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

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Prepared for:
Bureau of Land Management
P.O. Box 36800
Billings, MT 59107-6800

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 (*Orobanche 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
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. geyeri. 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.
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.

LITERATURE CITED


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

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

GENTIANACEAE
Frasera 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

OROBRANCHACEAE
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 purpurescens
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
Besseya 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