

THREATENED, ENDANGERED, AND SENSITIVE
PLANT INVENTORY OF THE BEAR RIVER RANGE,
CARIBOU NATIONAL FOREST

by

Robert K. Moseley and Michael Mancuso
Natural Heritage Section
Nongame/Endangered Wildlife Program
Bureau of Wildlife

November 1990

Idaho Department of Fish and Game
600 South Walnut, P.O. Box 25
Boise, Idaho 83707
Jerry M. Conley, Director

Cooperative Challenge Cost-share Project
Caribou National Forest
Idaho Department of Fish and Game
Purchase Order No. 40-02S2-0-1158

ABSTRACT

The Idaho portion of the Bear River Range is poorly known botanically. However, populations of several rare plants and potential habitat for others, including several federal candidate species are known from the Bear River Range in adjacent Utah. Because of the paucity of information on the rare flora of the Bear River Range, a two year project was initiated as a cooperative Challenge Cost-share project between the Caribou National Forest and the Idaho Department of Fish and Game's Natural Heritage Program. This report summarizes the results of the first year of the project, resulting from 1990 field work.

We relocated the only known extant population of Asplenium viride (green spleenwort) in Idaho, at Bloomington Lake, but found no new populations of this species. Two historically known populations of the federal candidate Penstemon compactus (Cache penstemon) were relocated, and five new populations were discovered. We also discovered two small populations of Musineon lineare (Rydberg's musineon) near Bloomington Lake. These sites constitute the first records of this federal candidate in Idaho. Penstemon leonardii (Leonard's penstemon) previously thought to be a rare species in Idaho, was found to be common throughout the study area and is of no conservation concern in Idaho. Included is a detailed discussion of each of the three rare species found in 1990, including information on its taxonomy and identification, range and habitat, conservation status, and recommendations to the U.S. Fish and Wildlife Service, Regional Forester and Caribou NF concerning its status in Idaho.

A list of species collected during the general plant collection phase of the project are included, along with additional notes on interesting aspects of the flora of the Bear River Range. In the final section we make recommendations for future floristic work in the study area.

TABLE OF CONTENTS

ABSTRACT	i
TABLE OF CONTENTS	ii
LIST OF APPENDICES	ii
INTRODUCTION	1
RESULTS	2
<u>Asplenium viride</u>	5
<u>Musineon lineare</u>	10
<u>Penstemon compactus</u>	14
Additional Floristic Notes	19
RECOMMENDATIONS FOR FUTURE STUDIES	21
REFERENCES	23

LIST OF APPENDICES

- Appendix 1 ... 1990 Work Plan for floristic inventory of the Bear River Range, Caribou National Forest.
- Appendix 2 ... List of areas floristically inventoried in 1990, Bear River Range, Caribou National Forest.
- Appendix 3 ... Annotated list of plants collected by Michael Mancuso and Bob Moseley during 1990 inventory.
- Appendix 4 ... Line drawings of Asplenium viride, Musineon lineare, and Penstemon compactus.
- Appendix 5 ... Element occurrence records for Asplenium viride, Musineon lineare, and Penstemon compactus on the Caribou National Forest.
- Appendix 6 ... Locations of Asplenium viride, Musineon lineare, and Penstemon compactus on the Caribou National Forest.
- Appendix 7 ... Slides of Asplenium viride, Musineon lineare, and Penstemon compactus and their habitats on the Caribou National Forest.

INTRODUCTION

The National Forest Management Act 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. 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 list.

The portion of the Cache National Forest (NF) administered by the Caribou NF, which encompasses the Bear River Range, is poorly known botanically. There are, however, known populations of several rare plants and potential habitat for others, including several federal candidate species known from the Bear River Range in adjacent Utah. Because of the paucity of information on the rare flora of the Bear River Range in Idaho, a two year project was initiated as a cooperative Challenge Cost-share project between the Caribou NF and the Idaho Department of Fish and Game's Natural Heritage Program. This report summarizes the results of the first year of the project, resulting from 1990 field work.

The primary objectives of this investigation are detailed in a work plan for 1990 field work (Appendix 1). A summary of the objectives are as follows:

- 1) Compile all available data on the floristics of the Bear River Range in Idaho, prior to the field season, with special emphasis being given to rare species that may occur there;
- 2) Conduct a general botanical inventory of the Bear River Range, to determine which habitats may harbor rare plant species;
- 3) Document the location of rare plant populations encountered during the survey;

- 4) Assess population trends, if possible, and threats to existing populations of rare plants and make management recommendations to the forest based on these assessments; and
- 5) Make recommendations for future floristic work in the Bear River Range.

RESULTS

Presurvey Results

Prior to the 1990 field season, we compiled existing data on the vascular flora of the Bear River Range in Idaho, from Heritage Program files and from library and herbarium searches. Of particular interest were the reports of the two previous rare plant inventories conducted on the Caribou NF in the late 1970's (Schultz and Schultz 1978; Dieffenbach n.d.). We found that four rare plants were known to exist in the study area:

1. Asplenium viride (green spleenwort) - A state-rare species (Moseley and Groves 1990) known from one extant population in Idaho, near Bloomington Lake in the study area.
2. Musineon lineare (Rydberg's musineon) - A herbarium record from the University of Idaho Herbarium (ID) indicated that this species, previously thought to be endemic to Utah, occurred in Strawberry Canyon. This was later found to be a misidentified specimen of Lomatium kingii; Rydberg's musineon does not occur in Strawberry Canyon, Franklin County. This species is a C2 candidate (U.S. Fish and Wildlife Service 1990) and a Region 4 Sensitive Species (USDA Forest Service 1988).
3. Penstemon compactus (Cache penstemon) - Two herbarium records from the Utah State University Herbarium (UTC) indicated that Cache penstemon occurs in the upper Logan River area of Idaho. This species was previously considered endemic to Utah, and is a C2 candidate (U.S. Fish and Wildlife Service 1990) and a Region 4 Sensitive Species (USDA Forest Service 1988).
4. Penstemon leonardii (Leonard's penstemon) - Recently added to the state-rare list, a search of regional herbaria (Moseley 1990) found only five specimens, all from the Bear River Range.

Four other rare species known from adjacent portions of the Bear River Range in Utah, have potential habitat within the study area:

1. Draba maguirei (Maguire's whitlow-grass) - Populations of this Utah endemic are known from within a few miles of the Idaho border.
2. Erigeron cronquistii (Cronquist's fleabane) - Another Utah endemic, C2 candidate (U.S. Fish and Wildlife Service 1990) and Region 4 Sensitive Species (USDA Forest Service 1988), surveys by the Utah Natural Heritage Program indicated that it occurs very close to the Idaho border in the Bear River Range (Franklin 1990).
3. Eriogonum loganum (Logan buckwheat) - This Region 4 Sensitive Species is endemic to lower elevations of the Bear River Range in Utah (Welsh and Thorne 1979).
4. Primula maguirei (Maguire's primrose) - This species is listed as Threatened under the Endangered Species Act, being known from only a few sites in the Logan River Canyon (Welsh and Thorne 1979).

Field Survey Results

With this list of rare species in mind, botanists from the Heritage Program surveyed suitable-appearing habitats in the Bear River Range during June 4-8 and July 16-20, 1990. In addition to searching for rare species, we made general plant collections in a wide variety of habitats throughout the study area. See Appendix 2 for areas inventoried during the 1990 field season.

We relocated the known population of green spleenwort at Bloomington Lake, but found no new populations of this species. The two known populations of Cache penstemon were relocated, and we discovered five new populations, most in the upper Logan River area. We also discovered that the Rydberg's musineon collection from Strawberry Canyon a misidentification, but did discover two new, small populations at Bloomington Lake. Leonard's penstemon was found to be common throughout the study area in several different habitats, including heavily grazed sheep range.

We did not discover any of the other target species in the study area during 1990. A list of species collected during the general plant collection phase of the project are listed in Appendix 3. All specimens are deposited at the University of Idaho Herbarium (ID), with duplicate specimens, if any, being sent to the Caribou NF Herbarium (housed at Idaho State University) and elsewhere.

