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SENSITIVE PLANT SURVEYS: 1989
U.S. FOREST SERVICE, REGION 1
GALLATIN NATIONAL FOREST
MONTANA

Prepared for:

United States Department of Agriculture
Forest Service
Gallatin National Forest
Federal Building
P.O. Box 130
Bozeman, Montana 59771

Prepared by:

Sarah Y. Mathews, Botanist
Montana Natural Heritage Program
State Library Building
1515 E. 6th Avenue
Helena, Montana 59620

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For the full report please contact:

**The Montana Natural Heritage Program
1515 E Sixth Ave
Helena, Montana 59620**

406-444-3009

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communis, Picea engelmannii, Pinus contorta, Populus tremuloides and Pseudotsuga menziesii. Benchland forests are dominated by Pinus contorta. Undrained bog land along the river supports a sedge-forb community.

II. METHODS

The Mill Creek Timber Sale area was surveyed on 14-15 and 19-22 June 1989, and 10-14, 17-18 and 21 July 1989. Surveys of the Tie Creek Timber Sale were conducted on 26-28 June 1989 and 19-20 July 1989. A late-season survey of the East Boulder Mine Site was conducted on 8-9 August 1989, as a follow-up to earlier surveys of the site by other parties. Although the primary purpose of the surveys was to determine the occurrence or absence of plant species included on the sensitive plant list of Region 1 (Northern Region) of the U.S. Forest Service, species inventories of each area were prepared during the surveys as part of the working method. Maps of each survey area were provided to the author by the Gallatin National Forest, and formed the basis of a working strategy. Individual sale units and building sites were located and surveyed, and all vascular plant species observed were recorded. Special attention was given to drainages, sites with unusual substrates, and any other habitats where it was thought that uncommon species might occur.

Identification of collections was made following Dorn (1984), Hitchcock and Cronquist (1973), Hitchcock et al. (1969), Hitchcock and Chase (1950) and Hermann (1970). A complete list of the vascular plant species observed during the surveys, and the study area(s) in which they were found, is presented in Part IV of Section One (pp. 4-23).

III. CONCLUSIONS

Sites of proposed timber harvest and mining activity on the Gallatin National Forest were the focus of sensitive plant surveys during the 1989 field season. An inventory of plant species was made for each of the three areas of proposed use. These inventories did not reveal the presence of any plant taxa included on the list of sensitive plant species for Region 1 (Northern Region) of the U.S. Forest Service. This is not to say that no designated sensitive species occur within the surveyed areas. Although intensive, the surveys should be regarded as incomplete for several reasons. The surveys were conducted in June and July. Species in bloom either before or after this could have been missed. While inventories of habitat types and sale units were extensive, total physical coverage of each sale unit of the proposed timber sales was not possible. This leaves open the question of whether or not a sensitive species occurrence may have been overlooked.

Two plant species currently included on the Montana Natural Heritage Program list of plant species of special concern (Shelly 1989) were found during the surveys in the Mill Creek drainage: Carex multicostata and Erigeron formosissimus. Both of these species are also listed as "Rare" by Lesica et al. (1984). Additionally, Carex multicostata is included on the U.S. Forest Service Region 1 Watch List (U.S. Department of Agriculture 1988). Appendix A of Section One (pp. 24-34) contains reports for these species.

IV. SPECIES LIST

A list of 294 vascular plant taxa, observed during inventories in the Mill Creek and Tie Creek drainages and the East Boulder mine site, is presented below; 50 families are represented. The list is arranged systematically by family, and alphabetically by genus and species within the families. Nomenclature and common name usage follow Hitchcock and Cronquist (1973). Abbreviations following the names indicate occurrence in one or more of the survey sites (EB = East Boulder Mine Site, MC = Mill Creek Timber Sale, TC = Tie Creek Timber Sale, ALL = occurs at all survey sites).

EQUISETACEAE (Horsetail Family)

- | | |
|---|-------|
| <u>Equisetum arvense</u> (common horsetail)
Moist sites, widespread. | MC TC |
| <u>Equisetum laevigatum</u> (smooth scouring-rush)
Moist to dry banks. | MC |

POLYPODIACEAE (Fern Family)

- | | |
|---|-----|
| <u>Athyrium filix-femina</u> (lady-fern)
Moist woods and stream banks. | MC |
| <u>Cystopteris fragilis</u> (brittle bladder fern)
Rocky stream banks. | TC |
| <u>Dryopteris austriaca</u> (mountain wood-fern)
Moist drainages. | MC |
| <u>Woodsia oregana</u> (woodsia)
Rocks and dry banks. | ALL |

CUPRESSACEAE (Juniper Family)

- | | |
|--|-----|
| <u>Juniperus communis</u> (common juniper)
Dry woodlands. | ALL |
| <u>Juniperus horizontalis</u> (creeping juniper)
Dry woodlands. | ALL |
| <u>Juniperus scopulorum</u> (Rocky Mountain juniper)
Dry woodlands. | MC |

PINACEAE (Pine Family)

- | | |
|---|-----|
| <u>Abies lasiocarpa</u> (subalpine fir)
Moist subalpine forests. | ALL |
|---|-----|

<u>Picea engelmannii</u> (Engelmann spruce) Moist montane to subalpine forests.	ALL
<u>Pinus contorta</u> (lodgepole pine) Dry forests.	ALL
<u>Pinus flexilis</u> (limber pine) Dry, open woodlands.	ALL
<u>Pseudotsuga menziesii</u> (Douglas-fir) Montane forests.	ALL
SALICACEAE (Willow Family)	
<u>Populus tremuloides</u> (aspen) Draws and moist meadows.	ALL
<u>Populus trichocarpa</u> (black cottonwood) Draws and stream bottoms.	MC TC
<u>Salix bebbiana</u> var. <u>bebbiana</u> (Bebb's willow) Limestone talus.	EB
BETULACEAE (Birch Family)	
<u>Alnus sinuata</u> (Sitka alder) Stream banks and moist forest edges.	ALL
URTICACEAE (Nettle Family)	
<u>Urtica dioica</u> (stinging nettle) Moist sites, widespread.	ALL
POLYGONACEAE (Buckwheat Family)	
<u>Eriogonum flavum</u> (yellow buckwheat) Dry, rocky knolls.	TC
<u>Eriogonum umbellatum</u> (sulfurflower) Dry banks and meadows.	ALL
<u>Polygonum douglasii</u> (Douglas' knotweed) Dry meadows and forests.	ALL
PORTULACACEAE (Purslane Family)	
<u>Claytonia lanceolata</u> (western springbeauty) Meadows.	MC

Lewisia rediviva (bitterroot) MC
Montane, heavy soils.

Montia perfoliata (miner's lettuce) TC
Montane forest understory.

CARYOPHYLLACEAE (Pink Family)

Arenaria congesta (capitate sandwort) MC TC
Dry meadows and open woods.

Arenaria latifolia (bluntleaf sandwort) MC TC
Dry rocky sites to open woodlands.

Cerastium arvense (field chickweed) MC TC
Meadows.

Cerastium vulgatum (common chickweed) TC
Moist stream banks.

Silene noctiflora (sticky cockle) MC TC
Waste places.

RANUNCULACEAE (Buttercup Family)

Actaea rubra (baneberry) MC TC
Moist banks and ravines.

Anemone multifida (Pacific anemone) ALL
Open woods and banks.

Anemone patens (pasqueflower) MC TC
Meadows.

Aquilegia flavescens (yellow columbine) MC TC
Woods and open slopes.

Clematis columbiana (Columbia virgin's-bower) ALL
Montane understory.

Clematis ligusticifolia (western virgin's-bower) EB
Open hillsides.

Delphinium bicolor (little larkspur) MC TC
Meadows to dry banks.

Delphinium occidentale (western larkspur) MC TC
Moist meadows and stream bottoms.

Ranunculus sceleratus (celeryleaved buttercup) TC
Bog border.

