



IDAHO BLM



TECHNICAL BULLETIN

THREATENED AND ENDANGERED SPECIES
TRAINING AND INVENTORY PROJECT

Astragalus atratus Wats. variety *inseptus* Barneby

prepared for

SHOSHONE DISTRICT
BUREAU OF LAND MANAGEMENT

by

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Astragalus atratus Wats. variety inseptus Barneby



Photograph by Linda Parsons 1988

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INTRODUCTION

Astragalus atratus var. inseptus has been designated as a Category Two Candidate Species for federal protection by the U.S. Fish and Wildlife Service. It has been placed in Category Two because more data were needed on the extent and the condition of its range prior to making a final determination on its status.

This taxon was reviewed by Eidemiller in the Threatened and Endangered Plant Inventory Report: Bennett Hills Environmental Impact Study Area prepared for the Shoshone District BLM in 1976. During the following year A. atratus var. inseptus could not be found even at known locations on Macon Flat (Eidemiller 1977). Although additional collections have been made since 1976, no clear understanding of the taxon's range emerged, which demonstrated the need for an up-to-date status survey.

Funding for the status survey was provided through Shoshone District BLM Purchase Order ID050-PH8-49. The status survey was undertaken by Lynda C. Smithman. The statement of work for the study contains the following elements:

1. Provide a key and field guide for identification of Astragalus atratus var. inseptus.
2. Provide field training to BLM personnel on identification of the species.
3. Make appropriate collections to document the species' range and curate them in the Harold M. Tucker Herbarium at the College of Idaho in Caldwell in accordance with standard herbarium procedures. Prepare at least two duplicates for the Shoshone District Herbarium.
4. Prepare two copies of a report detailing the following information for the species.
 - a) current range depicted on 1:100,000 scale maps (provided by the BLM);
 - b) plant community and soil associations;
 - c) threats to the species existence;

- d) recommendations for management of the species on public lands;
- e) recommendations for the appropriate federal and/or state status.

TRAINING AND FIELD STUDIES

Field reconnaissance for the status survey commenced 22 May 1988 and continued through 22 June 1988. Lynda C. Smithman was assisted in field by Carol Prentice, former Botanist Region III Idaho Department of Fish and Game, from 31 May through 3 June 1988. Shoshone District BLM staff members, who participated in field studies included Richard Mayberry and Linda Parsons. Ed Bottum, Region IV Idaho Department of Fish and Game, also participated in field studies. Ann De Bolt, Botanist with the Boise District BLM, and Roger Rosentreter, Botanist with the State BLM, provided valuable field assistance.

Reconnaissance efforts included documenting the occurrence of A. atratus var. inseptus through collection of vouchers as well as characterization of the habitat and investigation of predation or other threats. Emphasis was placed upon gathering more data on the limits of range and re-examining selected known sites to evaluate condition and assess threats. Unpublished data from winter range studies conducted by the Idaho Department of Fish and Game in 1975 and 1976 provided an excellent framework for documenting the range of A. atratus var. inseptus.

Additional field training for Shoshone District BLM staff took place 21 June 1988. Site visits were made to Macon Flat and to Trestle Reservoir near Magic Dam. Participants were familiarized with A. atratus var. inseptus, its habitat preferences and its associated species. Seeds were collected for further studies. BLM Wildlife Biologists, Range Conservationists and other field personnel generously shared observations and insights on the status of A. atratus var. inseptus and its habitat, based on their experiences in the Shoshone District BLM.

All collections of A. atratus var. inseptus and its associated species were taken to the Harold M. Tucker Herbarium at the College of Idaho in Caldwell, Idaho, for identification and confirmation. These collections are being curated in accordance with standard herbarium procedure and as part of the herbarium's permanent record system are available for review.

The field guide and key for A. atratus var. inseptus have been enclosed in the report packet. Maps, which depict the current range on 1:100,000 scale are also attached. Three duplicate collections of A. atratus var. inseptus have been submitted to the Shoshone District BLM Herbarium. A complete list of all currently documented locations is contained in Appendix B of this report.

HISTORY AND RELATIONSHIPS

Geologic History

Astragalus atratus var. inseptus, is endemic to the Snake River Plains of southern Idaho. Physiographically this region is situated within the Columbia Plateau Province, but floristically this region belongs to the Great Basin Section of the Intermountain Region.

The portion of the Snake River Plains, which is occupied by A. atratus var. inseptus is generally composed of shallow soils over basalt. According the Bureau of Mines (1978) the basalts include both recent unweathered flows and Middle Pliocene flows, while the Thorn Creek region contains Pliocene tuff. Smith (1966) in his study of the Bennett Hills characterizes a large portion of the Thorn Creek region as composed of broken red basalt.

The soils occupied by A. atratus var. inseptus did not exist before post-glacial times, about 10,000 years ago (Harris in Packard & Smithman 1984). The ancestral stock probably migrated northward from more southern parts of the Great Basin during the last glacial period. The migrating stock may have had no marked soil preference, but A. atratus var. inseptus adapted to the new clay soils (Packard & Smithman 1984). These new thin, clay soils, which are wet in the spring, are characteristic of the Bennett Hills and the Camas Prairie.

Related Taxa

A. atratus var. inseptus can be characterized as a rather wiry, depauperate appearing member of the genus Astragalus, which flowers from May through June. Although the whitish petals tinged with pale lilac are somewhat inconspicuous, the red mottled pods are quite distinctive.

This taxon occurs primarily within the Shoshone District Bureau of Land Management (BLM). It was originally collected by Barneby (Ripley & Barneby 10673) near Fairfield in Camas County, Idaho, during the field season of 1951. Barneby later described the taxon as a separate variety; the description was published in Vascular Plants of the Pacific Northwest (Hitchcock et al 1961).

