FIELD INVESTIGATIONS OF *ASTRAGALUS PAYSONII* (PAYSON'S MILK-VETCH), A REGION 1 SENSITIVE SPECIES, ON THE NEZ PERCE NATIONAL FOREST

by

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ABSTRACT

A field inventory survey for Astragalus paysonii (Payson's milk-vetch) was conducted on the Nez Perce National Forest during the summer of 1990 by the Idaho Department of Fish and Game's Natural Heritage Program. The investigation was a cooperative Challenge Cost Share project between the Department and the Nez Perce National Forest.

Payson's milk-vetch, a Region 1 Sensitive Plant Species, is a regional endemic to Idaho and Wyoming. The species exhibits an unusual distribution pattern with two disjunct population centers: southwestern Wyoming and adjacent Idaho, and Idaho County in northern Idaho. The majority of documented sites for Payson's milk-vetch are on lands administered by the Forest Service on the Nez Perce, Caribou, and Bridger-Teton National Forests.

This investigation concentrated on delineating the overall distribution of Payson's milk-vetch on the Nez Perce National Forest in northern Idaho. Prior to 1990 Payson's milk-vetch was known from four populations in this region, three historical sites and one extant site (Idaho Natural Heritage Program 1989). This report documents 9 new sites, principally from the Red River and Elk City Ranger Districts. Only one historical site was relocated and the other two are believed to be extirpated due to forest succession.

Payson's milk-vetch is a seral species that tolerates and seems to require a certain amount of disturbance. The majority of these new sightings support 1-10 scattered individuals from older roadside habitats and clearcuts which were broadcast burned. No individuals were found in recently disturbed sites, indicating that the species requires a minimum of 15 years following disturbance to enter an area.

Detailed results of field surveys are presented and several recommendations are made relative to the long-term conservation of Payson's milk-vetch on lands administered by the Forest Service.

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INTRODUCTION

The National Forest Management Act of 1976 (16 U.S.C. 1600. Planning Regulations Section 219.19, Fish and Wildlife Resource) and Forest Service policy require that Forest Service land be managed to maintain populations of all existing native animal and plant species at or above the minimum viable population level (USDA Forest Service 1984). A minimum viable population consists of the number of individuals, adequately distributed throughout their range, necessary to perpetuate the existence of the species in natural, genetically stable, self-sustaining populations.

The Forest Service, along with other Federal and State agencies, has recognized the need for special planning considerations in order to protect the flora and fauna on the lands in public ownership. Species recognized by the Forest Service as needing such considerations are those that (1) are designated under the Endangered Species Act as endangered or threatened, (2) are under consideration for such designation, or (3) appear on a regional Forest Service Sensitive Species[1] list.

Astragalus paysonii (Payson's milk-vetch) is a regional endemic[2] to Idaho and Wyoming. This species is listed as a Sensitive Species for both Region 1 and Region 4. Payson's milk-vetch is also listed as a Category 3c species with the U.S. Fish and Wildlife Service (USDI Fish and Wildlife Service 1985). This listing includes former candidate taxa that have proven to be more widespread or abundant than previously believed, or are not subject to identifiable threats.

During the 1990 field season surveys for Payson's milk-vetch were conducted on the Nez Perce National Forest by the Idaho Department of Fish and Game's Natural Heritage Program through the Cooperative Challenge Cost Share Program.

The primary objectives of this investigation were as follows:

1) Relocate and survey known populations and historical collection sites of Astragalus paysonii in northern Idaho.

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[1] Sensitive Plant Species - a plant species, or recognized subspecies or variety, for which the Regional Forester has determined there is a concern for population viability, within a state, as evidenced by significant current or predicted downward trend in populations or habitat (USDA Forest Service 1984, 1988).

[2] A species confined naturally to a certain limited area or restricted locality. In this instance, confined to narrow river canyons in northern Idaho and far northeastern Oregon.

2) Survey for potential habitats and new populations of Astragalus paysonii on the Nez Perce National Forest.

3) Attempt to delineate the overall distribution of Payson's milk-vetch within northern Idaho.

4) Acquire population data and characterize habitat conditions for known populations.

5) Assess population numbers and threats to existing populations and make management recommendations to the forests based on these assessments.

Astragalus paysonii Greenm.

