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**SENSITIVE PLANT SURVEYS IN THE  
BIG BELT AND ELKHORN MOUNTAINS**

**U.S.D.A. FOREST SERVICE - REGION 1  
HELENA NATIONAL FOREST  
MONTANA**

Prepared by:

Jackie M. Poole and Bonnie L. Heidel  
Montana Natural Heritage Program  
State Library Building  
1515 E. 6th Avenue  
Helena, Montana 59620

Prepared for:

Helena National Forest  
2880 Skyway Drive  
Helena, MT 59601

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## EXECUTIVE SUMMARY

The purpose of this study was to document the presence of sensitive plant populations in the Elkhorn and Big Belt Mountains of the Helena National Forest. This report summarizes the findings of the field inventory, including information on areas surveyed; rare plant status, locations, population data, and habitat; significant sites; and further details relevant to management decisions and future research. It represents a sensitive species program baseline, preliminary floristic inventory and contribution toward an ecosystem management approach.

The study area consisted of all Helena National Forest lands within the Big Belt and Elkhorn Mountains (Figure 1). It was divided into three priority levels for survey intensity as set by the Forest Service (Figure 2). The study focus stated in the original proposal centered around three little-known sensitive plant species collected once in the Big Belt Mountains. It was broadened to include a preliminary list of 48 plants of special concern potentially occurring in the Big Belt and Elkhorn Mountains, compiled from data available from the Helena National Forest and the Montana Natural Heritage Program (Appendix 2). Brief habitat profiles were developed for these species, and potential habitats identified using information on soils, landforms, geology, topography, and aerial photographs. Attempts were made to relocate historical collections. Surveys were conducted from mid-May through August 1992 (Appendix 1).

There are ten documented species of special state concern within the Helena National Forest administrative boundaries, six of which are presently designated sensitive or watch on the most current Region 1 - U.S. Forest Service list (Lesica and Shelly 1991). Six species of special concern were discovered or relocated in 1992, and work was done to interpret collection data on four other species which were not relocated.

Two of the six species studied in this project (Juncus hallii and Polygonum douglasii var. austinae) are listed as sensitive by the Forest Service. Delphinium andersonii, currently listed as Watch by the Forest Service, was located for the first time on the Helena National Forest, a significant distance from other known locations in Montana. The other three species (Astragalus convallarius var. convallarius, Cirsium longistylum, and Lesquerella klausii) are considered species of special state concern by the Montana Natural Heritage Program. The latter two are Montana endemics.

Four species previously collected from the Big Belt Mountains (Carex vallicola, Potentilla diversifolia var. multisecta, Claytonia lanceolata var. flava, and Arenaria kingii) were not



relocated. The latter two were lowered in consideration based on review of available information.

Helena National Forest in the Big Belt Mountains maintains the largest concentrations of Lesquerella klausii throughout its global range; two-thirds of all known populations occur in the northern half of the Big Belt Mountains of the Helena National Forest and most of the remainder occur on another district of the Forest. Discoveries of Cirsium longistylum in the Big Belt and Elkhorn Mountains represent major range extensions of another species endemic to Montana, currently considered as a Category 2 species by the U.S. Fish & Wildlife Service.

Discovery of Delphinium andersonii and rediscovery of Juncus hallii and Polygonum douglasii ssp. austinae in the Big Belt Mountains represent significant range extensions, as well as the largest known populations of the latter.

A total of 694 vascular plant species in 72 families were noted in the Big Belt Mountains (Appendix 6), and 382 species in 62 families were recorded in the Elkhorn Mountains (Appendix 7). The preliminary list of 48 species of special concern was refined, and presently consists of 26 taxa in the course of the study (Appendix 4).

Several areas, habitats and species need more research to provide a rudimentary information base for the sensitive species program. Unsurveyed and undersurveyed areas include the Dry Range, the Gates of the Mountain Wilderness, select low elevation areas around the Big Belts, and the burned portion of the northern Elkhorn Mountains. Undersurveyed habitats include riparian and wetland communities, old growth forest and alpine habitats. Species needing additional surveys include Juncus hallii, Astragalus convallarius var. convallarius, Delphinium andersonii, Carex vallicola, Polygonum douglasii ssp. austinae and Potentilla diversifolia var. multisecta. In addition, survey is recommended for three early-blooming species which have high probabilities of occurring on the Helena National Forest.

Our preliminary results document significant rare species and species' sites in the Big Belt Mountains and Elkhorn Mountains, as well as notably intact habitats. These sites contribute to Helena National Forest biodiversity and should be protected to conserve the genetic diversity of the species and their habitat.



## ACKNOWLEDGEMENTS

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## INTRODUCTION

Maintenance of biological diversity and ecosystem function are components of the U.S. Forest Service management mandate under the National Forest Management Act of 1976 and the Resources Planning Act Program of 1990 (Salwasser 1991). One of the specific objectives of this goal is the protection of sensitive species as developed under regional sensitive species policies (Reel et al. 1989).

The first step towards this objective is baseline resource inventory to identify sensitive species and to characterize their distribution and habitat requirements. Sensitive species identification has been accomplished in part through the Region 1 Sensitive Plant Field Guide with its target list of sensitive and watch species for the Helena National Forest (USDA Forest Service 1988), with updates (Lesica and Shelly 1991). The list was developed based on available botanical information.

The Big Belt and Elkhorn Mountains are not well known botanically, despite their proximity to Montana's capital city, Helena. This is particularly true for rare plants. Previous to this project, only one systematic species survey had been conducted in the project area, inventory of Lesquerella klausii in the Big Belt Mountains. Other previous collections of rare plants, all from the Big Belt Mountains, included Arenaria kingii, Carex vallicola, Cirsium longistylum, Claytonia lanceolata var. flava, Juncus hallii, Polygonum douglasii ssp. austinae, and Potentilla diversifolia var. multisecta. No rare plants have been reported from the Elkhorn Mountains. Little was known of the overall diversity and distribution of plant life in the Big Belt and Elkhorn Mountains. Three little-known sensitive species were originally proposed as the survey focus, including Arenaria kingii, Juncus hallii, and Polygonum douglasii ssp. austinae. The survey scope was expanded to include all documented and potential species of special state concern.

The primary purpose of this study was to provide a baseline for the sensitive species programs and related programs on the Helena National Forest by conducting systematic field inventory for sensitive species. Identification and determination of distribution and habitat requirements were conducted within a framework that lays the foundation for sensitive species biological evaluations and for more detailed studies. The work also represents a preliminary survey of the floristic diversity of the Elkhorn and Big Belt Mountains and contributions to a larger ecosystem management approach. This work was conducted concurrently with a sensitive animal species study by the Montana Natural Heritage Program (Reichel et al. 1993).





Soils, landforms, geology, topography, and aerial photography were used to select areas to sample, based on what was known about sensitive species' habitat requirements. We tried to relocate historical collections to determine their current status and extent and expand the survey to potential habitat. This report summarizes the findings of the field inventory, including information on areas surveyed, rare plant status, locations, and habitat profiles particularly as they apply to the Helena National Forest study areas, other significant sites, and further details relevant to management decisions and future research.

## THE STUDY AREA

The Big Belt and Elkhorn Mountains dominate the skyline east and south of Helena, respectively, in south central Montana (Figure 1). They lie as isolated mountain ranges on opposite sides of the Missouri River Valley, eastern outliers of the Rocky Mountains.

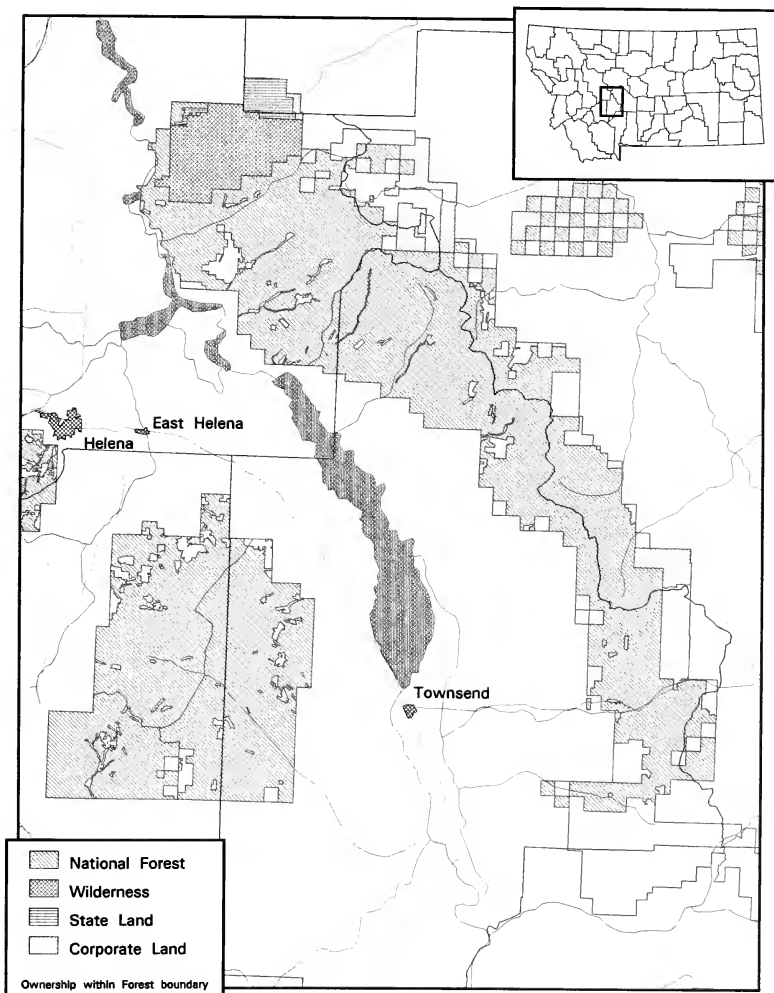
These mountain ranges are made up mainly of continuous blocks of land administered by Helena National Forest. The Big Belt Mountains lie entirely within Helena National Forest administrative boundaries, part of the Townsend and Helena Ranger Districts. The Elkhorn Mountains are mainly in the Helena National Forest, except for the southwestern corner lying in the Deerlodge National Forest. It is part of the Townsend Ranger District. For management purposes, the Big Belt and Elkhorn Mountains are considered separate ecosystem units.

These mountains are a geologic mix of sedimentary, metasedimentary, and igneous rocks, with elevations ranging from less than 4000 feet to almost 9500 feet. Climate is also quite variable with an average annual precipitation low of just over 11 inches in Townsend to a high of over 27 inches in the Tizer Basin in the Elkhorn Mountains (U.S. Forest Service 1992b) and a high of over 43 inches on Boulder Baldy in the Big Belt range (U.S. Forest Service 1992c). Temperature varies from winter and summer means of 18.1°F and 67.9°F in Helena, 24.8°F and 69.9°F at Holter Dam, 19.7°F and 66.8°F in Townsend, and 19.6°F and 65.4°F at Boulder State School (U.S. Department of Commerce 1982). Temperature data are not compiled for the mountain areas, but in general the mountainous areas are cooler although winter inversions may trap cold air in the valleys while the mountain temperatures remain more moderate. Due to the mix of parent materials and climatic variability, soils and plant communities are also diverse. Grasslands and shrublands at lower elevations blend into forests at middle and upper sites which give way to subalpine and alpine zones or bare ridges at the highest points. Wetlands are also important features, including numerous riparian areas, wet meadows, marshes, and bogs.



Figure 1.

# Helena National Forest Big Belt & Elkhorn Mountains Study Areas



Scale = 1:500,000



The Big Belt Mountains are a broad, elongate, northwest-southeast trending, uplifted arch of metasedimentary rocks, limestone and limited shale. They are bounded by the Missouri River Valley on the west, with a gravel-covered foreland sloping gently toward the river. Major streams in the Big Belt Mountains are Beaver and Deep Creeks on the west, and Atlanta and Big Camas Creeks on the east (adapted from Holdorf and Sirucek 1988).

The Elkhorn Mountains are composed of northward-trending alternating ridges and valleys. They are primarily underlain by metasedimentary and volcanic rocks of the Boulder Batholith that have been faulted and folded and cut by rhyolitic rocks. Broad intermontane valleys form the northern, eastern, and southwestern boundaries. The Elkhorn Mountains converge on the Boulder Mountains to the northwest. The division between these two ranges is arbitrarily placed along the valleys of Beavertown and Prickly Pear creeks. On the south the Elkhorn Mountains blend into unnamed hills north of the Jefferson River. Principal perennial streams in the Elkhorn Mountains area are Crow and Beaver creeks on the east, Warm Springs, Elkhorn, Muskrat, and Prickly Pear creeks on the west, and McClellan Creek on the north (adapted from Holdorf and Sirucek 1988). Large areas of the northeastern end burned in a 1988 wildfire.

The study area consisted of all Helena National Forest lands within the Big Belt and Elkhorn Mountains. The Dry Range to the east of the Big Belt Mountains was to have been included within the study area; however lack of reliable access to Forest Service tracts intermixed amongst private lands and an abrupt and sudden end to the field season has left the study of this area for a future project. Surveys were not conducted on private lands, Bureau of Land Management property, or other public holdings within the study area. Survey areas are listed and mapped in Appendix 1.

#### METHODS

A preliminary list of 48 state rare plant taxa known or suspected to occur in the Big Belt and Elkhorn Mountains was compiled in the first stage of setting species targets (Appendix 2). The Townsend Ranger District of the Helena National Forest developed a list of 27 Region 1 Forest Service Sensitive plants which might potentially occur on the district during the preparation of a biological evaluation of an allotment permit renewal. In addition, a search of the Montana Natural Heritage Program database revealed 21 plants of special concern which occur within the same watersheds and counties as the Big Belt and Elkhorn Mountains, and thus potentially might occur there.

Using the preliminary list, brief habitat profiles were compiled from readily available sources (USDA Forest Service 1992a; Lesica



and Shelly 1991a). These habitats were then identified as well as possible using information on soils, landforms, geology, topography, and color aerial photographs of Helena National Forest. Efforts were made to relocate historical collections to determine not only their current status and extent, but to add more information to the habitat profile. Fieldwork planning took place concurrently with fieldwork due to delayed arrival of the two new Montana Natural Heritage Program botanists.

Draft ecological landscape units developed by the Helena National Forest were examined for applicability. They were defined in part on forest type and structure, while many of the target species occupy non-forested habitat or narrow zones within a general habitat (see discussion, Appendix 4). Soil and landform subunits were tested more closely for applicability. Select subunits potentially harboring sensitive species were printed out at the same scale as USGS 7.5' topographic quads, the units transcribed onto the quads, and all units were visited on select quads. In general, the soil type and landform units either added no additional information to the search profile supplied by topographic maps and aerial photographs, or the species occupied multiple sets of environmental conditions. Soil types were most useful for finding areas of limestone, a broad indicator for rare plants in general within the project area.

The study area was divided and prioritized into three areas by the Forest Service (Figure 2) (Olsen, pers. commun. 1992). Highest study priority was assigned to an area of the Big Belt Mountains between Duck Creek Pass and Cayuse Mountain, and an area in the Elkhorn Mountains from Crow Peak north to High Peak and then southeast. The second priority level was the remainder of the Elkhorn Mountains and the area of the Big Belt Mountains to the south of the high priority area. The lowest priority area was in the Big Belt Mountains to the north of Cayuse Mountain and included the Gates of the Mountains Wilderness area and the Dry Range.

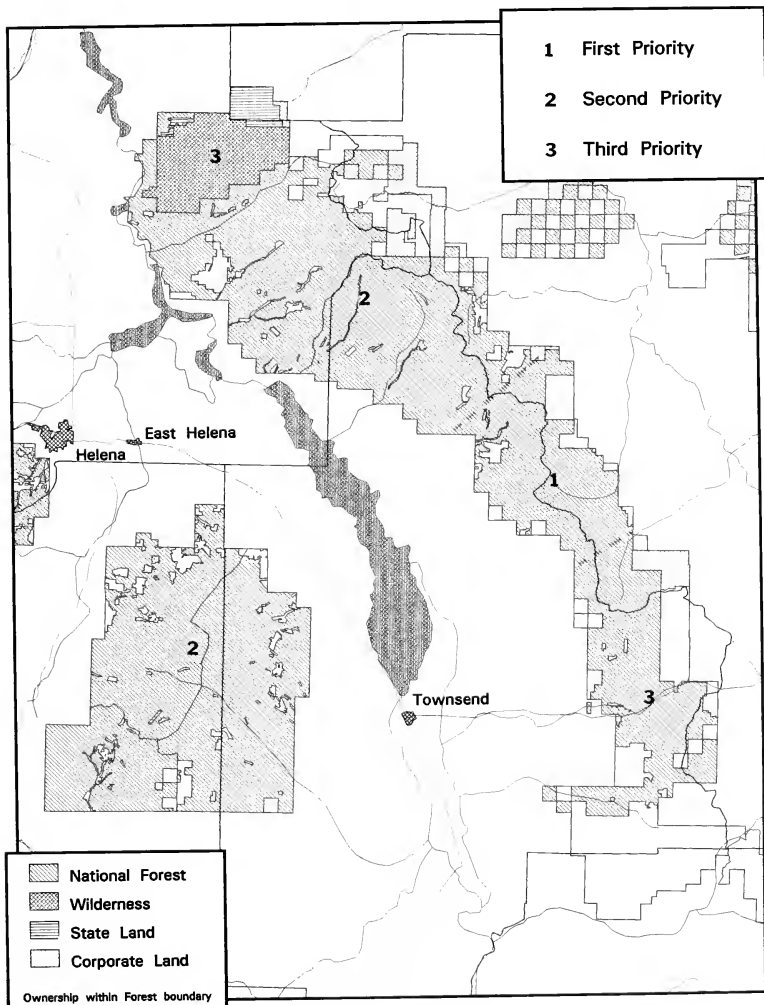
Effort was made to cover the most suitable habitats for known or suspected rare species during peak flowering or fruiting when the species was most conspicuous. Survey work in the early months of the field season focused on target species of grasslands and other low elevation forest settings, while later season work was directed more to species of wetlands and high elevation habitats. Surveys were conducted at the reconnaissance survey level outside of rare plant population sites by walking and driving through as much target habitat as possible. Effort was concentrated in the high priority study areas, but not all potential sites were surveyed. Appendix 1 lists place names of localities visited and the township, range, and section covered. Figure 3 provides a visual setting for these same sites.





Figure 2.

# Helena National Forest Big Belt & Elkhorn Mountains Study Area Priorities



Scale = 1:500,000



Montana Natural Heritage Program forms for plant species of special concern were completed for each site a rare plant was documented ("element occurrence record"), and boundaries mapped on USGS topographic maps. Information from the survey form is presented on the element occurrence printouts (Appendix 5). ECODATA plots were taken at single sites for three of the species (attached to printouts; Appendix 5).

Identifications were made using Vascular Plants of Montana (Dorn 1984) and Flora of the Pacific Northwest (Hitchcock and Cronquist 1973). More difficult determinations were made using comparison material in either the University of Montana or Montana State University herbaria. Additionally, knowledgeable botanists were also asked to identify some specimens. Voucher specimens are noted in the plant lists at the end of the report (Appendices 6 and 7) and deposited at the University of Montana, with duplicate materials at Montana State University.

Surveys were conducted 18-22 May, 17, 28 and 29 June, 12, 14-16, 27-30 July, and 1, 3-14, 17, 26-27 August 1992. There were drought conditions early in the season and it ended early with August snowfall.

In the following report, "rare plant" will be used to refer to vascular plant taxa that are on either the Region 1 - U.S. Forest Service lists of sensitive and watch species, or the Montana Natural Heritage state list of species of concern. The latter list is larger because it includes taxa which are not known or suspected to occur on lands administered by U.S. Forest Service.

This report should not be viewed as a definitive evaluation but as a preliminary study of rare plant distribution and floristic inventory of the Big Belt and Elkhorn Mountains. Potential habitats for sensitive species are to be addressed in the biological assessment process (Appendix 4) and documented sensitive species sites are to be addressed in biological evaluations (Appendix 5).

## RESULTS

### OVERVIEW OF PLANTS OF SPECIAL CONCERN WITHIN THE BIG BELT AND ELKHORN MOUNTAINS STUDY AREA

Ten plant species of state concern have been documented from the Big Belt and Elkhorn Mountains to date, including 17 new records for six of the species as a result of this project. Results are summarized in Table 1 on the following page. All ten of the species occur in the Big Belt Mountains, and the first nine of the ten are known or presumed to be located on land administered by the U.S. Forest Service. Only one of the ten species, Cirsium longistylum, is also in the Elkhorn Mountains. A composite map



of all species records in the Big Belt and Elkhorn Mountains is presented in Figure 3.

Table 1. Montana plant species of special concern documented in Helena National Forest - Big Belt and Elkhorn Mountains

SPECIES	TOTAL # OF RECORDS	USFS STATUS	
		CURRENT	RECOMMENDED
<i>Arenaria kingii</i>	1?	Watch	See discuss'n
<i>Astragalus convallarius</i> var. <i>convallarius</i>	1	-	Sensitive
<i>Carex vallicola</i>	1	-	Sensitive
<i>Cirsium longistylum</i>	10	-	See discuss'n
<i>Claytonia lanceolata</i> var. <i>flava</i>	1	Sensitive	Drop for all NF
<i>Delphinium andersonii</i>	1	Watch	Sensitive
<i>Juncus hallii</i>	2	Sensitive	Sensitive
<i>Lesquerella klausii</i>	21	-	See discuss'n
<i>Polygonum douglasii</i> ssp. <i>austinae</i>	5	Sensitive	See discuss'n
<i>Potentilla diversifolia</i> var. <i>multisecta</i>	(1)	-	Watch

The raw data on all ten species is presented in Appendix 5. An expanded body of information has been compiled and assembled on the six documented species for use in the Helena National Forest sensitive species program (this section).

Four species known from the Big Belt Mountains were not relocated. Two of these species, *Carex vallicola* and *Potentilla diversifolia* var. *multisecta* should continue to be sought (see Appendix 5 for element occurrence records and maps with general locations for these species). The third species, *Claytonia lanceolata* var. *flava*, is recommended dropped from the regional U.S. Forest Service list based on its statewide numbers. The fourth species, *Arenaria kingii*, is known from a single specimen in the Big Belt Mountains which is possibly misidentified and warrants re-annotation. The reasons for questioning the identification of the specimen include the sepal shape (very



shortly acute vs. sharply acute or acuminate) and sepal nervature (absent vs. broadly 1-nerved). In addition, the habitat description, "Douglas Fir climax", is in marked contrast to its dry Agropyron spicatum habitat as it is found elsewhere in Montana. This specimen is the only Montana collection for this species outside of Beaverhead County. The task of seeking an annotation will be pursued by the Montana Natural Heritage Program with the help of the Montana State University Herbarium.

A refined target list of rare plants on the Helena National Forest was also developed as a result of 1992 fieldwork (Appendix 4). Initially a preliminary list of 48 plants of special concern within the study area (Appendix 2) was compiled from a Forest Service Biological Evaluation (U.S. Forest Service 1992a) and information from the Montana Natural Heritage Program database. After examination of habitats within the study area and discussion with knowledgeable individuals, several species were deleted from the list of possibilities because the probability of finding suitable habitat was low (Appendix 3). The remaining 26 species (Appendix 4) form a more realistic list of plants of special concern which do occur in the Big Belt and Elkhorn Mountains or which have a high probability of occurring there. Appendix 4 also contains the status of these species on a global, state, and forest level as well as a habitat profile for each species and a confidence level for both the habitat profile and the probability of those species being present. For the suspected species, the ones of highest concern and which should receive the highest priority for survey, are noted.

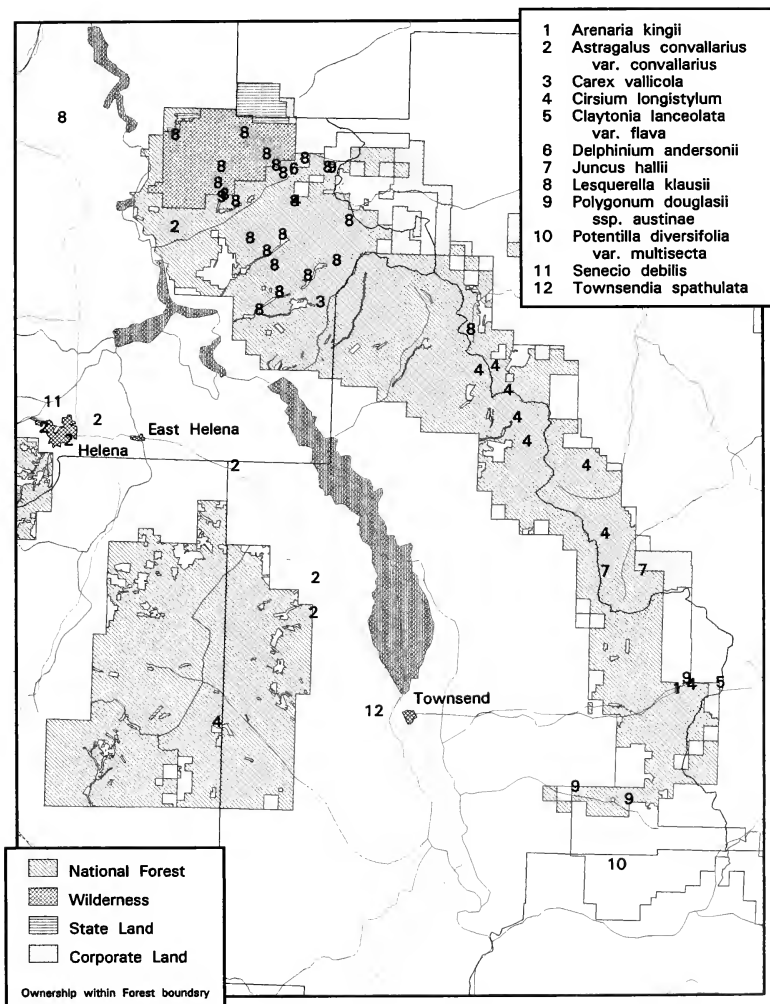
A secondary product of the sensitive species survey fieldwork is the compilation of floras for the Big Belt Mountains with 694 species (Appendix 6) and the Elkhorn Mountains with 382 species (Appendix 7).





Figure 3.

# Helena National Forest Big Belt & Elkhorn Mountains Sensitive Plant Sites



Scale = 1:500,000



VERIFIED OCCURRENCES OF PLANTS OF SPECIAL CONCERN  
INCLUDING HABITAT PROFILES AND SPECIES STATUS

For each of the six species discovered or relocated in the study area, a modified status report format (Henifin et al. 1981) is prepared. The text for each species is preceded by a photo or illustration. Site-specific information for each species is presented in Appendix 5, including element occurrence records and locations on 7.5' topographic maps. Site-specific information on the four unrelocated species is also included in Appendix 5.



SPECIES OF SPECIAL CONCERN

Astragalus convallarius var. convallarius



Figure 4. Astragalus convallarius var. convallarius close up  
#002 - located above Helena - of 20 June 1992  
Note linear reduced leaves, pendent pod, whitish  
flower color, broad banner and loose raceme



## SPECIES OF SPECIAL CONCERN

### Astragalus convallarius var. convallarius

#### I. SPECIES INFORMATION

##### A. CLASSIFICATION

1. **SCIENTIFIC NAME:** Astragalus convallarius Greene var. convallarius
2. **COMMON NAME:** lesser rushy milkvetch, timber milkvetch
3. **FAMILY:** Fabaceae (=Leguminosae; Pea Family)
4. **GENUS:** Astragalus is an extremely large genus with a broad range of geographical and ecological distribution (Hitchcock and Cronquist 1961). Rupert Barneby, the latest monographer of the genus, recognizes 368 species and 184 varieties in North America (Barneby 1964). There are also over 1500 additional species in South America and the Old World (Hitchcock and Cronquist 1961).
5. **SPECIES:** Astragalus convallarius can be recognized by a combination of characters: several sparsely linear-leaved or leafless (particularly at the base), ascending to erect, elongate stems arising from a buried root crown; small, loosely racemose flowers with petals not much different in length and all very strongly incurved; and linear, compressed pods. Within the northwest U.S., only A. diversifolius resembles A. convallarius. Barneby (1964) states that "...A. diversifolius is difficult to distinguish from A. convallarius by any one consistently effective differential character, and modern botanical opinion has been divided about its status." As an example Dorn (1984) does not recognize A. convallarius as distinct from A. diversifolius. Although Barneby (1964) does feel that the two species are somewhat hard to tell apart, he also states that "...nevertheless, the distinctive morphological features of A. diversifolius, seen in relation to a physiological adaptation of a mesophytic habitat, are amply diagnostic." Additionally A. diversifolius does not occur in Montana, but only in southeastern Idaho, northwestern Utah, and historically in southern Wyoming (Barneby 1964).





Barneby (1964) recognizes three varieties of Astragalus convallarius. Variety convallarius occurs in Montana in the upper Missouri River valley near Helena, and south of Lima near the state line, very close to populations in adjacent Idaho. This variety ranges from southeastern Idaho and southwest Wyoming to northeastern Nevada, Utah, and northwestern Colorado (Barneby 1964). The other two varieties, finitimus and scopulorum, are found in extreme southwest Utah and adjacent Nevada, and on the west slope of the Colorado Rocky Mountains, respectively (Barneby 1964).

## B. PRESENT LEGAL OR OTHER FORMAL STATUS

### 1. FEDERAL STATUS

a. U.S. FISH AND WILDLIFE SERVICE: None.

b. U.S. FOREST SERVICE: None.

2. STATE: Astragalus convallarius is ranked by the Montana Natural Heritage Program as G5S2 (Achuff 1991). This means that the species is secure globally but imperiled within the state. In Lesica and Shelly (1991a), the species is listed as Sensitive (known from a limited number of populations in Montana). None of the above state rank or status provide any legal protection for A. convallarius.

## C. DESCRIPTION

1. GENERAL NONTECHNICAL DESCRIPTION: Lesser rushy milkvetch is an almost leafless and rushlike taprooted perennial which blends in with surrounding grass cover (Figure 4). The stems and leaves are covered with whitish to grayish or greenish-grayish hairs. Sometimes the leaflets are hairless on the upper surface. Stems are usually few, commonly 4-6, erect or ascending, 5-20 in. long, and with fine lines or ridges. The first  $\frac{1}{4}$ - $2\frac{1}{4}$  in. of the stems are underground; after that the stems branch with the branches sometimes again branching. The branches zigzag at the tips. The small leaf-like structures at the base of the leaves are of two sorts. The lower ones are papery, pale or purplish-brown, up to  $\frac{1}{4}$  in. long, appressed to the stem, and have their edges united. The upper ones are smaller, leaf-like in texture, and more or less triangular. They press



lightly against the stem, and the leaf edges barely join at the base. The leaves are  $\frac{3}{4}$ -4 $\frac{1}{2}$  in. long, with 1-5 pairs of leaflets, although these are often greatly reduced, lacking, or lying along the leaf stalk. The leaflets are linear, rolled or rarely flattened, up to  $\frac{1}{8}$  in. wide, and  $<\frac{1}{8}$ -1 in. long. The flowering stalk is erect or spreading, and 1-5 $\frac{1}{2}$  in. long, lengthening to 7 in. in fruit. The 1-25 flowers are scattered along the stalk. Individual flower stalks are slender, arched outward, up to  $\frac{1}{8}$  in. long in flower, and up to  $\frac{1}{4}$  in. in fruit. The calyx is  $\frac{1}{8}$ - $\frac{1}{4}$  in. long, and covered with black or white hairs. It has more or less triangular teeth less than  $\frac{1}{8}$  in. long, and becomes papery in fruit. The petals are yellowish-white, or tinged with dull purple, and even sometimes bright rose-purple. The petals are usually not much different in length, and are about  $\frac{1}{4}$ - $\frac{1}{2}$  in. long. The pod hangs down, and is directly attached to the stem or sometimes appears to be on a very short stalk. The pod is linear in shape, flattened,  $\frac{1}{2}$ -2 in. long, and about  $\frac{1}{8}$  in. in diameter. The pod splits into two halves from the top down, and the two halves coil outward. The seeds are brown or olive-green, sometimes with purple speckles. The seeds are smooth and shiny, or rough and either dull or shiny. They are about  $\frac{1}{8}$  in. long (adapted from Barneby 1964 and Hitchcock and Cronquist 1961).

2. **TECHNICAL DESCRIPTION:** Slender, wiry, minutely strigulose, sparsely leafy or almost leafless and rushlike perennial, with a taproot and subterranean root-crown, the stems and herbage with a whitish to grayish or greenish-grayish pubescence, the leaflets sometimes glabrous above; stems usually few, (1-)4-6(-37), usually erect or ascending, (1-)2-5(-7) dm long, subterranean for about 1-7 cm, thereafter bearing branches or spurs, the branches sometimes again branched, the whole becoming flexuous or zigzag distally, striate throughout; stipules  $\pm$  dimorphic, those below papery-scarious, pallid or purplish-brown, often several-nerved, (1-)2-7 mm long, amplexicaul and connate, those above nearly always smaller, herbaceous, ovate, triangular, or deltoid, commonly only semiamplexicaul, rarely briefly united at base; leaves 2-11 cm long, the leaflets present, greatly reduced, wanting, or decurrent on the rachis, when present 1-5 pairs, linear, linear-filiform, or elliptic, commonly involute or rarely expanded and up to 3 mm wide, 2-25(-33) mm



long; peduncles erect, incurved-ascending, or divaricate, (1-)3-14 cm long; racemes very loosely (1-)3-25-flowered, the axis (0.5-)2-18(-23) cm long in fruit; bracts thinly herbaceous becoming papery, ovate or lanceolate, 0.5-2.3 mm long, greenish, pallid, or purple-tinged; pedicels slender or subfiliform, at anthesis ascending at a wide angle or arched outward, 1-3.5 mm long, in fruit straight and ascending or divaricate, geniculate at base and refracted, or tortuous, 2.2-5 mm long, tardily disjoining with the fruit; bracteoles 0; calyx 4.2-6 mm long, strigulose with black or white hairs, the campanulate tube 3.4-4.8 mm long, (2.2-)2.5-3 mm in diameter, rounded or obliquely turbinate at base, the broadly subulate, triangular, or deltoid, mostly obtuse teeth 0.5-1.4 mm long, the whole becoming papery, persistent and unruptured; petals yellowish-white, or tinged with dull purple, sometimes bright rose-purple, all strongly incurved, usually not strongly graduated; banner 8-11 mm long, the shortly cuneate claw abruptly expanded into a more or less ovate to suborbicular shallowly notched or entire blade 5-8.2 mm wide; wings 8.5-10.5 mm long, the claws (3-)3.5-5.6 mm, the lunately more or less oblong to obliquely obovate, obtuse, often erose, or sometimes subemarginate blades 3.5-7 mm long, (1.6-)2-3 mm wide; keel 8.1-9.4 mm long, the claws (3-)3.2-5.4 mm, the lunately triangular, or lunately half-circular blades 4.8-6.1 mm long, 2.3-3 mm wide; pod essentially pendulous, sessile but sometimes appearing very shortly and obscurely stipitate, the body more or less linear, straight or nearly so, 1.3-5 cm long, 2.3-4 mm in diameter, laterally compressed; dehiscence apical and downward through both sutures, the valves ultimately separating to the base and coiling outward, ovules 13-20; seeds brown or olivaceous, sometimes purple-speckled, smooth and lustrous, or ± pitted or rugulose and then either dull or shining, 2.5-4.3 mm long (adapted from Barneby 1964 and Hitchcock and Cronquist 1961).

3. **LOCAL FIELD CHARACTERS:** Astragalus convallarius can be recognized by a combination of characters: several sparsely linear-leaflets or leafless (particularly at the base), ascending to erect, elongate stems arising from a buried root crown; small, loosely racemose flowers with petals not much different in length and all very strongly incurved; and linear, compressed pods (Figure 4). Astragalus convallarius can be difficult to



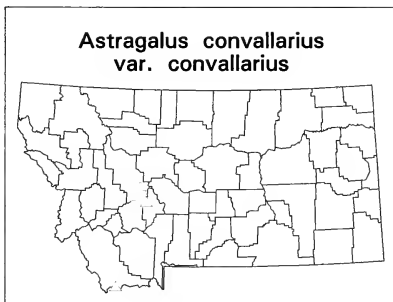
distinguish from A. diversifolius, and according to Dorn (1984), these two species are one (A. diversifolius). However, Barneby, the monographer of the North American species of Astragalus (1964), recognizes them as two species. According to Barneby (1964), in general A. diversifolius has broader and thinner-textured leaflets, and a broader and shorter pod. Also A. diversifolius occurs in more mesophytic habitats, and does not occur in Montana (Barneby 1964) though it is found in Idaho close to the Montana border.

At the Helena National Forest site, Astragalus convallarius var. convallarius was found with another Astragalus species, A. flexuosus. This species differs from convallarius in not appearing rush- or broom-like as it has numerous (15-21), well-developed leaflets.

Although there are three varieties of Astragalus convallarius, only the var. convallarius is found in Montana.

#### D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Astragalus convallarius var. convallarius is a Great Basin species which ranges from southeastern Idaho east into southwestern Wyoming and then south to northeastern Nevada, most of Utah, and northwestern Colorado (Barneby 1964). There are two population clusters in Montana: one in the upper Missouri River valley near Helena (Broadwater and Lewis & Clark Counties) at the northern extent of species distribution, and the other south of Dillon close to the Idaho border in Beaverhead County (Figure 5).



2. **CURRENT SITES:** Of the seven known populations in Montana, only one is from the Helena National Forest. This site (EOR# 007) between Beaver Creek and Big Log Gulch in the Helena Ranger District was discovered during the course of the field





surveys for this report. Most sites are on private land. Population information, including size, elevation, location, and associated species can be found in the Element Occurrence Record in Appendix 5.

3. UNVERIFIED/UNDOCUMENTED REPORTS: None.

E. HABITAT

1. ASSOCIATED VEGETATION: Astragalus convallarius var. convallarius is found in sagebrush and grassland communities. In Montana it occurs in fescue bunchgrass grasslands, such as Festuca scabrella-Agropyron spicatum, and Festuca idahoensis-Agropyron spicatum. The species is also found in the Stipa comata-Bouteloua gracilis plant association. On the Helena National Forest A. convallarius var. convallarius occurs in a Festuca scabrella-Agropyron spicatum plant association with Stipa viridula, Poa scabrella, and Astragalus flexuosus.
2. TOPOGRAPHY: Rangewide Astragalus convallarius var. convallarius grows on hillsides, bluffs, benches, and valley floors at elevations between 4150-9000 feet (Barneby 1964). In Montana the plant has been found on slopes and rolling uplands with north or southeast aspects. Elevations at these sites vary from 3880-4640 feet in the Helena area to 8100 feet at the site near the Idaho border.
3. SOIL RELATIONSHIPS: Astragalus convallarius var. convallarius grows in dry sandy, loamy, or clay soils of various origin and composition, apparently without preference as to rock formation, but is found most frequently on sedimentary formations (Barneby 1964). In Montana the species has been found on loamy or silty soils. The Helena National Forest site was discovered on silty soil derived from limestone and calcareous sandstone.
4. REGIONAL CLIMATE: The climate of west-central Montana can generally be classified as cool, dry, and continental, with locally greater amounts of precipitation in the mountains. The Astragalus convallarius var. convallarius site on the Helena National Forest is closest to the Holter Dam weather station although the site is about 15 miles southeast of the station and is slightly higher in elevation (3960 feet as compared to 3487



feet at Holter Dam). For the period of 1951-1980, the mean annual precipitation at Holter Dam was 12.02 inches, the mean January temperature was 24.8°F, and the mean July temperature was 69.9°F (U.S. Department of Commerce 1982.)

#### F. POPULATION DEMOGRAPHY, BIOLOGY AND SPECIATION

1. PHENOLOGY: Astragalus convallarius var. convallarius flowers in May and June, continuing through to August under favorable conditions.
2. POPULATION SIZE AND CONDITION: Astragalus convallarius var. convallarius is reported as being "common and locally abundant" in its range outside Montana (Barneby 1964). In Montana species frequency is recorded as "abundant" or "locally common" in its Beaverhead County sites and at least one of its Broadwater County sites. Small, widely-scatter populations or sub-populations are documented below the Helena National Forest Service boundary in the Elkhorn Mountains, as well as above Helena. The Helena National Forest population is described as having less than 10 individuals; however, the population may be larger as the plant is difficult to see, the weather was dry, and the search time was short.
3. REPRODUCTIVE BIOLOGY
  - a. TYPE OF REPRODUCTION: Assumed to be sexual.
  - b. POLLINATION BIOLOGY: Assumed to be insect-pollinated.
  - c. SEED DISPERSAL AND BIOLOGY: Although the pod of Astragalus convallarius var. convallarius probably splits rapidly from tip to base, the force of the release is seldom so violent as to eject the seeds any great distance (Barneby 1964). Nothing else is known concerning the seed dispersal or seed biology of this taxon.
  - d. PHYLOGENY AND SPECIATION: Although Barneby discusses the phylogeny of Astragalus at some length (see Barneby 1964, pp. 20-31), he does not provide a comprehensive phylogenetic system. Also A. convallarius var. convallarius is not specifically mentioned in the text.



## G. POPULATION ECOLOGY

### 1. BIOLOGICAL INTERACTIONS

- a. **COMPETITION:** In Montana Astragalus convallarius var. convallarius occurs in various types of bunchgrass grasslands. Although most Astragalus species are intolerant of direct competition with other herbs, and even more will not grow under the shade cast by overhanging shrubs or trees (Barneby 1964), A. convallarius var. convallarius may find openings between the grasses to colonize. Competition by noxious species is a threat in much of its potential habitat. Around the South Hills of Helena, large areas of potential habitat for this species have been invaded by Linaria dalmatica, rendering it unsuitable. Its habitat is also potentially invaded by Centaurea maculosa. The Helena National Forest site was in an area which had burned recently, and had 90% vegetative cover.
- b. **HERBIVORY:** Several species of Astragalus are known to be poisonous to livestock. The toxicity of A. convallarius var. convallarius is unknown. There are no reports of herbivory.

## II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. **THREATS TO CURRENTLY KNOWN POPULATIONS:** No known threats are currently known for the Helena National Forest population. However possible potential threats could include overgrazing and mining. Although Astragalus convallarius var. convallarius might not be a preferred food plant, extremely heavy grazing might lead to a decline in the population. Mining in the immediate area of the site would severely impact the population.
- B. **MANAGEMENT PRACTICES AND RESPONSE:** Not known.
- C. **RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS:** Although Astragalus convallarius var. convallarius on the Helena National Forest appears at present to be self-maintaining, any change in management practices in this area should be carefully evaluated to avoid or minimize any harmful effects to A. convallarius var. convallarius.



- D. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** As Astragalus convallarius var. convallarius was found for the first time on the Helena National Forest this year and represents only the seventh record for Montana, further searches for this interesting taxon on the Helena National Forest should be conducted. Also the known population should be revisited for a longer survey period and in more favorable climatic conditions, to assess the true extent of the population.
- E. **SUMMARY:** The populations of Astragalus convallarius var. convallarius in the Helena area are isolated from the rest of the variety's range at the northern end of its range. Variety convallarius is the only variety of this species found in Montana. There are no known current threats, but it occupies habitat elsewhere in the county that has been subject to mining and noxious weed invasions. The population on the Helena National Forest was first discovered during the course of this study. Additional survey work should be conducted at the low elevations around the Big Belt Mts. to elucidate the full extent of this population as well as survey for additional locations.





SPECIES OF CONCERN

Cirsium longistylum



Figure 6. Cirsium longistylum close up  
#023 of 15 July 1992  
Note dilated outer floral bracts with lacerate  
margins, cobwebby leaf hairs, long white corollas



SPECIES OF SPECIAL CONCERN

Cirsium longistylum



Figure 7. Cirsium longistylum habitat  
#023 of 15 July 1992  
Note mesic meadow setting and proximity to wet meadow



## SPECIES OF SPECIAL CONCERN

### Cirsium longistylum

#### I. SPECIES INFORMATION

##### A. CLASSIFICATION

1. **SCIENTIFIC NAME:** Cirsium longistylum Moore & Frankton
2. **COMMON NAME:** long-styled thistle
3. **FAMILY:** Asteraceae (=Compositae; Sunflower Family)
4. **GENUS:** Cirsium is native to the northern hemisphere, with possibly up to 200 species, 50 of which occur in North America (Cronquist 1955). Thirteen species are found in Montana, two of which are introduced (Dorn 1984).
5. **SPECIES:** Cirsium longistylum is part of a group described by Cronquist (1955) as being "poorly understood" and "badly in need of a competent revision." Hybridization is known to occur in the genus, often between seemingly unrelated species (Cronquist 1955). Due to variation within some populations of leaf and involucre characters, the question of hybridization between C. longistylum and possibly C. hookerianum arose (see Schassberger 1991, p. 26). Specimens were collected in 1991 and sent to the late Dr. Arthur Cronquist of the New York Botanical Garden. After examining the specimens, Cronquist felt that "C. longistylum was a 'good species', of limited distribution in Montana", and that "it probably hybridizes with C. hookerianum and possibly C. scariosum" (Roe 1992). Further studies, in particular isozyme and electrophoretic research, need to be done to clarify this problem.

Cirsium longistylum is distinguished from other Montana species by its dilated, lacerate-fringed tips on the outer involucre bracts, although this character is somewhat variable. However this character separates it from C. hookerianum (with long-tapering, arachnoid-villose involucre bracts) and C. scariosum (with occasional inner involucre bracts dilated and fringed at the tip). Keys to all the Montana species are available in



Dorn (1984) and to all the species in the Pacific Northwest in Hitchcock and Cronquist (1973).

**B. PRESENT LEGAL OR OTHER FORMAL STATUS**

**1. FEDERAL STATUS**

- a. **U.S. FISH AND WILDLIFE SERVICE:** This species is currently placed in Category 2 by the U.S. Fish and Wildlife Service (U.S. Department of Interior 1990). Category 2 refers to those taxa for which listing as threatened or endangered is possibly appropriate, but for which additional information is needed to make the decision.
- b. **U.S. FOREST SERVICE:** Cirsium longistylum was listed as Watch by the Forest Service, Region 1 (U.S. Department of Agriculture 1988) because it is common in areas of Lewis & Clark National Forest. However in 1991 this species was dropped from consideration due to a decision to redefine the "Watch category" and drop all Watch species which actually occurred on Forest Service lands (Lesica and Shelly 1991b). This decision is in apparent contradiction with its Category 2 status, signifying Endangered Species Act support but not mandate for considering it under Section 7 consultations.

It is recommended that genetic work supported by both federal agencies be conducted to resolve questions about hybridization and degree of introgression under both natural and unnatural disturbance regimes before it be dropped from consideration or proposed for listing.

2. **STATE:** The state of Montana does not afford legal status to plants. The Montana Natural Heritage Program (Achuff 1991) ranks the species as S3 ("either very rare and local throughout its range, or found locally, even abundantly at some of its locations, in a restricted range, or vulnerable to extinction throughout its range because of other factors, 21-100 occurrences"). Cirsium longistylum is listed as Sensitive in the state of Montana by Lesica and Shelly (1991a). Neither the above rank or status provide any legal protection in the state of Montana.





## C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Cirsium longistylum is a perennial herb from thick, woody underground stems (Figure 6). The stems are 20-24 inches tall, ribbed, and lightly covered with long, cobwebby hairs. The basal rosette leaves are somewhat spiny, shallowly lobed, green, hairless above and densely white hairy below. The stem leaves are gray-green with long white cobwebby hairs, narrowly spear-shaped, about 10 times as long as wide (up to 6 in. long and  $\frac{1}{2}$  in. wide), and with lobes up to  $\frac{1}{3}$  the width. The smaller upper leaves are only shallowly lobed with numerous fine marginal spines to  $\frac{1}{4}$  in. long. The flower heads are about  $1\frac{1}{2}$  in. high and 1 in. wide, and usually in a tight cluster at the top  $\frac{1}{3}$  of the plant. In young plants, the upper part of the stem may be unexpanded and the flowers clustered at the top of the stem. The flower heads have a few small leaves beneath, and the uppermost resemble the involucre bracts in shape. The involucre is  $\frac{3}{4}$  in. high. The outer bracts are narrowly spear-shaped, less than  $\frac{1}{2}$  in. wide at the base, and have a few glands or a dark blotch. The tip is slightly wider with a yellowish ragged margin and has a slender spine less than  $\frac{1}{2}$  in. long. The middle and inner involucre bracts are progressively narrower and less ragged at the tip. The flowering head is white. The individual flowers are  $\frac{1}{2}$  in. long with a basal ring of 30-40 tawny hairs  $\frac{1}{4}$  in. long. The anthers are slightly longer than  $\frac{1}{2}$  in. The style extends to  $\frac{1}{2}$  in. beyond the flower tube. The seeds are  $\frac{1}{4}$  in. long and less than  $\frac{1}{2}$  in. wide, light brown and sometimes flecked with purple (Schassberger 1991).
2. **TECHNICAL DESCRIPTION:** Plant perennial by biennial offsets from stout, woody rhizomes; stems ribbed, 50-60 cm tall, to 1.5 cm thick at base, lightly arachnoid pubescent with long multicellular hairs; rosette leaves moderately spiny, margins with broad, shallow divisions, green and glabrous above, densely white pubescent beneath; cauline leaves gray-green, arachnoid pubescent, with multicellular hairs above, white villous (long thin hairs with single long terminal cell and 1-several short basal cells) below, linear-lanceolate, base not decurrent, about 10 times as long as wide, to 15 cm long, 1.5 cm wide, lobed less than or equal to  $\frac{1}{3}$  the width, smaller upper leaves essentially entire, lobes ovate, often



irregular with numerous fine marginal spines to 5 mm long; heads 3 cm high, 2.5 cm wide, arrangement variable, usually in a close terminal cluster but also 1-2 on stem apex and lateral branches, many floriferous branches to 15 cm long, on terminal third of main stem; floriferous part of stem may be unexpanded in young plants with less than or equal to 5 heads grouped at the stem apex; heads subtended by a few reduced leaves, the uppermost about the size of the involucre bracts and approaching them in form, with gray multicellular hairs at right angles to the margin; involucre 2 cm high with 5-6 rows of bracts, outer bracts linear-lanceolate, base 1.5-2 mm wide, weakly glandular or with a dark blotch, surface glabrous, apical portion slightly dilated with a yellow lacerate fringe, tipped by a slender 2 mm spine; middle bracts similar but progressively less dilated-lacerate; inner bracts longer, lanceolate, tip not or only slightly lacerate, the lacerate margin varies from a conspicuous yellow fringe to minute irregular serrations and is best seen on young heads but never consists of fine lateral spines; flowers white, corolla 20-22 mm long, tube 7-9 mm, lobes 3.5-5.5 mm, pappus 18-19 mm, tawny, of 30-40 setae, longer setae clavellate; anthers, including appendages, 7.5-8.5 mm long, free tips usually incurved; style long-exserted to 1 cm beyond the corolla, tip to joint of style 3.5-5 mm; achenes 5.5-6.5 mm long, 2 mm wide, light brown sometimes with purplish flecks (Schassberger 1991).

3. **LOCAL FIELD CHARACTERS:** Cirsium longistylum is distinguished from other species in the field by its dilated, lacerate-fringed tips on the outer involucre bracts, although this character is somewhat variable. However this character separates it from C. hookerianum (with long-tapering, arachnoid-villose involucre bracts) and C. scariosum (with occasional inner involucre bracts dilated and fringed at the tip).

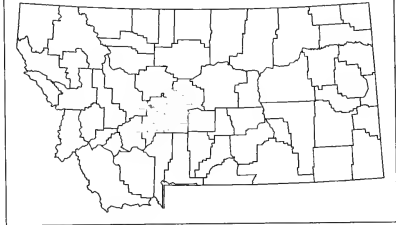
#### D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Cirsium longistylum is known from 31 locations in seven counties (Broadwater, Cascade, Jefferson, Judith Basin, Lewis & Clark, Meagher, and Wheatland) in central Montana in the Little Belt, Big Belt, Castle, and Elkhorn Mountains. It is endemic to Montana. Three of the new records on the Helena Nation



## Cirsium longistylum

Forest represent new county records (Figure 8). Prior to 1992, its rangewide distribution was considered to be limited to the Little Belt and Castle Mountains on the Lewis & Clark National Forest.



2. **CURRENT SITES:** Ten of the 31 sites mentioned above occur in the Helena National Forest, with nine in the Big Belt Mountains and one in the Elkhorn Mountains. Only one of these occurrences (Duck Creek Pass road, EOR# 006) was known previously to this study. More detailed information for each site including population features and the location on a USGS 7.5' topographic map can be found in Appendix 5.
3. **UNVERIFIED/UNDOCUMENTED REPORTS:** None known.

