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SENSITIVE PLANT SPECIES SURVEY
AT THE SOUTHERN END OF THE ELKHORN MOUNTAINS,
BROADWATER AND JEFFERSON COUNTIES, MONTANA

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Task Order No. 30

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EXECUTIVE SUMMARY

The southern end of the Elkhorn Mountains was surveyed for sensitive vascular plant species in areas administered by the Bureau of Land Management (BLM). We did not find species proposed as sensitive by the BLM, although we found large populations of two other noteworthy plant species. One of the them, flat-topped broomrape (Orobanche corymbosa) has recently been dropped from the BLM proposed list and state list of plant species of special concern. The second taxon is a subspecies of larkspur that is known only from Montana, limestone larkspur (Delphinium bicolor ssp. novum). The study provided documentation of its distribution and status, and basis for changing it from a species which is actively tracked by the state to one which is on the watch list among limited distribution plants of biogeographic interest.

This survey represents the sensitive species segment of 1994 botany baseline work conducted in the Elkhorn Mountains by Montana Natural Heritage Program for the Headwaters Resource Area and State Office of the Bureau of Land Management.

INTRODUCTION

This report describes a sensitive plant survey at the southern end of the Elkhorn Mountains on lands administered by the Bureau of Land Management (BLM). The purpose of this work was to locate and evaluate populations of plant species proposed for designation as sensitive by the BLM (USDI BLM 1993) in keeping with the Endangered Species Act of 1973 and agency policy. A secondary goal of this project was the development of a preliminary floristic list for the study area.

Baseline sensitive species surveys have been conducted in the Elkhorns on the Helena National Forest (Poole and Heidel 1993) and on the Limestone Hills to the east administered by the Bureau of Land Management (Heidel 1994). There has been little sensitive species survey in the southern end of the Elkhorn Mountains, which represents the most extensive calcareous outcrop in the Elkhorn Mountains vicinity. More sensitive species in Montana are restricted to limestone substrates than any other parent material, with the possible exception of sensitive species on peatland histosols. These factors taken together made the southern end of the Elkhorn Mountains a high priority for baseline sensitive species survey.

Prior to this study, no sensitive species were known from the area, although Townsendia spathulata is known from the Limestone Hills (Heidel 1994), and Cirsium longistylum had been found in the Elkhorn Mountains (Poole and Heidel 1993). This study represents an extension of previous limestone habitat surveys in Montana, mainly on BLM lands, out of which emerges a new picture of species' status and collective biogeography (e.g., Lesica and Achuff 1992, Vanderhorst and Lesica 1994, Vanderhorst 1995).

STUDY AREA

The Elkhorn Mountains are located in Broadwater and Jefferson County, Montana. Much of the montane and some of the foothill settings are on public land, administratively coordinated between Helena National Forest, Deerlodge National Forest, and the Bureau of Land Management (BLM) - Headwaters Resource Area. The largest expanse of foothills on public land are on the southern flanks of the Elkhorn Range, making up the core study area.

The study area is made up of Madison Group formations that mantle the Boulder Batholiths making up the core of the Elkhorn Mountains (Ross et al. 1955). These calcareous formations are in discontinuous bands across the state and have in common distinct vegetation and floristic attributes. The vegetation of the study area is a separate study (Cooper in prep.). In general, there are exceptionally well-developed mountain mahogany (Cercocarpus ledifolius) stands, and shrub communities of black sage (Artemisia novum) which are restricted to this substrate in Montana. Many of the common species as well as the rare species are calciphiles, e.g., Pentaphylloides floribunda, Ivesia gordonii, Senecio canus and Delphinium bicolor ssp. novum.

METHODS

Prior to fieldwork, a preliminary list of target plant species was compiled to guide timing and selection of habitats to be searched (Appendix 1). This list includes all low-elevation candidate sensitive species in the two counties, as well as candidate species from adjoining counties that are on limestone substrate. State plant species of special concern were considered only insofar as they potentially have bearing on BLM goals and objectives.

