

**REPORT ON THE CONSERVATION STATUS OF
ASTRAGALUS VEXILLIFLEXUS VAR. *NUBILUS***

by

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ASTRAGALUS VEXILLIFLEXUS VAR. *NUBILUS*, IN IDAHO**

Taxon Name: *Astragalus vexilliflexus* Sheld. var. *nubilus* Barneby

Common Name: White Clouds milkvetch

Family: Fabaceae

States Where Taxon Occurs: U.S.A.; Idaho

Current Federal Status: Category 2 Candidate

Recommended Federal Status: Category 1 Candidate

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ABSTRACT

Astragalus vexilliflexus var. *nubilus* (White Clouds milkvetch) is a narrow endemic, known from eight occurrences in the White Cloud Peaks and Boulder Mountains of central Idaho, in Custer County. All populations are on subalpine ridges on either side of the East Fork Salmon River valley, with seven along the east slope of the White Clouds and one across the river on the west slope of the Boulder Mountains. Surrounded by sagebrush-steppe or whitebark pine woodlands, its habitat includes exposed, dry, rocky ridge crests or upper slopes that typically support sparse vegetation cover.

Extensive surveys were conducted for this species in the White Clouds and Boulders between 1986 and 1994. The eight populations support approximately 6,000 plants and cover an area of about 30 acres. Both current and potential threats have been identified at several populations, including road maintenance/improvements, ORVs, livestock grazing, and trail use.

All known populations are found on Forest Service land, mostly the Sawtooth National Recreation Area, although part of one occurs on the Challis National Forest. Due to its rarity and to potential threats at all but two sites, we recommend that White Clouds milkvetch be changed from a category 2 to a category 1 species and that the Forest Service and Fish and Wildlife Service enter into a Conservation Agreement that establishes a monitoring and conservation program that will maintain viability.

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Appendix 2. Conservation Data Center records for occurrences of *Astragalus vexilliflexus* var. *nubilus*.

Appendix 3. Slides of the habit and habitat of *Astragalus vexilliflexus* var. *nubilus*.

I. Species Information.

1. Classification and nomenclature.

A. Species.

1. Scientific name.

a. Binomial: *Astragalus vexilliflexus* Sheld. var. *nubilus* Barneby

b. Full bibliographic citation: Barneby, R. 1956. Pugillus Astragalorum. XVIII. American Midland Naturalist 55:484-485.

c. Type specimen: *C.L. Hitchcock & C.V. Muhlick* "Open ridge on north of peak to east of Castle Peak, White Cloud Range, Custer Co., Idaho". August 8, 1944. Holotype at CAS; Isotypes at *IDS, WS, WTU* (Barneby 1956).

2. Pertinent synonym(s): None.

3. Common name(s): White Clouds milkvetch.

4. Taxon codes: PDFAB0F9E1 (Biodiversity Information Network and The Nature Conservancy).

5. Size of genus: Approximately 1600 species dispersed primarily around the Northern Hemisphere, including about 375 species in North America (Barneby 1989).

B. Family classification.

1. Family name: Fabaceae.

2. Pertinent family synonyms: Leguminosae; Papilionaceae.

3. Common name(s) for family: Bean; Pea; Legume.

C. Major plant group: Dicotyledonea

D. History of knowledge of taxon: *Astragalus vexilliflexus* var. *nubilus* was not described until 1956, although it was first collected east of the Livingston Mine in the White Cloud Peaks by Ray Davis in 1938. Another collection was made east of Castle Peak in 1944 by Hitchcock and Muhlick. During his 1980 vegetation reconnaissance of the Sawtooth NRA, Ron Taylor (Taylor n.d.) found an additional population in the vicinity of Castle Peak. In 1986, Duane Atwood and Bob Moseley conducted a limited botanical survey and discovered one new population. Five new populations were discovered and two of the three previously known populations were revisited in 1990, during the Conservation Data Center's thorough survey along the eastern front of the White Cloud Peaks and west slope of the Boulder Mountains (Mancuso and Moseley 1990).

E. Comments on current alternative taxonomic treatment(s): None.

2. Present legal or other formal status.

A. International: None.

B. National.

1. Present designation of proposed legal protection or regulation: *Astragalus vexilliflexus* var. *nubilus* appears in the 1990 and 1993 Notices of Review for candidate plants as a category 2 candidate (U.S. Fish and Wildlife Service (1990; 1993). Category 2 candidates include those taxa for which information now in the possession of the U.S. Fish and Wildlife Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which sufficient data on biological vulnerability and threat are not currently available to support a proposed rulemaking for listing under the Endangered Species Act (U.S. Fish and Wildlife Service 1993).

2. Other current formal status recommendation: *Astragalus vexilliflexus* var. *nubilus* is a U.S. Forest Service, Region 4 sensitive species (Spar et al. 1991).

The Idaho Native Plant Society maintains *Astragalus vexilliflexus* var. *nubilus* on its list of current and recommended Federal Candidate Species, which includes all globally rare and threatened taxa in Idaho (Idaho Native Plant Society 1994).

The Association for Biodiversity Information (International Association of Natural Heritage Programs and Conservation Data Centers) ranks *Astragalus vexilliflexus* var. *nubilus* G4T2, meaning the full species, *A. vexilliflexus* is globally secure, while the variety, *A. vexilliflexus* var. *nubilus* is globally imperiled because of rarity or because of other factors demonstrably making it vulnerable to extinction (Moseley and Groves 1992).