### E. HABITAT

1. **ASSOCIATED VEGETATION:** Cirsium longistylum occurs in open meadows which are dominated by grasses and forbs (Figure 7), but which sometimes include Potentilla fruticosa, indicating moderately mesic conditions (Schassberger 1991). Cirsium longistylum is found in both relatively pristine and somewhat disturbed sites (i.e., roadsides, trails, clearcuts, etc.) In the more natural sites in the study area, C. longistylum is found in the Festuca scabrella-Festuca idahoensis plant association and Deschampsia cespitosa-Danthonia parryi habitat type. Other associates in natural settings include:

Achillea millefolium  
Agropyron caninum  
Agropyron spicatum  
Agrostis scabra  
Anemone sp.  
Antennaria microphylla  
Arabis drummondii  
Aster foliaceus  
Astragalus agrestis  
Bromus carinatus



Bromus ciliatus  
Bromus inermis  
Campanula rotundifolia  
Carex hoodii  
Carex petasata  
Cerastium arvense  
Cirsium hookerianum  
Cirsium vulgare  
Clematis hirsutissima  
Conimitella williamsii  
Cynoglossum officinale  
Danthonia intermedia  
Equisetum arvense  
Elymus glaucus  
Erigeron speciosus  
Erysimum repandum  
Festuca idahoensis  
Fragaria virginiana  
Gaillardia aristata  
Galium boreale  
Gentianella amarella  
Geranium viscosissimum  
Geum triflorum  
Heracleum lanatum  
Iris missouriensis  
Juniperus communis  
Lupinus sericeus  
Mertensia oblongifolia  
Monarda fistulosa  
Oxytropis campestris  
Oxytropis sericea  
Perideridia gairdneri  
Pinus contorta  
Potentilla gracilis  
Potentilla ovina  
Pseudotsuga menziesii  
Rosa woodsii  
Senecio sp.  
Silene douglasii  
Smilacina stellata  
Solidago missouriensis  
Stipa occidentalis  
Stipa richardsonii  
Symphoricarpos albus  
Taraxacum officinale  
Thalictrum sp.  
Thlaspi arvense  
Trapogon dubius  
Trisetum spicatum  
Valeriana edulis





The disturbed sites in the study area which support C. longistylum are vegetated primarily by non-native, invasive species including:

Carduus nutans  
Phleum pratense  
Poa pratensis

2. **TOPOGRAPHY:** Cirsium longistylum occurs primarily in level to gently sloping meadows. Occasionally, particularly in disturbed site populations, the species will be on moderately steep, but vegetated slopes. The species is known from an elevation range of 4680-8000 feet. The Elkhorn Mountain site is at 6920 feet on a very gentle, east-facing slope. Cirsium longistylum sites in the Big Belt Mountains vary in elevation from 5220-7800 feet, and grow on all aspects on level to moderately steep sites in both ridgetop and valley bottom settings, often in positions along run-off zones or above palustrine / riparian habitat.
3. **SOIL RELATIONSHIPS:** Cirsium longistylum is usually found on loamy or silty soils which are at least seasonally moist. Often these soils are gravelly, particularly in disturbed (i.e., roadside) populations. It often occurs in settings with extensive burrowing activity, providing a natural disturbance habitat for establishment.
4. **REGIONAL CLIMATE:** Central Montana has hot, dry summers and cold, snowy winters. The precipitation is greatest normally in May and June, and comes in the form of wet snow and rain (U.S. Department of Commerce 1982). Precipitation is generally heavier in the mountains. The average annual precipitation data from mountain sites in the Elkhorns (Tizer Basin) and the Big Belts (Boulder Baldy) are much higher (27.6 inches and 43.2 inches, respectively) (U.S. Forest Service 1992b and 1992c) than lower elevation sites such as Townsend (3833 feet elevation, 11.11 inches), Helena (3784 feet, 11.37 inches), Boulder State School (4904 feet, 11.12 inches), and Holter Dam (3487 feet, 12.02 inches) (U.S. Department of Commerce 1982). Temperature varies from winter and summer means of 18.1°F and 67.9°F in Helena, 24.8°F and 69.9°F at Holter Dam, 19.7°F and 66.8°F in Townsend, and 19.6°F and 65.4°F at Boulder State School (U.S. Department of Commerce 1982). Temperature is not measured at the mountain sites.



## F. POPULATION DEMOGRAPHY, BIOLOGY AND SPECIATION

1. **PHENOLOGY:** Flowering begins near the end of June, peaks in July and extends into August. Flowering sequence occurs basipetally in C. longistylum, with the lowermost flowering heads developing last. Seeds mature in August and September, and would appear to be primarily wind dispersed. Seeds have been germinated successfully without cold stratification or scarification, and therefore may germinate in the fall. (Adapted from Schassberger 1991).
2. **POPULATION SIZE AND CONDITION:** Most populations of Cirsium longistylum are quite large (hundreds to tens of thousands of individuals). However these populations are often a mix of C. longistylum, C. hookerianum, and various morphologically intermediate combinations so the exact number of individuals of C. longistylum is not known.

The population in the Elkhorn Mountains was a mix of both species with only one plant among approximately one hundred being identifiable as Cirsium longistylum.

The populations in the Big Belt Mountains varied in size from 7 to upwards of 5000 individuals (see Appendix 5). Although not noted at every site, hybridization with Cirsium hookerianum was probably occurring. The presence of weevils was noted at two sites (EOR#s 022 and 023).

### 3. REPRODUCTIVE BIOLOGY

- a. **TYPE OF REPRODUCTION:** Cirsium longistylum is said to reproduce both asexually by biennial offsets from a perennial rhizome (Moore and Frankton 1963), and sexually by seed. No evidence of rhizomes were found when it was collected on the Helena National Forest. Populations contain a range life history stages, from single whorl rosettes through larger multiple whorl rosettes to flowering and fruiting individuals. Whether the species is a perennial or a strict biennial is not yet known. Small (single whorl) to large (multiple whorl) rosettes are observed in populations as well as flowering plants, perhaps representing a three growth season to flowering stage. Demographic monitoring studies begun in 1990 will help determine



the life history of the species (adapted from Schassberger 1991).

- b. **POLLINATION BIOLOGY:** Cirsium longistylum is probably primarily insect pollinated. Bumblebees (Bombus sp.) as well as other bee genera have been observed to visit the flowering heads, and may be the main pollinators. It is not known whether self-pollination occurs.
- c. **SEED DISPERSAL AND BIOLOGY:** Cirsium longistylum can produce numerous seeds. The presence of a lengthy, fluffy pappus suggests that the seeds are wind-dispersed. The seeds are subject to predation by a non-native weevil, Rhinocyllus conicus, which was brought to North America to control the introduced weed, Carduus nutans (Schassberger 1991). Studies are continuing on the effect of the weevil on C. longistylum seed production. In 1992 most seeds appeared to have aborted (i.e., blackened and not filled out). The cause is not known.
- d. **PHYLOGENY AND SPECIATION:** Cirsium longistylum was first recognized as a distinct species by Moore and Frankton in 1963. They felt that due to the limited distribution of the species and the considerable variation in habit and head arrangement, C. longistylum might be a hybrid (Moore and Frankton 1963). However pollen was 95% normal, which does not support the hybrid thesis but also does not rule it out (Moore and Frankton 1963). The lacerate outer involucre bract character is unique for thistles in Montana. Moore and Frankton (1963) stated that this unusual character might be the result of a hybrid combination of genes. Although Moore and Frankton do not explicitly name the parents, they do mention that C. hookerianum and C. kelseyi (= C. scariosum according to Hitchcock and Cronquist, 1973) are most similar in general appearance and occur in the same region.

A morphological analysis of 15 populations of Cirsium longistylum gathered from the Little Belt, Big Belt, and Elkhorn Mountains this summer is still in progress. Initial findings indicate that all populations were



composed of individuals with characters of C. longistylum, C. hookerianum, and perhaps other species, as well as intermediate forms. A specimen collected by Lesica (5836, University of Montana herbarium) is an example of an intermediate form. However further evidence will be required to make a judgement as to whether C. longistylum is a "good" species suffering from introgression with a more competitive species, or a product of hybridization.

## G. POPULATION ECOLOGY

### 1. BIOLOGICAL INTERACTIONS

- a. **COMPETITION:** No research has been conducted. However field observations indicate that Cirsium longistylum prefers sites where the soil has been disturbed, whether naturally by burrowing animals or unnaturally by machines. This suggests that C. longistylum favors areas of bare soil and full sunlight with little competition.
- b. **HERBIVORY:** As mentioned above, the seeds of Cirsium longistylum are attacked by a non-native weevil, Rhinocyllus conicus. This insect was brought to North America to combat another introduced pest, Carduus nutans. The effect of this biological control agent on Cirsium longistylum is not known. Research begun to study the impact on seed viability and population viability is continuing.

Most, if not all, of the Cirsium longistylum populations are on Forest Service land leased for cattle grazing. Although this does not appear to be a serious problem, cattle occasionally eat young flowering stalks and centers of rosettes.

## II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. **THREATS TO CURRENTLY KNOWN POPULATIONS:** The only verifiable threat to Cirsium longistylum at this time is its limited distribution to three mountain ranges in Montana. However most populations have high numbers of individuals in a variety of size/age classes and appear to be viable. Thus this threat is somewhat alleviated. The threat of seed predation and thus reduced seed production and population viability by the non-native





weevil has not been well enough studied to know if this is a problem. Likewise the effect of grazing is also not known. Whether C. longistylum is a "good" species or a hybrid poses a fundamental question. If C. longistylum is a true species, it might suffer from introgression either from C. hookerianum or C. scariosum. The affect of unnatural disturbance on introgression warrants investigation if introgression is documented.

- B. **MANAGEMENT PRACTICES AND RESPONSE:** Cirsium longistylum has been found along roadsides, in grazed pastures, and in clearcuts. Although it appears to maintaining its population numbers with respect to the road maintenance and grazing, populations seem to diminish gradually from clearcut areas as the site regenerates.
- C. **RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS:** Cirsium longistylum is frequently found in disturbed situations. Even in the natural settings, C. longistylum occurs in areas where burrowing animals have churned the soil. Thus for its long-term persistence at a site, it may require be more or less constant disturbance. The appearance of C. longistylum along roadsides and in clearcuts is therefore not unusual, but may not contribute to long-term viability. This is particularly the case with clearcuts where disturbance happens once and the forest eventually regenerates. A plant which prefers open, unshaded, meadow situations, C. longistylum probably cannot tolerate the shading effect produced by tree growth.
- D. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** Cirsium longistylum is currently designated by the U.S. Fish and Wildlife Service as a Category 2 species. However it has no Forest Service status. Although the possibility of the species being listed as Endangered or Threatened is remote until genetic studies and threat assessments are done, populations should at least be recorded and if possible protected until a decision is made to list or drop from Category status.
- E. **SUMMARY:** Ten population of Cirsium longistylum were found during the course of this survey, three of which represented new county records. Nine were discovered or relocated in the Big Belt Mountains, and a new site, the most western for the species, was found in the Elkhorn Mountains. These ten populations represent approximately one-third of the total known of this Montana endemic. The majority of the ten represent populations in disturbances caused by man, but populations in intact habitat were also documented.



Number of individuals is difficult to resolve due to hybridization problems. Undoubtedly additional populations will be found in both the Big Belt and Elkhorn Mountain ranges.



SPECIES OF SPECIAL CONCERN

Delphinium andersonii



Figure 9. Delphinium andersonii close up  
#004 of 21 May 1993  
Note flared sepals, whitish upper petals with blue  
unveined tips



## SPECIES OF SPECIAL CONCERN

### Delphinium andersonii

#### I. SPECIES INFORMATION

##### A. CLASSIFICATION

1. **SCIENTIFIC NAME:** Delphinium andersonii Gray
2. **COMMON NAME:** Anderson's larkspur, desert larkspur
3. **FAMILY:** Ranunculaceae (Buttercup Family)
4. **GENUS:** There are about 200 species of Delphinium worldwide (Hitchcock and Cronquist 1964), with 79 species recognized in North America (Ewan 1945). Nine species are found in Montana (Dorn 1984), one of which is non-native.
5. **SPECIES:** Delphinium andersonii is distinguished from other species in Montana by its thick, branching, woody root system; flared sepals; glabrous, dissected leaves; and whitish upper petals with blue tips (Dorn 1984).

##### B. PRESENT LEGAL OR OTHER FORMAL STATUS

###### 1. FEDERAL STATUS

- a. **U.S. FISH AND WILDLIFE SERVICE:** None.
- b. **U.S. FOREST SERVICE:** Delphinium andersonii is designated as Watch by the Forest Service. It was given this status because it was suspected to occur on Forest Service land, but had not been found. Now that D. andersonii has been discovered on the Helena National Forest, it should be redesignated as Sensitive.

2. **STATE:** Delphinium andersonii is categorized as state Sensitive in Lesica and Shelly (1991a). The Montana Natural Heritage Program (Achuff 1991) ranks the species as G5S1, that is secure globally but critically imperiled in Montana. None of the above state categories or ranks provide any legal protection for Delphinium andersonii.





## C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Delphinium andersonii is a perennial herb with a thick, woody rootstock (Figure 9). There are several erect stems up to about 25 in. tall. The stems usually lack hairs below the flowers, or are sometimes totally without hairs. The leaves occur mainly at the base or on the lower  $\frac{1}{4}$  of the stem. They are fleshy, and are more or less withered by flowering time. The lower leaves are on stalks 1-5 times as long as the leaf blade. The leaf blade is round in outline, about 2 in. broad, and divided into many linear segments. The upper leaves are generally very much reduced or even absent. The flowering stalk is unbranched or can have 1-several reduced branches. The main flowering branch has 3-15 flowers which are not crowded along the stem except for the buds at the tip. The individual flower stalks are 2-4 times as long as the flower. The sepals are blue, slightly less than  $\frac{1}{2}$  in. long, and deeply split. The upper petals are whitish with blue tips. The fruit is up to 1 in. long. The seeds are less than  $\frac{1}{8}$  in. long and have noticeable angles with white wings.

2. **TECHNICAL DESCRIPTION:** Low perennial from an extensive, thick, branching, woody root; stems 1-several, erect, 1.5-5(-7) dm tall, slender to fairly thick and sometimes fistulose, glabrous below the inflorescence or occasionally throughout (Figure 9). Leaves mainly basal or on the lower third of the stem, the lower ones more or less withered by anthesis (green at anthesis according to Ewan), the upper leaves generally with very much reduced and bracteate if present; lower leaves with petioles 1-5 times as long as the blades, the blades orbicular in outline, mostly 2-5(-6) cm broad, somewhat fleshy, usually about 3 times dissected, the ultimate segments linear to oblong, 1-3(-4) mm broad, rounded to somewhat acute and callous at the apex, the primary divisions of the blades not distinct; inflorescence simple or with 1-several reduced lateral racemes, the main raceme usually 3- to 15-flowered, lax and open, the lower pedicels mostly 2-4 times as long as the calyx; sepals generally deep clear blue (light blue or somewhat purplish), ovate-oblong, blunt or rounded, sometimes apiculate, (9-)11-15 mm long, spreading rather than cupulate, spur usually shorter than the



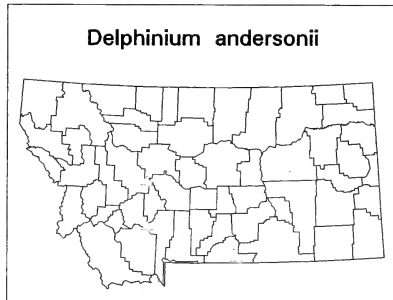
sepals; lower petals of the same color as the sepals, orbicular, rather deeply bifid,  $\frac{1}{4}$ - $\frac{1}{2}$  the length of the blade; upper petals whitish and blue-tipped, deeply to shallowly emarginate; follicles (12-)15-25 mm long, erect or very slightly divaricate, usually glabrous but occasionally slightly crisp-puberulent; seeds 1.5-2.5 mm long, with prominent white-winged angles (adapted from Hitchcock and Cronquist 1964, and Ewan 1945).

3. **LOCAL FIELD CHARACTERS:** Delphinium andersonii is usually distinguishable from all other Delphinium species in the area by its thick, branching, woody root system; flared sepals; glabrous, dissected leaves; and whitish upper petals with blue tips (Dorn 1984).

#### D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Delphinium andersonii is a characteristic plant of the desert valleys and ranges of the Great Basin. It ranges from central and southeastern Oregon east to central Montana, then south to Utah, Nevada, and California, east of the Sierra Nevada (Hitchcock and Cronquist 1964).

In Montana it is at the northeastern extent of its range in Montana. It is known from four localities in three counties: Carbon, Jefferson, and Lewis & Clark (Figure 10).



2. **CURRENT SITES:**

Delphinium andersonii was discovered on the Helena National Forest north of Hogback Mountain by Peter Lesica as part of this study. This location is somewhat distant (ca. 70 miles north) from the closest known Montana location. More detailed population information on this species and its location on a USGS 7.5' topographic map can be found in Appendix 5.



3. UNVERIFIED/UNDOCUMENTED REPORTS: None.

E. HABITAT

1. ASSOCIATED VEGETATION: Delphinium andersonii is found in sagebrush deserts, juniper woodlands, or open forests of desert ranges (Hitchcock and Cronquist 1964). In Montana it has been associated with Artemisia arbuscula, Agropyron spicatum, Pinus flexilis, Juniperus osteosperma, Penstemon laricifolius, Allium textile, and Cryptantha celosioides. At the Helena National Forest, it was found with Artemisia michauxiana, Agropyron spicatum, Cymopterus terebinthinus, and Oenothera caespitosa.
2. TOPOGRAPHY: In Montana Delphinium andersonii grows on gentle to steep slopes. On the Helena National Forest site D. andersonii occurs at a midway point on the southeast-face of a 60-80% slope.
3. SOIL RELATIONSHIPS: Delphinium andersonii is reported from "loose rich soil" in Jefferson County, dry sandy soils in Carbon County, and from loose limestone talus in the Helena National Forest.
4. REGIONAL CLIMATE: The climate of west-central Montana can generally be classified as cool, dry, and continental, with locally greater amounts of precipitation in the mountains. The closest weather station to the site is at Holter Dam which is about 17 miles northwest with an elevation of 3487 feet. The Delphinium andersonii site is at an elevation of 5000 feet. For the period of 1951-1980, the mean annual precipitation at Holter Dam was 12.02 inches, the mean January temperature was 24.8°F, and the mean July temperature was 69.9°F (U.S. Department of Commerce 1982.)

F. POPULATION DEMOGRAPHY, BIOLOGY AND SPECIATION

1. PHENOLOGY: Delphinium andersonii flowers from late April through mid-July. In the Helena National Forest, the species was collected in flower in late May.
2. POPULATION SIZE AND CONDITION: The Delphinium andersonii population on the Helena National Forest is quite large (estimated at 1000-10,000 individuals). The populations in Carbon County are small (ca. 50 plants), and the exact size of



the Jefferson County population is not known although the species is stated to be locally abundant at the site. Condition of the population on the Helena National Forest is not known.

### 3. REPRODUCTIVE BIOLOGY

- a. **TYPE OF REPRODUCTION:** Presumably reproduces sexually by seed.
- b. **POLLINATION BIOLOGY:** Insect pollinated, but exact species unknown.
- c. **SEED DISPERSAL AND BIOLOGY:** Unknown.
- d. **PHYLOGENY AND SPECIATION:** Joseph Ewan, the last monographer of the genus Delphinium, placed D. andersonii in the series Spiciform. However he stated that further anatomical data might place the species in the Lignifasciculate series. The Spiciform series is a primarily North American group with little if any affinity to Eurasian species (Ewan 1945).

In central Idaho Delphinium andersonii hybridizes with D. glaucescens where their ranges overlap (Hitchcock and Cronquist 1964). Delphinium glaucescens (a synonym of D. glaucum according to Dorn, 1984) occurs in southwest and south-central Montana (Dorn 1984), but no reports of hybridization in Montana are known.

### G. POPULATION ECOLOGY

#### 1. BIOLOGICAL INTERACTIONS

- a. **COMPETITION:** At three of the four Montana sites, Delphinium andersonii occurs on open breaklands or talus slopes with moderate to little vegetative cover. Hitchcock and Cronquist (1964) note that the species is found in deserts, woodlands, and open forests. The above might imply that D. andersonii does not compete well in shade or in areas of dense vegetative cover.
- b. **HERBIVORY:** Various species of Delphinium have been reported as poisonous. Only cattle are affected, and horses and sheep as has been reported (Ewan 1945). Some species are toxic





only before flowering, while others are poisonous throughout their life (Ewan 1945). The exact toxicity of D. andersonii is not known.

## II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. **THREATS TO CURRENTLY KNOWN POPULATIONS:** In the Helena National Forest, Delphinium andersonii occurs midway up a 500 foot, 60-80% talus slope. Although this slope is along the main road past Refrigerator Canyon, it is doubtful that any threats to this population currently exist barring road widening activities or aerial herbicide broadcast.
- B. **MANAGEMENT PRACTICES AND RESPONSE:** None.
- C. **RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS:** As there are no current or anticipated management practices which might affect this population in the near future, this population is probably self-maintaining.
- D. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** As Delphinium andersonii was just discovered on the Helena National Forest, this Watch/Sensitive species should be surveyed in other potential habitat, particularly in the long gap between this population and the next closest one in Jefferson County.
- E. **SUMMARY:** Delphinium andersonii was discovered for the first time on National Forest land in the Helena National Forest during the course of this rare plant survey. This Montana peripheral should undergo a status upgrade from U.S. Forest Service Region 1 Watch to Sensitive. Little is known concerning the biology, population structure, and response to management of this rare species in Montana. Additional surveys should be conducted to determine the extent of this species on Forest Service lands, particularly in the Helena National Forest.



SPECIES OF SPECIAL CONCERN

Juncus hallii



Figure 11. Juncus hallii close up  
#007 of 6 August 1992  
Note few-flowered cymose inflorescence app. lateral,  
usually not surpassed by bract, light brown perianth



SPECIES OF SPECIAL CONCERN

Juncus hallii



Figure 12. Juncus hallii habitat  
#007 of 6 August 1992  
Note wetland margin setting at based of The  
Needles



## SPECIES OF SPECIAL CONCERN

### Juncus hallii

#### I. SPECIES INFORMATION

##### A. CLASSIFICATION

1. **SCIENTIFIC NAME:** Juncus hallii Engelm.
2. **COMMON NAME:** Hall's rush
3. **FAMILY:** Juncaceae (Rush Family)
4. **GENUS:** Juncus is a broadly distributed genus with over 200 species (Hitchcock et al. 1969). There are 28 species in Montana (Dorn 1984).
5. **SPECIES:** Juncus can be a difficult group as many of the characteristic structures are minute. Juncus hallii is distinguished by a combination of features. It is a perennial rush with densely clustered, terete stems. The upper leaf blades are flattened and well developed. The inflorescence usually appears to be lateral. This is caused by the lowermost, leaflike, terete involucral bract which exceeds the flowers and generally the inflorescence. The few flowers (1-7) per stem each have a pair of small bracteoles at the base of the perianth segments. The perianth is 3-5 mm long, and the capsules are retuse and the seeds inside are appendaged at both ends. (Adapted from Hitchcock et al. 1969 and Dorn 1984).

##### B. PRESENT LEGAL OR OTHER FORMAL STATUS

###### 1. FEDERAL STATUS

- a. **U.S. FISH AND WILDLIFE SERVICE:** None.
- b. **U.S. FOREST SERVICE:** Sensitive.

2. **STATE:** Juncus hallii was ranked as G4G5S1 by the Montana Natural Heritage Program (Achuff 1991). This means that was considered secure on a global basis, but critically imperiled within Montana. Lesica and Shelly (1991a) place the species in the Sensitive status category which indicates that the species is known from a limited number of habitats in Montana or that it occurs primarily in restricted habitats considered vulnerable to man-





caused disturbances. As a result of 1992 fieldwork and status re-evaluation, its status will be changed to S2; imperiled within Montana. Neither the above rank or status provide any legal protection for this species within the state of Montana.

### C. DESCRIPTION

- 1. GENERAL NONTECHNICAL DESCRIPTION:** A perennial rush to 16 in. tall with densely clustered, round stems (Figure 11). The lower leaves and those at the plant's base have brown sheaths encircling the stems. The sheaths lack leaf blades entirely or have a bristle. The upper leaves have leaf blades which are up to 6 in. long, rolled and grooved on the inner surface, and lack partitions. The flowering stalk appears to have a stem which usually surpasses the entire stalk. However what appears to be the stem is actually a rounded, leaflike bract. The flowers are few (1-7) per cluster and on short stalks. The petal-like structures are small (less than  $\frac{1}{2}$  in. long), light brown with thin translucent margins, and pointed at the tip. The outer ones are somewhat larger than the inner. The fruit is dark brown, about as long as the flower, and notched on the otherwise rounded tip. The seeds are minute, with tails at either end of the spindle-shaped, lightly lined body.
- 2. TECHNICAL DESCRIPTION:** Caespitose perennial 2-3(-4) dm tall, stems terete; basal leaves and those on the lower fifth of the stem bladeless or with a bristle-like blade, lowest sheaths brownish; upper leaves with blades to 15 cm long, the blades terete but channeled on the adaxial surface and not septate; inflorescence appearing lateral: the lowest involucre bract terete, leaflike, appearing to be a continuation of the stem, exceeding the flowers, but usually not exceeded by the inflorescence, if exceeded by the inflorescence, then the inflorescence appearing terminal; flowers (1-)2-6(-7), closely cymose, but plainly pedicellate; perianth segments 4-5 mm long, light brown, membranous-margined, acute, the outer series slightly longer; stamens 6, the anthers scarcely 1 mm long, subequal to the filaments; capsule dark brown, equalling or slightly exceeding the perianth, distinctly retuse at the otherwise rounded tip; seeds about 1 mm long, with an appendage at each end about half as



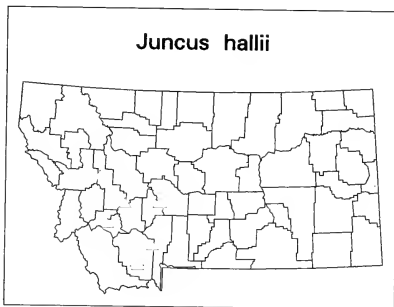
long as the fusiform, finely striate body (adapted from Hitchcock et al. 1969).

3. **LOCAL FIELD CHARACTERS:** The perennial habit of Juncus hallii along with its apparently lateral inflorescence, its few (1-7) flowers per cluster, well developed upper leaf blades, and retuse capsules should distinguish it from other Juncus species in Montana (Figure 11). It is also necessary to confirm that its seeds are appendaged, to distinguish it from J. parryi. This usually cannot be done without a dissecting scope. Only J. nevadensis has been reported to occur with J. hallii. Juncus nevadensis is distinguished by its obviously terminal inflorescence (i.e., far surpassing the leaf blades and the involucre bracts), septate leaves, unnotched capsules, and unappendaged seeds.

#### D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Juncus hallii occurs within the Rocky Mountains from southwestern Montana to Colorado (Hitchcock et al. 1969).

In Montana it is known from nine localities in Madison, Meagher, Powell, and Silver Bow Counties (Figure 13), including the Lincoln District of the Helena National Forest.



2. **CURRENT SITES:** The sites in the Big Belt Mountains of the Helena National Forest are the only sites in Meagher County and include the easternmost locality in the state. More detailed population information on this species and its location on a USGS 7.5' topographic map can be found in Appendix 5.
3. **UNVERIFIED/UNDOCUMENTED REPORTS:** None



## E. HABITAT

1. **ASSOCIATED VEGETATION:** Juncus hallii has been reported from montane to alpine moist grasslands and sedge meadows. Common associates at the Big Belt Mountain site were Calamagrostis canadensis, Carex scopulorum, Carex microptera, and Senecio foetidus. Other associated species were Phleum alpinum, Juncus nevadensis, Deschampsia cespitosa, Carex rostrata, Danthonia intermedia, Agrostis scabra, Epilobium watsonii, Spiranthes cernua, Antennaria corymbosa, Aster occidentalis, and Pedicularis groenlandica.
2. **TOPOGRAPHY:** Juncus hallii occurs on flats or benches on gentle mid to upper slopes with elevations ranging from 4000-8400 feet. At the Big Belt Mountain sites, the species was on a level wetland setting in the Birch Creek headwater basin below The Needles at 7420 feet elevation (Figure 12) and in a small sloping wet meadow above the Birch Creek headwater basin, located on the lower slopes of a mountain.
3. **SOIL RELATIONSHIPS:** Only one Montana site has soil information, and the soil is classified as a silt loam. Parent material at the Big Belt Mountain sites was alluvium. At The Needles site Juncus hallii occurs near a sphagnum bog. In the other site, it occurs close to a headwaters stream rivulet.
4. **REGIONAL CLIMATE:** The climate of west-central Montana can generally be classified as cool, dry, and continental, with locally greater amounts of precipitation in the mountains. The closest weather station to the Big Belt Mountain populations of Juncus hallii is about 20 map miles southwest at Townsend which is much lower in elevation at 3833 feet. For the period of 1951-1980, the mean annual precipitation at Townsend was 11.11 inches, the mean January temperature was 19.7°F, and the mean July temperature was 66.8°F (U.S. Department of Commerce 1982.)

## F. POPULATION DEMOGRAPHY, BIOLOGY AND SPECIATION

1. **PHENOLOGY:** Juncus hallii flowers in July to August (Hitchcock et al. 1969).



2. **POPULATION SIZE AND CONDITION:** There are no exact population estimates for Juncus hallii in Montana. At three of the sites the species is cited as being common, very common, or abundant. Although J. hallii was reported in 1983 as being common at the Needles site, in 1992 J. hallii was sparsely scattered over less than an acre, only accounting for about 1% of the graminoid cover. This does not necessarily represent a decline in the population. Because the Needles site is a wetlands complex, the different population estimates may be the result of being at different sloughs.

3. **REPRODUCTIVE BIOLOGY**

- a. **TYPE OF REPRODUCTION:** Assumed to be sexual.
- b. **POLLINATION BIOLOGY:** Assumed to be wind-pollinated.
- c. **SEED DISPERSAL AND BIOLOGY:** It is assumed that the seeds would fall to the ground near the parent plant.
- d. **PHYLOGENY AND SPECIATION:** Unknown.

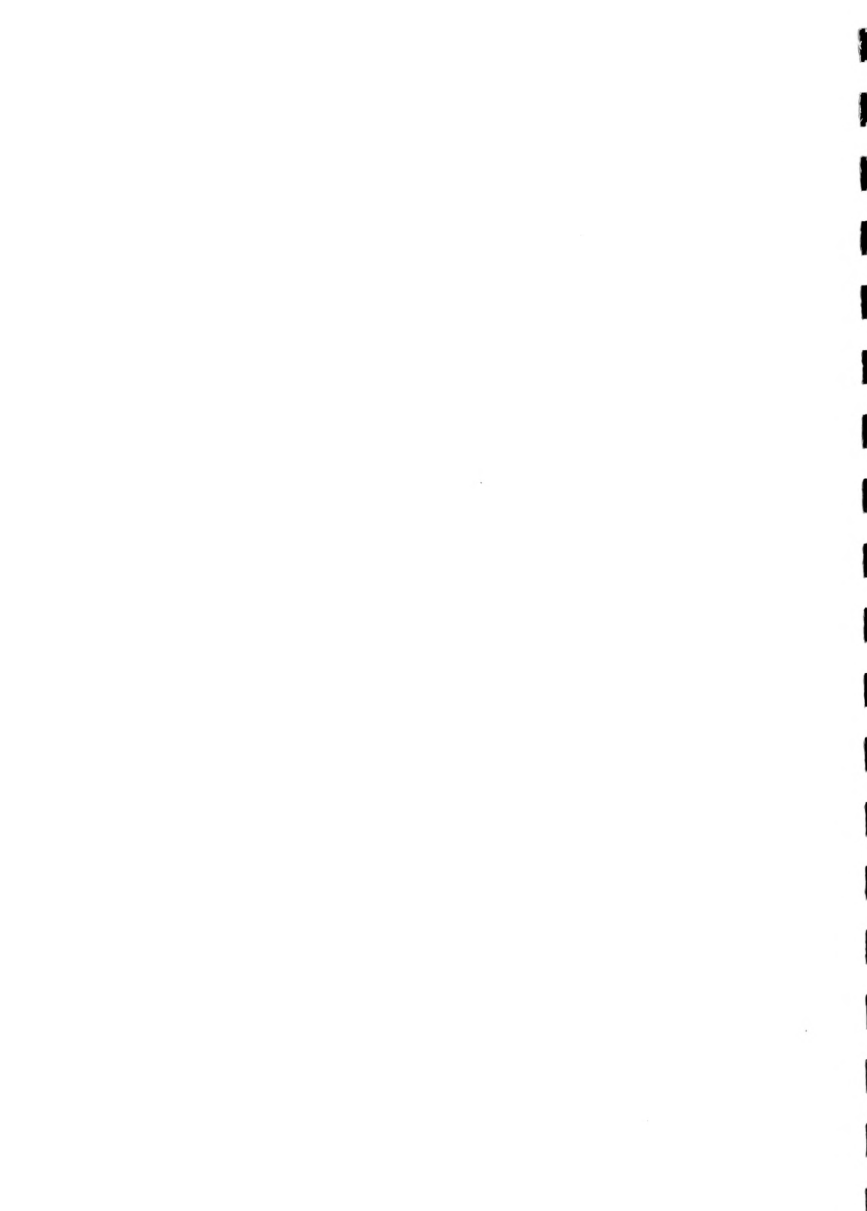
G. **POPULATION ECOLOGY**

1. **BIOLOGICAL INTERACTIONS**

- a. **COMPETITION:** Juncus hallii grows in sedge meadows or moist grasslands where the herbaceous cover is dense. However all of the sites are open without tree or shrub cover. Thus although J. hallii may be able to compete within the dense, yet relatively short herbaceous layer, it does not tolerate the shade of taller plants.
- b. **HERBIVORY:** Unknown.

II. **ASSESSMENT AND MANAGEMENT RECOMMENDATIONS**

- A. **THREATS TO CURRENTLY KNOWN POPULATIONS:** None observed.
- B. **MANAGEMENT PRACTICES AND RESPONSE:** None known.
- C. **RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS:**  
Juncus hallii is dependent upon mesic conditions such as those at the Needles site. Any activity which would alter or destroy the hydrology of this area would have





severe repercussions on J. hallii. Livestock grazing, mining, timber and peat harvesting should not be /permitted in the wetland complex area. Moderate levels of non-motorized recreation seem to be compatible.

- D. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** As time did not allow a truly thorough search of the all the sloughs within the Needles wetland complex and surrounding basin, a definitive survey should be conducted.
- E. **SUMMARY:** Juncus hallii is a Forest Service Sensitive species known from wetland areas around a basin north of Mount Edith in the Big Belt Mountains on the Helena National Forest. State status of tufted rush has been re-evaluated and changed to changed to S2 ("imperiled" within Montana) due to its numbers and its restriction to wetland habitats which are easily altered or destroyed by humans. The Helena National Forest site is one of nine within Montana. Currently no threats are perceived to J. hallii; however any activity such as mining, timber or peat harvesting, or livestock grazing which would degrade the quantity and/or quality of the hydrologic system on which the species is dependent, would have a negative effect on J. hallii. Further surveys of the wetland complex in which the species occurs need to be conducted.



## E. HABITAT

1. **ASSOCIATED VEGETATION:** In general Lesquerella klausii occurs on slopes with little vegetation. Throughout its range, the species can be found in forests of Pinus ponderosa and/or Pseudotsuga menziesii with associated herbaceous vegetation dominated by bunchgrasses, including Agropyron spicatum and Festuca idahoensis. At higher elevations, L. klausii has occurs with Pinus flexilis, Abies lasiocarpa, and Festuca viridula. (Adapted from Shelly 1988).

Most Lesquerella klausii sites are shale barren communities which support unusual plant assemblages not commonly encountered in Montana (Figure 15). Several of the higher elevation sites contain interesting examples of unusual windblown cushion plant communities (adapted from Shelly 1988).

In the Big Belt Mountains of the Helena National Forest, Lesquerella klausii occurs sparsely vegetated grasslands or on barren shale slopes. Other plant species observed in the study area with L. klausii include:

Achillea millefolium  
Agropyron smithii  
Amelanchier alnifolia  
Androsace chamaejasme  
Antennaria neglecta  
Apocynum androsaemifolium (Spreading dogbane)  
Arctostaphylos uva-ursi (Kinnikinnick)  
Artemisia frigida (Fringed sagewort)  
Artemisia michauxiana  
Artemisia tridentata (Big sagebrush)  
Asclepias sp.  
Astragalus gilviflorus  
Astragalus vexilliflexus  
Balsamorhiza sagittata (Arrowleaf balsamroot)  
Berberis repens (Creeping oregongrape)  
Bromus tectorum  
Castilleja pallescens  
Cerastium arvense  
Chrysopsis villosa (Hairy goldenaster)  
Chrysothamnus nauseosus (Common rabbit-brush)  
Chrysothamnus viscidiflorus (Green rabbit-brush)  
Cirsium longistylum  
Cirsium undulatum (Wavyleaf thistle)  
Collinsia parviflora



SPECIES OF SPECIAL CONCERN

Lesquerella klausii



Figure 14. Lesquerella klausii close up  
#014 of 15 May 1987  
Note loose cluster of bright yellow flowers, stems  
lying close to ground. Fruiting material needed for  
diagnostic ID.



SPECIES OF SPECIAL CONCERN

Lesquerella klausii



Figure 15. Lesquerella klausii habitat  
#014 of 15 May 1987  
Note sparsely-vegetated exposed shale surface





## SPECIES OF SPECIAL CONCERN

### Lesquerella klausii

#### I. SPECIES INFORMATION

##### A. CLASSIFICATION

1. **SCIENTIFIC NAME:** Lesquerella klausii R. Rollins
2. **COMMON NAME:** Divide bladderpod, Klaus' bladderpod
3. **FAMILY:** Brassicaceae (=Cruciferae; Mustard Family)
4. **GENUS:** The genus Lesquerella consists of approximately 75 species in North America, with most of the species being concentrated in Mexico, the southwestern United States, and the Rocky Mountain and intermontane basin region of the western United States (Rollins and Shaw 1973). Dorn lists only four species of Lesquerella in his 1984 flora of Montana. However at least four other species have either been newly described or recently discovered in Montana, including L. klausii.
5. **SPECIES:** The earliest collections of Lesquerella klausii were most often determined as Physaria geyeri. However Dr. Reed Rollins recognized that there was a previously undescribed species amongst these collections. Klaus H. Lackschewitz discovered the species near Lewis and Clark Pass in 1977, and the species was named in his honor (adapted from Shelly 1988).

##### B. PRESENT LEGAL OR OTHER FORMAL STATUS

###### 1. FEDERAL STATUS

- a. **U.S. FISH AND WILDLIFE SERVICE:** None.
- b. **U.S. FOREST SERVICE:** In 1988 the Forest Service placed Lesquerella klausii in the Watch Category (U.S. Department of Agriculture 1988). In 1991 this species was dropped from consideration due to a decision to drop all Watch species which actually occurred on Forest Service lands (Lesica and Shelly 1991b).



2. **STATE:** The Montana Natural Heritage Program (Achuff 1991) lists Lesquerella klausii as G3S3, that is threatened throughout its range both globally and in Montana. Lesica and Shelly (1991a) place the species in their Watch List category which indicates that the species is too common to be listed as Sensitive, but more information is needed for certainty. Neither of these state categories holds any legal protection for the species.

### C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Lesquerella klausii is a short-lived, taprooted perennial herb densely covered with microscopic star-like hairs. The stems are mostly about 4-8 in. tall, and often lie flat on the ground surface with the flower-bearing tips curving upward (Figure 14). The basal leaves are clustered at the top of the taproot, egg-shaped to triangular in outline with slender stalks, and about  $\frac{1}{2}$ -1 in. long. The stem leaves are egg-shaped, narrowed at the base, and about  $\frac{1}{2}$ - $\frac{3}{4}$  in. long. The plant produces an abundance of yellow flowers in loose clusters that are  $\frac{3}{8}$ -1 $\frac{1}{2}$  in. long. The petals are about  $\frac{1}{2}$  inch long. The rounded fruits are slightly less than  $\frac{1}{4}$  in. in diameter, and are on S-shaped stalks about  $\frac{1}{4}$  in. long. The seeds are less than  $\frac{1}{8}$  in. long (adapted from Shelly 1988).
2. **TECHNICAL DESCRIPTION:** Taprooted perennial, densely stellate pubescent; trichomes loosely spreading, primary rays 3-5, forked, ultimate rays exceptionally long for members of the genus; caudex simple, only slightly enlarged; radical leaves petiolate, entire, 1.5-2.5 cm long, blade obovate to deltate, with slender petioles; cauline leaves oblanceolate to spatulate, 6-9 mm long; stems erect to decumbent, slender, 6-10 cm high; infructescences loose, 1-3 cm long; pedicels slender, sigmoid, 5-7 mm long; siliques broadly obovate, slightly bilobed to nearly truncate above, densely pubescent with spreading trichomes, ca. 4 mm high, ca. 5 mm wide, valves pubescent on interior; replum narrowly obovate, obtuse above, 2.5-3 mm long; styles pubescent or glabrous, 3-3.5 mm long; ovules 2 in each locule; funiculi attached near apex of replum; seeds slightly longer than broad, wingless, thick, ca. 2 mm long, ca. 1.8 mm wide; cotyledons accumbent (adapted from Shelly 1988 and Rollins 1984).

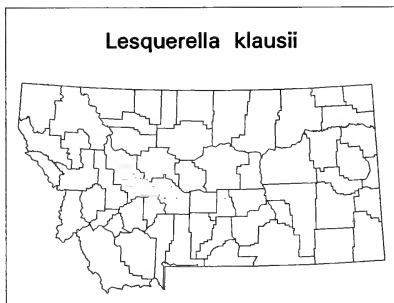


3. **LOCAL FIELD CHARACTERS:** Lesquerella klausii is primarily distinguished by its broadly obovate (almost spherical but slightly tapered at the base) fruit which is notched at the tip. Also L. klausii is restricted to outcrop settings, most consistently on open shale barrens but also found on limestone and other parent material. The only other Lesquerella species found in the Big Belt Mountains during this study was L. alpina (alpine bladderpod). This species is distinguished from L. klausii in having generally narrow, entire leaves, generally shorter stems, and less inflated fruits which are often narrowed and flattened at the tip. Physaria didymocarpa (common twinpod) also occurs in the Big Belt Mountains, and is distinct from L. klausii in having much larger leaves and flowers, and very large inflated fruits (adapted from Shelly 1988).

#### D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Lesquerella klausii is endemic to Montana.

It occurs in Meagher and Lewis & Clark Counties in western Montana (Figure 16). In addition, one of the newly documented populations occurs on both sides of the Broadwater-Meagher county lines.



2. **CURRENT SITES:** There are presently 34 known sites for Lesquerella klausii. Twenty-one of these sites are within the Big Belt Mountains of the Helena National Forest. Only a few of the previously known localities were briefly revisited (however EORs and topographic maps are provided for all localities in the Big Belt Mountains in Appendix 5). Four new sites were found, and more detailed population and locational information can be found in Appendix 5.
3. **UNVERIFIED/UNDOCUMENTED REPORTS:** None known.



Cymopterus terebinthinus (Turpentine  
cymopterus)  
Delphinium bicolor  
Erigeron compositus (Cut-leaved daisy)  
Eriogonum ovalifolium (Oval-leaved buckwheat)  
Festuca ovina  
Festuca scabrella (Rough fescue)  
Fragaria vesca  
Juniperus communis (Common juniper)  
Juniperus scopulorum (Rocky Mountain juniper)  
Koeleria macrantha (Prairie junegrass)  
Lesquerella alpina (Alpine bladderpod)  
Linum perenne (Blue flax)  
Lomatium cous  
Lomatium dissectum (Fern-leaved lomatium)  
Lupinus sp.  
Mentzelia albicaulis (White-stemmed  
mentzelia)  
Oxytropis campestris  
Oryzopsis hymenoides (Indian ricegrass)  
Penstemon albertinus (Alberta penstemon)  
Penstemon attenuatus (Sulphur penstemon)  
Penstemon eriantherus (Fuzzytongue penstemon)  
Phacelia hastata (Silverleaf phacelia)  
Phacelia linearis (Threadleaf phacelia)  
Phlox sp.  
Physaria didymocarpa (Common twinpod)  
Poa secunda  
Polygonum douglasii ssp. douglasii  
Prunus virginiana  
Purshia tridentata (Antelope-brush)  
Rhus trilobata (Skunk-bush sumac)  
Rosa sayi (Prickly rose)  
Rosa woodsii  
Saxifraga oppositifolia  
Senecio canus (Woolly groundsel)  
Senecio integerrimus  
Smilacina stellata  
Symphoricarpos albus  
Townsendia parryi (Parry's townsendia)

2. **TOPOGRAPHY:** Lesquerella klausii occurs primarily on steep, south-facing slopes, with portions of some populations occurring on east, northwest, or west exposures, or on level sites. The slopes are gently to moderately sloping, ranging from approximately 5-45%. Elevation at L. klausii sites varies from 4000-7680 feet, a broad range for such a geographically restricted species (adapted from Shelly 1988).





3. **SOIL RELATIONSHIPS:** Lesquerella klausii is primarily restricted to sparsely vegetated gravelly or rocky slopes often with poor soil development. The species occurs most consistently in the Big Belts on loose platy shale, but is also found on limestone, argillite, and quartz-derived substrates (adapted from Shelly 1988).
4. **REGIONAL CLIMATE:** In general the climate of west-central Montana is classified as cool, dry, and continental, with locally greater amounts of precipitation in the mountains. The two closest weather stations to populations of Lesquerella klausii in the Big Belt Mountain are at Holter Dam and Helena Regional Airport. The Holter Dam station at an elevation of 3487 feet is about 8 miles northwest from the closest Big Belt Mountain L. klausii site. For the period of 1951-1980, the mean annual precipitation at Holter Dam was 12.02 inches, the mean January temperature was 24.8°F, and the mean July temperature was 69.9°F (U.S. Department of Commerce 1982.) The Helena Regional Airport site at an elevation of 3828 feet is about 13 miles southwest from the closest site of L. klausii in the Big Belt Mountains. For the period of 1951-1980, the mean annual precipitation at the Helena Regional Airport was 11.37 inches, the mean January temperature was 18.1°F, and the mean July temperature was 67.9°F (U.S. Department of Commerce 1982).

#### F. POPULATION DEMOGRAPHY, BIOLOGY AND SPECIATION

1. **PHENOLOGY:** Lesquerella klausii flowers from early May to early July, depending upon climatic conditions and elevation. Peak flowering however at most sites is in late May and early June. A few flowering individuals have been observed in September and October, during warm periods, but probably this does not result in any substantial seed set. Fruiting occurs primarily from mid-May to July, and seems to be very vigorous during peak periods (adapted from Shelly 1988).
2. **POPULATION SIZE AND CONDITION:** Populations of Lesquerella klausii range in size from less than 20 to more than 3000 individuals. Populations may contain up to nine subpopulations. The average number of individuals in a population is approximately 650. At the end of the 1987 field season, the total number of plants observed was approximately 17000-18000. (Adapted from Shelly



1988). Over half of the known individuals are in the Big Belt Mountains of the Helena National Forest.

For population specifics at all sites of Lesquerella klausii in the Big Belt Mountains of the Helena National Forest, refer to Appendix 5.

### 3. REPRODUCTIVE BIOLOGY

- a. **TYPE OF REPRODUCTION:** Lesquerella klausii is probably cross-pollinated as are most species in the genus (Rollins and Shaw 1973). Although self-incompatibility is common in Lesquerella, self-compatibility is present in at least some species. During surveys in 1986 and 1987, no evidence of vegetative reproduction was observed. (Adapted from Shelly 1988).
- b. **POLLINATION BIOLOGY:** During 1986 and 1987 field surveys, Lesquerella klausii was visited by various insects including a member of the genus Bombus (bumblebee). Rollins and Shaw (1973) reported mostly bees and flies repeatedly visiting the flowers of Lesquerella. It is unknown however if these insects are effectual pollinators.
- c. **SEED DISPERSAL AND BIOLOGY:** The fruits of Lesquerella klausii are papery and dry, and the seed are wingless. Thus, there does not appear to be any specific mechanism (such as animal or wind) for long-distance dispersal. Probably most seeds fall near the parent plants, and might be dispersed by precipitation.

In 1985 and 1986 numerous seedlings were observed at the Hunters Gulch site (see EOR# 001, Appendix 5). This area was burned during the 1984 North Hills fire, and it appears that this may have invigorated the population. Seed germination was enhanced, perhaps due to a reduction in competition and/or the heat of the fire (adapted from Shelly 1988).

Aside from this observational data, little is known about the seed biology of this species.



- d. **PHYLOGENY AND SPECIATION:** According to Rollins (1984) Lesquerella klausii "...is not easily confused with any other species of Lesquerella." Rollins (1984) further states that on the basis of fruit characteristics, "...the species falls in a borderline between Lesquerella and Physaria..." However L. klausii "...definitely falls into Lesquerella rather than Physaria" (Rollins and Shaw, 1973; Rollins, 1984).

## G. POPULATION ECOLOGY

### 1. BIOLOGICAL INTERACTIONS

- a. **COMPETITION:** Lesquerella klausii occurs most frequently on open, sparsely vegetated slopes, often in azonal soils. At about one-third of the sites, the species has partially colonized adjacent disturbed areas (usually steep, unstable roadbanks). Although the density of L. klausii is often greater in these disturbed areas, the majority of the plants are still found in the adjacent native habitat. These observations suggest that L. klausii does not compete well in denser vegetation, such as bunchgrass communities and closed forest stands. Noxious weeds and other exotics are localized threats (adapted from Shelly 1988).
- b. **HERBIVORY:** Lesquerella klausii habitat (steep, unstable, sparsely vegetated slopes) does not lend itself to livestock grazing. However grazing has been observed at a few sites outside of the Big Belt Mountains. This moderate level of grazing did not seem to have seriously impacted the populations, but heavy grazing might lead to a decline in the size of the populations. Further research is needed (adapted from Shelly 1988).

## II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. **THREATS TO CURRENTLY KNOWN POPULATIONS:** Within the Big Belt Mountains of the Helena National Forest, Lesquerella klausii is potentially threatened by mining, road maintenance and construction and aerial herbicide application.

Several sites (EOR#s 003, 006, 008, 010, 011, 012, 016, 017, 025, and 026) may be threatened by future mining



activities. Gold mining has increased in the vicinity of York. In 1987 two mine claim posts were observed at the Bull Run Gulch site (EOR# 016). The preceding material was obtained from Shelly (1988). The current status of the mining threat to these sites is not known (adapted from Shelly 1988).

Several populations (EOR#s 003, 006, 007, 008, and 012) are either adjacent to roads or colonization from nearby native habitat. Further road maintenance or future construction might threaten these populations (adapted from Shelly 1988).

Noxious weeds are noted as present at several sites, which call for special attention in the noxious weed control program of the Helena National Forest. In most cases, the noxious weeds become established outside of Lesquerella klausii habitat in more fertile substrate before invading that habitat, so that preventative control is to possible.

- B. MANAGEMENT PRACTICES AND RESPONSE:** Lesquerella klausii is tolerant of disturbance, as evidenced by its ecological preference for more open habitats (steep shale barrens and rocky slopes), and its ability to colonize altered sites such as open roadbanks. Surface modification of small areas adjacent to larger populations in natural habitat may not have an adverse effect on the long-term viability of such sites. However, large-scale habitat destruction such as that from mining, could potentially result in the extirpation of populations. Other types of land use which might occur in L. klausii habitat such as moderate livestock grazing, do not seem to impose a serious threat to the species (adapted from Shelly 1988).
- C. RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS:** Several populations of Lesquerella klausii are within the Gates of the Mountains Wilderness Area (EOR#s 013, 014, 018, 032 and 033) or wholly or partially within the vehicle closure area along its southern boundary (EOR#s 001, 007, and 015). These populations should be regarded as protected. However any plans regarding recreational development (for example, hiking and pack trails), should take L. klausii into account, and avoid or at the least minimize impacts to these sites. Maintenance of L. klausii in its natural habitat will enhance the long-term persistence of the species (adapted from Shelly 1988).





Road maintenance crews and their supervisors should be notified of the locations of populations occurring along the roadsides. Detailed maps with locations of populations should be provided to the road maintenance staff. This could reduce or eliminate unnecessary impacts or losses of these sites (adapted from Shelly 1988).

The potential impacts of mining should be examined whenever such activities are considered within the vicinity of Lesquerella klausii sites. Major impacts should be avoided if possible, and at least mitigated for, to allow the continued existence of these populations (adapted from Shelly 1988).

- D. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** The discovery of Lesquerella klausii some 10 miles further south of other Big Belt Mountain localities indicates the need for surveys in this intervening area. Also additional surveys could be conducted in the Gates of the Wilderness area to ascertain the full extent of the species there.

Monitoring plots should be set up in at least three roadside locations and in three relatively undisturbed sites to determine effects of disturbance as well as long-term population trends.

- E. **SUMMARY:** Lesquerella klausii is a Montana endemic occurring in Lewis & Clark and Meagher Counties. Twenty of the currently known 34 populations are in the Big Belt Mountains within the Helena National Forest, and all the others are on another diistrict of the forest. The species is tolerant of moderate disturbance, and soil texture and the lack of competing vegetation seem to be the most important factors in determining the its distribution. Eight populations are considered to be protected within the Gates of the Mountains Wilderness Area and the adjacent vehicle closure area to the south. Thus the species is not imminently threatened with extinction, but future threats from mining and road maintenance/construction could extirpate other populations. A declining trend in numbers of individuals or populations could lead to placement of the species as a Forest Service Sensitive species and/or a U.S. Fish and Wildlife Service Category species.