Following is a detailed discussion of each of the three rare

species found in 1990, including information on its taxonomy and identification, range and habitat, conservation status, and recommendations to the Regional Forester and Caribou NF concerning its status in Idaho. Additional notes on interesting aspects of the flora of the Bear River Range discovered during this survey are also given. In the final section we make recommendations for future floristic work in the study area.

Asplenium viride Hudson

CURRENT STATUS USFS Region 4 - None
USFWS - None
Idaho Native Plant Society - Review
Heritage Rank - G5 S1

TAXONOMY

Family: Aspleniaceae (Spleenwort); a segregate family of Polypodiaceae

Common Name: Green spleenwort

Synonymy: A. trichomanes-ramosum L. Linnaeus used A. trichomanes-ramosum for this plant before Hudson used A. viride, and, therefore, it is the proper epithet, even though it is compound (Lellinger 1985). We have chosen to use A. viride in this report, however, because of its widespread use in regional floras (Davis 1952; Cronquist 1969; 1972; Hitchcock and Cronquist 1973; Higgins 1987), recognizing that A. trichomanes-ramosum is nomenclaturally correct.

Citation: Fl. Angl. 385. 1762

Technical Description: Leaves clustered, spreading 0.5-1.5 dm long, glabrous or with a few septate, glandular hairs along the rachis, hardly evergreen, rather soft-textured, but the old stipes often long-persistent; petiole short, slender, up to about 1 mm thick, often grooved above, brown or brownish toward the base, green or greenish-stramineous distally; blade elongate and narrow, the rachis green or greenish; pinnae mostly 7-20 opposite or offset pairs, often short-petiolate, 3-8 mm long and 2-6 mm wide, coarsely round-toothed, obscurely veined, the distal ones gradually reduced; sori several, 1-2 mm long, obviously longer than wide, straight or nearly so, with an evident indusium, or at maturity sometimes expanded and confluent (Cronquist 1972).

Nontechnical Description: The leaves of green spleenwort are clustered along a short-creeping rhizome and are soft and somewhat evergreen, 0.5 to 1.5 dm long. The rachis of the leaves is mostly green, except possibly for a brownish base. The old petiole bases are often long-persistent. The undersides of the leaves have rows of elongate sori (spore producing structures), with an evident indusium (Duft and Moseley 1989). See Appendix 4 for a line drawing of green spleenwort and Appendix 7 for slides of its habit and habitat.

Distinguishing Features and Similar Species: No other species of Asplenium is known to occur in southeastern Idaho, although A. trichomanes is known from south of the study area in the Wasatch Range of Salt Lake and Utah counties, Utah. Green spleenwort is

distinguished from the latter species by having a green or greenish rachis, and soft, hardly-evergreen leaves. _A trichomanes has a dark rachis and firm, evergreen leaves.

Two other ferns are sympatric with green spleenwort at Bloomington Lake, Cystopteris fragilis and Pellaea breweri. C. fragilis has pinnately lobed pinnae , while P. breweri has a dark, wiry rachis (Duft and Moseley 1989).

DISTRIBUTION

Range: Green spleenwort is largely a boreal species, distributed from Newfoundland to Alaska south to Vermont, northern New York, northern Michigan, Wisconsin, South Dakota, Wyoming, Colorado, Utah, northeastern Nevada, Oregon and northern California. In Idaho, it is confirmed from one site, on the Caribou NF, and from one unconfirmed sighting in Clearwater County, along the North Fork of the Clearwater River. The confirmed population occurs in the study area, on the cirque headwall above Bloomington Lake. This population was first discovered by Steve Brunfeld, from the Department of Forest Resources at the University of Idaho, in 1984.

We relocated the population in 1990, and found that it consisted of between 30-40 plants in three small areas of the headwall. Since much of the headwall is vertical and relatively inaccessible, it is possible that more plants occur there. Our thorough searches of the study area were unsuccessful in finding any additional populations. The searches did reveal, however, that habitats on the cirque headwall above Bloomington Lake are unique in the study area. See Appendix 5 for the Heritage Program element occurrence record for green spleenwort on the Caribou NF. This data base record contains information on location, ownership, population data and quality of the population, among other things. Also see Appendix 6 for the mapped location of the known population on the Caribou NF.

Habitat and Associated Species: Nearly all references indicate that green spleenwort is epipetric (growing directly on rocks, usually in crevices) on limestone or other basic substrates, usually where moist. This describes its habitat at Bloomington Lake exactly. It occurs on vertical outcrops of Laketown Dolomite (Mitchell and Bennett 1979) on the upper part of the north-facing cirque headwall. The rock-crevice habitats occupied by green spleenwort on these outcrops are probably moist throughout the summer. The elevation of the population is approximately 8500 feet. Associated species include Musineon lineare, Cystopteris fragilis, Pellaea breweri, Draba lonchocarpa, Lloydia serotina, Primula parryi, and Synthyris pinnatifida.

A single plant was found on the lower part of the headwall on Swan Peak Quartzite (Mitchell and Bennett 1979), chemically and physically a very different substrate than the "normal" carbonate substrate on which it is usually found. This substrate can easily be distinguished from the Laketown Dolomite, which occurs in the upper half of the headwall by being nearly white, as compared with the dark gray dolomite.

CONSERVATION STATUS

Conservation Status - Idaho: Green spleenwort was only recently recognized as a rare plant in Idaho by the Idaho Natural Heritage Program and the Idaho Native Plant Society (Moseley and Groves 1990). Although Davis (1952) includes green spleenwort in his treatment of the flora of Idaho, he states that it is rare and gives no locations. A recent search of regional herbaria for Idaho rare plant localities (Moseley 1990) failed to locate any collections, besides Steve Brunnsfeld's 1984 collection from Bloomington Lake.

The Idaho Native Plant Society has placed green spleenwort on their Review list of rare plants of the state (Idaho Native Plant Society 1990). The Review category of the Idaho Native Plant Society list refers to taxa which may be of conservation concern, but for which we have insufficient data upon which to base a recommendation regarding their appropriate classification (Moseley and Groves 1990).

The Idaho Natural Heritage Program currently ranks green spleenwort as G5 S1 (G5 = green spleenwort demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery; S1 = critically imperiled in Idaho because of extreme rarity or because of some factor of its biology making it especially vulnerable to extinction; Moseley and Groves 1990).

Conservation Status - Elsewhere:

California - Green spleenwort is on List 2 of the California Native Plant Society catalogue (Smith and Berg 1988), which includes taxa that are rare, threatened, or endangered in California, but more common elsewhere.

Oregon - It is also on List 2 in Oregon (Oregon Natural Heritage Data Base 1989), which includes taxa that are endangered in Oregon but more common or stable elsewhere. It is currently on the USFS Region 6 Sensitive Species list for Oregon.

Washington - Green spleenwort was once considered sensitive in Washington (Washington Natural Heritage Program 1981), but has since been taken off the rare plant list for the state (Washington Natural Heritage Program 1990).

In eastern North America, Hinds (1983) lists green spleenwort as being rare in New Brunswick, Nova Scotia, Northwest Territories, Quebec, Maine, Michigan, New York, Vermont and Wisconsin.

Ownership: The population of green spleenwort is on the Cache NF, which is administered in Idaho, by the Caribou NF, Montpelier Ranger District. The Clearwater County population, if confirmed, is on the Clearwater NF.

Threats: No clear anthropogenic threats to the population of green spleenwort at Bloomington Lake were seen during 1990. The population is extremely small, however, consisting of less than 50 plants, and remains vulnerable to extirpation.

Management Implications: Bloomington Lake is heavily used by recreationists during the summer, but there was no evidence that this use was impacting the green spleenwort population. The Bloomington Lake population is significant, however, in that it is the only one known extant in Idaho. Also, it is very small and vulnerable to extirpation. The Forest should, therefore, give special consideration to this species when formulating plans for development in the Bloomington Lake area.

ASSESSMENT AND RECOMMENDATIONS

Summary: We relocated the population of green spleenwort on the headwall above Bloomington Lake, discovered by Steve Brunsfeld in 1984. The population is small, consisting of less than 50 individuals, but is currently well removed from the intense recreational pressure the lake area receives. This population is significant, however, in that it is the only one known extant in Idaho.