The study area was surveyed for sensitive plants May 28 and 30, and June 7, 1994. Appendix 2 shows the primary search routes in the study area. Emphasis was placed on evaluating typical, well-developed limestone habitats, but field travel was also planned to sample the range of elevations, moisture conditions and vegetation cover.

The primary reference for identifying plants in the field was Dorn (1984), augmented by Hitchcock and Cronquist (1973). Nomenclature generally follows Dorn (1984), as updated by more recent taxonomic works. When noteworthy plant species were found, notes were taken on population numbers, stage, setting, associated species, and any potential threats. Distribution was marked onto USGS 7.5' topographic quad maps. Voucher specimens were collected for depositing at Montana State University (MONT) and color slides were taken of the plant and its habitat.

RESULTS

Study focused on the one state species of special concern that was documented from the project area, limestone larkspur (Delphinium bicolor ssp. novum). This taxon had been documented on BLM lands in projects of the previous year on the Tendoy Mountains (Vanderhorst and Lesica 1994), and on Doherty Mountain (Vanderhorst 1993), as well as on BLM lands adjoining Bannack State Park (Vanderhorst 1995). The previous studies had provided the basis for recommending that it not be considered as a sensitive species by BLM. These works had also revised our current understandings of Delphinium taxonomy in the state, consulting with experts in the genus to determine that what had identified as Delphinium andersonii and D geyeri is in fact the undescribed subspecies of D. bicolor.

The status of this larkspur endemic to Montana had not been reviewed completely in its own right, so the Elkhorn study provided a basis for completing a status review. The survey results and compiled status report in turn provide rationale for taking this species off the list of state species of special concern. Other noteworthy biodiversity features that were documented included a very large population of flat-topped broomrape (Orobancha corymbosa). In light of these limited sensitive species survey results, priority was shifted to vegetation analysis in this two-part study (reported separately).

We also convey information on a rare lichen, Arctoparmelia subcentrifuga, recently identified by Bruce McCune (Oregon State University research preparing state lichen flora) as a species which is only known from two places in Montana and which is globally rare. It was collected by an interagency team on land administered by BLM in T.5N R.2W Sec. 14, SW 1/4 of NE 1/4.

The modest floristic list of 160 species is preliminary, and has not incorporated all the ECODATA plot composition data from the vicinity. Although no vascular plant species proposed for sensitive designation by BLM were found in the southern Elkhorns study area, the vegetation and wildlife habitat values may represent significant biodiversity values. The extensive limestone Cercocarpus ledifolius communities, and localized features such as the good condition Deschampsia cespitosa meadow at the upper end of Johnny Gulch are integral to the Elkhorn Mountains landscape as a whole. The Delphinium bicolor ssp. novum is a case in point for the values of maintaining this landscape in a natural setting. This state endemic is secure precisely because its habitat remains largely intact.

The remainder of this results section contains the status report on limestone larkspur.

Delphinium bicolor Nutt. ssp. novum
(Ranunculaceae)
Limestone larkspur

A. CLASSIFICATION

1. **FAMILY:** Ranunculaceae, Buttercup Family
2. **GENUS:** Delphinium, the larkspur genus
3. **SPECIES:** bicolor, the species epithet referring to
4. **SUBSPECIES:** calcicola is the as-yet unpublished epithet given to this endemic taxon (Michael J. Warnock in prep.), translating literally as "limestone-dweller" (Calc- L. limestone; -Cola L. dwell). It is characterized in a draft manuscript of the Delphinium genus for the Flora of North America project, prepared by Warnock, who will publish a monograph on the taxon before the Flora is out in print. It will be referred to as "subsp. novum" until this work has been published.