Unfortunately not all of the duplicates shared with various herbaria in the region have been annotated, which causes considerable confusion in demarcating the ranges of A. atratus var. inseptus and A. atratus var. owyheensis. It also appears that a few collections have been confused in the past with similar taxa and that these duplicates have not uniformly been annotated. In an effort to dispel some of the confusion, which has complicated past literature searches Appendix B contains a current compilation of herbarium data.

It is believed that A. atratus var. inseptus is derived from A. atratus var. owyheensis. There are several subtle morphological differences between the two varieties:

	var. <u>inseptus</u>	var. <u>owyheensis</u>
terminal leaflet	jointed to rachis	confluent with rachis
leaves	linear oblong	linear & more reduced in size
pod texture	leathery	papery

Barneby (1982) states that in Gooding County, Idaho, A. atratus var. inseptus passes into and may not be taxonomically distinguishable from A. atratus var. owyheensis.

There may be some differences in habitat; A. atratus var. inseptus is associated with stony flats and clay soils in the Bennett Hills, while the more widespread A. atratus var. owyheensis is associated with deeper soils on sagebrush hillsides in northeast Nevada, southeast Oregon and southwest Idaho. A. atratus var. mensanus is restricted primarily to Inyo County, California, while var. atratus occurs in central and north-central Nevada.

According to Packard (unpublished status report) A. obscurus occupies a niche similar to the niche occupied by A. atratus var. inseptus in the Bennett Hills. A. obscurus is also found in the western portion of the Bennett Hills. The attached field guide contains a key for differentiating

several similar appearing taxa: A. atratus var. inseptus, A. atratus var. owyheensis, A. convallarius, A. miser, A. mulfordiae, A. obscurus, A. oniciformis, A. salmonis and A. yoder-williamsii.

Soil & Moisture Relationships

Astragalus atratus var. inseptus has a marked affinity for clay soils. The soils range from rather dense clay primarily in the north to clay loam in the south. Although this taxon is usually found in flats and on plains, it also occurs on gentle slopes. Shallow clay over basalt is characteristic of almost all of the range, however, the soils may be a little deeper on the sloped sites. In the southern portion of the range A. atratus var. inseptus is sometimes found on north facing slopes. At higher altitudes in the north the aspect may vary, but the slope is always rather gentle. Elevations range from 2925 feet in the south to 5600 feet in the north.

The climate for the Snake River Plains consists of cold winters and hot dry summers. According to Eidemiller (1976) the mean annual minimum is 36 degrees Fahrenheit at Gooding and 26 degrees Fahrenheit at Fairfield; the mean annual maximum is 63 degrees Fahrenheit at Bliss and 57 degrees Fahrenheit at Fairfield. She also noted that the annual precipitation is 8.5 inches at Bliss and 16.3 inches at Fairfield. Eidemiller found that 70 percent of the moisture occurs as snowfall, while only 27 percent occurs as rain between April and July.

The preference of A. atratus var. inseptus for clay soils may indicate drought tolerance. Clay binds water tightly to the clay particles, which means that water is not available to the plants (Packard & Smithman 1984). At higher elevations, where rain may be in excess to the ability of clay to bind water A. atratus var. inseptus reaches its upward limit of tolerance. Severe playa-like sites which retain surface water in the spring, but dry out during the summer are devoid of A. atratus var. inseptus. Sandy soils may also have too much water available to the plants and therefore are not suitable habitat for this taxon. At lower elevations, such as the Bliss site, A. atratus var. inseptus may tolerate clay loam soils, perhaps, because there is less rainfall.

Associated Species

A. atratus var. inseptus is frequently, but not always, associated with mound intermound complexes, which form Artemisia mosaics. At lower altitudes the taxon occurs with A. tridentata ssp. wyomingensis and A. arbuscula, while at higher altitudes it occurs with A. tridentata ssp. vaseyana and A. longiloba. In the eastern and southern portions of its range it is sometimes found in pure stands of A. tridentata ssp. wyomingensis, such as the Hobdey Spring site in the Clover Creek drainage. At the Bliss site individual A. tridentata ssp. wyomingensis tend to be dwarfed and thus, the contrast in shrub heights gives the impression of a mosaic.

There seems to be a beneficial relationship with Artemisia. Tall flowering stems grow upright inside the shrub, which protects the fruit from predators. But the chances of successful reproduction in this situation are tempered by seed falling into an area where it must compete with grasses and other species which also seek association with Artemisia.

Species associated with Astragalus atratus var. inseptus in the southern portion of the range include: Allium acuminatum, Aster scopulorum, Antennaria dimorpha, Blepharipappus scaber, Lomatium sp. and Poa sandbergii.

In the northern portion of the range A. atratus var. inseptus occurs in conjunction with species that are endemic to the Bennett Hills and also have some affinities with the Owyhee highlands. These species include Artemisia papposa, Eriogonum thymoides, Balsamorhiza hookerii, Viola beckwithii, Penstemon cusickii, Haplopappus stenophyllus, Arabis holboellii, Erigeron bloomeri and Trifolium macrocephalum.

LIMITS OF RANGE

Astragalus atratus var. inseptus occupies a rather restricted area from the base of the central Idaho mountains south to the Snake River, an area where more typically Great Basin species have come in following severe climatic conditions. From the western Bennett Hills it extends eastward to the Little Wood River.