CURRENT STATUS USFS Region 1 Sensitive Species
USFS Region 4 Sensitive Species
USFWS Category 3c

TAXONOMY

Family: Fabiaceae or Leguminosae (Pea)

Common Name: Payson's milk-vetch

Citation: Barneby, R.C. 1944. Leaflets of Western Botany 4:60.

Synonymy: Hamosa paysonii Rydb.
Rydberg, P.A. 1927. Bull. Torrey Bot. Club 54:22

Technical Description: Taprooted, perennial herb with ascending stems 2-4.5 dm tall; herbage pale green and nearly glabrous; stipules are free, 2-5 mm long; leaves 4-9 cm long with 7-15 leaflets, odd-pinnate; leaflets ovate-oblong to obovate-cuneate, 5-20 mm long and mostly retuse; inflorescence of 5- to 20-flowered racemes on a 3-8 cm long peduncle; flowers white with a purple tinge at base of petals, banner 7-9 mm long; calyx ca. 3.5 mm long, partly black-stigillose; fruit pods declined or deflexed, short-stipitate (1-1.5 mm), lunately linear-ellipsoid body, 10-17 mm long and 2.5-3.5 mm broad, cuspidate at apex, narrowly grooved dorsally, fully 2-locular, with green, puberulent valves that become papery and straw-colored when fully mature (Hitchcock 1961, Barneby 1964)(see Appendix I for line drawings).

Nontechnical Description: A perennial, taprooted herb with upright stems from 2-4.5 dm tall. Overall plant is diffuse with a pale green color and few hairs. Leaves are 4-9 cm long with 7-15 ovate leaflets. Leaflets are small, 5-20 mm long and often have a small notch at the apex. The flowers are small (< 1 cm), mostly white with a purple tinge at the base of petals, and arranged in a raceme consisting of 5 to 20 flowers. Stipules are 2-5 mm long and free from the stem (not attached around stem). Fruits are narrowly crescent-shaped, attached to a short stalk (1-1.5 mm long), and either curved or bend downward along the stem. Pods are 10-17 mm long and 2.5-3.5 mm broad, initially green then becoming papery and straw-colored at maturity, with 2 seed chambers and a distinct groove running along the back.

Distinguishing Features and Similar Species: Almost 100 species of Astragalus exist in the Pacific Northwest and for many, this genus initially appears overwhelming. However, a number of key characters can be used to distinguish the individual species. Of particular importance in Astragalus is the habitat specificity. Many Astragalus commonly appear on rare species lists due to their restricted habitat requirements, particularly to rare edaphic features. Fortunately, Astragalus paysonii occurs in habitats

that are not frequented by many other members of the genus, making it easier to identify.

The most distinguishing features of Payson's milk-vetch are the free stipules, small white flowers with their distinct smell, and the grooved pods. "Free stipules" indicate that the leaf stipules are attached to the leaf petiole and, although they may somewhat clasp the stem, they do not fully surround the stem and unite opposite the petiole (see Appendix I for comparison line drawings). Flower size is quite small compared to most Astragalus species and is usually measured by the banner length. Payson's milk-vetch has a banner length of 7 to 9 mm. Flowers are white in color with a purple lining near the base of the petals and possess a lovely sweet fragrance. The smell is most obvious when the plant has been kept in a plastic bag for a length of time. Fruits of Payson's milk-vetch are narrow, 2-chambered, strongly crescent shaped, and tend to bend or curve downward along the stem. An evident groove can be seen along the entire back of the pods, which becomes more distinct with maturity.

In addition to the above characters, identification is aided by a general lack of hairs on the foliage and light green color of the plant. From a distance, the overall diffuse appearance of the plant is striking as is the very dispersed appearance and number of fruiting pods in the inflorescence.

Only one other species of Astragalus, Astragalus canadensis (Canada milk-vetch), was commonly encountered in the same habitat and vicinity as Payson's milkvetch in northern Idaho. These two milk-vetchs are distinct in a number of characters including flowers, fruits, and stipules. Canada milk-vetch possesses larger (12-18 mm), slightly drooping, pale yellow to cream-colored flowers arranged in a rather compact raceme. The plants are generally taller than Payson's milk-vetch (3-8 dm) with connate stipules that fully surround the stem and unite on the opposite side. Additionally, the fruits of Canada milk-vetch are erect and rather woody.