Recommendations to the Regional Forester: Green spleenwort is very rare in Idaho. The only known extant population in Idaho occurs in Region 4 on the Caribou NF, and is very small. We believe that it meets criteria necessary for inclusion on the Regional Sensitive Species List in Region 4. It is currently on the USFS Region 6 Sensitive Species List for Oregon.

Recommendation to Caribou National Forest: The population of green spleenwort at Bloomington Lake is of floristic significance in Idaho, being the only one known extant. For that reason it should be given special consideration by the Forest Service during the planning of land management activities in the Bloomington Lake area.

Land managers and field personnel on the Caribou NF should be informed of the occurrence of this species in their area. Possible sightings of this plant should be documented by specimens (if the size of the population warrants collecting), and should be sent to the University of Idaho Herbarium (Department of Biological Sciences, University of Idaho, Moscow 83843) for verification of their identity. When sending specimens for identification, always include detailed location, habitat, and pertinent morphological information. Confirmed sightings of this species should be reported to the Idaho Natural Heritage Program, via Region 4 TES Plant Forms, for entry into their permanent data base on sensitive species.

Other Recommendations: At the 1991 Idaho Rare Plant Conference, we will recommend that the Idaho Native Plant Society reclassify green spleenwort from their Review list to Priority 1 (Moseley and Groves 1990), and classification that better reflects its conservation status in Idaho.

Musineon lineare (Rydberg) Mathias

CURRENT STATUS USFS Region 4 - Sensitive
USFWS - Category 2 Candidate
Idaho Native Plant Society - None
Heritage Rank - G2 S1

TAXONOMY

Family: Apiaceae [Umbelliferae (Celery)]

Common Name: Rydberg's musineon

Citation: Annals of the Missouri Botanical Garden 17:265. 1930.

Technical Description: Plants 5.5-25 cm tall, caulescent or subcaulescent, glabrous, from a mostly branched caudex, more or less clothed at the base with persistent leaf bases; leaves mostly on lower 1/3 of the plants, ternate or more often pinnate, with 2-4 opposite pair of lateral leaflets; petioles 0.5-6 (14) cm long; blades 1-5.3 cm long; leaflets, sessile, entire or bifid, trifid, or rarely pinnatifid, the ultimate leaflets or lobes 3-20 mm long; peduncles 5-22 cm long, slender; umbel solitary; rays 5-10, 1-5 mm long; involucre of ca 3 linear or narrowly elliptic bractlets 4-10 mm long; pedicels ca 1 mm long; calyx teeth ca 0.5 mm long, greenish or purplish with scarious margins; petals and stamens white; styles ca 1 mm long; fruit 2-4 mm long, minutely scabrous, the ribs evident but not winged (Goodrich 1987).

Nontechnical Description: Rydberg's musineon is a low perennial, 0.5 to 2.5 dm tall, with glabrous, slender, lax stems that are usually longer than the leaves. The leaves are narrowly oblong in outline, excluding the petiole, and pinnate with linear segments. The involucre bracts (subtending the inflorescence) are distinctly linear-lanceolate, acute, and greatly exceeding the white flowers. Fruits are ovate oblong (Welsh and Thorne 1979). See Appendix 4 for a line drawing of Rydberg's musineon and Appendix 7 for slides of its habit and habitat.

DISTRIBUTION

Range: Prior to 1990, Rydberg's musineon was thought to be endemic to Cache County, Utah, where it is known only from the Bear River Range (Franklin 1990).

A specimen located at the University of Idaho Herbarium (D.F. Stauffer 1) from Strawberry Canyon, in the Bear River Range east of Montpelier, was originally identified as Rydberg's musineon. We searched the Strawberry Canyon area in June and found Lomatium kingii to be the only umbel present. An evaluation of the specimen in July determined that it was indeed L. kingii.

In July, however, we did locate two small populations of Rydberg's musineon from the Bloomington Lake area. These populations are disjunct by approximately 15 miles north of the nearest populations in Utah. Population 001 occurs on rock outcrops in the cirque immediately east of the Bloomington Lake cirque. It consisted of approximately 250 individuals, although the population may extend onto the inaccessible portion of the headwall. Population 002 occurs on the cirque headwall immediately above (south of) Bloomington Lake. We counted 160 individuals in this population.

Thorough searches of similar-appearing habitat in the study area were unsuccessful (Appendix 2). See Appendix 5 for Heritage Program element occurrence records for Rydberg's musineon on the Caribou NF. These data base records contain information on location, ownership, population data and quality of the population, among other things. Also see Appendix 6 for the mapped locations of known populations on the Caribou NF.

Habitat and Associated Species: The two populations of Rydberg's musineon near Bloomington Lake both occur on ledges and in crevices on near-vertical outcrops of Laketown Dolomite (Mitchell and Bennett 1979). This habitat occurs on cirque headwalls resulting from alpine glaciation during the Pleistocene. The ledge and crevice habitats of the musineon are northerly-facing and appear to be relatively moist season-long. Elevations of the populations range from 8800 to 9000 feet. Associated species include Asplenium viride, Cystopteris fragilis, Pellaea breweri, Draba lonchocarpa, Lloydia serotina, Primula parryi, Synthyris pinnatifida, Epilobium alpinum, Trisetum spicatum, Oxyria digyna, Arnica latifolia, Aquilegia coerulea, Heuchera rubescens, and Sedum debile.

CONSERVATION STATUS

Conservation Status - Idaho: Rydberg's musineon was only discovered in Idaho in July 1990. It was previously thought to be endemic to the Bear River Range of Cache County, Utah (Goodrich 1987). Rydberg's musineon is a Region 4 Sensitive Species for the Wasatch-Cache NF (USDA Forest Service 1988); the Caribou NF should be added to the list.

Since Rydberg's musineon was only recently discovered in Idaho, the Idaho Native Plant Society has not yet classified it.

The Idaho Natural Heritage Program currently ranks Rydberg's musineon as G2 S1 (G2 = Rydberg's musineon is imperiled globally because of rarity or because of other factors demonstrably making it vulnerable to extinction; S1 = critically imperiled in Idaho because of extreme rarity or because of some factor of its biology

making it especially vulnerable to extinction; Moseley and Groves 1990).

Conservation Status - Elsewhere:

Utah - Franklin (1990) conducted an inventory for Rydberg's musineon in Utah, in 1989. He found it to be widely scattered in the Bear River Range in Cache County and has recommended that it be reclassified by the Fish and Wildlife Service from a C2 candidate to a 3c candidate (more common than previously thought and/or no longer subject to identifiable threats). Since it has a fairly narrow range and is largely endemic to Forest Service land, however, he recommended that it remain a Forest Service Sensitive Species. See also status report by Woodbury (1980).

Ownership: The two small populations of Rydberg's musineon occur on the Cache NF, which is administered in Idaho, by the Caribou NF, Montpelier Ranger District.

Threats: No clear anthropogenic threats to the populations of Rydberg's musineon at Bloomington Lake were seen during 1990. The populations are extremely small, however, with a combined total of less than 500 individuals seen in 1990. For this reason it remains vulnerable to extirpation in Idaho.

Management Implications: The Bloomington Lake area is heavily used by recreationists during the summer, but there was no evidence that this use is impacting the Rydberg's musineon populations. These two populations are significant, however, in that they are the only ones known in Idaho. Also, they are very small, making them inherently vulnerable to extirpation. The Forest should, therefore, give special consideration to this species when formulating plans for development in the Bloomington Lake area.

ASSESSMENT AND RECOMMENDATIONS

Summary: We discovered two small populations of Rydberg's musineon on cirque headwalls in the Bloomington Lake area. These are the first records for this species in Idaho. The populations are small, consisting of less than 500 individuals combined, but are currently well removed from the intense recreational pressure that the lake area receives. We were unable to find any additional populations during a thorough search of the Bear River Range in Idaho, but did discover that the environment and habitats present on the headwalls above Bloomington Lake, are unique for southeastern Idaho.