Although A. atratus var. inseptus occurs in Blaine, Canas, Elmore, Gooding and Lincoln Counties, Idaho, it is by no means widespread, for its range is quite discontinuous. While the taxon may give the appearance of being "locally abundant", it actually constitutes only a trace to one

percent of ground cover, where it occurs. The populations are often difficult to relocate, even during the same field season.

During May and June of 1975 and 1976 personnel with the Idaho Department of Fish and Game recorded observations on A. atratus var. inseptus, while they conducted the Mule Deer Winter Range Study in the Bennett Hills. Approximately 986 acres were surveyed and community descriptions were prepared. Of the sites surveyed A. atratus var. inseptus occurred only in 21 out of 215 total sites. These 21 sites comprised about 42.5 acres. The percent of ground cover provided by A. atratus var. inseptus ranged from a trace to one percent, thus it could be roughly estimated that this taxon occupied .23 acres of the 986 acres surveyed. Although these estimates are only approximate, the extrapolated data indicate that A. atratus var. inseptus comprised less than 1% of the sampled acres in the region.

North

The clay soils of the Bennett Hills, Camas Prairie and Macon Flat comprise the northern habitat for A. atratus var. inseptus. At one time the populations may have been rather continuous across the plains south of the Timmerman Hills to the Little Wood River. The Idaho Batholith creates a definite northern boundary for the taxon.

At higher altitude sites such as Mud Spring (5600 feet) in Camas County, there is increased precipitation and cooler temperatures, which may favor an extended flowering and fruiting season. But at these altitudes there is a heavier stand of vegetation, which seems to exclude the open niches required by A. atratus var. inseptus.

The populations observed on the rocky tablelands of Rattlesnake Creek and tributaries of Thorn Creek seem to be more extensive than the Mud Springs population, particularly in the elevation ranges of 5000-5400 feet. Conditions appear more severe and there are significant interspaces between the shrubs, so that A. atratus var. inseptus has less competition.

South

In these areas there is less rainfall, higher temperatures

and possibly a higher rate of evaporation, than in the north. The flowering and fruiting season appears to somewhat shortened due to lack of summer rain. Numerous clay slopes and flats exist in the southern portion of the range, but many of these do not support A. atratus var. inseptus. This portion of the range has been interrupted with improvement programs as well as fire, which has resulted in the removal of native vegetation. Competition from Agropyron cristatum and Bromus tectorum may retard the re-establishment of A. atratus.

Densities vary among the rather discontinuous populations in the south. For example only a few traces of A. atratus var. inseptus were observed near Hobday Spring in the Clover Creek drainage, yet a ridgetop site near Bliss provides one of the healthiest populations within the entire range. Near Little Canyon Creek in Elmore, County, A. atratus var. inseptus was observed in a small shrub enclosure, which was cleared in the spring of 1987.

East

The Little Wood River appears roughly to serve as an eastern boundary. From this point A. oniciformis replaces A. atratus var. inseptus on the sandier soils eastward across the Snake River Plain. Fire has destroyed many acres of native vegetation south of the Timmerman Hills. Although there are a few locations where A. atratus var. inseptus is attempting to re-colonize these burned areas, the populations numbers are small and the progress seems slow.

Population densities of A. atratus var. inseptus vary among the sites which contain native vegetation. Several sites were field checked, which have native shrubs, but are almost entirely lacking in native grasses and herbs. A. atratus var. inseptus was conspicuously absent. Some of the grazing allotments in this area habitually receive greater than 60 percent utilization, which may explain the absence of A. atratus var. inseptus. Where diversity remains, there are healthy populations of A. atratus var. inseptus.

West

Little Canyon Creek and Bennett Mountain in Elmore County, Idaho, provide a western boundary for the range for A.

atratus var. inseptus. Although there continue to be suitable sites with clay soil and native vegetation at low to middle elevations A. atratus var. inseptus appears to be replaced by A. obscurus in the west. At higher elevations the granitic substrates associated with Bennett Mountain appear to provide an effective barrier for further westward distribution of A. atratus var. inseptus.

STABILITY OF THE TAXON

Health

During the 1988 field season very little decadence among the various populations of A. atratus var. inseptus was observed; examples of necrosis seemed to be associated with insect predation. The taxon may be a rather short lived perennial. Rather premature withering of the leaves and aborted inflorescences were noted, which may have been drought related. No chlorotic individuals were observed. Field observations made during a year with more moisture would be helpful for developing a better understanding of the taxon's health and ability to regenerate. The taxon's ecological amplitude appears to be rather restricted.

Reproduction

Eidemiller (1976) indicates that the growing season has 153 days at Bliss and 121 days at Fairfield. Lack of summer rainfall abbreviates this potential season for A. atratus var. inseptus. During 1988 the author noted a somewhat shorter season at lower altitudes than with the northern counterparts. At lower elevations there seemed to be only one flowering and fruiting, while the availability of early summer rain at higher altitudes in the north enabled the plants to have an extended or perhaps second flowering and fruiting cycle.

Reproductive effort in A. atratus var. inseptus appears to be by seed. According to Packard (unpublished status report) this plant fits the stereotype of a self pollinated species. For example it has inconspicuously colored, small corollas, which are generally closed. Individual plants are strikingly uniform. Autogamy or self pollination is considered to be an advanced or derived condition, which

correlates with the idea that A. atratus var. inseptus is a recently derived taxon. Self pollinating plants may have a selective advantage for colonizing new habitats or open niches. Such factors as immediate fitness and rapid production of offspring can result in an entire colony after only several generations.

The decumbent to prostrate flowering stems form a low rosette. Fruit born along these stems dehisce and often drop their seed in a somewhat circular pattern around the parent, which results in a slow, but effective method for the colonization of open niches in its habitat. Other methods of seed dispersal for A. atratus var. inseptus are not well understood at this time. Packard (unpublished status report) believes that gut transport is involved, possibly by birds or large herbivores.