3. Review of past status: In his review of the taxon for the Rare and Endangered Plants Technical Committee of the Idaho Natural Areas Council, Bob Steele (1977; 1981) recommended Federal Threatened status. He noted that *Astragalus vexilliflexus* var. *nubilus* had a very limited distribution, only a small number of known populations, and the fact that one of these populations was potentially subject to mining threats.

C. State.

1. Idaho.

a. Present designation or proposed legal protection or regulation: None.

b. Other current formal status recommendation: Because *Astragalus vexilliflexus* var. *nubilus* is endemic to Idaho, the Association for Biodiversity Information state rank (S) equals the global rank for the infraspecific taxon (T) (see above; Moseley and Groves 1992).

Because it is a federal candidate species, no Idaho Native Plant Society category applies to *Astragalus vexilliflexus* var. *nubilus* (Idaho Native Plant Society 1994).

c. Review of past status: None.

3. Description.

A. General nontechnical description: *Astragalus vexilliflexus* var. *nubilus* is a taprooted perennial herb with a prostrate, cushion-like habit. The herbage has short hairs and the leaves are divided into (5)7-13 leaflets. The pea-shaped flowers are small, mostly 5-8 mm long and yellowish except for the purplish keel. Flowers are not raised above the foliage, so that the flowers can be nearly hidden by the leaves. The fruit is a membranous "pea" pod approximately 7-11 mm long and 2.5-3 mm wide. See Appendix 1 for a line drawing and Appendix 3 for color slides of its habit and habitat.

B. Technical Description: Prostrate, densely tufted and intricately matted, taprooted perennial; herbage loosely silky-strigulose or villosulous with sinuous hairs up to (0.3) 0.5-0.8 mm long; leaves short petioled or sessile with (5) 7-13 commonly crowded leaflets; calyx 3.1-3.8 mm long, the tubes 1.5-1.8 mm, the teeth 1.3-2 mm long; petals ochroleucous with purplish keel; banner 5.2-6.2 mm long, 4-5 mm wide; wings 4.7-5.9 mm long, the claws 1.1-1.5 mm, the blades 2.5-2.8 mm long, 1.5-1.7 mm wide; pods subsymmetrically lenticular, 3.5-5 mm long (Barneby 1964; Hitchcock 1961).

C. Local field characters: The genus *Astragalus* is well represented in central Idaho, including several species which occur sympatrically or in close proximity with White Clouds milkvetch; they are *Astragalus alpinus* (alpine milkvetch), *A. kentrophyta* (thistle milkvetch), *A. miser* (weedy milkvetch), *A. platytropis* (broad-keeled milkvetch) and *A. whitneyi* (balloon milkvetch). All are more widespread than White Clouds milkvetch. Four of the five species can be readily distinguished via the following characteristics:

Alpine milkvetch - plants with widely spreading rootstocks, a more ascending and diffuse habit and lilac-purplish flowers.

Weedy milkvetch - plants generally with a more ascending and diffuse habit, leaflets relatively remote and elongated flowering stems.

Broad-keeled milkvetch - its habit is similar to White Clouds milkvetch, but can be differentiated by its silvery-gray foliage, purplish flowers and a disproportionally large and swollen red-speckled or -mottled pod.

Balloon milkvetch - plants with a diffuse and somewhat ascending habit and inflated red or purple-mottled pods.

White Clouds milkvetch is most likely to be confused with thistle milkvetch. The following key, modified from Hitchcock and Cronquist (1973) should help distinguish the two species:

1. Leaflets all continuous with the rachis, sharp pointed to spinose; racemes 1-3 flowered; flowers usually more purplish *Astragalus kentrophyta*
1. Leaflets not continuous with the rachis, nor sharp pointed; racemes usually with more than 3 flowers; flowers yellow except for purplish keel*Astragalus vexilliflexus* var. *nubilus*

Specimens of *A. vexilliflexus* var. *vexilliflexus* from the Salmon River Mountains of central Idaho have been confused with var. *nubilus*, although upon viewing the two taxa in the field, the differences are obvious. Below is a conspectus comparing several morphological features:

	<i>vexilliflexus</i>	<i>nubilus</i>
.....		
herbage pubescence	appressed	silky-villosulous
inflorescence	extends beyond leaves	within leaves
flower color	purple	cream-yellow; few purple lines on banner
plant habit	strongly prostrate	weakly prostrate; leaves somewhat erect, although plant matted

D. Identifying characteristics of material which is in interstate or international commerce or trade: No interstate or international trade is known. See above section for differences with closely related species.

E. Photographs and/or line drawings: No drawings of the whole plant of *Astragalus vexilliflexus* var. *nubilus* are known. In Hitchcock (1961), there is a drawing of its perianth, associated with a full line drawing of *A. vexilliflexus* var. *vexilliflexus*. These are reproduced in both Spahr et al. (1991) and U.S. Forest Service (n.d.). Photographs (35 mm slides) of this species and its habitat are in the slide collection of the Conservation Data Center. Several have been reproduced in Appendix 3.

4. Significance.

A. Natural: None known.

B. Human: None known.

5. Geographical distribution.

A. Geographical range: *Astragalus vexilliflexus* var. *nubilus* is restricted to the eastern slope of

the White Cloud Peaks and across the valley of the East Fork Salmon River on the western slope of the Boulder Mountains in Custer County, Idaho.