Recommendations to the Regional Forester: Rydberg's musineon is extremely rare in Idaho, known from only two small populations on land administered by the Caribou NF. I concur with Franklin's (1990) recommendation that it remain a Forest Service Sensitive Species, since it has a narrow range and is largely restricted to Forest Service land. It is currently listed as Sensitive for the Wasatch-Cache NF; the Caribou NF should now be added.

Recommendation to Caribou National Forest: The populations of Rydberg's musineon at Bloomington Lake are of floristic significance by being the only ones known in Idaho and being disjunct by over 15 miles from the nearest populations in Utah. For those reasons it should be given special consideration by the Forest Service during the planning of land management activities in the Bloomington Lake area.

Land managers and field personnel on the Caribou NF should be informed of the occurrence of this species in their area. Possible sightings of this plant should be documented by specimens (if the size of the population warrants collecting), and should be sent to the University of Idaho Herbarium (Department of Biological Sciences, University of Idaho, Moscow 83843) for verification of their identity. When sending specimens for identification, always include detailed location, habitat, and pertinent morphological information. Confirmed sightings of this species should be reported to the Idaho Natural Heritage Program, via Region 4 TES Plant Forms, for entry into their permanent data base on sensitive species.

Recommendations to the U.S. Fish and Wildlife Service: Rydberg's musineon is currently a Category 2 candidate (U.S. Fish and Wildlife Service 1990). While our investigation in Idaho gives only a small view of its distribution and abundance, Franklin's (1990) inventory in Utah gives a more complete picture of the conservation status of Rydberg's musineon. He found it to be more common than previously thought and that is not subjected to any identifiable threats at present. He recommended that it be reclassified to category 3c.

Other Recommendations: At the 1991 Idaho Rare Plant Conference, we will recommend that the Idaho Native Plant Society add Rydberg's musineon to the Idaho Rare Plant List as a Priority 1 taxon (Moseley and Groves 1990).

Penstemon compactus (Keck) Crosswhite

CURRENT STATUS USFS Region 4 - Sensitive
USFWS - Category 2 Candidate
Idaho Native Plant Society - None
Heritage Rank - G2 S1

TAXONOMY

Family: Scrophulariaceae (Figwort)

Common Name: Cache penstemon; Bear River Range penstemon

Citation: American Midland Naturalist 77:6. 1967.

Synonymy: P. cyananthus Hook. var. compactus (Crosswhite) Neese

Technical Description: Perennial herb 1-2 (3) dm tall, often with well developed basal leaves; stems decumbent to ascending, few to several arising from a branched woody caudex; herbage glabrous; leaves entire, the basal and lower cauline 5-11 cm long, 8-14 (25) mm wide, oblanceolate, tapering to a petiolar base, the upper cauline ones 2-5 cm long, 5-14 mm wide, lanceolate, sessile; thyrse of 2 or 3 (4) compact verticillasters, minutely glandular-puberulent to glabrous, more or less secund; calyx 6-9 mm long, the segments lanceolate, attenuate, sometimes caudate, with recurved tips, glandular-puberulent or sometimes glabrous, the margins scarious, moderately erose; corolla 18-23 (26) mm long, ventricose-ampliate, the upper lip arched up, the lower spreading to reflexed, the throat 6.5-9 (10) mm broad when pressed, 2-ridged ventrally, the tube 5-7 mm long, the limb sky-blue, the tube blue-violet, glabrous within and without, including the palate; staminode included, glabrous or pubescent at the apex; fertile stamens included, or the upper pair slightly exerted, the anther-cells 1.3-1.8 mm long, dehiscent from the distal 2/3, the proximal 1/3 remaining indehiscent, hispid on the sides with white hairs, the sutures papillate-toothed; 2n=16 (Holmgren 1984).

Nontechnical Description: Cache penstemon is a low, stout perennial, 1-2 dm tall, from a woody caudex. The glabrous, entire leaves are lanceolate, with the basal ones from 5-11 cm long and 1-1.5 cm wide, becoming reduced higher on the stem. The leaves are commonly folded. The short inflorescence has two or three whorls of very large, clear-blue flowers that generally all face in one direction (secund). See Appendix 4 for a line drawing Cache penstemon and Appendix 7 for slides of its habit and habitat.

Distinguishing Features and Similar Species: Cache penstemon is closely related to P. cyananthus, under which, it is sometimes treated as a subspecies or variety. Neese (1987) considered P. compactus to be within the range of variation of the highly variable P. cyananthus and reduced it to varietal status. On the other hand, Holmgren (1984) admits that there is a close relationship, but states that the two taxa grow side by side with no signs of introgression. We observed a similar situation on Wilderness Peak (occurrence 001), where P. cyananthus grew in deeper-soil sagebrush sites, immediately adjacent to the rock outcrop-habitat of P. compactus, with no morphological intermediates.

The following key, adapted from Holmgren (1984) and Neese (1987), will help distinguish the two taxa:

- A. Plants relatively dwarf, mostly 1-2.5 dm tall; leaves commonly folded; inflorescence distinctly secund (flowers arranged on one side), reduced, usually of 2-4 whorls of flowers; calyx obscurely glandular; plants of limestone outcrops P. compactus
- A. Plants taller, usually over 3 dm tall; leaves seldom folded; inflorescence subsecund to more commonly symmetrical, densely flowered, with usually 5 or more whorls of flowers; calyx glabrous; plants of deeper-soil habitats P. cyananthus

In addition to P. cyananthus, four other penstemons are sympatric with Cache penstemon in Idaho: P. montanus, P. humilis, P. whippleanus, and P. leonardii. The latter three species all have smaller flowers than Cache penstemon. P. montanus differs by having lavender, instead of clear-blue, flowers and prostrate stems that are rarely, if at all, erect.

DISTRIBUTION

Range: Prior to 1990, Cache penstemon was known in Idaho from two Franklin County collections at the Utah State University Herbarium (UTC). Both were from the upper Logan River area on the west slope of the Bear River Range, just a couple miles north of the Utah border. We relocated both of these populations (occurrences 001 and 002) in 1990, and found only five additional populations, despite a thorough inventory of the high ridges of the Bear River Range in Idaho (Appendix 2). All seven populations occur on ridgetops, six surrounding the upper Logan River drainage and one on the Cub triangulation station at the head of the Cub River.

Most of the populations are limited in extent and contain from 10 and 400 individuals. The exception is occurrence 001 on Wilderness Peak, which contains from between 1000 to 2000

individuals, but is still restricted in area. In total, approximately 3000 individuals are known from Idaho. See Appendix 5 for Heritage Program element occurrence records for Cache penstemon on the Caribou NF. These data base records contain information on location, ownership, population data and quality of the population, among other things. Also see Appendix 6 for the mapped locations of known populations on the Caribou NF.

Habitat and Associated Species: All populations of Cache penstemon in Idaho, occur on carbonate substrates, either St. Charles Limestone, Garden City Limestone, or Fish Haven Dolomite (Mitchell and Bennett 1979). Two populations (002 and 004) come to within inches of the contact between the dark gray Fish Haven Dolomite and the bright white Swan Peak Quartzite, but no Cache penstemon occurs on the quartzite.

Cache penstemon occurs on bedrock habitats, outcrops or cliff bands, usually rooted in crevices. These habitats are open and dry, usually near ridgelines or summits, and of moderate to steep slope. It was found on all aspects. Elevations ranged from 8800 to 9300 feet. Associated species include Penstemon cyananthus, P. montanus, P. humilis, P. whippleanus, P. leonardii, Artemisia tripartita, Artemisia spiciformis, Leucopoa kingii, Lomatium kingii, Pinus flexilis, Symphoricarpos oreophilus, Petrophytum caespitosum, Poa fendleriana, Castilleja applegatei, Eriogonum heracleoides, Erigeron tener, E. compositus, Sedum lanceolatum, Ribes cereum, Linum kingii, Pseudotsuga menziesii, and Monardella odoratissima.

CONSERVATION STATUS

Conservation Status - Idaho: Although Cache penstemon was first collected in Idaho in 1954, and reported in two recent floras (Holmgren 1984; Neese 1987), its presence was unknown to botanists working on rare plant conservation in the state until this year. Cache penstemon is a Region 4 Sensitive Species for the Wasatch-Cache NF (USDA Forest Service 1988); the Caribou NF should be added to the list.