Eidemiller (1976) suggests that A. atratus var. inseptus may be seral. Packard (unpublished status report) observes that the taxon occupies scabland habitat, which contains a somewhat seral flora, but the scabland flora can also be thought of as edaphic climax. If A. atratus var. inseptus is seral, it would require open niches, which can be found in habitats grazed by large herbivores. Although the taxon has a demonstrated ability for colonizing, its rather narrow habitat requirements appear to limit both its distribution and its population numbers.

Climatic Fluctuation

Astragalus atratus var. inseptus occurs in such a restricted area within the Snake River Plains, that it appears vulnerable to climatic fluctuations. Should the climate become, for example, cooler and wetter there might be an unfavorable effect on the northern population. With this potential scenario there could be more competition from moisture tolerant species, which would force A. atratus var. inseptus southward, where suitable habitat has been usurped by Agropyron cristatum and Bromus tectorum. In contrast a warm drying trend might put more pressure on the scattered southern populations, but might favor expansion of the northern populations.

A small population near Thorn Creek Reservoir demonstrates the rather narrow tolerances of A. atratus var. inseptus. It is absent from the better drained soil, which supports

Zygadenus sp., but it is also absent from the more dense clay which supports Polyctenium fremontii. Consequently A. atratus var. inseptus is restricted to a few individuals, which occur in a rather erratic pattern in the Artemisia mosaic in this region. Even minor fluctuations could have a negative effect on the smaller, more isolated populations throughout the range of A. atratus var. inseptus.

Predation

Several forms of predation were observed during the 1988 field season. These included rabbits, which apparently found the fruits quite palatable, and web-spinning insect larva, which appears to have an affinity for several species of Astragalus in the region. Evidence of fruit bored by insects was noted throughout the range of A. atratus var. inseptus.

Predation appears to be a serious threat to the stability of A. atratus var. inseptus, particularly in the southern portion of the range, where small, quite isolated populations could be easily eradicated. The more continuous northern populations have not only better sources for seed dispersal, but also, due to additional summer rainfall, an opportunity to regenerate and produce another cycle of fruit.

Marmots were observed in the northern portion of the range. There was also evidence of deer and antelope in the vicinity of healthier populations of A. atratus var. inseptus, but it could not be determined if the taxon was being utilized. There is no direct evidence to suggest that cattle use this plant. No data has been collected on the possible impact of sheep.

Destruction of Habitat

Loss of habitat appears to be the greatest threat to A. atratus var. inseptus at this time. In the lower elevations of the range there has been considerable loss of habitat from range improvement programs, which include spraying, seeding and other treatments. Wildfire has disrupted habitat in both the southern portion and the northeast portions of its range.

Although A. atratus var. inseptus appears slow to return to

disturbed areas, it will in time return if the disturbance is limited in size and there are nearby sources for seed dispersal, as is evidenced by the Little Canyon Creek Shrub Exclosure. The taxon has also become re-established near Trestle Reservoir, which was treated and improved approximately 20 years ago, however, this area is scheduled for repeated treatment. Rather extensive treated areas adjacent to the Bliss population, contain only a few individuals. The same is true of burned areas in the eastern portion of the range, where recovery of A. atratus var. inseptus appears quite limited.

While no direct evidence of livestock grazing was observed, A. atratus var. inseptus was absent in areas where there has been livestock trailing or habitual overuse of the range as can be determined from the lack of diversity, which results in a combination of shrubs with an understory of Bromus tectorum or Ranunculus testiculatus. Well managed grazing, however, does not seem to be a threat. For example in areas where there is 60 percent or less utilization of the vegetation, such as near Trestle Reservoir and Rattlesnake Creek, there appear to be healthy populations of A. atratus var. inseptus. Dinosaur Pasture, which is near Trestle Reservoir, has not been grazed for 2 years.

Additional threats to the taxon include loss of habitat through the development of utility corridors, reservoirs, and roads. Development of land for agricultural crops also displaces A. atratus var. inseptus. Both the known and the potential habitat mapped by Eidemiller in 1976 have been reduced in size.

Packard (unpublished status report) suggests that preserving only a small segment of habitat for A. atratus var. inseptus would probably not preserve enough variability for continuance of the taxon. If the taxon is self pollinating, then its variability would not be diffused throughout its range, but would tend to be localized. A more successful approach would include devising management strategies which would offer protection throughout the range of A. atratus var. inseptus, in order to maintain variability. Once variability is lost, downward trends may be irreversible.

RECOMMENDATIONS

During the course of field studies several opportunities were identified for continued research. In coordination with the Idaho State Office BLM duplicate collections of A.

atratus var. inseptus will be sent to the New York Botanical Garden along with a letter requesting Barneby to review its current taxonomic status. The seeds collected at the Trestle Reservoir site will be sent to Berry Botanical Garden, the seed conservation reserve for our region. A small portion of the seed will be retained in Idaho for additional experimental research.

Specific recommendations for the management of A. atratus var. inseptus in the Shoshone District BLM can be outlined as follows:

designate several Areas of Critical Environmental Concern or Natural Research Areas representative of habitats occupied by A. atratus var. inseptus, such as the Bliss site, an eastern Bennett Hills site (in the vicinity of Rattlesnake Creek) and a Macon Flat site.

continue coordination with the Boise Interagency Fire Center for monitoring A. atratus var. inseptus during and after the prescribed burn at Trestle Reservoir.

review grazing practices to prevent overutilization of allotments containing A. atratus var. inseptus.

devise a method for tabulating habitat loss for A. atratus var. inseptus, for use in evaluating future proposals for development, treatments and other use, which might impact the taxon.

investigate the use of A. atratus var. inseptus for range restoration projects.