Figure 1. Distribution of *Astragalus vexilliflexus* var. *nubilus*.
Portion of Sawtooth NF map; 1 inch = 2 miles. Three digit code refers to the occurrence (see Appendix 2).

B. Precise occurrences in Idaho.

1. Populations currently or recently known extant: The Idaho Conservation Data Center (CDC) data base contains eight extant occurrences of *Astragalus vexilliflexus* var. *nubilus*. Records for the each occurrence appear in Appendix 2, and are identified by a three-digit code (i.e., 001, 002, etc.). Among other things, each record contains information on the county of occurrence, site name, narrative of the location, date of initial discovery, date of most recent observation, pertinent USGS quads, township, range and section, and latitude and longitude. See Mancuso and Moseley (1990) for maps of all known populations.

2. Populations known or assumed extirpated: All populations have been discovered or revisited since 1990. No populations are known to be extirpated.

3. Historically known populations where current status not known: None.

4. Locations not yet investigated believed likely to support additional natural populations: The survey of the ridges and slopes adjacent to the East Fork Salmon River in the White Cloud Peaks and Boulder Mountains is complete. It is possible, although somewhat remote, that it could occur on the west slope of the White Cloud Peaks, facing the Sawtooth Valley, and on the eastern slope of the Boulder Mountains. These are two areas that contain potential habitat that have not been surveyed.

5. Reports having ambiguous or incomplete locality information: None.

6. Locations known or suspected to be erroneous reports: A widely disjunct population of *A. vexilliflexus* recently discovered near Stibnite, in the Salmon River Mountains, turned out to be the type variety and not var. *nubilus*.

C. Biogeographical and phylogenetic history: There is no information of which I am aware concerning the biogeographical and phylogenetic history (e.g., fossil record, Pleistocene refugia, migrational patterns, etc.) of *Astragalus vexilliflexus* or its infraspecific taxa. Its distribution lies well to the south and west of the sometimes similarly matted, less densely pubescent, and larger-flowered, montane form of *A. vexilliflexus* var. *vexilliflexus* (Barneby 1964).

6. General environment and habitat description.

A. Concise statement of general environment: *Astragalus vexilliflexus* var. *nubilus* is a high elevation species, occurring along ridge crests and upper slopes between 8400 and 9900 feet. It is not known to occur in the alpine zone, however. It's found on flat to steep slopes and all aspects, with southerly exposures the most common. Sites are rocky, dry, open, and relatively sparsely vegetated. It is not found within adjacent areas characterized by greater vegetation cover. *Astragalus vexilliflexus* var. *nubilus* occurs in grass/low forb and *Artemisia tridentata* ssp. *vaseyana* communities. In the White Cloud Peaks and Boulder Mountains it occurs on substrates of the Challis volcanics and related rocks (Fisher et al. 1983), and at one site on till of metamorphic and granitic origin.

B. Physical characteristics.

1. Climate.

a. Koppen climate classification: The geographic area encompassing populations of *Astragalus vexilliflexus* var. *nubilus* is classified as Koppen's unit BSk: semiarid climate or steppe, with an average annual temperature under 64.4° F (Trewartha and Horn 1980).

b. Regional macroclimate: No long-term weather data are available for the White Cloud Peaks or Boulder Mountains. Data collected at Stanley, Idaho, located approximately 20 miles away, at 6200 feet elevation, provide an overview of regional climatic patterns. Precipitation, as snow, is greatest from November to the end of January, accounting for about 33% of the yearly total. Another precipitation spike occurs in June, and falls as both snow and rain. July and August are the driest months, accounting for only 10% of the yearly average (Johnson 1978).

The White Cloud Peaks and the Boulder Mountains probably both receive less precipitation than the nearby Sawtooth Range to the west and Salmon River Mountains to the north due to the westerly direction of the regionally prevailing storm tracks. Winters in central Idaho are long and cold. July and August are the warmest months, but frosts can occur any time of year, especially at the higher elevations. Large variations in diurnal temperature are common.

c. Local microclimate: *Astragalus vexilliflexus* var. *nubilus* commonly occurs on open ridgelines and upper slopes, areas subject to frequent high winds. Plants in some populations are likely covered by snow much of the winter, but others may not be. Soils are generally rocky and shallow and are probably more xeric than in neighboring, sagebrush or forest communities. Frost heaving is probably common on these exposed sites.

2. Air and water quality requirements: Unknown.

3. Physiographic provinces: *Astragalus vexilliflexus* var. *nubilus* lies within the Northern Rocky Mountain Geomorphic Province (Ross and Savage 1967).

4. Physiographic and topographic characteristics: All occurrences of *Astragalus vexilliflexus* var. *nubilus* occur on upper slopes or on ridgelines. Slope angle can vary from gentle to moderately steep (<35%) and the predominant aspects are westerly and southerly, although it is known to occur on all aspects. Elevations range from 8400 feet (occurrence 007) to 9900 feet (005).