Since Cache penstemon was only recently recognized in the state by conservation biologists, the Idaho Native Plant Society has not yet classified it.

The Idaho Natural Heritage Program currently ranks Cache penstemon as G2 S1 (G2 = imperiled globally because of rarity or because of other factors demonstrably making it vulnerable to extinction; S1 = critically imperiled in Idaho because of extreme rarity or because of other factors of its biology making it very vulnerable to extinction; Moseley and Groves 1990).

Conservation Status - Elsewhere:

Utah - Franklin (1990) conducted an inventory for Cache penstemon in Utah, in 1989. He found it to be scattered at high elevations in the Bear River Range in Cache County. While not as common as Rydberg's musineon in Utah, he recommended that it also be reclassified by the Fish and Wildlife Service from a C2 candidate to a 3c candidate. Since it has a fairly narrow range and is largely endemic to Forest Service land, however, he recommended that it remain a Forest Service Sensitive Species. See also status report by Welsh (1979).

Ownership: All seven populations of Cache penstemon in Idaho occur on the Cache NF, which is administered in Idaho, by the Caribou NF, Montpelier Ranger District.

Threats: No clear anthropogenic threats to any of the populations of Cache penstemon were seen during 1990. Most are accessible to domestic sheep grazing along the ridges, but no clear threat to population viability from this activity was seen. The populations are small, however, with a combined total of about 3000 individuals seen in 1990. For this reason it remains vulnerable to extirpation in Idaho.

Management Implications: As stated above, most of the populations are accessible to domestic sheep grazing. While no negative effect of this activity was seen in 1990, it may constitute a long-term threat to population viability. If grazing does occur in these areas, the Allotment Management Plan should reflect the need to periodically monitor the Cache penstemon populations. In general, the Forest should give special consideration to this species when formulating plans for development in the Logan River area.

ASSESSMENT AND RECOMMENDATIONS

Summary: We relocated the two previously known sites of Cache penstemon in Idaho, and discovered five new locations. All occur on ridgetops, mostly surrounding the upper Logan River. The populations are all limited in extent and have a combined total of about 3000 individuals. We saw no clear threats to the populations in 1990, although sheep grazing may affect some. We were unable to find any additional populations during a thorough search of the Bear River Range in Idaho.

Recommendations to the Regional Forester: Cache penstemon is rare in Idaho, known from only seven small populations on the Caribou NF. I concur with Franklin's (1990) recommendation that it remain a Forest Service Sensitive Species, since it has a narrow range and is largely restricted to Forest Service land.

Recommendation to Caribou National Forest: The Cache penstemon populations in Idaho are all limited in extent and have a combined

total of only about 3000 individuals. We saw no clear threats to the populations in 1990, although sheep grazing may affect some. If grazing does occur in these areas, the Allotment Management Plan should reflect the need to periodically monitor the Cache penstemon populations. Because it is so rare in Idaho, it should be given special consideration by the Forest Service during the planning of land management activities in the Logan River area.

Land managers and field personnel on the Caribou NF should be informed of the occurrence of this species in their area. Possible sightings of this plant should be documented by specimens (if the size of the population warrants collecting), and should be sent to the University of Idaho Herbarium (Department of Biological Sciences, University of Idaho, Moscow 83843) for verification of their identity. When sending specimens for identification, always include detailed location, habitat, and pertinent morphological information. Confirmed sightings of this species should be reported to the Idaho Natural Heritage Program, via Region 4 TES Plant Forms, for entry into their permanent data base on sensitive species.

Recommendations to the U.S. Fish and Wildlife Service: Cache penstemon is currently a Category 2 candidate (U.S. Fish and Wildlife Service 1990). While our investigation in Idaho gives only a small view of its distribution and abundance, Franklin's (1990) inventory in Utah gives a more complete picture of its conservation status. He found it to be more common than previously thought, although not as common as Rydberg's musineon, and that it is not subject to any identifiable threats at present. He recommended that it be reclassified to category 3c.

Other Recommendations: At the 1991 Idaho Rare Plant Conference, we will recommend that the Idaho Native Plant Society add Cache penstemon to the Idaho Rare Plant List as a Priority 2 taxon (Moseley and Groves 1990).

Additional Floristic Notes

1. Erigeron cronquistii - During Franklin's (1990) survey of the Bear River Range in Utah, he mapped populations of Cronquist's fleabane on Doubletop Mountain, about two miles south of the Idaho border. Therefore, we expected to find populations in Idaho, since the habitat is not uncommon there. We did find several populations of an Erigeron that superficially appeared to be E. cronquistii. The ray corollas were white to pink, as in E. cronquistii, but the pappus was equal to the disc corolla in length, a characteristic of E. tener, its nearest congener (Welsh 1987).

Because of this confusion, we sent six specimens to Dr. Arthur Cronquist, of the New York Botanical Garden, for his identification. He responded that, while geographically they ought to be E. cronquistii, the leaves are clearly E. tener, and the pappus length also suggests E. tener. The white or pink rays, on the other hand, are of E. cronquistii rather than E. tener. In other words, we found no E. cronquistii populations in Idaho, and no specimens of E. tener in the study area that had the more typical blue to red-purple ray flowers. Further study may reveal that this form of E. tener warrants taxonomic recognition.

2. Bloomington Lake Cirque - During our 1990 inventory of the Bear River Range, we surveyed nearly every high ridge and summit between the Utah border, on the south, to Sherman Peak, on the north. In all our searching, we never found another area as biologically and physically unique as the Bloomington Lake cirque, especially the headwall above the lake. Physically, it is the steepest headwall in the Idaho portion of the Bear River Range and it holds snow in the chutes and along cliff bases much longer than any other area of the range; snow was still present there in late July 1990. In addition, two very different geologic substrates occur on the headwall. The bottom cliff bands, next to the lake, are comprised of the white Swan Peak Quartzite, while the upper face is gray Laketown Dolomite. These two substrates have very different chemical and physical properties, especially as perceived by plants living in this harsh habitat.

The headwall is also floristically unique for the Bear River Range in Idaho, obviously controlled by the physical factors discussed above. The presence of two rare plants, Rydberg's musineon and green spleenwort, is only one indication of this. Other species occurring there, such as Oxyria digyna, Primula parryi, Draba lonchocarpa, Lloydia serotina, and Polystichum lonchitis, were not seen elsewhere in the study area, and indicate environmental conditions that normally exist 2000 feet higher than those at Bloomington Lake.

The headwall and summits around Bloomington Lake were proposed to the Caribou NF as a Research Natural Area (RNA) by the Idaho Natural Areas Coordinating Committee. The Forest rejected the proposal and it was not included in the Caribou Forest Plan. This area is unique for southeastern Idaho and should be given special recognition commensurate with its ecological significance. While the recreational pressure at Bloomington Lake may conflict with its designation as a RNA, it would not conflict with the Special Interest "Botanical" Area designation, a program housed in the Recreation Branch. This designation would also facilitate the interpretation of the unique ecological phenomena at Bloomington Lake for the public. The Idaho Natural Heritage Program is willing to help the Forest in this endeavor.

3. Penstemon leonardii - Until this year, Leonard's penstemon was considered rare in Idaho (Idaho Native Plant Society 1990; Moseley and Groves 1990). Our observations and collections during this study revealed that it is common throughout the Bear River Range, occurring in several different habitats, including as an increaser on heavily grazed sheep range. This species in no way warrants any level of conservation concern in Idaho. We will recommend that the Idaho Native Plant Society drop this species from their list at the 1991 Rare Plant Conference.

4. Draba maguirei - Maguire's draba was considered one of the target species that we would probably encounter. Although it is common in the Mt. Naomi area, Utah, just a few miles south of the Idaho border, it was not found in similar-appearing habitats in Idaho. It is currently on the Idaho Native Plant Society list as a Review species (Idaho Native Plant Society 1990). We will recommend that the Idaho Native Plant Society drop this species from their list at the 1991 Rare Plant Conference.