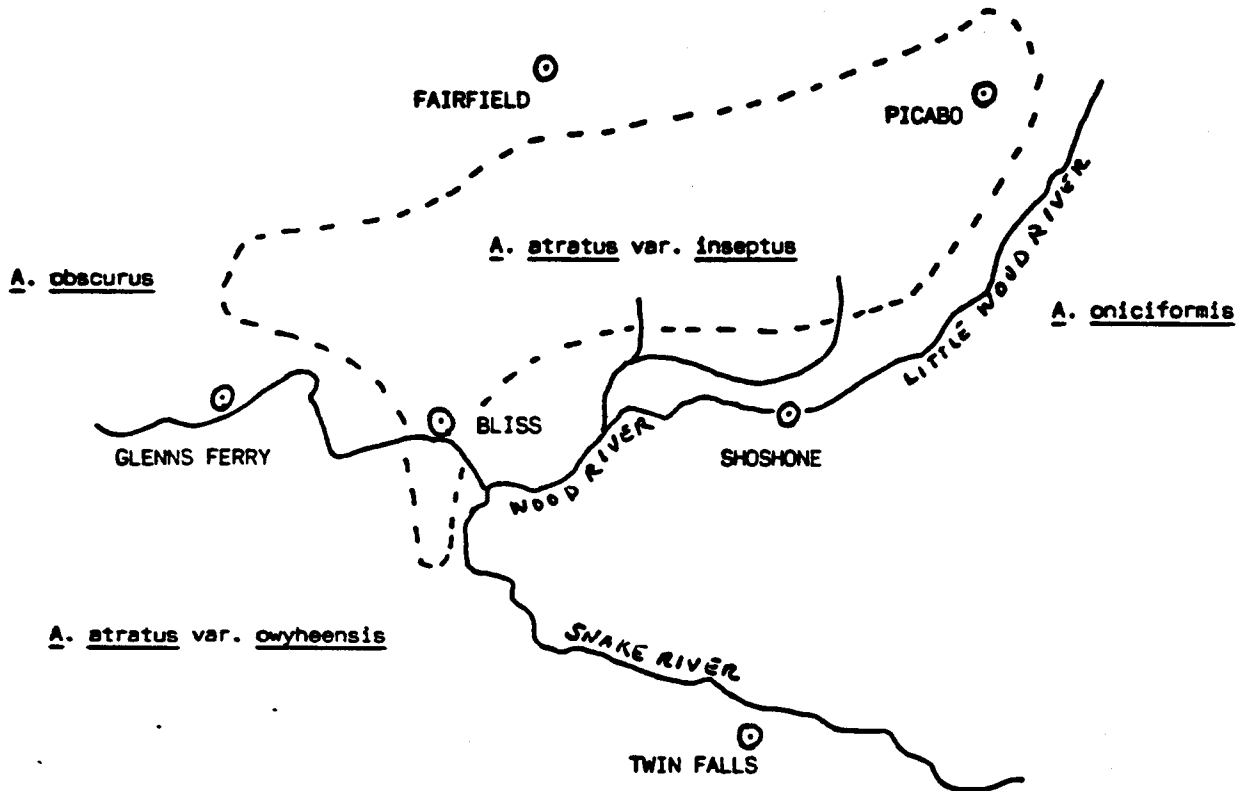
maintain A. atratus var. inseptus as a "candidate" for federal listing until adequate data on reproductive processes and population trends are gathered for decision making.

Follow-up study on A. atratus var. inseptus should be actively encouraged and funded by the BLM. Future studies might focus on reproduction biology, seed dispersal, predation and germination. It would be advisable to set up permanent transects for monitoring over several seasons to acquire a more complete understanding of population dynamics and trends. Methods utilized by Lesica and Elliott (1987) in their study of A. scaphoides would also be appropriate for A. atratus var. inseptus. Data gathered during a moist year could be quite valuable for interpreting population trends. The continuing efforts of BLM personnel could be complemented by the use of specialists and volunteers.

The apparent palatability of A. atratus var. inseptus indicates that this taxon could be quite beneficial for wildlife in range restoration projects, particularly since it seems well adapted for the harsh conditions associated with the Bennett Hills and basalt flows of the Snake River Plain. Its potential for providing wildlife nutrition should be explored further.

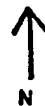
APPENDIX A

RANGE MAP
Astragalus atratus var. inseptus



KEY

--- range of A. atratus var. inseptus



APPENDIX B

HERBARIUM DATA

Astragalus atratus Wats. var. inseptus Barneby

Brown 75-40. 6 VI 75 LINCOLN COUNTY, IDAHO: 0.7 mi. west
of Preacher Creek with Artemisia tridentata.
T4S, R16E, Sec. 18 SE Elev. c. 3900 ft. CIC

Brown 75-45. 4 VI 75 LINCOLN COUNTY, IDAHO: Mount Bennett
Hills north of Shoshone, dry open ground near Black Butte
cattle guard. Artemisia arbuscula dominant. Pods slightly
curved. NY

Eidemiller 76-BH-102. 14 VII 76 BLAINE COUNTY, IDAHO:
T2S, R18E, Sec. 20 SE 1/4 of NE 1/4 CIC

Eidemiller 76-BH-82 12 VII 76 LINCOLN COUNTY, IDAHO:
Shoshone Kipuka.
T3S, R17E, Sec. 27 SE 1/4 CIC