<u>Ranunculus uncinatus</u> (little buttercup) Moist meadows and stream bottoms.	MC TC
<u>Thalictrum occidentale</u> (western meadowrue) Moist woods.	MC TC

BERBERIDACEAE (Barberry Family)

<u>Berberis repens</u> (creeping Oregongrape) Montane understory.	ALL
--	-----

BRASSICACEAE (Mustard Family)

<u>Alyssum alyssoides</u> (pale alyssum) Waste places.	EB
<u>Arabis glabra</u> (towermustard) Dry forests.	ALL
<u>Arabis holboellii</u> (Holboell's rockcress) Dry forests and outcrops.	MC
<u>Capsella bursa-pastoris</u> (shepherd's purse) Waste places.	MC TC
<u>Draba crassifolia</u> (thickleaved draba) Meadows.	MC
<u>Draba nemorosa</u> (woods draba) Dry woodlands.	MC TC
<u>Erysimum asperum</u> (rough wallflower) Dry banks.	MC TC
<u>Rorippa nasturtium-aquaticum</u> (water-cress) Small streams and backwaters.	MC TC
<u>Thlaspi arvense</u> (field pennycress) Waste places.	MC TC
<u>Thlaspi montanum</u> (wild candytuft) Meadows and rocky banks.	MC TC

CRASSULACEAE

<u>Sedum lanceolatum</u> (lanceleaved stonecrop) Dry forests and banks.	MC TC
--	-------

SAXIFRAGACEAE

<u>Heuchera cylindrica</u> (roundleaf alumroot) Rocks.	ALL
<u>Heuchera parviflora</u> (common alumroot) Dry meadows and rocky sites.	MC TC
<u>Lithophragma parviflora</u> (smallflowered fringecup) Meadows.	MC TC
<u>Mitella pentandra</u> (alpine mitrewort) Moist streambanks and bogs.	MC TC
<u>Mitella trifida</u> (three-tooth mitrewort) Widespread in woods and on banks.	MC TC
<u>Parnassia palustris</u> (northern grass-of-Parnassus) Moist streambanks.	EB
<u>Saxifraga arguta</u> (brook saxifrage) Moist streambanks and drainages.	MC TC
<u>Saxifraga bronchialis</u> (matted saxifrage) Rocks.	ALL

GROSSULARIACEAE (Currant Family)

<u>Ribes americanum</u> (black currant) Moist streambanks and drainages.	MC
<u>Ribes cereum</u> (squaw currant) Woodlands and open hillsides.	MC
<u>Ribes hudsonianum</u> (stinking currant) Steambanks.	TC
<u>Ribes lacustre</u> (prickly currant) Moist woods and streambanks.	MC TC
<u>Ribes viscosissimum</u> (sticky currant) Open slopes.	MC

ROSACEAE

<u>Amelanchier alnifolia</u> (western serviceberry) Open woodlands and hillsides.	ALL
<u>Crataegus columbiana</u> (Columbia hawthorn) Draws.	TC

<u>Crataegus douglasii</u> (black hawthorn) Draws.	TC
<u>Fragaria virginiana</u> (strawberry) Woodlands and meadows.	ALL
<u>Geum macrophyllum</u> (largeleaved avens) Moist stream banks and meadows.	ALL
<u>Geum triflorum</u> (prairie smoke) Meadows.	MC TC
<u>Physocarpus malvaceus</u> (mallow ninebark) Warm woodland and open slopes.	ALL
<u>Potentilla fruticosa</u> (shrubby cinquefoil) Meadows, slopes and open woods.	ALL
<u>Potentilla glandulosa</u> (sticky cinquefoil) Dry, often rocky, sites.	ALL
<u>Potentilla gracilis</u> (slender cinquefoil) Meadows, open woodlands.	ALL
<u>Prunus virginiana</u> (chokecherry) Draws and open slopes.	ALL
<u>Rosa acicularis</u> (prickly rose) Open slopes.	MC
<u>Rubus idaeus</u> (red raspberry) Dry woods and slopes.	ALL
<u>Rubus parviflorus</u> (thimbleberry) Moist woods and openings.	ALL
<u>Sorbus scopulina</u> (mountain-ash) Open slopes and woodlands.	MC TC
<u>Spiraea betulifolia</u> (shiny-leaf spiraea) Woods and open slopes.	ALL

FABACEAE (Pea Family)

<u>Astragalus miser</u> (weedy milk-vetch) Widespread in dry woods and on banks.	ALL
<u>Hedysarum sulphurescens</u> (yellow hedysarum) Open, dry woodlands.	MC
<u>Lupinus argenteus</u> (silvery lupine) Meadows and open woodlands.	MC TC

Oxytropis lagopus (rabbit-foot crazyweed) MC
Roadside.

Oxytropis sericea (silky crazyweed) TC
Dry meadows and hillsides.

Trifolium hybridum (alsike clover) MC
Waste places and meadows.

Trifolium repens (white clover) MC
Waste places and meadows.

Vicia americana (American vetch) TC
Meadows.

GERANIACEAE (Geranium Family)

Geranium bicknellii (Bicknell's geranium) MC
Dry banks.

Geranium richardsonii (white geranium) ALL
Woodlands.

Geranium viscosissimum (sticky geranium) ALL
Meadows and open woodlands.

LINACEAE (Flax Family)

Linum perenne (blue flax) TC
Meadows and draws.

ACERACEAE (Maple Family)

Acer glabrum (Rocky Mountain maple) ALL
Moist woodland.

RHAMNACEAE (Buckthorn Family)

Ceanothus velutinus (buckbrush) ALL
Dry woods and open slopes.

HYPERICACEAE (St. John's Wort Family)

Hypericum anagalloides (bog St. John's Wort) EB
Stream banks.

VIOLACEAE (Violet Family)

- Viola adunca (early blue violet) MC TC
Moist woods and openings.
- Viola canadensis (Canada violet) MC TC
Moist woods.
- Viola nuttallii (Nuttall's violet) MC
Moist woods to dry meadows.
- Viola nuttallii var. vallicola (valley yellow violet) TC
Moist to dry meadows.

ELAEAGNACEAE (Oleaster Family)

- Shepherdia canadensis (buffalo-berry) ALL
Montane to subalpine understory.

ONAGRACEAE (Evening-primrose Family)

- Epilobium angustifolium (fireweed) ALL
Widespread in woods, meadows and on banks.
- Epilobium glaberrimum (smooth willow-herb) MC TC
Moist stream banks.
- Epilobium latifolium (red willow-herb) MC
Rocky streambank.

APIACEAE (Parsley Family)

- Angelica arguta (sharptooth angelica) ALL
Moist woods, stream banks and meadows.
- Cymopterus bipinnatus (Hayden's cymopterus) MC
Open, rocky places.
- Heracleum lanatum (cow-parsnip) ALL
Moist meadows and stream banks.
- Lomatium dissectum (fern-leaved lomatium) MC TC
Meadows to dry banks.
- Lomatium triternatum (nine-leaflet lomatium) MC TC
Meadows and moist draws.
- Osmorhiza chilensis (mountain sweet-cicely) ALL
Widespread in woods and along streams.

Sanicula marilandica (black snake-root) TC
Streambanks and moist draws.

CORNACEAE (Dogwood Family)

Cornus stolonifera (red-osier dogwood) ALL
Moist stream bottoms.

ERICACEAE

Arctostaphylos uva-ursa (kinnikinnick) ALL
Dry woodlands.

Chimaphila umbellata (prince's pine) ALL
Moist forests.

Pterospora andromedea (pinedrops) EB
Coniferous forests.

Pyrola asarifolia (common pink wintergreen) ALL
Moist forests.

Pyrola chlorantha (green wintergreen) MC TC
Moist forests.

Pyrola minor (lesser wintergreen) MC
Moist forests.

Pyrola secunda (one-sided wintergreen) MC EB
Moist forests.

Pyrola uniflora (woodnymph) MC TC
Moist forests.

Vaccinium globulare (globe huckleberry) MC TC
Moist upland forests.

Vaccinium scoparium (grouse whortleberry) ALL
Moist upland forests.

PRIMULACEAE (Primrose Family)

Androsace filiformis (rock jasmine) TC
Moist stream banks.

Dodecatheon conjugens (desert shooting star) MC TC
Meadows.

GENTIANACEAE (Gentian Family)

Frasera speciosa (giant frasera) EB
Open woodland.