B. PRESENT LEGAL OR OTHER FORMAL STATUS

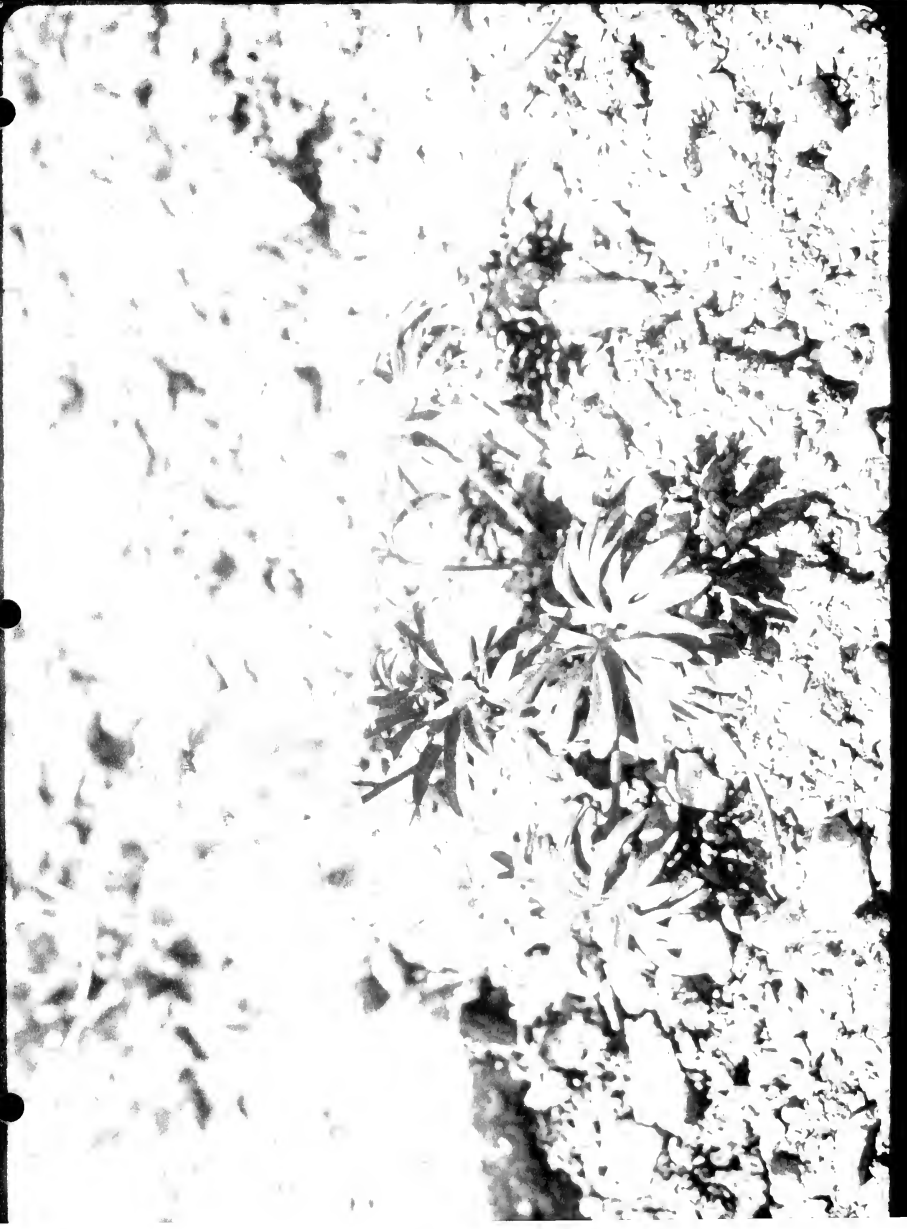
1. FEDERAL STATUS

- a. **U.S. FISH AND WILDLIFE SERVICE:** none
- b. **BUREAU OF LAND MANAGEMENT:** none at present;
Proposed sensitive prior to 1993 under D. andersonii; misapplied.

2. **STATE:** This species has a state rank of "S3", indicating that it is vulnerable in Montana, but not actively tracked. It is considered as a taxon of limited distribution, of biogeographic significance.