Ertter 4215. 13 VI 81 GOODING COUNTY, IDAHO: 3.3 miles
E of Hwy 46 between Fairfield & Gooding, on road to Thorn
Creek Reservoir Dam. Mt. Bennett Hills, rhyolite scabland,
deeper soil at edge of sagebrush mound.
T3S, R16E, Sec. 6 NE of NW ca. 5600 ft. CIC

Grimes - Idaho Fish & Game s.n. 3 VI 75 LINCOLN COUNTY,
IDAHO: Timber Gulch.
T4S, R16E, Sec. 3. Shoshone District BLM

Packard & Grimes 80-88. 12 VI 80 BLAINE COUNTY, IDAHO:
Sagebrush hillsides near an old cauldery on Bill Castle
Ranch n. of Picabo.
T1S, R20E CIC

Ripley & Barneby 10673 ISOTYPE! 10 VI 51 CAMAS COUNTY,
IDAHO: Stiff clay soil of sagebrush flat. Camas Prairie 10
miles se of Fairfield. 5000 psm. NY

Rosentreter 114. 30 V 78 TWIN FALLS COUNTY, IDAHO:
Peters Gulch near Hagerman. Artemisia/Poa.
T7S, R13E, Elev. c. 3700 ft. CIC

Rosentreter 4908. 9 VI 88 BLAINE COUNTY, IDAHO:
Macon Flat area. Shallow, stoney basalt site. Artemisia
longiloba flat, 30 mi. N of Shoshone.
T2S, R17E, Sec 3 NE 1/4 Elev. c. 4880 ft. BLM

Smithman 1361. 23 V 84 BLAINE COUNTY, IDAHO:
Magic Dam Spillway. Broken basalt plain, historic dump.
Sagebrush-grass.
T2S, R18E, Sec. 18 SW 1/4 of NE 1/4 Elev. c. 4800 ft. CIC

Smithman 1367. 23 V 84 BLAINE COUNTY, IDAHO:
Magic Reservoir area, w of Dinosaur Ridge. Moderate slope.
Sprayed sagebrush.
T2S, R18E, Sec. 20 N1/2 Elev. c. 4770 ft. CIC

Smithman 1388. 24 V 84 CAMAS COUNTY, IDAHO:
Macon Flat. Small washes & stony flats. South of railroad
track. Sagebrush mosaic.
T2S, R17E, Sec. 3 NW 1/4 Elev. c. 4880 ft. CIC

Smithman 1472. 26 VI 84 LINCOLN COUNTY, IDAHO:
Silver-Midpoint Transmission Line. Northern Snake River
Plain. Between Picabo & Richfield. Sagebrush-grass.
T3S, R20E, Sec. 10 SE 1/4 of SW 1/4 Elev. c. 4580 ft. CIC

Smithman 1463. 18 VI 84 BLAINE COUNTY, IDAHO:
Magic Reservoir area. Trestle Reservoir. Rocky clay. Big
Sagebrush.
T2S, R18E, Sec. 20, NE 1/4 of NE 1/4 Elev. c. 4750 ft. CIC

Smithman 1489 26 VI 84 LINCOLN COUNTY, IDAHO:
Silver-Midpoint Transmission Line. Northern Snake River
Plain. Between Picabo & Richfield. Artemisia tripartita &
Poa sandbergii.
T3S, R20E, Sec. 10 NW 1/4 of NE 1/4 Elev. c. 4600 ft. CIC

Smithman 1775 22 V 88 GOODING COUNTY, IDAHO:
Bliss to Hill City Rd. Crest of north-facing slope, approx.
5 mi. n of Bliss. Packed clay loam. Artemisia tridentata

ssp. wyomingensis.

T5S, R13E, Sec. 7, SW 1/4 Elev. c. 3500 ft. CIC

Smithman & De Bolt. 1781. 27 V 88 ELMORE COUNTY, IDAHO:
Little Canyon Cr. area. Exclosure for shrub study. Cleared
clay soil with new plantings. Surrounding area - Artemisia
tridentata ssp. wyomingensis.

T4S, R10E, Sec. 13, NE of SE Elev. c. 3640 ft. CIC

Smithman & De Bolt. 1783. 27 V 88 ELMORE COUNTY, IDAHO:
Little Canyon Cr. area near Berry Ranch. Gentle north-
facing slopes & flats, clay soil. Wyoming sage-low sage
intermounds.

T4S, R10E, Sec. 15, East Center Elev. c. 3640 ft. CIC

Smithman & De Bolt. 1784. 27 V 88 ELMORE COUNTY, IDAHO:
Bennett Mountain Rd. 1.1 miles n. of King Hill Junction.
Clay soil, north facing slopes & flats. Artemisia
tridentata ssp. wyomingensis, A. arbuscula & Poa sandbergii.
T4S, R10E, Sec. 18, South Center Elev. c. 3560 ft. CIC

Smithman & Mayberry 1808. 8 VI 88 GOODING COUNTY, IDAHO:
Thorn Creek tributary. Rocky tablelands, in clay Big Sage-
Low Sage intermound complex.

T3S, R15E, Sec. 26 S 1/2 Elev. c. 4900 ft. CIC

Smithman & Mayberry 1809. 8 VI 88 GOODING COUNTY, IDAHO:
Thorn Creek tributary. Clay soil, Extensive Big Sage-Low
Sage intermound complex.

T3S, R15E, Sec. 24 W 1/2 Elev. c. 5240 ft. CIC

Smithman & Mayberry 1810. 8 VI 88 GOODING COUNTY, IDAHO:
Rattlesnake Creek. Rocky tablelands with clay. Big Sage-
Low Sage intermound complex.