MENYANTHACEAE (Buck-bean Family)

Menyanthes trifoliata (buck-bean) ALL
Bogs and lakes.

APOCYNACEAE (Dogbane Family)

Apocynum androsaemifolium (spreading dogbane) TC
Dry slopes and meadows.

POLEMONIACEAE (Phlox Family)

Collomia linearis (narrow-leaf collomia) MC TC
Meadows and open woodlands.

Microsteris gracilis (pink microsteris) MC TC
Dry to moderately open places.

Phlox multiflora (phlox) MC TC
Meadows and banks.

HYDROPHYLLACEAE (Waterleaf Family)

Hydrophyllum capitatum (ballhead waterleaf) TC
Stream banks.

Nemophila breviflora (Great Basin nemophila) MC TC
Dry meadows and open woods.

Phacelia hastata (silverleaf phacelia) MC
Dry banks.

Phacelia linearis (threadleaf phacelia) MC TC
Dry banks and open woods.

BORAGINACEAE

Cynoglossum officinale (hound's-tongue) MC TC
Waste places.

Hackelia patens (spreading stickseed) MC TC
Meadows and dry banks.

<u>Lithospermum ruderale</u> (Columbia puccoon) Dry meadows and open woods.	MC TC
<u>Mertensia ciliata</u> (broadleaf bluebells) Moist meadows and stream bottoms.	ALL
<u>Mertensia oblongifolia</u> (leafy bluebells) Meadows and dry hillsides.	MC TC
<u>Myosotis sylvatica</u> var. <u>alpestris</u> (wood forget-me-not) Meadows, openings and stream banks.	MC TC

LAMIACEAE (Mint Family)

<u>Agastache urticifolia</u> (nettle-leaf horse-mint) Meadows and dry banks.	MC TC
<u>Dracocephalum parviflorum</u> (American dragonhead) Dry banks.	MC
<u>Mentha arvensis</u> (field mint) Moist banks.	TC
<u>Monarda fistulosa</u> (wild bergamot) Meadows and dry banks.	MC TC
<u>Prunella vulgaris</u> (self-heal) Widespread in moist places.	ALL

SCROPHULARIACEAE (Figwort Family)

<u>Besseyia wyomingensis</u> (Wyoming besseyia) Dry meadows and benches.	TC
<u>Castilleja crista-galli</u> (cock's comb paintbrush) Dry woods on shallow soil.	ALL
<u>Castilleja miniata</u> (scarlet paintbrush) Moist woods, draws and stream banks.	ALL
<u>Castilleja rhexifolia</u> (rhexia-leaved paintbrush) Moist upland meadows and openings.	MC
<u>Collinsia parviflora</u> (blue-eyed Mary) Dry woodlands.	ALL
<u>Mimulus guttatus</u> (yellow monkey-flower) Moist steambanks and bogs.	ALL
<u>Mimulus lewisii</u> (Lewis' monkey-flower) Moist streambanks and wet meadows.	MC

<u>Pedicularis bracteosa</u> (bracted lousewort) Open, warm woodlands.	TC
<u>Penstemon attenuatus</u> (sulfur penstemon) Dry woods and banks.	MC TC
<u>Penstemon deustus</u> (hot-rock penstemon) Rocky banks.	MC
<u>Penstemon eriantherus</u> (fuzzytongue penstemon) Dry woods and banks.	MC TC
<u>Penstemon fruticosus</u> (shrubby penstemon) Rocky slopes and talus.	ALL
<u>Verbascum thapsus</u> (common mullein) Waste places.	MC TC
<u>Veronica americana</u> (American brooklime) Moist stream banks.	TC
<u>Veronica biloba</u> (bilobed speedwell) Moist stream banks.	TC
<u>Veronica serpyllifolia</u> (thyme-leaved speedwell) Moist stream banks and meadows.	MC TC

OROBANCHACEAE (Broomrape Family)

<u>Orobanche uniflora</u> (naked broomrape) Bogs and moist stream banks.	TC
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RUBIACEAE

<u>Galium aparine</u> (cleavers) Banks and waste places.	MC TC
<u>Galium boreale</u> (northern bedstraw) Widespread in moist to dry woods.	ALL
<u>Galium triflorum</u> (sweetscented bedstraw) Moist forests.	ALL

CAPRIFOLIACEAE (Honeysuckle Family)

<u>Linnaea borealis</u> (twinflower) Moist forests.	ALL
<u>Lonicera utahensis</u> (Utah honeysuckle) Moist forests.	MC TC

<u>Sambucus racemosa</u> (elderberry) Forest openings and draws.	MC TC
<u>Symphoricarpos albus</u> (common snowberry) Meadows.	MC TC
<u>Symphoricarpos oreophilus</u> (mountain snowberry) Dry woods and upland meadows.	MC TC

VALERIANACEAE (Valerian Family)

<u>Valeriana dioica</u> (northern valerian) Widespread in forest understory.	ALL
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CAMPANULACEAE (Harebell Family)

<u>Campanula rotundifolia</u> (harebell) Meadows to rocky banks.	ALL
---	-----

ASTERACEAE (Aster Family)

<u>Achillea millefolium</u> (common yarrow) Dry meadows, openings and banks.	ALL
<u>Agoseris aurantiaca</u> (orange agoseris) Moist to dry meadows.	ALL
<u>Agoseris glauca</u> (pale agoseris) Dry meadows and banks.	MC
<u>Agoseris glauca</u> var. <u>dasycephala</u> (pale agoseris) Moist to dry meadows.	MC
<u>Anaphalis margaritacea</u> (pearly-everlasting) Widespread in forest openings.	ALL
<u>Antennaria anaphaloides</u> (tall pussytoes) Dry meadows.	MC
<u>Antennaria microphylla</u> (rosy pussytoes) Dry woodlands and meadows.	ALL
<u>Antennaria racemosa</u> (raceme pussytoes) Cool woodlands.	ALL
<u>Arnica amplexicaulis</u> (clasping arnica) River banks.	EB
<u>Arnica cordifolia</u> (heart-leaf arnica) Cool woodlands.	ALL

<u>Arnica latifolia</u> (mountain arnica) Moist to dry woodlands.	ALL
<u>Arnica longifolia</u> (seep-spring arnica) Moist stream banks.	MC
<u>Arnica sororia</u> (twin arnica) Moist to dry meadows.	TC
<u>Artemisia frigida</u> (fringed sage) Dry meadows and banks.	TC
<u>Artemisia ludoviciana</u> (prairie sage) Dry meadows.	TC
<u>Artemisia michauxiana</u> (Michaux's mugwort) Dry, often rocky sites.	MC TC
<u>Artemisia tridentata</u> (big sage) Dry meadows and openings.	MC TC
<u>Aster foliaceus</u> (leafy aster) Moist to dry meadows and openings.	MC EB
<u>Aster modestus</u> (great northern aster) Dry, open woodland.	EB
<u>Balsamorhiza sagittata</u> (arrowleaf balsamroot) Dry meadows and openings.	MC TC
<u>Brickellia grandiflora</u> (large-flowered brickellia) Talus slopes.	EB
<u>Chrysopsis villosa</u> (hairy golden-aster) Dry banks and waste places.	ALL
<u>Cirsium arvense</u> (Canadian thistle) Meadows, woods and waste places.	ALL
<u>Crepis acuminata</u> (long-leaved hawksbeard) Dry meadows.	TC
<u>Crepis intermedia</u> (gray hawksbeard) Dry meadows.	TC
<u>Crepis modocensis</u> (low hawksbeard) Dry meadows and openings.	TC
<u>Crepis runcinata</u> (dandelion hawksbeard) Dry meadows and openings.	TC
<u>Erigeron caespitosus</u> (gray daisy) Rocky places.	EB TC