DISTRIBUTION

Range: Payson's milk-vetch is a regional endemic to two disjunct sites in Idaho and the southwestern portion of Wyoming. In Idaho, Payson's milk-vetch is documented from the Nez Perce National Forest in northern Idaho and from the Palisades Reservoir area of Bonneville County, southeastern Idaho. In adjacent southwestern Wyoming populations are known from Sublette and Lincoln Counties in the Salt River and Wyoming ranges (Clark and Dorn 1981)(see Appendix II). The regional flora describes this species as "rare and local" (Hitchcock 1961).

Two principle objectives of the 1990 field season were to (1) attempt to relocate historical populations in northern Idaho, and

(2) search for suitable habitats within northern Idaho for new populations. Prior to the 1990 field season, Payson's milk-vetch was known from four populations in northern Idaho, three historical sites and one extant site (Idaho Natural Heritage Program 1989)(see Appendix IV). The extant population was located in 1989 by Forest Service employees on the Red River Ranger District. Several hundred plants were found near the head of Sharman Creek (see Appendix II and IV). During the 1990 field season attempts were made to relocate the three historical sites, although two sites had rather vague data. The following is a list of the three historical site locations and the years they were collected and last observed:

1) Middle slopes of Fog Mountain - 1951
2) Indian Hill - 1941
3) Ridge between Schooner and Soda Creeks, 4 miles E of Red River Ranger Station - 1948

Caicco (1989) attempted to relocate the Fog Mountain population with no success in 1989. Results of the 1990 survey of Fog Mountain also failed to locate any Payson's milk-vetch. Similarly, no plants were located on Indian Hill. By the time these areas were surveyed, we were quite familiar with identifying the habitats that supported Payson's milk-vetch. No suitable habitat was found at either of these locations. Consequently, it is now believed that these two population are extirpated due to forest succession.

The population located 4 miles E of Red River Ranger Station along the ridge between Schooner and Soda Creeks was relocated. Five large, healthy plants with numerous flowers/fruits were found within 15' of a main logging road and in old skid trails within a subalpine fir/beargrass community.

An extensive search for new populations and suitable habitats of Payson's milk-vetch on the Nez Perce National Forest was accomplished by centering searches in the vicinity of known populations and extending the search area from that point. By this method 8 new sites were located and documented. One additional confirmed population was discovered by Mindy Weibush (Volunteer for Elk City Ranger District). The majority of these sites supporting 1-10 individuals found scattered along several roads within the Red River and Elk City Ranger Districts (see Appendix II and III for distribution in northern Idaho and demographic data).

Habitat and Associated Species: All of the sites for Payson's milk-vetch in northern Idaho occurred in seral habitats. Data from herbarium specimens coincides with field observations and indicates that Payson's milk-vetch can not only tolerate, but may be adapted to disturbance (Clark and Dorn 1981). Typical habitats included the tops of older roadcuts and edges of openings in

clearcuts that were subsequently broadcast burned (see Appendix V for slides of habitat). Based on the size of established trees and regrowth, both habitats had undergone a minimum of 15 years since major disturbance. Very recent roadcuts and clearcuts did not support populations of Payson's milk-vetch. Occasionally, plants were found occupying naturally disturbed openings within a stand where the canopy was less dense. Very old roads and trail edges provided additional habitat.

Payson's milk-vetch appears to prefer east, north, and northeast aspects on flat to moderate slopes (to 45%), though sites have been discovered from other aspects. Elevational limits in northern Idaho appear to be between 4600 to 5800 feet. Wyoming populations have been collected at elevations as high as 9200 feet. Plants are virtually restricted to exposed mineral soils of decomposed granites and are common in disturbed areas that have been burned (Clark and Dorn 1981). Within such communities, Payson's milk-vetch is likely a significant nitrogen fixer (Clark and Dorn 1981).

