ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PDFAB0F7Q0
Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Astragalus rusbyi*
COMMON NAME: Rusby's Milkvetch
SYNONYMS: *Atelophragma rusbyi*
FAMILY: Fabaceae

AUTHOR, PLACE OF PUBLICATION: Greene, Edward Lee. Bulletin California Acadamy Sciences 1(1):8. 1884.

TYPE LOCALITY: Arizona: Coconino County: Humphreys Peak.

TYPE SPECIMEN: CAS 27760 (holotype). H.H. Rusby, #573. July 2, 1883.

TAXONOMIC UNIQUENESS: *Astragalus* is believed to be the largest genus of flowering plants in the world, with over 2500 species worldwide and over 400 species in North America alone, primarily in arid regions of the western U.S. There are an additional 200 plus varieties found in the U.S. and Canada as well. *Astragalus rusbyi* is endemic to Arizona.

DESCRIPTION: Slender herbaceous perennial; stems incurved-ascending, 15-35 cm long, thinly pubescent on upper portions, glabrous below; leaves 3-8 cm long with 17-25 oval leaflets, slightly hairy underneath, glabrous above; inflorescence with 15-25 whitish flowers, about 8-9 mm long; pods pendulous, on a slender stipe 2.2-5 mm long, straight or nearly so, 13-25 mm long, 3-4 mm in diameter, with short black or mixed black and white hairs and lacking a groove on the suture (Falk et al 2001).

AIDS TO IDENTIFICATION: Similar species - *Astragalus recurvus* has purple-tinged flowers less than 7 mm long and strongly curved pods without a stipe (Falk et al 2001).

ILLUSTRATIONS:
Photos: http://www.aznps.com/rareplants/Astragalus_rusbyi.pdf.
Photos and Herbarium Mounts:
http://swbiodiversity.org/seinet/taxa/index.php?taxon=Astragalus%20rusbyi.
Photos:
http://www.plantsystematics.org/imgs/bboyle/r/Fabaceae_Astragalus_rusbyi_28445.html.
http://www.plantsystematics.org/taxpage/0/0/79/binomial/Astragalus%20rusbyi.html.

TOTAL RANGE: Endemic to Arizona.

RANGE WITHIN ARIZONA: Flagstaff area and the lower slopes of the San Francisco Peaks descending into Oak Creek Canyon, Coconino County (Falk et al 2001). Collections from areas to the south, including Oak Creek Canyon and Yavapai County are of uncertain validity (Springer et al 2012). An early report of this species from Mt. Trumbull has been referred to *A. straturensis*, which has purple flowers and occurs on limestone soils (Barneby, 1964).

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Perennial herb

PHENOLOGY: Flowers and Fruits: June to September, varying in abundance in response to the amount and timing of summer rains.

BIOLOGY: Barneby (1964) notes that *A. rusbyi*, like most members of section Strigulosi varies in "vigor and abundance in proportion to amount and timing of summer rains," but prolonged vegetative dormancy (documented for some other species) has not been established.

Although a number of *Astragalus* species contain toxins (such as miserotoxin or swainsonine) or accumulate selenium, thus making them poisonous to livestock, there are also many species that are highly desirable to herbivores. The toxicity of *A. rusbyi* is unknown (Springer et al 2012).

The following information is also from Springer et al 2012:

We currently do not have a thorough understanding of the basic ecology of this species. Additionally, we have insufficient knowledge of the effects of increased tree densities, tree thinning, or fire on the population dynamics. However, some limited information is available from large landscape scale studies within its range.

It would appear from one study that ecological restoration treatments, whether they involve thinning plus prescribed burning, or prescribed burning alone, have neutral to positive effects on *A. rusbyi*. However, in another restoration study area less than 3 km away, no significant effects, either positive or negative, were observed with thinning and prescribed burning treatments and there was no correlation found between the presence of *A. rusbyi* and trees per ha, pine basal area, or canopy cover. In this study, there was no "thinning only" component, but rather, treatments were designed to examine the effects of various levels of tree thinning, and these treatments were all combined with prescribed burning.

From the information available, it appears to have a large taproot, which should give some resistance to the impacts of drought and fire, but high-intensity fire or burning at peak growth times could be detrimental.

A. rusbyi has a foliar nitrogen content of 4.4% and a foliar C:N mass ratio of 11. It is classified as a competitive ruderal species, meaning it is able to compete well with other understory species, but is not very tolerant of stresses, such as deep shade.