<u>Erigeron compositus</u> (dwarf mountain fleabane) Rocky places and roadsides.	ALL
<u>Erigeron formosissimus</u> (beautiful daisy) Meadows and open places.	MC
<u>Erigeron ochroleucus</u> (buff fleabane) Dry woodlands.	TC
<u>Gaillardia aristata</u> (blanket-flower) Dry meadows and banks.	ALL
<u>Haplopappus acaulis</u> (stemless goldenweed) Rocky banks.	TC
<u>Helianthella uniflora</u> (Rocky Mountain helianthella) Open woods and meadows.	ALL
<u>Hieracium albiflorum</u> (white-flowered hawkweed) Dry woodland.	ALL
<u>Hieracium cynoglossoides</u> (hounds-tongue hawkweed) Dry woodlands and meadows.	EB TC
<u>Hieracium gracile</u> (slender hawkweed) Moist upland openings.	MC
<u>Hieracium umbellatum</u> (narrow-leaved hawkweed) Dry woodland.	EB TC
<u>Rudbeckia laciniata</u> (tall coneflower) Moist meadows and stream banks.	EB
<u>Rudbeckia occidentalis</u> (black head) Moist meadows and stream banks.	TC
<u>Senecio canus</u> (woolly groundsel) Dry meadows and banks.	MC TC
<u>Senecio crassulus</u> (thick-leaved groundsel) Dry meadows and forest openings.	TC
<u>Senecio dimorphophyllus</u> (Payson's groundsel) Dry meadows and banks.	MC
<u>Senecio integerrimus</u> (western groundsel) Meadows.	MC
<u>Senecio pseud aureus</u> (streambank butterweed) Moist meadows and steam banks.	EB
<u>Senecio serra</u> (butterweed groundsel) Meadows and draws.	TC

<u>Senecio triangularis</u> (arrowleaf groundsel) Moist meadows and stream banks.	ALL
<u>Solidago canadensis</u> (Canada goldenrod) Moist meadows and openings.	EB
<u>Solidago multiradiata</u> (northern goldenrod) Dry woods and openings.	EB MC
<u>Tanacetum vulgare</u> (common tansy) Moist stream banks and waste places.	MC
<u>Taraxacum officinale</u> (common dandelion) Meadows, open woods and banks.	ALL
<u>Townsendia parryi</u> (Parry's townsendia) Dry meadows and openings.	MC TC

JUNCACEAE (Rush Family)

<u>Luzula parviflora</u> (smallflowered woodrush) Moist streambanks and drainages.	MC
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CYPERACEAE (Sedge Family)

<u>Carex disperma</u> (soft leaved sedge) Moist meadows.	EB
<u>Carex geveri</u> (elk sedge) Moist to dry forest.	ALL
<u>Carex multicostata</u> (many-ribbed sedge) Moist banks.	MC
<u>Carex rostrata</u> (beaked sedge) Saturated meadows and banks.	ALL
<u>Eriophorum polystachion</u> (many-spiked cotton-grass) Lakes and bogs.	TC

POACEAE (Grass Family)

<u>Agropyron spicatum</u> (bluebunch wheatgrass) Dry woods and meadows.	EB TC
<u>Agropyron caninum</u> var. <u>andinum</u> (bearded wheatgrass) Dry forest and openings.	EB
<u>Agrostis exarata</u> (spike bentgrass) Moist forest and stream banks.	MC

<u>Agrostis scabra</u> (rough hair-grass) Dry forests.	EB MC
<u>Beckmannia syzigachne</u> (sloughgrass) Saturated meadows and banks.	TC
<u>Bromus ciliatus</u> (fringed brome) Wet meadows.	EB
<u>Bromus inermis</u> (smooth brome) Dry meadows and forest openings.	ALL
<u>Bromus japonicus</u> (Japanese brome) Dry forests and openings.	EB
<u>Bromus tectorum</u> (cheat grass) Dry meadows and waste places.	ALL
<u>Bromus vulgaris</u> (narrow-flowered brome) Dry forest and rocky slopes.	MC
<u>Calamagrostis canadensis</u> (bluejoint reedgrass) Moist meadows and openings.	EB MC
<u>Calamagrostis rubescens</u> (pinegrass) Dry forests.	ALL
<u>Dactylis glomerata</u> (orchard-grass) Dry woods and waste places.	ALL
<u>Danthonia californica</u> (California oatgrass) Meadows and forest openings.	TC
<u>Danthonia intermedia</u> (timber oatgrass) Dry forests.	EB
<u>Danthonia spicata</u> (common wild oats) Dry forests.	EB
<u>Danthonia unispicata</u> (onespike danthonia) Dry meadows and openings.	TC
<u>Deschampsia elongata</u> (slender hairgrass) Moist banks.	MC TC
<u>Festuca idahoensis</u> (Idaho fescue) Meadows and forest openings.	MC TC
<u>Festuca occidentalis</u> (western fescue) Dry forests.	MC TC
<u>Festuca ovina</u> (sheep fescue) Meadows and dry banks.	MC

<u>Glyceria striata</u> (fowl mannagrass) Moist forests and banks.	EB TC
<u>Koeleria cristata</u> (Junegrass) Meadows.	ALL
<u>Melica smithii</u> (Smith's melic) Forest understory.	MC
<u>Melica spectabilis</u> (showy oniongrass) Moist to dry meadows.	MC TC
<u>Melica subulata</u> (Alaska oniongrass) Dry woods.	MC
<u>Melica subulata</u> var. <u>pammellii</u> (Alaska oniongrass) Moist forests.	TC
<u>Oryzopsis asperifolia</u> (roughleaf ricegrass) Open forests.	EB
<u>Oryzopsis exiguu</u> (little ricegrass) Rocky banks.	MC
<u>Phleum alpinum</u> (alpine timothy) Moist upland openings.	MC
<u>Phleum pratense</u> (common timothy) Dry forests and meadows.	ALL
<u>Poa palustris</u> (fowl bluegrass) Moist forests.	TC
<u>Poa pratensis</u> (Kentucky bluegrass) Widespread in forests and meadows.	ALL
<u>Poa scabrella</u> (pine bluegrass) Forest understory.	TC
<u>Stipa occidentalis</u> (western needlegrass) Dry forests.	EB
<u>Stipa occidentalis</u> var. <u>minor</u> (little needlegrass) Dry forests and openings.	EB
<u>Trisetum canescens</u> (tall trisetum) Dry forests and openings.	EB
<u>Trisetum spicatum</u> (spike trisetum) Dry forests.	EB

LILIACEAE (Lily Family)

- Allium brevistylum (short-style onion) MC TC
Moist banks and meadows.
- Allium cernuum (nodding onion) EB
Dry open sites.
- Allium textile (textile onion) TC
Dry banks and meadows.
- Calochortus gunnisonii (sego-lily) EB TC
Dry meadows and forest openings.
- Disporum trachycarpum (wartberry fairy-bell) ALL
Moist forests.
- Erythronium grandiflorum (glacier-lily) MC TC
Moist forests and openings.
- Fritillaria atropurpurea (checker lily) MC
Open forests.
- Fritillaria pudica (yellow bell) MC
Meadows.
- Smilacina racemosa (western false Solomon's seal) ALL
Moist woods and openings.
- Smilacina stellata (starry false Solomon's seal) MC
Moist banks.
- Streptopus amplexifolius (twisted-stalk) ALL
Moist forests.
- Zygadenus elegans (elegant death-camas) TC
Dry forest and meadows.
- Zygadenus venenosus (meadow death-camas) MC TC
Meadows.

IRIDACEAE (Iris Family)

- Iris missouriensis (western blue flag) TC
Moist meadows and openings.
- Sisyrinchium angustifolium (blue-eyed grass) EB
Moist banks.