C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Limestone larkspur is a perennial herb 1-4 dm tall originating from a root system which is not hollow. The leaves are mostly in lower 1/3 of stem, round outline with many lobes, glabrous to faintly pubescent. The large, showy blue flowers are on long, spreading pedicels, and are irregular with the large sepals flaring in front and the upper one producing a prominent spur in back (Figure 1). The petals are smaller than the sepals, and the upper are usually blue-tipped, sometimes solid white, without pigmented veins. There are usually three pistils, which develop into the diverging fruits (after Vanderhorst and Lesica 1994).



2. **TECHNICAL DESCRIPTION:** The subspecies has sepals dark bright blue, 12-21 x 9-12 mm, spurs 15-23 mm; lower petal blades cleft 2 mm or more, hairs usually yellow (Warnock in prep.). The species in general is an herbaceous perennial 1-4(7) dm, base often anthocyanous, glabrous to puberulent, roots non-fistulose. Leaves mostly in lower 1/3 of stem, 1-4 x 1.5-7 cm, round, glabrous to puberulent, 3-19 lobes, lobes 1-8 mm wide; petioles 0.3-8 cm; basal (1)2-7 at anthesis, lobes 1-8 mm wide, petioles glabrous to puberulent; cauline 3-6 at anthesis, lobes 1-8 mm wide. Inflorescences 3-12(22) flowers; pedicels 1-4(8) cm, more or less puberulent. Bracteoles 2-7 (17) mm from flowers, 4-6(8)mm, green, sometimes white margined, lanceolate, puberulent. Sepals dark blue, puberulent, laterals usually spreading, 16-21 x 6-11 mm, spurs straight to gently decurved, elevated 0-40 degrees above horizontal, 13-18 mm. Lower petal blades covering stamens, 7-12 mm (Warnock in prep.).
3. **LOCAL FIELD CHARACTERS:** Limestone larkspur is distinguished from the type subspecies in that its sepals are dark bright blue as opposed to dark blue to purple, the flowers are overall slightly larger, and the cleft in the lower petals is at least 2 mm as opposed to 2 mm or less. It is also consistently found on limestone, which is not the case with the type subspecies (Warnock in prep.). The character that is easiest to use in the field is the solid color of the upper petals - without prominently pigmented veins; this is difficult to discern on herbarium specimens.

D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** The range of this taxon corresponds with Madison Group outcrops in the state, as found around the Elkhorn Mountains, in the Big Belt Mountains, Pryor Mountains, Tendoy Mountains, Tobacco Mountains, Pioneer Mountains and other scattered locales (Figure 2). It has been documented at least 21 times in sites that include Beaverhead, Broadwater, Carbon, Gallatin, Jefferson, Lewis and Clark, and Madison counties.
2. **CURRENT SITES:** All of the above-mentioned sites for this taxon are current. The five sites in the study area include:
1. Jefferson Co. Southwestern end of the limestone foothills ridges by Dry Creek in T.5N R.3W Sec. 14 SE 1/4
 2. Jefferson Co. A scattered tract in the Boulder River valley; T.4N R.2W Sec. 6 SW 1/4
 3. Broadwater Co. North of Johnny Gulch Road in T.5N R.1W Sec. 23.

4. Broadwater Co. A scattered tract on Lone Mt. five miles south of Radersburg; R.4N R1E Sec. 7 SE 1/4.

5. Broadwater Co. A scattered tract in rolling uplands with dry balds in T.4N R.1W Sec. 15 NW 1/4 of NE 1/4; NE 1/4 of NW 1/4.

In general, limestone larkspur prevailed in the most open and exposed settings, at southern ends of the study area. It was replaced at higher elevations by D. bicolor ssp. bicolor.

3. **HISTORICAL SITES:** None

4. **UNVERIFIED/UNDOCUMENTED REPORTS:** We have not yet requested Dr. Warnock to annotate all Montana specimens currently labelled as D. andersonii and D. geveri. Jim Vanderhorst has reviewed these materials for their consistency to the Warnock treatment. The multiple folders of D. bicolor at the three major herbaria (MONT, MONTU, MRC) also need to be reviewed.