SPECIES OF SPECIAL CONCERN

Polygonum douglasii ssp. austinae



Figure 17. Polygonum douglasii ssp. austinae close up  
#005 of 9 August 1992  
Typical stature plant; note lens cap for scale



SPECIES OF SPECIAL CONCERN

Polygonum douglasii ssp. austinae



Figure 18. Polygonum douglasii ssp. austinae habitat  
#007 of 11 August 1992  
Positioned on upper slope below crest in exposed  
open or semi-open habitat



## SPECIES OF SPECIAL CONCERN

### Polygonum douglasii ssp. austinae

#### I. SPECIES INFORMATION

##### A. CLASSIFICATION

1. **SCIENTIFIC NAME:** Polygonum douglasii Greene ssp. austinae (Greene) Hickman
2. **COMMON NAME:** Austin's knotweed
3. **FAMILY:** Polygonaceae (Buckwheat Family)
4. **GENUS:** There are about 150 species in the genus (Hitchcock and Cronquist 1964), 20 of which occur in Montana (Dorn 1964).
5. **SPECIES:** Polygonum douglasii ssp. austinae was originally described as a full species, P. austinae by Greene in 1886. Marcus E. Jones perceived the species close relationship to P. douglasii, and placed austinae as a variety of P. douglasii. Hitchcock and Cronquist in their flora of the Pacific Northwest (1964, 1973) again recognized austinae at species rank although they did state that it was closely related to P. douglasii. Hickman (1984), as background work for revision of Jepson's California flora, placed austinae as a subspecies of P. douglasii. In the flora of Montana, Dorn (1984) does not include austinae, so it is assumed that he includes it within P. douglasii as he does not list varieties or subspecies for any species. Material with the leaves of P. d. ssp. douglasii and the branching of P. d. ssp. austinae was collected in the Hunter Gulch site (B. Heidel #891 MONT) for taxonomic consideration.

##### B. PRESENT LEGAL OR OTHER FORMAL STATUS

###### 1. FEDERAL STATUS

- a. **U.S. FISH AND WILDLIFE SERVICE:** None.
- b. **U.S. FOREST SERVICE:** Sensitive.  
(See p. 55; Population ecology/Biological interactions/Competition)





2. **STATE:** The Montana Natural Heritage Program listed this taxon as G4T4S1 (Achuff 1991). This means that on a global basis both the species and the subspecies were apparently secure although they may be rare at the periphery of their ranges. However the subspecies was considered critically imperiled within Montana. Lesica and Shelly (1991a) place this taxon within the Sensitive Category, meaning that it is known from a limited number of populations, has a restricted range, occurs in threatened habitats, or is sparsely distributed throughout the state. Based on the number of new records and their extent, the state rank assigned by the Montana Natural Heritage Program will be changed to S2 (see p. 55: Population Biology/Biological interactions/Competition). Neither the rank nor the category provide any legal protection for the taxon in the state of Montana.

### C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Polygonum douglasii ssp. austinae is a low-growing, somewhat scaly annual that is usually 2-4 in. tall, but may grow up to 8 in. in height (Figure 17). The branches arise from the base and are erect to curving upward. The numerous leaves are jointed at the base. The lower leaves are more or less egg-shaped to elliptic in outline, narrowing to a very short stalk, usually  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, and  $\frac{1}{2}$ - $\frac{1}{3}$  as wide. The leaves become gradually smaller up the stem and non-stalked. The stipules are  $\frac{1}{8}$ - $\frac{1}{4}$  in. long and appear torn. The flowers occur in open clusters of 1-4 in the axils of all but the lowermost leaves. Each individual flower is on a very short stalk less than  $\frac{1}{8}$  in. long. The five petal-like parts are less than  $\frac{1}{8}$  in. long, joined for about  $\frac{1}{4}$  their length, and are greenish with whitish or pink-tinged margins. The seed-like fruit is triangular, black, shiny, smooth, slightly less than  $\frac{1}{8}$  in. long, and egg-shaped in outline but tapered at both ends.
2. **TECHNICAL DESCRIPTION:** Low-growing more or less scurfy annual 5-10(-20) cm tall, branched at the base, ascending to erect; leaves numerous, jointed at the base, the lower ones ovate or elliptic to broadly oblanceolate, usually 5-15 mm long and  $\frac{1}{2}$ - $\frac{1}{3}$  as broad, narrowed to a very short petiole, gradually reduced and becoming sessile upward and transitional to the uppermost small bracts;



stipules 3-5 mm long, eventually lacerate; flowers 1-4 in the axils or all but the lowermost leaves, in slender, open racemes, soon reflexed, the pedicels 1-2 mm long; perianth 1.75-2.5 mm long, connate for about  $\frac{1}{4}$  the length, the segments 5, greenish with whitish or pink-tinged margins; stamens 5-8; styles 3, distinct, barely 0.5 mm long; achene triquetrous, black, nearly smooth, shining, 2-3 mm long, ovate in outline but tapered to both ends (adapted from Hitchcock and Cronquist 1964).

3. **LOCAL FIELD CHARACTERS:** Polygonum douglasii ssp. austinae (Figure 17) is not morphologically different from P. douglasii ssp. douglasii but no single character is diagnostic. When possible a suite of characters should be used to define the two entities. The lower leaves of ssp. austinae are the most distinctive characteristic. They are ovate or elliptic to broadly oblanceolate, usually 5-15 mm long and  $\frac{1}{2}$ - $\frac{3}{4}$  as broad, while the lower leaves of ssp. douglasii are linear to narrowly oblong (sometimes more nearly lanceolate or oblanceolate), 1-6 mm long and rarely as much as  $\frac{1}{5}$  as broad. The basally many-branched form of ssp. austinae contrasts with the typically single-stemmed or sparsely-branched form of ssp. douglasii. The perianth of ssp. austinae is slightly shorter (1.5-2.5 mm long) than that of ssp. douglasii (3-3.5 mm long). The achenes of ssp. austinae are smaller (2-2.5 mm long) and broader (generally less than twice as long as broad) than those of ssp. douglasii which are larger (>2.5 mm long) and narrower (at least twice as long as broad).

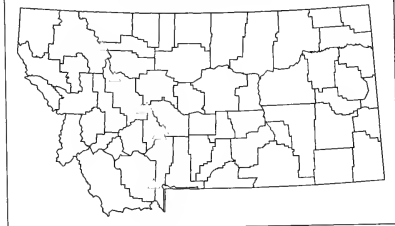
Dorn (1984) easily separates Polygonum douglasii from the other species in the genus by its erect habit, loose axillary inflorescences, leaves with jointed bases, and recurved or reflexed pedicels.

#### D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** According to Hitchcock and Cronquist (1964), Polygonum douglasii ssp. austinae ranges from central Oregon to northeast California, east across southern Idaho to south-central Montana and Wyoming, and is reported for eastern British Columbia. In Montana it is widely scattered in the western part of the state, and is known from eight sites in four counties: Broadwater, Lewis & Clark, Madison, and Pondera (Fig. 19, next page).



**Polygonum douglasii  
ssp. austinae**



2. **CURRENT SITES:** Polygonum douglasii ssp. austinae is currently known from four sites in the Big Belt Mountains on the Helena National Forest. More detailed information on these sites as well as the exact location for each site on a 7.5' USGS topographic map can be found in Appendix 5.
3. **UNVERIFIED/UNDOCUMENTED REPORTS:** There is an historical locality (1945) with a general location (20 miles east of Townsend in Big Belt Mountains on road to White Sulphur Springs) which possibly could be within the Helena National Forest, but this site could not be relocated.

**E. HABITAT**

1. **ASSOCIATED VEGETATION:** Throughout its range, Polygonum douglasii ssp. austinae is found on sparsely-vegetated, mainly dry flats or banks, from the sagebrush plains into the lower mountains, often in ponderosa pine forests (Hitchcock and Cronquist 1964). Montana sites consist of barren shale slopes or grasslands, often in association with ponderosa pine and bluebunch wheatgrass. At the sites on the Helena National Forest, the taxon occurs within a ponderosa pine-bluebunch wheatgrass plant association. Commonly associated species at these sites are:

Amelanchier alnifolia  
Arenaria nuttallii  
Artemisia dracunculul  
Artemisia tridentata  
Aster laevis  
Bromus japonicus



Bromus tectorum  
Capsella bursa-pastoris  
Carex geveeri  
Chaenactis douglasii  
Chrysopsis villosa  
Cryptantha celosioides  
Danthonia unispicata  
Eriogonum ovalifolium  
Gayophytum decipiens  
Lesquerella klausii  
Lomatium dissectum  
Lomatium triternatum  
Mentzelia dispersa  
Oryzopsis hymenoides  
Penstemon attenuatus  
Phacelia hispida  
Polygonum douglasii ssp. douglasii  
Prunus virginiana  
Purshia tridentata  
Ribes cereum  
Symphoricarpos albus

2. **TOPOGRAPHY:** Polygonum douglasii ssp. austinae occurs on flats to steep slopes at elevations ranging from 4320-6600 feet. On the Helena National Forest, the plant is found on east, south, or west-facing slopes of 5-45%. It is typically restricted to an upper portion of the exposed slope, though also found in an unvegetated channel bottom that cut through the outcrop at one site. Elevation at these sites ranges from 4320-6220 feet.
3. **SOIL RELATIONSHIPS:** In Montana Polygonum douglasii ssp. austinae grows in silty soils derived from shale parent material, or at less weathered sites, in the shale itself. This is particularly true of these sites in the Helena National Forest.
4. **REGIONAL CLIMATE:** The climate of west-central Montana can generally be classified as cool, dry, and continental, with locally greater amounts of precipitation in the mountains. In the Helena National Forest the northern populations of Polygonum douglasii ssp. austinae are 15-20 miles southeast of the closest weather station, Holter Dam. However these populations occur at 4320-6220 feet elevation as compared to the weather station at 3487 feet. The southern populations are 12-15 miles east-southeast of the closest weather station at Townsend. These populations occur at 4920-6220 feet elevation as compared to Townsend





at 3833 feet. For the period of 1951-1980, at Townsend the mean annual precipitation was 11.11 inches, the mean January temperature was 19.7°F, and the mean July temperature was 66.8°F; while at Holter Dam the mean annual precipitation was 12.02 inches, the mean January temperature was 24.8°F, and the mean July temperature was 69.9°F (U.S. Department of Commerce 1982.)

## F. POPULATION DEMOGRAPHY, BIOLOGY AND SPECIATION

1. **PHENOLOGY:** Polygonum douglasii ssp. austinae flowers June through August (Hitchcock and Cronquist 1964).
2. **POPULATION SIZE AND CONDITION:** Population sizes of annuals are expected to fluctuate, so any point-in-time observations are to be taken as limited indication of long-term conditions. Population sizes outside the Helena National Forest are reported as "locally common" or as a "large colony". Populations sizes within the Helena National Forest range from a low of 6 plants to over 150 plants observed with possibly more than 1000 individuals total. Three of populations are in excellent or good condition, with small areas where it is locally common. One population (6 plants) is barely persisting. For more detailed information on each site, see Appendix 5.
3. **REPRODUCTIVE BIOLOGY**
  - a. **TYPE OF REPRODUCTION:** Unknown. The small size of the flowers suggests selfing.
  - b. **POLLINATION BIOLOGY:** Unknown.
  - c. **SEED DISPERSAL AND BIOLOGY:** Seeds probably fall close to the parent plant, and may be disperse by rainfall or small animal vectors (cached by insects or small mammals).
  - d. **PHYLOGENY AND SPECIATION:** As stated above, Polygonum douglasii ssp. austinae was originally described and is sometimes recognized as a full species. The relationship between this taxon and P. douglasii is very close. Perhaps at one time the two were more distinct, and have been brought into recent contact by human disturbance, causing some mingling of their genes. However it is just as likely that P.



douglasii is a species complex with various entities such as austinae in the process of becoming distinct species.

## G. POPULATION ECOLOGY

### 1. BIOLOGICAL INTERACTIONS

- a. **COMPETITION:** In Montana, Polygonum douglasii ssp. austinae (#006) occurs primarily on shale barrens which are almost devoid of other vegetation. Its persistence on an isolated shale mound of less than 15 square meters under extremely heavy invasion by Bromus tectorum reflects a competitive resiliency. Should this pattern repeat, or its known population numbers significantly increase, this will warrant its deletion from the Region 1 - U.S. Forest Service list and the Montana Natural Heritage Program list.
- b. **HERBIVORY:** The habitat of Polygonum douglasii ssp. austinae does not lend itself to livestock grazing. Livestock trails cross some of the populations. Invasion of annual species like Bromus tectorum from surrounding grassland may be fostered by heavy grazing (see preceding discussion under Competition).

## II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

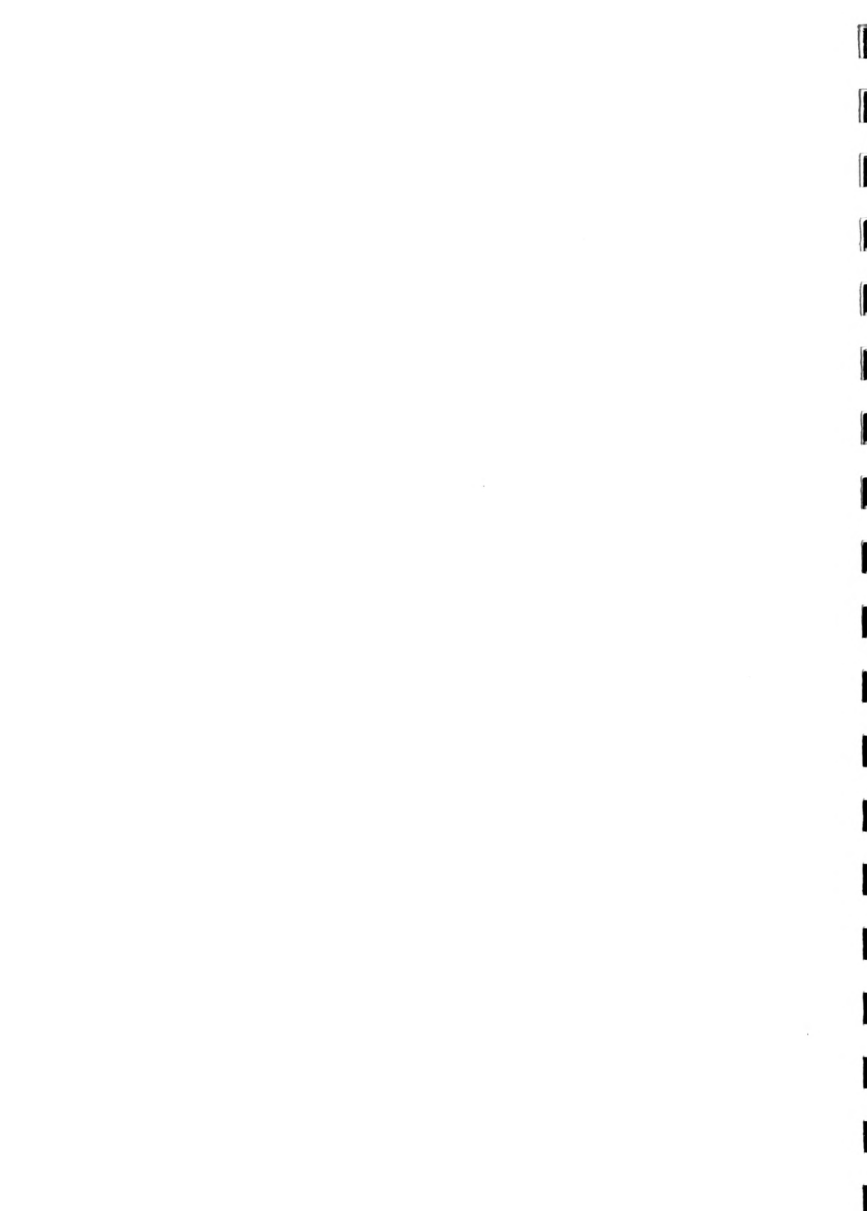
- A. **THREATS TO CURRENTLY KNOWN POPULATIONS:** In the Helena National Forest, a population along roadcuts is threatened by slope destabilization and future maintenance and construction activities. Exotic plants are invading at two other Helena National Forest sites, and may pose potential dangers from competition. The degree of mining threats has not been ascertained.
- B. **MANAGEMENT PRACTICES AND RESPONSE:** One population on the Helena National Forest is persisting in spite of heavy grazing and the severe invasion of exotic plants throughout the small pocket of suitable habitat.
- C. **RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS:** Road maintenance crews and their supervisors should be notified of the location of the population occurring near the road. A detailed map with the location of the population should be provided to the road maintenance staff. This could reduce or eliminate unnecessary impacts or the loss of this site.



Exotic plant invasion of populations should be followed to ensure that the non-native species do not extirpate Polygonum douglasii ssp. austinae at those sites.

D. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** Further survey work should be conducted to learn the full extent of the taxon in the Big Belt Mountains and to re-evaluate whether it warrants Sensitive status. It is possible the its habitat overlap with Lesquerella klausii is basis for predicting new locations; it was not sought from but may possibly have major populations in the Gates of the Mountains Wilderness where Lesquerella klausii is found. A major shale outcrop area in the vicinity of Sulphur Bar Creek was not visited, and may represent the location for the historic site east of Townsend.

E. **SUMMARY:** Polygonum douglasii ssp. austinae is a Forest Service Sensitive plant which usually occurs on barren shale slopes within the ponderosa pine-bluebunch wheatgrass plant association at low to moderate elevation. This subspecies has been, and in some floras still is, recognized as a species. Although it is common outside of Montana, there are only seven sites in three counties in the state, with 4 sites and an unrelocated historic collection being on the Helena National Forest in the Big Belt Mountains. Most of these populations are in good condition. Further survey work to realize the full extent of this taxon within the Helena National Forest and to determine whether it warrants Sensitive status is warranted. There is possible threat from road maintenance activities and exotic plant invasion.



## DISCUSSION

Six sensitive or special interest species were found in the Big Belt Mountains and one special interest species in the Elkhorn Mountains of the Helena National Forest. They represent the largest global concentration of a Montana endemic species, Lesquerella klausii, and new county records for five others: Astragalus convallarius var. convallarius, Delphinium andersonii, Cirsium longistylum, Juncus hallii, and Polygonum douglasii ssp. austinae. The first three of the six occur on the Helena National Forest and no other Forests of the region.

As a result of this preliminary fieldwork and accompanying data interpretation, three sets of recommendations are made. They cover sensitive species designation changes on the Region 1 - U.S. Forest Service list, management guidelines, and further study needs. They are presented in the following text under the three headings.

**It is recommended that Helena National Forest convey status change recommendations to the Region 1 Sensitive Species Coordinator based on results of 1992 fieldwork. (Note: There is currently a national moratorium on sensitive species list changes.)**

- 1) Designate Astragalus convallarius var. convallarius as sensitive.
- 2) Change the Delphinium andersonii designation from watch to sensitive.
- 3) Treat Cirsium longistylum as sensitive as long as it is considered a Category 2 taxa. Consult with the U.S. Fish and Wildlife Service, and with Lewis and Clark National Forest, the only other forest where this species occurs. Genetics and disturbance response research are needed by the U.S. Fish and Wildlife Service to assess whether to drop or list it.
- 4) Consider a special Helena National Forest designation for Lesquerella klausii as a unique case if it does not meet regional criteria for sensitive designation, since its global distribution is almost entirely restricted to the Forest.

Among the four taxa which were not relocated, recommendations are made to:

- 1) Drop Claytonia lanceolata var. flava from the regional list based on the number of statewide records.
- 2) Resolve the question of identification associated with the Helena National Forest specimen of Arenaria kingii. This work is to be pursued this winter by the Heritage Program in cooperation





with Montana State University to resolve whether or not the sole Forest specimen is based on a misidentification therefore warranting deletion from the sensitive list for the Helena National Forest.

3) Review the status of Carex vallicola to determine whether it warrants designation as sensitive.

4) Add Potentilla diversifolia var. multisecta to the Region 1 list as watch because it was historically known from the vicinity of Helena National Forest.

It is recommended that Helena National Forest incorporate 1992 field data in sensitive species management guidelines as described in FSM 2670 and the Helena National Forest Management Plan:

1) Apply the list of target species in Appendix 4 in the biological assessment process. Note: Species status in the biological evaluation process depends on Region 1 designation, and designation changes are recommended in the preceding text.

2) Apply the information on documented sensitive species sites in conducting biological evaluations to determine the potential influence of a project on overall species viability in the region. None of the work completed to date automatically serves the purpose of site clearance, but is to be used judiciously in the biological evaluation process on a case by case basis.

3) Consider an RNA management unit designation for one site of Lesquerella klausii. This species has its highest worldwide concentration and numbers on the Helena National Forest. One of its five largest populations in the Big Belt Mountains, #017, is on Cabin Gulch, which has been proposed for research natural area designation. This site was not included in 1992 fieldwork. Additional work is needed to complete the site inventory and nomination.

It is recommended that Helena National Forest pursue study of land areas, habitats and species which need more research to provide information for the sensitive species program in the Big Belt and Elkhorn Mountains. Some of these are already protected within the Gates of the Mountains Wilderness Area or in the vehicle closure areas. However other sites are in high use areas, and might be impacted if not identified for management consideration.

1) LAND AREAS needing general sensitive species surveys include much of the second and third priority level areas. In particular, this includes the Dry Range, the Gates of the



Mountain Wilderness, the burned portion of the northern Elkhorn Mountains, and low elevation prairie around the Big Belt Mts. The low elevation work dovetails with sensitive species priorities and is to be conducted in late May or early June searching for Astragalus convallarius var. convallarius, Carex vallicola, and Potentilla diversifolia var. multisecta.

2) HABITATS needing general sensitive species surveys include riparian and wetland communities and old growth forest. There was no survey in the latter because it was not encountered and background location information was unavailable at the time of planning. Wetland survey needs dovetail with Juncus hallii survey needs. Riparian and wetland habitats are integral to biodiversity at all levels in dry mountain ranges like the Big Belt and Elkhorn Mountains. Riparian and wetland sites presently range from good to poor condition relative to their biodiversity and ecosystem function potential. Many have the potential to improve by lowering stocking rates or reducing grazing time.

A preliminary list of riparian and wetland areas in the Elkhorn Mountains which merit further survey and protection consideration are Hog Hollow, Spring Creek, and Swamp Creek particularly the Swamp Creek Spring complex, South Fork Lakes including the uppermost lake, lakes and wetlands above the Tizer basin, Black Canyon, Bear Gulch and the meadow above it, the marshes along the South Fork of Crow Creek, and the aspen corridor along Jenkins Gulch.

A preliminary list of riparian and wetland areas in the Big Belt Mountains which merit further survey and/or protection consideration are Boulder Creek, Boulder Lakes, various Gates of the Mountains watercourses, Dry Creek, and Skidway area wetlands. Juncus hallii occurs in the Big Belt Mountains in a Birch Creek headwaters basin with wetland complexes north of Mount Edith. This area of ponds and surrounding wetlands (including sphagnum bogs) was not thoroughly surveyed during this study.

Other habitats of botanical interest include the alpine vegetation on the peaks of the Mount Edith and Boulder Baldy in the Big Belt Mountains and Elkhorn Mountain. While they cover a small area, they contribute substantially to Helena National Forest biodiversity and potentially provide biogeography insights that help understand the flora as a whole.

3) SENSITIVE SPECIES targets which warrant further survey work include:

- Low elevation prairie surveys for Astragalus convallarius var. convallarius, Carex vallicola, and Potentilla diversifolia var. multisecta in late May or June, as mentioned above.



- Wetland surveys for Juncus hallii in July, as mentioned above.
- Sedimentary rock outcrop surveys for Delphinium andersonii and Polygonum douglasii ssp. austinae. The former is to be surveyed on limestone in late May or early June. The latter is to be surveyed on shale in July or August. Surface geology maps indicate that there are shale outcrops west of Sulphur Bar Creek that may correspond with the original collection of the latter.
- In addition, survey is recommended for the three taxa identified in Appendix 4 as having highest probabilities of occurring in the Big Belt or Elkhorn Mountains. These include Draba densifolia, to be sought in open gravelly montane and alpine habitat in June, Oxytropis lagopus var. conjugans, to be sought in limestone outcrop among sagebrush in June, and Viola renifolia, to be sought in swampy spruce woods in June.

It is significant to note that none of the ten documented species of special concern on the Helena National Forest occupy forested habitats, with the exception of the Arenaria kingii record which has been called into question. They are not concentrated in any single area of the Forest, but there are habitat overlaps among them. Three species are in low elevation prairie, potentially affected by livestock management: Astragalus convallarius var. convallarius, Carex vallicola, and Potentilla diversifolia var. multisecta. Note: Only the latter were relocated. Two species occupy mid-elevation meadow settings also potentially affected by livestock management: Cirsium longistylum and Claytonia lanceolata var. flava. Three occur on outcrop habitat, with few direct threats except in cases of roadside management or mining, but they are subject to the degradation of noxious weed invasion. They come into close contact in select areas, though not occupying same slopes or slope segments: Polygonum douglasii ssp. austinae occurs with Lesquerella klausii at the northern end of its distribution in the Big Belts, in close proximity to Delphinium andersonii. The only wetland sensitive species among the taxa is Juncus hallii, which is affected by surrounding forested land use practices.

All but one of the documented rare plant records are from the Big Belt Mountains rather than the Elkhorn Mountains. The numbers are not definitive but the pattern is clear. Three explanations are offered to explain the difference. The Elkhorn Mountains have a more uniform surface geology which includes little of the sedimentary substrates that support species of special concern in the Big Belt Mountains. The Elkhorn Mountains have a narrower range in elevation, with less alpine habitat and little low elevation prairie habitat that supports species of concern right outside the Elkhorn Mountains. Finally, the Elkhorn Mountains cover an area approximately one quarter the size of the Big Belt Mountains. Two sensitive species not known from the Elkhorn Mountains are found immediately outside national forest



boundaries (Astragalus convallarius var. convallarius and Townsendia spathulata), while there are no similar sensitive species records immediately outside national forest boundaries surrounding the Big Belt Mountains. The lower floristic diversity documented in the Elkhorn Mountains is interpreted as reflecting the lower habitat diversity of the area as well as the lesser amount of time spent there.

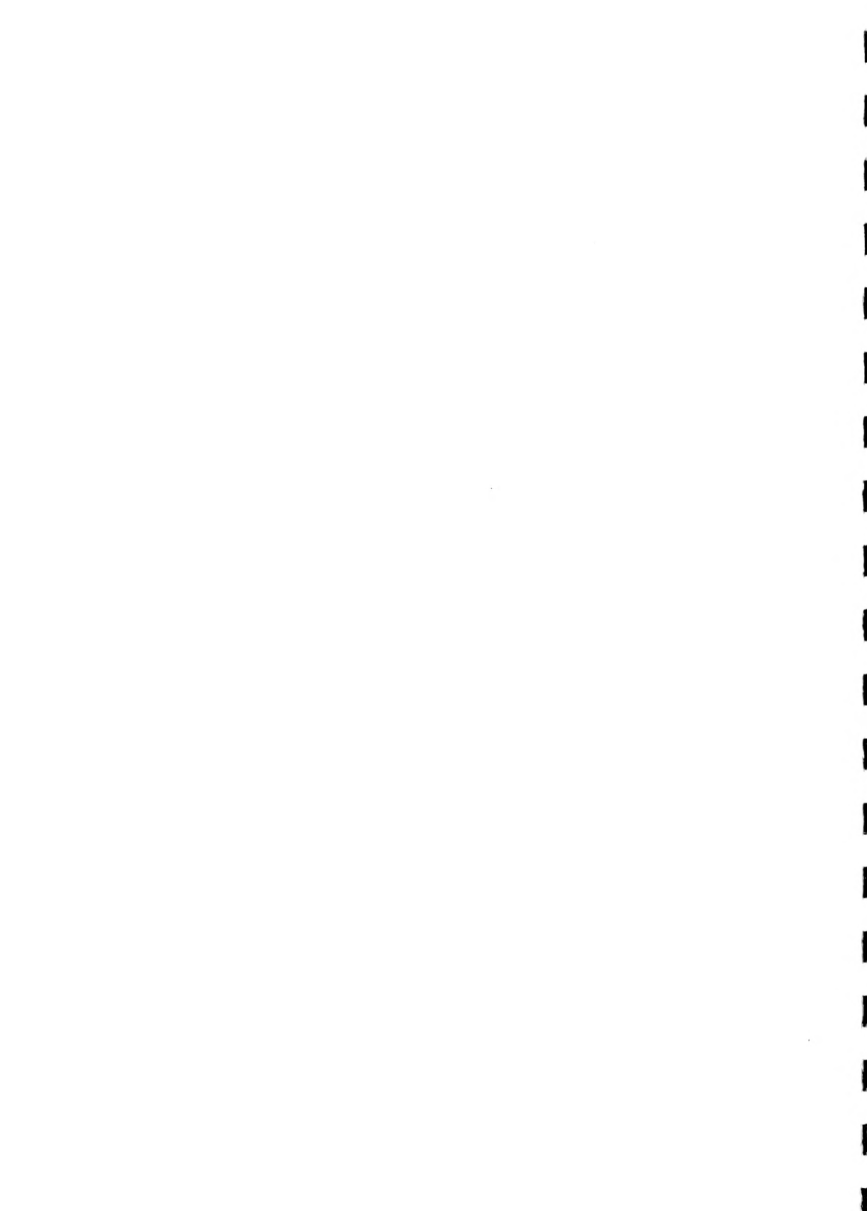
Though the results of our sensitive plant survey and floristic inventory of the Elkhorn and Big Belt Mountains are preliminary, they lay a foundation of sensitive species information for the Helena National Forest. They contribute to a floristic biodiversity picture of the Helena National Forest and the state. Finally, they help set and refine Helena National Forest and statewide work priorities, protection priorities, and management standards which address sensitive species.





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APPENDIX 1

SITES SURVEYED IN THE ELKHORN AND BIG BELT MOUNTAINS  
HELENA NATIONAL FOREST

(This list is followed by annotated Helena National Forest maps.  
Annotated topo maps available upon request.)

BIG BELT MOUNTAINS

Atlantic Ridge		15 July 1992
Avalanche Creek and Gulch		5 August 1992
T10N R1E SECTION 11	SE $\frac{1}{2}$ SE $\frac{1}{2}$ SW $\frac{1}{2}$ , N $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , NE $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , W $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$ , NW $\frac{1}{2}$ NE $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$ , E $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$ , E $\frac{1}{2}$ NE $\frac{1}{2}$ NE $\frac{1}{2}$	
T10N R1E SECTION 1	NW $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$ , SW $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , E $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , NW $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , SE $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , E $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$	
T11N R1E SECTION 36	E $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , W $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$ , SW $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$ , W $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$ , E $\frac{1}{2}$ NE $\frac{1}{2}$ NE $\frac{1}{2}$	
T11N R2E SECTION 31	NW $\frac{1}{2}$ NW $\frac{1}{2}$	
T11N R2E SECTION 30	SE $\frac{1}{2}$ SW $\frac{1}{2}$	
Beaver Creek		?
Benton Gulch		27 August 1992
T10N R3E SECTION 6	N $\frac{1}{2}$ SW $\frac{1}{2}$ , SE $\frac{1}{2}$ SW $\frac{1}{2}$ , SW $\frac{1}{2}$ SE $\frac{1}{2}$ , N $\frac{1}{2}$ SE $\frac{1}{2}$ SE $\frac{1}{2}$ , W $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$	
T10N R3E SECTION 5	W $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , SE $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$ , SW $\frac{1}{2}$ NE $\frac{1}{2}$ NW $\frac{1}{2}$ , N $\frac{1}{2}$ NE $\frac{1}{2}$ NW $\frac{1}{2}$	
T11N R3E SECTION 32	W $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , NE $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , SW $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$ , NE $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$	
T11N R3E SECTION 33	N $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , E $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , W $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NE $\frac{1}{2}$ NW $\frac{1}{2}$ , W $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$	
T11N R3E SECTION 28	W $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , NE $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , SE $\frac{1}{2}$ NW $\frac{1}{2}$ SE $\frac{1}{2}$ , SW $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$ , N $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$ , SE $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$ , NW $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$ , NE $\frac{1}{2}$ SW $\frac{1}{2}$ NE $\frac{1}{2}$ , W $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$	
T11N R3E SECTION 27	S $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , N $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , S $\frac{1}{2}$ SW $\frac{1}{2}$ NE $\frac{1}{2}$ , NE $\frac{1}{2}$ SW $\frac{1}{2}$ NE $\frac{1}{2}$ , N $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$	
T11N R3E SECTION 26	S $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$ , NE $\frac{1}{2}$ NW $\frac{1}{2}$ N $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$ , N $\frac{1}{2}$ NE $\frac{1}{2}$ NE $\frac{1}{2}$	
Big Camas Creek		28-29 July 1992
T9N R4E SECTION 16	SE $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , N $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ NW $\frac{1}{2}$	
T9N R4E SECTION 17	N $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$ , S $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$ , N $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ NW $\frac{1}{2}$	
Big Log Gulch		?
Bilk Mountain area		5 August 1992
T10N R2E SECTION 1	NE $\frac{1}{2}$ NE $\frac{1}{2}$ , E $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$ , NE $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$	
T10N R3E SECTION 6	SW $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$	
T11N R3E SECTION 31	SW $\frac{1}{2}$ SW $\frac{1}{2}$ , W $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , W $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$	
T11N R2E SECTION 36	NE $\frac{1}{2}$ NE $\frac{1}{2}$ , NE $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$	
T11N R2E SECTION 25	SW $\frac{1}{2}$ SE $\frac{1}{2}$ , W $\frac{1}{2}$ NW $\frac{1}{2}$ SE $\frac{1}{2}$ , S $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , S $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , SW $\frac{1}{2}$ NE $\frac{1}{2}$	
Boulder Lakes		11 August 1992
Boulder Baldy		15 July 1992





Camas Ridge		29 July 1992
T9N R4E SECTION 9	SW $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$	
T9N R4E SECTION 8	SW $\frac{1}{2}$ SE $\frac{1}{2}$ , SE $\frac{1}{2}$ SW $\frac{1}{2}$ , NE $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$ , S $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$	
T9N R4E SECTION 7	N $\frac{1}{2}$ SE $\frac{1}{2}$ , N $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , S $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$	
Camas Lake		15 July 1992
Candle Mountain		Lesica
Carl Creek		14 July 1992
Cement Gulch		27 August 1992
T10N R3E SECTION 20	SE $\frac{1}{2}$ NE $\frac{1}{2}$ NW $\frac{1}{2}$ , W $\frac{1}{2}$ NE $\frac{1}{2}$ NW $\frac{1}{2}$	
T10N R3E SECTION 17	W $\frac{1}{2}$ SE $\frac{1}{2}$ SW $\frac{1}{2}$ , E $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , SE $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , SW $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$	
T10N R3E SECTION 7	SE $\frac{1}{2}$ , S $\frac{1}{2}$ NE $\frac{1}{2}$	
T10N R3E SECTION 8	S $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$	
Confederate Gulch		5 August 1992
T10N R2E SECTION 25	SW $\frac{1}{2}$ NW $\frac{1}{2}$ , N $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , S $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$ , N $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$	
T10N R3E SECTION 30	N $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , N $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ NE $\frac{1}{2}$ , N $\frac{1}{2}$ SW $\frac{1}{2}$ NE $\frac{1}{2}$ , SE $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$ , W $\frac{1}{2}$ NE $\frac{1}{2}$ NE $\frac{1}{2}$	
T10N R3E SECTION 19	E $\frac{1}{2}$ SE $\frac{1}{2}$ SE $\frac{1}{2}$ , SE $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$	
T10N R3E SECTION 20	SW $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , E $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , NW $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , S $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NE $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ NE $\frac{1}{2}$ , NE $\frac{1}{2}$ NE $\frac{1}{2}$	
Dry Creek		10 August 1992
Duck Creek Pass and gravel hills		7 August 1992
T9N R4E SECTION 31	S $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$ , E $\frac{1}{2}$ SW $\frac{1}{2}$ NE $\frac{1}{2}$ , S $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$	
T9N R4E SECTION 32	NW $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , W $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$	
Gipsy Lake wetlands		8 August 1992
Grass Mountain		14 August 1992
Hellgate Gulch		7 August 1992
T10N R1E SECTION 3	W $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$ , SW $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , N $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , N $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , S $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , E $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NE $\frac{1}{2}$ NW $\frac{1}{2}$	
T11N R1E SECTION 34	W $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , W $\frac{1}{2}$ NW $\frac{1}{2}$ SE $\frac{1}{2}$ , SW $\frac{1}{2}$ NE $\frac{1}{2}$ , SE $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$	
Hogback Ridge		9 August 1992
Hunter Gulch		29 July 1992
Little Camas Creek		27-28 July 1992
T9N R4E SECTION 30	E $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , NW $\frac{1}{2}$ NW $\frac{1}{2}$ SE $\frac{1}{2}$ , S $\frac{1}{2}$ SW $\frac{1}{2}$ NE $\frac{1}{2}$ , S $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$	
T9N R4E SECTION 29	W $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , NE $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , N $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , W $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$ , NE $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$	
T9N R4E SECTION 21	W $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$ , N $\frac{1}{2}$ NW $\frac{1}{2}$	
T9N R4E SECTION 16	N $\frac{1}{2}$ SE $\frac{1}{2}$ SE $\frac{1}{2}$ , SE $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$ , S $\frac{1}{2}$ SE $\frac{1}{2}$ SW $\frac{1}{2}$ , NW $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , E $\frac{1}{2}$ NW $\frac{1}{2}$ SE $\frac{1}{2}$	
Mount Edith, Edith Lake, and The Needles		6 August 1992
T7N R4E SECTION 2	E $\frac{1}{2}$ NE $\frac{1}{2}$ NE $\frac{1}{2}$	
T8N R4E SECTION 35	SE $\frac{1}{2}$ SE $\frac{1}{2}$ SE $\frac{1}{2}$	
T8N R4E SECTION 36	NW $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$ , S $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , NE $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , S $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , W $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$ , NE $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$	
T8N R4E SECTION 25	SE $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$ , NW $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$	



T8N R4E SECTION 26	E $\frac{1}{2}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ , NW $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ , SW $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ , E $\frac{1}{2}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ , S $\frac{1}{2}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ , S $\frac{1}{2}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ , NW $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$	
T8N R4E SECTION 23	E $\frac{1}{2}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ , NW $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ , W $\frac{1}{2}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ , W $\frac{1}{2}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$	
T8N R4E SECTION 22	N $\frac{1}{2}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ , NW $\frac{1}{4}$ NE $\frac{1}{4}$	
T8N R4E SECTION 15	E $\frac{1}{2}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ , NW $\frac{1}{4}$ SE $\frac{1}{4}$ , S $\frac{1}{2}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$	
T8N R4E SECTION 14	NW $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ , E $\frac{1}{2}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$	
T8N R4E SECTION 11	W $\frac{1}{2}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ , SE $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ , N $\frac{1}{2}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ , SE $\frac{1}{4}$ NW $\frac{1}{4}$ , SW $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$	
Needham Mountain		12 August 1992
North of Mount Baldy		8 August 1992
Pike Creek		?
Porcupine Springs area		28 July 1992
T9N R4E SECTION 27	E $\frac{1}{2}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ , S $\frac{1}{2}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ , NW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$	
T9N R4E SECTION 28	W $\frac{1}{2}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ , SE $\frac{1}{4}$ NE $\frac{1}{4}$	
Slip Gulch		?
Skidway aspens		14 August 1992
Spring Gulch		27 August 1992
T10N R2E SECTION 15	NW $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ , NW $\frac{1}{4}$ SW $\frac{1}{4}$ , W $\frac{1}{2}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$	
T10N R2E SECTION 16	E $\frac{1}{2}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$	
T10N R2E SECTION 9	SW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ , W $\frac{1}{2}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ , SW $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ , NE $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$ , NE $\frac{1}{4}$ NE $\frac{1}{4}$ , S $\frac{1}{2}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$	
T10N R2E SECTION 10	NW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ , W $\frac{1}{2}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$	
T10N R2E SECTION 4	E $\frac{1}{2}$ SE $\frac{1}{4}$ , E $\frac{1}{2}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ , E $\frac{1}{2}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$	
T10N R2E SECTION 3	SW $\frac{1}{4}$ SW $\frac{1}{4}$ , S $\frac{1}{2}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ , SE $\frac{1}{4}$ NW $\frac{1}{4}$ , NE $\frac{1}{4}$ SW $\frac{1}{4}$ NW, NW $\frac{1}{4}$ NW $\frac{1}{4}$	
Thompson Gulch		28 July 1992
T9N R4E SECTION 27	SE $\frac{1}{4}$ NE $\frac{1}{4}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ , S $\frac{1}{2}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ , E $\frac{1}{2}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$	
T9N R4E SECTION 22	W $\frac{1}{2}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ , E $\frac{1}{2}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ , S $\frac{1}{2}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ , E $\frac{1}{2}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ , E $\frac{1}{2}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ , E $\frac{1}{2}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$	
White Gulch		5 August 1992
T11N R2E SECTION 36	E $\frac{1}{2}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$	
T10N R2E SECTION 1	SW $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ , NE $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ , SW $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ , N $\frac{1}{2}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ , SW $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ , NW $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$	
T10N R2E SECTION 11	N $\frac{1}{2}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ , SW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ , S $\frac{1}{2}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$	
T10N R2E SECTION 14	NW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$	
T10N R2E SECTION 15	NE $\frac{1}{4}$ NE $\frac{1}{4}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ , SE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ , W $\frac{1}{2}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$	
T10N R2E SECTION 16	N $\frac{1}{2}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ , N $\frac{1}{2}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ , S $\frac{1}{2}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$	
T10N R2E SECTION 17	S $\frac{1}{2}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$	
T10N R2E SECTION 20	N $\frac{1}{2}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ , SE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$	



Elkhorn Mountains

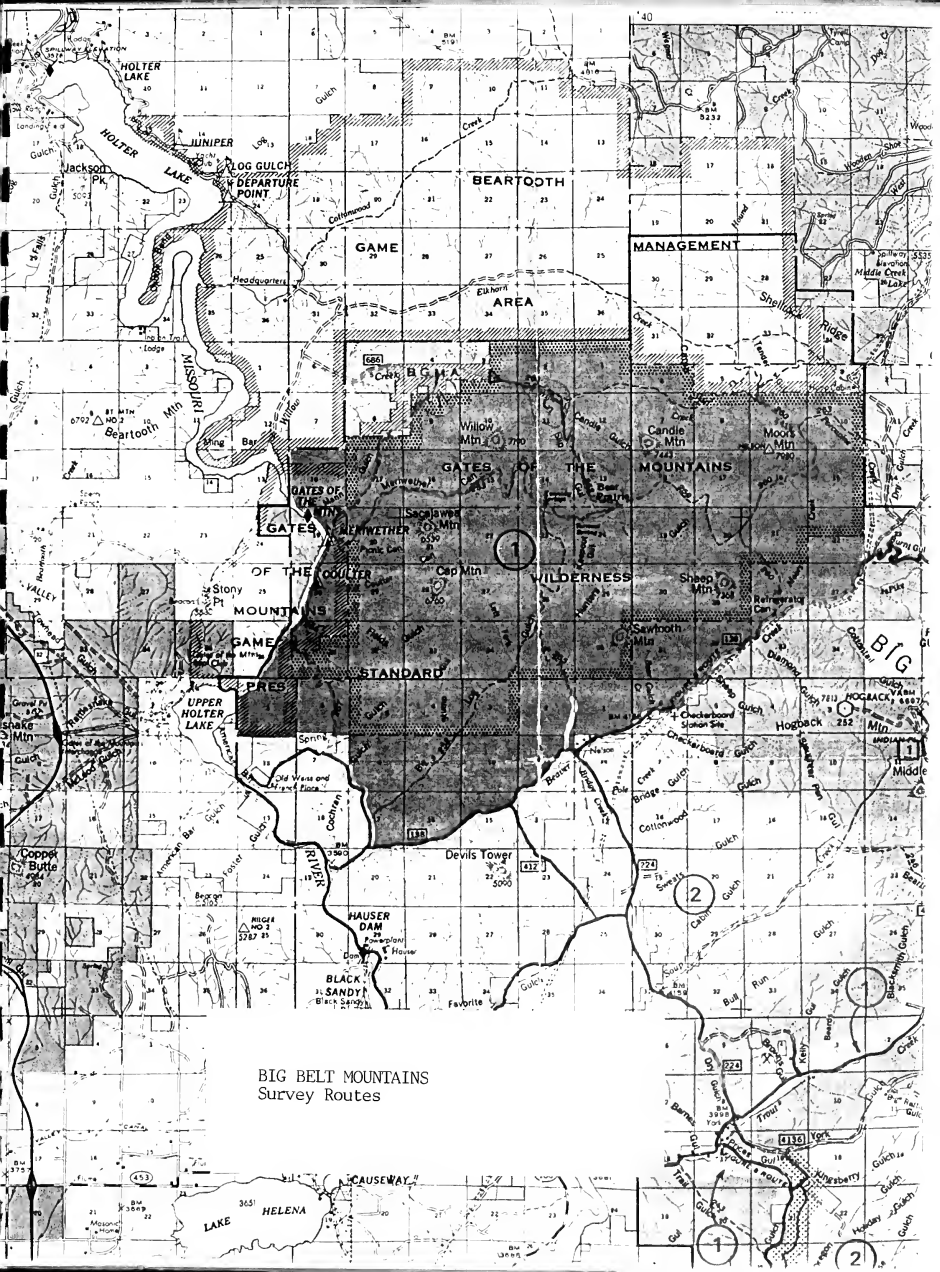
Aldrich Spring and unnamed spring to SE	14 August 1992
T6N R1W SECTION 17	SE $\frac{1}{2}$ SE $\frac{1}{2}$
T6N R1W SECTION 21	N $\frac{1}{2}$ NW $\frac{1}{2}$
T6N R1W SECTION 16	S $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$
Bear Gulch spring and meadow	26 August 1992
T6N R2W SECTION 1	SE $\frac{1}{2}$ NW $\frac{1}{2}$ , E $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ SW $\frac{1}{2}$ , SW $\frac{1}{2}$ SW $\frac{1}{2}$
T6N R2W SECTION 2	NE $\frac{1}{2}$ SE $\frac{1}{2}$ , SE $\frac{1}{2}$ NE $\frac{1}{2}$
Black Canyon	13 August 1992
Bonanza Spring and area	14 August 1992
T6N R1W SECTION 19	S $\frac{1}{2}$ NE $\frac{1}{2}$ , NW $\frac{1}{2}$ NE $\frac{1}{2}$ , SE $\frac{1}{2}$ NW $\frac{1}{2}$
Crow Creek Falls trail	11 July 1992
T7N R1W SECTION 32	S $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$ , NE $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$
T7N R1W SECTION 29	S $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$
T7N R1W SECTION 30	N $\frac{1}{2}$ SE $\frac{1}{2}$ SE $\frac{1}{2}$ , SE $\frac{1}{2}$ NW $\frac{1}{2}$ SE $\frac{1}{2}$ , NW $\frac{1}{2}$ NW $\frac{1}{2}$ SE $\frac{1}{2}$ , NE $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , SE $\frac{1}{2}$ NW $\frac{1}{2}$ , S $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$
T7N R2W SECTION 25	E $\frac{1}{2}$ NE $\frac{1}{2}$ NE $\frac{1}{2}$ NE $\frac{1}{2}$ , NE $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$
T7N R2W SECTION 24	S $\frac{1}{2}$ SE $\frac{1}{2}$ SE $\frac{1}{2}$ , SE $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$
Elkhorn Spring	17 June 1992
Elkhorn Peak	?
Graham Spring	?
Hall Creek trail, including Dewey Creek Spring and Poe and Manley Parks	17 August 1992
T7N R2W SECTION 36	N $\frac{1}{2}$ SW $\frac{1}{2}$ , SE $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , SW $\frac{1}{2}$ NE $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ NW $\frac{1}{2}$
T7N R2W SECTION 35	N $\frac{1}{2}$ NE $\frac{1}{2}$ NE $\frac{1}{2}$ , N $\frac{1}{2}$ NW $\frac{1}{2}$ NE $\frac{1}{2}$
T7N R2W SECTION 26	SW $\frac{1}{2}$ SW $\frac{1}{2}$ SE $\frac{1}{2}$ , SE $\frac{1}{2}$ SE $\frac{1}{2}$ SW $\frac{1}{2}$ , NW $\frac{1}{2}$ SE $\frac{1}{2}$ SW $\frac{1}{2}$ , W $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , E $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , NW $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , SW $\frac{1}{2}$ NW $\frac{1}{2}$
T7N R2W SECTION 27	N $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$ , S $\frac{1}{2}$ SE $\frac{1}{2}$ NE $\frac{1}{2}$ , SE $\frac{1}{2}$ SW $\frac{1}{2}$ NE $\frac{1}{2}$ , NW $\frac{1}{2}$ NW $\frac{1}{2}$ SE $\frac{1}{2}$ , NE $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , S $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , E $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$
T7N R2W SECTION 28	NE $\frac{1}{2}$
Hidden Lake	1 August 1992
Hog Hollow and spring	14 August 1992
T6N R1W SECTION 20	NW $\frac{1}{2}$ NW $\frac{1}{2}$ , N $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$ , W $\frac{1}{2}$ SE $\frac{1}{2}$ SW $\frac{1}{2}$ , SW $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , E $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$ , E $\frac{1}{2}$ SW $\frac{1}{2}$ NW $\frac{1}{2}$ , E $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$
Hunters Spring	3 August 1992
T6N R1W SECTION 27	NE $\frac{1}{2}$ NE $\frac{1}{2}$
Jenkins Gulch	26 August 1992
T6N R1W SECTION 4	W $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , E $\frac{1}{2}$ SW $\frac{1}{2}$ SW $\frac{1}{2}$
T6N R1W SECTION 9	NW $\frac{1}{2}$ NW $\frac{1}{2}$ NW $\frac{1}{2}$
T6N R1W SECTION 8	NW $\frac{1}{2}$ NE $\frac{1}{2}$ , N $\frac{1}{2}$ SW $\frac{1}{2}$ NE $\frac{1}{2}$ , E $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , SW $\frac{1}{2}$ SE $\frac{1}{2}$ NW $\frac{1}{2}$ , NW $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$ , N $\frac{1}{2}$ NW $\frac{1}{2}$ SW $\frac{1}{2}$
T6N R1W SECTION 7	N $\frac{1}{2}$ NE $\frac{1}{2}$ SE $\frac{1}{2}$ , S $\frac{1}{2}$ NW $\frac{1}{2}$ SE $\frac{1}{2}$ , S $\frac{1}{2}$ NE $\frac{1}{2}$ SW $\frac{1}{2}$
Johnny Gulch	17 June 1992
Kelly Spring	28 June 1992
Norris Gulch, White Rock and Piedmont Springs, and vicinity	3 August 1992



T6N R1W SECTION 28	$S\frac{1}{2}NE\frac{1}{4}SE\frac{1}{4}$ , $S\frac{1}{2}NW\frac{1}{4}SE\frac{1}{4}$ , $N\frac{1}{2}SW\frac{1}{4}SE\frac{1}{4}$ , $SE\frac{1}{4}SE\frac{1}{4}$	29 June 1992
T6N R1W SECTION 33	$NE\frac{1}{4}NE\frac{1}{4}NE\frac{1}{4}$ , $W\frac{1}{2}SE\frac{1}{4}NE\frac{1}{4}$ , $SW\frac{1}{4}NE\frac{1}{4}$ , $NW\frac{1}{4}SW\frac{1}{4}SW\frac{1}{4}$	26 August 1992
Sheps Gulch		
South Fork Lakes and trail		
T6N R2W SECTION 13	$W\frac{1}{2}NW\frac{1}{4}NW\frac{1}{4}$	
T6N R2W SECTION 14	$N\frac{1}{2}NE\frac{1}{4}NE\frac{1}{4}$ , $NE\frac{1}{4}NW\frac{1}{4}NE\frac{1}{4}$ , $N\frac{1}{2}NW\frac{1}{4}NW\frac{1}{4}$	
T6N R2W SECTION 11	$S\frac{1}{2}SW\frac{1}{4}SE\frac{1}{4}$ , $NE\frac{1}{4}SE\frac{1}{4}SW\frac{1}{4}$ , $SW\frac{1}{4}NE\frac{1}{4}SW\frac{1}{4}$ , $E\frac{1}{2}NW\frac{1}{4}SW\frac{1}{4}$ , $SW\frac{1}{4}SW\frac{1}{4}$	
Swamp Creek trail and springs		4 August 1992
T6N R2W SECTION 13	$SE\frac{1}{4}NE\frac{1}{4}$ , $N\frac{1}{2}NW\frac{1}{4}SE\frac{1}{4}$ , $S\frac{1}{2}NE\frac{1}{4}SW\frac{1}{4}$ , $SE\frac{1}{4}NW\frac{1}{4}SW\frac{1}{4}$ , $N\frac{1}{2}NW\frac{1}{4}SW\frac{1}{4}SW\frac{1}{4}$	
T6N R2W SECTION 14	$N\frac{1}{2}SE\frac{1}{4}SE\frac{1}{4}$ , $N\frac{1}{2}SW\frac{1}{4}SE\frac{1}{4}$ , $N\frac{1}{2}SE\frac{1}{4}SW\frac{1}{4}$ , $SW\frac{1}{4}SW\frac{1}{4}$	
T6N R2W SECTION 23	$W\frac{1}{2}NW\frac{1}{4}NW\frac{1}{4}$	
Tizer Lakes		1 August 1992
Two Sam Spring		14 August 1992
T6N R2W SECTION 26	$NE\frac{1}{4}NW\frac{1}{4}NE\frac{1}{4}$	
Upper Slim Sam Creek and Silver Spring		3 August 1992
T6N R1W SECTION 29	$NE\frac{1}{4}NE\frac{1}{4}$ , $S\frac{1}{2}NW\frac{1}{4}NE\frac{1}{4}$ , $S\frac{1}{2}NE\frac{1}{4}NW\frac{1}{4}$	
Weasel Creek		?
Willard Creek		?