HABITAT: Meadows in yellow pine forest, or edge of thickets and aspen groves, in dry or temporarily moist basaltic soils (Barneby 1964).

ELEVATION: 5400 – 8000 feet (1650-2440m) from Falk et al 2001. However, if the southern Oak Creek Canyon specimens are not included (as suggested by Springer et al 2012), then the elevational range becomes closer to 7000 – 8000 feet.

EXPOSURE: Probably does not tolerate deep shade.

SUBSTRATE: Dry or temporarily moist basaltic soils.

PLANT COMMUNITY: Meadows in Ponderosa Pine forests or edges of thickets and aspen groves.

POPULATION HISTORY AND TRENDS: *A. rusbyi* has a very small range in northern Arizona, with the bulk of its population limited to a band approximately 18 x 7 km (11 x 4.5 mi) in size to the west and north of the San Francisco Peaks and a few scattered populations to the west. It has been known from this endemic locale for over 130 years and there are more than 100 known collections (including repetitive ones). Population counts from some study plots range from only a few, to several hundred, plants (Springer et al 2012). NatureServe considers the species to be vulnerable, but not imperiled. Much of this limited habitat is targeted for forest treatments, and the USDA Forest Service considers the species to be Sensitive. Some of the forest health monitoring studies should be able to provide data on population sizes and trends.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None.
STATE STATUS: None.
OTHER STATUS: Forest Service Sensitive (USDA, FS Region 3 1999, 2007, 2013)

MANAGEMENT FACTORS: Interest in this species is due in part to its addition to the U.S. Forest Service Region 3 sensitive species list in 1999 and its occurrence in ecological restoration projects and proposed fuels reduction projects that involve tree thinning and prescribed burning. Some of its habitat has been subjected to large wildfires over the last few

decades, and other areas have undergone ecological restoration treatments, while much of its range in ponderosa pine forest is slated to undergo such treatments in the near future. Past and ongoing studies should be able to better define management requirements for the species.

PROTECTIVE MEASURES TAKEN: Listed as USDA Forest Service Sensitive species on the Coconino and Kaibab National Forests.

SUGGESTED PROJECTS:

LAND MANAGEMENT/OWNERSHIP: USDA Forest Service (Coconino and Kaibab National Forests) and private land holdings.

SOURCES OF FURTHER INFORMATION

REFERENCES:

Barneby, R.C. 1964. Atlas of North American Astragalus. 2 Vols. New York Botanical Garden, Bronx, New York. 1188 pp.

Falk, Mima, Philip Jenkins et al; Arizona Rare Plant Committee. 2001. Arizona Rare Plant Guide. Published by a collaboration of agencies and organizations. Pages unnumbered.

JStor|Global Plants, accessed 1/26/2016, http://plants.jstor.org/stable/10.5555/al.ap.specimen.cas0027760.

Kearney, T.H., R.H. Peebles, and collaborators. 1951. Arizona flora. 2nd edition with Supplement (1960) by J.T. Howell, E. McClintock, and collaborators. Univ. California Press, Berkeley. 1085 pp.

Springer, Judith D., Michael T. Stoddard, Daniel C. Laughlin, Debra L. Crisp and Barbara G. Phillips. 2012. Ecology of Rusby's Milkvetch (*Astragalus rusbyi*), a rare endemic of Northern Arizona Pine Forests. Calochortiana December 2012, Number 1.

Tropicos, accessed 1/26/2015, http://www.tropicos.org/Name/13017190.

USDA, Forest Service Region 3, Regional Forester's List of Sensitive Plants. 1999.

USDA, Forest Service Region 3, Regional Forester's List of Sensitive Plants. 2007.

USDA, Forest Service Region 3, Regional Forester's List of Sensitive Plants. 2013.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

ADDITIONAL INFORMATION: An early report of this species from Mt. Trumbull has been referred to *A. straturensis*, which has purple flowers and occurs on limestone soils (Barneby, 1964).

Revised: 2016-01-27 (BDT)

To the user of this abstract: you may use the entire abstract or any part of it. We do request, however, that if you make use of this abstract in plans, reports, publications, etc. that you credit the Arizona Game and Fish Department. Please use the following citation:

Arizona Game and Fish Department. 20XX **(= year of last revision as indicated at end of abstract)**. X...X **(= taxon of animal or plant)**. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. X pp.