ORCHIDACEAE (Orchid Family)

<u>Calypso bulbosa</u> (fairy-slipper) Moist forests.	MC TC
<u>Corallorhiza maculata</u> (Pacific coral-root) Moist forests.	ALL
<u>Corallorhiza striata</u> (striped coral-root) Moist forests.	TC
<u>Corallorhiza trifida</u> (early coral-root) Moist forests.	MC
<u>Goodyera oblongifolia</u> (rattlesnake-plantain) Moist forests.	ALL
<u>Habenaria dilitata</u> (white bog-orchid) Moist banks and openings.	MC TC
<u>Habenaria saccata</u> (slender bog-orchid) Moist banks and openings.	MC
<u>Habenaria unalascensis</u> (Alaska rein-orchid) Dry forests.	TC
<u>Listera cordata</u> (heart-leaf twayblade) Moist forests.	MC
<u>Spiranthes romanzoffiana</u> (ladies-tresses) Moist stream banks.	EB

APPENDIX A

Carex multicosata

I. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Carex multicosata Hook.
2. COMMON NAME: Many-ribbed sedge
3. FAMILY: Cyperaceae (Sedge family)
4. GENUS: According to Hermann (1970), there are at least 600 species of Carex in North America. in the Rocky Mountain region there are 165 species, making it the most diverse montane region for sedges. Differences among species are often small, and the group is not well understood by range ecologists (Hermann 1970).
5. SPECIES: Carex multicosata is a western species of dry meadows and open woods in the mountains; it is more common in Oregon and California, but occurs east to Montana and north to Washington (Hermann 1970).

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. FEDERAL STATUS

- a. U.S. FISH AND WILDLIFE SERVICE: Carex multicosata is not currently listed in the U.S.F.W.S. Notice of Review (U.S. Department of Interior 1985).
- b. U.S. FOREST SERVICE: Carex multicosata is currently included on the Watch List for Region 1 (Northern Region) of the U.S. Forest Service (U.S. Department of Agriculture 1988).

2. STATE: Carex multicosata is currently listed by the Montana Natural Heritage Program (Shelly 1989) as "critically imperiled in the state" (state rank = S1). It is also included on the list of vascular plants of rare status by the Montana Rare Plant Project (Lesica et al. 1984), indicating that it is either "limited to a restricted geographic range" or "occurs sparsely over a wider area in Montana." These state ranks do not currently provide any direct legal protection for Carex multicosata.

C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Carex multicostata is a tufted perennial sedge growing from short woody rootstocks. The flowers, which are reduced to ovaries and surrounding bracts and/or anthers subtended by scales, arise on angular stems above the flat green leaves and are tightly aggregated into light brown heads. The stems are ribbed.
2. **TECHNICAL DESCRIPTION:** Densely caespitose from short woody rootstocks; stout culms 3-9 dm, striate, surpassing the leaves; leaves flat, 2.5-6 mm wide, 3 or 4 per culm; spikes gynaeandrous, aggregated into oblong heads, 1.5-4 cm long and 14-20 mm thick; scales ovate, obtuse to acute or slightly cuspidate, light reddish-brown with pale three-nerved center and broad hyaline margins; perigynia planoconvex, ovate, 3.5-5.5 mm long and 2-2.5 mm wide, subcoriaceous, green to straw-colored, wing-margined, serrulate to below the middle, conspicuously nerved dorsally, with a flat bidentate beak which is often winged and serrulate to the tip; achenes lenticular, 1.75-2.5 by 1.5 mm, yellowish or light-brown, substipitate (adapted from Hermann 1970).

D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Carex multicostata occurs from Montana to Washington and south to California and Nevada.
2. **CURRENT SITES (MONTANA):** Carex multicostata is recently (1989) documented from one site in Montana. The species was collected on the Gallatin National Forest during the sensitive plant inventory of the Mill Creek Timber Sale area. It was found by a spring in the headwaters area of Counts Creek, along the road traversing the SW 1/4 of Section 14 of T6S, R9E. Additional location data are provided in the element occurrence print-out, p. 28, and the map, p. 29.
3. **HISTORICAL SITES (MONTANA):** Carex multicostata is known from only four other sites in Montana. Two collections have been made in Beaverhead County (1959), and two collections are from Gallatin County (1921 and 1977).

- E. **HABITAT:** Hermann (1970) lists the elevational range of Carex multicostata as 330 m (1000 ft.) to 3700 m (11000 ft.). In Montana, the species is known from above timberline in the Bridger Range and from a large

subalpine (2400 m) meadow in the Mill Creek drainage of Park County (element occurrence 004). The latter site is on a gentle (5%) north-facing slope at the upper edge of a former clearcut, and is associated with common montane and subalpine meadow species. It was growing with Deschampsia elongata in a moist seep.

- II. **ASSESSMENT AND MANAGEMENT RECOMMENDATIONS:** Carex multicosata is listed as "critically imperiled in the state" by the Montana Natural Heritage Program (Shelly 1989), and as a plant of rare status by the Montana Rare Plant Project (Lesica et al. 1984). It is not known how many individuals occur at the Counts Creek site, from which a single individual was collected. Because it occurs at a site where timber sale-related road improvements will take place, viability of the species in the area is possibly threatened. It is recommended that the area be further assessed for the extent and viability of the species before road expansion takes place.

CAREX MULTICOSTATA
MANY-RIBBED SEDGE

Element occurrence code: PMCYP038Y0.004

Global rank: G5 Forest Service status: WATCH LIST
State rank: S1Survey site name: COUNTS CREEK
County: Park

USGS quadrangle: KNOWLES PEAK

Township-range: 006S009E Section: 14
Township-range comments: SW4

Survey date: 1989-07-18	Elevation: 7200
First observation: 1989	Slope/aspect: 0-3% / NORTH
Last observation: 1989-07-18	Size (acres): 1

Location:

ABSAROKA MOUNTAINS, COUNTS CREEK DRAINAGE, 1.35 AIR MI. SW
OF CONFLUENCE OF COUNTS AND MILL CREEKS, 1.1 AIR MI. SSW OF
GREEN MOUNTAIN.

Element occurrence data:

FULL EXTENT OF POPULATION UNKNOWN; SITE THREATENED BY ROAD
EXPANSION ASSOCIATED WITH TIMBER SALE; FURTHER ASSESSMENT OF
POPULATION SIZE AND VIABILITY NEEDED.

General site description:

SUBALPINE MEADOW CA. 20 YEARS FOLLOWING CLEARCUT; WITH
DESCHAMPSIA ELONGATA.

Land owner/manager:

GALLATIN NATIONAL FOREST, LIVINGSTON RANGER DISTRICT

Comments:

VOUCHER-MATHEWS, S. (227), 1989, MONT.

Information source:

MATHEWS, SARAH. DEPT. OF BIOLOGY, MONTANA STATE UNIVERSITY,
BOZEMAN, MT 59715.

Erigeron formosissimus

I. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Erigeron formosissimus Greene
2. COMMON NAME: Beautiful daisy
3. FAMILY: Asteraceae (Sunflower family)
4. GENUS: According to Cronquist (1955), there are approximately 200 species of Erigeron, 130 of which are centered in the western cordillera of North America north of Mexico.
5. SPECIES: Erigeron formosissimus is a southern Rocky Mountain species of meadows and open places in the mountains, often found at high elevations. Two varieties (viscidus and formosissimus) are recognized, their ranges being nearly concurrent (Cronquist 1955).

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. FEDERAL STATUS

- a. U.S. FISH AND WILDLIFE SERVICE: Erigeron formosissimus is not currently listed in the U.S.F.W.S. Notice of Review (U.S. Department of Interior 1985).
 - b. U.S. FOREST SERVICE: Erigeron formosissimus is not currently included on the list of sensitive species for Region 1 (Northern Region) of the U.S. Forest Service (U.S. Department of Agriculture 1988).
2. STATE: Erigeron formosissimus is currently listed by the Montana Natural Heritage Program (Shelly 1989) as "critically imperiled in the state" (state rank = S1). It is listed as a "vascular plant of rare status" by the Montana Rare Plant Project (Lesica et al. 1984), indicating that the species is either "limited to a restricted geographic range" or "occurs sparsely over a wider area in Montana." These state ranks do not currently provide any direct legal protection for Erigeron formosissimus.

C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Erigeron formosissimus is a small perennial herb arising from a caudex anchored by a system of fibrous roots. A clump of slightly hairy leaves arises from the caudex. These leaves are longer than wide and are shaped like a spatula with rounded ends. Flowering stems arise from the center of the clump, and bear one to several blue or pink daisy-like heads and leaves which become smaller upwards towards the flowers. Leafy bracts subtending each head have many short glandular hairs and/or longer hairs without glands.
2. **TECHNICAL DESCRIPTION:** Medium perennial herb from a simple or branched caudex with fibrous roots; stems 1-4 dm, glandular above, often spreading-hirsute; basal leaves oblanceolate to oval, apices rounded, petiolate to subpetiolate, up to 15 cm long and 15 mm wide; cauline leaves reduced upwards, becoming sessile, lanceolate to ovate; heads 1-several, the disk 1-2 cm wide; involucre 5-8 mm, glandular and often hirsute; rays 75-150, 8-15 mm long and less than or equal to 1mm wide, blue, pink, or sometimes white; disk corollas 3.5-4.4 mm long; achenes 2-nerved (adapted from Cronquist 1955).