T3S, R16E, Sec. 19 NW 1/4 of NW 1/4 Elev. c. 5400 ft. CIC

Smithman, Packard & BLM 1400. 2 VI 84 LINCOLN COUNTY,
IDAHO: Burned area n of Richfield. Seeded, clay soil
around lava flows. Poa sandbergii.

T3S, R20E, Sec. 19 SE 1/4 of NE 1/4 Elev. c. 4520 ft. CIC

Smithman, Parsons, Rosentreter & Bottum. 1813. 9 VI 88

CAMAS COUNTY, IDAHO: West of Magic Reservoir. Clay soil.
Sagebrush mosaics.
T2S, R17E, Sec. 13 SW 1/4 Elev. 4800 ft. CIC

Smithman, Parsons, Rosentreter & Bottum. 1816. 9 VI 88
BLAINE COUNTY, IDAHO: Between Mud Lake & Sonners
Reservoir. Artemisia tridentata ssp. wyomingensis. Clay
soil. Heavy Grazing. Bromus japonicus & remnants of Poa
sandbergii.
T2S, R19E, Sec. 20 E 1/2 Elev. 4760 ft. CIC

Smithman, Parsons, Rosentreter & Bottum. 1818. 9 VI 88
LINCOLN COUNTY, IDAHO: Southeast of Tapper Lake, near
where road enters Sec. 7, Artemisia tridentata ssp.
wyomingensis. Clay soil over basalt. Phlox & Erigeron.
T3S, R20E, Sec. 6 SE 1/4 Elev. 4600 ft. CIC

Smithman, Parsons, Rosentreter & Bottum. 1826. 9 VI 88
BLAINE COUNTY, IDAHO: Near Mud Lake, Artemisia tridentata
ssp. wyomingensis. Heavy clay over basalt. Grazing & past
fires.
T2S, R19E, Sec. 35 SE 1/4 of NE 1/4 Elev. 4600 ft. CIC

Smithman & Prentice 1797. 1 VI 88 GOODING COUNTY, IDAHO:
Hobdey Spring area. Clover Cr. drainage. North-facing
gentle slope. Hard packed clay soil with light gravel on
surface. Artemisia tridentata ssp. wyomingensis, Poa
sandbergii & Chrysothamnus.
T4S, R12E, Sec. 31 SE 1/4 Elev. c. 3120 ft. CIC

Smithman & Prentice 1799. 2 VI 88 CAMAS COUNTY, IDAHO:
Mud Springs area. Approx. 10 miles s. of Fairfield, near
Fairfield-Gooding hwy. Artemisia tridentata ssp. vaseyana
intermounds, Poa sandbergii & Festuca idahoensis.
T2S, R15E, Sec. 28 SE 1/4 of NW 1/4 Elev. c. 5600 ft. CIC

Smithman & Ralston 492. 10 V 80 TWIN FALLS COUNTY,
IDAHO: Shoestring Bridge, south of Bliss. NW facing slope.
T6S, R13E, Sec. 20, SE 1/4 Elev. c. 2925 ft. CIC

APPENDIX C

SOURCES

Barneby, R. 1964. Atlas of North American Astragalus.
Memoirs of the New York Botanical Garden. Vol. 13:1-1188.

----- 1982. Intermountain FABALES. Unpublished
Manuscript for the Intermountain Flora. New York. New York
Botanical Garden.

Bureau of Mines. 1978. Geologic Map of Idaho. Idaho
Department of Lands. Moscow, Idaho.

Cronquist, A., A. Holmgren, N. Holmgren & J. Reveal. 1972.
Intermountain Flora. Vascular Plants of the Intermountain
West, U.S.A. Part 1. New York. Hafner Publishing Co.

----- & P. Holmgren. 1977. Intermountain Flora.
Vascular Plants of the Intermountain West, U.S.A. Part 6.
New York. Hafner Publishing Co.

----- & P. Holmgren. 1984. Intermountain Flora.
Vascular Plants of the Intermountain West, U.S.A. Part 4.
New York. New York Botanical Garden.

Cronquist, A. 1978. The Biota of the Intermountain Region
in Geohistorical Context. Great Basin Naturalist Memoirs.
Provo, Utah. Brigham Young University Press. Vol. 2.

Davis, R. 1952. Flora of Idaho. Provo, Utah. Brigham
Young University Press.

De Bolt, A. & R. Rosentreter. 1988. An Illustrated Guide
to the Sensitive Plants of Boise District BLM. Boise,
Idaho. BLM.

Eidemiller, B. 1976. Threatened and Endangered Plant
Inventory Report: Bennett Hills Environmental Impact Study
Area. Shoshone, Idaho. Report for the Shoshone District
Office, BLM.

----- 1977. Threatened and Endangered Plant
Inventory Report: Sun Valley Environmental Impact Study
Area. Shoshone, Idaho. Report for the Shoshone District
Office, BLM.

Federal Register. 1980. 45(242):82480 (Endangered & Threatened Wildlife & Plants December 15, 1980).

----- 1983. 48(229):53640 (Endangered & Threatened Wildlife & Plants November 28, 1983).

Harris, Bill. 1984. Personal Communication. Shoshone, Idaho. Shoshone District BLM. Quoted In: Packard & Smithman 1984.

Harrison, B. 1981. Inventory of Threatened and Endangered Plants in a Portion of the Shoshone District. Provo, Utah. Intermountain Research.

Hironaka, M., M. Fosberg & A. Winward. 1983. Sagebrush-Grass Habitat Types of Southern Idaho. Forest, Wildlife & Range Experiment Station. University of Idaho. Moscow, Idaho.