Most of the seral habitats that support Payson's milk-vetch are now dominated by replanted or naturally regenerated Pinus contorta (lodgepole pine) with scattered Pseudotsuga menziesii (Douglas-fir), and Larix occidentalis (western larch). The corresponding climax communities keyed to the following habitat types (Cooper et al. 1987):

Abies grandis/Linnaea borealis (grand fir/twinflower)
Abies grandis/Vaccinium globulare (grand fir/ blue huckleberry)
Abies grandis/Xerophyllum tenax (grand fir/ beargrass)
Abies lasiocarpa/Xerophyllum tenax (subalpine fir/beargrass)

Species commonly found growing with Payson's milk-vetch include, Thermopsis montanus, Calamagrostis rubescens, Xerophyllum tenax, Linnaea borealis, Arctostaphyllos uva-ursi, Vaccinium scoparium, V. globulare, and Fragaria vesca. Additional species occasionally found associated with Payson's milk-vetch include, Alnus sinuata, Spiraea betulifolia, and Achillea millefolium. Two of the associated species, Thermopsis montanus and Xerophyllum tenax, proved to be excellent indicators for identifying potential habitat of Payson's milk-vetch. Not only were these species very consistent associates, but they were also easily distinguished from a distance.

Role of Fire: Many of the habitats that presently support Payson's milk-vetch were broadcast burned, indicating that fire may play an important role in the distribution of the species. Historically, fire in the Lochsa/Selway region has significantly effected the vegetation of the area. This region of Idaho is noted for large, uncontrolled forest fires occurring in 1910, 1919, 1924, 1930, and 1934 (Habeck 1972).

Advances in fire suppression and control efforts over the last 50 years suggests that fire reduction has had an environmental impact on the forest ecosystem (Habeck 1972). Such suppression may have altered the natural cycles, reducing suitable habitat for species adapted to seral communities, such as Payson's milk-vetch.

The Selway area, including Indian Hill and Fog Mountain, has not been effected by large fires in recent times, which may have reduced potentially suitable habitats created by this periodic disturbance. Conditions at these two historical sites of Payson's milk-vetch are undoubtedly quite different today than they were 40-50 years ago when the collections were made. These two populations have likely been extirpating by the process of natural succession, due to fire suppression.

Further evidence of altered habitat due to natural succession in the Fog Mountain vicinity is that Dasynotus daubenmirei, another Sensitive Plant that occupies disturbed habitats, is also believed to be extirpated from the area (Caicco 1990).

STATUS

Ownership: The majority of documented sites for Payson's milk-vetch are on lands administered by the Forest Service in the Nez Perce, Caribou, and Bridger-Teton National Forests. All of the northern Idaho populations of Payson's milk-vetch occur within Idaho County with all but one site occupying lands administered by the Nez Perce National Forest. Populations were found scattered along several roads within the Red River and Elk City Ranger Districts. One extant population and two extirpated populations are documented from the Selway Ranger District. The only site not located on Forest Service land is within the city limits of Elk City on privately owned property (see Appendix II and III).

Threats:

Natural: Natural threats to Payson's milk-vetch are principally limited to the process of natural succession. Since the species is adapted to seral habitats, it is limited to and dependant on continued disturbance. As succession proceeds in a disturbed community, species composition and community structure change. Such change could potentially eliminate suitable habitat for Payson's milk-vetch and other seral or pioneer species, thus eliminating the species from an area. Excessive shading and lack of exposed mineral soils would likely result in the loss of Payson's milk-vetch. The inability to relocate two of the historical sites, Indian Hill and Fog Mountain, is likely due to habitat loss caused by the process of natural succession, possibly due to fire suppression.

Another potential natural threat was noted and observed during this field season. It appears that Payson's milk-vetch is a poor

fruit/seed producer. Less than half of the flowers observed during 1990 actually produce fruit pods, resulting in a very sparce and diffuse fruiting inflorescence. This pattern was so consistant, that it could be used as a means of identifying the species. It should be noted, however, that some Astragalus spp. seeds have been found to be viable for long periods of time in seed banks. Although seed viability in Payson's milk-vetch is unknown, this species could be compensating low seed production for longer seed viability.

Man-caused: Although Payson's milk-vetch apparently tolerates and requires a certain amount of disturbance, extensive activity in and around known populations could be a threat to the existing individuals. Invasion and competition of exotic weeds, chemical sprays, recreational activity, and road construction/ maintenance seem to pose the most significant threat to Payson's milk-vetch. However, such activity, while extirpating existing individuals, may be dispersing seeds and providing habitat for future populations.