5. Ivesia gordonii - Gordon ivesia is widespread at mid- to high elevations in the western United States, but is represented in the Wasatch Range (including The Bear River Range) of Idaho and Utah by an exceptionally robust form. We made several collections in the study area and in the Preuss Range near the Wyoming border. It occurs on outcrops and in heavily grazed tall forb communities and appears restricted to carbonate substrates. Both Noel Holmgren of the New York Botanical Garden, who is reviewing Ivesia for the Intermountain Flora, and Barbara Ertter of the University of California, Berkeley, independently came to the conclusion that the Wasatch form of Ivesia gordonii is a distinct variety and will be described as such (Ertter, personal communication, 1990). This soon-to-be-described taxon is common in Utah and Idaho.

RECOMMENDATIONS FOR FUTURE STUDIES

The TES and floristic inventory of the Bear River Range in Idaho was envisioned to be a two year project. The first year was to be more or less exploratory, since very little was known about the floristics of the area. We feel that much was accomplished in 1990, in terms of floristic exploration, and in filling gaps in our knowledge of the Idaho distribution of several rare plant species. We have the following recommendations for phase two of the project, which will hopefully take place in 1991:

1. Continue Survey of Bear River Crest - Our 1990 inventory concentrated on habitats occurring on the crest of the Bear River Range, since that is where most of the known species occurred. We inventoried a major portion of the crest, but a few areas still remain to survey that may contain populations of the three rare species discussed in this report. The crest area remaining to be surveyed includes much of the main divide, from Bloomington Lake north to Emigrant Pass, mostly along the High Line Trail. Areas of the main crest north of Emigrant Pass may should also be surveyed if a reconnaissance reveals the potential for suitable habitat of any of the target species.

2. Canyons on the West Slope of the Range - Much of the focus of our 1990 survey was on the east slope of the range and in the upper Logan River. A quick reconnaissance trip down the Cub River revealed potential habitat for several rare species. Other west-slope canyons may have similar potential. These canyons are lower in elevation than any of the east-slope canyons and have considerably different habitats. This area appears to have the only potential habitat for Primula maguirei, a species listed as Threatened, and should be a major focus during the second phase of this project.

3. Vernal Pond and Wetland Habitats - The Bear River Range has numerous structural basins created by complex faulting patterns. These internally drained basins (e.g., Egan Basin and Gibson Basin) contain ponds and wetlands that are seasonally flooded during the late spring and early summer, as the snow pack melts, but can become very dry by late summer. The vernal ponds and wetlands can range in size from just a few square yards to well over one hundred acres, and can vary greatly in the degree to which they dry out. Whatever the case, the annual fluctuation of water level creates a very unique and extreme environment for plant and animal growth and survival. The vernal pools, for instance, are usually inhabited by specially adapted plants that are highly habitat-specific. Many of the species in these habitats are also known to have limited distributions.

We were unable to spend much time exploring the vernal pool and wetland habitats of the study area in 1990, but they should be the focus of increased efforts during the second phase of botanical exploration of the Bear River Range in Idaho.

4. Stipa viridula (green needlegrass) - We recently found a collection of green needlegrass at the University of Idaho Herbarium (Curto 479) that occurs near Alexander, west of Soda Springs. Green needlegrass is a Forest Service Region 4 Sensitive Species (USDA Forest Service 1988). Potential habitat exists nearby on the Caribou NF, at the northern end of the study area. This area should be searched as part of phase two.

5. Erigeron tener - E. cronquistii - To better clarify the status of the white-flowered Erigeron tener collections made in 1990, it would be useful to make more collections to see just where it gives way to E. cronquistii.

REFERENCES

- Cronquist, A. 1969. Asplenium. Pages 59-61 In: Vascular Plants of the Pacific Northwest, Part 1, By C.L. Hitchcock, A. Cronquist, M. Ownbey, and J.W. Thompson. University of Washington Press, Seattle.
- Cronquist, A. 1972. Asplenium. Pages 211-214 In: Intermountain Flora, Vascular plants of the Intermountain West, U.S.A., Volume 1, by A. Cronquist, A.H. Holmgren, N.H. Holmgren, and J.L. Reveal. Hafner Publishing Co., Inc., New York.
- Cronquist, A., A.H. Holmgren, N.H. Holmgren, and J.L. Reveal. 1972. Intermountain Flora, Vascular plants of the Intermountain West, U.S.A., Volume 1. Hafner Publishing Co., Inc., New York. 270 pp.
- Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal, and P.K. Holmgren. 1977. Intermountain Flora, Vascular plants of the Intermountain West, U.S.A., Volume 6. Columbia University Press, New York. 584 pp.
- Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal, and P.K. Holmgren. 1984. Intermountain Flora, Vascular plants of the Intermountain West, U.S.A., Volume 4. New York Botanical Garden, New York. 572 pp.
- Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal, and P.K. Holmgren. 1989. Intermountain Flora, Vascular plants of the Intermountain West, U.S.A., Volume 3, Part B (written by R.C. Barneby). New York Botanical Garden, New York. 279 pp.
- Davis, R.J. 1952. Flora of Idaho. Brigham Young University Press, Provo, UT. 836 pp.
- Dieffenbach, T. No date. Plant survey of the Caribou Mountain area. USDA Forest Service contract report by Idaho State University; on file at Idaho Natural Heritage Program, Boise, ID. 60 pp.
- Duft, J.F., and R.K. Moseley. 1989. Alpine wildflowers of the Rocky Mountains. Mountain Press Publishing Co., Missoula, MT. 200 pp.
- Franklin, M.A. 1990. Report for 1989 challenge cost share project, Wasatch-Cache National Forest. Unpublished report by the Utah Natural Heritage Program, on file at the Idaho Natural Heritage Program, Boise, ID. 17 pp., plus appendices.

- Goodrich, S. 1987. Musineon. Page 633 In: A Utah flora, by S.L. Welsh, N.D. Atwood, L.G. Higgins, and S. Goodrich. Great Basin Naturalist Memoir No. 9. Brigham Young University , Provo, UT.
- Higgins, L.G. 1987. Asplenium. Pages 18-19 In: A Utah flora, by S.L. Welsh, N.D. Atwood, L.G. Higgins, and S. Goodrich. Great Basin Naturalist Memoir No. 9. Brigham Young University , Provo, UT.
- Hinds, H.R. 1983. The rare vascular plants of New Brunswick. Syllogeus No. 50. National Museums of Canada, Ottawa, Ontario. 38 pp., plus maps.
- Hitchcock, C.L., and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press, Seattle. 730 pp.
- Holmgren, N.H. 1984. Penstemon. Pages 370-455 In: Intermountain Flora, Vascular plants of the Intermountain West, U.S.A., Volume 4, by A. Cronquist, A.H. Holmgren, N.H. Holmgren, J.L. Reveal, and P.K. Holmgren. New York Botanical Garden, New York.
- Idaho Native Plant Society. 1990. Results of the sixth annual rare plant meeting, March 1990. Unpublished manuscript on file at the Idaho Natural Heritage Program, Boise, ID. 5 pp.
- Lellinger, D.B. 1985. A field manual of the ferns and fern-allies of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 389 pp.
- Mitchell, V.E., and E.H. Bennett. 1979. Geologic map of the Preston Quadrangle, Idaho. The Geologic Map Series (2^o Quadrangle). Idaho Bureau of Mines and Geology, Moscow.
- Moseley, R.K. 1990. Results of the 1989 search of regional herbaria for location information pertaining to Idaho's rare flora: The fourth generation search. Unpublished report on file at the Idaho Natural Heritage Program, Boise. 12 pp., plus appendices.
- Moseley, R., and C. Groves. 1990. Rare, threatened and endangered plants and animals of Idaho. Natural Heritage Section, Nongame and Endangered Wildlife Program, Idaho Department of Fish and Game, Boise, ID. 33 pp.
- Neese, E.C. 1987. Penstemon. Pages 579-601 In: A Utah flora, by S.L. Welsh, N.D. Atwood, L.G. Higgins, and S. Goodrich. Great Basin Naturalist Memoir No. 9. Brigham Young University , Provo, UT.

