381, Laramie, WY 82071-3381

SPECIES NAME: Astragalus barrii COUNTY: Campbell

LOCATION: (attach an annotated topo map copy with population location and a GIS electronic file if available)

USGS QUAD: Weston ELEVATION RANGE: _____

TOWNSHIP, RANGE, SECTION(S): T54N R71W Sec. 24 SE 1/4 of NW 1/4 of SE 1/4

NATIONAL FOREST DISTRICT/BLM FIELD OFFICE/OTHER: Thunder Basin NG - Spring Creek

DIRECTIONS TO SITE (Refer to roads, trails, geographic features, etc.):
0.35 miles N of Weston intersection to FS Rd 908, 0.5 miles east to slope in road, and ~0.3 miles north to outcrop

TOTAL NO. of INDIVIDUALS (by SUBPOPULATION) 64 counted ~ 100 est.

% FLOWERING 50% late fl. % FRUITING 20% % VEGETATIVE 30%
Small, drought-affected

SIZE (ACRES) Less than 1 acre - app. 15 x 15 m; occasional

VEGETATION TYPE/DOMINANT SPECIES: ARTTR1/ELYLAN also CARFIL, ELYSPI, STIC

ASSOCIATED SPECIES: YUCGLA, ASTGIL, ANTDIM, HAPSPI, PHLXOO, VICAME, PENALB, HYMRIC, DENALB, LESARE, ALLTEX, MUSDIV, GUTSAR, KOECRI, WAAXI, ALYDES, ERIPUM, DALSPA, SOLSPP, PSOESC, HETVIL

ASPECT (S, SE, NNW, etc.): E % SLOPE: 5 (2-20) SLOPE POSITION: ridge crest

SLOPE SHAPE: str LIGHT EXPOSURE: open MOISTURE: dr

SOIL TEXTURE: silt (21% gravel orange-wh) SOIL SERIES/GEOLOGY: _____

GENERAL SETTING: Outcrop of low ridge above Little Powder River; east aspect, @ crest of ridge, mainly 5% slope (2-20)

LAND USE/ SIGNS OF DISTURBANCE: light grazing, light rec. use (broken glass & nearby ORV trail)

PHOTOGRAPH TAKEN?: Y VEGETATION PLOT?: _____

SPECIMEN (COLLECTOR/ COLL. #): Y

COMMENTS: Limited potential habitat, most plants small, largest plants are eroded @ base subject to wind scouring

Please use the reverse side for elaborating or diagramming any of the information on this form

APPENDIX E
New Element Occurrence Records for *Astragalus barrii*
SPRING CREEK UNIT

WYOMING NATURAL DIVERSITY DATABASE
-Element Occurrence Record-

ASTRAGALUS BARRII

Number: 038

Common Name: BARR'S MILKVETCH PDFAB0F150
Data Sensitive?: N Identification verified: Y
TNC Global Rank: G3 WYNDD State Rank: S3
Federal Status: WY Distribution Note: REGIONAL ENDEMIC
Management Status:
County: Campbell
USGS Quad Name: WESTON
Latitude: 443846N Longitude: 1052008W
South Lat: East Long:
North Lat: West Long:
Map Accuracy: Precise; location is within a 75 foot radius of point
on USGS topo map.
Town/Range: Section: T/R/S Comments:
054N071W 24 Sec 24 SE4 of NW4 of SE4
Location: Powder River Basin; 0.35 miles north of Weston to FS
Rd 908, 0.5 miles east to slope in road, and ca 0.3
miles north to outcrop.
Last Observed: 2003-05-25 First Observed: 2003-05-25
Occurrence Rank: C
Rank Comments: Small extent and limited numbers.
Data: 2003-05-25: In fruit and flower with 20% just in
fruit, 50% still with some flowers and 20%
vegetative. Occasional in area of ca 5x15m, 80-100
plants estimated (64 counted). Plants are almost
all small, less than 10 cm diameter. The largest
plants are eroded out at the base. Occurs with
Musineon divaricatum, *Stenotus acaulis*, *Astragalus*
gilviflorus. Observed by B. Heidel.
Habitat: Outcrop along low ridge above Little Powder River, at
crest of ridge, east-northeast aspect, mainly 5% slope,
on calcareous orange silt with high content of fine
sand. The sparse vegetation is dominated by *Artemisia*
tridentata spp *wyomingensis*/*Elymus lanceolatus* with high
cover of *Carex filifolia*.
Elevation: 3840- feet Size: 1 acres
Comments: This population is on the same substrate as EO #037
and Montana populations downstream to the north.
Managed Area: THUNDER BASIN NATIONAL GRASSLAND
Ownership:
Mgmt Comments:
Specimens: Heidel, B. (2279). 2003. RM.