Management Implications: Current land-use and management of habitat containing Astragalus paysonii on land administered by the Forest Service does not appear to conflict with the species long-term viability. However, it appears likely that a certain amount of protection and habitat manipulation/enhancement may be necessary to maintain viable populations of Payson's milk-vetch in northern Idaho. Although Payson's milk-vetch tolerates and potentially benefit from disturbance, future management activities involving extensive disturbance to areas with known populations should be assessed with regard to their impact and cumulative effect on the conservation status of the species. Informed management decisions should be made based on a Species Management Guide for Astragalus paysonii in the Northern Region (see next section on Recommendations to the Forest).

ASSESSMENT AND RECOMMENDATIONS

Summary: Astragalus paysonii is a "rare and local" regional endemic with two known disjunct centers of distribution: southeastern Wyoming and adjacent Idaho, and northern Idaho. All of the northern Idaho populations of Payson's milk-vetch occur within Idaho County with all but one site occupying lands administered by the Nez Perce National Forest.

This report documents nine new locations of Payson's milk-vetch from northern Idaho. Plants were found scattered in groups of 1-10 individuals along several roads within the Red River and Elk City Ranger Districts. Only one historical site was relocated and the other two are believed to be extirpated due to natural forest succession.

Evidence indicates that Payson's milk-vetch is a seral or pioneer

species that apparently requires a certain amount of disturbance. All of the known populations exist within roadside habitats or clearcut/broadcast burn sites. Fire may play an important role in the distribution of the species and Payson's milk-vetch is likely a significant nitrogen fixer in burned over communities (Clark and Dorn 1981). It appears that the species requires a minimum of 15 years following disturbance to enter an area. During this investigation no individuals were found in recently disturbed sites.

The majority of the northern Idaho populations of Payson's milk-vetch appear not to conflict with current land-use and management (principally logging). Extensive activity in and around known populations poses a potential threat to existing individuals, however, such activity may simultaneously be dispersing seeds and providing habitat for future populations. Natural threats involve the process of natural succession and possibly low seed production. Natural forest succession may have been responsible for the extirpation of two historical sites.

Recommendations to the U.S. Fish and Wildlife Service: Payson's milk-vetch is listed presently as a Category 3c species with the Fish and Wildlife Service. This listing includes former candidate taxa that have proven to be more widespread or abundant than previously believed, or are not subject to identifiable threats. Data presented in this report indicates that a Category 3c status designation is appropriate for Astragalus paysonii and should be maintained.

Should further research or changes in land use indicate significant increase or decline in populations of Payson's milk-vetch, the species should be reevaluated.

Recommendations to the Nez Perce National Forest: Prior to 1990, Payson's milk-vetch was known from a single extent population and three historical sites on the Nez Perce National Forest. This report documents nine new sites with all but one site occupying lands administered by the Nez Perce National Forest. The majority of these sites support groups of 1-10 scattered individuals from roadside habitats within the Red River and Elk City Ranger Districts. Only one historical site was relocated and the other two are believed to be extirpated due to forest succession. Present land use (principally logging followed by broadcast burning) does not appear to jeopardize the long-term viability of this species on the Forest.

Very little is known about the ecology of Payson's milk-vetch. The species appears to tolerate and indeed require a certain amount of disturbance. Evidence indicates that burning may play an important role in the distribution of the species and that a minimum of 15 years following disturbance is needed prior to entering an area. Seed production appears to be low and longevity

of seed in the seedbank is unknown. Moreover, Payson's milk-vetch is a regional endemic and as such it correctly deserves special consideration. For all of these stated reasons, it is recommended that Astragalus paysonii be maintained on the Sensitive Plant Species list for the Nez Perce National Forest.

In order to understand the ecological requirements of Payson's milk-vetch, additional biological data are needed. Virtually all of the known populations consist of few individuals and, because the species requires a certain amount of disturbance, it appears likely that protection and habitat manipulation/enhancement may be necessary to maintain viable populations of Payson's milk-vetch in northern Idaho.

As a basis for making informed management decisions and gathering additional information, the Forest should develop a Species Management Guide for Payson's milk-vetch in the Northern Region. Two major areas need to be addressed in such a plan. The first is the collection of further biological data, which may include population dynamics, seed dispersal mechanisms, and the effect of various types of management disturbance on population levels. The second topic to address should be a monitoring and conservation strategy for Payson's milk-vetch on the Forest. Such a strategy should be conducted in cooperation with Region 4 and all three Forests should keep each other informed about recent developments.