5. **AREAS SURVEYED BUT SPECIES NOT LOCATED:** Most of the study area harbored the common D. bicolor ssp. bicolor.

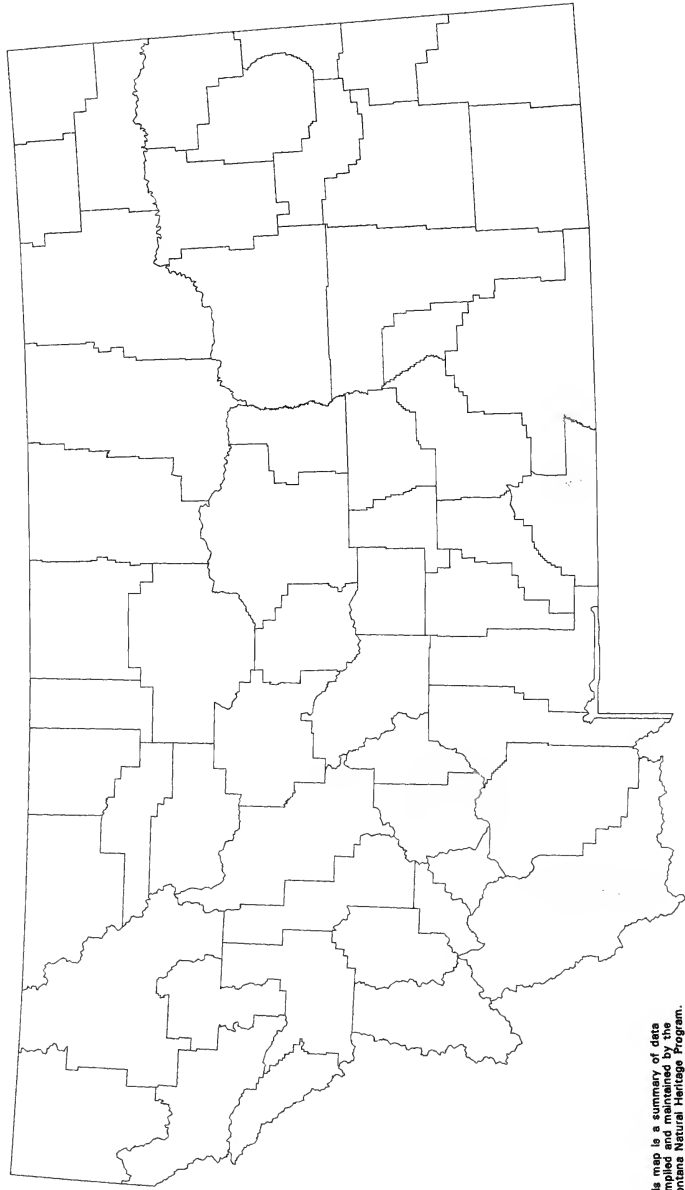
E. HABITAT

1. **ASSOCIATED VEGETATION:** In the study area, this taxon was only found in grassland, and not in the extensive mountain mahogany shrublands. Most of the associated vegetation types were bunchgrass communities dominated by Elymus spicatus, but lower elevation communities dominated by Stipa comata that barely entered the study area were also associated. The associated species included:

Artemisia campestris
 Bouteloua gracilis
 Coryphantha missouriensis
 Cryptantha celosioides
 Elymus spicatus
 Erigeron caespitosum
 Koeleria macrantha
 Kuhnia eupatorioides
 Oryzopsis hymenoides
 Penstemon aridus
 Phlox caespitosa
 Poa cusickii
 Senecio canus
 Stipa comata

2. **TOPOGRAPHY:** This taxon is found in a wide range of topographic positions and slope angles across the study area, corresponding with sparseness of vegetation. It is on ridge crests, steep side slopes, gentle rolling uplands, and gravelly valleybottom.