5. Edaphic factors: *Astragalus vexilliflexus* var. *nubilus* primarily occurs on substrates of the Challis Volcanic Group, a diverse collection of volcanic, Eocene-age rocks covering large areas in central Idaho. The most extensive types of Challis volcanic rock occurring in the species' core range are potassium-rich andesite, latite and basalt flows. Lesser amounts of dacite, rhyodacite lavas and breccias, and tuffs have also been mapped along the eastern front of the White Clouds (Fisher *et al.* 1983).

Lithic soils dominate, but one population occurs on gravelly textured glacial till of

metamorphic and granitic origin.

6. Dependence of this taxon on natural disturbance: The sites on which White Clouds milkvetch occurs are relatively open compared to adjacent sagebrush or forest stands. The open community is largely a result of the underlying bedrock close to the surface in combination with local, small-scale disturbances, such as frost heaving and wind. Because the slopes are usually not very steep, disturbance due to downslope movement of the substrate is of only minor importance. The role of large ungulate grazing in maintaining these open communities is unknown.

7. Other unusual physical features: None known.

C. Biological characteristics.

1. Vegetation physiognomy and community structure: Most ridgeline and associated upper slope occurrences of *Astragalus vexilliflexus* var. *nubilus* are characterized by an open community supporting bunchgrasses and other low-growing forbs. A high percentage of rock and bare ground are also present. These high elevation communities are unclassified, although Ron Taylor (n.d.) named this kind of habitat a subalpine fellfield in his vegetation reconnaissance of the White Clouds. Areas adjacent to populations support *Artemisia tridentata* ssp. *vaseyana*/*Agropyron spicatum*, *Artemisia tridentata* ssp. *vaseyana*/*Festuca idahoensis* or *Pinus albicaulis* habitat types (Hironaka et al. 1983; Steele et al. 1981).

2. Regional vegetation type: White Clouds milkvetch habitat falls within Kuchler's (1964) Sagebrush Steppe (*Artemisia-Agropyron*). Under Bailey's (1980) scheme, its habitat falls in the Grand fir-Douglas-fir Forest Section of the Rocky Mountains Province, Steppe Division, Dry Domain. The ecoregion classification developed by Omernik and Gallant (1986) places *Astragalus vexilliflexus* var. *nubilus* habitat in the Northern Rockies Ecoregion.

3. Frequently associated species: Common associates include *Agropyron spicatum*, *Festuca idahoensis*, *Carex rossii*, *Chrysothamnus viscidiflorus*, *Haplopappus acaulis*, *Bupleurum americanum*, *Phlox austromontanus*, *Astragalus whitneyi*, and *Astragalus kentrophyta*.

4. Dominance and frequency: White Clouds milkvetch is locally abundant and can be one of the more common species on its open-soil habitat.

5. Successional phenomena: It occurs in open communities with high amounts of bare ground and low species richness. It is not clear to us exactly how these open sites are maintained and how long they persist. Bedrock geology, wind erosion, and frostheaving may all play a role in keeping these communities open, as well as downslope soil movement on the uncommon steeper sites occupied by White Clouds milkvetch. Only part of one population occurs in the partial shade of a whitebark pine stand. Clearly, therefore, the early primary successional status must be maintained in order for the populations to persist, but it is not known whether or not these early successional sites are ephemeral, and continually shifting position to maintain the metapopulation structure, or whether they are long-persistent.

6. Dependence on dynamic biotic features: See above discussion.

7. Other endangered species: None known to be sympatric with White Clouds milkvetch.

7. Population biology.

A. General summary: Eight occurrences of *Astragalus vexilliflexus* var. *nubilus* are known to be extant. All populations occur on subalpine ridges and slopes adjacent to the East Fork of the Salmon River in the White Cloud Peaks and Boulder Mountains. Estimates of above-ground plants in a population range from less than ten to as many as 2,000 individuals. Little is known of pollination ecology, seed dispersal, or seedling biology.

B. Demography.

1. Known populations: Eight occurrences are known to be extant, all observed in 1990. All populations are small, with the largest being about 2000 individuals and the smallest consisting of less than ten plants. All occur on slopes facing the East Fork Salmon River valley. Population estimates have been made of above-ground plants at all sites, but nothing is known about the seed banking characteristics of this species, so these above-ground estimates do not necessarily reflect absolute population levels. We estimate that *Astragalus vexilliflexus* var. *nubilus* populations total approximately 6000 plants occupying less than 30 acres.

2. Demographic details: Appendix 2 contains the CDC records for the eight White Clouds milkvetch occurrences. These records contain such demographic details as (1) estimated area occupied by population(s); (2) number of plants; (3) density (if known); (4) evidence of reproduction; and occasionally (5) evidence of expansion or contraction of the population. No data has been collected on presence of dispersed seeds.

Each occurrence has been given a rank ("EORANK" field in the records in Appendix 2). The "A" (highest), "B", "C", and "D" (lowest) ranks for each occurrence are based primarily on above-ground population numbers and ecological quality of the site. Secondary considerations include population isolation/habitat fragmentation, immediate/imminent threats, and proximity to developed sites (with the implied expectation that habitat will be degraded in the near-term). Below is a summary of the occurrences by rank:

a. A-RANKED OCCURRENCES (2):

Wickiup Creek Ridge (005) - White Cloud Peaks, ridge complex between upper Wickiup Creek and Little Boulder Creek; elevation 9400-9900 feet; 500 plants observed over 20+ acres.