Land managers and field personnel on the Nez Perce National Forest should be informed of the occurrence of Astragalus paysonii in their areas. Possible sightings of this plant should be documented by specimens (if the size of the population warrants collecting), and should include both flowers and roots. Specimens should be sent to the University of Idaho Herbarium for verification of their identity. Confirmed sightings of Payson's milk-vetch should be submitted to the Idaho Natural Heritage Program for entry into their permanent data base on Sensitive Species.

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APPENDIX I

Line drawings of Astragalus paysonii.
(from Hitchcock 1961)

APPENDIX II

Maps of precise occurrences of
Astragalus paysonii.

Map A. Overall distribution of Astragalus paysonii.
Map AA. Northern Idaho populations of Astragalus paysonii.

Non-Forest Service Land

Map B. Portion of Elk City 7.5' quadrangle

Nez Perce National Forest

Map C. Portion of Elk City 7.5' quadrangle
Map D. Portion of Elk City 7.5' quadrangle
Map E. Portion of Moose Butte 7.5' quadrangle
Map F. Portion of Trapper Creek 7.5' quadrangle
Map G. Portion of Whitewater Ranch 7.5' quadrangle
Map H. Portion of Selway Falls 7.5' quadrangle

APPENDIX III

Demographic data for 9 new Astragalus paysonii
sites in northern Idaho.

Categories follow those on the Idaho Natural Heritage Program's Special Plant Survey Form. The categories breakdown as follows:

Pop. Size -	Pop. Area -
actual #	1yd^2
estimated #	1-5 yds^2
1-10	5-10 yds^2
11-50	10-100 yds^2
51-100	100 yds^2 - 2 ac
101-1000	2 ac+
1001-10,000	actual area
10K+	(if known)

1. Mother Lode Road (#1818)
   a. Location:
   b. Area: scattered within 100 yd^2 - 2 acres
   c. Number of plants: 11-50 plants in 1990
   d. Density: Low
   e. Evidence of expansion/contraction: No evidence

2. Wheeler Creek Road (#1803)
   a. Location:
   b. Area: scattered within 100 yds^2 - 2 acres
   c. Number of plants: 101-150 plants in 1990
   d. Density: Low
   e. Evidence of expansion/contraction: No evidence

3. Cole-Porter Road North (#1800)
   a. Location:
   b. Area: scattered within 10-100 yds^2
   c. Number of plants: 1-10 plants in 1990
   d. Density: Low
   e. Evidence of expansion/contraction: No evidence

4. Cole-Porter Road South (#1800)
   a. Location:
   b. Area: scattered within 10-100 yds^2
   c. Number of plants: 51-100 plants in 1990
   d. Density: Low
   e. Evidence of expansion/contraction: No evidence

5. Soda Creek Road (#1172)
   a. Location:
   b. Area: scattered within 5-10 yds^2
   c. Number of plants: 51-100 plants in 1990
   d. Density: Low
   e. Evidence of expansion/contraction: No evidence

6. Jungle Creek
   a. Location:
   b. Area: scattered within 2 acres
   c. Number of plants: 101-150 plants in 1990
   d. Density: Low

e. Evidence of expansion/contraction: No evidence

7. Nez Perce Trail Road (#468)
   a. Location:
   b. Area: scattered within 100 yds^2 - 2 acres
   c. Number of plants: 100-150 plants in 1990
   d. Density: Low
   e. Evidence of expansion/contraction: No evidence

8. Whitewater Ranch Road (#421)
   a. Location:
   b. Area: scattered within 100 yds^2 - 2 acres
   c. Number of plants: 100 plants in 1990
   d. Density: Low
   e. Evidence of expansion/contraction: No evidence

9. Falls Point NE (Rd #443)
   a. Location:
   b. Area: 1-5 yd^2
   c. Number of plants: 6 plants in 1990
   d. Density: Low
   e. Evidence of expansion/contraction: No evidence

APPENDIX IV

Demographic data for 4 previously documented populations of Astragalus paysonii in northern Idaho.

Historical sites -	Fog Mountain	(#.001)
	4 mi E of Red River RS Relocated in 1990	(#.002)
	Indian Hill	(#.003)
Extant sites -	Sharman Creek	(#.005)

APPENDIX V

Slides of Astragalus paysonii and its habitat.