D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Erigeron formosissimus is found chiefly in the central and southern Rocky Mountains, occurring from South Dakota, Montana and Wyoming through Utah, Arizona and New Mexico, and extending into Mexico (Cronquist 1955).
2. **CURRENT SITES (MONTANA):** Erigeron formosissimus is recently documented (1989) from one site in Montana. The species was collected in the Gallatin National Forest near the headwaters of a tributary to Davis Creek, in the Mill Creek drainage. Location data are provided in the element occurrence print-out, p. 33, and on the map, p. 34.
3. **HISTORICAL SITES (MONTANA):** Five previous collections of E. formosissimus have been made in Montana, from 1919 to 1979. These were taken from Carbon, Gallatin, and Madison counties. The locations and status of these populations is currently unknown.

E. HABITAT

1. **ASSOCIATED VEGETATION:** Erigeron formosissimus is a mountain species of meadows and open ground. Near Davis Creek (element occurrence 005), plants were found in a conifer forest opening at about 2100 m (7000 ft.). Species associated with E. formosissimus at this site include:
 - Dactylis glomerata (orchardgrass)
 - Hieracium gracile (slender hawkweed)
 - Phleum alpinum (alpine timothy)
 - Picea engelmannii (Engelmann spruce)
 - Pinus contorta (lodgepole pine)
 - Pinus flexilis (limberpine)
 - Pseudotsuga menziesii (Douglas-fir)

2. **TOPOGRAPHY AND SOILS:** Erigeron formosissimus was collected on a lower slope of Chico Peak near the headwaters of a tributary to Davis Creek. Plants occur on a gentle (10%) north-facing slope at about 2100 m (7000 ft.). Soils are sandy and derived from metamorphic parent materials.

II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. **THREATS TO POPULATION:** Erigeron formosissimus occurs outside proposed harvest units of the Mill Creek Timber Sale, but at a site where road building would destroy known plants; however, habitat for regeneration would still exist.

- B. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** Erigeron formosissimus was collected during the survey for sensitive plants in the Mill Creek Timber Sale area. At the time of collection, the species was not recognized as a plant of rare status, and many pertinent population parameters were not noted. Further assessment of the size, viability and security of the population is recommended before road expansion takes place.

- C. **SUMMARY:** Erigeron formosissimus is recently (1989) documented from one site on the Gallatin National Forest. This site lies within the proposed Mill Creek Timber Sale, in an area designated for road expansion. Erigeron formosissimus is not currently included on the list of sensitive plants for Region 1 of the U.S. Forest Service, but is listed as "critically imperiled in the state" by the Montana Natural Heritage Program (Shelly 1989), and as a vascular plant of rare status by the Montana Rare Plant Project (Lesica et al. 1984). Further assessment of the population at the Mill Creek site is recommended.

ERIGERON FORMOSISSIMUS
BEAUTIFUL DAISY

Element occurrence code: PDAST3M1K0.005

Global rank: G4 Forest Service status: NONE
State rank: S1

Survey site name: DAVIS CREEK
County: Park

USGS quadrangle: KNOWLES PEAK

Township-range: 006S009E Section: 09
Township-range comments: S2SE4

Survey date: 1989-07-18	Elevation: 7000
First observation: 1989	Slope/aspect: 3-8% / NORTH
Last observation: 1989-07-18	Size (acres): 5

Location:

ABSAROKA MOUNTAINS, DAVIS CREEK DRAINAGE, 2.4 AIR MILES SSW
OF CONFLUENCE OF DAVIS AND MILL CREEKS, CA. 1.6 AIR MILES
NNE OF CHICO PEAK ("BALDY" ON EMIGRANT QUAD), 1 AIR MILE WSW
OF GREEN MOUNTAIN.

Element occurrence data:

ONLY A FEW PLANTS OBSERVED, BUT FULL EXTENT OF POPULATION
UNKNOWN; PLANTS OCCUR IN AREA VERY NEAR TO PROPOSED TIMBER
HARVEST UNITS, AND SPECIFICALLY IN AREA OF ROAD EXPANSION.

General site description:

SANDY SOIL, METAMORPHIC PARENT MATERIAL; MOIST OPENING IN
SUBALPINE FOREST, WITH PINUS CONTORTA, P. FLEXILIS,
PSEUDOTSUGA MENZIESII, PICEA ENGELMANNII, HIERACIUM GRACILE,
PHLEUM ALPINUM, DACTYLIS GLOMERATA.

Land owner/manager:

GALLATIN NATIONAL FOREST, LIVINGSTON RANGER DISTRICT

Comments:

VOUCHER - MATHEWS, S. (220), 1989, MONT.

Information source:

MATHEWS, SARAH. DEPT. OF BIOLOGY, MONTANA STATE UNIVERSITY,
BOZEMAN, MT 59715.

SECTION TWO: Individual Sensitive Plant Surveys on the Gallatin National Forest.

INTRODUCTION

Six plant taxa of limited distribution in Montana that had previously been documented on the Gallatin National Forest were the focus of individual field surveys. Priority was given to species included on the U.S. Forest Service list of sensitive plants for Region 1 (Northern Region). Section Two provides details of each survey, followed by recommendations for management and/or further research. Identification of field collections followed Dorn (1984), Hitchcock and Cronquist (1973), Hitchcock et al. (1969), and Hitchcock and Chase (1950).

Agoseris sp. nov.

I. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Agoseris sp. nov.
2. COMMON NAME: Pink agoseris
3. FAMILY: Asteraceae (Sunflower family)
4. GENUS: According to Cronquist (1955), there are seven species of Agoseris occurring in the northwestern United States (not including the undescribed species discussed here), and one species occurring in South America.
5. SPECIES: The Agoseris species studied in this survey has not yet been formally described in the scientific literature, but the publication is in progress (Moseley et al., in revision). Specimens have been collected in Lemhi County, Idaho and Beaverhead, Deerlodge, Madison, Park and Sweet Grass counties, Montana.

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. FEDERAL STATUS

- a. U.S. FISH AND WILDLIFE SERVICE: Agoseris sp. nov. is not currently listed in the U.S.F.W.S. Notice of Review (U.S. Department of Interior 1985).
 - b. U.S. FOREST SERVICE: Agoseris sp. nov. is currently included on the list of sensitive species for Region 1 (Northern Region) of the U.S. Forest Service (U.S. Department of Agriculture 1988).
2. STATE: Agoseris sp. nov. is currently listed by the Montana Natural Heritage Program (Shelly 1989) as "critically imperiled in the state" (state rank = S1). This state rank does not currently provide any direct legal protection for Agoseris sp. nov. Through its inclusion on the Region 1 sensitive plant list, the taxon has legal protection under U.S. Forest Service agency policies (W. Ruediger, pers. comm.).