Bowery Ridge (008) - White Cloud Peaks, ridge complex between Germania Creek and the East Fork Salmon River; elevation 8800-9200 feet; eight subpopulations supporting ca. 2000 plants occurring over 2+ acres.

b. B-RANKED OCCURRENCES(4):

Railroad Ridge (001) - White Cloud Peaks, Railroad Ridge, ca. 2 miles east of the Livingston Mine; elevation 8800-9400 feet; five subpopulations supporting a total of ca. 700 plants.

South of Bowery Creek (002) - White Cloud Peaks, along ridge complex between the East Fork Salmon River and Narrow Canyon ca. two miles south of Bowery Creek; elevation 8800 feet; ca. 500 individuals on one acre.

Jim Creek (003) - White Cloud Peaks, north of Jim Creek, ca. 1 mile east of the Livingston Mine; elevation 9100 feet; ca. 500 plants on less than one acre.

Red Ridge (007) - White Cloud Peaks, Red Ridge, between Little Boulder and Big Boulder Creeks; elevation 8400 feet; ca. 1500 plants on about 1.5 acres.

c. C-RANKED OCCURRENCES (1):

Germania Ridge (006) - White Cloud Peaks, ridge that forms divide between Wickiup and Germania Creeks; elevation 9100-9485 feet; comprised of three small subpopulations supporting a total of ca. 30 plants on about one acre total.

d. D-RANKED OCCURRENCES (1):

Bowery Chain Lakes Creek (004) - White Cloud Peaks, along cut-off trail between Boulder Chain Lakes Creek and Spring Basin; elevation 8700 feet; <10 plants on less than one acre.

C. Phenology.

1. Patterns: Because of the isolated nature of its populations, little is known about the phenology of *Astragalus vexilliflexus* var. *nubilus*. Based on limited observations, it generally flowers in late July and early August, with fruit maturation taking place through August and dispersal taking place in late August and September.

2. Relation to climate and microclimate: Unknown.

D. Reproductive ecology.

1. Type of reproduction: White Clouds milkvetch does not reproduce vegetatively; new individuals arise from seeds.

2. Pollination.

a. Mechanisms: White Clouds milkvetch reproduces by seeds, but the fertilization mechanism is not known. No studies have been conducted to determine if it is an obligate or facultative outcrosser, or if any selfing occurs or to what degree it may occur.

b. Specific known pollinators: Unknown.

c. Other suspected pollinators: Unknown.

d. Vulnerability of pollinators: Unknown.

3. Seed dispersal.

a. General mechanisms: Specific details unknown, but gravity is probably the primary dispersal agent. Wind and water may possibly play a limited role, although the seed has no structures to facilitate either of these mechanisms.

b. Specific agents: Unknown, but probably gravity is the most important.

c. Vulnerability of dispersal agents and mechanisms: Unknown.

d. Dispersal patterns: Specific details unknown.

4. Seed biology.

a. Amount and variation of seed production: Unknown.

b. Seed viability and longevity: Unknown, but at least some *Astragali* have very long-lived seeds.

c. Dormancy requirements: Unknown.

d. Germination requirements: Unknown.

e. Percent germination: Unknown.

5. Seedling ecology: Unknown.

6. Survival and nature of mortality of plants: Lack specific knowledge.

7. Overall assessment of reproductive success: No data.

8. Population ecology.

A. General summary: There is little knowledge of the effect of herbivores, disease, competition, hybridization, or allelopathy on population viability.

B. Positive and neutral interactions: None known.

C. Negative interactions.

1. Herbivores, predators, pests, parasites and diseases: Seed herbivores, such as rodents and birds, may have a negative effect on seed survival, but specific details are lacking.

2. Evidence of competition.

a. Intraspecific: Not known.

b. Interspecific: Few vascular plants are immediately sympatric with *Astragalus vexilliflexus* var. *nubilus*. The vegetation cover is low on all sites and interspecific competition is probably not significant on most sites.

3. Toxic and allelopathic interactions with other organisms: None known.

D. Hybridization.

1. Naturally occurring: None known.

2. Artificially induced: Unknown.

3. Potential in cultivation: Unknown.

E. Other factors of population ecology: None known.

9. Current land ownership and management responsibility.

A. General nature of ownership: Known populations all occur on a land administered by the U.S. Forest Service, either Sawtooth or Challis national forests.

B. Specific landowners: The ownership of the eight occurrences is listed in the records in Appendix 2. Below is a summary of ownership (referenced by occurrence number):

1. Sawtooth National Forest, Sawtooth National Recreation Area.

Railroad Ridge (001)
South of Bowery Creek (002) - on boundary between Sawtooth NRA and Challis NF.
Jim Creek (003)
Boulder Chain Lakes (004)
Wickiup Creek Ridge (005)
Germania Ridge (006)
Red Ridge (007)
Bowery Ridge (008)

2. Challis National Forest, Yankee Fork Ranger District.

South of Bowery Creek (002) - on boundary between Sawtooth NRA and Challis NF.

C. Management responsibility: Management responsibility mirrors the administrative responsibility outlined above.

D. Easements, conservation restrictions, special designations, etc.: Most occurrences occur in the Sawtooth National Recreation Area (001, 003, 004, 005, 006, 007, 008, and part of 002).