- Oregon Natural Heritage Data Base. 1989. Rare, threatened and endangered plants and animals of Oregon. Oregon Natural Heritage Data Base, The Nature Conservancy, Portland, OR. 40 pp.
- Schultz, J.S., and L.M. Schultz. 1978. Report of the botanical survey of endangered and threatened plants, Caribou National Forest. USDA Forest Service contract report; on file at Idaho Natural Heritage Program, Boise, ID. 114 pp.
- Smith, J.P., and K. Berg. 1988. Inventory of rare and endangered vascular plants of California. California Native Plant Society, Sacramento, CA. 168 pp.
- USDA Forest Service. 1988. Sensitive Plant Program Handbook R-4 FSH 2609.25. Intermountain Region, Ogden, UT.
- 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.
- Washington Natural Heritage Program. 1981. Endangered, threatened and sensitive vascular plants of Washington. Washington Natural Heritage Program, Olympia, WA. 26 pp.
- Washington Natural Heritage Program. 1990. Endangered, threatened and sensitive vascular plants of Washington. Washington Natural Heritage Program, Department of Natural Resources, Olympia, WA.
- Welsh, S.L. 1979. Status Report - Penstemon compactus. Unpublished report on file at Idaho Natural Heritage Program, Boise, ID.
- Welsh, S.L. 1987. Erigeron. Pages 180-192 In: A Utah flora, by S.L. Welsh, N.D. Atwood, L.G. Higgins, and S. Goodrich. Great Basin Naturalist Memoir No. 9. Brigham Young University, Provo, UT.
- Welsh, S.L., and K.H. Thorne. 1979. Illustrated manual of proposed endangered and threatened plants of Utah. Funded by the U.S. Fish and Wildlife Service, Bureau of Land Management, and U.S. Forest Service. 318 pp.
- Welsh, S.L., N.D. Atwood, L.G. Higgins, and S. Goodrich. 1987. A Utah Flora. Great Basin Naturalist Memoir No. 9. Brigham Young University, Provo, UT. 894 pp.
- Woodbury, K. 1980. Updated status report - Musineon lineare. Unpublished report on file at Idaho Natural Heritage Program, Boise, ID.

Appendix 1

1990 Work Plan for floristic inventory of the
Bear River Range, Caribou National Forest.

Appendix 2

List of areas floristically inventoried in 1990,
Bear River Range, Caribou National Forest.
(from south to north, more or less;
detailed field maps available from Heritage Program)

East Slope

Red Sinks - Swan lake
Ridge between Swan Lake and Ranger Dip
Fish Haven Canyon
Green Canyon
Egan Basin - Franklin Basin divide to north of Danish Pass
St. Charles Canyon
Upper North Fork St. Charles Creek and Snowslide Canyon
Middle Fork St. Charles Creek
Bloomington Canyon
North Fork Bloomington Creek
Bloomington Peak and cirque
Bloomington Lake area
Ridges between Bloomington Cr - Worm Creek -
 North Fork St. Charles Creek
Paris Ice Cave
Paris Canyon
Paris Springs
Paris Peak
Midnight Mountain
Emigration Canyon
North Canyon
Meadow Creek
Skinner Canyon Road
Sherman Peak
Eightmile Creek

Upper Logan River

Beaver Creek drainage
Wilderness Peak - White Canyon
Divide between Beaver Creek and Logan River

West Slope

Strawberry Canyon

Appendix 3

Annotated list of plants collected by
Michael Mancuso and Bob Moseley during 1990 inventory.

Note: Nomenclature follows the Intermountain Flora (Cronquist et al. 1972; 1977; 1984; 1989). For those families not covered by these volumes we refer to A Utah Flora (Welsh et al. 1987).

SPECIES to study area)	COLLECTOR & NUMBER	LOCATION(S) COLLECTED	DISTRIBUTIONAL COMMENTS (relative
Asteraceae			
<u>Arnica latifolia</u>	Moseley 1789	Bloomington Lk headwall	widespread
<u>Artemisia ludoviciana</u>	Mancuso 256	Bloomington Lk area	widespread and common
<u>Crepis acuminata</u>	Moseley 1748	Wilderness Peak	locally common
<u>Crepis atrabarba</u>	Moseley 1746	Wilderness Peak	uncommon
<u>Erigeron eatonii</u>	Moseley 1736	Wilderness Peak	widespread and abundant
<u>Erigeron leiomerus</u>	Moseley 1757, 1778	Bloomington Lk, Crooked Cr, St. Charles Cr	widespread and common
<u>Erigeron peregrinus</u> ssp. <u>callianthemus</u>	Moseley 1783	Bloomington Lk headwall	probably widespread
<u>Erigeron speciosus</u>	Moseley 1729	Wilderness Peak	common
<u>Erigeron tener</u> (determined by A. Cronquist)	Moseley 1753, 1754	Paris Pk, Crooked Cr, 1760, 1795, 1796 White Can, Danish Pass, Paris Pk	locally common on peaks crest and of range from south
<u>Erigeron ursinus</u>	Mancuso 262, 284	Bloomington Lk area	rare
<u>Hieracium cynoglossoides</u>	Moseley 1791	Bloomington Pk headwall	fairly common, locally
<u>Hymenoxys acaulis</u>	Mancuso 277	near Cub Pk	local; rare
<u>Machaeranthera canescens</u>	Mancuso 280	above Bloomington Lk	widespread and common
<u>Petradoria pumila</u> var. <u>pumila</u>	Moseley 1743	Wilderness Peak	common
<u>Senecio canus</u>	Moseley 1797	west of Paris Pk	widespread and abundant
<u>Senecio fremontii</u> var. <u>fremontii</u>	Mancuso 283	above St. Charles Cr RNA	uncommon
<u>Senecio fremontii</u> var. <u>fremontii</u>	Moseley 1774	Bloomington Lk headwall	uncommon
<u>Senecio streptanthifolius</u>	Moseley 1745	Wilderness Peak	common
Boraginaceae			
<u>Hackelia</u>	Moseley 1764	west of Gibson Basin	rare
Brassicaceae			
<u>Arabis lemmonii</u> var. <u>lemmonii</u>	Moseley 1784	Bloomington Lk headwall	uncommon
<u>Arabis lignifera</u>	Moseley 1750	Wilderness Peak	common at site
<u>Draba crassifolia</u>	Moseley 1787	Bloomington Lk headwall	locally common
<u>Draba lonchocarpa</u>	Moseley 1787	Bloomington Lk headwall	only seen here
<u>Draba</u> (sent for det.; probably probably <u>D. densifolia</u> & <u>D. oligosperma</u>)	Moseley 1755, 1759	Crooked Cr, White Can,	locally common;
<u>Erysimum asperum</u>	Mancuso 261	Danish Pass	common ?
<u>Lesquerella occidentalis</u> var. <u>diversifolia</u>	Moseley 1734	Wilderness Peak	widespread
<u>Rorripa curvipes</u> var. <u>integral</u>	Moseley 1786	Bloomington Lk headwall	only seen here
<u>Streptanthus cordatus</u>	Moseley 1766	west of Gibson Basin	only seen here
<u>Thlaspi montanum</u>	Moseley 1742, 1781	Wilderness Peak, Danish Pass, Bloomington Lk	widespread
<u>Thlaspi montanum</u>	Mancuso 266		
Caryophyllaceae			
<u>Arenaria congesta</u> var. <u>congesta</u>	Moseley 1744	Wilderness Peak	common
<u>Lychnis drummondii</u>	Mancuso 249	north of Wilderness Pk	rare
<u>Silene douglasii</u> ?	Mancuso 252	north of Wilderness Pk	uncommon
<u>Silene menziesii</u> var. <u>menziesii</u>	Moseley 1788	Bloomington Lk headwall	widespread ?
Cyperaceae			
<u>Carex microptera</u> common	Mancuso 275	Cub Peak	widespread,