Distribution of *Delphinium bicolor* ssp. *novum* in Montana



This map is a summary of data compiled and maintained by the Montana Natural Heritage Program. For more information on particular areas or species, please contact:

Montana Natural Heritage Program
Montana State Library
Natural Heritage Section
Helena, MT 59620
406-444-3009

Data as of: November 11, 1994
Map produced: November 11, 1994

3. **SOIL RELATIONSHIPS:** Limestone larkspur occupies shallow, gravelly soils usually overlying limestone outcrop but also found on alluvial sand in the Boulder Valley and locally on thin soils overlying sandstone. In all of these settings, regardless of topographic position, soils are droughty and calcareous.
4. **CLIMATE FACTORS:** This species is among the majority of species in the local flora that flowers and reaches peak growth early in the growing season, coinciding with the peak precipitation and mild temperatures of spring before extreme heat and drought of summer.

F. POPULATION DEMOGRAPHY AND BIOLOGY

1. **PHENOLOGY:** Plants were in full bloom in late May and early June, with one or more mature flowers. Most inflorescences only had 2-5 flowers.
2. **POPULATION SIZE AND CONDITION:** In the study area, limestone larkspur were usually in low densities, distributed in patches, with less than 20 flowering plants per acre. There were more nonflowering plants compared to flowering plants. The Elkhorns populations were incompletely surveyed because they extended off of public land onto lower elevation private lands where they seem to have their center. Providing some basis for estimation, Vanderhorst and Lesica (1994) characterize the Tendoy Mountains populations as typically large, ranking between 200-10,000 plants.
3. **REPRODUCTIVE BIOLOGY:** Larkspurs are adapted for pollination by insects, with the upper sepal modified into a nectar-bearing spur that lures visitors.

G. POPULATION ECOLOGY

1. BIOLOGICAL INTERACTIONS

- a. **COMPETITION:** Limestone larkspur is considered to be a poor competitor, occupying some of the most sparsely-vegetated ridges in the study area. It was also observed in early-successional settings like roadcuts. The spot invasion of noxious weeds poses the immediate and most insidious potential threat to its habitat.
- b. **HERBIVORY:** Larkspurs are known to be toxic to cattle, particularly the species which are taller and late-flowering. Limestone larkspur has been observed in heavily-grazed areas where it appears resistant or even favored by grazing (Vanderhorst 1993). In the study area, this plant occupies secondary range having little or no livestock use, but it may still be an "increaser" under some circumstances.

- H. **LAND OWNERSHIP:** Each of the study area sites listed previously are on BLM lands although most or all of them appear to extend onto adjoining private lands.
- I. **ASSESSMENT SUMMARY:** This state endemic extends across at least seven counties in settings where there are few threats. Its ecological amplitude is broader than previously known; not strictly limited to areas with limestone bedrock. It is recommended that it be dropped from active tracking by Montana Natural Heritage Program, though it is a limited distribution taxon.

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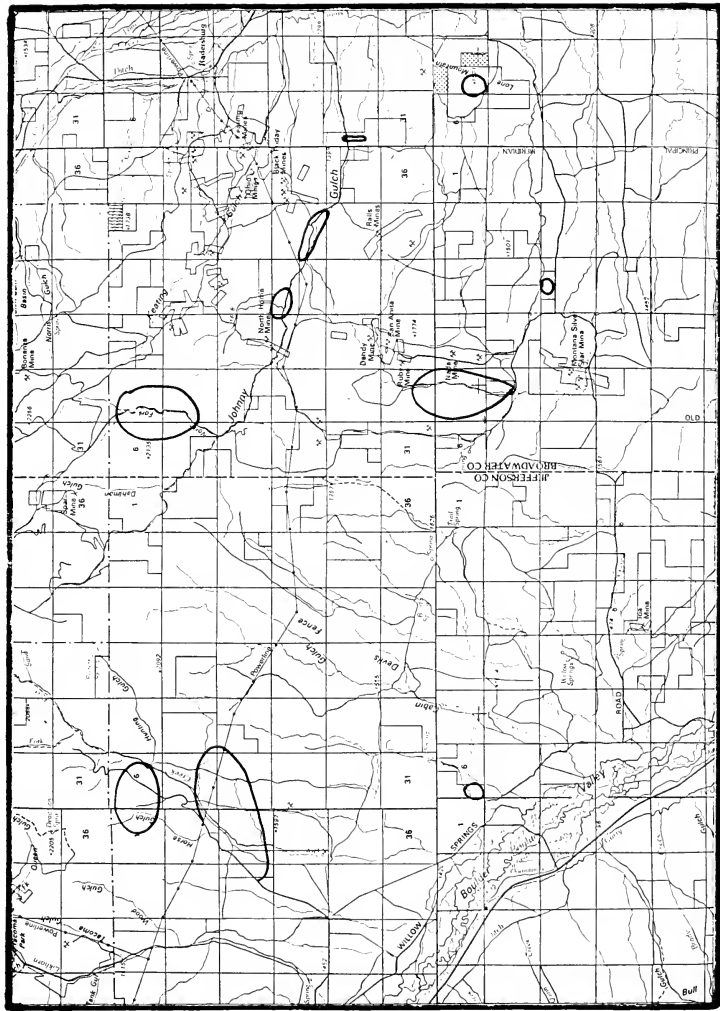
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Appendix 1. Species targeted for survey in the study area at the southern end of the Elkhorn Mountains