C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Agoseris sp. nov. is a medium-sized perennial herb from a taproot. The crown may be simple or branched. Leaves all arise from the base, and 1-3 leafless flowering stems are produced. Leaves are smooth, thin, and longer than wide, and are 6-20 cm long. The acute leaf tips have a sharp, slender purple tip. Each flowering stem bears a single dandelion-like head of pink flowers. Below the heads are green bracts with purple mottling and woolly bases.
2. **TECHNICAL DESCRIPTION:** Perennial herb from a slender taproot; caudex simple or branched, producing a basal rosette and 1-3 scapes. Leaves oblanceolate, 6-20 cm long, 0.7-2.2 cm wide, entire to toothed distally, glabrous, apex acute, with a purple mucro, base narrowed to a long petiole; petiole narrowly to broadly winged, sheathing at the base, margins villous with spreading, multicellular hairs; scape 6-49 cm high, villous at the base, becoming tomentose beneath the solitary head; involucre campanulate, subequal, becoming imbricate in fruit; phyllaries lanceolate, in 3-4 series, inner acute, outer may be blunter and broader, light green with a purple medial stripe and purple mottling over all, outer ones densely villous at base; flowers all ligulate, 50-70 per head, perfect, light pink at emergence, drying to deep pink; achenes terete, gradually tapering to a slender beak; pappus double, of numerous capillary bristles (adapted from Moseley et al., in revision).
3. **LOCAL FIELD CHARACTERS:** Agoseris sp. nov. is similar in habit to Agoseris aurantiaca, a common species that is widespread in mountain meadows. The flowers of A. aurantiaca emerge burnt orange and often dry purplish in color. The flowers of Agoseris sp. nov. are pink at emergence. The two species are also distinguishable on the basis of habitat; A. aurantiaca occurs in moist to dry, well-drained meadows, while Agoseris sp. nov. is found in wet meadows where the soil is saturated through the growing season (Moseley et al., in revision).

D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Agoseris sp. nov. is known from Lemhi County, Idaho, and southwestern and southcentral Montana.

2. **CURRENT SITES (GALLATIN NATIONAL FOREST):** Agoseris sp. nov. is recently documented (1989) from one site on the Gallatin National Forest, and was collected in 1980 from a second site on the Forest. The location of the population found in 1989 is provided in the element occurrence print-out on p. 40, and is indicated on the map on p. 41. Field surveys were conducted by the author on 31 July 1989 and 10 August 1989.
3. **HISTORICAL SITES:** The population of Agoseris sp. nov. represented by the 1980 collection was the focus of the 1989 field survey by the author. The collection (Lackschewitz 9421, MONTU) was made in the vicinity of Sunlight Peak in the Crazy Mountains. The survey was not successful, due to logistical difficulties encountered in trying to reach the site (the trail is washed out just below the pass from the Sunlight Creek drainage over to Sunlight Lake). There was insufficient time for a second attempt to reach the area from the east side. The existing information on this population is provided in the element occurrence print-out on p. 42.

E. HABITAT

1. **ASSOCIATED VEGETATION:** Agoseris sp. nov. occurs in wet meadows at high elevations. The site found in 1989 occurs in openings of Pinus albicaulis (whitebark pine) stands, with grasses, sedges and the following forbs:
 - Antennaria alpina (alpine pussytoes)
 - Polygonum bistortoides (American bistort)
 - Potentilla diversifolia (diverse-leaved cinquefoil)
 - Veronica wormskjoldii (American alpine speedwell)
2. **TOPOGRAPHY AND SOILS:** At the currently documented site, Agoseris sp. nov. occurs on level ground at 2850 m. (9500 ft.). The subalpine meadow soils are saturated throughout the growing season.

F. POPULATION DEMOGRAPHY AND BIOLOGY

1. **POPULATION SIZE AND CONDITION:** The extent of the Agoseris sp. nov. population in the Haystack and Monument Peaks vicinity (occurrence 007) is unknown at this time. The species was found during a survey for another species, and time was not available for a full survey of the site. Much suitable habitat was observed in the area.
2. **REPRODUCTIVE BIOLOGY:** Many Agoseris species

reproduce by the sexual production of seeds. Single seeds are enclosed in achenes with persistent pappuses, which aid in airborne transport. The plants collected at the Haystack and Monument Peaks site were small, with unbranched caudices and single flowering stems. This suggests a relatively young age for the individuals collected, but may not reflect the age structure of the whole population.

- G. **LAND OWNERSHIP:** Both populations of Agoseris sp. nov., as represented by the 1980 and 1989 collections, occur wholly on Gallatin National Forest lands.

II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. **THREATS TO KNOWN POPULATIONS (GALLATIN NATIONAL FOREST):** The meadows containing Agoseris sp. nov. in the Haystack and Monument Peaks area lie just north, and outside, of the Absaroka-Beartooth Wilderness Area boundary. The area is frequented by trail bikers, who access the site via primitive roads leading to the abandoned Independence Mine.
- B. **FURTHER ASSESSMENT AND MANAGEMENT NEEDS:** More detailed information regarding the occurrence and distribution of Agoseris sp. nov. in Montana is needed. Little is known of the range and abundance of this species. Further surveys of likely mountain habitats could indicate whether Agoseris sp. nov. is a typical subalpine meadow element, or whether it is truly rare, and restricted in both range and abundance. The Agoseris sp. nov. population in the Haystack and Monument Peaks vicinity should be revisited for more detailed documentation. At the same time the impact of off-road vehicle use on the population should be assessed.
- C. **SUMMARY:** Agoseris sp. nov. is a species being newly described. Its extent and abundance in Montana, and on the Gallatin National Forest, is poorly known. Based on its occurrence in Lemhi County, Idaho and in counties of southwest and southcentral Montana, it could, at this time, be designated as a regional endemic. Agoseris sp. nov. is known from two sites on the Gallatin National Forest. The size and condition of these populations is not fully documented at this time. Detailed documentation of both sites, and further surveys in other likely areas on the Gallatin National Forest, are needed.

AGOSERIS SP 1
PINK AGOSERIS

Element occurrence code: PDAST090C0.007

Global rank: G2 Forest Service status: WATCH LIST
State rank: S1Survey site name: HAYSTACK / MONUMENT PEAKS
County: Sweet Grass

USGS quadrangle: HAYSTACK PEAK

Township-range: 007S012E Section: 27
Township-range comments: NE4,22SE4

Survey date: 1989-07-31	Elevation: 9450
First observation: 1989	Slope/aspect: 0-3% / EAST
Last observation: 1989-07-31	Size (acres): 0

Location:

ABSAROKA-BEARTOOTH MOUNTAINS, EAST FORK BOULDER RIVER DRAINAGE, BASIN JUST NORTH OF BLUE LAKE, CA. 1 AIR MILE NORTHEAST OF MONUMENT PEAK, AND 1 AIR MILE NORTHWEST OF HAYSTACK PEAK.

Element occurrence data:

UNKNOWN; POPULATION NOT FULLY SURVEYED, ADDITIONAL FIELD WORK NEEDED; MEADOWS IMPACTED BY ROADS AND OFF-ROAD TRAIL BIKE USE.

General site description:

WET SUBALPINE MEADOW IN WHITEBARK PINE OPENING, WITH ANTENNARIA ALPINA, POLYGONUM BISTORTOIDES, POTENTILLA DIVERSIFOLIA, VERONICA WORMSKJOLDII.

Land owner/manager:

ABSAROKA-BEARTOOTH WILDERNESS AREA
GALLATIN NATIONAL FOREST, BIG TIMBER RANGER DISTRICT

Comments:

VOUCHER - MATHEWS, S. (265), 1989, MONT; IDENTIFICATION VERIFIED BY R. MOSELEY, IDNHP.

Information source:

MATHEWS, SARAH. DEPT. OF BIOLOGY, MONTANA STATE UNIVERSITY, BOZEMAN, MT 59717.

AGOSERIS SP 1
PINK AGOSERIS

Element occurrence code: PDAST090C0.006

Global rank: G2 Forest Service status: WATCH LIST
State rank: S1Survey site name: SUNLIGHT BASIN
County: Park

USGS quadrangle: CAMPFIRE LAKE

Township-range: 004N011E Section: 08
Township-range comments: SW4

Survey date: 1980-07-31	Elevation: 9280
First observation: 1980	Slope/aspect:
Last observation: 1980-07-31	Size (acres): 0

Location:

BELOW NORTH SLOPE OF SUNLIGHT PEAK, CRAZY MOUNTAINS.

Element occurrence data:
UNKNOWN.General site description:
MOIST MEADOW.Land owner/manager:
GALLATIN NATIONAL FOREST, BIG TIMBER RANGER DISTRICTComments:
BORDERS WATERSHED 10070003.Information source:
LACKSCHEWITZ K.H. (9421). 1980. MONTU.