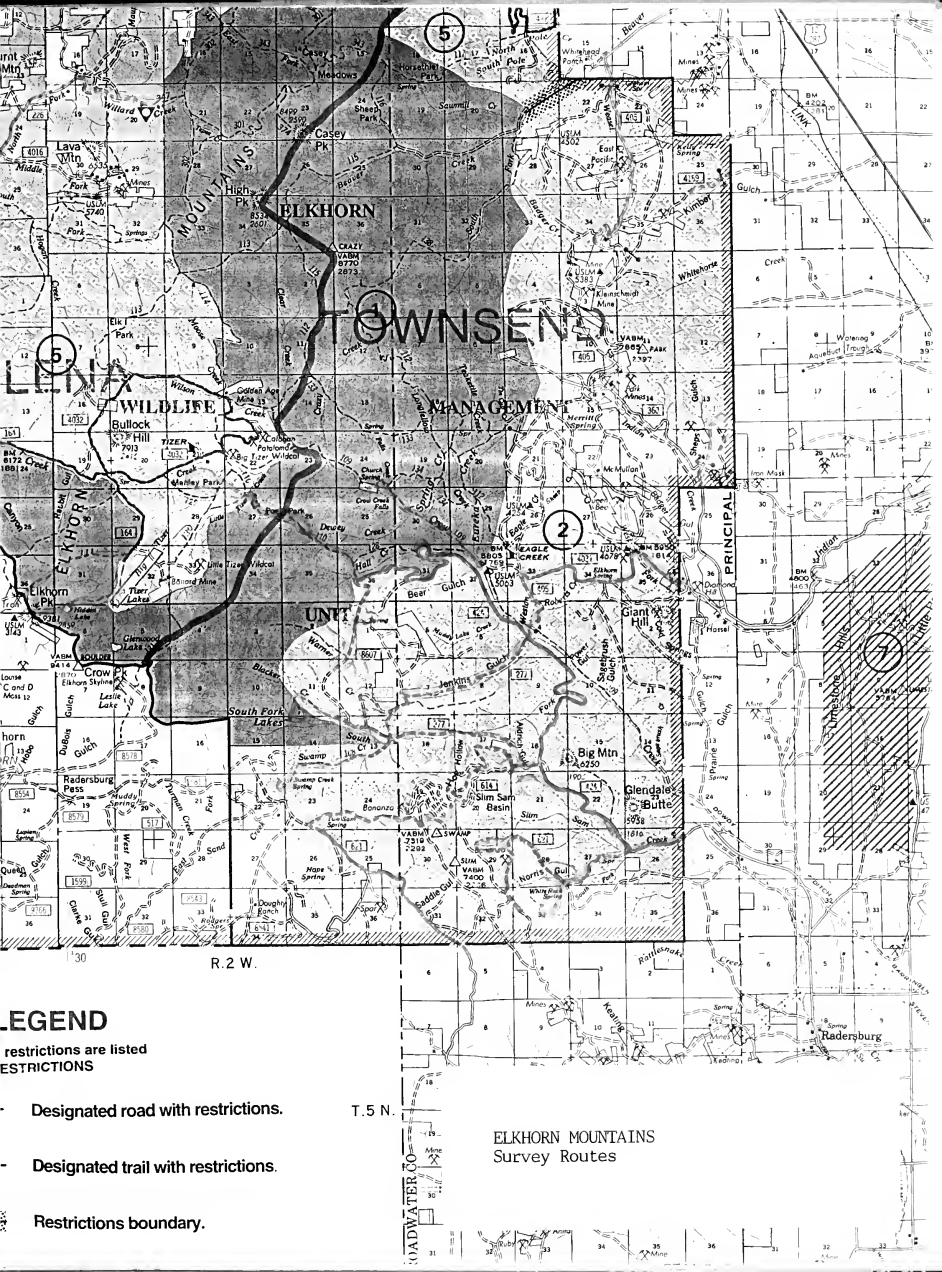






BIG BELT MOUNTAINS  
Survey Routes





# LEGEND

restrictions are listed  
RESTRICTIONS

- Designated road with restrictions.
- Designated trail with restrictions.
- Restrictions boundary.

T.5 N.

ELKHORN MOUNTAINS  
Survey Routes

R.2 W.

LOADWATER CO.

53-30





BIG BELT MOUNTAINS  
Survey Routes

TOWNSHIP

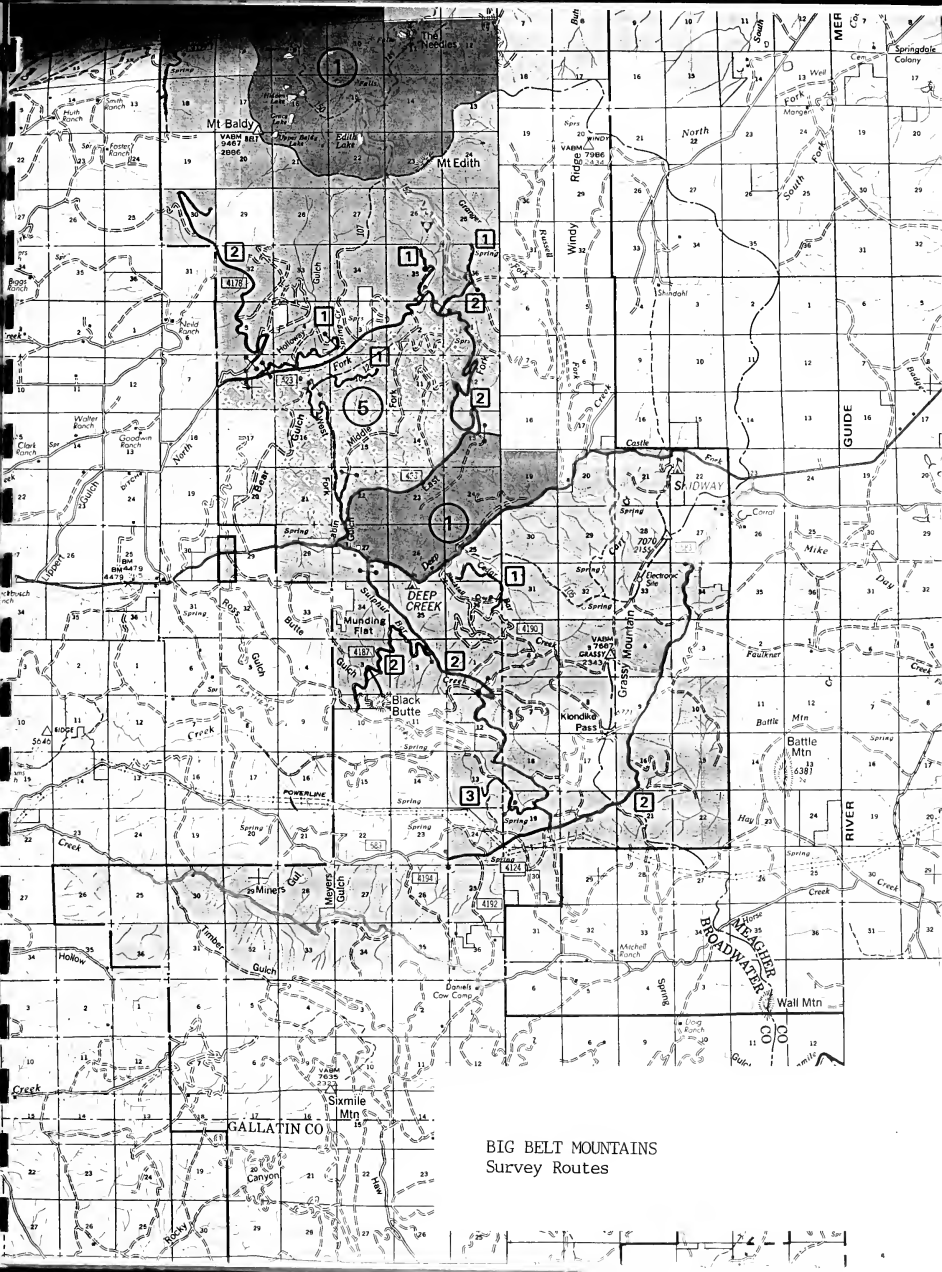
Boulder  
Boulder  
Boulder











BIG BELT MOUNTAINS  
Survey Routes



## APPENDIX 2

PRELIMINARY LIST OF SENSITIVE PLANTS (USFS REGION 1)  
AND PLANTS OF SPECIAL CONCERN (MTNHP)  
WITHIN THE ELKHORN AND BIG BELT MOUNTAINS  
OF THE HELENA NATIONAL FOREST

NAME	RANK	STATUS <sup>1</sup>	SOURCE <sup>2</sup>
<u>Adoxa moschatellina</u>	G5S1	Sensitive	MTNHP
<u>Agroseris lackschewitzii</u>	G3S3	Sensitive	USFS
<u>Aquilegia brevistyla</u>	G5S1	Sensitive	MTNHP
<u>Arenaria kingii</u>	G4S1	Sensitive	USFS
<u>Asplenium trichomanes</u>	G5SH	Sensitive	USFS
<u>Astragalus convallarius</u> var. <u>convallarius</u>	G5T5S2	-	MTNHP
<u>Astragalus molybdenus</u>	G3S1S2	Sensitive	USFS
<u>Botrychium paradoxum</u>	G1S1	C2; Sensitive	USFS
<u>Carex livida</u>	G5S2	Sensitive	USFS
<u>Carex multicosata</u>	G5S1	Watch	MTNHP
<u>Carex paupercula</u>	G5S2	Sensitive	USFS
<u>Carex vallicola</u>	G5S2	-	MTNHP
<u>Castilleja exilis</u>	G5SH	-	MTNHP
<u>Cirsium longistylum</u>	G3QS3	C2	MTNHP
<u>Claytonia lanceolata</u> var. <u>flava</u>	G5TUQS3	C2; Sensitive	MTNHP
<u>Cypripedium calceolus</u> var. <u>parviflorum</u>	G5T3S2S3	Sensitive	USFS
<u>Cypripedium passerinum</u>	G4G5S2	Sensitive	USFS
<u>Draba densifolia</u>	G5S2	-	MTNHP
<u>Drosera linearis</u>	G4S1	Sensitive	USFS
<u>Epipactis gigantea</u>	G4S2	Sensitive	USFS
<u>Erigeron flagellaris</u>	G5S1	-	MTNHP
<u>Eriophorum viridicarinatum</u>	G5S2	Sensitive	USFS
<u>Goodyera repens</u>	G5S2S3	Sensitive	MTNHP
<u>Juncus hallii</u>	G4G5S2	Sensitive	USFS
<u>Lesquerella klausii</u>	G3S3	-	MTNHP
<u>Mimulus primuloides</u>	G4S1	Sensitive	USFS
<u>Orchis rotundifolia</u>	G5S2S3	Sensitive	USFS
<u>Oxytropis lagopus</u> var. <u>conjugans</u>	G4T2S2	-	MTNHP
<u>Oxytropis podocarpa</u>	G4S1	Sensitive	USFS
<u>Phlox kelseyi</u> var. <u>missoulensis</u>	G4T2QS2	Sensitive	USFS
<u>Polygonum douglasii</u> ssp. <u>austinae</u>	G4T4S2	Sensitive	USFS
<u>Potentilla diversifolia</u> var. <u>multisecta</u>	G5T3T4SH	-	MTNHP
<u>Ranunculus jovis</u>	G4S1S2	Sensitive	USFS
<u>Salix serissima</u>	G4S1	Watch	MTNHP
<u>Salix wolfii</u> var. <u>wolfii</u>	G4T4S1	Sensitive	USFS



<u>Saussurea densa</u>	G3S1	Sensitive	USFS
<u>Saussurea weberi</u>	G3S1	Sensitive	USFS
<u>Saxifraga tempestiva</u>	G2S2	Sensitive	USFS
<u>Scirpus subterminalis</u>	G4G5S1	Sensitive	USFS
<u>Selaginella watsonii</u>	G4G5S3	Sensitive	USFS
<u>Senecio debilis</u>	G3G4S1	-	MTNHP
<u>Sphenopholis obtusata</u> var. <u>major</u>	G5T5S1	-	MTNHP
<u>Thalictrum alpinum</u>	G4G5S1	Sensitive	USFS
<u>Townsendia spathulata</u>	G3S3	-	MTNHP
<u>Veratrum californicum</u>	G5S1	Sensitive	MTNHP
<u>Viola renifolia</u>	G5S1	Sensitive	USFS

<sup>1</sup>C2 - U.S. Fish and Wildlife Service Category 2 (potential for listing)

Sensitive and Watch - Region 1, U.S. Forest Service

<sup>2</sup>USFS - Taxa from U.S. Forest Service Biological Evaluation for Crow Creek area

MTNHP - Montana Natural Heritage Program database, searched by county and watershed



### APPENDIX 3

#### SPECIES DELETED FROM APPENDIX 2

Antennaria pulcherrima - The habitat that this species requires calcareous fens and carrs is not known from the Elkhorn or Big Belt Mountains. Also this species is no longer being tracked by the Montana Natural Heritage Program as the species is questionable taxonomically.

Arenaria kingii - The report of this species from the Big Belt Mountains may be based on a misidentified specimen. All other Montana collections are from Beaverhead County. This species probably does not occur in either the Big Belt of Elkhorn Mountains.

Astragalus molybdenus - The habitat that this species occupies alpine calcareous scree is not available in the Elkhorn or Big Belt Mountains.

Carex livida - This species occurs only in peatlands, particularly calcareous ones. As there is little such habitat in the Elkhorn or Big Belt Mountains and some of that was searched, it is unlikely that this species occurs in the study area.

Carex paupercula - This species is found in peatlands in the montane zone. As there is little such habitat in the Elkhorn or Big Belt Mountains and some of that was searched, it is unlikely that this species occurs in the study area.

Castilleja exilis - This species is known from alkaline meadows and marshes, primarily at lower elevations. This type of habitat is not known from the Elkhorn or Big Belt Mountains.

Claytonia lanceolata var. flava - This taxon will be submerged within another more widespread and common species, and thus will no longer be of concern.

Cyripedium passerinum - This species grows in peaty soils in the ecotone between wet mossy coniferous forests and wetlands or streams. The Elkhorn and Big Belt Mountains do not support this type of habitat, and are outside the known range of this species.

Drosera linearis - This species requires sphagnum bogs. As there is little such habitat in the Elkhorn or Big Belt Mountains and some of that was searched, it is unlikely that this species occurs in the study area.

Eriophorum viridicarinatum - This species is found in Carex dominated peatlands and cold sphagnum bogs in the foothill





and montane zones. As there is little such habitat in the Elkhorn or Big Belt Mountains and some of that was searched, it is unlikely that this species occurs in the study area.

Mimulus primuloides - This species grows around seeps and in peatlands in open wet meadows in the montane to subalpine zone. As there is little such habitat in the Elkhorn or Big Belt Mountains and some of that was searched, it is unlikely that this species occurs in the study area.

Orchis rotundifolia - This species occurs on organic soils with good drainage, often on limestone, in wet mossy coniferous forest edges near peatlands and streams. This habitat type is unknown from the Elkhorn or Big Belt Mountains.

Oxytropis podocarpa - This species grows on alpine limestone habitat, which is absent or scarce in the study area.

Ranunculus jovis - This species is found in sagebrush or open areas in spruce-fir parklands in the alpine zone. The Elkhorn and Big Belt Mountains do contain this type of habitat, and are outside the known range of this species.

Saussurea densa - This species grows on open calcareous talus and loose scree in the alpine zone. This type of habitat is not known from the Elkhorn or Big Belt Mountains which are outside the known range of this species.

Saussurea weberi - This species is found in moist meadows and gentle sparsely vegetated slopes in the alpine zone. This type of habitat is not known from the Elkhorn or Big Belt Mountains.

Saxifraga tempestiva - This species occurs on vernal moist open soil in meadows, rock edges and depressions which retain snow in the krummholz and alpine zones. There is not habitat of this sort in the Elkhorn or Big Belt Mountains.

Scirpus subterminalis - This species requires quiet fresh water of shallow lakes and ponds in the valley, foothills, and montane zone. As there is little of this habitat in the Elkhorn and Big Belt Mountains, there is only a remote chance of this species occurring there.

Selaginella watsonii - This species occupies sheltered outcrop microhabitats at high alpine elevations. There is little of this habitat in the Elkhorn and Big Belt Mountains.

Senecio debilis - This species grows in moist alkaline meadows in the valley and foothills zone. Habitat of the type is not known from the Elkhorn or Big Belt Mountains.



Thalictrum alpinum - This species occurs on hummocks in moist alkaline meadows in the montane zone. This type of habitat is not known from the Elkhorn or Big Belt Mountains.



APPENDIX 4

REVISED LIST OF TARGETED SENSITIVE PLANTS (USFS REGION 1)  
AND PLANTS OF SPECIAL CONCERN (MTNHP)  
WITHIN THE ELKHORN AND BIG BELT MOUNTAINS  
OF THE HELENA NATIONAL FOREST

SPECIES	MTNHP	USFS	USFWS
<u>Adoxa moschatellina</u>	G5S1	Sensitive	-
This species possibly occurs in the Elkhorn Mountains in moist, mossy places (such as slopes) in woods and rock crevices at elevations of 4400-5400'. Flowering and fruiting run from June through August. The confidence level <sup>1</sup> of the species occurrence and the habitat profile are low.			
<u>Agroseris lackschewitzii</u>	G3S3	Sensitive	-
This species could occur in the Elkhorn and Big Belt Mountains in moist-wet meadows or subalpine wet meadows where the soil is saturated throughout growing season. The species has been collected at 6150-9500' elevation. It flowers from July to early August, and fruits in late August. The confidence level of the habitat profile is high, and that of the species occurrence is low.			
<u>Aquilegia brevistyla</u>	G5S1	Sensitive	-
This species might grow in the Big Belt Mountains in open woods and streambanks at mid-elevations (5000-6000') in the mountains. Flowering begins in June and wanes in early July. The confidence level of the habitat profile is high, and that of the species occurrence is medium.			

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<sup>1</sup>The confidence level of the species occurrence and the habitat profile refer to the probability either that the species might occur in the area or that the habitat profile includes all habitat types which the species occupies. The rankings are low (unlikely that the species occurs in the area or that the habitat profile includes all habitat types which the species occupies), medium (a 50/50 chance that the species occurs in the area or that the habitat profile includes all habitat types which the species occupies), or high (highly likely that the species occurs in the area or that the habitat profile includes all habitat types which the species occupies). Information for the rankings was drawn from knowledgeable individuals, the Montana Natural Heritage Program database, and the literature.



Asplenium trichomanes G5SH Sensitive -  
 Not collected in Montana since 1895, this species might be found in the Gates of the Mountains Wilderness Area on moist sites on cliffs and crevices in rocky talus at mid-elevation in the mountains. The fronds mature in July. The confidence level of the habitat profile is medium, and that of the species occurrence is low.

Astragalus convallarius G5T5S2 - -  
 var. convallarius  
 This species was collected in the northern part of the Big Belt Mountains during the course of this study, and was also found just outside the Helena National Forest boundary of the Elkhorn Mountains. While it may possibly extend into the Elkhorn Mountains, the most promising potential habitat is at lower elevations outside of administrative boundaries. It occurs in grasslands and sagebrush in the valleys and foothills at elevations of 3880 to 4400' in the Helena National Forest vicinity and at 8100' in Beaverhead County. Flowering begins in May to early June depending on elevation.

Botrychium paradoxum G1S1 Sensitive C2  
 This species could possibly be found in the Elkhorn and Big Belt Mountains in grasslands and meadows (moist shrubby ones often near lakes) in the foothills and montane zones at 4000-8200' elevation. The fronds mature in July. The confidence level of the habitat profile and of the species occurrence is low.

Carex multicostata G5S1 Watch -  
 This species possibly occurs in the Elkhorn and Big Belt Mountains in meadows, woods, and on open slopes. It is found at moderate elevations, but occasionally ascends above timberline (6000-11000' elevation). Flowering and fruiting are in July. The confidence level of the habitat profile and of the species occurrence is medium.

Carex vallicola G5S2 - -  
 This species has been collected once in the Big Belt Mountains, without precise locality information, and might possibly occur in the Elkhorn Mountains. It grows on moist or moderately dry slopes from the foothills to moderate elevations (5760-7080') in mountains, often with sagebrush or aspen. Flowering is in June, and fruiting is in late June through August. The confidence level of the habitat profile is medium and the species occurrence has previously been documented on the Helena National Forest.





- Cirsium longistylum G3Q53 - -  
 This species was collected during this study in both the Elkhorn and Big Belt Mountains. It is known from meadows, slopes, and roadsides at moderate elevations (4680-8040') in the mountains. Flowering begins in late June and can continue to frost. Seed development starts in late August.
- Cypripedium calceolus G5T3S3 Sensitive -  
 var. parviflorum  
 This species might possibly be found in the Big Belt and Elkhorn Mountains on organic soils in moist coniferous forests in seepage areas and moist ecotones between peatlands and upland forest at elevations of 3000-6200'. Flowering occurs in May to June. A historic occurrence north of Belgrade has never been relocated. The confidence level of the habitat profile is high and that of the species occurrence is low.
- Delphinium andersonii G5S1 Watch -  
 This species was collected for the first time in the Big Belt Mountains during the course of this study. Previously it was known from sagebrush valleys and hills in open forests at around 4120' elevation, but in the Big Belt Mountains, the species was found on a talus slope at around 5000'. It flowers during May and June. The habitat profile may need more refinement.
- Draba densifolia G5S2 - -  
 This species might possibly occur in the Elkhorn and Big Belt Mountains. It is found in open gravelly soil of rocky slopes and exposed ridges in the montane to alpine zones at elevations of 5600-8800'. Flowering occurs May through June depending on elevation. The confidence level of the habitat profile and of the species occurrence is high.
- Epipactis gigantea G4S2 Sensitive -  
 This species could occur in the Big Belt and Elkhorn Mountains on stable intact groundwater discharge zones located along streambanks, lake margins, edges of peatlands, and around springs and seepage areas, often near thermal waters at elevations of 2900-5800'. Flowering occurs June through August. The confidence level of the habitat profile is high and of the species occurrence is low.
- Erigeron flagellaris G5S1 - -  
 This species might be found in the Big Belt Mountains on open soil in meadows and open forests in montane zone at around 5000' elevation. Flowering occurs in late June through August. The confidence level of the habitat profile and of the species occurrence is low.



- Goodyera repens G5S2S3 Sensitive -  
 This species might possibly occur in the Big Belt Mountains on moist limestone slopes of old growth Doug fir forests in the montane zone at elevations of 5700-6100'. The species begins flowering in late July to August. The confidence level of the habitat profile is high and that of the species occurrence is medium.
- Juncus hallii G4G5S2 Sensitive -  
 The species was relocated in the Big Belt Mountains during the course of this study. It might also be found in the Elkhorn Mountains in montane to alpine moist grasslands and sedge meadows at 4000-8400' elevation. Flowering occurs during July to August. The species habitat profile may need more refinement.
- Lesquerella klausii G3S3 - -  
 Most individuals and populations of this Montana endemic are found within the Big Belt Mountains. The species occurs on open shale slopes and gravelly areas at moderately to fairly high elevations (4000-7100') in the mountains. It flowers from May to early June, with fruiting beginning in late May and continuing through June.
- Oxytropis lagopus G4T3S3 - -  
 var. conjugans  
 This Montana endemic probably occurs in the Big Belt Mountains on limestone outcrops in sagebrush areas to the lower mountains at elevations of 3900-6120'. Flowering occurs May to June, and fruiting happens during July. The confidence level of the habitat profile and of the species occurrence is high.
- Phlox kelseyi G4T2QS2 Sensitive 3C  
 var. missouensis  
 This taxon usually occurs on gravelly windswept ridges and slopes, although sometimes it grows in forb dominated meadows. It is found at elevations of 3600-7540', and could occur in the Big Belt and Elkhorn Mountains. Flowering lasts from May to June. The confidence level of the habitat profile is high while that of the species occurrence is medium.
- Polygonum douglasii G4T4S2 Sensitive -  
 ssp. austinae  
 This taxon was found at several sites in the Big Belt Mountains during the course of this study. It occurs on open, gravelly, often shale-derived soil of eroding slopes and banks in montane zone, or on usually moist barren shale slopes at 5140-6600' elevation. It flowers in July, and fruit matures in August.



- Potentilla diversifolia G5T3T4SH - -  
 var. multisecta  
 This taxon was collected from an area within the general vicinity of the southern Big Belt Mountains along Rocky Canyon, " miles north of Belgrade" but has not been seen in Montana for almost 90 years. The area of the original collection corresponds with private property within the boundaries of lands administered by the U.S. Forest Service. It is reported from dry rocky slopes and ridges in the subalpine and alpine zones at 7000-9000' elevation. Flowering occurs in late May through June. The habitat profile may need more refinement.
- Salix serissima G4S1 Watch -  
 This willow grows in low elevation fen habitat including a site ca. 10 miles east of the Big Belt Mountains near White Sulphur Springs. It might possibly be found in the Big Belt Mountains in swamps and fens in the valleys and foothills at elevations of 4500-5300', though no habitat resembling the White Sulphur Springs setting was found. It flowers in June, and the fruit matures in July through September. The confidence level of the habitat is high and of the species occurrence is low.
- Salix wolfii var. wolfii G4T4S1 Sensitive -  
 This willow might occur in the Elkhorn Mountains in rocky clay-loam soils in wet meadows, or more often in riparian areas in the montane to subalpine zones at elevations of 6500-9000'. Fruit matures in July to August. The confidence level of the habitat profile is medium while that of the species occurrence is low.
- Sphenopholis obtusata G5T5S1 - -  
 var. major  
 This grass has not been collected in Montana since 1949, but might occur in the Elkhorn and Big Belt Mountains in grasslands in the valleys and on the plains at 3000-5000' elevation. The fruit matures in July and August. The confidence level of the habitat and of the species occurrence is low.
- Townsendia spathulata G3S3 - 3C  
 This species occurs on low elevation limestone ridges at the eastern edge of the Elkhorn Mountains in the Limestone Hills on land administered by BLM. It might possibly be found elsewhere in the Elkhorn and Big Belt Mountains on open rocky limestone-derived soils of slopes and windswept ridgetops in the valley and foothill zones at elevations of 4500-6400'. Flowering occurs in May to early June. The confidence level of the habitat profile is high while that of the species occurrence is medium.



Veratrum californicum G5S1 Sensitive -

This species might occur in the Elkhorn Mountains in wet meadows and along streambanks in the montane and subalpine zones at 6000-8500' elevation. It flowers during July and August. The confidence level of the habitat profile is medium while that of the species occurrence is low.

Viola renifolia G5S1 Sensitive -

This violet might possibly occur in the Elkhorn Mountains in organic soils in swampy spruce woods in the montane zone at elevations of 3000-5000'. It flowers from June to early July. The confidence level of the habitat profile and of the species occurrence (Swamp Creek Springs) is high.





**APPENDIX 5**

**ELEMENT OCCURRENCE RECORDS, MAPS, AND PHOTOGRAPHS  
OF SPECIES OF CONCERN OCCURRING  
IN THE ELKHORN AND BIG BELT MOUNTAINS, HELENA NATIONAL FOREST**



ARENARIA KINGII \* 001  
KING'S ARENARIA

Global rank: G4      Forest Service status: SENSITIVE  
State rank: S1      Federal Status:

Survey site name: DEEP CREEK CANYON  
EO rank:  
EO rank comments:

County: BROADWATER

USGS quadrangle: SULPHUR BAR CREEK

Township: Range: Section: TRS comments:  
007N      005E      19      SE4

Survey date: 1948-06-06      Elevation: 5200 -  
First observation: 1948      Slope/aspect:  
Last observation: 1948-06-06      Size (acres): 0

Location:  
18 MILES EAST OF TOWNSEND, HELENA NATIONAL FOREST, DEEP  
CREEK CANYON.

Element occurrence data:  
UNKNOWN.

General site description:  
DOUGLAS FIR CLIMAX.

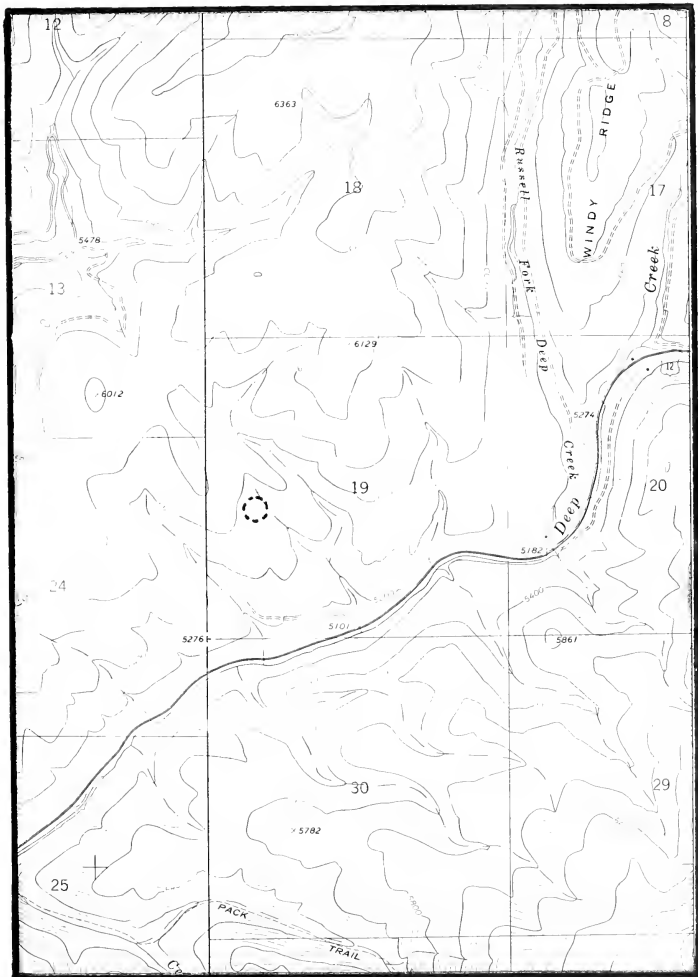
Land owner/manager:  
HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:  
SPECIMEN ANNOTATED BY DORN. SPECIMEN LACKED NARROW SEPALS  
AND PRONOUNCED MIDRIB OF OTHER MONTANA MATERIAL. THERE IS  
ALSO A MAJOR HABITAT DIFFERENCE BETWEEN THIS AND OTHER  
MONTANA SITES.

Information source:  
MONTANA NATURAL HERITAGE PROGRAM BOTANIST. MTNHP. 1515 EAST  
SIXTH AVENUE, HELENA, MT 59620.

Specimens:  
METCALF, H. (S.N.). 1948. SPECIMEN #38791. MONT.





Arenaria kingii #001  
Suphur Bar Creek Quad



ASTRAGALUS CONVALLARIUS VAR CONVALLARIUS \* 007  
LESSER RUSHY MILKVETCH

Global rank: G5T5 Forest Service status:  
State rank: S2 Federal Status:

Survey site name: BIG LOG GULCH  
EO rank:  
EO rank comments:

County: LEWIS AND CLARK

USGS quadrangle: UPPER HOLTER LAKE

Township: Range: Section: TRS comments:  
012N 002W 17 NW4SE4

Survey date: Elevation: 3960 -  
First observation: 1992-05-20 Slope/aspect: 2% / SOUTHEAST  
Last observation: 1992-05-20 Size (acres): 1

Location:

BIG BELT MOUNTAINS, CA. 2.1 AIR MILES NORTH OF THE NORTH END  
OF HAUSER DAM; FROM NELSON GO WEST CA. 4 MILES AND PARK  
ONE-THIRD MILE EAST OF JUNCTION, HIKE NORTH TO SADDLE  
BETWEEN BIG LOG GULCH AND BEAVER CREEK.

Element occurrence data:

LESS THAN 10 PLANTS; IN FLOWER AND BUD. POPULATION MAY BE  
LARGER THAN OBSERVED DUE TO DROUGHT AND DIFFICULTY IN  
OBSERVING PARTICULARLY WHEN NOT IN FLOWER.

General site description:

MESIC GRASSLAND ON ROLLING UPLANDS DOMINATED BY FESTUCA  
SCABRELLA, STIPA VIRIDULA, AGROPYRON SMITHII, AND POA  
SCABRELLA; SILTY SOIL; PARENT MATERIAL-LIMESTONE/CALCAREOUS  
SANDSTONE; RECENT FIRE BURNED TREES IN AREA. WITH ASTRAGALUS  
FLEXUOSUS. OPEN EXPOSURE, TOPOGRAPHIC POSITION - ON SADDLE.  
TOTAL SHRUB COVER 0%; TOTAL FORB COVER 10%; TOTAL GRAMINOID  
COVER 80%; TOTAL BARE GROUND COVER 10%.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

RECENT FIRE.

Information source:

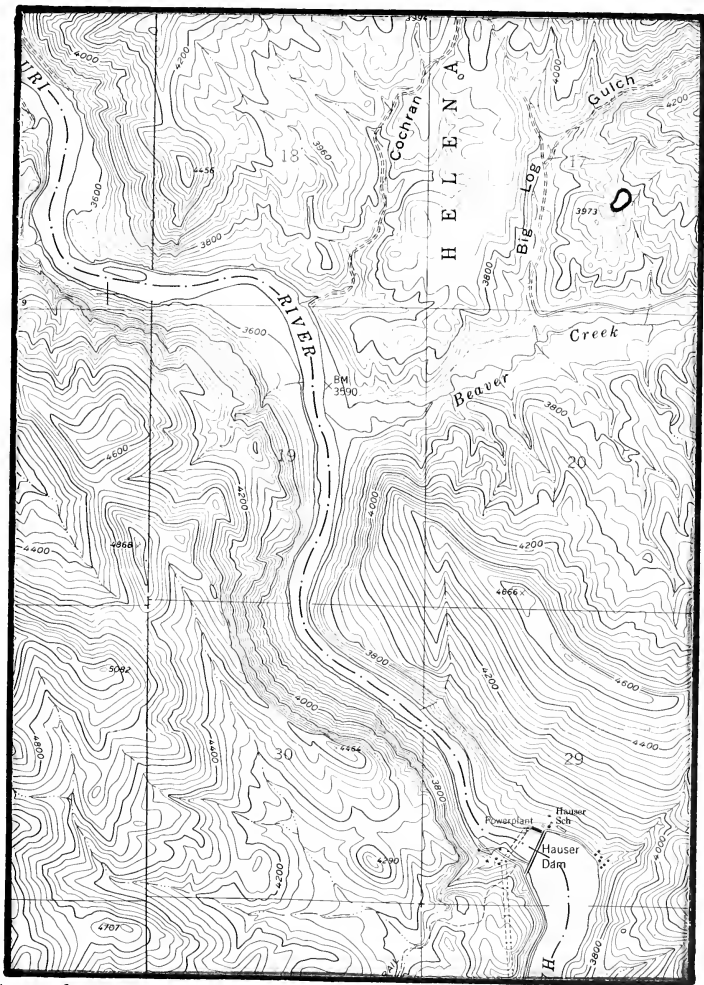
LESICA, P. DIVISION OF BIOLOGICAL SCIENCES, UNIV. OF  
MONTANA, MISSOULA, MT 59812.

Specimens:

LESICA, P. (5643). 1992. MONTU.







*Astragalus convallarius* var. *convallarius* #007  
Upper Holter Lake Quad



CAREX VALLICOLA \* 001  
A SEDGE

Global rank: G5 Forest Service status:  
State rank: S2 Federal Status:

Survey site name: OREGON GULCH  
EO rank:  
EO rank comments:

County: LEWIS AND CLARK

USGS quadrangle: CANYON FERRY

Township: Range: Section: TRS comments:  
011N 001W 12 E2

Survey date:	Elevation: 6150 -
First observation: 1985	Slope/aspect: 10% / WEST
Last observation: 1985-07-18	Size (acres): 0

Location:  
BIG BELT MOUNTAINS, HEDGES MOUNTAIN, OREGON GULCH DRAINAGE.  
(CA. 4.2 MILES NE OF CANYON FERRY LAKE.)

Element occurrence data:  
SCATTERED.

General site description:  
UNDER OPEN STAND OF PSEUDOTSUGA MENZESEII.

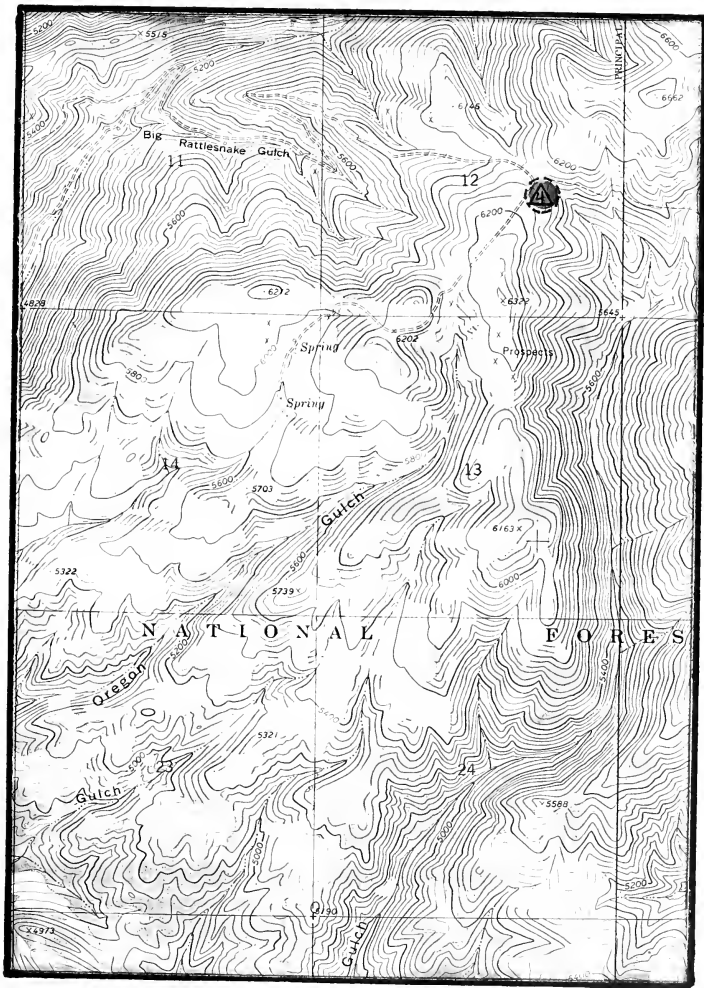
Land owner/manager:  
HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:  
NONE.

Information source:  
PIERCE, J. (1317). 1985. SPECIMEN # 019141. MONTU.

Specimens:





Carex vallicola #001  
Canyon Ferry Quad



CIRSIUM LONGISTYLUM \* 006  
LONG-STYLED THISTLE

Global rank: G2Q Forest Service status:  
State rank: S3 Federal Status: C2

Survey site name: DUCK CREEK PASS  
EO rank: BC  
EO rank comments: LARGE POPULATION, PRIMARILY ROADSIDE, PROBABLY  
HYBRIDIZING WITH CIRSIUM HOOKERIANUM.

County: MEAGHER  
BROADWATER

USGS quadrangle: GIPSY LAKE  
BOULDER BALDY  
GURNETT CREEK EAST

Township: Range: Section: TRS comments:  
009N 004E 32 27,28,33,31,30  
25 36

Survey date: 1992-07-27 Elevation: 6320 -7600  
First observation: 1976 Slope/aspect:  
Last observation: 1992-10-02 Size (acres): 20

Location:  
BIG BELT MOUNTAINS, DUCK CREEK PASS ROAD (FS RD #139),  
BEGINNING JUST WEST OF TURNOFF TO THOMPSON GULCH GUARD  
STATION, AND SCATTERED IN SUBPOPULATIONS ALONG ROAD FOR 6.4  
MILES TO THE WEST.

Element occurrence data:  
1992: 1000-5000 INDIVIDUALS, ALL IN FLOWER. 1983: SOME  
SUBPOPULATIONS HAVE >100 PLANTS; ANOTHER THISTLE, POSSIBLY  
C. HOOKERIANUM, OCCURS IN ALL AREAS, PROBABLY HYBRIDIZING.

General site description:  
1992: OPEN GRASSLANDS WITH SCATTERED SHRUBS BETWEEN ROAD  
EDGE AND FOREST, WITH FESTUCA IDAHOENSIS, TRisetum SP., POA  
PRATENSIS, BROMUS SP., PSEUDOTSUGA MENZIESII, AND PINUS  
CONTORTA. 1983 (RAMSTETTER): MOIST FIELDS AND ALONG  
ROADSIDE; WITH LUPINUS, SOLIDAGO.

Land owner/manager:  
HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

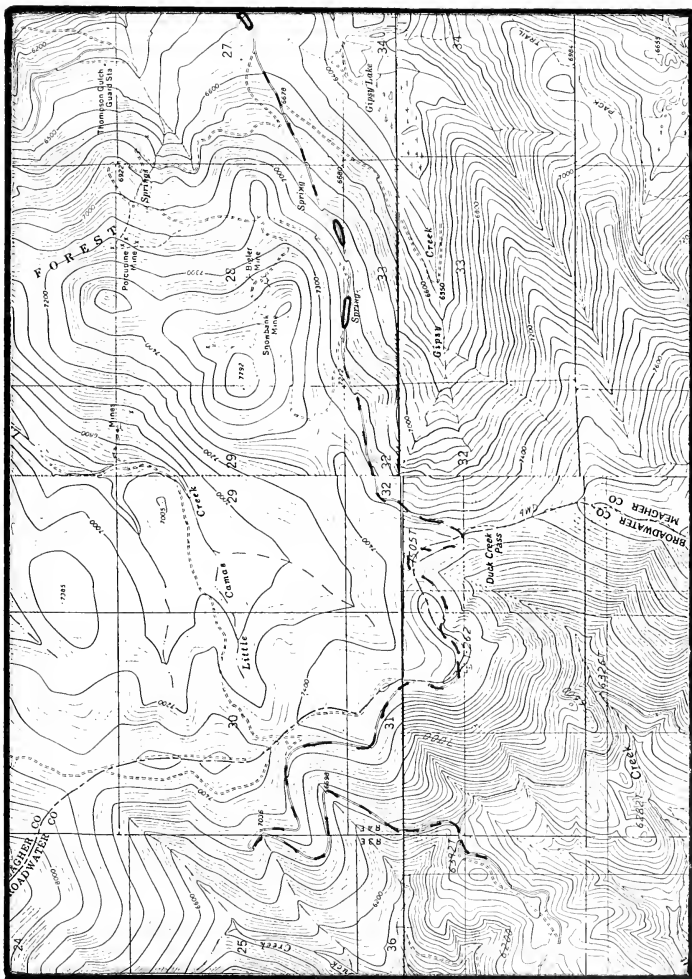
Comments:  
SOME DISTURBANCE CAUSED BY ROAD CONSTRUCTION AND  
MAINTENANCE.

Information source:  
POOLE, J. 1992. [MTNHP FIELD SURVEYS TO ELKHORN AND BIG BELT  
MOUNTAINS, HELENA NATIONAL FOREST, JULY 12, 27-29, AUGUST  
3-7, 14, 17, 26 AND 27.]

Specimens:  
RAMSTETTER, J. (11, 13). 1983. MONTU.  
DORN, R. D. (2783). 1976. MONTU.  
LESICA, P. (5846). 1992.







Cirsium longistylum #006

upper left: Boulder Baldy Quad

upper right: Gipsy Lake Quad

lower left: Gurnett Creek E Quad

lower right: Mt Edith Quad

77% reduction Distribution extending along 6.4 miles of road; extending outside of right-of-way



CIRSIUM LONGISTYLUM \* 022  
LONG-STYLED THISTLE

Global rank: G2Q Forest Service status:  
State rank: S3 Federal Status: C2

Survey site name: CARL CREEK  
EO rank: D  
EO rank comments: VERY SMALL POPULATION, DISTURBED HABITAT.

County: BROADWATER

USGS quadrangle: BATTLE MOUNTAIN

Township: Range: Section: TRS comments:  
007N 005E 20 NE4

Survey date: 1992-07-14 Elevation: 5440 -5480  
First observation: 1992-07-14 Slope/aspect: 0-5% / SOUTH,  
SOUTHEAST.  
Last observation: 1992-07-14 Size (acres):

Location:

BIG BELT MOUNTAINS, ALONG CARL CREEK TRAIL, JUST SOUTH OF  
TRAILHEAD OFF HIGHWAY 12.

Element occurrence data:

7 PLANTS TOTAL, 1 COLLECTED. IN EARLY FLOWERING; WEEVILS  
PRESENT.

General site description:

IN ABANDONED ROADBED (NORTH END) AND SEMI-INTACT MEADOW  
(SOUTH END) OF PARTIALLY-OPEN VALLEY BOTTOM SEGMENT ALONG  
CARL CREEK. ASSOCIATED SPECIES (NORTH END): PHLEUM PRATENSE,  
SYMPHORICARPOS ALBUS, CIRSIUM VULGARIS, GERANIUM  
VISCOSISSIMUM, BROMUS INERMIS; SOUTH END: GALIUM BOREALE,  
FESTUCA IDAHOENSIS, SENECEO SPP., AND ACHILLEA MILLEFOLIUM.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

VALLEY BOTTOM WAS FORMER ROADBED; HIGH NUMBER OF EXOTICS  
OUTSIDE OF ROADBED MAY REFLECT GRAZING HISTORY.

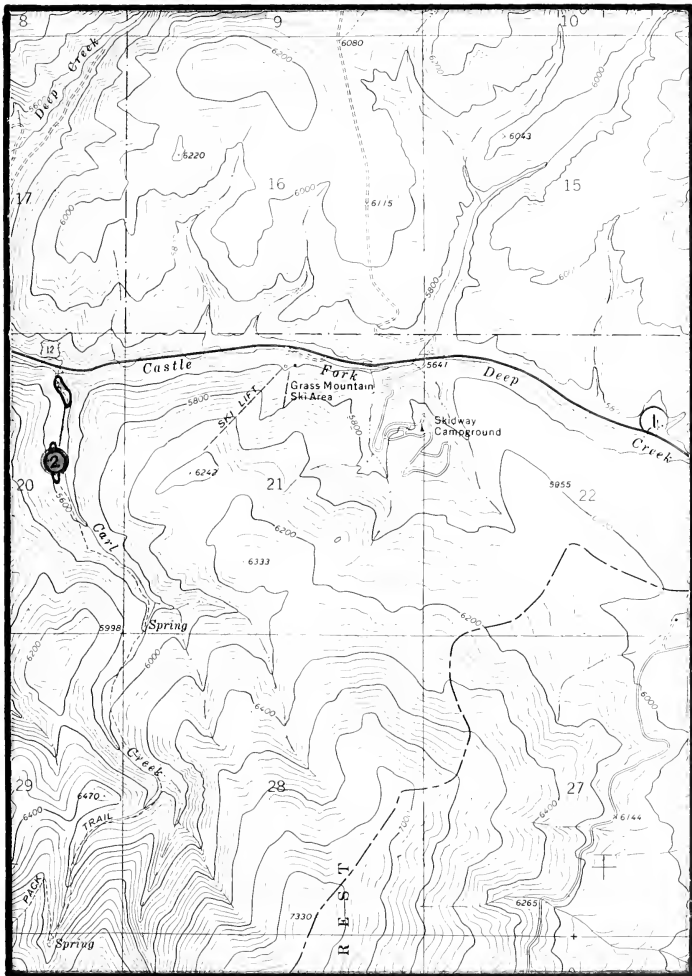
Information source:

HEIDEL, B. 1992. [MTNHP FIELD SURVEY TO CARL CREEK OF 14  
JULY.]

Specimens:

HEIDEL, B. (796). 1992. MONT.





Cirsium longistylum #022  
Battle Mt Quad



CIRSIUM LONGISTYLUM \* 023  
LONG-STYLED THISTLE

Global rank: G2Q Forest Service status:  
State rank: S3 Federal Status: C2

Survey site name: ATLANTA RIDGE  
EO rank: A  
EO rank comments: LARGE POPULATION IN INTACT HABITAT.

County: MEAGHER

USGS quadrangle: BOULDER BALDY

Township: Range: Section: TRS comments:  
009N 004E 06 S2NW4, N2SW4, 5 NW4SW4

Survey date: 1992-07-15 Elevation: 6400 -7440  
First observation: 1992-07-15 Slope/aspect: 0-10% / EAST,  
SOUTH  
Last observation: 1992-07-15 Size (acres): 40

Location:

BIG BELT MOUNTAINS, ON ATLANTA RIDGE ABOVE ATLANTA CREEK,  
WEST OF ATLANTA ROAD (FS RD #575), UPPER END OF RIDGE. ALSO  
ALONG ATLANTA CREEK AND DIVERSION CHANNEL IN FEWER NUMBERS.

Element occurrence data:

250-400 PLANTS IN PEAK FLOWERING, THE MAJORITY AT WEST END  
IN MEADOW SETTING. WEEVILS PRESENT.

General site description:

MOST NUMEROUS IN TRANSITION BETWEEN FESTUCA SCABRELLA  
HABITAT TYPE AND DESCHAMPSIA CESPITOSA-OENTHONIA PARRYI HT,  
ASSOCIATED WITH IRIS MISSOURIENSIS, AGROPYRON CANINUM,  
EQUISETUM ARVENSE, GALIUM BOREALE, POTENTILLA GRACILIS,  
OXYTROPIS SERICEA; INTO OPEN PINUS CONTORTA. ALSO ALONG  
SPARSELY VEGETATED DIVERSION CHANNEL BANKS, AND WIDELY  
SCATTERED ALONG ATLANTA RIDGE ABOVE MEADOW SPECIES LIKE  
HERACLEUM LANATUM AND MERTENSIA OBLONGIFOLIA.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

REPRESENTS LARGEST AND MOST NATURAL OCCURRENCE OF CIRSIUM  
LONGISTYLUM ON HELENA NATIONAL FOREST. TEN SPECIMENS  
COLLECTED BY B. HEIDEL FOR MORPHOMETRIC STUDY (NOT SUITED  
FOR HERBARIUM).

Information source:

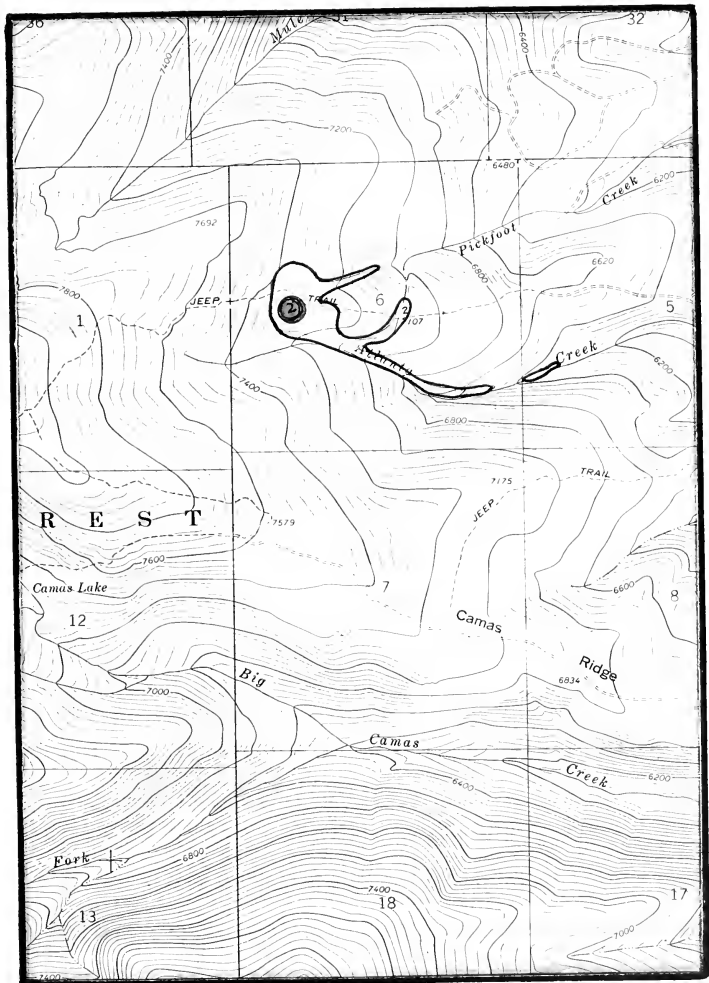
HEIDEL, B. 1992. [MTNHP FIELD SURVEY TO ATLANTIC RIDGE OF 15  
JULY.]

Specimens:

HEIDEL, B. (820). 1992.







Cirsium longistylus #023  
Boulder Baldy Quad



CIRSIUM LONGISTYLUM \* 024  
LONG-STYLED THISTLE

Global rank: G2Q      Forest Service status:  
State rank: S3      Federal Status: C2

Survey site name: CEMENT GULCH  
EO rank:  
EO rank comments:

County: BROADWATER

USGS quadrangle: WHITES CITY

Township: Range: Section: TRS comments:  
010N      003E      7      SE4NE4

Survey date:      Elevation: 6000 -  
First observation: 1992-08-05      Slope/aspect:  
Last observation: 1992-08-05      Size (acres):

Location:

BIG BELT MOUNTAINS; TAKE COUNTY RTE. #287 UP CONFEDERATE AND  
CEMENT GULCHES TO NEAR READY CASH GULCH.