Hitchcock, C., A. Cronquist, M. Ownbey & J. Thompson. 1955. Vascular Plants of the Pacific Northwest. Part 5. Seattle. University of Washington Press.

----- 1959. Vascular Plants of the Pacific Northwest. Part 4. Seattle. University of Washington Press.

----- 1961. Vascular Plants of the Pacific Northwest. Part 3. Seattle. University of Washington Press.

----- 1964. Vascular Plants of the Pacific Northwest. Part 2. Seattle. University of Washington Press.

----- 1969. Vascular Plants of the Pacific Northwest. Part 1. Seattle. University of Washington Press.

Hitchcock, C., & A. Cronquist. 1973. Flora of the Pacific Northwest. An Illustrated Manual. Seattle. University of Washington Press.

Idaho Department of Fish & Game. 1975 & 1976. Mule Deer Winter Range Survey. Unpublished notes & reports. Caldwell, Idaho. Harold M. Tucker Herbarium, College of Idaho.

Idaho Rare Plants Seminar: Candidate Species for Federal

Review. 1988. Boise, Idaho. Proceedings published in Idaho Native Plant Society Newsletter. Sage Notes. Vol. 11(2).

Lesica, P. & J. Elliott. 1987. Distribution, Age Structure, and Predation of Bitterroot Milkvetch Populations in Lemhi County, Idaho. Report prepared for Idaho State Office, BLM. Helena, Montana.

Packard, P. Unpublished Status Reports, Lecture Notes, Species Inventories & Personal Communication. Caldwell, Idaho. College of Idaho.

Packard, P. & L. Smithman. 1984. Threatened and Endangered Species Training and Inventory Project: Astragalus oniciformis Barneby. Report prepared for Shoshone District Office BLM. Caldwell, Idaho. College of Idaho.

Rosentreter, R. 1985. Sensitive and Uncommon Plants in the Shoshone District BLM. Boise, Idaho. Idaho State Office BLM.

Smith, C. 1966. Geology of Eastern Mount Bennett Hills, Camas, Gooding & Lincoln Counties, Idaho. Ph. D. dissertation, University of Idaho. Published on demand by Microfilms International. Ann Arbor, Michigan.

Smithman, L. 1984. Threatened and Endangered Plant Survey of the Silver - Midpoint Transmission Line for Idaho Power Co. Meridian, Idaho. Ralston & Associates.

Steele, R., S. Brunsfeld, D. Henderson, K. Holte, F. Johnson & P. Packard. Rare & Endangered Plants Technical Committee of the Idaho Natural Areas Council. 1981. Vascular Plant Species of Concern in Idaho. Moscow, Idaho. University of Idaho Forest, Wildlife & Range Experiment Station.

----- 1983. Status Changes and Additions to Vascular Plant Species of Concern in Idaho. Moscow, Idaho. University of Idaho Forest, Wildlife & Range Experiment Station.

Winward, A. & E. Tisdale. 1977. Taxonomy of the Artemisia tridentata Complex in Idaho. Forest, Wildlife & Range Experiment Station. University of Idaho. Moscow, Idaho.

Prepared for Shoshone District BLM
by Lynda C. Smithman
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FIELD GUIDE AND KEY

Astragalus atratus and Similar Taxa

Inconspicuous plants; flowers small, usually more or less 1/4 inch, but always less than 1/2 inch; dirty white (sometimes purple); tiny leaved - maybe slightly grayish, but not silvery with hairs.

If they don't have pods yet - they don't exist!



1 A. Pods obviously stipitate; hangs down and is 3 cornered when rolled between the fingers; grows on sandy soil; has a more or less buried root crown.

Plants spread out flat on the ground; sandy holes and flats in the Picabo region.

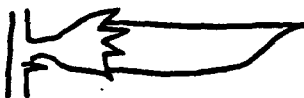
A. oniciformis

Plants upright about 4 inches tall with tufted, slightly upright branches; found on stony flats and ridges in Owyhee County south of South Mountain.

A. yoder-williamsii

Taller plant, up to a little over a foot tall; grows in sandy places along the Snake R. and Owyhee R. as well as foothills parallel to the Snake; frequently found on slopes.

A. mulfordiae



1 B. Pods not obviously stipitate - there may be a small stipe hidden under the calyx.

Lead 2

2 A. Pods stiffly upright.



A. obscurus

2 B. Pods hanging down or somewhat down.
Lead 3



3 A. Pods long, straight and narrow; not much more than a wide line.



Root crown - where the branches come off the root - at the surface of the ground. Plants usually small, many non-flowering branches at base of plant making a dense clump of vegetation; branches leafy to base.

A. niger



Root crown buried so that branches pull up showing a bare more or less white colored base; all branches usually with flowers; lower portions of branches bare of well developed leaves.

A. convallarius

3 B. Pod shape does not suggest a wide line.



Pod wide and curved.

A. salmonis



Pod elliptical.

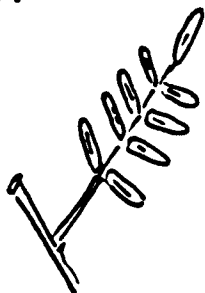
A. atratus, Lead 4

(Note: both of the above species have a slight stipe, but it does not show because the calyx hides the stipe.)



4 A. Leaves linear, terminal leaflet confluent with rachis, pod papery.

A. atratus var. owyheensis



4 B. Leaves linear-obvate, terminal leaflet jointed to rachis, pod leathery.

A. atratus var. inseptus

adapted from Field Guide & Key
Astragalus oniciformis and Similar Species
Patricia L. Packard 1984