10. Management practices and experience.

A. Habitat management.

1. Review of past management and land-use experiences.

a. This taxon: No population monitoring has been conducted for White Clouds milkvetch, so the effect of livestock grazing and recreation impacts on population viability are not known.

b. Related taxa: Livestock grazing, which takes place in some populations of White Clouds milkvetch, has been shown to have a detrimental effect on pollinators of a rare *Astragalus* in California (Sugden 1985).

c. Other ecologically similar taxa: N/A

2. Performance under changed conditions: The condition of the populations has not been tracked over time, therefore we know little of their performance under changed ecological conditions. Five of the eight occurrences were discovered in 1990 and another in 1986. Only two occurrences were known prior to then; 003 was discovered in 1938 and 005 in 1944. No population data were collected for these historical collections, so all we know today is that they persisted over the intervening 50 years. Occurrence 005 has no observable human or livestock disturbances but the Railroad Ridge Road is very close to occurrence 003 and there is cattle grazing in the area.

3. Current management policies and actions: Most populations are in the Sawtooth National Recreation Area, managed primarily for recreation, although disturbances such as cattle grazing, motorcycles and hiking take place in and around White Clouds milkvetch populations.

4. Future land use(s): Little change in land use patterns from those mentioned above are expected to occur in the near future. Some populations are within the boundary of a proposed Wilderness.

B. Cultivation.

1. Controlled propagation techniques: None known.

2. Ease of transplanting: Unknown.

3. Pertinent horticultural knowledge: None known.

4. Status and location of presently cultivated material.

a. Specimen plants: None known.

b. Stored seed/propagule banks: None known.

11. Evidence of threats to survival.

A. Present or threatened destruction, modification, or curtailment of habitat or range.

1. Past threats: Domestic livestock and possibly wild horse grazing has taken place in and around all occurrences of White Clouds milkvetch during the last century. The effect of this disturbance on the viability of milkvetch populations is unknown. Construction of a recreation trail through occurrence 004 and the Railroad Ridge Road through 003 probably destroyed some individuals and habitat. Although it may be a coincidence, the two largest populations (occurrences 005 and 008) had no observable disturbances to their habitat when they were last observed in 1990.

2. Existing threats: Livestock grazing occurs in and around five occurrences (001, 002, 003, 006, 007) and is especially heavy around the South of Bowery Creek (002) Red Ridge (007) sites. The Railroad Ridge Road comes very close to the Jim Creek occurrence (003) and any widening of the road would impact the population. ORV use occurs in the Railroad Ridge occurrence (001), while both ORVs and hikers use the trail through the Boulder Chain Lakes Creek occurrence (004).

3. Potential threats: See above.

B. Overutilization for commercial, sporting, scientific, or educational use.

1. Past threats: None known.

2. Existing threats: Minimal to no existing threats.

3. Potential threats: Minimal to no potential threats foreseen.

C. Disease, predation, or grazing.

1. Past threats: None known.

2. Existing threats: See Past Threats.

3. Potential threats: See Past Threats.

D. Inadequacy of existing regulatory mechanisms.

1. Past threats: None.

2. Existing threats: None.

3. Potential threats: None.

E. Other natural or manmade factors.

1. Past threats: See below.

2. Existing threats: The small size of all populations, in terms of both size and numbers, presents a real threat to their survival due to deleterious environmental and genetic events.

3. Potential threats: See above.

II. Assessment and Recommendations.

12. General assessment of vigor, trends, and status: White Clouds milkvetch has a limited and scattered distribution in the East Fork Salmon River drainage, where it's restricted to a relatively narrow range of habitat conditions. Eight populations have been documented, all visited during 1990. Together, these populations support approximately 6,000 individuals and cover an area of about 30 acres. Five of the eight populations face current or potential threats to their long-term viability.

13. Recommendations for listing, status change, and/or conservation actions.

A. Recommendations to the U.S. Fish and Wildlife Service: White Clouds milkvetch is a Category 2 candidate. Following our 1990 survey, we made the recommendation to expand the search for new populations beyond what was accomplished that year. For the most part this was done in 1993. It still remains a rare species with some viability concerns for a majority of the populations. We recommend that White Clouds milkvetch be changed from a category 2 to a category 1 candidate and the Fish and Wildlife Service enter into a Conservation Agreement with the U.S. Forest Service as soon as practicable to protect and monitor all populations.

B. Recommendations to other U.S. Federal Agencies.

1. U.S. Forest Service: All known populations of White Clouds milkvetch occur on lands managed by the U.S. Forest Service, largely on the Sawtooth National Recreation Area administered by the Sawtooth National Forest. White Clouds milkvetch should remain on the Forest Service Sensitive Species list for the Sawtooth and Challis national forests.

Land managers and field personnel should be informed of the occurrence of this species in their area. Possible sightings should be documented by specimens (if the size of the population warrants collection) and should be sent to the University of Idaho Herbarium (Department of Biological Sciences, University of Idaho, Moscow, Idaho 83843) for verification of their identity. Confirmed sightings should be reported to the Idaho Conservation Data Center for entry into their permanent data base on sensitive species.

a. Sawtooth National Forest: All of the populations with identified current or potential threats are within the Sawtooth NRA. Establishment of monitoring programs to assess impacts and trends are recommended where these threats pose the most serious questions to long-term population viability. The following populations are therefore recommended for monitoring: South of Bowery Creek (002), Jim Creek (003), Boulder Chain Lakes Creek (004) and Red Ridge (007). Additionally, immediate protection measures are recommended for the Boulder Chain Lake Creek (004) population. Rerouting a section of trail #047 may be one option.

b. Challis National Forest: The South of Bowery Creek (002) population extends onto Challis NF-administered land along the Sawtooth NRA boundary in the Boulder Mountains. Coordination with the Sawtooth NRA to establish a monitoring program for this population is recommended. There is potential habitat for White Clouds milkvetch in the Herd Creek drainage that was not as thoroughly surveyed as the East Fork Salmon River valley. Forest personnel should be aware of the possibility of this species in that area.