Element occurrence data:

General site description:

ROADSIDE; WITH POA PRATENSIS AND CARDUUS NUTANS.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

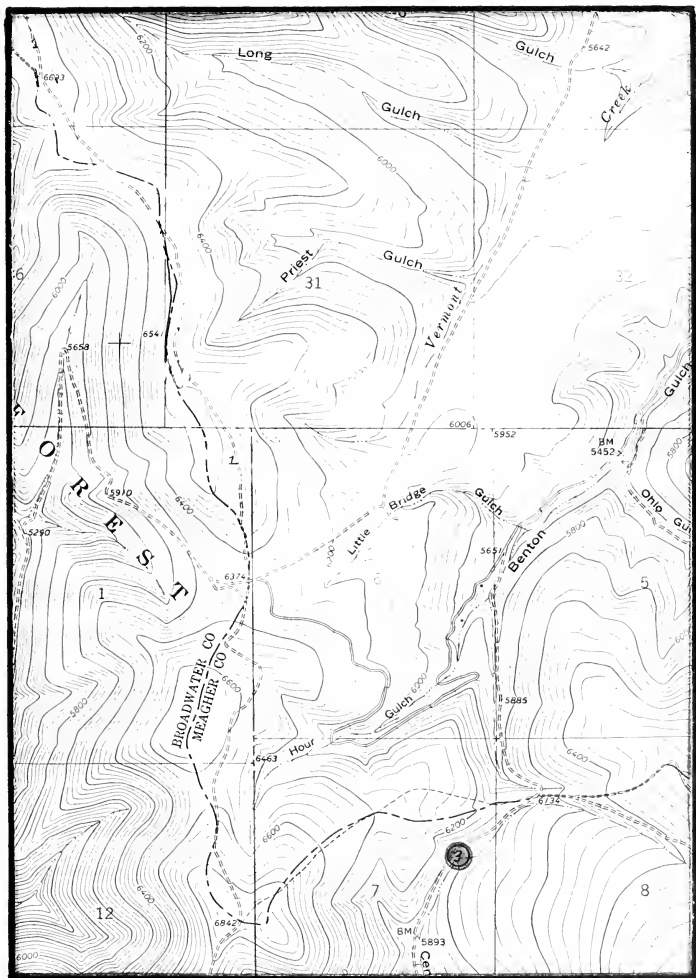
Information source:

LESICA, P. DIVISION OF BIOLOGICAL SCIENCES, UNIV. OF  
MONTANA, MISSOULA, MT 59812.

Specimens:

LESICA, P. (5834). 1992. MONTU.





*Cirsium longistylum* #024  
Whites City Quad



CIRSIUM LONGISTYLUM \* 025  
LONG-STYLED THISTLE

Global rank: G2Q            Forest Service status:  
State rank: S3              Federal Status: C2

Survey site name: HOGBACK MOUNTAIN  
EO rank:  
EO rank comments:

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
012N            001W            3            NE4SE4

Survey date:	Elevation: 7800 -
First observation: 1992	Slope/aspect:
Last observation: 1992	Size (acres):

Location:  
BIG BELT MOUNTAINS, FELLFIELD ON TOP OF HOGBACK MOUNTIAN.

Element occurrence data:

General site description:  
FELLFIELD, GRAVELLY LIMESTONE-DERIVED SOIL, WITH POTENTILLA  
OVINA AND POA INTERIOR.

Land owner/manager:  
HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

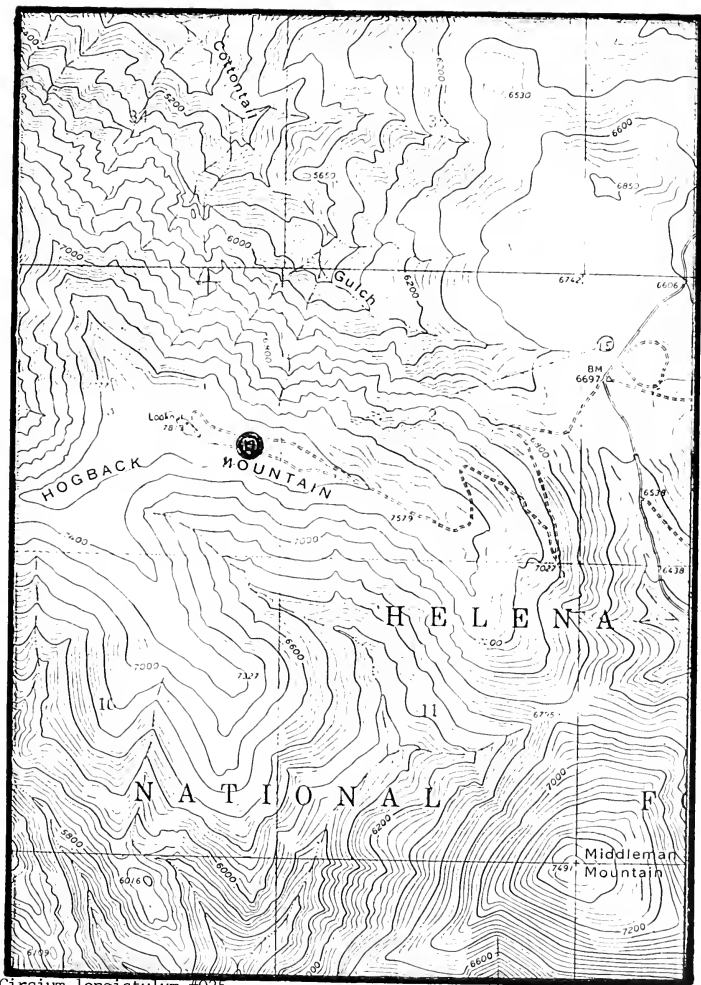
Comments:

Information source:  
LESICA, P. 1992. DIVISION OF BIOLOGICAL SCIENCES, UNIV. OF  
MONTANA, MISSOULA, MT 59812.

Specimens:  
LESICA, P. (5855). 1992. MONTU.







Cirsium longistylum #025  
Hogback Mt Quad



CIRSIUM LONGISTYLUM \* 026  
LONG-STYLED THISTLE

Global rank: G2Q Forest Service status:  
State rank: S3 Federal Status: C2

Survey site name: BEAR GULCH SPRING  
EO rank: D  
EO rank comments: 1 PLANT MIXED WITH ANOTHER SPECIES AND POSSIBLE  
HYBRIDS; PASTURE NEAR ROAD.

County: JEFFERSON

USGS quadrangle: CROW CREEK FALLS

Township: Range: Section: TRS comments:  
006N 002W 1 NW4SE4NW4

Survey date: 1992-08-26 Elevation: 6920 -  
First observation: 1992-08-26 Slope/aspect: 10% / EAST  
Last observation: 1992-08-26 Size (acres): 1

Location:

ELKHORN MOUNTAINS, 2.3 AIR MILES SOUTH OF CROW CREEK FALLS;  
TAKE CROW CREEK ROAD (FS RD #424) BEYOND CAMPGROUND TO TRAIL  
110 (TO POE PARK), GO LEFT, STAYING ON MAIN ROAD FOR CA. 1  
MILE TO CORRAL AND SPRING.

Element occurrence data:

IN 1992 ONLY 1 PLANT, IN FRUIT, WITH CIRSIUM LONGISTYLUM  
CHARACTERS WAS OBSERVED AMONG A POPULATION OF CA. 100 PLANTS  
OF CIRSIUM HOOKERIANUM AND POSSIBLE HYBRIDS AND BACK  
CROSSES.

General site description:

OPEN GRASSLAND SURROUNDED BY FOREST; GRAZED PASTURE BY ROAD  
WITH FENCED SPRING AND UPPER SPRING RUN; NEARBY MESIC MEADOW  
AROUND DRAINAGE; WITH PHELEUM PRATENSE, POTENTILLA SP.,  
ANTENNARIA SP., AND CAREX SPP.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

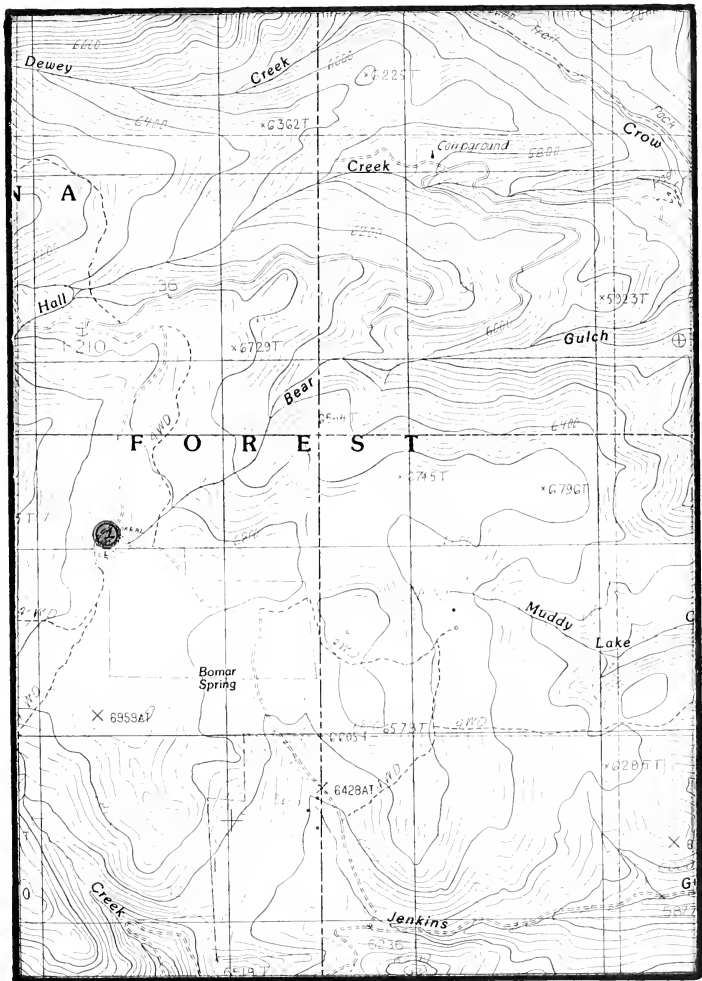
Information source:

POOLE, J. M. 1992. [MTNHP FIELD SURVEY TO ELKHORN AND BIG  
BELT MOUNTAINS IN THE HELENA NATIONAL FOREST OF JULY 12,  
27-29 AND AUG. 3-7, 14, 17, 26.]

Specimens:

POOLE, J. M. (3164). 1992. MONT.





Cirsium longistylum #026  
Crow Creek Falls Quad



CIRSIUM LONGISTYLUM \* 027  
LONG-STYLED THISTLE

Global rank: G2Q      Forest Service status:  
State rank: S3      Federal Status: C2

Survey site name: CONFEDERATE GULCH  
EO rank:  
EO rank comments:

County: BROADWATER

USGS quadrangle: DIAMOND CITY

Township: Range: Section: TRS comments:  
010N      003E      20      NE4

Survey date:	Elevation: 5220 -
First observation: 1992-08-05	Slope/aspect:
Last observation: 1992-08-05	Size (acres):

Location:

BIG BELT MOUNTAINS, ALONG CONFEDERATE GULCH JUST ABOVE  
CEMENT GULCH.

Element occurrence data:

General site description:

DISTURBED AREA; WITH PHLEUM PRATENSE AND ELYMUS GLAUCUS.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

Information source:

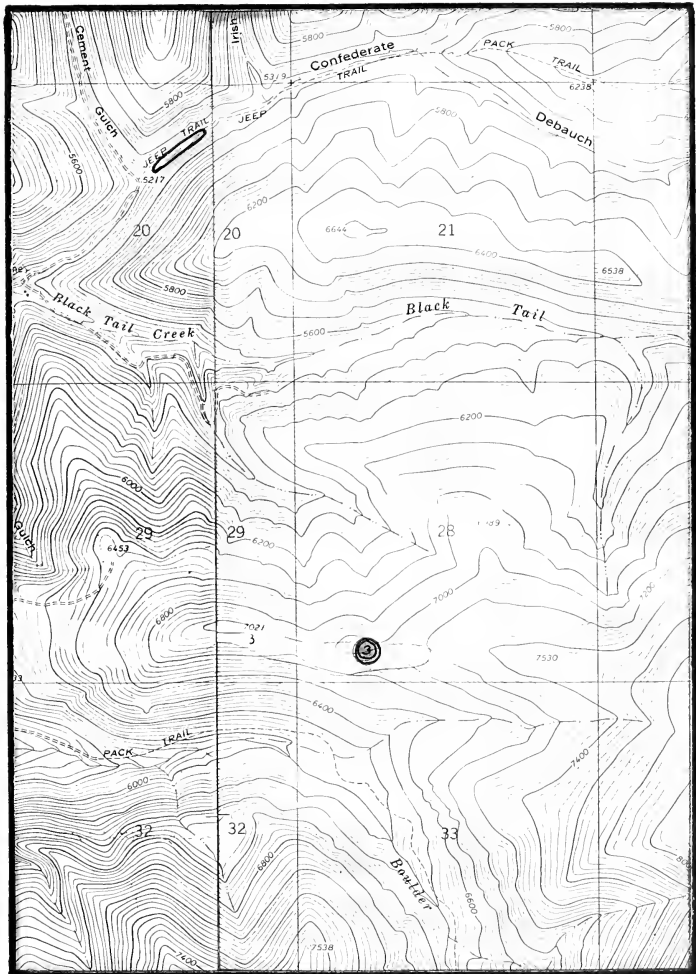
LESICA, P. DIVISION OF BIOLOGICAL SCIENCES, UNIVERSITY OF  
MONTANA, MISSOULA, MT. 59812.

Specimens:

LESICA, P. (5833). 1992. MONTU.







Cirsium longistylum #027  
Diamond City Quad



CIRSIUM LONGISTYLUM \* 028  
LONG-STYLED THISTLE

Global rank: G2Q Forest Service status:  
State rank: S3 Federal Status: C2

Survey site name: BOULDER CREEK  
EO rank: CD  
EO rank comments: SMALL POPULATION.

County: BROADWATER

USGS quadrangle: BOULDER BALDY  
DIAMOND CITY

Township: Range: Section: TRS comments:  
010N 003E 28 S2SW4, 29 S2SE4

Survey date: 1992-08-11 Elevation: 6920 -7020  
First observation: 1992-08-11 Slope/aspect: 20-40% / SOUTH  
Last observation: 1992-08-11 Size (acres):

Location:

BIG BELT MOUNTAINS, RIDGELINE ABOVE BOULDER CREEK,  
ACCESSIBLE FROM FS RD #4171 TO LOGGING ROAD TO FS TRAIL  
#142, WHICH CUTS OVER THE RIDGE.

Element occurrence data:

20-40 PLANTS WIDELY SCATTERED ACROSS EXPOSED SLOPE. VERY  
LATE FLOWERING AND FRUITING STAGES.

General site description:

OPEN UPPER SOUTH-FACING RIDGELINE ABOVE BOULDER CREEK IN  
AGROPYRON SPICATUM HABITAT TYPE WITH PAST GRAZING HISTORY  
LIKELY. UNUSUALLY HEAVY LITTER BUILDUP. ASSOCIATED SPECIES:  
FESTUCA IDAHOENSIS, MONARDA FISTULOSA.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

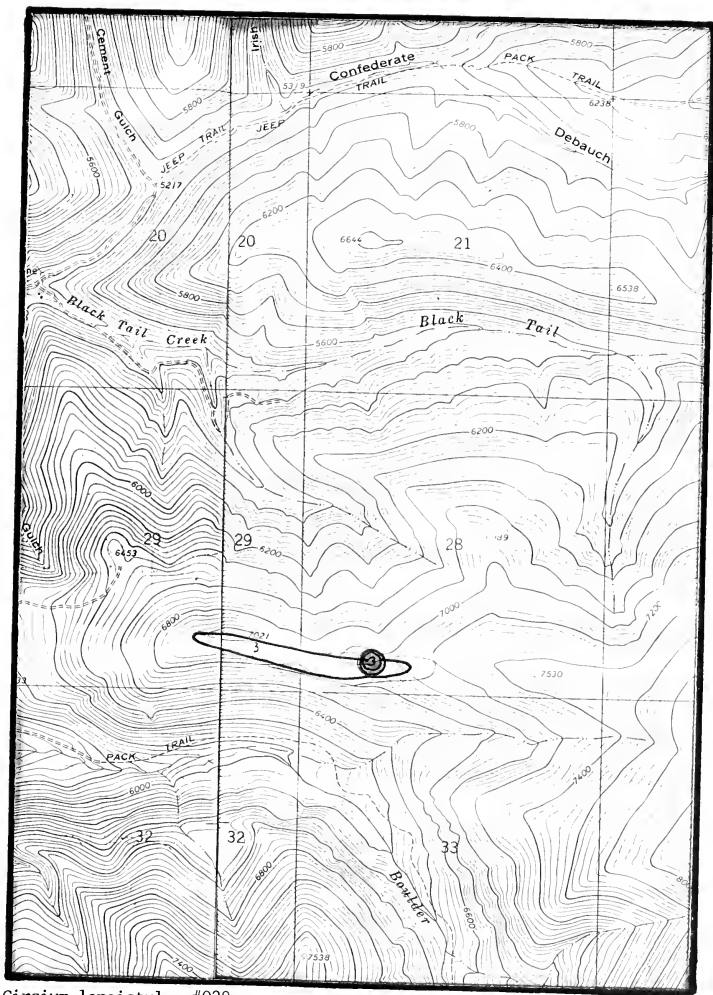
FIVE SPECIMENS COLLECTED FOR MORPHOMETRIC STUDY.

Information source:

HEIDEL, B. 1992. [MTNHP FIELD SURVEYS TO BOULDER CREEK AND  
BOULDER LAKES OF 11 AUGUST.]

Specimens:





Cirsium longistylum #028  
 Diamond City Quad

Boulder Baldy Quad



CIRSIUM LONGISTYLUM \* 029  
LONG-STYLED THISTLE

Global rank: G2Q Forest Service status:  
State rank: S3 Federal Status: C2

Survey site name: SPRINGS GULCH  
EO rank: BC  
EO rank comments: SMALL POPULATION IN DISTURBED SITE, ONLY 10% WAS  
CIRSIUM LONGISTYLUM.

County: BROADWATER

USGS quadrangle: WHITES CITY

Township: Range: Section: TRS comments:  
010N 002E 3 NW4NW4NW4

Survey date: 1992-08-27 Elevation: 6640 -6840  
First observation: 1992-08-27 Slope/aspect: 50% / SOUTHWEST  
Last observation: 1992-08-27 Size (acres): 10

Location:

BIG BELT MOUNTAINS, HEAD OF SPRINGS GULCH ON SOUTH SLOPES OF  
BILK MOUNTAIN, 0.3 AIR MILES SOUTHWEST OF THE EASTERN PEAK  
OF BILK MOUNTAIN; END OF SPRINGS GULCH ROAD (FS RD #1020).

Element occurrence data:

IN 1992 THERE WERE CA. 50 PLANTS (10% WERE CIRSIUM  
LONGISTYLUM, 20% WERE C. HOOKERIANUM, AND THE REST WERE  
HYBRIDS; N=25). IN FRUIT WITH FEW SEEDS POSSIBLY DUE TO  
EARLIER DROUGHTS.

General site description:

MEADOW WITH VARIOUS GRASSES AND SEDGES SURROUNDED BY  
PSEUDOTSUGA MENZIESII FOREST; NUMEROUS INTRODUCED SPECIES  
SUCH AS CARDUUS NUTANS AND CIRSIUM VULGARE ALONG ROAD EDGE;  
SEDGE MEADOW DOWNSLOPE MAY BE MORE "NATURAL."

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

Information source:

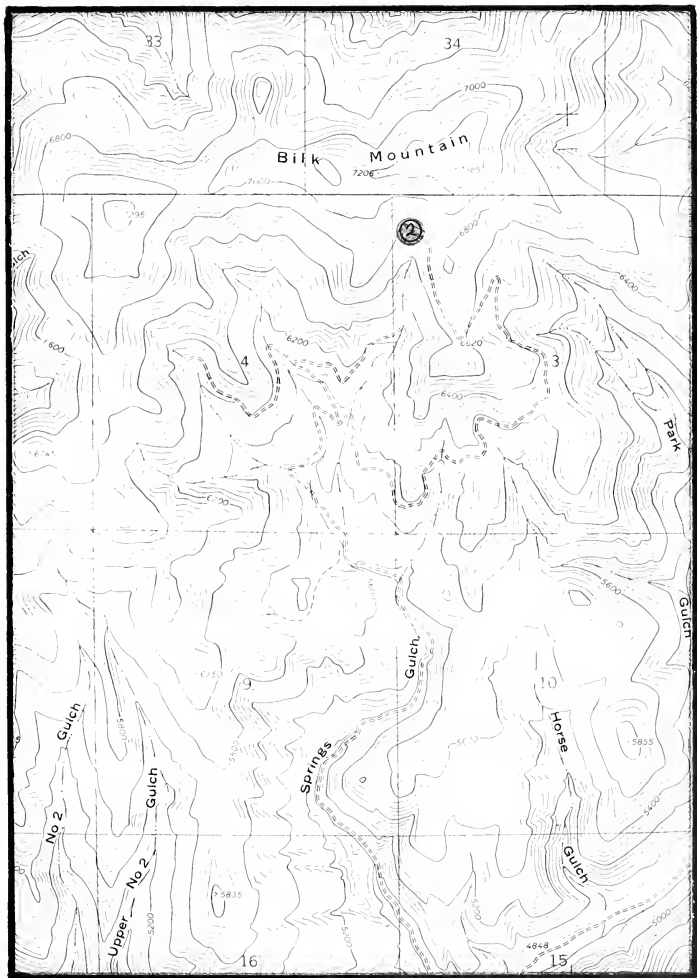
POOLE, J. M. 1992. [MTNHP FIELD SURVEY TO ELKHORN AND BIG  
BELT MOUNTAINS IN HELENA NATIONAL FOREST OF JULY 12, 27-29  
AND AUG. 3-7, 14, 17, 26, 27.]

Specimens:

POOLE, J. (3165). 1992. MONT.







Cirsium longistylum #029  
Whites City Quad



CIRSIUM LONGISTYLUM \* 030  
LONG-STYLED THISTLE

Global rank: G2Q Forest Service status:  
State rank: S3 Federal Status: C2

Survey site name: LONG GULCH/PRIEST GULCH RIDGE  
EO rank: AB  
EO rank comments: LARGE POPULATION IN RELATIVELY UNDISTUBED HABITAT,  
BUT NOT ALL OF THE POPULATION IS CIRSIUM  
LONGISTYLUM.

County: MEAGHER  
BROADWATER

USGS quadrangle: WHITES CITY

Township: Range: Section: TRS comments:  
011N 003E 31 SW4SW4,W2NW4SW4,W2SW4NW4  
36 NE4SE4NE4,S2NE4NE4,NW4NE4NE4,NE4NW4NE4;25SW  
1 E2NE4NE4,NW4NE4NE4

Survey date: 1992-08-05 Elevation: 6440 -6693  
First observation: 1992-08-05 Slope/aspect: 5-15% / VARIOUS  
Last observation: 1992-08-05 Size (acres): 100

Location:  
BIG BELT MOUNTAINS, 2.7 AIR MILES EAST OF EAST SUMMIT OF  
BILK MOUNTAIN, RIDGE AT THE HEAD OF LONG AND PRIEST GULCHES;  
CA. 0.3 - 2.1 MILES NORTH OF FS RD #4161 (LAST 0.2 MILES  
NORTH ON NORTH SPLIT) FROM JUNCTION WITH FS RD #587 (WHITES  
GULCH ROAD) WHICH IS CA. 4 MILES NORTHEAST OF WHITES CITY.

Element occurrence data:  
IN 1992 CA. 500 INDIVIDUALS OBSERVED (BUT NOT ALL THE  
POPULATION IS CIRSIUM LONGISTYLUM.)

General site description:  
ROUGH FESCUE MEADOW AT CREST OF BIG BELT MOUNTAINS DIVIDE;  
SILTY MOIST SOILS. WITH POA PRATENSIS, POTENTILLA GRACILIS,  
SMILACINA STELLATA, BROMUS CARINATUS, FESTUCA IDAHOENSIS,  
STIPA RICHARDSONII, PERIDERIDEA GAIRDNERI, FRAGARIA  
VIRGINIANA, GEUM TRIFLORUM, DANTHONIA INTERMEDIA, GALIUM  
BOREALE, GERANIUM VISCOSUM, ETC.

Land owner/manager:  
HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:  
ECODATA PLOT #92JPO01.

Information source:  
POOLE, J. M. 1992. [MTNHP FIELD SURVEY TO ELKHORN AND BIG  
BELT MOUNTAINS IN THE HELENA NATIONAL FOREST OF JULY 12,  
27-29, AUG. 3-7, 14, 17, 26, 27.]

Specimens:



1/2  
500 Cir.

# COMMUNITY SURVEY FORM

MTNHP  
5/27/91

## GENERAL PLOT DATA

### IDENTIFICATION AND LOCATION

PLOT NO. 92JP001 MO 08 DAY 05 MANUAL \_\_\_\_\_ UNITS  ft \_\_\_\_\_ m  
 EXAMINER(S) poole, Leska YEAR 92 EOCODE \_\_\_\_\_ \*  
 PNC \_\_\_\_\_ CT \_\_\_\_\_  
 SITE \_\_\_\_\_ STATE MT COUNTY Meagher  
 PURP \_\_\_\_\_ PREC \_\_\_\_\_ QUADNAME Whites City QUADCODE \_\_\_\_\_  
11N T/3E R/31 S/SW4S/6W4/4 COMMUNITY SIZE (acres) 60  
 PLOT TYPES \_\_\_\_\_ PLTRL 35.8 PLOT W \_\_\_\_\_ SURVEY \_\_\_\_\_  
 PHOTOS # 26  
 DIRECTIONS --> \_\_\_\_\_

### CONSERVATION RANKING

COND \_\_\_\_\_ Com: \_\_\_\_\_  
 VIAB \_\_\_\_\_ Com: \_\_\_\_\_  
 DEFN \_\_\_\_\_ Com: \_\_\_\_\_  
 RANK \_\_\_\_\_ Com: \_\_\_\_\_  
 MGMT: \_\_\_\_\_  
 PROT: \_\_\_\_\_

### ENVIRONMENTAL FEATURES

DL G SOIL RPT \_\_\_\_\_  
 SOIL UNIT \_\_\_\_\_ SOIL TAXON \_\_\_\_\_  
 PM SHAL LANDFORM RMRI PLOT POS RIWR SLP SHAPE R ASP 335°  
 SLOPE % 5 ELEVATION 6600 EROS POTENT SA EROS TYPE NO  
 HORIZON ANGLE (%): N \_\_\_\_\_ E \_\_\_\_\_ S \_\_\_\_\_ W \_\_\_\_\_ IFSLP \_\_\_\_\_ IFVAL \_\_\_\_\_  
 SPFE \_\_\_\_\_  
 GROUND COVER: 10 S+ TG+ 0 R+ 70 L+ 0 W+ 0 M+ 20 BV+ T 0 = 100%  
 DISTURBANCE HISTORY (type, intensity, frequency, season)--> some pocket gopher activity, no recent livestock

RIPARIAN FEATURES: Channel Width \_\_\_\_\_ Channel Entrench \_\_\_\_\_  
 Surface Water \_\_\_\_\_ Ht. Abv. H2O \_\_\_\_\_ Dist. from H2O \_\_\_\_\_

### GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# OCULAR PLANT SPECIES DATA

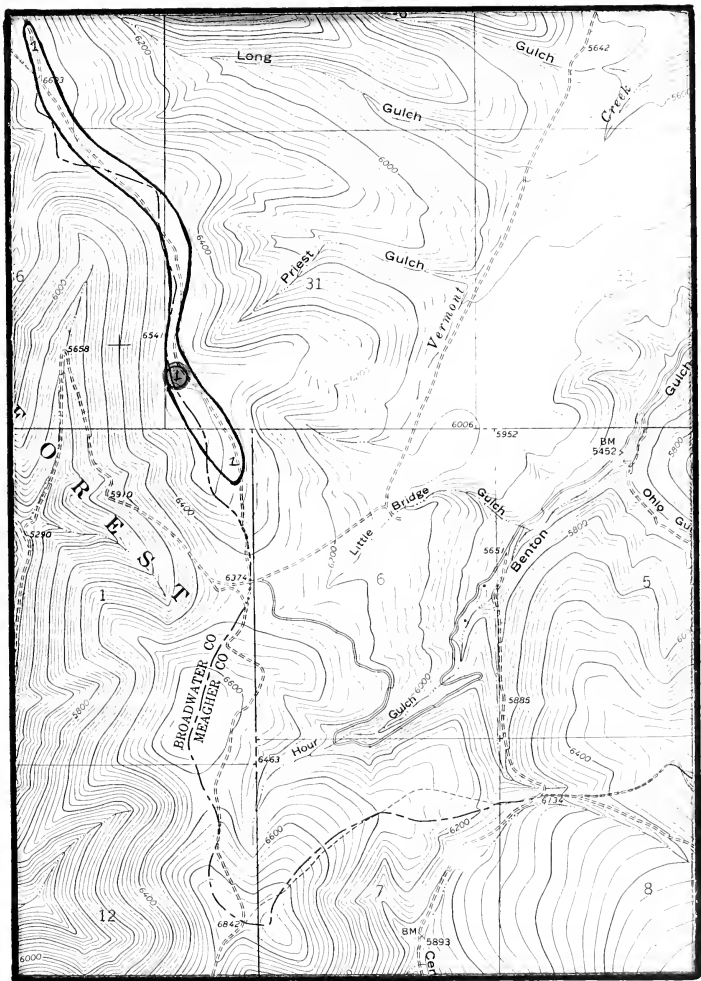
PltIDL \_\_\_\_\_

 PLOT NO. \_\_\_\_\_ NO. SPECIES 51 PNC \_\_\_\_\_

TREES				FRBS			
Tot Cv	<u>T</u>	MHT	<u>5.0</u>	Tot Cv	<u>60</u>	MHT	<u>1.0</u>
Tal Cv	Med Cv	Grd Cv	CC	Med Cv	Low Cv	Grd Cv	CC
T 1		<u>Psamen</u>	<u>T</u>	F 1		<u>Lup sof</u>	<u>T</u>
T 2				F 2	<u>Polemonia gracilis</u>	<u>Pot gra</u>	<u>20</u>
T 3				F 3		<u>Fra vir</u>	<u>10</u>
T 4				F 4	<u>Smilacina stellata</u>	<u>Smi ste</u>	<u>20</u>
T 5				F 5	<u>rd scylos</u>	<u>Ara</u>	<u>3</u>
				F 6		<u>Cer vis</u>	<u>3</u>
SHRBS							
Tot Cv	<u>1</u>	MHT	<u>2.5</u>	Tot Cv		MHT	
Tal Cv	Med Cv	Grd Cv	CC	Med Cv	Low Cv	Grd Cv	CC
S 1		<u>Juncom</u>	<u>1</u>	F 7		<u>Eri spe</u>	<u>3</u>
S 2		<u>Ros woo</u>	<u>T</u>	F 8		<u>Gajari</u>	<u>T</u>
S 3				F 9		<u>Ach mil</u>	<u>T</u>
S 4				F 10		<u>Thalict</u>	<u>3</u>
S 5				F 11		<u>Cir lon</u>	<u>T</u>
S 6				F 12		<u>Cun off</u>	<u>1</u>
S 7				F 13		<u>Aster</u>	<u>T</u>
S 8				F 14		<u>Cou tri</u>	<u>10</u>
S 9				F 15		<u>Sal bor</u>	<u>3</u>
S 10						<u>Ara dru</u>	<u>T</u>
S 11						<u>Cam rot</u>	<u>T</u>
S 12						<u>Ant mic</u>	<u>T</u>
GRAM							
Tot Cv	<u>90</u>	MHT	<u>2.5</u>	Tot Cv		MHT	
Med Cv	Low Cv	Grd Cv	CC	Med Cv	Low Cv	Grd Cv	CC
G 1		<u>Fer sca</u>	<u>60</u>			<u>Sil dod</u>	<u>T</u>
G 2		<u>Ag can</u>	<u>T</u>			<u>Ery rep</u>	<u>T</u>
G 3		<u>Sti org</u>	<u>T</u>			<u>Ger ama</u>	<u>T</u>
G 4		<u>Poa pra</u>	<u>20</u>			<u>Cer ary</u>	<u>1</u>
G 5		<u>Dun int</u>	<u>3</u>			<u>Con will</u>	<u>T</u>
G 6		<u>Bro car</u>	<u>10</u>			<u>Trc off</u>	<u>T</u>
G 7		<u>Bro cil</u>	<u>T</u>			<u>Trc dub</u>	<u>T</u>
G 8		<u>Car pat</u>	<u>1</u>			<u>Ant fol</u>	<u>T</u>
G 9		<u>Fer ida</u>	<u>10</u>			<u>Sis ang</u>	<u>T</u>
G 10		<u>Ag sca</u>	<u>T</u>			<u>Oxy Cor</u>	<u>T</u>
G 11		<u>Stiric</u>	<u>10</u>			<u>Vet eda</u>	<u>T</u>
G 12		<u>Car hoo</u>	<u>T</u>			<u>Cle hif</u>	<u>T</u>
						<u>Hst agr</u>	<u>T</u>
				FERN Tot Cv	<u>0</u>	MHT	
					Low Cv	Grd Cv	
				BRYO/LICH	Tot Cv	<u>T</u>	

COMMENTS (EODATA) --&gt; \_\_\_\_\_

 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



*Cirsium longistylum* #030  
 Whites City Quad





CLAYTONIA LANCEOLATA VAR FLAVA \* 021  
YELLOW SPRINGBEAUTY

Global rank: G5T5 Forest Service status: SENSITIVE  
State rank: S3 Federal Status: C2

Survey site name: CASTLE FORK DEEP CREEK  
EO rank:  
EO rank comments:

County: BROADWATER

USGS quadrangle: BATTLE MOUNTAIN

Township: Range: Section: TRS comments:  
007N 005E 22 NE4

Survey date: Elevation: 5790 -  
First observation: 1991 Slope/aspect: 0-10% / SOUTH  
Last observation: 1991-07-01 Size (acres): 1

Location:  
BIG BELT MOUNTAINS; CA. 22 MILES EAST OF TOWNSEND ON HWY 12,  
JUST NORTH OF ROAD IN WET SWALE.

Element occurrence data:  
100+ PLANTS.

General site description:  
OPEN MOIST SWALE IN SAGEBRUSH UPLANDS, WITH POLYGONUM  
BISTORTOIDES, MERTENSIA OBLONGIFOLIA AND DODECATHEON  
PULCHELLUM.

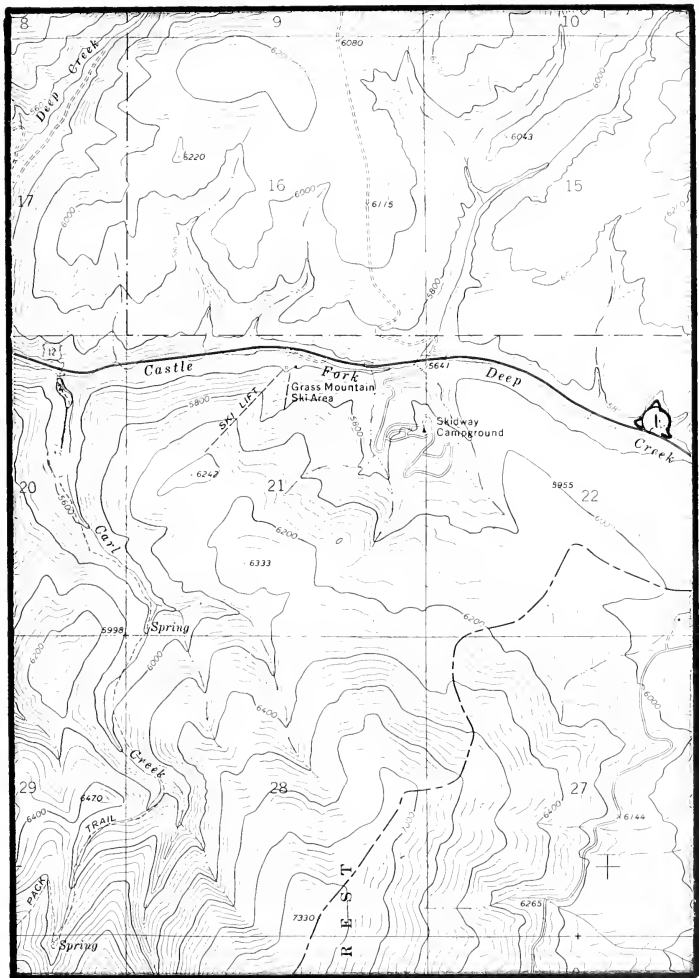
Land owner/manager:  
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)  
HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:  
ENTIRE SITE NOT SURVEYED.

Information source:  
ROE, LISA S. MONTANA NATURAL HERITAGE PROGRAM, 1515 EAST  
SIXTH AVENUE, HELENA, MT 59620.

Specimens:





Claytonia lanceolata var. flava #021  
 Battle Mt Quad



DELPHINIUM ANDERSONII \* 004  
ANDERSON'S LARKSPUR

Global rank: G5 Forest Service status: WATCH  
State rank: S1 Federal Status:

Survey site name: BEAVER CREEK  
EO rank:  
EO rank comments:

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
013N 001W 27 SW4NE4

Survey date: Elevation: 4720 -5320  
First observation: 1992-05-21 Slope/aspect: 60-80% /SOUTHEAST  
Last observation: 1992-05-21 Size (acres): 20

Location:

BIG BELT MOUNTAINS, 1.2 ROAD MILES EAST OF REFRIGERATOR  
CANYON (CA. 5 MILES EAST OF NELSON), 500 FEET UP TALUS SLOPE  
NORTH OF ROAD.

Element occurrence data:

1,000-10,000 PLANTS; IN FLOWER.

General site description:

OPEN EXPOSURE, MIDSLOPE, DRY SHIFTING LIMESTONE TALUS SLOPE  
WITH LITTLE (10% COVER) VEGETATION. WITH ARTEMISIA  
MICHAUXIANA, AGROPYRON SPICATUM, AND CYMPTERUS  
TEREBINTHINUS.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

KEYS OUT TO THIS SPECIES BUT SEEMS OUT OF RANGE.

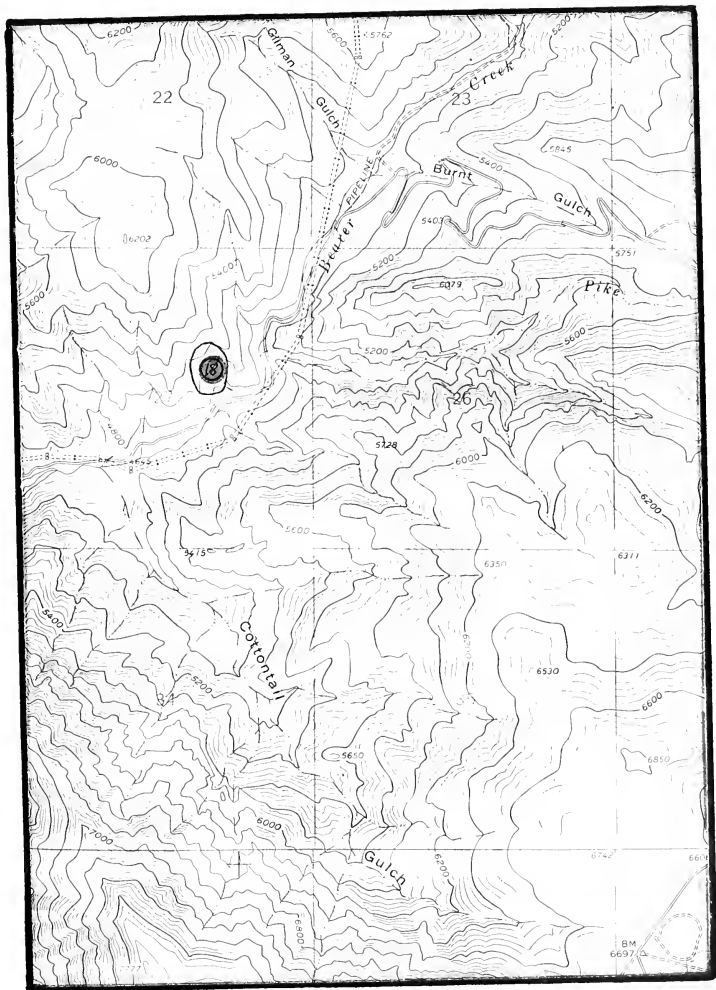
Information source:

LESICA, P. DIVISION OF BIOLOGICAL SCIENCES. UNIV. OF  
MONTANA, MISSOULA, MT. 59812.

Specimens:

LESICA, P. (5652). 1992. MONTU.





*Delphinium andersonii* #004  
Hogback Mt Quad





JUNCUS HALLII \* 007  
HALL'S RUSH

Global rank: G4G5 Forest Service status: SENSITIVE  
State rank: S2 Federal Status:

Survey site name: THE NEEDLES  
EO rank: AB  
EO rank comments: SMALL POPULATION IN SEEMINGLY PRISTINE HABITAT.

County: MEAGHER

USGS quadrangle: MOUNT EDITH

Township: Range: Section: TRS comments:  
008N 004E 11 NW4

Survey date: 1992-08-06 Elevation: 7400 -  
First observation: 1983 Slope/aspect:  
Last observation: 1992-08-06 Size (acres): 1

Location:

BIG BELT MOUNTAINS, ENE OF TOWNSEND, CA. 0.25 MILE SOUTHWEST  
OF "THE NEEDLES," AND CA. 2.4 AIR MILES NNW OF MOUNT EDITH.

Element occurrence data:

1992: CA. 100 INDIVIDUALS. 1983: COMMON.

General site description:

SPHAGNUM BOG AROUND EDGES OF SLOUGH, WITH JUNCUS NEVADENSIS,  
ERIOPHORUM POLYSTACHION, CAREX CANESCENS, C. SCOPULORUM VAR.  
CHIMAPHILA, CALAMAGROSTIS CANADENSIS, CAREX MICROPTERA AND  
SENECIO FOETIDUS.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

ECODATA PLOT #92JP002.

Information source:

POOLE, J. M. 1992. [MTNHP FIELD SURVEY OF ELKHORN AND BIG  
BELT MOUNTAINS, HELENA NATIONAL FOREST, OF JULY 12, 27-29,  
AUGUST 3-7, 14, 17, 26 AND 27.]

Specimens:

RAMSDEN, D. J. (1353). 1983. SPECIMEN #095419. MONTU.



# COMMUNITY SURVEY FORM

MTNHP  
5/27/91

## GENERAL PLOT DATA

### IDENTIFICATION AND LOCATION

PLOT NO. 92JP002 MO 8 DAY 6 MANUAL \_\_\_\_\_ UNITS  ft \_\_\_\_\_ m  
 EXAMINER(S) J. Poole, P. Lesica YEAR 92 ECODE \_\_\_\_\_ \* \_\_\_\_\_  
 PNC \_\_\_\_\_ CT \_\_\_\_\_  
 SITE \_\_\_\_\_ STATE MT COUNTY Meagher  
 PURP \_\_\_\_\_ PREC \_\_\_\_\_ QUADNAME Mount Edith QUADCODE \_\_\_\_\_  
8N T/4E R/II S/NW4S/NE4/4 COMMUNITY SIZE (acres) <1  
 PLOT TYPES \_\_\_\_\_ PLTRL 50 PLOT W 10 SURVEY \_\_\_\_\_  
 PHOTOS \_\_\_\_\_  
 DIRECTIONS --> \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### CONSERVATION RANKING

COND \_\_\_\_\_ Com: \_\_\_\_\_  
 VIAB \_\_\_\_\_ Com: \_\_\_\_\_  
 DEFN \_\_\_\_\_ Com: \_\_\_\_\_  
 RANK \_\_\_\_\_ Com: \_\_\_\_\_  
 MGMT: \_\_\_\_\_  
 PROT: \_\_\_\_\_

### ENVIRONMENTAL FEATURES

DL 6 SOIL RPT \_\_\_\_\_  
 SOIL UNIT \_\_\_\_\_ SOIL TAXON \_\_\_\_\_  
 PM SAAL LANDFORM GMTU PLOT POS BKWH SLP SHAPE S ASP 0  
 SLOPE % 0 ELEVATION 7420 EROS POTENT SA EROS TYPE NO  
 HORIZON ANGLE (%): N \_\_\_\_\_ E \_\_\_\_\_ S \_\_\_\_\_ W \_\_\_\_\_ IFSLP \_\_\_\_\_ IFVAL \_\_\_\_\_  
 SPFE Sphagnum Bog  
 GROUND COVER: T S+ 0 G+ 0 R+ 10 L+ T W+ 80 M+ 10 BV+ 0 O = 100%  
 DISTURBANCE HISTORY (type, intensity, frequency, season)--> \_\_\_\_\_  
Wild ungulate grazing & bedding  
 \_\_\_\_\_  
 \_\_\_\_\_

-RIPARIAN FEATURES: Channel Width \_\_\_\_\_ Channel Entrench \_\_\_\_\_  
 Surface Water \_\_\_\_\_ Ht. Abv. H2O \_\_\_\_\_ Dist. from H2O \_\_\_\_\_

### GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# OCULAR PLANT SPECIES DATA

PltIDL \_\_\_\_\_

 PLOT NO. \_\_\_\_\_ NO. SPECIES 16 PNC \_\_\_\_\_

TREES	Tot Cv <u>0</u>	Mht _____		FRBS	Tot Cv <u>20</u>	Mht <u>0.5</u>	
	Tal Cv _____	Med Cv _____			Med Cv _____	Low Cv _____	
	Low Cv _____	Grd Cv _____	CC		Grd Cv _____		CC

T 1	_____	_____	_____
T 2	_____	_____	_____
T 3	_____	_____	_____
T 4	_____	_____	_____
T 5	_____	_____	_____

F 1	_____	<u>Epi wat</u>	<u>1</u>
F 2	_____	<u>Sp cer</u>	<u>T</u>
F 3	_____	<u>San fce</u>	<u>10</u>
F 4	_____	<u>Ant cor</u>	<u>3</u>
F 5	_____	<u>Ast occ</u>	<u>3</u>
F 6	_____	<u>Red gro</u>	<u>T</u>

SHRBS	Tot Cv <u>0</u>	Mht _____	
	Tal Cv _____	Med Cv _____	
	Low Cv _____	Grd Cv _____	CC

F 7	_____	_____	_____
F 8	_____	_____	_____
F 9	_____	_____	_____
F 10	_____	_____	_____
F 11	_____	_____	_____
F 12	_____	_____	_____
F 13	_____	_____	_____
F 14	_____	_____	_____
F 15	_____	_____	_____

S 1	_____	_____	_____
S 2	_____	_____	_____
S 3	_____	_____	_____
S 4	_____	_____	_____
S 5	_____	_____	_____
S 6	_____	_____	_____
S 7	_____	_____	_____
S 8	_____	_____	_____
S 9	_____	_____	_____
S 10	_____	_____	_____
S 11	_____	_____	_____
S 12	_____	_____	_____

GRAM	Tot Cv <u>90</u>	Mht <u>1.5</u>	
	Med Cv _____	Low Cv _____	
	Grd Cv _____		CC

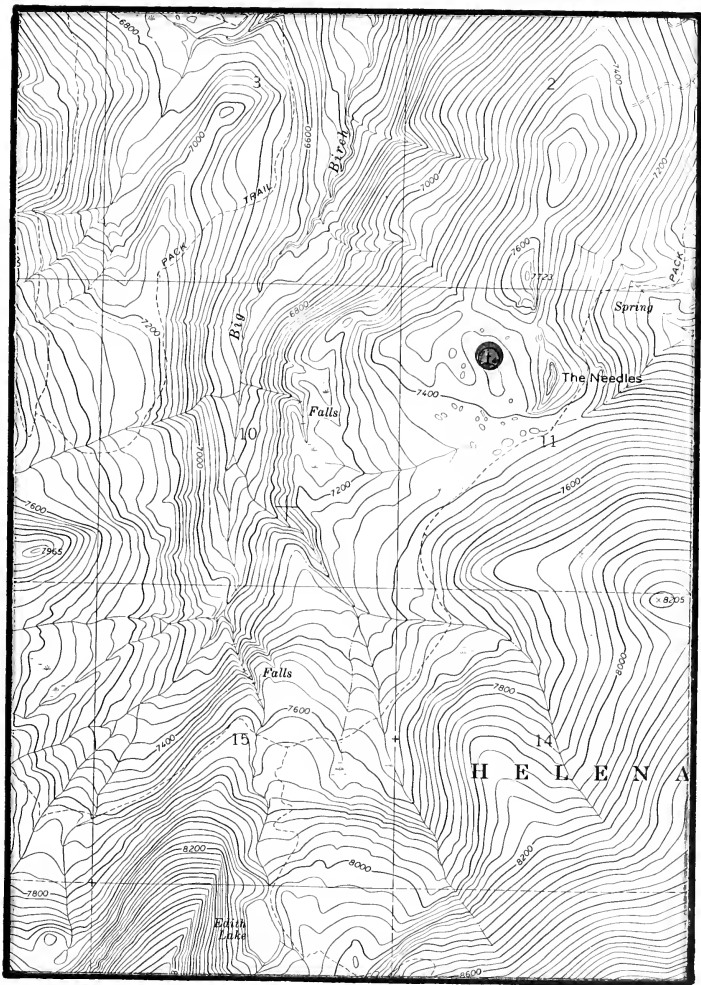
G 1	_____	<u>Calcar</u>	<u>50</u>
G 2	_____	<u>Carmic</u>	<u>20</u>
G 3	_____	<u>Car sca</u>	<u>50</u>
G 4	_____	<u>Ph alp</u>	<u>T</u>
G 5	_____	<u>Jun hel</u>	<u>T</u>
G 6	_____	<u>Jun</u>	<u>1</u>
G 7	_____	<u>Des ces</u>	<u>3</u>
G 8	_____	<u>Car ras</u>	<u>T</u>
G 9	_____	<u>Van int</u>	<u>T</u>
G 10	_____	<u>Hyg sca</u>	<u>1</u>
G 11	_____	_____	_____
G 12	_____	_____	_____

FERN	Tot Cv <u>0</u>	Mht _____	Med Cv _____
		Low Cv _____	Grd Cv _____
BRYO/LICH	Tot Cv <u>80</u>		

COMMENTS (EODATA) --> \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



Juncus hallii #007  
Mt. Edith Quad



JUNCUS HALLII \* 009  
HALL'S RUSH

Global rank: G4G5      Forest Service status: SENSITIVE  
State rank: S2      Federal Status:

Survey site name: NORTH OF MOUNT BALDY  
EO rank:  
EO rank comments:

County: MEAGHER

USGS quadrangle: MOUNT EDITH

Township: Range: Section: TRS comments:  
008N      004E      08      SW4NE4

Survey date:      Elevation: 8860 -  
First observation: 1992-08-08      Slope/aspect: 10% / NORTHEAST  
Last observation: 1992-08-08      Size (acres): 1

Location:

BIG BELT MOUNTAINS, CA. 2.5 MILES SOUTH OF DUCK CREEK PASS,  
CA. 1.5 MILES NORTH OF MOUNT BALDY, LESS THAN 0.5 MILE SOUTH  
OF ROAD ALONG DIVIDE.

Element occurrence data:  
COMMON.

General site description:

IN MOIST MEADOW OPENING IN PINUS ALBICAULIS PARKLAND NEAR  
BASE OF MOUNTAIN AT STREAM HEADWATERS, WITH DESCHAMPSIA  
CESPITOSA AND CAREX PAYSONIS.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

Information source:

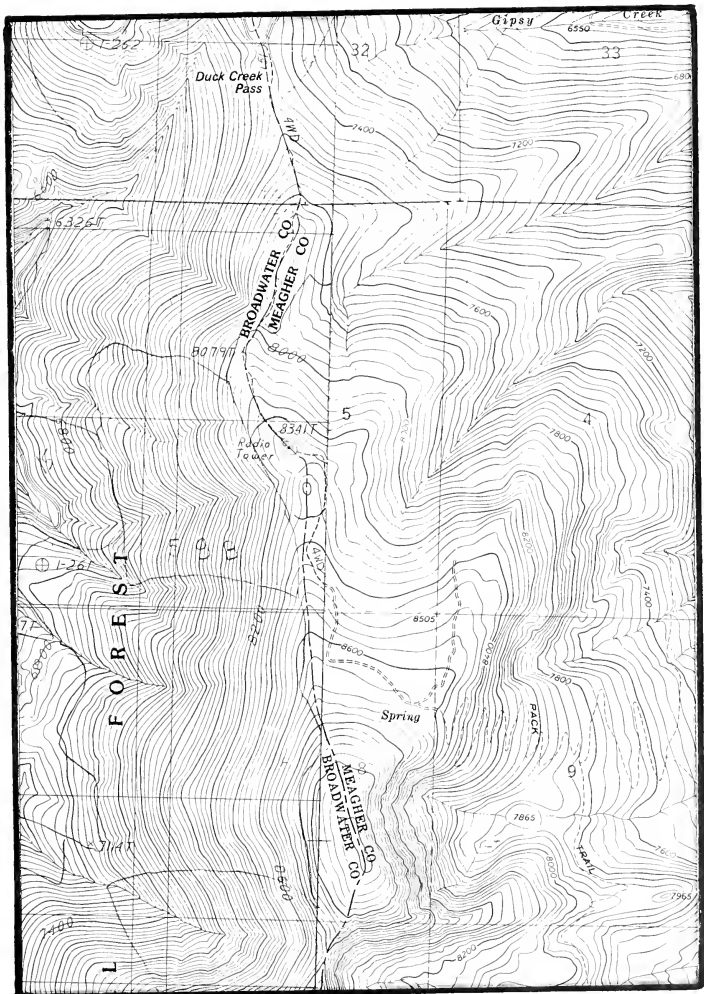
LESICA, PETER. DIVISION OF BIOLOGICAL SCIENCES, UNIV. OF  
MONTANA, MISSOULA, MT 59812.