<u>SPECIES</u> <u>to study area)</u>	<u>COLLECTOR</u> <u>& NUMBER</u>	<u>LOCATION(S)</u> <u>COLLECTED</u>	<u>DISTRIBUTIONAL</u> <u>COMMENTS (relative</u>
Fabaceae			
<u>Astragalus</u> <u>agrestis</u>	Moseley 1799	Midnight Mt	uncommon
<u>Astragalus</u> <u>argophyllus</u>	Moseley 1752, 1798	Midnight Mt, Wilderness Pk	local; uncommon
<u>Astragalus</u> <u>tenellus</u>	Mancuso 250, 272	Wilderness Pk, M.F. St. Charles Cr.	local
<u>Astragalus</u> <u>utahensis</u> ?	Mancuso 260	Egan Basin	rare; only seen here
<u>Hedysarum</u> <u>boreale</u>	Moseley 1749	Wilderness Peak	uncommon
Geraniaceae			
<u>Geranium</u> <u>richardsonii</u>	Mancuso 259	Egan Basin	widespread
Lamiaceae			
<u>Monardella</u> <u>odoratissima</u>	Moseley 1733	Wilderness Peak	widespread; common
Liliaceae			
<u>Calochortus</u> <u>nuttallii</u>	Mancuso 246	north of Wilderness Pk	widespread
<u>Lloydia</u> <u>serotina</u>	Moseley 1780	Bloomington Lk headwall	only seen here
Linaceae			
<u>Linum</u> <u>kingii</u>	Moseley 1725	Wilderness Peak	widespread; locally common
Onagraceae			
<u>Oenothera</u>	Moseley 1771	Gibson Basin dry lakebed	only seen here
Poaceae			
<u>Stipa</u> <u>lettermanii</u>	Mancuso 276	Cub Peak	common
<u>Trisetum</u> <u>canescens</u>	Mancuso 271	Middle Fk St. Charles Cr	uncommon
Polemoniaceae			
<u>Polemonium</u> <u>foliosissimum</u> var. <u>alpinum</u>	Moseley 1756	Crooked Cr	common
Polygonaceae			
<u>Eriogonum</u> (sent for det.) of	Moseley 1727, 1794	Wilderness Pk,	locally abundant south
	Mancuso 268, 282	St. Charles Cr, Bloomington Pk	Bloomington Peak
<u>Oxyria</u> <u>digyna</u>	Moseley 1772	Bloomington Lk headwall	only seen here

<u>SPECIES</u> <u>to study area)</u>	COLLECTOR & NUMBER	LOCATION(S) COLLECTED	DISTRIBUTIONAL COMMENTS (relative
Polypodiaceae			
<u>Asplenium viride</u>	Moseley 1785	Bloomington Lk headwall	only seen here
<u>Cystopteris fragilis</u>	Moseley 1792 Mancuso 270	Bloomington Lk headwall, Mid. Fk. St Charles Cr	widespread
<u>Pellaea breweri</u>	Moseley 1732 Mancuso 269	Wilderness Pk, Mid. Fk. St. Charles Cr.	widespread
<u>Polystichum lonchitis</u>	Moseley 1773	Bloomington Lk headwall	only seen here
Primulaceae			
<u>Primula parryi</u>	Moseley 1775	Bloomington Lk headwall	only seen here
Ranunculaceae			
<u>Anemone multifida</u> var. <u>tetonensis</u>	Moseley 1738	Wilderness Peak	common; widespread ?
<u>Anemone</u>	Moseley 1790	Bloomington Lk headwall	common
<u>Clematis columbiana</u>	Moseley 1763	west of Gibson Basin	only seen here
<u>Delphinium nuttallianum</u>	Mancuso 274	Cub Peak	common; widespread?
Rosaceae			
<u>Ivesia gordonii</u>	Moseley 1731, 1767	Wilderness Pk, Hidden Lk	widespread
<u>Potentilla diversifolia</u>	Moseley 1777 Mancuso 263	Bloomington Lk headwall, Danish Pass	uncommon
<u>Potentilla ovina</u>	Mancuso 281	SE of Bloomington Lk	only seen here
Saxifragaceae			
<u>Heuchera parviflora</u>	Mancuso 248	north of Wilderness Pk	common; widespread
<u>Heuchera rubescens</u>	Mancuso 264	Danish Pass	widespread; common
Scrophulariaceae			
<u>Orthocarpus tolmiei</u>	Moseley 1741	Wilderness Peak	widespread; scattered
<u>Penstemon compactus</u>	Moseley 1739, 1758, 1762 Mancuso 253	upper Logan River area	rare; local
<u>Penstemon cyananthus</u>	Moseley 1726, 1728, 1770 Mancuso 257, 273, 285	Wilderness Pk, Bloomington Lk, Hidden Lk, Blue Lk	widespread
<u>Penstemon humilis</u>	Mancuso 255, 265	Danish Pass, Wilderness Pk	widespread
<u>Penstemon leonardii</u> var. <u>leonardii</u>	Moseley 1735, 1769 Mancuso 247, 258	Wilderness Pk, Hidden Lk, Blue Lk,	widespread
<u>Penstemon montanus</u> var. <u>montanus</u>	Moseley 1730	Wilderness Peak	only seen here
<u>Penstemon wippleanus</u>	Moseley 1740, 1761, 1776	Wilderness Pk, White Can Bloomington Lk headwall	uncommon
<u>Synthyris pinnatifida</u> var. <u>pinnatifida</u>	Moseley 1737, 1779	Wilderness Peak, Bloomington Lk headwall	widespread; local
Santalaceae			
<u>Commandra umbellata</u>	Mancuso 254	north of Wilderness Peak	uncommon
Valerianaceae			
<u>Valeriana sitchensis</u>	Moseley 1747	Wilderness Peak	widespread

Appendix 4

Line drawings of Asplenium viride,
Musineon lineare, and Penstemon compactus.

1. Asplenium viride (from Cronquist 1972)
2. Musineon lineare (from Welsh and Thorne 1979)
3. Penstemon compactus and P. cyananthus, for comparison
(from Holmgren 1984)

Appendix 5

Element occurrence records for
Asplenium viride, Musineon lineare, and Penstemon compactus.
on the Caribou National

Appendix 6

Locations of Asplenium viride, Musineon lineare, and Penstemon compactus on the Caribou National Forest.

- Map 1. Overview of the distribution of the three species on the Caribou NF. Portion of 1988 Caribou NF map.
- Map 2. Asplenium viride and Musineon lineare populations above Bloomington Lake. Portion of 1969 Paris Peak 7.5' quadrangle.
- Map 3. Penstemon compactus populations in the White Canyon - Wilderness Peak area. Portion of 1969 Mapleton 7.5' quadrangle.
- Map 4. Penstemon compactus population between Gibson Basin and Logan River. Portion of 1969 Egan Basin 7.5' quadrangle.
- Map 5. Penstemon compactus population on Cub triangulation station. Portion of 1969 Egan Basin 7.5' quadrangle.

Appendix 7

Slides of Asplenium viride, Musineon lineare, and Penstemon compactus and their habitats on the Caribou National Forest.

1. Asplenium viride - close-up; note green rachis with brownish base.
2. Asplenium viride - leaves clustered along a short rhizome.
3. Asplenium viride - comparison with other sympatric ferns: Asplenium viride in center-right, Pellaea breweri in upper left, and Cystopteris fragilis in lower left.
4. Musineon lineare - close-up of plant in Logan Canyon, UT;
5. Musineon lineare - close-up of plant at Bloomington Lake; note linear leaf segments, long flexuous stem, and long, linear involucre bracts (subtending inflorescence).
6. Asplenium viride and Musineon lineare - habitat above Bloomington Lake; ledges and crevices on cliffs.
7. Asplenium viride and Musineon lineare - habitat above Bloomington Lake; Swan Peak Quartzite (white) below, Laketown Dolomite (gray) above. Plants occur on dolomite in chutes with snow in upper right.
8. Penstemon compactus - close-up; note large flowers, short, one-sided inflorescence, and narrow, folded cauline leaves.
9. Penstemon compactus - close-up of plant.
10. Penstemon cyananthus - compare with P. compactus; note tall, erect stem, symmetrical inflorescence, and broader, unfolded leaves.
11. Penstemon compactus - habitat on Wilderness Peak (001); note Cache penstemon scattered across slope.
12. Penstemon compactus - habitat above Gibson Basin (004) in background; white Swan Peak Quartzite in foreground has no Cache penstemon; population begins immediately past contact on gray Fish Haven Dolomite in background.