SPECIES SCIENTIFIC NAME COMMON NAME	CURRENT GLOBAL, STATE RANKS	NEAREST COUNTY(ies)
<i>Agoseris lackschewitzii</i>	G3 S2S3	Madison, Meagher
<i>Astragalus convallarius</i>	G5T5 S2	Broadwater
<i>Carex vallicola</i>	G5 S2S3	Lewis & Clark
<i>Castilleja rustica</i>	G5 S3	Madison
<i>Cirsium longistylum</i>	G2Q S2Q	Jefferson
<i>Delphinium bicolor</i> ssp. <i>novum</i>	G5T3 S3	Broadwater, Jefferson
<i>Mimulus suksdorfii</i>	G5 S3	Beaverhead
<i>Oxytropis lagopus</i> var. <i>conjugens</i>	G4T3 S3	Jefferson
<i>Pediocactus simpsonii</i>	G5 S4	Silverbow
<i>Phacelia incana</i>	G3 S1	Beaverhead
<i>Polygonum douglasii</i> ssp. <i>austinae</i>	G5T4 S2S3	Broadwater, Madison
<i>Sphaeromeria capitata</i>	G3 S2S3	Beaverhead
<i>Townsendia nuttallii</i>	G3 SU	Beaverhead
<i>Townsendia spathulata</i>	G3 S3	Broadwater

Appendix 2 - BLM areas surveyed for sensitive plant species



(Townsend BLM map)

Appendix 3 - Preliminary list of vascular plants in the southern end
of the Elkhorn Mountains

ANACARDIACEAE

Rhus trilobata

APIACEAE

Cymopterus bipinnatus

Lomatium dissectum

Lomatium triternatum

Musineon divaricatum

ASTERACEAE

Achillea millefolium

Agoseris glauca

Antennaria corymbosa

Antennaria microphylla

Antennaria parvifolia

Arnica mollis

Artemisia cana

Artemisia dracuncululus

Artemisia frigida

Artemisia nova

Artemisia tridentata

Balsamorhiza sagittata

*Carduus nutans**

*Centaurea diffusa**

*Centaurea maculosa**

Chaenactis douglasii

Chrysopsis villosa

Chrysothamnus nauseosus

Cirsium flodmanii

Crepis intermedia

Dyssodia papposa

Erigeron caespitosus

Erigeron compositus

Erigeron ochroleucus

Gaillardia aristata

Grindelia squarrosa

Gutierrezia sarothrae

Haplopappus acaulis

Hymenopappus filifolius

Hymenoxys acaulis

Senecio canus

Solidago spp.

Sonchus spp.