Specimens:

LESICA, P. (5850). 1992. MONT. ANNOTATED RALPH BROOKS.







Juncus hallii #009  
Gurnett Creek East Quad

Mt. Edith Quad



LESQUERELLA KLAUSII \* 001  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: HUNTERS GULCH  
EO rank: A  
EO rank comments: LARGE POPULATION, RELATIVELY UNDISTURBED AREA.

County: LEWIS AND CLARK

USGS quadrangle: NELSON

Township: Range: Section: TRS comments:  
012N 002W 01 NW4;2,E2

Survey date: 1985-07-01 Elevation: 4280 -  
First observation: 1978 Slope/aspect:  
Last observation: 1987-06-02 Size (acres): 50

Location:

HUNTERS GULCH; FROM YORK, TAKE RD. NORTH TO NELSON; AT  
NELSON, GO WEST 0.25 MILE TO HUNTERS GULCH; SITE IS CA.  
0.75-1.0 MILE UP GULCH.

Element occurrence data:

1000-2000 INDIVIDUALS; MANY SEEDLINGS PRESENT; SITE BURNED  
IN 1984, WHICH APPEARS TO HAVE INVIGORATED THE THREE  
SUBPOPULATIONS.

General site description:

ON SLOPES ABOVE GULCH, IN SPARSE GRASSLAND VEGETATION WITH  
SCATTERED PINUS PONDEROSA ON SOME SLOPES; SOILS ARE GRAVELLY  
AND SHALE-DERIVED; AGROPYRON SPICATUM / CYMPTERUS  
TEREBINTHINUS / CHRYSOTHAMNUS VISCIDIFLORU / MENTZELIA  
ALBICAULIS.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

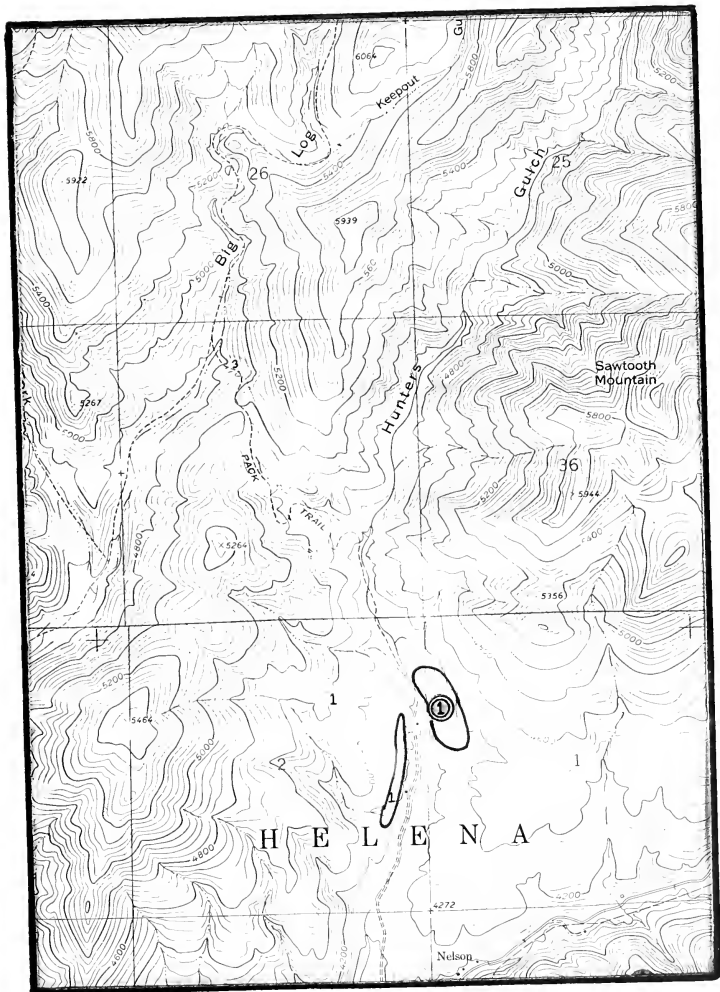
VOUCHERS - LESICA, P. (3468, 3470), 1985, SPECIMEN #s  
102147, 102129 (MONTU); SHELLY, J.S. (1067) AND G.V. KING,  
1986, (MONTU).

Information source:

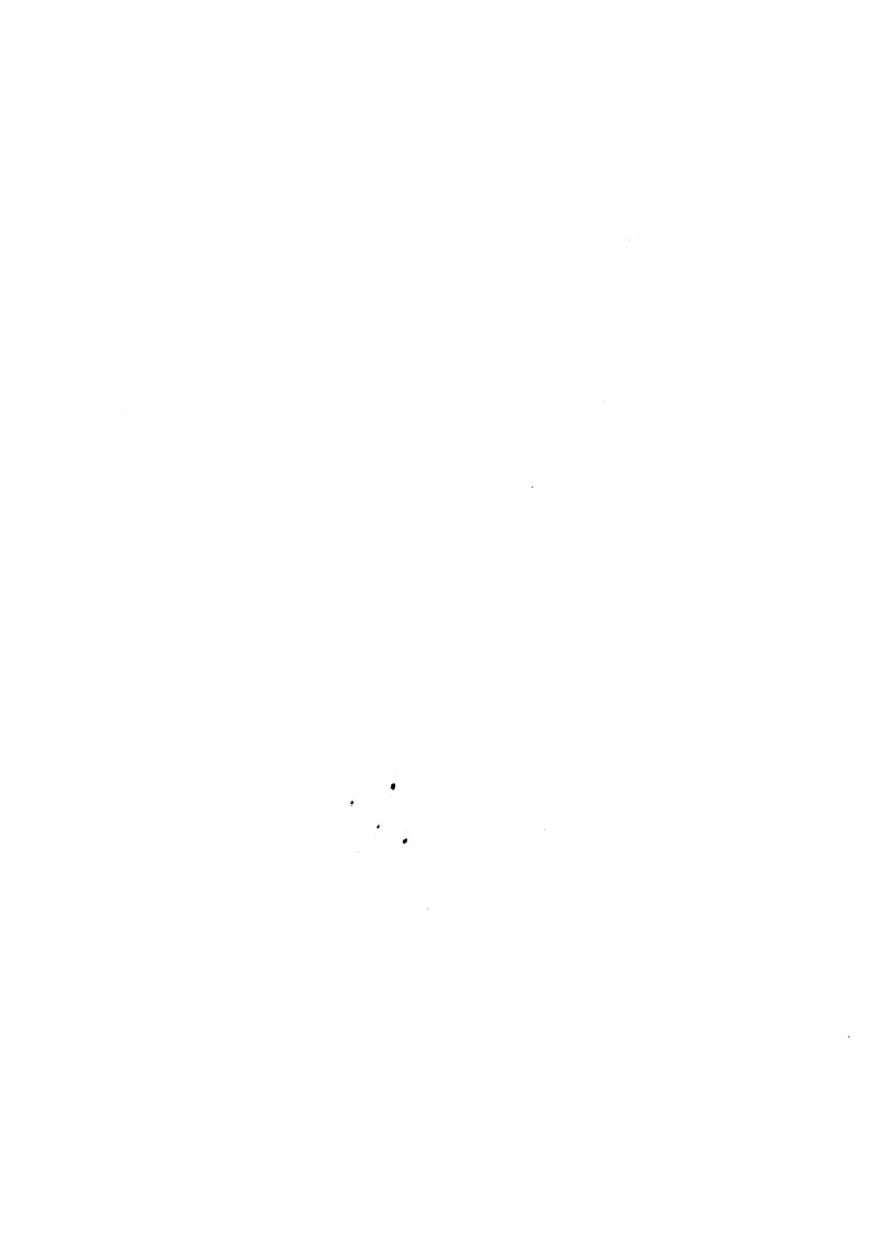
SHELLY, J.S. MT NATURAL HERITAGE PROGRAM, STATE LIBRARY,  
1515 E. 6th AVE., HELENA, MT 59620.

Specimens:





Lesquerella klausii #001  
Nelson Quad



LESQUERELLA KLAUSII \* 003  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: PIKE CREEK  
EO rank: B  
EO rank comments: LARGE POPULATION, SOME PORTIONS RELATIVELY  
UNDISTURBED.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
013N 001W 25 N2;T13NR1E:19S2,30N2

Survey date: 1985-07-01 Elevation: 5800 -  
First observation: 1985 Slope/aspect:  
Last observation: 1986-06-01 Size (acres): 50

Location:

BIG BELT MOUNTAINS, PIKE CREEK; EAST OF NELSON ON BEAVER  
CREEK RD., NEAR HEAD OF DRAINAGE, CA. 1-2 AIR MILES WEST OF  
LEWIS & CLARK - MEAGHER COUNTY LINE.

Element occurrence data:

1000-2000 INDIVIDUALS, SCATTERED OVER A LARGE AREA; SOME  
PORTIONS OF SITE ARE FAIRLY UNDISTURBED.

General site description:

MODERATE TO STEEP SLOPES, IN GRAVELLY SHALE-DERIVED SOIL;  
WITH SCATTERED PSEUDOTSUGA MENZIESII, AGROPYRON SPICATUM,  
CYMPTERUS, PENSTEMON, ERIOGONUM.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

VOUCHER-LESICA, P. (3475), 1985, MONTU (102146).

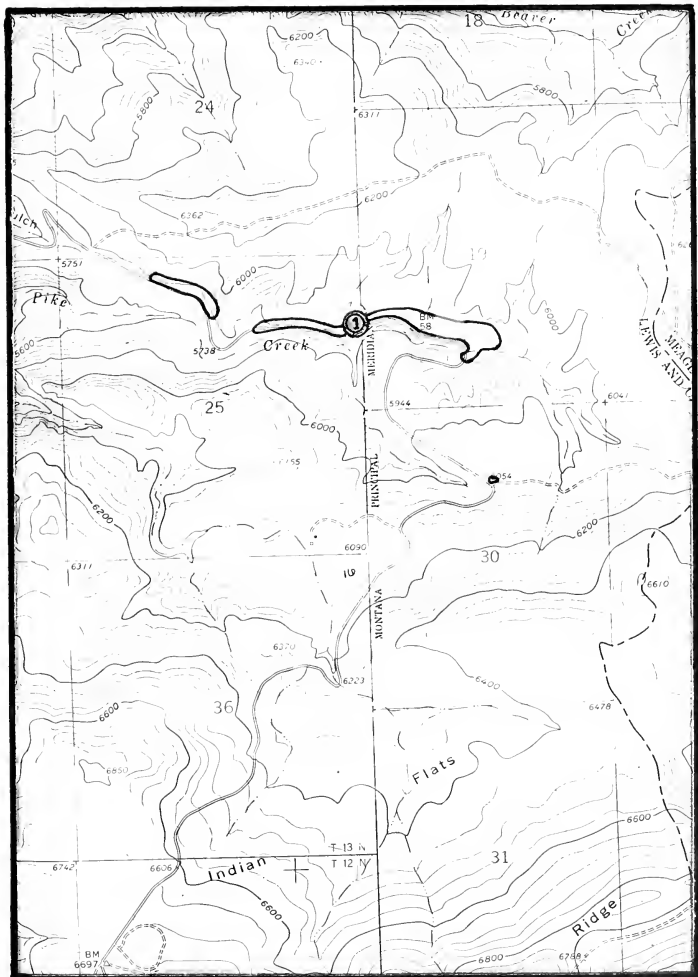
Information source:

SHELLY, J.S. MT NATURAL HERITAGE PROGRAM, STATE LIBRARY,  
1515 E. 6th AVE., HELENA, MT 59620.

Specimens:







Lesquerella klausii #003  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 006  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: BARKING DOG  
EO rank: BC  
EO rank comments: MEDIUM-SIZED POPULATION; UNDISTURBED SLOPES &  
ROADBANKS.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
012N 001E 17 N2NE4

Survey date: 1986-06-10 Elevation: 5240 -  
First observation: 1986 Slope/aspect:  
Last observation: 1986-06-10 Size (acres): 4

Location:

BIG BELT MOUNTAINS, HELENA N.F. ROAD 138 (BEAVER CREEK ROAD)  
CA. 3 MILES ESE OF INDIAN FLATS GUARD STATION; 0.25 AIR  
MILES SE OF BARKING DOG, SLOPE NORTH OF INDIAN CREEK.

Element occurrence data:

CA. 200-300 PLANTS, IN FLOWER AND EARLY FRUIT; SITE IS BI-  
SECTED BY A ROAD, BUT PLANTS MOSTLY OCCUR IN NATIVE MONTANE  
SLOPE AREAS, WITH SOME HAVING SEEDED ONTO THE DISTURBED ROAD  
BANKS.

General site description:

SOUTH-FACING SLOPE AND ROADBANKS, IN GRAVELLY LOAM SOIL WITH  
SMALL SHALE FLAKES; WITH PSEUDOTSUGA MENZIESII, AGROPYRON  
SPICATUM, FESTUCA IDAHOENSIS, PHACELIA HASTATA.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

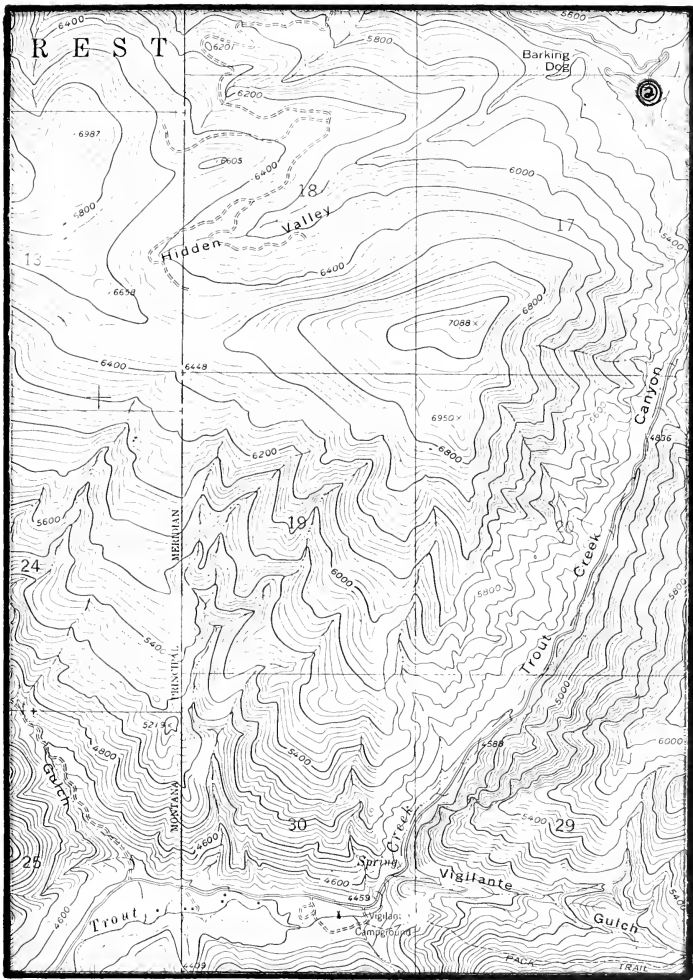
VOUCHER-SHELLY, J.S. (1071) AND G.V. KING, 1986-06-01,  
MONTU.

Information source:

SHELLY, J.S. 1986. FIELD SURVEYS IN LEWIS & CLARK AND  
BROADWATER COUNTIES OF 10-13 JUNE.

Specimens:





Lesquerella klausii #006  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 007  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: NELSON  
EO rank: B  
EO rank comments: SMALL POPULATION, MOST PLANTS IN UNDISTURBED  
HABITAT.

County: LEWIS AND CLARK

USGS quadrangle: NELSON

Township: Range: Section: TRS comments:  
012N 002W 01 E2SE4,12N2NW4

Survey date: 1986-06-10 Elevation: 4300 -  
First observation: 1986 Slope/aspect:  
Last observation: 1986-06-10 Size (acres): 10

Location:

0.75-1.0 AIR MILES ENE OF NELSON, 0.05-0.25 AIR MILES NORTH  
OF BEAVER CREEK RD. (HELENA NF RD 138); ONE SMALL ROADSIDE  
SITE 0.25 MILES NE OF NELSON.

Element occurrence data:

CA. 150 PLANTS, 3 SUBPOPULATIONS (27 PLANTS ON ROADSIDE, CA.  
120 ON UNDISTURBED SLOPES NORTH OF ROAD); SOME CHEATGRASS  
INVASION, AREA WAS PARTIALLY BURNED IN THE NORTH HILL FIRE  
(1984).

General site description:

S-FACING SHALE BARREN SLOPES; WITH OPEN PINUS PONDEROSA,  
AGROPYRON SPICATUM, PURSHIA TRIDENTATA, CYMPTERUS  
TEREBINTHINUS, PHACELIA LINEARIS, CHRYSOPSIS VILLOSA.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT  
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

VOUCHER-SHELLY, J.S. (1089) AND G.V. KING, 1986, MONTU; MAP  
SHOWING SUBPOPULATIONS ON FILE AT MTNHP.

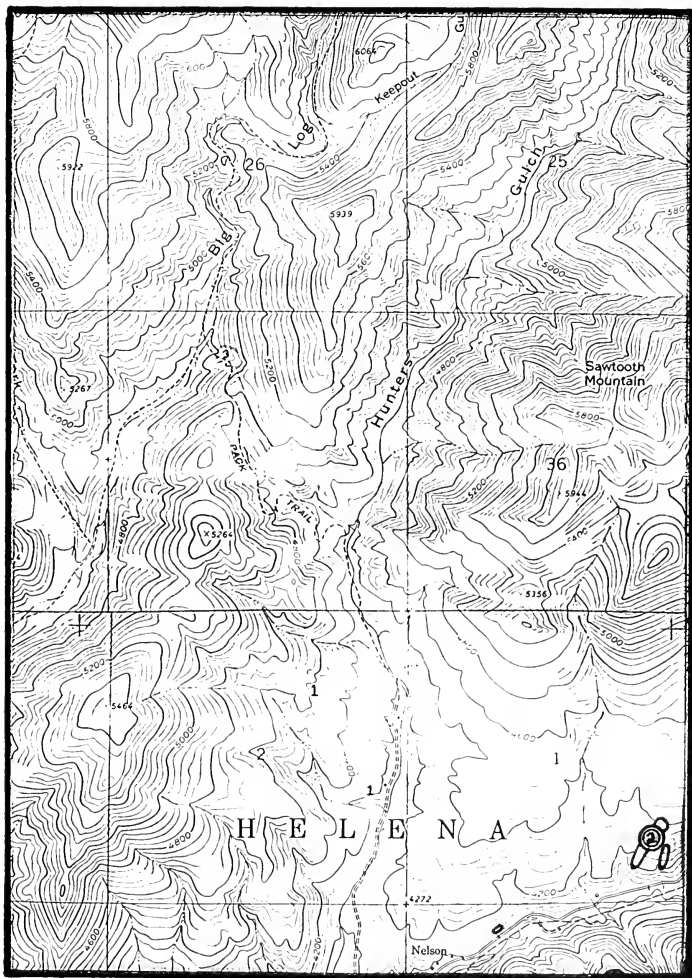
Information source:

SHELLY, J.S. 1986. FIELD SURVEYS IN LEWIS & CLARK AND  
BROADWATER COUNTIES OF 10-13 JUNE.

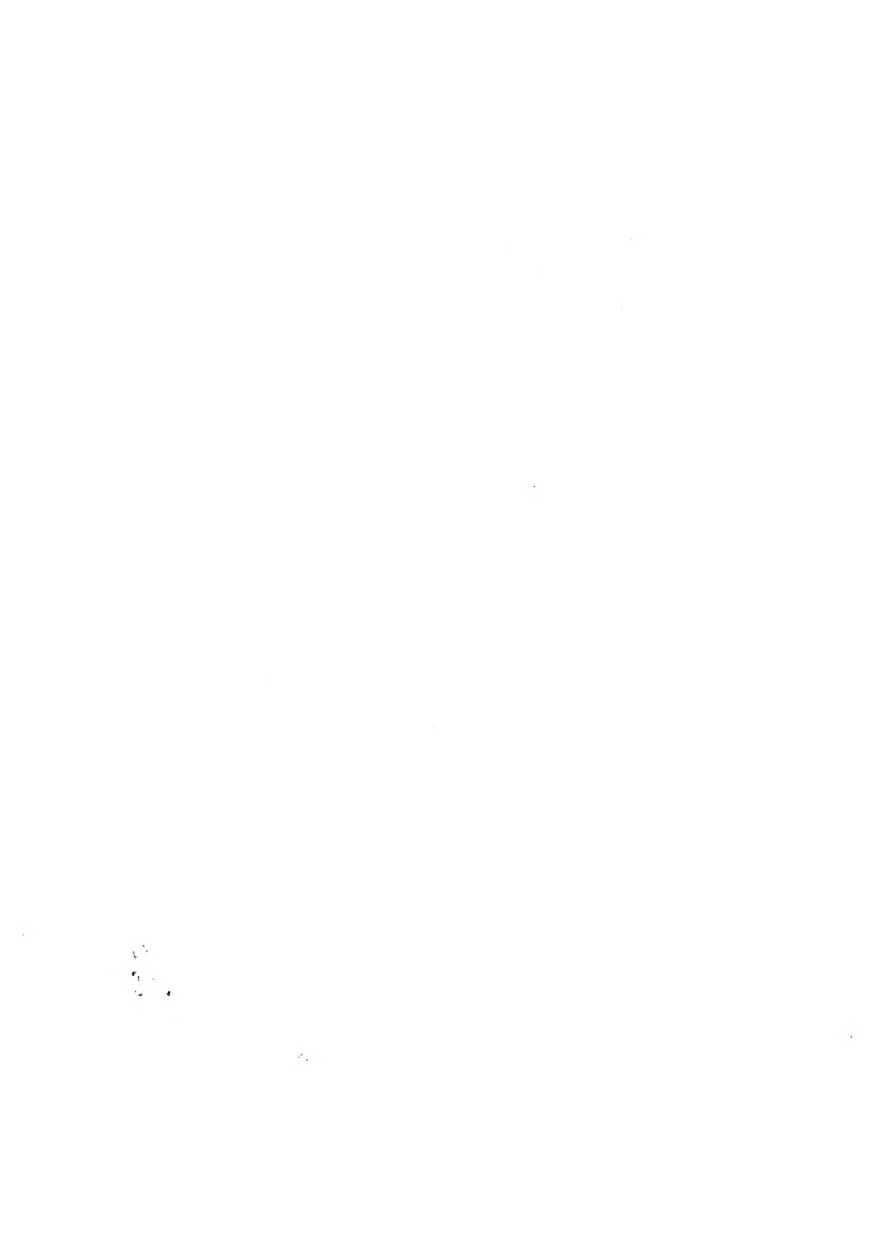
Specimens:







Lesquerella klausii #007  
Nelson Quad



LESQUERELLA KLAUSII \* 008  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: REFRIGERATOR CANYON  
EO rank: BC  
EO rank comments: LARGELY NATURAL SITE, BUT BISECTED BY A POWERLINE.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
013N 001W 28 E2SE4,27W2SW4

Survey date: 1986-06-10 Elevation: 4680 -  
First observation: 1986 Slope/aspect:  
Last observation: 1986-06-10 Size (acres): 8

Location:

BIG BELT MOUNTAINS, ON N SIDE OF BEAVER CREEK ROAD. (HELENA  
N.F. RD. #138) CA. 0.5 MILES ENE OF REFRIGERATOR CANYON, CA.  
4.5 MILES NE OF NELSON.

Element occurrence data:

CA. 200 PLANTS, IN FLOWER AND FRUIT; SOME PLANTS OCCUR ON  
ROADBANK, BUT OTHERWISE MOST OCCUR ON THE UNDISTURBED SLOPE.

General site description:

IN COARSE TO FINE SHALE RUBBLE SOILS, ON SOUTH-FACING SLOPE;  
PINUS PONDEROSA/AGROPYRON SPICATUM, WITH JUNIPERUS  
SCOPULORUM, SENECIO CANUS, BERBERIS, ROSA.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

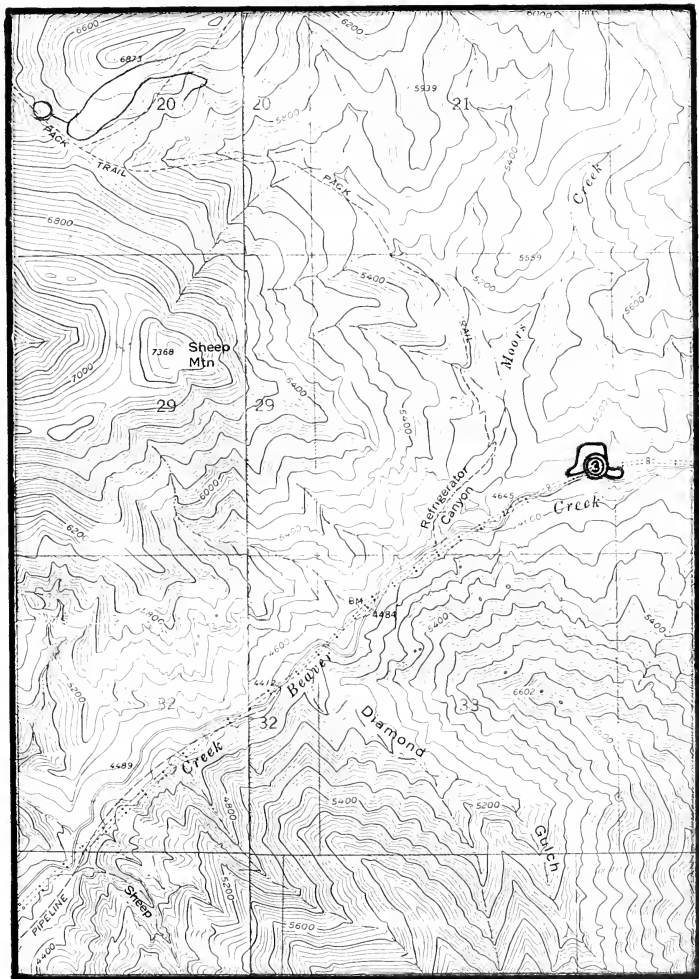
VOUCHER-SHELLY, J.S. (1069) AND G.V. KING, 1986, MONTU.

Information source:

SHELLY, J.S. 1986. FIELD SURVEYS IN LEWIS & CLARK AND  
BROADWATER COUNTIES OF 10-13 JUNE.

Specimens:





Lesquerella klausii #008  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 009  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: BURNT GULCH  
EO rank: C  
EO rank comments: ROAD GOES THROUGH SITE.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
013N 001W 23 NE4SW4

Survey date: 1986-06-10 Elevation: 5200 -  
First observation: 1986 Slope/aspect:  
Last observation: 1986-06-10 Size (acres): 5

Location:

BIG BELT MOUNTAINS, ALONG BEAVER CREEK RD. (HELENA N.F. RD.  
#138) IN BURNT GULCH, FOURTH SWITCHBACK UP FROM BEAVER  
CREEK, CA. 6 MILES NE OF NELSON.

Element occurrence data:

CA. 150 PLANTS, IN FLOWER AND FRUIT; PLANTS OCCUR ON ROAD-  
BANK AND IN SMALL AREA OF UNDISTURBED VEGETATION ABOVE THE  
ROAD.

General site description:

GRAVELLY LOAM SOILS, ON AND ABOVE ROADBANK; PSEUDOTSUGA  
MENZIESII/AGROPYRON SPICATUM, WITH PINUS PONDEROSA, KOELERIA  
MACRANTHA, FESTUCA, PENSTEMON.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

VOUCHER - SHELLY, J.S. (1070) AND G.V. KING, 1986, MONTU.

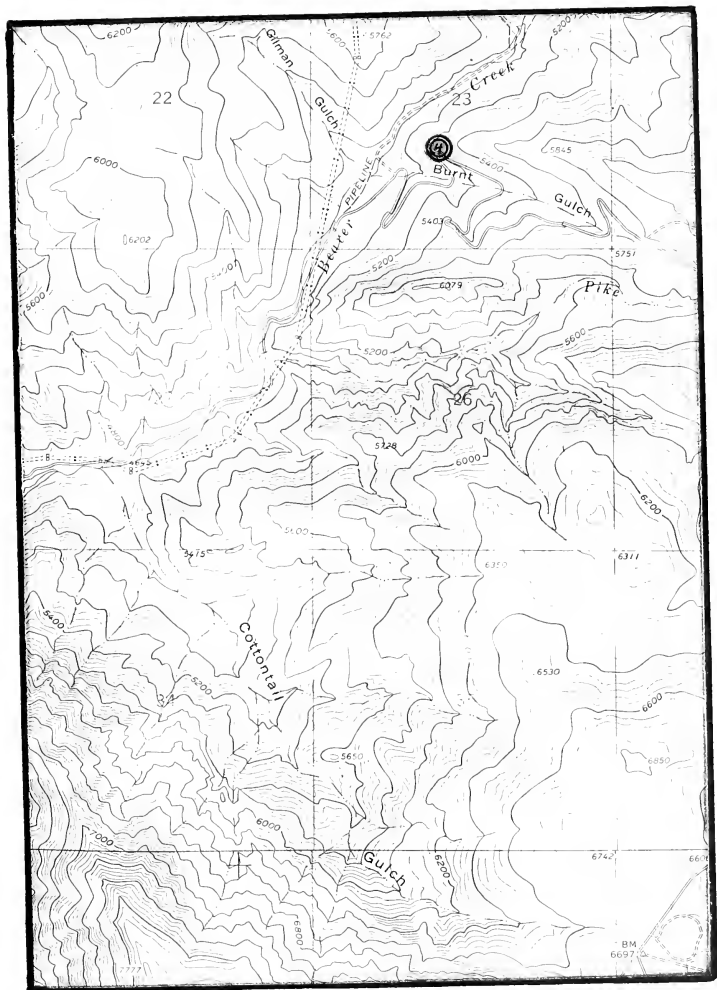
Information source:

SHELLY, J.S. 1986. FIELD SURVEYS IN LEWIS & CLARK AND  
BROADWATER COUNTIES OF 10-13 JUNE.

Specimens:







Lesquerella klausii #009  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 010  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: BLACKSMITH GULCH  
EO rank: BC  
EO rank comments: UNDISTURBED SITE, BUT POPULATION IS VERY SMALL.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
012N 001W 35 SE4E2

Survey date: 1986-06-11 Elevation: 4600 -  
First observation: 1986 Slope/aspect:  
Last observation: 1986-06-11 Size (acres): 5

Location:

BIG BELT MOUNTAINS, BLACKSMITH GULCH, 0.35 AIR MILES W OF  
TROUT CREEK ROAD (HELENA N.F. RD. #4021). CA. 4 MILES NE OF  
YORK.

Element occurrence data:

SMALL POPULATION, 20-25 PLANTS; VERY SPARSE POPULATION, IN  
UNDISTURBED HABITAT; IN FRUIT.

General site description:

SHALE RUBBLE SOILS, SOUTH-FACING SLOPE; PINUS PONDEROSA/  
PSEUDOTSUGA MENZIESII/AGROPYRON SPICATUM, WITH ARTEMISIA  
FRIGIDA, PENSTEMON ERIANTHERUS, SENECIO CANUS.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

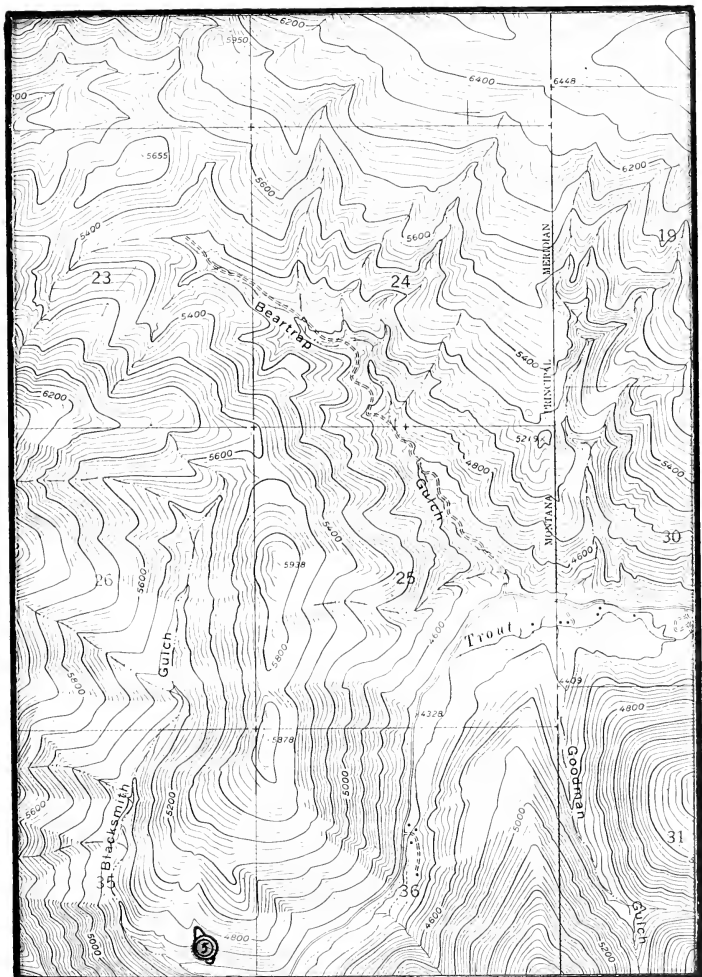
VOUCHER - SHELLY, J.S. (1092) AND G.V. KING, 1986, MONTU.

Information source:

SHELLY, J.S. 1986. FIELD SURVEYS IN LEWIS & CLARK AND  
BROADWATER COUNTIES OF 10-13 JUNE.

Specimens:





Lesquerella klausii #010  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 011  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: KELLY GULCH  
EO rank: BC  
EO rank comments: FAIRLY SMALL POPULATION, ADJACENT TO ROAD.

County: LEWIS AND CLARK

USGS quadrangle: CANYON FERRY

Township: Range: Section: TRS comments:  
011N 001W 04 SE4SE4

Survey date: 1986-06-11 Elevation: 4200 -  
First observation: 1986 Slope/aspect:  
Last observation: 1986-06-11 Size (acres): 5

Location:

BIG BELT MOUNTAINS, E. SIDE OF MOUTH OF KELLY GULCH, 0.1  
MILE N. OF TROUT CREEK RD. (HELENA N.F. RD. #4021), CA. 1.25  
MILES NE OF YORK.

Element occurrence data:

CA. 50-60 PLANTS, IN FRUIT; UNDISTURBED SITE, THOUGH ADJA-  
CENT TO SEVERAL RESIDENCES.

General site description:

TAN-RED COLORED GRAVELLY LOAM SOIL, SW-FACING SLOPE; PINUS  
PONDEROSA/PSEUDOTSUGA MENZIESII/AGROPYRON SPICATUM, WITH  
ORYZOPSIS HYMENOIDES, RHUS.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

VOUCHER - SHELLY, J.S. (1093) AND G.V. KING, 1986, MONTU.

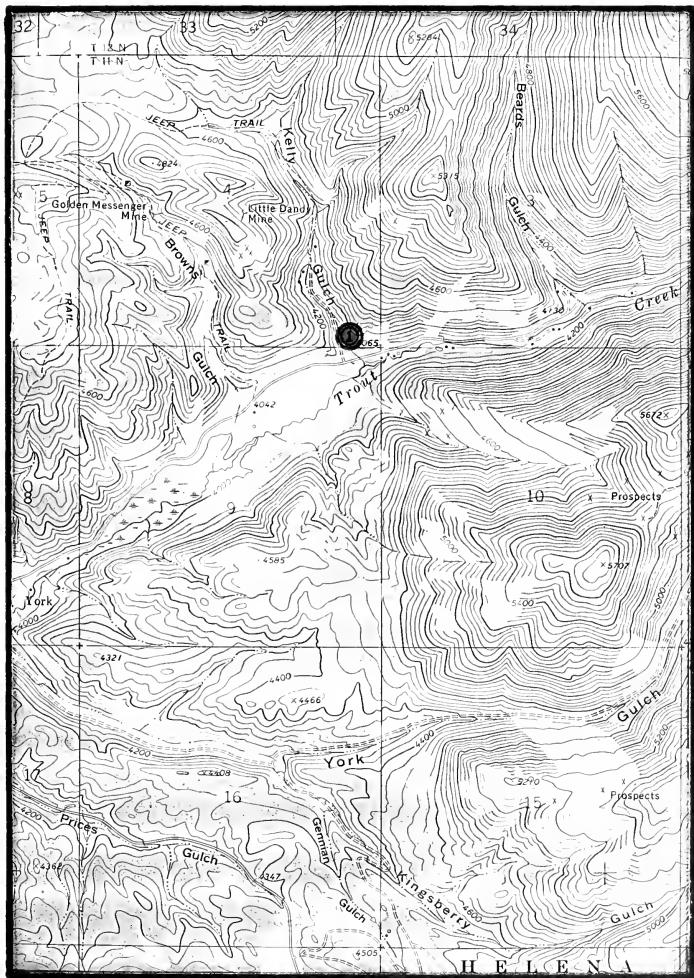
Information source:

SHELLY, J.S. 1986. FIELD SURVEYS IN LEWIS & CLARK AND  
BROADWATER COUNTIES OF 10-13 JUNE.

Specimens:







Lesquerella klausii #011  
 Canyon Ferry Quad



LESQUERELLA KLAUSII \* 012  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: PRICES GULCH  
EO rank: D  
EO rank comments: SMALL POPULATION, MOST PLANTS ON ROADBANK.

County: LEWIS AND CLARK

USGS quadrangle: HAUSER LAKE

Township: Range: Section: TRS comments:  
011N 001W 17 W2NE4

Survey date: 1986-06-11 Elevation: 4000 -  
First observation: 1986 Slope/aspect:  
Last observation: 1986-06-11 Size (acres): 2

Location:

BIG BELT MOUNTAINS, PRICES GULCH, HELENA N.F. ROAD #224,  
0.1-0.2 MILES E. OF TROUT CREEK RD. (HELENA N.F. RD #4021),  
JUST S. OF YORK.

Element occurrence data:

2 SUBPOPULATIONS: 14 ON ROADSIDE, 4 IN ADJACENT FOREST; IN  
FRUIT.

General site description:

ROADSIDE RUBBLE, AND THIN ROCKY SOILS IN FOREST; WITH  
PSEUDOTSUGA MENZIESII, AGROPYRON SPICATUM, PENSTEMON  
ERIANATHERUS.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT  
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

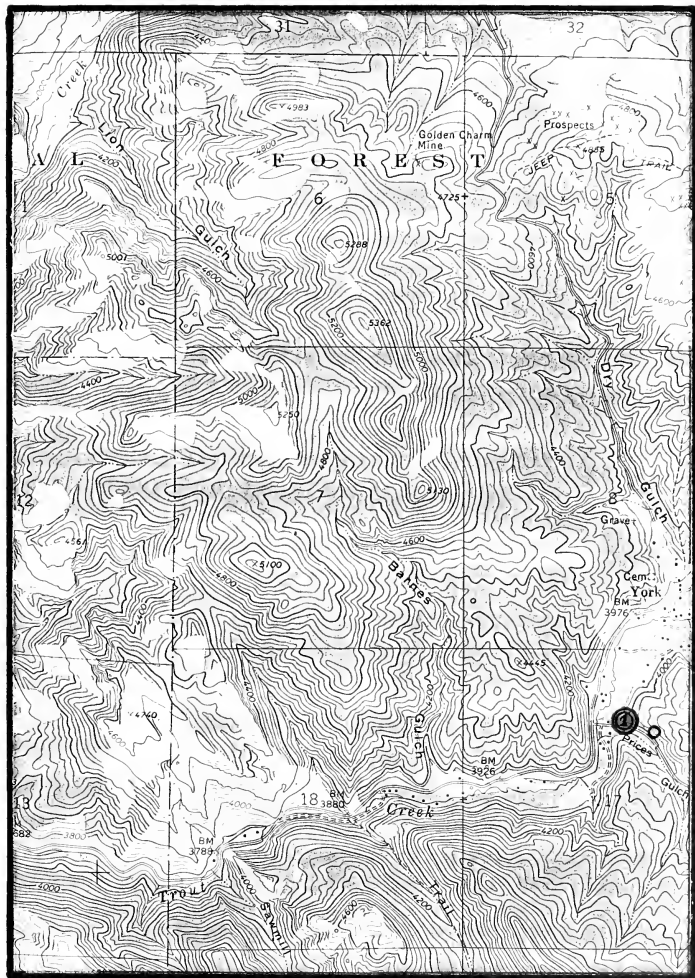
VOUCHER - SHELLY, J.S. (1094) AND G.V. KING, 1986, MONTU.

Information source:

SHELLY, J.S. 1986. FIELD SURVEYS IN LEWIS & CLARK AND  
BROADWATER COUNTIES OF 10-13 JUNE.

Specimens:





Lesquerella klausii #012  
Hauser Lake Quad



LESQUERELLA KLAUSII \* 013  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: BIG LOG GULCH-HUNTERS GULCH RIDGE  
EO rank: AB  
EO rank comments: FAIRLY LARGE POPULATION, UNDISTURBED HABITAT.

County: LEWIS AND CLARK

USGS quadrangle: NELSON

Township: Range: Section: TRS comments:  
013N 002W 35 CENTER,NE4NW4

Survey date: 1986-10-19 Elevation: 4900 -  
First observation: 1986 Slope/aspect:  
Last observation: 1987-06-02 Size (acres): 10

Location:

BIG BELT MOUNTAINS, GATES OF THE MOUNTAINS WILDERNESS;  
SLOPES BETWEEN BIG LOG GULCH AND HUNTERS GULCH, CA. 1.6 AIR  
MI. NNW. OF NELSON.

Element occurrence data:

SEVERAL HUNDRED PLANTS, IN TWO SUBPOPULATIONS; AREA BURNED  
IN 1984 FIRE.

General site description:

SOUTH-FACING SLOPE, GRAVELLY LIMESTONE RUBBLE; WITH PINUS  
PONDEROSA, AGROPYRON SPICATUM, FESTUCA SCABRELLA, ACHILLEA  
MILLEFOLIUM, ARTEMISIA FRIGIDA.

Land owner/manager:

GATES OF THE MOUNTAINS WILDERNESS  
HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

VOUCHER-SHELLY, J.S. (1307) AND G.V. KING, 1986, MONTU.

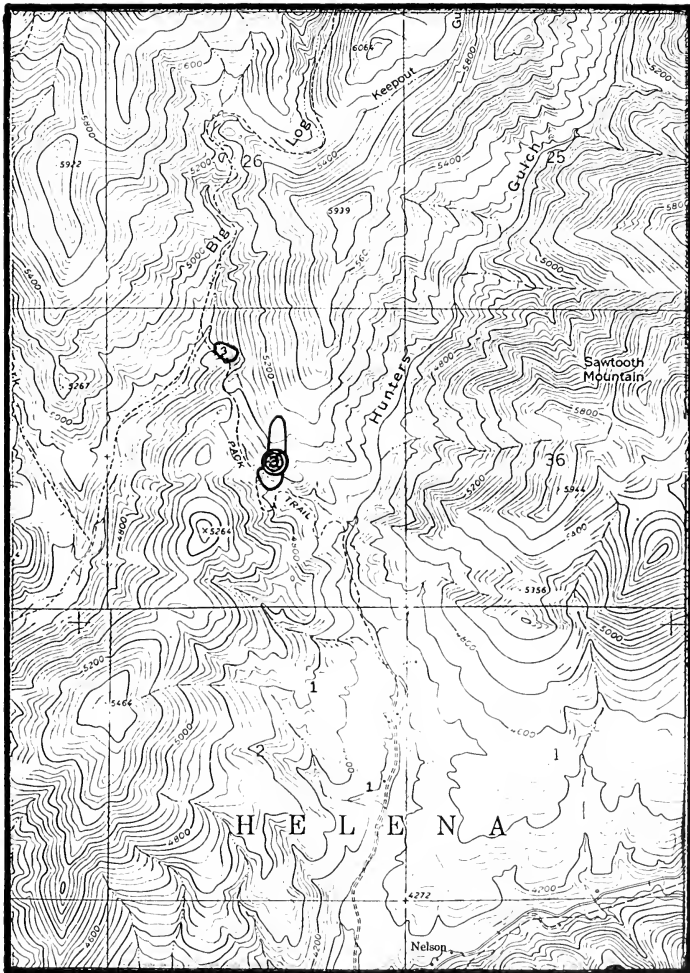
Information source:

SHELLY, J.S. MT NATURAL HERITAGE PROGRAM, STATE LIBRARY,  
1515 E. 6th AVE., HELENA, MT 59620.

Specimens:







Lesquerella klausii #013  
Nelson Quad



LESQUERELLA KLAUSII \* 014  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: SHEEP MOUNTAIN PASS  
EO rank: A  
EO rank comments: LARGE POPULATION IN VIRTUALLY UNDISTURBED AREA.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN  
NELSON

Township: Range: Section: TRS comments:  
013N 001W 20 N2,21NW4SW4

Survey date: 1987-05-15 Elevation: 6120 -  
First observation: 1987 Slope/aspect:  
Last observation: 1987-05-15 Size (acres): 60

Location:

FROM YORK, NORTH ON DRY GULCH ROAD TO BEAVER CREEK ROAD;  
BEAVER CREEK ROAD TO REFRIGERATER CANYON, AND NORTH ON  
HIKING TRAIL CA. 2 MILES.

Element occurrence data:

EST. 2000-3000+ PLANTS, 3 SUBPOPULATIONS; HABITAT IS  
UNDISTURBED, EXCEPT FOR NEARBY HIKING TRAIL; FLOWERS AND  
EARLY FRUIT.

General site description:

SHALE BARRENS; PSEUDOTSUGA MENZIESII/AGROPYRON SPICATUM,  
WITH BALSAMORHIZA SAGITTATA, LOMATIUM DISSECTUM, PENSTEMON  
ALBERTINUS, ERIGERON COMPOSITUS, ARTEMISIA, ERIOGONUM.

Land owner/manager:

GATES OF THE MOUNTAINS WILDERNESS  
HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

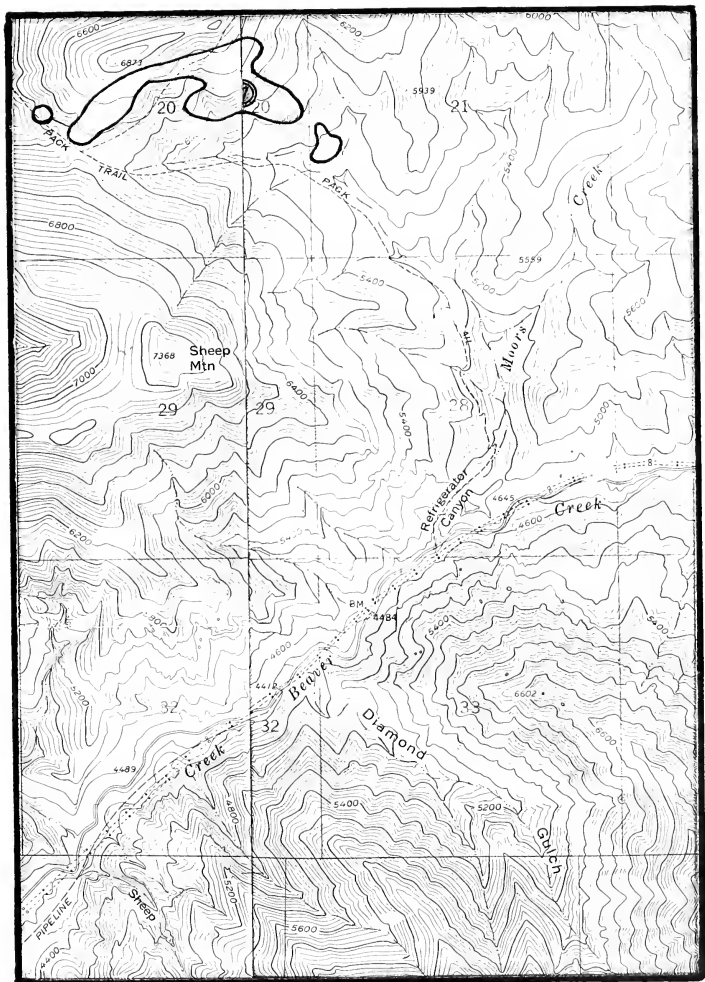
VOUCHER-SHELLY, J.S. (1308), 1987, MONTU.

Information source:

SHELLY, J.S. 1987. FIELD SURVEYS IN LEWIS & CLARK AND  
MEAGHER COS. OF 15 MAY, 28 MAY, 2 JUNE, & 8-11 JUNE.

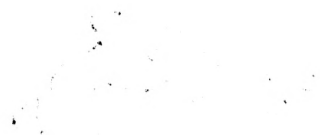
Specimens:





Lesquerella klausii #014  
 Nelson Quad

Hogback Mt Quad



LESQUERELLA KLAUSII \* 015  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: MOORS CREEK  
EO rank: B  
EO rank comments: MEDIUM-SIZED POPULATIONS; LITTLE USED AREA.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
013N 001W 28 E2NW4

Survey date: 1987-05-15 Elevation: 5120 -  
First observation: 1987 Slope/aspect:  
Last observation: 1987-05-15 Size (acres): 2

Location:

FROM YORK, NORTH ON DRY GULCH ROAD ABOUT 5.5 MILES TO BEAVER  
CREEK ROAD; UP BEAVER CREEK RD. CA. 5 MILES TO REFRIGERATOR  
CANYON, AND CA. 1 MILE NORTH ON HIKING TRAIL.

Element occurrence data:

EST. 400-500 PLANTS IN 2 SUBPOPULATIONS; FLOWERS AND EARLY  
FRUIT; HIKING TRAIL TRAVERSES POPULATIONS.

General site description:

LIMESTONE RUBBLE SOILS; PSEUDOTSUGA MENZIESII/AGROPYRON  
SPICATUM, WITH PENSTEMON ERIANTHERUS, JUNIPERUS COMMUNIS, J.  
SCOPULORUM, SENECIO CANUS, SMILACINA.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

VOUCHER-SHELLY, J.S. (1309), 1987, MONTU.

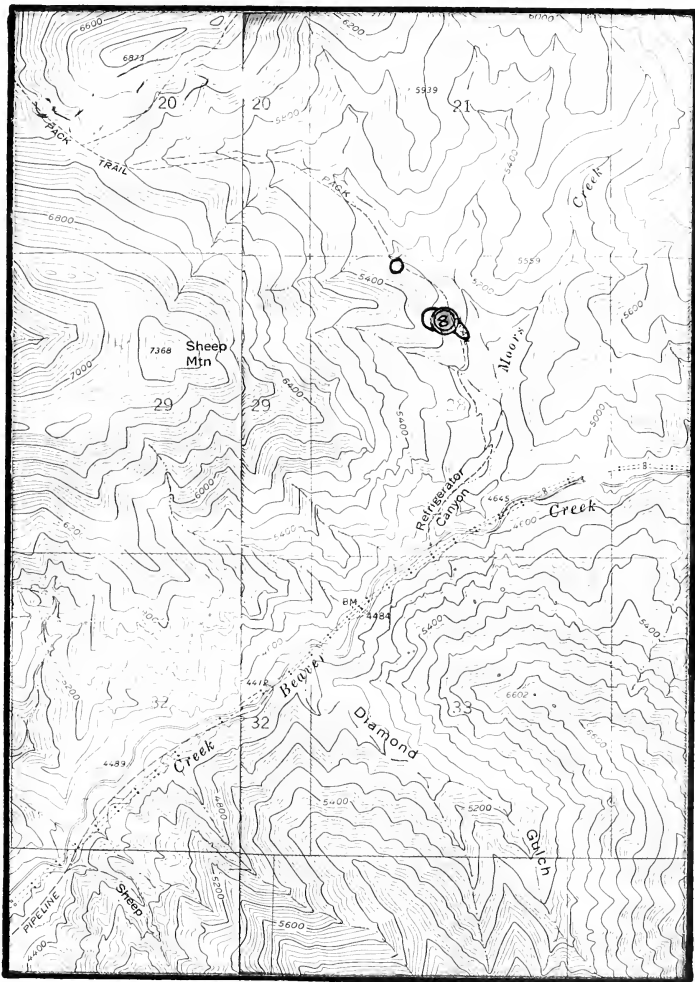
Information source:

SHELLY, J.S. 1987. FIELD SURVEYS IN LEWIS & CLARK AND  
MEAGHER COS. OF 15 MAY, 28 MAY, 2 JUNE, & 8-11 JUNE.