Sources: Heidel, B. 2004. Inventory of *Astragalus barrii* (Barr's
Milkvetch) on the Spring Creek Unit of Thunder Basin
National Grassland. Prepared for Medicine Bow National Forest.
Wyoming Natural Diversity Database, Laramie.
Author: T.A. Dutcher Edition Date: 03-07-02

WYOMING NATURAL DIVERSITY DATABASE
-Element Occurrence Record-

ASTRAGALUS BARRII

Number: 039

Common Name: BARR'S MILKVETCH PDFAB0F150
Data Sensitive?: N Identification verified: Y
TNC Global Rank: G3 WYNDD State Rank: S3
Federal Status: WY Distribution Note: REGIONAL ENDEMIC
Management Status:

County: Campbell
USGS Quad Name: BOWMAN HILL

Latitude: 444800N Longitude: 1051229W
South Lat: 444754N East Long: 1051228W
North Lat: 444807N West Long: 1051237W
Map Accuracy: Precise; location is within a 75 foot radius of point
on USGS topo map.

Town/Range: Section: T/R/S Comments:
056N070W 25,36 Sec 25 SE4 of SE4; Sec 36 NE4
of NE4

Location: Powder River Basin; ca 16 miles northeast of Weston on
Rocky Point Road and 0.9 miles south on road to
Dickman Ranch, above the road and west of it.

Last Observed: 2003-05-26 First Observed: 2003-05-26
Occurrence Rank: AB

Rank Comments: Good population size, vigorous plants.

Data: 2003-05-26: 65% flowering, 25% in fruit, 10%
vegetative. Population estimate 600-650 (524
counted); with over 70% in Sec. 25 north of the
fence line. There are many large plants (>10 cm
diameter) and all size classes represented. Occurs
with *Eriogonum pauciflorum*, *Astragalus*
spatulatus, *Stenotus acaulis*, *Phlox hoodii*,
Gutierrezia sarothrae. Observed by B. Heidel.

Habitat: Ridgeline above broad Duck Creek valley with two small
outcrop knolls, on mainly north and west aspects at
primarily ridge crests and upper slope positions. A
third tiny subpopulation lies on an outcrop in the
saddle between knolls. The sparse vegetation is
dominated by *Artemisia tridentata* spp
wyomingensis/*Elymus lanceolatus*.

Elevation: 3940-3960 feet Size: 1 acres

Comments: There is a separate record less than 2 miles to the
south in Sec. 1 that is being treated as a discrete
EO; intervening habitat has not been surveyed.

Managed Area: BLM BUFFALO FIELD OFFICE, STATE OF WYOMING

Ownership: Mgmt Comments:

Specimens: Heidel, B. (2280, 2281). 2003. RM.

Sources: Heidel, B. 2004. Inventory of *Astragalus barrii* (Barr's
Milkvetch) on the Spring Creek Unit of Thunder Basin
National Grassland. Prepared for Medicine Bow National Forest.
Wyoming Natural Diversity Database, Laramie.

Author: T.A. Dutcher Edition Date: 03-07-02

WYOMING NATURAL DIVERSITY DATABASE
-Element Occurrence Record-

ASTRAGALUS BARRII Number: 040
Common Name: BARR'S MILKVETCH PDFAB0F150
Data Sensitive?: N Identification verified: Y
TNC Global Rank: G3 WYNDD State Rank: S3
Federal Status: WY Distribution Note: REGIONAL ENDEMIC
Management Status:

County: Campbell
USGS Quad Name: WESTON

Latitude: 444223N Longitude: 1051648W
South Lat: East Long:
North Lat: West Long:
Map Accuracy: Precise; location is within a 75 foot radius of point
on USGS topo map.