C. Other status recommendations.

1. Municipalities: None.

2. Counties: None.

3. State(s) (Idaho):

a. Conservation Data Center: The Idaho Conservation Data Center has the ranking responsibility for *Astragalus vexilliflexus* var. *nubilus* in the Association of Biodiversity Information. I will recommend that the global (G) and state (S) ranks remain the same, that is G4T2 S2.

b. Idaho Native Plant Society: I recommend that the Idaho Native Plant Society maintain *Astragalus vexilliflexus* var. *nubilus* on their list of recommended globally rare and threatened federal candidates.

4. Other Nations: No recommendations.

5. International Trade, etc.: No recommendations.

14. Recommended critical habitat: Because only eight populations are known to exist, all should be protected to the fullest extent possible.

15. Conservation/recovery recommendations.

A. General conservation recommendations.

1. Recommendations regarding present or anticipated activities: With only eight occurrences known, no more loss or degradation of habitat is acceptable. All development activities within the range of White Clouds milkvetch should be evaluated against this standard.

2. Areas recommended for protection:

3. Habitat management recommendations: Habitat management in or near White Cloud milkvetch populations should be oriented toward maintaining viable populations. Therefore, some level of monitoring is needed to determine the status and trend of populations over time.

4. Publicity sensitivity: None.

5. Other recommendations: None.

B. Monitoring activities and further research recommendations: The impacts of livestock should be monitored as part of Allotment Management Planning. Potential impacts to White Clouds milkvetch from ORV's, horse and hiker traffic should be taken into consideration in formulating area travel plans. For example, the Boulder Chain Lakes Creek population (004) could easily be impacted or extirpated by erosion from trail #047. The Jim Creek population (003) should be monitored to determine the effects of any road maintenance or related activities along FS Road 669.

16. Interested parties:

Conservation Data Center
Idaho Department of Fish and Game
P.O. Box 25
Boise, ID 83707

Idaho Native Plant Society
P.O. Box 9451
Boise, ID 83707

Forest Supervisor
Challis National Forest
HCR 63, Box 1671
Challis, ID 83226

Forest Supervisor
Sawtooth National Forest
2647 Kimberly Road East
Twin Falls, ID 83301

Regional Forester
USFS Intermountain Region
Federal Building
324 25th St.
Ogden, UT 84401

Director
Snake River Plain Herbarium
Biology Department
Boise State University
1910 University Drive
Boise, ID 83725

Director
University of Idaho Herbarium
Department of Biological Sciences
University of Idaho
Moscow, ID 83843

Chief Botanist
The Nature Conservancy
1815 N Lynn St.
Arlington, VA 22209

III. Information Sources.

17. Sources of information.

A. Publications.

1. References cited in report:

- Bailey, R.G. 1980. Description of the ecoregions of the United States. Miscellaneous Publication No. 1391. USDA, Forest Service, Washington, DC. 77 p., plus map.
- Barneby, R.C. 1956. Pugillus Astragalorum XVIII: Miscellaneous novelties and reappraisals. *American Midland Naturalist* 55:477-503.
- Barneby, R.C. 1964. Atlas of North American Astragalus. *Memoirs of the New York Botanical Garden* Vol. 13. The New York Botanical Garden, Bronx, NY. 1188 p.
- Barneby, R.C. 1989. Fabales. *Intermountain Flora, Volume 3, Part B*, The New York Botanical Garden, Bronx, NY. 279 p.
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- Kuchler, A.W. 1964. Potential natural vegetation of the conterminous United States. Special Publication No. 36. American Geographical Society, New York, NY.
- Moseley, R.K. 1989. Results of the 1989 search of regional herbaria for location information pertaining to Idaho's rare flora: The fourth generation search. Idaho Department of Fish and Game, Natural Heritage Section, Boise, ID. 12 p.
- Mancuso, M., and R.K. Moseley. 1990. Field investigation of *Astragalus vexilliflexus*

var. *nubilus* (White Cloud milkvetch), a Region 4 Sensitive Species, on the Sawtooth National Forest. Idaho Department of Fish and Game, Natural Heritage Section, Boise, ID. 12 p., plus appendices.

Moseley, R., and C. Groves, compilers. 1992. Rare, threatened and endangered plants and animals of Idaho. Second edition. Idaho Department of Fish and Game, Conservation Data Center, Boise, ID. 38 p.

Omernik, J.M., and A.L. Gallant. 1986. Ecoregions of the Pacific Northwest. EPA/600/3-86/033. US Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR. 39 p.

Ross, S.H., and C.N. Savage. Idaho earth sciences. Earth Science Series 1. Idaho Bureau of Mines and Geology, Moscow, ID. 271 p.