*Taraxacum laevigatum**

Thelesperma marginatum

Townsendia hookeri

Townsendia parryi

Tragopogon dubius

BERBERIDACEAE

Mahonia repens

BORAGINACEAE

Cryptantha celosioides
Eritrichium howardii
Lappula redowski
Lithospermum incisum

BRASSICACEAE

Arabis holboellii
Arabis microphylla
*Camelina microcarpa**
*Camelina sativa**
Draba oligosperma
Erysimum asperum
Erysimum repandum
Lesquerella alpina

CACTACEAE

Coryphantha missouriensis
Opuntia polyacantha

CAMPANULACEAE

Campanula rotundifolia

CARYOPHYLLACEAE

Arenaria capillaris
Cerastium arvense

CHENOPODIACEAE

Ceratoides lanata
*Salsola iberica**

CRASSULACEAE

Sedum sp.

CUPRESSACEAE

Juniperus scopulorum

CYPERACEAE

Carex filifolia
Carex stenophylla

ERICACEAE

Arctostaphylos uva-ursi

EUPHORBIACEAE

*Euphorbia esula**

FABACEAE

Astragalus adsurgens
Astragalus bisulcatus
Astragalus drummondii
Astragalus gilviflorus
Astragalus miser
Astragalus purshii var. *concinus*

Lupinus argenteus
Medicago lupulina*
Medicago sativa*
Oxytropis sericea

GENTIANACEAE
Fraseria speciosa
Gentianella amarella

GROSSULARIACEAE
Ribes cereum

HYDROPHYLLACEAE
Phacelia linearis

IRIDACEAE
Iris missouriensis
Sisyrinchium montanum

LABIATAE
Hedeoma hispidum
Marrubium vulgarea*

LILIACEAE
Allium cernuum
Allium textile
Fritillaria atropurpurea
Zigadenus venosus

LINACEAE
Linum lewisii

MALVACEAE
Sphaeralcea coccinea

ONAGRACEAE
Epilobium latifolium
Gaura coccinea
Gayophyton diffusum

OROBANCHACEAE
Orobanche corymbosa
Orobanche ludoviciana

PINACEAE
Pinus flexilis
Pinus ponderosa
Pseudotsuga menziesii

PLANTAGINACEAE
Plantago patagonica

POACEAE

Aristida purpurea
Bouteloua gracilis
Bromus tectorum*
Danthonia intermedia
Deschampsia cespitosa
Elymus hispidus*
Elymus lanceolatus
Elymus spicatum
Festuca idahoensis
Festuca scabrella
Koeleria macrantha
Oryzopsis hymenoides
Poa compressa*
Poa scabrella
Schizachne purpureascens
Sporobolus asper
Stipa comata

POLEMONIACEAE

Phlox albomarginata
Phlox caespitosa
Phlox hoodii
Phlox longifolia

POLYGONACEAE

Eriogonum chrysops
Eriogonum mancum
Eriogonum ovalifolium

POLYPODIACEAE

Cheilanthes feei

PRIMULACEAE

Androsace septentrionalis
Dodecatheon conjugens
Douglasia montana

RANUNCULACEAE

Delphinium bicolor ssp. bicolor
Delphinium bicolor ssp. novum

ROSACEAE

Anemone multifida
Anemone patens
Cercocarpus ledifolius
Clematis hirsutissima
Geum triflorum
Ivesia gordonii
Pentaphylloides floribunda
Potentilla concinna
Potentilla hippiana
Purshii tridentata
Rosa spp.

SALICACEAE

Populus acuminata
Populus angustifolia

SANTALACEAE

Commandra umbellata

SAXIFRAGACEAE

Heuchera parvifolia

SCROPHULARIACEAE

Besseyia wyomingensis
Castilleja flavescens
Linaria dalmatica*
Linaria vulgaris*
Orthocarpus tenuifolius
Pedicularis contorta
Penstemon aridus
Penstemon eriantherus
Penstemon procerus
Verbascum thapsus*

SELAGINELLACEAE

Selaginella densa

SOLANACEAE

Hyoscyamus niger*

VIOLACEAE

Viola nuttallii

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