Specimens:







Lesquerella klausii #015  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 016  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: BULL RUN GULCH  
EO rank: A  
EO rank comments: POPULATION & HABITAT CURRENTLY IN EXCELLENT  
CONDITION.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
012N 001W 33 N2NE4,28SE4

Survey date: 1987-05-28 Elevation: 5120 -  
First observation: 1987 Slope/aspect:  
Last observation: 1987-05-28 Size (acres): 15

Location:

FROM YORK, NORTH ON DRY GULCH ROAD CA. 2.2 MILES TO BULL RUN  
GULCH, AND UP GULCH (EAST) CA. 1.1 MILES.

Element occurrence data:

EST. 750-1000+ PLANTS, 3 SUBPOPULATIONS; FLOWERS AND FRUIT;  
HABITAT LARGELY UNDISTURBED, BUT 2 MINE CLAIM POSTS ON SITE.

General site description:

SHALE RUBBLE; PINUS PONDEROSA/PSEUDOTSUGA MENZIESII/  
AGROPYRON SPICATUM, WITH CHRYSOPSIS VILLOSA, LOMATIUM  
DISSECTUM, CIRSIUM UNDULATUM, AMELANCHIER ALNIFOLIA,  
PENSTEMON ATTENUATUS.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

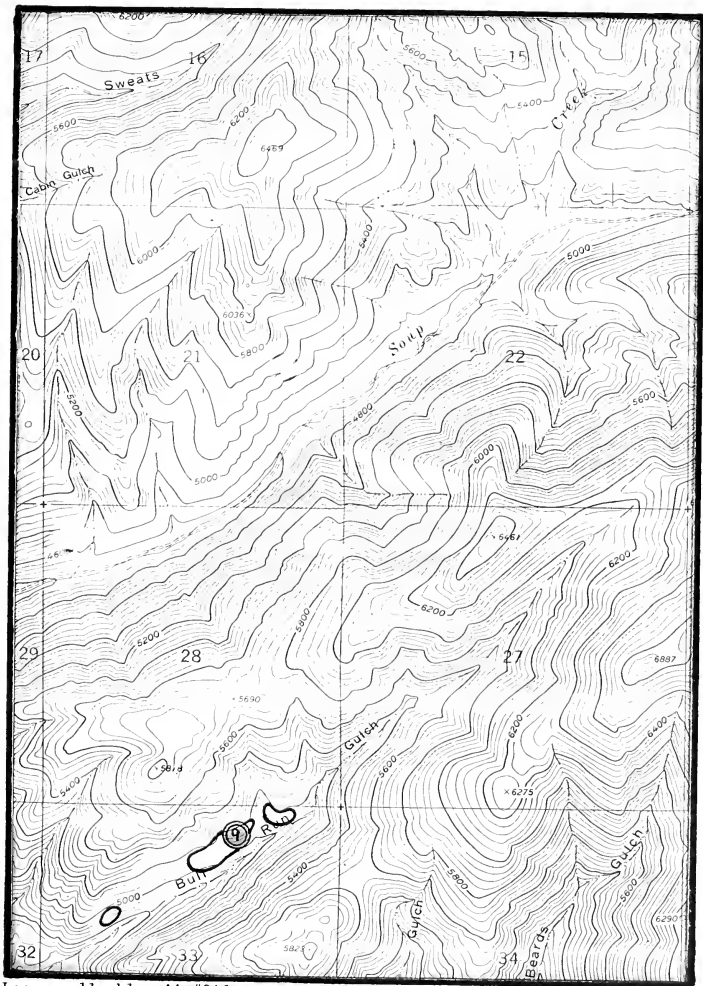
VOUCHER-SHELLY, J.S. (1310). 1987. MONTU.

Information source:

SHELLY, J.S. 1987. FIELD SURVEYS IN LEWIS & CLARK AND  
MEAGHER COS. OF 15 MAY, 28 MAY, 2 JUNE, & 8-11 JUNE.

Specimens:





Lesquerella klausii #016  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 017  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: SWEATS GULCH  
EO rank: A  
EO rank comments: LARGE POPULATION, HABITAT IN GOOD TO EXCELLENT  
CONDITION.

County: LEWIS AND CLARK

USGS quadrangle: NELSON

Township: Range: Section: TRS comments:  
012N 001W 19 NE4,20W2NWR,17E2SW4,N2SE4

Survey date: 1987-05-28 Elevation: 4960 -  
First observation: 1987 Slope/aspect:  
Last observation: 1987-05-28 Size (acres): 15

Location:

FROM YORK, NORTH ON DRY GULCH ROAD CA. 3 MILES TO JEEP  
TRAIL; NORTHEAST ON TRAIL CA. 0.6 MILES TO SITE, ON NORTH  
SIDE OF SWEATS GULCH.

Element occurrence data:

3 SUBPOPULATIONS: 1)500-600+, 2)15, 3)30-40; FLOWERS AND  
FRUIT; HABITAT MOSTLY UNDISTURBED; ORV TRAIL ALONG RIDGE.

General site description:

SHALE RUBBLE; PINUS PONDEROSA/PSEUDOTSUGA MENZIESII/  
AGROPYRON SPICATUM, WITH PURSHIA TRIDENTATA, RHUS TRILOBATA,  
PHACELIA HASTATA, ROSA SAYI, PENSTEMON ATTENUATUS, LOMATIUM,  
ASCLEPIAS.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

VOUCHER-SHELLY, J.S. (1311), 1987, MONTU.

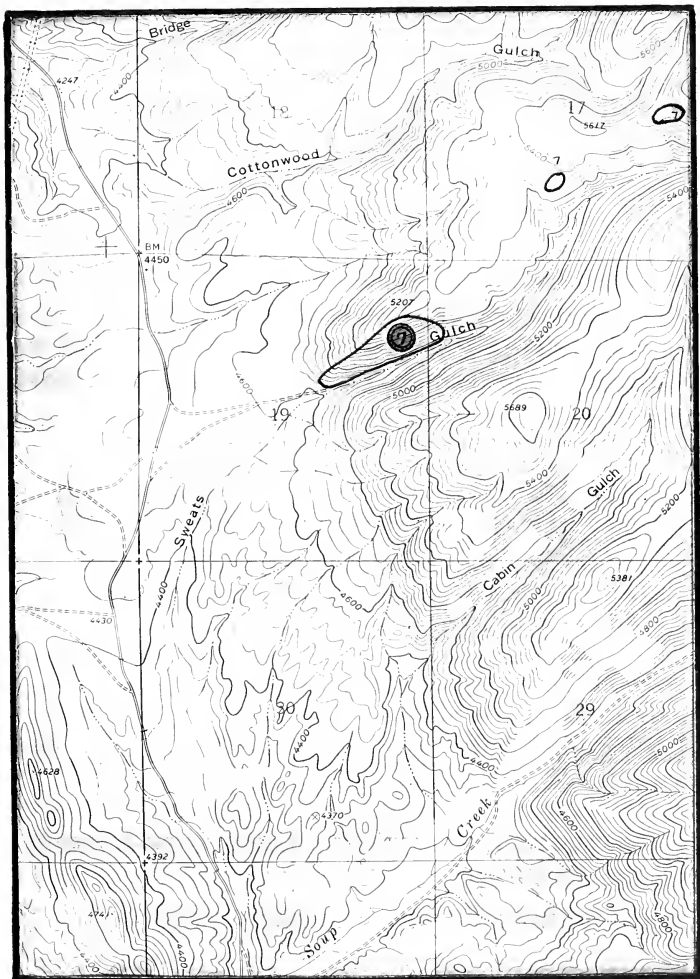
Information source:

SHELLY, J.S. 1987. FIELD SURVEYS IN LEWIS & CLARK AND  
MEAGHER COS. OF 15 MAY, 28 MAY, 2 JUNE, & 8-11 JUNE.

Specimens:







Lesquerella klausii #017  
Nelson Quad



LESQUERELLA KLAUSII \* 018  
DIVIDE BLADDERPOD

Global rank: G3      Forest Service status:  
State rank: S3      Federal Status:

Survey site name: KEEPOUT GULCH  
EO rank: B  
EO rank comments: MODERATE POPULATION SIZE, IN UNDISTURBED HABITAT.

County: LEWIS AND CLARK

USGS quadrangle: NELSON

Township: Range: Section: TRS comments:  
013N      002W      26      NE4

Survey date: 1987-06-02      Elevation: 5400 -  
First observation: 1987      Slope/aspect:  
Last observation: 1987-06-02      Size (acres): 2

Location:

FROM YORK, NORTH ON DRY GULCH ROAD TO BEAVER CREEK (NELSON);  
BEAVER CREEK ROAD WEST FOR 0.3 MILES, THEN JEEP TRAIL NORTH  
CA.1 MILE AND PACK TRAIL NORTH CA. 3 MILES TO KEEPOUT GULCH.

Element occurrence data:

EST. 200-300+ PLANTS; UNDISTURBED HABITAT; FLOWERS AND  
FRUIT.

General site description:

LIMESTONE RUBBLE; PINUS PONDEROSA/PSEUDOTSUGA MENZIESII/  
AGROPYRON SPICATUM, WITH JUNIPERUS COMMUNIS, ARCTOSTAPHYLOS  
UVA-URSI, SMILACINA, LINUM, APOCYNUM, ACHILLEA.

Land owner/manager:

GATES OF THE MOUNTAINS WILDERNESS  
HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

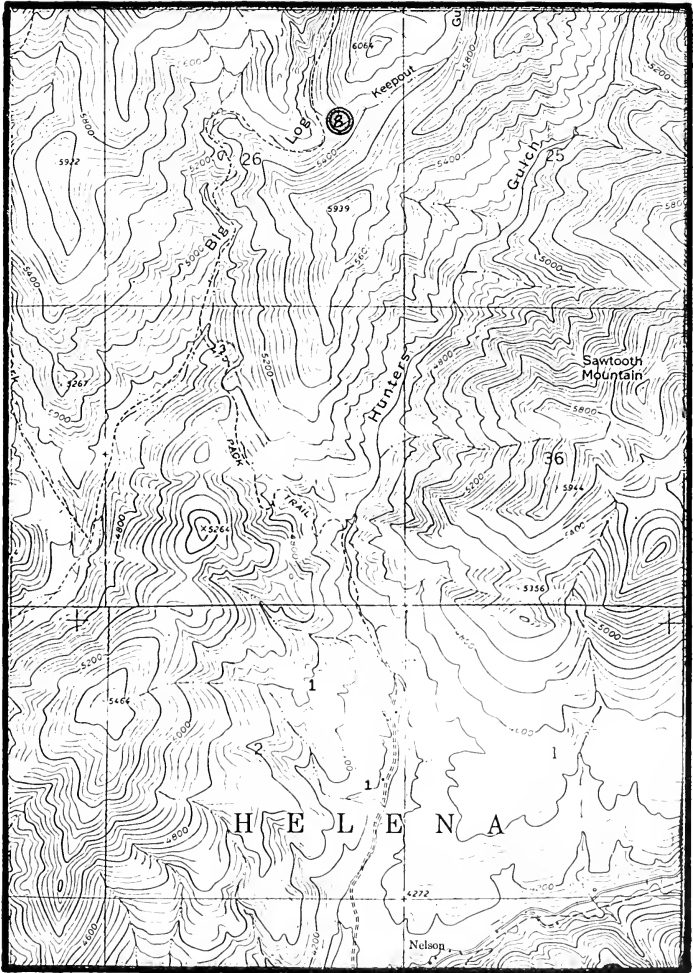
VOUCHER-SHELLY, J.S. (1312), 1987, MONTU.

Information source:

SHELLY, J.S. 1987. FIELD SURVEYS IN LEWIS & CLARK AND  
MEAGHER COS. OF 15 MAY, 28 MAY, 2 JUNE, & 8-11 JUNE.

Specimens:





Lesquerella klausii #018  
Nelson Quad



LESQUERELLA KLAUSII \* 025  
DIVIDE BLADDERPOD

Global rank: G3      Forest Service status:  
State rank: S3      Federal Status:

Survey site name: SOUP CREEK WEST  
EO rank: C  
EO rank comments: SMALL POPULATION, BUT HABITAT IN GOOD CONDITION.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
012N      001W      28      NW4NW4

Survey date: 1987-09-29      Elevation: 4700 -  
First observation: 1987      Slope/aspect:  
Last observation: 1987-09-29      Size (acres): 5

Location:

BIG BELT MOUNTAINS, SOUP CREEK DRAINAGE, CA. 2.0 AIR MILES  
NORTHEAST OF HELENA NF ROAD #224, CA. 3.5 AIR MILES NORTH OF  
YORK.

Element occurrence data:

ONE POPULATION, CA. 25-30 PLANTS; HABITAT LARGELY  
UNDISTURBED; MAY BE MORE PLANTS ON SLOPE TO THE SOUTHWEST.

General site description:

STEEP SOUTH AND SOUTHEAST-FACING SLOPE, SHALE RUBBLE SCREE;  
WITH PINUS PONDEROSA, RHUS TRILOBATA, AGROPYRON SPICATUM,  
CHRYSOTHAMNUS NAUSEOSUS, PHACELIA HASTATA.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT  
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

ADDITIONAL SURVEYS NEEDED IN AREA IN EARLY SUMMER.

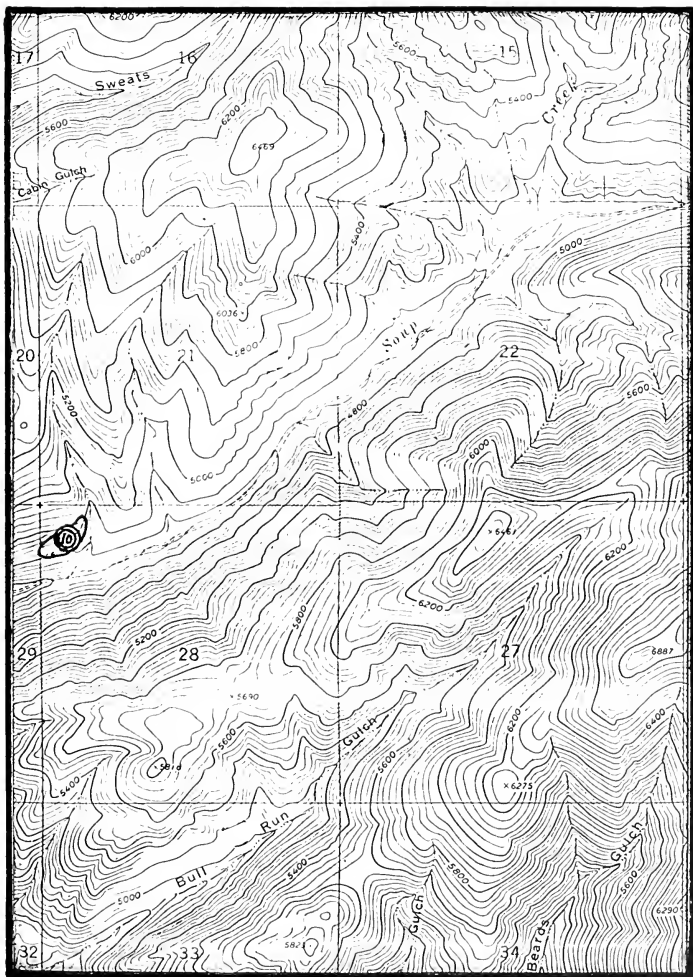
Information source:

SHELLY, J.S. 1987. FIELD SURVEY TO CABIN GULCH PRNA, BIG  
BELT MOUNTAINS, OF 29 SEPTEMBER.

Specimens:







Lesquerella klausii #025  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 026  
DIVIDE BLADDERPOD

Global rank: G3      Forest Service status:  
State rank: S3      Federal Status:

Survey site name: SOUP CREEK EAST  
EO rank: B  
EO rank comments: FAIRLY LARGE POPULATION, GOOD-EXCELLENT CONDITION  
HABITAT.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
012N      001W      15      S2SW4,22N2NW4

Survey date: 1987-09-29      Elevation: 5400 -  
First observation: 1987      Slope/aspect:  
Last observation: 1987-09-29      Size (acres): 5

Location:

BIG BELT MOUNTAINS, SOUP CREEK DRAINAGE, CA. 4 MILES NORTH-  
EAST OF HELENA NF ROAD #224, CA. 5 AIR MILES NNE OF YORK.

Element occurrence data:

EST. 300-400+ PLANTS (249 INDIVIDUALS COUNTED); HABITAT  
UNDISTURBED; POST-FRUITING.

General site description:

STEEP SOUTH TO SOUTHEAST-FACING SLOPE, SHALE RUBBLE SOILS;  
WITH PINUS PONDEROSA, PSEUDOTSUGA MENZIESII, AGROPYRON  
SPICATUM, SENECIO CANUS.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT  
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

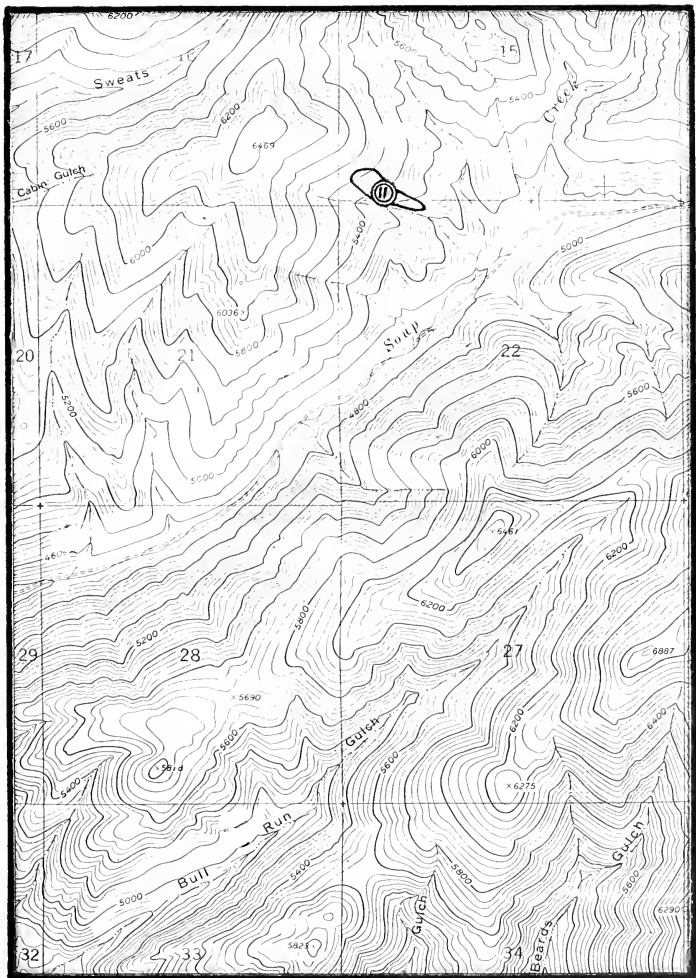
ADDITIONAL SURVEYS NEEDED IN AREA IN EARLY SUMMER; SITE MAY  
PARTIALLY EXTEND ONTO PRIVATE LAND.

Information source:

SHELLY, J.S. 1987. FIELD SURVEY TO CABIN GULCH PRNA, BIG  
BELT MOUNTAINS, OF 29 SEPTEMBER.

Specimens:





Lesquerella klausii #026  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 029  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: VIGILANTE CAMPGROUND  
EO rank: C  
EO rank comments: RELATIVELY UNDISTURBED HABITAT, BUT SMALL  
POPULATION.

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
012N 001E 29 NW4SW4SW4;30SE4SE4

Survey date:	1989-05	Elevation:	4600 -
First observation:	1989	Slope/aspect:	20% / SOUTHWEST
Last observation:	1989-05	Size (acres):	2

Location:

BIG BELT MOUNTAINS, TROUT CREEK DRAINAGE, CA. 0.2 MILE EAST  
OF VIGILANTE CAMPGROUND, ALONG TRAIL (#248) TO HANGING  
VALLEY.

Element occurrence data:

SCATTERED, PERHAPS 50-75+ PLANTS OBSERVED.

General site description:

OPEN SLOPES, GRAVELLY SOIL; WITH PINUS PONDEROSA, LOMATIUM  
DISSECTUM, ASTRAGALUS GILVIFLORUS.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

SIGHT RECORD; VEGETATIVE PLANTS (PRE-FLOWERING), THAT ARE  
PROBABLY THIS SPECIES, WERE ALSO OBSERVED IN SECTION 21,  
N2SW4SW4, BUT SHOULD BE VERIFIED.

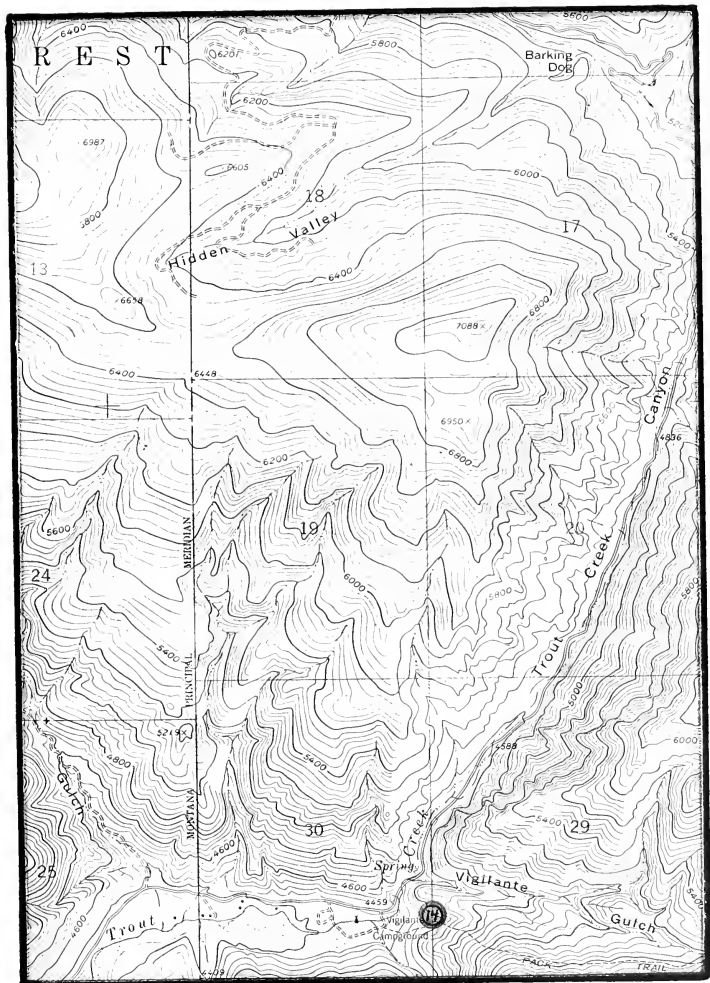
Information source:

SHELLY, J.S. MONTANA NATURAL HERITAGE PROGRAM.

Specimens:







Lesquerella klausii #029  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 030  
DIVIDE BLADDERPOD

Global rank: G3      Forest Service status:  
State rank: S3      Federal Status:

Survey site name: HOGBACK MOUNTAIN  
EO rank: C  
EO rank comments:

County: LEWIS AND CLARK

USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
012N      001W      03      NE4SE4, 1 NW4NW4

Survey date: 1992-08-09      Elevation: 6690 -7680  
First observation: 1992-08-09      Slope/aspect: 5-20% / SSW  
Last observation: 1992-08-09      Size (acres): 2

Location:

BIG BELT MOUNTAINS, HOGBACK MOUNTAIN NEAR RIDGETOP, SOUTH OF OLD TOWER SITE. ACCESSIBLE VIA FS RD #138 ("FIGURE 8 ROUTE") UP BEAVER CREEK TO FS RD #298. POPULATION IS CA. 0.1 MILE SOUTHEAST OF OLD LOOKOUT TOWER SITE.

Element occurrence data:

UNCOMMON IN RESTRICTED HABITAT; 50-100 PLANTS, PAST FRUITING. IN IMMATURE FLOWERING STAGE FOR THE SECOND TIME OF THE SEASON. INCOMPLETE SURVEY.

General site description:

OPEN, SOUTH-FACING DRY HABITAT, UPPER GRAVELLY LIMESTONE SLOPES IN CAREX RUPESTRIS HABITAT TYPE BETWEEN TALUS AND OUTCROP. ASSOCIATED SPECIES: SENECIO CANA, ANDROSACE CHAMAEJASME, ERIOGONUM OVALIFOLIUM, CASTILLEJA PALLESCENS.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

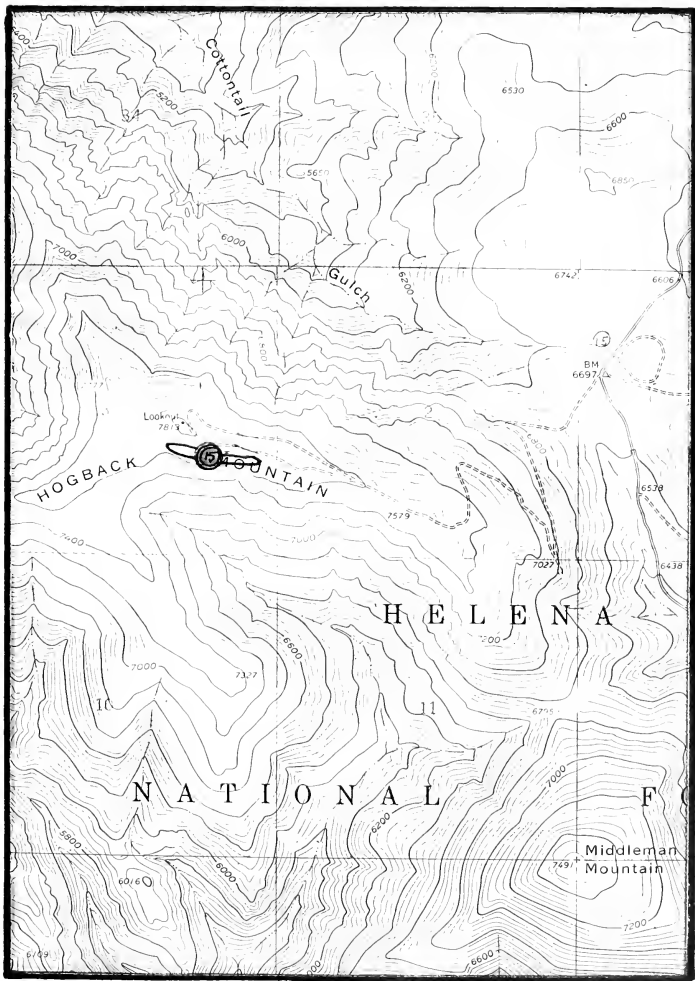
OVER 3 MILES FROM OCCURRENCE #003, SEPARATED BY ELEVATION AND DISTINGUISHED BY SUBSTRATE. WIDELY SCATTERED PLANTS FOUND IN PRAIRIE OUTCROPS; MINOR CONTRIBUTION AS SATELLITES TO POPULATION NUMBERS.

Information source:

HEIDEL, B. AND P. LESICA. 1992. [MTNHP FIELD SURVEY TO HOGBACK MOUNTAIN OF 9 AUGUST.]

Specimens:





Lesquerella klausii #030  
Hogback Mt Quad



LESQUERELLA KLAUSII \* 031  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: NEEDHAM MOUNTAIN  
EO rank: B  
EO rank comments:

County: BROADWATER  
MEAGHER

USGS quadrangle: WHITES CITY

Township: Range: Section: TRS comments:  
011N 002E 23 S2NW4, 22 NE4NE4, NE4SW4

Survey date: 1992-08-12 Elevation: 6500 -6800  
First observation: 1992-08-12 Slope/aspect: 20-40% / SOUTH AND  
SOUTHEAST  
Last observation: 1992-08-12 Size (acres):

Location:

BIG BELT MOUNTAINS, NEEDHAM MOUNTAIN AND ADJOINING RIDGE TO  
NORTHEAST, ACCESSIBLE VIA FS RD #4161 TO RUGGED JEEP TRAILS.

Element occurrence data:

150-200 PLANTS, IN IMMATURE FLOWERING STAGE FOR SECOND TIME  
IN SEASON, MANY OF THE FLOWERS ABORTED. OCCASIONAL IN  
RESTRICTED HABITAT.

General site description:

SPARSELY VEGETATED AREAS ON SOUTH AND EAST-FACING GRASSLAND  
SLOPES OF NEEDHAM MOUNTAIN AND ADJOINING RIDGELINE. UPPER  
GRAVELLY LIMESTONE SURROUNDED BY AGROPYRON SPICATUM-FESTUCA  
IDAHOENSIS HABITAT TYPE. ASSOCIATED SPECIES: ERIOGONUM  
OVALIFOLIUM, SENECIO CANA, FESTUCA OVINA, CHRYSOPSIS  
VILLOSA, ARTEMISIA TRIDENTATA, ASTRAGALUS VEXILLIFLEXUS.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

REPRESENTS MINOR SOUTHERN RANGE EXTENSION SOUTHWARD AND NEW  
COUNTY RECORD.

Information source:

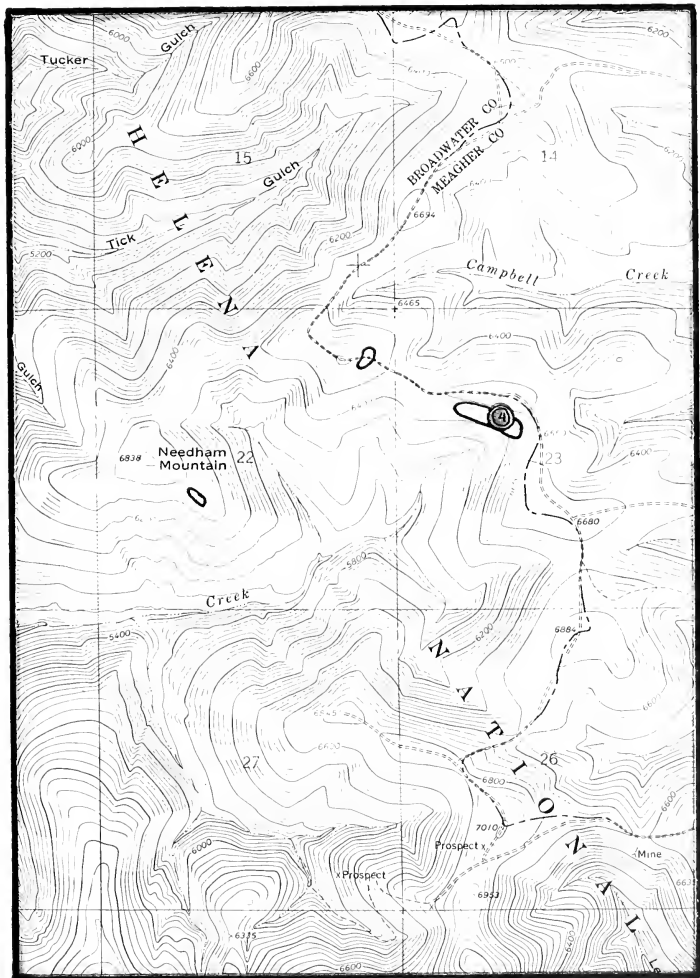
HEIDEL, B. 1992. [MTNHP FIELD SURVEY TO NEEDHAM MOUNTAIN OF  
12 JULY.]

Specimens:

HEIDEL, B. (922). 1992. MONT.







Lesquerella klausii #031  
Whites City Quad



LESQUERELLA KLAUSII \* 032  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: MERIWETHER CANYON  
EO rank:  
EO rank comments:

County: LEWIS AND CLARK

USGS quadrangle: BEARTOOTH MOUNTAIN

Township: Range: Section: TRS comments:  
013N 002W 17 W2SW4NE4, W2NW4NE4; SECTN 8 SW4SW4SE4

Survey date: Elevation: 4760 -5280  
First observation: 1992-05-18 Slope/aspect: 5-30% / WEST  
Last observation: 1992-05-18 Size (acres): 45

Location:

BIG BELT MOUNTAINS, NORTH OF MERIWETHER CANYON; FROM  
BEARTOOTH GAME RANGE FOLLOW WILLOW CREEK, TAKE UNMAINTAINED  
TRAIL TO MERIWETHER CANYON. TRAIL GOES THROUGH LOW SADDLE,  
POPULATION IS SOUTH OF THE SADDLE ALONG THE TRAIL.

Element occurrence data:

1,000 TO 10,000 PLANTS; IN FLOWER AND FRUIT.

General site description:

OPEN, DRY, SANDY, GRAVELLY, GRASSY UPLAND; LIMESTONE PARENT  
MATERIAL; 40% BARE GROUND. DOMINATED BY AGROPYRON SPICATUM,  
POA SECUNDA, FESTUCA SCABRELLA, AND ROSA WOODSII. TOTAL TREE  
COVER 0%; TOTAL SHRUB COVER 5%; TOTAL FORB COVER 15%; TOTAL  
GRAMINOID COVER 35%.

Land owner/manager:

GATES OF THE MOUNTAINS WILDERNESS  
HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

LOTS OF UNSURVEYED POTENTIAL HABITAT IN MANN GULCH.

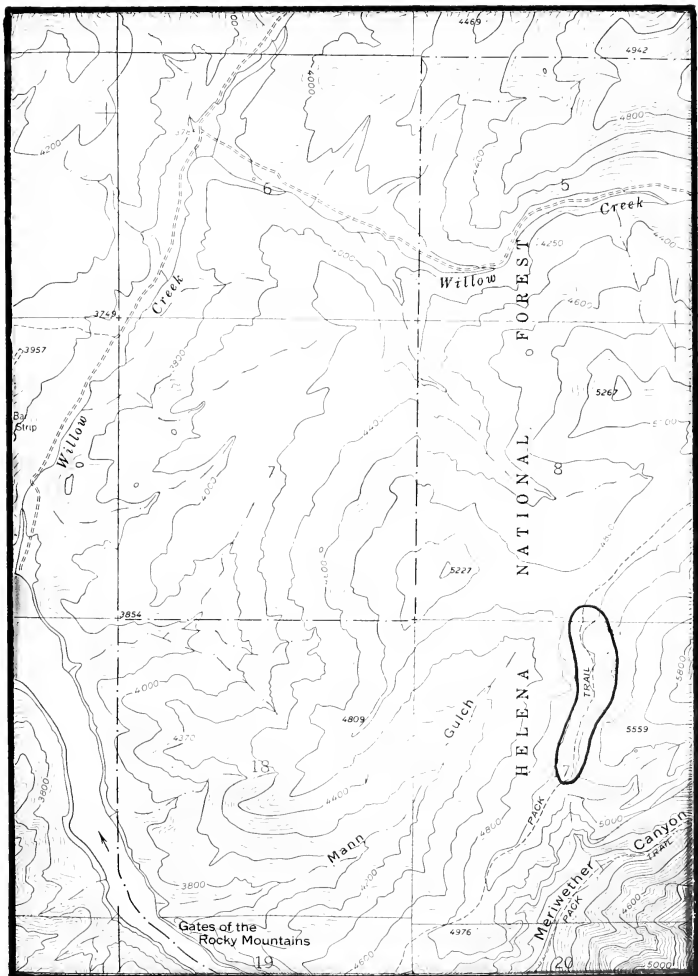
Information source:

LESICA, P. DIVISION OF BIOLOGICAL SCIENCES. UNIV. OF  
MONTANA, MISSOULA, MT 59812.

Specimens:

LESICA, P. (5614). 1992. MONTU.





*Lesquerella klausii* 032  
 Beartooth Mt Quad



LESQUERELLA KLAUSII \* 033  
DIVIDE BLADDERPOD

Global rank: G3 Forest Service status:  
State rank: S3 Federal Status:

Survey site name: WILLOW CREEK AND SLIP GULCH TRAIL  
EO rank:  
EO rank comments:

County: LEWIS AND CLARK

USGS quadrangle: CANDLE MOUNTAIN

Township: Range: Section: TRS comments:

013N 001W 7 W4SE4SW4,SE4SW4SW4; 18 NW4NE4NW4, NE4NW4NW4  
13 NW4NW4NW4; 12 SW4SW4SW4; 11 SE4SE4SE4; 14 NE4

Survey date: Elevation: 5160 -7440  
First observation: 1992-05-19 Slope/aspect: 25% / SOUTH  
Last observation: 1992-05-19 Size (acres): 30

Location:

BIG BELT MOUNTAINS; SOUTH SLOPES OF CANDLE MOUNTAIN AND  
ALONG THE SLIP GULCH TRAIL CA. 1.3 AIR MILES WEST OF THE  
SUMMIT OF CANDLE MOUNTAIN; TAKE WILLOW CREEK OR REFRIGERATOR  
CANYON TRAIL TO BEAR PRAIRIE AND FROM THERE CLIMB TO CANDLE  
MOUNTAIN BY SOUTHWEST SPUR RIDGE.

Element occurrence data:

MORE THAN 10,000 INDIVIDUALS IN 2 SUBPOPULATIONS, IN FLOWER.

General site description:

OPEN DRY UPPER MOUNTAIN SLOPES ON LIMESTONE PARENT MATERIAL,  
STONY SILTY SOIL. DOMINANT PLANT SPECIES: FESTUCA  
IDAHOENSIS, AGROPYRON SPICATUM, DELPHINIUM BICOLOR,  
BALSAMORHIZA SAGITTATA AND SENECIO INTEGERRIMUS. FESTUCA  
IDAHOENSIS/AGROPYRON SPICATUM HABITAT TYPE.

Land owner/manager:

GATES OF THE MOUNTAINS WILDERNESS  
HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

PROBABLY MANY MORE UNSURVEYED SUBPOPULATIONS IN AREA.

Information source:

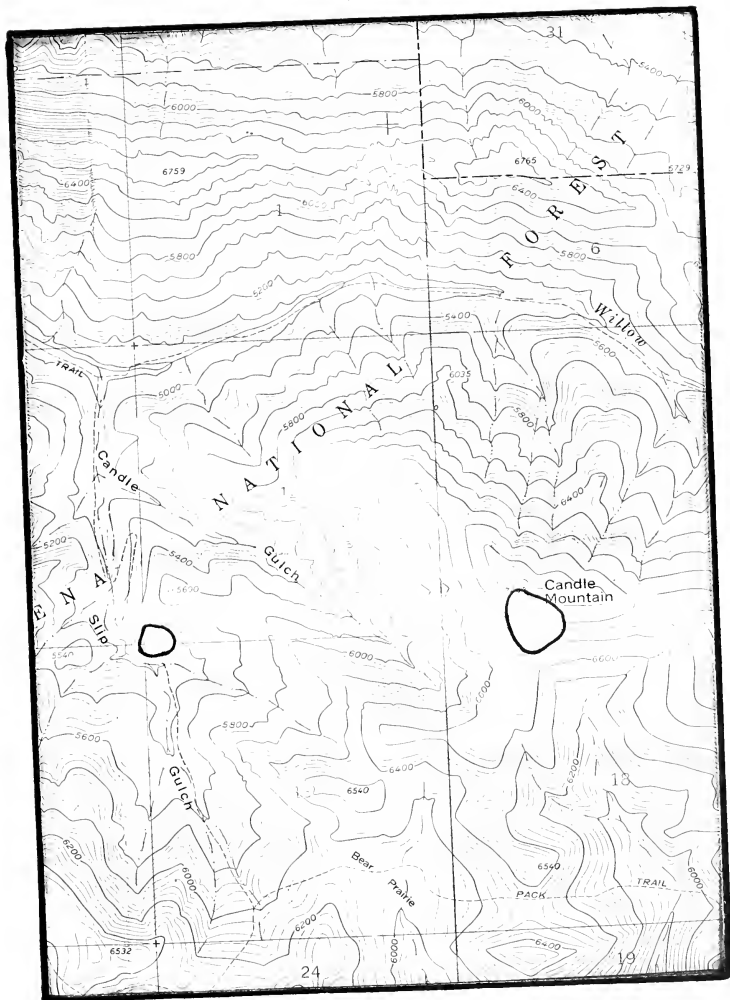
LESICA, P. DIVISION OF BIOLOGICAL SCIENCES, UNIV. OF  
MONTANA, MISSOULA, MT 59812.

Specimens:

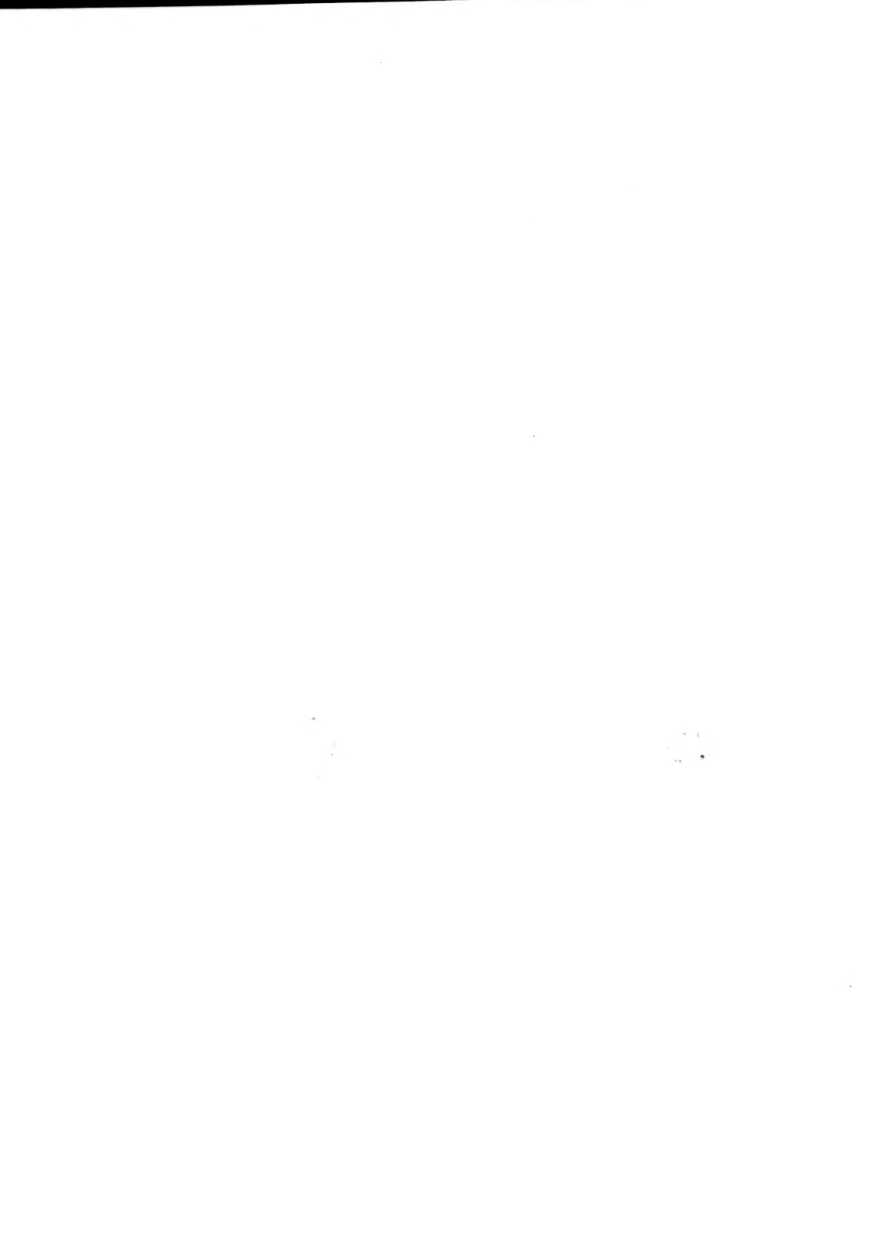
LESICA. P. (5622). 1992. MONTU.







Lesquerella klausii #033  
Candle Mt Quad



POLYGONUM DOUGLASII SSP AUSTINAE \* 003  
AUSTIN'S KNOTWEED

Global rank: G5T4      Forest Service status: SENSITIVE  
State rank: S2      Federal Status:

Survey site name: DEEP CREEK  
EO rank:  
EO rank comments:

County: BROADWATER

USGS quadrangle: SULPHUR BAR CREEK

Township: Range: Section: TRS comments:  
007N      005E      20

Survey date:	Elevation: 5400 -
First observation: 1945	Slope/aspect:
Last observation: 1945-08-16	Size (acres): 0

Location:  
20 MILES EAST OF TOWNSEND IN BIG BELT MOUNTAINS, ON ROAD TO  
WHITE SULPHUR SPRINGS (GENERAL LOCATION).

Element occurrence data:  
IN FRUIT.

General site description:  
SHALE BANK WHERE MOISTURE IS CLOSE TO SURFACE.

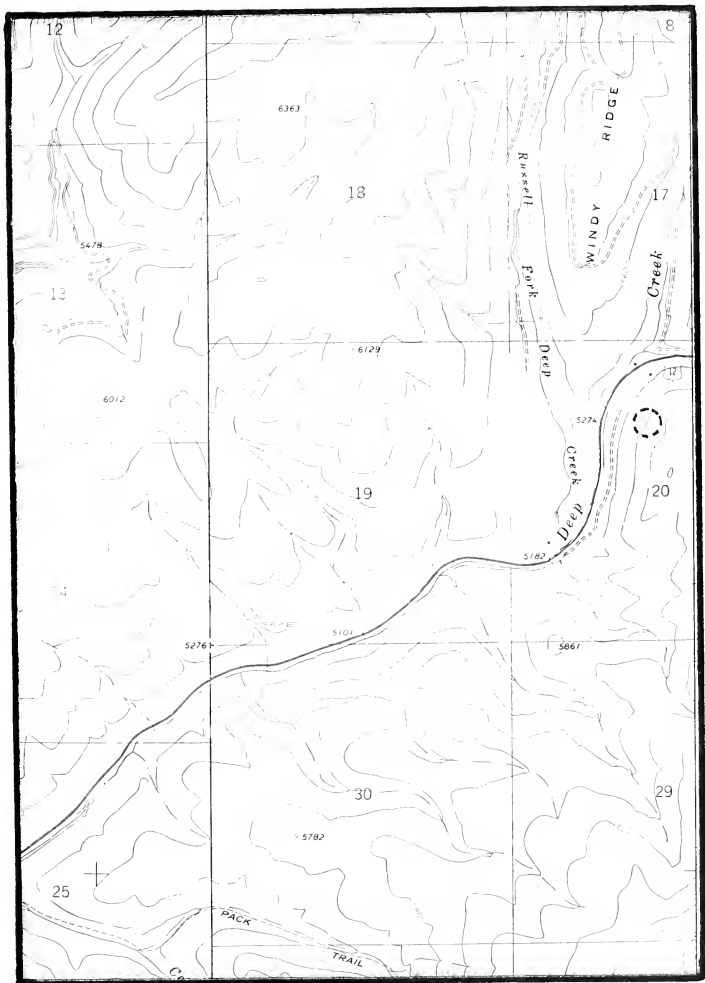
Land owner/manager:  
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)  
HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:  
GENERAL LOCATION.

Information source:  
HITCHCOCK, C.L. AND MUHLICK. (13646). 1945. WTU.

Specimens:





*Polygonum douglasii* ssp. *austinae* #003  
Sulphur Bar Creek Quad



POLYGONUM DOUGLASII SSP AUSTINAE \* 004  
AUSTIN'S KNOTWEED

Global rank: G5T4 Forest Service status: SENSITIVE  
State rank: S2 Federal Status:

Survey site name: HUNTERS GULCH  
EO rank: B  
EO rank comments:

County: LEWIS AND CLARK

USGS quadrangle: NELSON

Township: Range: Section: TRS comments:  
012N 002W 02 NE4SE4, SE4NE4

Survey date: 1992-07-29 Elevation: 4320 -  
First observation: 1992-07-29 Slope/aspect: 5-20% / SOUTHEAST  
Last observation: 1992-07-29 Size (acres):

Location:

BIG BELT MOUNTAINS, HUNTERS GULCH; CA. 0.5 MILE ABOVE  
TRAILHEAD ON WEST SIDE OF VALLEY, OFF FS TRAIL #255.

Element occurrence data:

OVER 40 PLANTS, IN FRUIT. (INCOMPLETELY SURVEYED.)

General site description:

UPPER SLOPES OF SHALE BARRENS WITHIN AGROPYRON SPICATUM  
HABITAT TYPE, SURROUNDED BY PINUS PONDEROSA HT WITH HIGH  
PINE MORTALITY CAUSED BY FIRE. ASSOCIATED SPECIES: POLYGONUM  
DOUGLASII VAR. DOUGLASII ELSEWHERE ON SLOPE, CHRYSOPSIS  
VILLOSA, LESQUERELLA KLAUSII, PHACELIA HISPIDA, BROMUS  
TECTORUM, CRYPTANTHA CELESIOIDES. OCCASIONAL IN A SEGMENT OF  
MOST-EXPOSED OUTCROP HABITAT.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

SAME SHALE SLOPES BUT GENERALLY NOT IN THE SAME MICROHABITAT  
AS POLYGONUM DOUGLASII VAR. DOUGLASII AND LESQUERELLA  
KLAUSII. POSSIBLE HYBRID FORM NOTED AND COLLECTED (HEIDEL  
#889) WITH HIGHLY-BRANCHED PATTERN AND INTERMEDIATE LEAVES.

Information source:

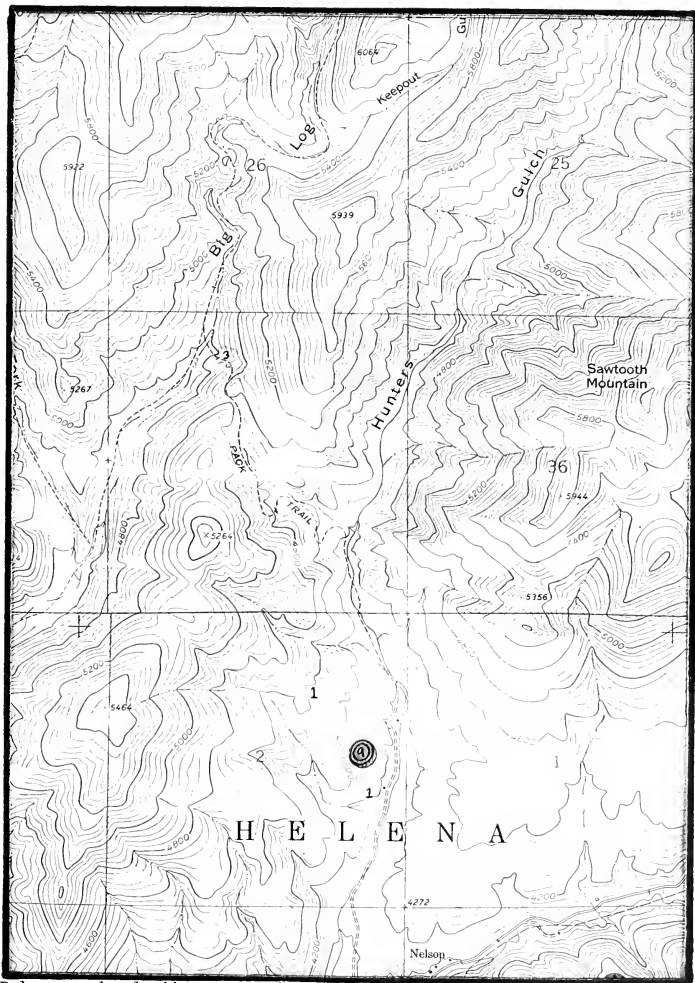
HEIDEL, B. 1992. [MTNHP FIELD SURVEY TO HUNTERS GULCH OF 28  
JULY.]

Specimens:

HEIDEL, B. (891). 1992. MONT.







*Polygonum douglasii* ssp. *austinae* #004  
Nelson Quad



POLYGONUM DOUGLASII SSP AUSTINAE \* 005  
AUSTIN'S KNOTWEED

Global rank: G5T4 Forest Service status: SENSITIVE  
State rank: S2 Federal Status:

Survey site name: PIKE CREEK, BURNT GULCH  
EO rank: A  
EO rank comments: LARGE POPULATION COMPLEX; LIMITED DISTURBANCE.  
LARGEST KNOWN OCCURRENCE.

County: LEWIS AND CLARK  
USGS quadrangle: HOGBACK MOUNTAIN

Township: Range: Section: TRS comments:  
013N 001E 19 S2, 30 CENTER  
36 NE4NE4

Survey date: 1992-07-29 Elevation: 5800 -6160  
First observation: 1992-07-29 Slope/aspect: 5-45% / S, W, SE  
Last observation: 1992-07-29 Size (acres):

Location:

BIG BELT MOUNTAINS, PIKE CREEK AND BURNT GULCH VALLEYS EAST  
OF REFRIGERATOR CANYON, ABOVE FS RD #138, CA. 0.75 MILE WEST  
OF LEWIS & CLARK COUNTY LINE.

Element occurrence data:

1000+ PLANTS IN LATE FRUIT, WITH LEAVES BECOMING A  
CONSPICUOUS RED COLOR IN SENESCENCE. LIMITED TO A SEGMENT OF  
OUTCROP SLOPE AND NEVER COMMON IN THIS SETTING.

General site description:

SHALE BARREN COMPLEX ACROSS SEVERAL SQUARE MILES WITHIN  
PINUS PONDEROSA/AGROPYRON SPICATUM HABITAT TYPE; RECURRENT  
ALONG SOUTH-FACING VALLEY OUTCROPS ON UPPER SLOPES.  
ASSOCIATED SPECIES: CAREX GEYERI, LOMATIUM DISSECTUM,  
ERIOGONUM OVALIFOLIUM, GAYOPHYTON DECIPIENS, PENSTEMON  
ATTENUATUS, DANTHONIA UNIFLORA, ASTER LAEVIS, PRUNUS  
VIRGINIANA, AMELANCHIER ALNIFOLIA. ALSO PRESENT IN LOW  
NUMBERS WITH VIGOROUS PLANTS ON UNVEGETATED NATURAL SHALE  
DRAWS DISSECTING THE OUTCROP SLOPE. OPEN EXPOSURE, DRY  
HABITAT, SILTY SOIL.