Spahr, R., L. Armstrong, D. Atwood, and M. Rath. 1991. Threatened, endangered, and sensitive species of the Intermountain Region. USDA, Forest Service, Intermountain Region, Ogden, UT.

Steele, R. 1977. *Astragalus vexilliflexus* var. *nubilus*. Page 42 in: Endangered and threatened plants of Idaho - A summary of current knowledge, By the Rare and Endangered Plants Technical Committee of the Idaho Natural Areas Council. Bulletin No. 21, Forest, Wildlife and Range Experiment Station, University of Idaho, Moscow, ID.

Steele, R. 1981. *Astragalus vexilliflexus* var. *nubilus*. Page 10 in: Vascular Plant Species of Concern in Idaho, By the Rare and Endangered Plants Technical Committee of the Idaho Natural Areas Council. Bulletin No. 34, University of Idaho, Forest, Wildlife and Range Experiment Station, Moscow, ID

Steele, R., R.D. Phister, R.A. Ryker, and J.A. Kittams. 1981. Forest habitat types of central Idaho. General Technical Report INT-114. USDA, Forest Service, Intermountain Research Station, Ogden, UT. 138 p.

Sugden, E.A. 1985. Pollinators of *Astragalus monoensis* Barneby (Fabaceae): New host records, potential impacts of sheep grazing. Great Basin Naturalist 45:299-312.

Taylor, R. No date. Vegetation reconnaissance of selected locations in the Sawtooth National Recreational Area. Unpublished document on file at: Idaho Department of Fish and Game, Conservation Data Center, Boise, ID. 24 p.

Trewartha, G.T., and L.H. Horn. 1980. An introduction to climate. McGraw-Hill Book Co., New York, NY. 412 p.

U.S. Fish and Wildlife Service. 1990. Endangered and threatened wildlife and plants; review of plant taxa for listing as endangered or threatened species; notice of review. Federal Register 50 CFR Part 17:6184-6229 (February 21, 1990).

U.S. Fish and Wildlife Service. 1993. Plant taxa for listing as endangered or threatened species; notice of review. Federal Register 50 CFR Part 17:51144-51190 (September 30, 1993).

U.S. Forest Service. No date. Idaho and Wyoming endangered and sensitive plant field guide. Intermountain Region, Ogden, UT.

2. Other pertinent publications.

a. Technical: None known.

b. Popular: None known.

B. Herbaria consulted: At least four major herbarium searches have been conducted for Idaho's rare plants over the years, including *Astragalus vexilliflexus* var. *nubilus*, most recently in 1989 (Moseley 1989). Specimens of *A. vexilliflexus* var. *nubilus* are known to be deposited at the herbaria listed below, along with the number of specimens in each collection [the standardized acronyms follow Holmgren et al. (1990)]. For specific collection information relating to each occurrence, refer to the "Specimen" field in the occurrence records found in Appendix 2.

BRY (1)
ID (7)
IDS (1)
UTC (1)
WS (1)
WTU (1)

C. Fieldwork: Systematic inventories were conducted for *Astragalus vexilliflexus* var. *nubilus* by botanists from the Idaho Conservation Data Center in 1990 and 1994, throughout the East Fork Salmon River drainage in the White Cloud Peaks and the Boulder Mountains (see Mancuso and Moseley 1990, for details of 1990 survey). In 1994, Moseley completed the survey along the west slope of the Sheep Peak-Bowery Peak massif and between Railroad Ridge and Potaman Peak. In 1986, general floristic surveys were conducted throughout the high White Clouds by Duane Atwood and Bob Moseley. Ron Taylor conducted similar surveys in 1980.

D. Knowledgeable individuals:

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Conservation Data Center
Idaho Department of Fish and Game
P.O. Box 25
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Michael Mancuso
Conservation Data Center
Idaho Department of Fish and Game
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324 25th St.
Ogden, UT 84401

E. Other information sources: None known.

18. Summary of material on file: Color slides, field forms, maps, and most published and unpublished references pertaining to *Astragalus vexilliflexus* var. *nubilus* are on file at the Idaho Conservation Data Center office.

IV. Authorship.

19. Initial authorship:

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20. Maintenance of status report: The Idaho Conservation Data Center will maintain current information and update the status report as needed. Should *Astragalus vexilliflexus* var. *nubilus* be listed as an endangered or threatened species by the U.S. Fish and Wildlife Service, the Service, through its Boise Field Office, should maintain the primary file on information, encourage others to provide new information, and distribute new findings, as received, to the interested parties (section II.16.).

V. New information.

21. Record of revisions: Not applicable.

Appendix 1

Line drawing of *Astragalus vexilliflexus* var. *nubilus* (from Hitchcock 1961).

Appendix 2

Conservation Data Center records for occurrences of *Astragalus vexilliflexus* var. *nubilus*.

NOT INCLUDED IN CDC HOME PAGE VERSION OF THIS REPORT

Appendix 3

Slides of the habit and habitat of *Astragalus vexilliflexus* var. *nubilus*.

1. Close-up; note yellow flowers and small fruits, neither raised above level of the leaves, and leaflets not spine-tipped.
2. Note prostrate habit of plant (hammer gives scale).
3. Habitat along Red Ridge (007); note open, sparsely vegetated ground.
4. Habitat along Railroad Ridge (001); note rocky texture of substrate.
5. Habitat along "Bowery Ridge" (008); note overall sparse vegetation cover.