Town/Range: Section: T/R/S Comments:
055N070W 33 SE4 of SE4 of NW4

Location: Powder River Basin, from Weston take FS Rd 1247 ca. 5
miles west and north, then left on FS Rd 1247B to end
of road at oil well. From well, site is 0.37 miles at
a 33 degree bearing, ca. 5.5 air miles north east of
Weston.

Last Observed: 2003-05-03 First Observed: 2003-05-03
Occurrence Rank: CD
Rank Comments: Small population

Data: 2003-05-03: 3 fruiting and 3 vegetative plants on
less than 20 x 20 ft, observed by Peter
Ebertowski. Occurs with Elymus spicatus, Commandra
umbellata, Haplopappus grindelioides, Cryptantha
spp, Musineon spp.

Habitat: Badlands knoll just above steep ravine and below clay
balds, 30% slope, south aspect. Knoll is the least steep
portion of a tan layer.

Elevation: 4000- feet Size: 1 acres

Comments: Astragalus gilviflorus is also present in the
vicinity; dried Astragalus barrii flowers were used
in identification.

Managed Area: THUNDER BASIN NATIONAL GRASSLAND

Ownership:

Mgmt Comments:

Specimens:

Sources: Ebertowski, Peter. Graduate student studying the flora
of the Thunder Basin National Grassland / Powder River
Basin. University of Wyoming, Laramie.

Author: T.A. Dutcher Edition Date: 03-07-02

WYOMING NATURAL DIVERSITY DATABASE
-Element Occurrence Record-

ASTRAGALUS BARRII
Common Name: BARR'S MILKVETCH
Data Sensitive?: N Identification verified: Y
TNC Global Rank: G3 WYNDD State Rank: S3
Federal Status: WY Distribution Note: REGIONAL ENDEMIC
Management Status:

Number: 044
PDFAB0F150

County: Campbell
USGS Quad Name: BOWMAN HILL

Latitude: 444646 Longitude: 1051274W
South Lat: East Long:
North Lat: West Long:
Map Accuracy: Precise; location is within a 75 foot radius of point
on USGS topo map.

Town/Range: Section: T/R/S Comments:
055N070W 01 Sec 01 SE4 of SE4

Location: Powder River Basin; ca 16 miles northeast of Weston on
Rocky Point Road and 3 miles south on road to
Dickinson Ranch, as Duck Creek enters rugged breaks.

Last Observed: 2003-05-29 First Observed: 2003-05-29
Occurrence Rank: AB
Rank Comments:

Data: 2003-05-29: 600+ individuals observed by John Proctor,
60% in flower, 35% fruiting, 5% vegetative. Occurs with
Elymus spicatus, Artemisia tridentata Chrysothamnus
nauseosus, Koeleria macrantha, Penstemon albidus,
Erigeron pumilis, Machaeranthera grindelioides, Astragalus
spatulatus, Allium textile, Kraschenninikovia lanata,
Gutierrezia sarothrae, Musineon divaricatum.

Habitat: Eroded prairie knolls at the headwall of a forested drainage,
at crest and upper slopes on east and west aspects, 5 % slope,
in full sun.

Elevation: 3880- feet Size: 0.3 acres
Managed Area: THUNDER BASIN NATIONAL GRASSLAND
Comments: Possibly extending onto private land in Section 6.
A 2-track dissects the population.

GPS reading (NAD27)
N44 459 and W105 12 737, also 44 46 442 and 105 12 680

Ownership:

Mgmt Comments:

Specimens:

Sources: Proctor, John. Botanist of Medicine Bow National Forest.
Medicine Bow / Routt National Forests, 100 Main St., Walden, CO 80480.
Author: B. Heidel Edition Date: 03-10-20