Land owner/manager:

HELENA NATIONAL FOREST, HELENA RANGER DISTRICT

Comments:

SYMPATRIC WITH P. DOUGLASII VAR. DOUGLASII AND A POSSIBLE  
HYBRID. ECODATA PLOT #92BH001 TAKEN (WITH P. LESICA) IN  
T14N, R1W, SECTION 36, NE4NE4. ROAD CONSTRUCTION AND  
RESULTING SLOPE DESTABILIZATION AND EXOTIC INVASION ARE THE  
ONLY MAJOR DISTURBANCES. NO MINING ACTIVITY; NO LIVESTOCK  
FORAGING.

Information source:

HEIDEL, B. 1992. [MTNHP FIELD SURVEY TO PIKE CREEK, BURNT  
GULCH OF 29 JULY AND 9 AUGUST.]

Specimens:

HEIDEL, B. (897). 1992. MONTU.



Big Horn National Monument 1005

# COMMUNITY SURVEY FORM

MTNHP  
5/27/91

## GENERAL PLOT DATA

### IDENTIFICATION AND LOCATION

MANUAL \_\_\_\_\_ UNITS  ft  m  
 PLOT NO. 92B4001 MO 08 DAY 09 YEAR 92 ECODE PDFUNOLDX1 \* 005  
 EXAMINER(S) B. Heidel P. Lesica  
 PNC \_\_\_\_\_ CT \_\_\_\_\_  
 SITE Helena NF - Burnt gulch / Pike or area STATE ND COUNTY Ward  
 PURP \_\_\_\_\_ PREC SC QUADNAME Horbach M1a QUADCODE 4011170  
14.1 T/1W R/36 S/NE 4S/NE 4/4 COMMUNITY SIZE (acres) 5  
 PLOT TYPES \_\_\_\_\_ PLTRL \_\_\_\_\_ PLOT W \_\_\_\_\_ SURVEY \_\_\_\_\_  
 PHOTOS 001 -  
 DIRECTIONS --> East side of 200 Creek some barriers at water end of Burnt area rd

### CONSERVATION RANKING

COND A Com: \_\_\_\_\_  
 VIAB A Com: \_\_\_\_\_  
 DEFN 1B Com: \_\_\_\_\_  
 RANK A Com: \_\_\_\_\_  
 MGMT: \_\_\_\_\_  
 PROT: \_\_\_\_\_

### ENVIRONMENTAL FEATURES

DL G SOIL RPT \_\_\_\_\_  
 SOIL UNIT \_\_\_\_\_ SOIL TAXON \_\_\_\_\_  
 PM SHAL LANDFORM Rhoc PLOT POS SLMS SLP SHAPE R ASP 220  
 x SLOPE % 45 ELEVATION \_\_\_\_\_ EROS POTENT UP EROS TYPE 3L  
 HORIZON ANGLE (%): N \_\_\_\_\_ E \_\_\_\_\_ S \_\_\_\_\_ W \_\_\_\_\_ IFSLP \_\_\_\_\_ IFVAL \_\_\_\_\_  
 SPFE Shifting scree  
 GROUND COVER: 10 S+ 90 G+ 7 R+ 1 L+ 1 W+ 0 M+ 3 BV+ 0 O = 100%  
 DISTURBANCE HISTORY (type, intensity, frequency, season)--> \_\_\_\_\_  
no natural disturbance

RIPARIAN FEATURES: Channel Width NA Channel Entrench \_\_\_\_\_  
 Surface Water \_\_\_\_\_ Ht. Abv. H2O \_\_\_\_\_ Dist. from H2O \_\_\_\_\_

### GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

Idaho Spruce growth in riparian  
Remnant PSM forest below

# OCULAR PLANT SPECIES DATA

PlotIDL \_\_\_\_\_

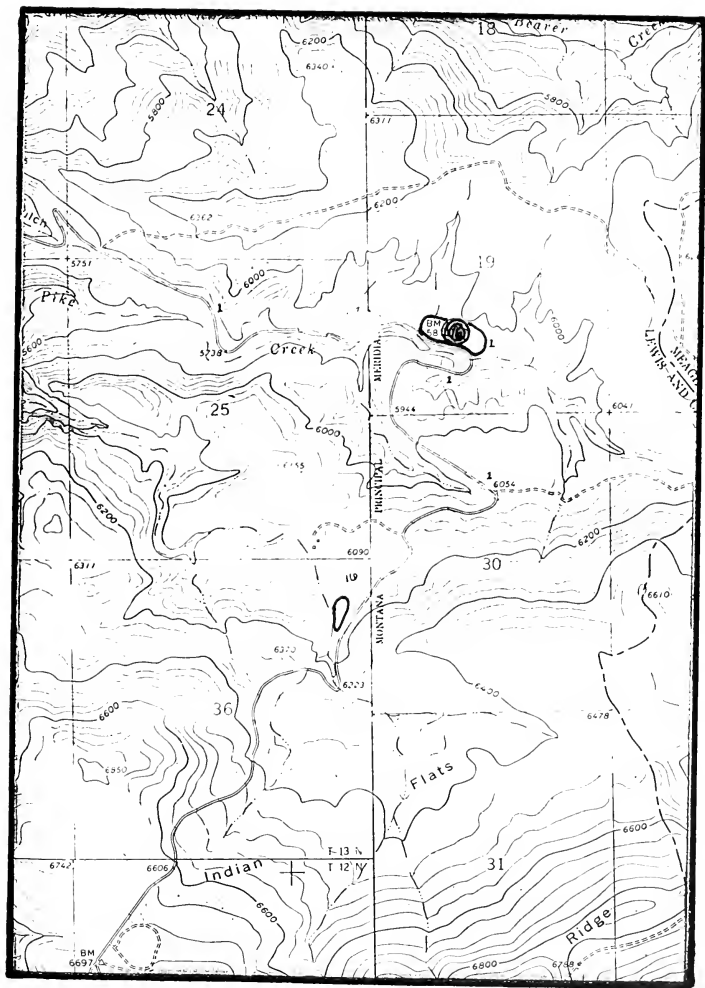
PLOT NO. 928401 NO. SPECIES \_\_\_\_\_ PNC \_\_\_\_\_

TREES				Tot Cv <u>3</u> MHT <u>30'</u>		FRBS				Tot Cv <u>20</u> MHT <u>5</u>					
Tal Cv _____		Med Cv _____		Low Cv _____		Grd Cv _____		Med Cv _____		Low Cv _____					
								Grd Cv _____							
						CC									
T 1	_____	_____	_____	_____	_____	_____	_____	F 1	_____	_____	_____	_____	_____	_____	_____
T 2	_____	_____	_____	_____	_____	_____	_____	F 2	_____	_____	_____	_____	_____	_____	_____
T 3	_____	_____	_____	_____	_____	_____	_____	F 3	_____	_____	_____	_____	_____	_____	_____
T 4	_____	_____	_____	_____	_____	_____	_____	F 4	_____	_____	_____	_____	_____	_____	_____
T 5	_____	_____	_____	_____	_____	_____	_____	F 5	_____	_____	_____	_____	_____	_____	_____
SHRBS						Tot Cv <u>3</u> MHT <u>1</u>									
Tal Cv _____		Med Cv _____		Low Cv _____		Grd Cv _____									
						CC									
S 1	_____	_____	_____	_____	_____	_____	_____	F 6	_____	_____	_____	_____	_____	_____	_____
S 2	_____	_____	_____	_____	_____	_____	_____	F 7	_____	_____	_____	_____	_____	_____	_____
S 3	_____	_____	_____	_____	_____	_____	_____	F 8	_____	_____	_____	_____	_____	_____	_____
S 4	_____	_____	_____	_____	_____	_____	_____	F 9	_____	_____	_____	_____	_____	_____	_____
S 5	_____	_____	_____	_____	_____	_____	_____	F 10	_____	_____	_____	_____	_____	_____	_____
S 6	_____	_____	_____	_____	_____	_____	_____	F 11	_____	_____	_____	_____	_____	_____	_____
S 7	_____	_____	_____	_____	_____	_____	_____	F 12	_____	_____	_____	_____	_____	_____	_____
S 8	_____	_____	_____	_____	_____	_____	_____	F 13	_____	_____	_____	_____	_____	_____	_____
S 9	_____	_____	_____	_____	_____	_____	_____	F 14	_____	_____	_____	_____	_____	_____	_____
S 10	_____	_____	_____	_____	_____	_____	_____	F 15	_____	_____	_____	_____	_____	_____	_____
S 11	_____	_____	_____	_____	_____	_____	_____								
S 12	_____	_____	_____	_____	_____	_____	_____								
GRAM						Tot Cv <u>10</u> MHT <u>1</u>									
Med Cv _____		Low Cv _____		Grd Cv _____											
						CC									
G 1	_____	_____	_____	_____	_____	_____	_____								
G 2	_____	_____	_____	_____	_____	_____	_____								
G 3	_____	_____	_____	_____	_____	_____	_____								
G 4	_____	_____	_____	_____	_____	_____	_____								
G 5	_____	_____	_____	_____	_____	_____	_____								
G 6	_____	_____	_____	_____	_____	_____	_____								
G 7	_____	_____	_____	_____	_____	_____	_____								
G 8	_____	_____	_____	_____	_____	_____	_____								
G 9	_____	_____	_____	_____	_____	_____	_____								
G 10	_____	_____	_____	_____	_____	_____	_____								
G 11	_____	_____	_____	_____	_____	_____	_____								
G 12	_____	_____	_____	_____	_____	_____	_____								
						FERN Tot Cv _____ MHT _____ Med Cv _____									
						Low Cv _____ Grd Cv _____									
						BRYO/LICH Tot Cv _____									

COMMENTS (EODATA) --> \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



*Polygonum douglasii* ssp. *austinae* #005  
Hogback Mt Quad





POLYGONUM DOUGLASII SSP AUSTINAE \* 006  
AUSTIN'S KNOTWEED

Global rank: G5T4 Forest Service status: SENSITIVE  
State rank: S2 Federal Status:

Survey site name: DRY CREEK TRAIL  
EO rank: D  
EO rank comments: VERY SMALL POPULATION IN HIGHLY-DISTURBED SETTING.

County: BROADWATER

USGS quadrangle: DEER PARK

Township: Range: Section: TRS comments:  
006N 003E 25 NE4

Survey date: 1992-08-10 Elevation: 4920 -  
First observation: 1992-08-10 Slope/aspect: 5% / SOUTH  
Last observation: 1992-08-10 Size (acres):

Location:

BIG BELT MOUNTAINS, CA. 1 MILE EAST ON DRY CREEK ROAD FROM  
THE HELENA N.F. BOUNDARY, ON NORTH SIDE OR ROAD ALMOST  
OPPOSITE CABIN.

Element occurrence data:

6 PLANTS IN LATE FRUIT.

General site description:

SMALL SHALE OUTCROP MOUND SURROUNDED BY HIGHLY-DISTURBED  
AGROPYRON SPICATUM HABITAT TYPE AND PINUS PONDEROSA H.T. IN  
MORE SHELTERED ASPECTS. OCCASIONAL IN VERY SMALL, DISTURBED  
POTENTIAL HABITAT. INVADED BY BROMUS JAPONICUS. ASSOCIATED  
SPECIES: POLYGONUM DOUGLASII VAR DOUGLASII, CHRYSOPSIS  
VILLOSA, ARTEMISIA TRIDENTATA, CAPSELLA BURSA-PASTORIS,  
GAYOPHYTON DECIPIENS, EUPHORBIA SPP.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

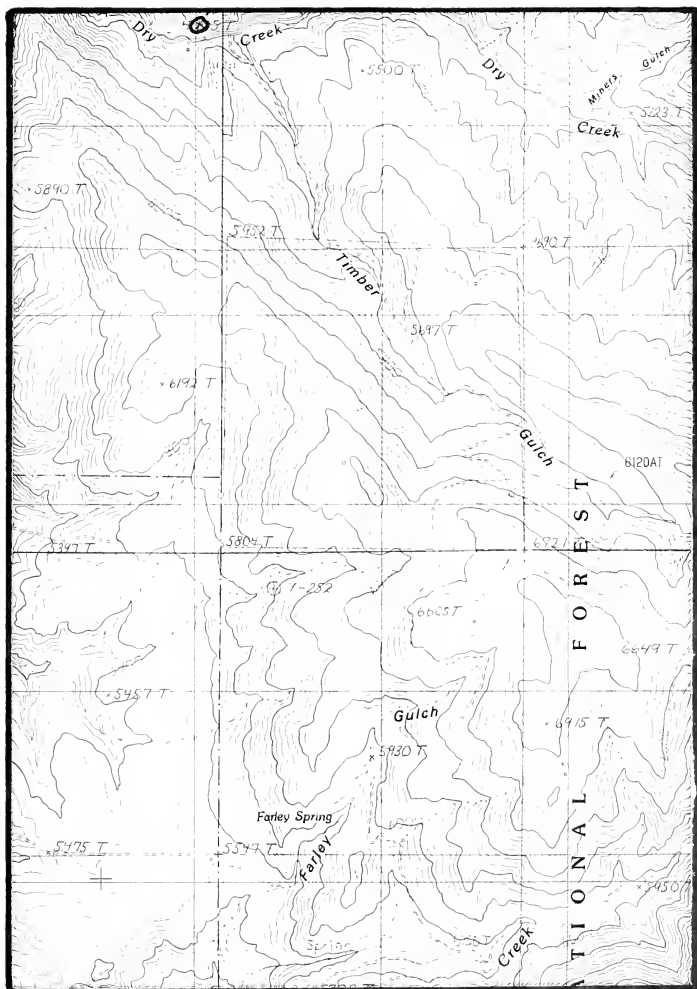
THIS SITE REFLECTS ITS PERSISTENCE UNDER INVASION BY EXOTIC  
GRASSES IN SMALL HABITAT.

Information source:

HEIDEL, B. 1992. [MTNHP FIELD SURVEY TO DRY CREEK OF 10  
AUGUST.]

Specimens:





*Polygonum douglasii* ssp. *austinae* #006  
Deer Park Quad



POLYGONUM DOUGLASII SSP AUSTINAE \* 007  
AUSTIN'S KNOTWEED

Global rank: G5T4 Forest Service status: SENSITIVE  
State rank: S2 Federal Status:

Survey site name: DRY CREEK SHALE BARRENS  
EO rank: AB  
EO rank comments: LARGE POPULATION AND HIGH VIABILITY WITH DIVERSITY  
OF OUTCROP SLOPES.

County: BROADWATER

USGS quadrangle: SIXMILE MOUNTAIN

Township: Range: Section: TRS comments:  
006N 004E 27 SW4SE4, 34 NW4NE4

Survey date: 1992-08-10 Elevation: 5680 -5850  
First observation: 1992-08-10 Slope/aspect: 20-35% / SOUTH  
Last observation: 1992-08-10 Size (acres):

Location:

BIG BELT MOUNTAINS, OVER 5 MILES EAST OF SIGN MARKING HELENA  
NATIONAL FOREST BOUNDARY, CA. 0.25 MILE WEST OF SECTION LINE  
GATE AND FORK BETWEEN OLD AND NEW ROADBEDS.

Element occurrence data:

ESTIMATED OVER 300 INDIVIDUALS; INCOMPLETELY SURVEYED.  
EXTENSIVE POTENTIAL HABITAT OF GOOD QUALITY. OCCASIONAL  
ACROSS RECURRENT SOUTH-FACING OUTCROP HABITAT; PAST FRUITING  
AND IN EARLY STAGES OF LEAF SENESCENCE.

General site description:

BROAD SOUTH-FACING SHALE OUTCROP SLOPES ABOVE OLD ROADBED  
AND BEAVER-IMPOUNDED WATERCOURSE, BELOW PINUS PONDEROSA AND  
AGROPYRON SPICATUM HABITAT TYPES. ON UPPER SLOPES IN  
ASSOCIATION WITH POLYGONUM DOUGLASII VAR DOUGLASII,  
PENSTEMON ATTENUATUS, ARENARIA NUTTALLII, RIBES CEREUM,  
BROMUS JAPONICUS, CHAENACTIS DOUGLASII, MENTZELIA DISPERSA,  
PHACELIA HASTATA.

Land owner/manager:

HELENA NATIONAL FOREST, TOWNSEND RANGER DISTRICT

Comments:

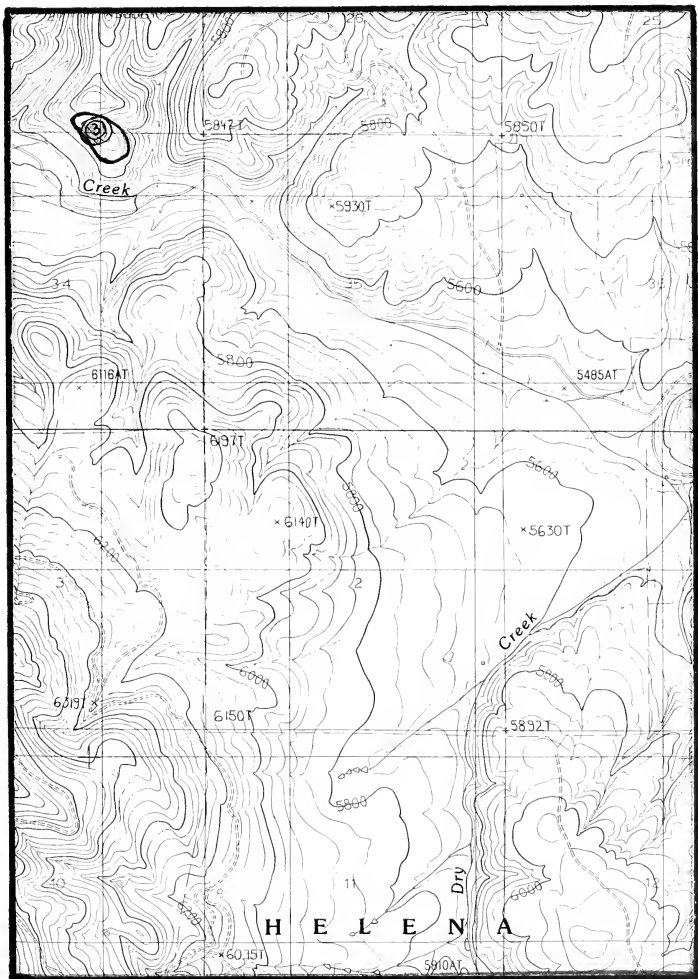
POTENTIAL HABITAT EXTENDS FOR OVER 1 MILE IN SECTIONS 27 AND  
28.

Information source:

HEIDEL, B. 1992. [MTNHP FIELD SURVEY TO DRY CREEK OF 10  
AUGUST.]

Specimens:





*Polygonum douglasii* ssp. *austinae* #007  
 Sixmile Mt Quad





POTENTILLA DIVERSIFOLIA VAR MULTISECTA \* 002  
DIVERSE-LEAVED CINQUEFOIL

Global rank: G5T3T4      Forest Service status:  
State rank: SH      Federal Status:

Survey site name: ROCKY CANYON  
EO rank:  
EO rank comments:

County: GALLATIN

USGS quadrangle: SIXMILE MOUNTAIN  
DEER PARK

Township: Range: Section: TRS comments:  
005N      004E      21

Survey date:      Elevation: 6760 -  
First observation: 1900      Slope/aspect:  
Last observation: 1900-05-26      Size (acres): 0

Location:  
ROCKY CANYON (CA. 25 MILES NORTH OF BELGRADE; HISTORICAL  
RECORD).

Element occurrence data:  
IN FLOWER (26 MAY 1900).

General site description:  
DRY ROCKY PLACES.

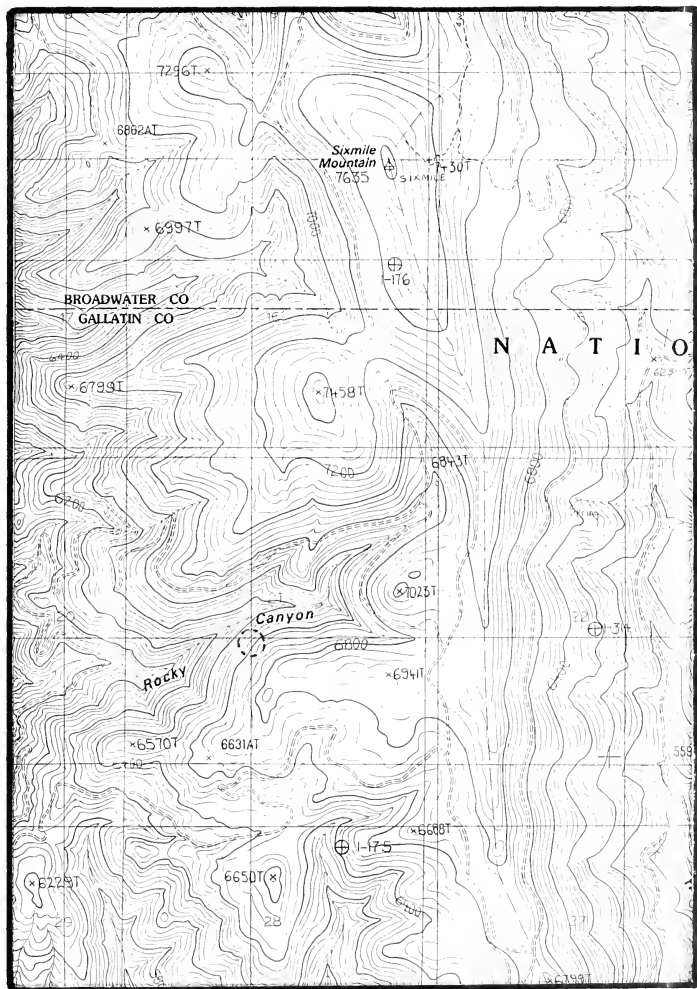
Land owner/manager:  
BAR NONE RANCH CONSERVATION EASEMENT

Comments:  
ALSO COLLECTED BY J. LOCKE, 26 MAY 1900 (MONT).

Information source:  
BLANKINSHIP, J. W. (S.N.). 1900. MONT. (MRPP CARD).

Specimens:





*Potentilla diversifolia* var. *multisecta* #002  
Sixmile Mt Quad



APPENDIX 6

PRELIMINARY FLORA OF BIG BELT MOUNTAINS

Nomenclature follows Hitchcock and Cronquist (1973).  
Nomenclature for Salix follows Dorn (1984). Taxa that are bold-  
faced were collected. Species followed by an asterisk (\*) are  
introduced (non-native).

Aceraceae

*Acer glabrum*

Alismataceae

*Sagittaria cuneata*

Anacardiaceae

*Rhus radicans*

*Rhus trilobata*

Apiaceae

*Angelica arguta*

*Berula erecta*

***Bupleurum americanum***

*Cymopterus bipinnatus*

*Cymopterus terebinthinus*

*Heracleum lanatum*

*Lomatium cous*

*Lomatium dissectum*

*Lomatium macrocarpum*

*Lomatium triternatum*

***Musineon vaginatum***

*Osmorhiza chilensis*

*Osmorhiza occidentalis*

*Perideridia gairdneri*

Apocynaceae

*Apocynum androsaemifolium*

Asclepiadaceae

*Asclepias ovalifolia*

Asteraceae

*Achillea millefolium*

***Agoseris aurantiaca***

*Agoseris glauca*

*Anaphalis margaritacea*

***Antennaria alpina***

*Antennaria anaphaloides*

*Antennaria corymbosa*

*Antennaria lanata*

*Antennaria microphylla*

*Antennaria neglecta*



Antennaria parviflora  
Antennaria racemosa  
**Antennaria umbrinella**  
Arctium minus\*  
Arnica cordifolia  
Arnica latifolia  
**Arnica mollis**  
Arnica parryi  
Arnica rydbergii  
Arnica sororia  
Artemisia absinthium\*  
Artemisia campestris  
Artemisia cana  
Artemisia dracunculus  
Artemisia frigida  
Artemisia ludoviciana  
Artemisia michauxiana  
Artemisia tridentata  
Aster alpigenus  
Aster campestris  
Aster chilensis  
Aster conspicuous  
Aster falcatus  
Aster foliaceus  
Aster integrifolius  
Aster laevis  
Aster occidentalis  
**Aster sibiricus**  
Balsamorhiza sagittata  
Bidens cernua  
Brickellia grandiflora  
Carduus nutans\*  
Centaurea diffusa\*  
Centaurea maculosa\*  
Chaenactis douglasii  
Chrysopsis villosa  
Chrysothamnus nauseosus  
Chrysothamnus viscidiflorus  
Cirsium arvense\*  
Cirsium canadense  
Cirsium hookerianum  
**Cirsium longistylum**  
Cirsium scariosum  
Cirsium undulatum  
Cirsium vulgare\*  
Conyza canadensis  
Crepis acuminata  
Crepis atriobarba  
**Crepis occidentalis**  
Crepis runcinata  
**Crepis tectorum\***  
Erigeron annuus





Erigeron caespitosus  
Erigeron compositus  
Erigeron corymbosus  
Erigeron divergens  
Erigeron ochroleucus  
Erigeron peregrinus  
Erigeron pumilus  
Erigeron simplex  
Erigeron speciosus  
Erigeron ursinus  
Filgao arvensis\*  
Gaillardia aristata  
Gnaphalium uliginosum  
Grindelia squarrosa  
Gutierrezia sarothrae  
Haplopappus acaulis  
Haplopappus lanuginosus  
Haplopappus lyallii  
Helianthella uniflora  
Hieracium albiflorum  
Hieracium gracile  
Hieracium umbellatum  
Hymenopappus filifolius  
Hymenoxys acaulis  
Hymenoxys richardsonii  
Kuhnia eupatorioides  
Lactuca pulchella  
Lactuca serriola\*  
Liatris punctata  
Lygodesmia juncea  
Machaeranthera canescens  
Machaeranthera grindelioides  
Madia glomerata  
Matricaria matricarioides\*  
Microseris nigrescens  
Microseris nutans  
Petasites sagittatus  
Ratibida columnifera  
Senecio canus  
Senecio crassulus  
Senecio cymbalarioides  
Senecio foetidus  
Senecio fremontii  
Senecio indecorus  
Senecio integerrimus  
Senecio pauperculus  
Senecio serra  
Senecio triangularis  
Solidago canadensis  
Solidago gigantea  
Solidago missouriensis  
Solidago nemoralis



Sonchus asper  
Stephanomeria runcinata  
Stephanomeria tenuifolia  
Tanacetum vulgare\*  
Taraxacum ceratophorum  
Taraxacum officinale\*  
Townsendia parryi  
Tragopogon dubius\*

Berberidaceae

Berberis repens

Betulaceae

Alnus incana  
Alnus sinuata  
Betula occidentalis

Boraginaceae

Cryptantha affinis  
Cryptantha celosioides  
Cryptantha spiculifera  
Cryptantha torreyana  
Cynoglossum officinale\*  
Eritrichium howardii  
Hackelia floribunda  
Hackelia micrantha  
Lappula redowskii  
Lithospermum arvense  
Lithospermum incisum  
Lithospermum ruderale  
Mertensia ciliata  
Mertensia oblongifolia

Brassicaceae

Alyssum desertorum\*  
Arabis drummondii  
Arabis glabra  
Arabis holboellii  
Arabis nuttallii  
Arabis sparsiflora  
Berteroa incana\*  
Camelina microcarpa\*  
Capsella bursa-pastoris\*  
Descurania pinnata  
Descurania sophia\*  
Draba aurea  
Draba incerta  
Draba nemorosa  
Draba oligosperma  
Draba reptans  
Erysimum asperum  
Erysimum cheiranthoides



Erysimum repandum\*  
Lepidium densiflorum  
Lesquerella alpina  
**Lesquerella klausii**  
Physaria didymocarpa  
Rorippa curvisiliqua  
Rorippa islandica  
Rorippa obtusa  
Rorippa nasturtium-aquaticum  
Sisymbrium altissimum\*  
Sisymbrium loeselii  
Thlaspi arvense\*

Cactaceae

Coryphantha missouriensis  
Opuntia polyacantha

Callitrichaceae

Callitriche sp.

Campanulaceae

Campanula rotundifolia

Caprifoliaceae

Linnaea borealis  
Lonicera utahensis  
Sambucus racemosa  
Symphoricarpos albus  
Symphoricarpos occidentalis

Caryophyllaceae

Arenaria capillaris  
Arenaria congesta  
Arenaria lateriflora  
Arenaria nuttallii  
Arenaria obtusiloba  
Arenaria rubella  
Cerastium arvense  
Cerastium nutans  
Lychnis alba\*  
**Paronychia sessiliflora**  
Sagina procumbens  
Silene acaulis  
Silene antirrhina\*  
Silene douglasii  
Silene noctiflora\*  
Spergula arvensis\*  
Spergularia marina\*  
Spergularia rubra\*  
Stellaria calycantha  
Stellaria longipes  
Stellaria obtusa



Chenopodiaceae

Chenopodium album\*  
Chenopodium fremontii  
Chenopodium leptophyllum  
Chenopodium rubrum  
Eurotia lanata  
Kochia scoparia\*  
Monolepis nuttalliana  
Salsola kali\*

Convolvulaceae

Convolvulus arvensis  
Evolvulus nuttallianus

Cornaceae

Cornus stolonifera

Crassulaceae

Sedum lanceolatum  
Sedum rosea

Cupressaceae

Juniperus communis  
Juniperus horizontalis  
Juniperus scopulorum

Cyperaceae

Carex aquatilis  
Carex athrostachya  
Carex aurea  
Carex canescens  
Carex capillaris  
Carex concinna  
Carex dioica  
Carex disperma  
Carex douglasii  
Carex elynoides  
Carex filifolia  
Carex geyeri  
Carex haydeniana  
Carex hoodii  
Carex lanuginosa  
Carex lasiocarpus  
Carex lenticularis  
Carex limosa  
Carex microptera  
Carex nebrascensis  
Carex paysonis  
Carex petasata  
Carex phaeocephala  
Carex raynoldsii  
Carex rossii





Carex rostrata  
Carex rupestris  
Carex scopulorum  
Carex sprengei  
Carex vesicaria  
Eleocharis acicularis  
Eleocharis palustris  
Eleocharis pauciflora  
Eriophorum chamissonis  
Eriophorum polystachion  
Scirpus validus

Elaeagnaceae

Shepherdia canadensis

Equisetaceae

Equisetum arvensis  
Equisetum hyemale  
Equisetum laevigatum

Ericaceae

Arctostaphylos uva-ursi  
Cassiope mertensiana  
Chimaphila menziesii  
Chimaphila umbellata  
Gaultheria humifusa  
Hypopitys monotropa  
Ledum glandulosum  
Menziesia ferruginea  
Phyllodoce empetriformis  
Pterospora andromedea  
Pyrola asarifolia  
Pyrola chlorantha  
Pyrola minor(?)  
Pyrola secunda  
Vaccinium globulare  
Vaccinium scoparium

Euphorbiaceae

Euphorbia esula\*

Fabaceae

Astragalus aboriginum  
Astragalus adsurgens  
Astragalus agrestis  
Astragalus americanus  
Astragalus bisulcatus  
Astragalus canadensis(?)  
Astragalus convallarius var. convallarius  
Astragalus crassicaarpus  
Astragalus drummondii  
Astragalus flexuosus



Astragalus gilviflorus  
Astragalus microcystis  
Astragalus miser  
Astragalus missouriensis  
Astragalus vexilliflexus  
Glycerrhiza lepidota  
**Hedysarum sulphurescens**  
Lupinus argenteus  
Lupinus sericeus  
Medicago lupulina\*  
Medicago sativa\*  
Melilotus alba\*  
Melilotus officinalis\*  
Oxytropis besseyi  
Oxytropis campestris  
Oxytropis deflexa  
Oxytropis lagopus  
Oxytropis sericea  
Petalostemon purpureum  
Psoralea esculenta  
Psoralea tenuiflora  
Trifolium pratense\*  
Trifolium repens\*  
Trifolium longipes  
Vicia americana

#### Fumariaceae

Corydalis aurea

#### Gentianaceae

Frasera speciosa  
Gentiana affinis  
Gentiana amarella  
Gentianella tenella

#### Geraniaceae

Geranium bicknellii  
Geranium carolinianum  
Geranium richardsonii  
Geranium viscosissimum

#### Grossulariaceae

Ribes cereum  
**Ribes irriguum**  
Ribes lacustre  
Ribes montigenum  
Ribes setosum  
Ribes viscosissimum

#### Haloragaceae

Myriophyllum spicatum



Hippuridaceae  
Hippuris vulgaris

Hydrangeaceae  
Philadelphus lewisii

Hydrophyllaceae  
Hydrophyllum capitatum  
Nemophila breviflora  
Phacelia hastata  
Phacelia heterophylla  
Phacelia hispida  
Phacelia linearis  
Phacelia sericea

Iridaceae  
Iris missouriensis  
Sisyrinchium angustifolium

Isoetaceae  
Isoetes bolanderi

Juncaceae  
Juncus balticus  
Juncus drummondii  
Juncus effusus  
Juncus ensifolius  
Juncus hallii  
Juncus longistylis  
Juncus mertensianus  
Juncus nevadensis  
Juncus nodosus  
Juncus parryi  
Juncus tenuis  
Luzula campestris  
Luzula parviflora  
Luzula hitchcockii  
Luzula spicata

Lamiaceae  
Agastache urticifolia  
Dracocephalum parviflorum  
Hedeoma drummondii  
Hedeoma hispida  
Mentha arvensis  
Monarda fistulosa  
Nepeta cataria\*  
Prunella vulgaris  
Salvia nemorosa\*

Liliaceae  
Allium brevistylum



Allium cernuum  
Allium geyeri  
Allium schoenoprasum  
Allium textile  
Calochortus nuttallii  
Disporum trachycarpum  
Erythronium grandiflorum  
Fritillaria atropurpurea  
Fritillaria pudica  
Lloydia serotina  
Smilacina racemosa  
Smilacina stellata  
Streptopus amplexifolius  
Veratrum viride  
Zigadenus elegans  
Zigadenus venenosus

Linaceae

Linum lewisii  
Linum perenne  
Linum rigidum

Loasaceae

Mentzelia albicaulis  
Mentzelia decapetalla  
Mentzelia dispersa

Malvaceae

Iliamna rivularis  
Sphaeralcea coccinea

Menyanthaceae

Menyanthes trifoliata

Najadaceae

Najas flexilis

Onagraceae

Epilobium alpinum  
Epilobium angustifolium  
Epilobium glaberrimum  
Epilobium paniculatum  
Epilobium watsonii  
Gaura coccinea  
Gayophytum decipiens  
Gayophytum racemosum  
Oenothera caespitosa  
Oenothera strigosa

Orchidaceae

Calypso bulbosa  
Corallorhiza maculata





Corallorhiza striata  
Corallorhiza wisteriana  
Cypripedium montanum  
Goodyera oblongifolia  
**Habenaria dilatata**  
Habenaria hyperborea  
**Habenaria saccata**  
Habenaria unalascensis  
Listera caurina  
Spiranthes cernua

Orobanchaceae

Orobanche fasciculata

Pinaceae

Abies lasiocarpa  
Pinus albicaulis  
Pinus contorta  
Pinus flexilis  
Pinus ponderosa  
Picea engelmannii  
Pseudotsuga menziesii

Plantaginaceae

Plantago major\*  
Plantago patagonica

Poaceae

Agropyron caninum  
Agropyron cristatum\*  
Agrostis dasystachyum  
Agropyron intermedium\*  
Agropyron repens\*  
Agropyron scribneri  
Agropyron smithii  
Agropyron spicatum  
Agrostis alba\*  
**Agrostis humilis**  
Agrostis scabra  
Alopecurus aequalis  
Bouteloua gracilis  
Bromus carinatus  
Bromus ciliatus  
Bromus inermis\*  
Bromus japonicus\*  
Bromus tectorum\*  
Calamagrostis canadensis  
Calamagrostis inexpansa  
**Calamagrostis neglecta**  
Calamagrostis purpurascens  
Calamagrostis rubescens  
Catabrosa aquatica



*Cinna latifolia*  
*Dactylis glomerata*\*  
*Danthonia intermedia*  
*Danthonia unispicata*  
*Deschampsia cespitosa*  
*Elymus canadensis*  
*Elymus cinereus*  
*Elymus glaucus*  
*Festuca idahoensis*  
*Festuca ovina*  
*Festuca scabrella*  
*Glyceria borealis*  
*Glyceria striata*  
*Helectotrichon hookeri*  
*Hierochloa odorata*  
*Hordeum brachyantherum*  
*Hordeum jubatum*  
*Koeleria cristata*  
*Koeleria macrantha*  
*Melica smithii*  
*Melica spectabilis*  
*Melica subulata*  
*Muhlenbergia mexicana*  
*Oryzopsis exigua*  
*Oryzopsis hymenoides*  
*Oryzopsis micrantha*  
*Phalaris arundinacea*\*  
*Phleum alpinum*  
*Phleum pratense*\*  
*Poa alpina*  
*Poa compressa*\*  
*Poa cusickii*  
*Poa interior*  
*Poa palustris*\*  
*Poa nervosa*  
*Poa pratensis*\*  
*Poa reflexa*  
*Poa rupicola*  
*Poa sandbergii*  
*Poa secunda*  
*Poa scabrella*  
*Puccinellia pauciflora*  
*Sporobolus cryptandrus*  
*Stipa comata*  
*Stipa occidentalis*  
*Stipa richardsonii*  
*Stipa viridula*  
*Trisetum cernuum*  
*Trisetum spicatum*

Polemoniaceae

*Collomia linearis*



**Gilia congesta**  
**Linanthus septentrionalis**  
**Microsteris gracilis**  
**Phlox albomarginata**  
**Phlox hoodii**  
**Phlox multiflora**  
**Phlox pulvinata**  
**Polemonium pulcherrimum**

**Polygonaceae**

**Eriogonum flavum**  
**Eriogonum ovalifolium**  
**Eriogonum umbellatum**  
**Polygonum aviculare\***  
**Polygonum bistortoides**  
**Polygonum douglasii var. austinae**  
**Polygonum douglasii var. douglasii**  
**Polygonum hydropiper**  
**Polygonum majus**  
**Polygonum sawatchense**  
**Oxyria digyna**  
**Rumex acetosella\***  
**Rumex crispus\***  
**Rumex maritimus**  
**Rumex salicifolius**

**Polypodiaceae**

**Athyrium distentifolium**  
**Cheilanthes feei**  
**Cystopteris fragilis**  
**Pellaea glabella**  
**Woodsia oregana**

**Portulacaceae**

**Claytonia lanceolata**  
**Lewisia pygmaea**  
**Lewisia rediviva**  
**Montia chamissoi**

**Potamogetonaceae**

**Potamogeton gramineus**

**Primulaceae**

**Androsace chamaejasme**  
**Androsace filiformis**  
**Androsace septentrionalis**  
**Dodecatheon conjugens**  
**Dodecatheon pulchellum**  
**Douglasia montana**  
**Lysimachia thrysifolia**



### Ranunculaceae

Actaea rubra  
Anemone drummondii  
Anemone multifida  
Anemone occidentalis  
Anemone nuttalliana  
Clematis columbiana  
Clematis hirsutissima  
Clematis ligusticifolia  
Clematis tenuiloba  
Delphinium andersonii  
Delphinium bicolor  
Delphinium occidentale  
Ranunculus abortivus  
Ranunculus acriformis  
Ranunculus aquatilis  
Ranunculus eschscholtzii  
Ranunculus flammula  
Ranunculus glaberrimus  
Ranunculus inamoenus  
Ranunculus macounii  
Ranunculus sceleratus  
Ranunculus uncinatus  
Thalictrum occidentale  
Trollius laxus

### Rhamnaceae

Ceanothus velutinus

### Rosaceae

Amelanchier alnifolia  
Cercocarpus ledifolius  
Crataegus columbiana  
Crataegus douglasii  
Fragaria vesca  
Fragaria virginiana  
Geum aleppicum  
Geum macrophyllum  
Geum rossii  
Geum triflorum  
Kelseyia uniflora  
Physocarpus malvaceus  
Physocarpus monogynus  
Potentilla arguta  
Potentilla biennis  
Potentilla concinna  
Potentilla diversifolia  
Potentilla glandulosa  
Potentilla gracilis  
Potentilla hippiana  
Potentilla norvegica\*  
Potentilla ovina





Potentilla pensylvanica  
Prunus virginiana  
Purshia tridentata  
Rosa sayi  
Rosa woodsii  
Rubus idaeus  
Rubus parviflorus  
Sibbaldia procumbens  
Sorbus scopulina  
Spiraea betulifolia

Rubiaceae

Galium aparine  
Galium biflorum  
Galium boreale  
Galium triflorum

Salicaceae

Populus angustifolia  
Populus tremuloides  
Populus trichocarpa  
Salix arctica  
Salix bebbiana  
Salix boothii  
Salix exigua  
Salix lemmonii  
Salix planifolia  
Salix reticulata  
Salix scouleriana  
Salix wolfii

Santalaceae

Comandra umbellata

Saxifragaceae

Conimitella williamsii  
Heuchera cylindrica  
Heuchera parvifolia  
Lithophragma parviflora  
Mitella stauropetala  
Parnassia fimbriata  
Parnassia palustris  
Saxifraga arguta  
Saxifraga bronchialis  
Saxifraga integrifolia  
Saxifraga occidentalis  
Saxifraga oppositifolia  
Telesonix jamesii

Scrophulariaceae

Besseyia wyomingensis  
Castilleja hispida



Castilleja miniata  
Castilleja pallescens  
Castilleja pulchella  
Castilleja sulphurea  
Collinsia parviflora  
Linaria dalmatica\*  
Linaria vulgaris\*  
Mimulus guttatus  
Mimulus lewisii  
Orthocarpus luteus  
Orthocarpus tenuifolius  
Pedicularis bracteosa  
Pedicularis contorta  
Pedicularis cystopteridifolia  
Pedicularis groenlandica  
Penstemon albertinus  
Penstemon attenuatus  
Penstemon eriantherus  
Penstemon montanus  
Penstemon nitidus  
Penstemon procerus  
Penstemon rydbergii  
Verbascum thapsus\*  
Veronica americana  
Veronica biloba  
Veronica peregrina  
Veronica serpyllifolia  
Veronica wormskjoldii

Selaginellaceae

Selaginella densa

Solanaceae

Hyoscyamus niger\*

Sparganiaceae

Sparganium emersum

Typhaceae

Typha latifolia

Urticaceae

Parietaria pensylvanica

Urtica dioica

Valerianaceae

Valeriana dioica

Valeriana sitchensis

Verbenaceae

Verbena bracteata



Violaceae

Viola adunca  
Viola canadensis  
Viola nephrophylla  
Viola nuttallii  
Viola orbiculata



## APPENDIX 7

### PRELIMINARY FLORA OF THE ELKHORN MOUNTAINS, HELENA NATIONAL FOREST

Nomenclature follows Hitchcock and Cronquist (1973).  
Nomenclature for Salix follows Dorn (1984). Taxa that are bold-  
faced were collected. Species followed by an asterisk (\*) are  
introduced (non-native).

#### Aceraceae

*Acer glabrum*

#### Amaranthaceae

*Amaranthus retroflexus*

#### Anacardiaceae

*Rhus trilobata*

*Toxicodendron rydbergii*

#### Apiaceae

*Cymopterus bipinnatus*

*Heraclium lanatum*

*Lomatium triternatum*

*Lomatium* spp.

*Musineon divaricatum*

*Osmorhiza claytoni*

*Osmorhiza depauperata*

*Osmorhiza occidentalis*

*Osmorhiza purpurea*

*Perideridia gairdneri*

#### Apocynaceae

*Apocynum androsaemifolium*

#### Asteraceae

*Achillea millefolium*

*Agoseris aurantiaca*

*Agoseris glauca*

*Anaphalis margaritacea*

*Antennaria anaphaloides*

*Antennaria corymbosa*

*Antennaria microphylla*

*Antennaria racemosa*

*Antennaria rosea*

*Arnica cordifolia*

*Arnica latifolia*

*Arnica longifolia*

*Artemisia dracunculus*

*Artemisia frigida*

*Artemisia ludoviciana*





Artemisia tridentata  
Aster campestris  
Aster conspicuus  
Aster falcatus  
Aster integrifolius  
Aster occidentalis  
Aster spp.  
Balsamorhiza sagittata  
Carduus nutans\*  
Centaurea maculosa\*  
Chaenactis douglasii  
Chrysopsis villosa  
Chrysothamnus nauseosus var. graveolens  
Chrysothamnus viscidiflorus  
Cirsium hookerianum  
Cirsium longistylum  
Cirsium undulatum  
Cirsium vulgare\*  
Conyza canadensis\*  
Crepis occidentalis  
Erigeron cespitosus  
Erigeron compositus  
Erigeron rydbergii  
Erigeron simplex  
Erigeron speciosus  
Gaillardia aristata  
Grindelia squarrosa  
Gutierrezia sarothrae  
Haplopappus acaulis  
Helianthella uniflora  
Hieracium albiflorum  
**Hieracium gracile**  
Hymenopappus filifolius  
Liatris punctata  
Matricaria matricarioides\*  
Senecio canus  
Senecio integerrimus  
Senecio megacephalus  
Senecio plattensis  
Senecio serra  
Senecio sphaerocephalus  
Senecio triangularis  
Solidago missouriensis  
Solidago multiradiata  
Stephanomeria runcinata  
Tanacetum vulgare\*  
Taraxacum ceratophorum  
Taraxacum laevigatum  
Taraxacum officinale\*  
Tetradymia canescens  
Trapogon sp.



Berberidaceae

Berberis repens

Betulaceae

Alnus sinuata

Boraginaceae

Cryptantha celosioides

Cynoglossum vulgaris\*

Lithospermum ruderale

Mertensia ciliata

Mertensia viridis

Brassicaceae

Arabis drummondii

Arabis holboellii

Camelina microcarpa\*

Capsella bursa-pastoris\*

Cardamine breweri

Cardamine occidentalis

Descurainia sophia\*

Draba oligantha

Erysimum asperum

Lepidium densiflorum

Lesquerella alpina

Sisymbrium altissimum

Thelypodium spp.

Thlaspi arvense

Cactaceae

Opuntia polyacantha

Callitrichaceae

Callitriche verna

Campanulaceae

Campanula rotundifolia

Caprifoliaceae

Linnaea borealis

Lonicera utahensis

Sambucus racemosa

Symphoricarpos albus

Caryophyllaceae

Arenaria capillaris

Arenaria congesta var. lithophila

Arenaria nuttallii

Arenaria obtusiloba

Cerastium arvense

Cerastium beeringianum

Cerastium vulgatum



Sagina saginoides  
Silene douglasii  
Silene scouleri  
Stellaria monantha

Chenopodiaceae

Chenopodium sp.  
Rumex sp.

Cornaceae

Cornus stolonifera

Crassulaceae

Sedum lanceolatum

Cupressaceae

Juniperus communis  
Juniperus scopulorum

Cyperaceae

Carex aquatilis  
Carex canescens  
Carex diandra  
Carex disperma  
Carex filifolia  
Carex foetida  
Carex geyeri  
Carex haydeniana  
Carex hoodii  
Carex illota  
Carex lanuginosa  
Carex microptera  
Carex nebrascensis  
Carex oligosperma  
Carex rostrata  
Carex scopulorum  
Eleocharis palustris  
Scirpus pungens

Elaeagnaceae

Shepherdia canadensis

Equisetaceae

Equisetum arvense  
Equisetum laevigatum

Ericaceae

Arctostaphylos uva-ursi  
Chimaphila umbellata  
Hypopitys monotropa  
Ledum glandulosum  
Phyllodoce empetriformis



Pterospora andromedea  
Pyrola asarifolia  
Pyrola minor  
Pyrola secundiflora  
Pyrola uniflora  
Vaccinium globulare  
Vaccinium scoparium

Euphorbiaceae  
Euphorbia esula

Fabaceae  
Astragalus alpigenus  
Astragalus crassicaarpus  
Astragalus drummondii  
Astragalus lotiflorus  
Astragalus miser  
Hedysarum sulphurescens  
Lupinus argenteus  
Lupinus spp.  
Medicago lupulina  
Melilotus officinalis\*  
Oxytropis besseya  
Oxytropis lagopus var. lagopus  
Oxytropis sericea  
Trifolium pratense\*  
Trifolium repens\*  
Vicia americana

Fumariaceae  
Corydalis sp.

Gentianaceae  
Frasera speciosa  
Gentiana affinis  
Gentiana calycosa  
Gentianella tenella

Geraniaceae  
Geranium richardsonii  
Geranium viscosissimum

Grossulariaceae  
Ribes americana  
Ribes cereum  
Ribes hendersonii  
Ribes inerme

Hydrangeaceae  
Philadelphus lewisii

Hydrophyllaceae





Phacelia hastata  
Phacelia heterophylla  
Phacelia linearis

Iridaceae

Iris missouriensis  
Sisyrinchium montanum

Juncaceae

Juncus acuminatus  
Juncus balticus  
Juncus bufonis  
Juncus castanea  
Juncus drummondii  
Juncus effusus  
Juncus ensifolius  
Juncus parryi  
Juncus tenuis  
Luzula parviflora  
Luzula spicata

Lamiaceae

Mentha arvensis  
Monarda fistulosa

Lemnaceae

Lemna minor

Liliaceae

Allium cernuum  
Disporum trachycarpum  
Erythronium grandiflorum  
Streptopus amplexifolius  
Veratrum viride  
Zigadenus elegans

Linaceae

Linum lewisii  
Linum rigidum

Onagraceae

Epilobium alpinum  
Epilobium angustifolium  
Epilobium ciliatum  
Epilobium glaberrimum  
Epilobium watsonii  
Gaura coccinea

Orchidaceae

Corallorhiza maculata  
Habenaria dilatata  
Habenaria saccata



*Spiranthes romanzoffiana*

Orobanchaceae

*Orobanche fasciculata*

Oxalidaceae

*Oxalis corniculata*

Pinaceae

*Abies lasiocarpa*

*Picea engelmannii*

*Pinus albicaulis*

*Pinus contorta*

*Pinus flexilis*

*Pinus ponderosa*

*Pseudotsuga menziesii*

Plantaginaceae

*Plantago major*

*Plantago patagonica*

Poaceae

*Agrostis scabra*

*Agropyron caninum*

*Agropyron secunda*

*Agropyron spicatum*

*Bouteloua gracilis*

*Bromus anomalus*

*Bromus carinatus*

*Bromus japonicus*

*Bromus pumpellianus*

*Bromus tectorum*

*Calamagrostis canadensis*

*Calamagrostis purpurascens*

*Calamagrostis rubescens*

*Dactylis glomerata\**

*Danthonia intermedia*

*Danthonia unispicata*

*Deschampsia cespitosa*

*Deschampsia elongata*

*Elymus canadensis*

*Elymus glauca*

*Festuca idahoensis*

*Festuca octoflora\**

*Festuca ovina*

*Festuca scabrella*

*Glyceria borealis*

*Glyceria striata*

*Hordeum jubatum\**

*Koeleria cristata*

*Oryzopsis exigua*

*Phalaris arundinacea\**



Phleum pratense\*  
Poa arctica  
Poa interior  
Poa pratensis\*  
Poa scabrella  
Poa secunda  
Poa trivialis\*  
Stipa comata  
Stipa nelsonii  
Stipa occidentalis  
Trisetum cernuum  
Trisetum spicatum  
Trisetum wolfii

Polemoniaceae

Collomia linearis  
Ipomopsis congesta  
Phlox albomarginata  
Phlox hoodii  
Phlox multiradiata

Polygonaceae

Eriogonum androsaemifolium  
Eriogonum flavum  
Eriogonum ovalifolium  
Eriogonum umbellatum  
Oxyria digyna  
Polygonum douglasii var. douglasii  
Polygonum hydropiper  
Rumex acetosella\*  
Rumex crispus  
Rumex salicifolius

Polypodiaceae

Athyrium filix-femina  
Cryptogramma acrostichoides  
Cystopteris fragilis

Portulacaceae

Lewisia pygmaea  
Lewisia rediviva

Potamogetonaceae

Potamogeton pectinatum

Primulaceae

Androsace filiformis  
Dodecatheon pulchellum  
Douglasia montana

Ranunculaceae

Actaea rubra



Anemone multifida  
**Caltha leptosepala**  
Clematis hirsutissima  
Clematis ligusticifolia  
Delphinium bicolor  
Ranunculus abortivus  
Ranunculus acriformis  
Ranunculus aquatilis  
Ranunculus cymbalaria  
Ranunculus eschscholtzii  
Thalictrum occidentale  
Thalictrum venulosum

Rosaceae

Dryas octopetala  
Fragaria vesca  
Fragaria virginiana  
Geum macrophyllum  
Geum rossii var. turbinatum  
Geum triflorum  
Ivesia gordonii  
Potentilla anserina  
Potentilla concinna  
Potentilla fruticosa  
Potentilla glandulosa  
Potentilla gracilis  
Potentilla hippiana  
Potentilla tridentata  
Prunus virginiana  
Purshia tridentata  
Rosa arkansana  
Rosa woodsii  
Rubus idaeus  
Sorbus americana  
Spiraea betulifolia

Rubiaceae

Galium boreale  
Galium trifidum  
Galium triflorum

Salicaceae

Populus angustifolia  
Populus tremuloides  
Populus trichocarpa  
Salix amygdaloides  
Salix bebbiana  
Salix drummondiana  
Salix lutea  
Salix planifolia  
Salix scouleriana