Aquilegia brevistyla

I. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Aquilegia brevistyla Hook.
2. COMMON NAME: Small-flowered columbine
3. FAMILY: Ranunculaceae (Buttercup family)
4. GENUS: According to Hitchcock and Cronquist (1964), there are nearly 70 species of Aquilegia. They are distributed in the Northern Hemisphere and are mostly montane.
5. SPECIES: Aquilegia brevistyla is a far northwestern species, occurring in Alaska and extending across northern British Columbia and Alberta to Wyoming, Montana and South Dakota.

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. FEDERAL STATUS

- a. U.S. FISH AND WILDLIFE SERVICE: Aquilegia brevistyla is not currently listed in the U.S.F.W.S. Notice of Review (U.S. Department of Interior 1985).
 - b. U.S. FOREST SERVICE: Aquilegia brevistyla is currently included on the list of sensitive species for Region 1 (Northern Region) of the U.S. Forest Service (U.S. Department of Agriculture 1988).
2. STATE: Aquilegia brevistyla is currently listed by the Montana Natural Heritage Program (Shelly 1989) as "critically imperiled in the state" (state rank = S1). This state rank does not currently provide any direct legal protection for A. brevistyla. Through its inclusion on the Region 1 sensitive plant list, the taxon has legal protection under U.S. Forest Service agency policies (W. Ruediger, pers. comm.).

C. DESCRIPTION

1. GENERAL NONTECHNICAL DESCRIPTION: Aquilegia brevistyla is a slender perennial herb with few branches. Plants have a cluster of leaves from the

base on long stems, and a few leaves on the flowering stem on very short stems. The basal leaves are divided into six lobed segments, while the stem leaves are merely lobed. The showy blue and white flowers often hang downward on curved stems. The flowers have five blue sepals and five white petals which have tubular extensions, or spurs. The spurs of A. brevistyla are relatively short, and are hooked at the ends. Plants bloom in June and July.

2. **TECHNICAL DESCRIPTION:** Slender perennial herb, 2-8 dm, sparingly branched, glabrous to glandular and pubescent; basal leaves triternate, on long petioles; stem leaves few, lobed, nearly sessile; flowers showy, 1.5-2.5 cm long, nodding or ascending; sepals 5, blue to purple, oblong-lanceolate, clawed; petals creamy white, blades about same length as sepals, spur bluish, hooked, 6-8 mm long; styles and stamens only slightly exceeding the petals; stamens many; follicles 5, pubescent, 2-2.5 cm long, their beaks 2-5 mm long (adapted from Hitchcock and Cronquist 1964, Moss 1959).
3. **LOCAL FIELD CHARACTERS:** Aquilegia brevistyla is similar in habit and habitat to the other columbines encountered in southwestern Montana. Aquilegia flavescens (yellow columbine), probably the species most commonly encountered, has yellow to pinkish flowers with long, slightly incurved spurs. Aquilegia coerulea (Colorado columbine), another species with blue and white flowers, also occurs on the Gallatin National Forest. It is distinguished from A. brevistyla by its longer spurs (2-4 cm) which are nearly to quite straight. All three species may be found in woodland or meadow habitats, and in rock crevices.

D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Aquilegia brevistyla is a species of northwestern North America, occurring from Alaska to northern British Columbia, across Alberta to Wyoming, Montana and South Dakota.
2. **CURRENT SITES (GALLATIN NATIONAL FOREST):** There are no currently documented occurrences of Aquilegia brevistyla on the Gallatin National Forest.
3. **HISTORICAL SITES:** One collection, made in 1967 from the Boulder River above McLeod, may represent a population of A. brevistyla. The specimen,

collected by L. Thornton (no accession or collection number; housed at MONT, Bozeman), was pressed in such a way that it is difficult to properly measure the flower parts for positive identification. The area of this collection was surveyed by the author on 28-30 July 1989. No populations of either A. brevistyla or A. coerulea were found, although A. flavescens was frequently observed. The existing information for this record is provided in the element occurrence print-out on p. 47.

4. **AREAS SURVEYED BUT TAXON NOT LOCATED:** The following areas along the Boulder River, in the vicinity of the 1967 collection, were surveyed for Aquilegia brevistyla. The area from Hell's Canyon Campground to Hick's Park Campground was surveyed less extensively than the area below Hell's Canyon. Areas actually surveyed were smaller in most cases than the portions of the sections listed, as the survey was concentrated on riverbanks and nearby woodland habitats.
- a. T4S, R12E, Section 23, NE 1/4, SE 1/4
 - Section 24, SW 1/4
 - Section 25, W 1/2
 - Section 26, E 1/2
 - Section 36, W 1/2
 - T5S, R12E, Section 1, W 1/2
 - Section 12, W 1/2
 - Section 13, NW 1/4
 - Section 23, E 1/2
 - Section 26, NE 1/4
 - Sections 34 & 35, border
 - T6S, R12E, Section 4, E 1/2
 - Section 9, E 1/2
 - Section 16, E 1/2
 - Section 21, W 1/2
- E. **HABITAT:** According to Moss (1959), Aquilegia brevistyla is a species of meadows, open woods and rock crevices, "occurring occasionally throughout ... forested areas" within its range.
- F. **LAND OWNERSHIP:** Lands along the Boulder River are under both private and U.S. Forest Service ownership. It is not certain whether the 1967 collection was taken from public or private lands.

II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. **THREATS:** Lands along the Boulder River are heavily used for recreation and firewood cutting. Either activity might alter the habitat in such a way as to threaten

viability of a population of Aquilegia brevistyla.

- B. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** Although the lands along the Boulder River "20 miles above the town of McLeod" were extensively searched during the 1989 survey, Aquilegia brevistyla was not found, nor was A. coerulea. For an A. brevistyla survey, timing was correct. The species blooms primarily in June, and the Boulder River collection was made 4 July 1967. If the 1967 collection actually represents A. coerulea, plants could bloom as late as August, and the timing of further surveys should be extended across the growing season. Another consideration in planning future surveys is the very general nature of the location data given for the 1967 collection. The herbarium label states that the plant was collected "along the Boulder River, 20 miles above the town of McLeod." While this vicinity might again be a good starting point, it is difficult to know whether the label mileage was estimated, or clocked on an odometer. Consideration was given to the question of whether the main Boulder River, or its east or west forks, were actually visited by the collector. It was decided that the main Boulder River was correct, and the survey was conducted in that drainage.
- C. **SUMMARY:** Aquilegia brevistyla is a northwestern North American species that may have its southernmost occurrence along the Boulder River in Sweet Grass County, Montana. While Hitchcock et al. (1969) state that the species is "probably not to be found in our area," an Aquilegia brevistyla specimen of undisputed identity, from Judith Basin County, Montana, is housed in the Montana State University Herbarium (MONT #51788). A population of A. brevistyla, represented by the 1967 historical collection, was not relocated during surveys in 1989. Given the heavy use of the main Boulder River drainage by recreationists and firewood cutters, further surveys for this species are called for so that possible threats can be identified and mitigated.

AQUILEGIA BREVISTYLA
SMALL-FLOWER COLUMBINE

Element occurrence code: PDRAN05020.002

Global rank: G5 Forest Service status: WATCH LIST
State rank: S1Survey site name: BOULDER RIVER
County: Sweet Grass

USGS quadrangle: CHROME MOUNTAIN

Township-range: 005S012E Section: 01
Township-range comments:

Survey date:	Elevation: 5560
First observation: 1967	Slope/aspect:
Last observation: 1967-07-04	Size (acres):

Location:

BOULDER RIVER, 20 MILES ABOVE THE TOWN OF MCLEOD (GENERAL
LOCATION).Element occurrence data:
IN FRUIT.General site description:
UNKNOWN.Land owner/manager:
GALLATIN NATIONAL FOREST, BIG TIMBER RANGER DISTRICT

Comments:

IDENTIFICATION IS QUESTIONABLE; R. DORN: "PROBABLY A.
COERULEA JAMES"; A. PLANTENBERG, 1983: "NO"; S. SHELLY,
"FLORAL MEASUREMENTS INCONCLUSIVE." GENERAL LOCATION;
SURVEYS IN 1989, BY S. MATHEWS, DID NOT LOCATE ANY
POPULATIONS.Information source:
THORNTON, L. (S.N.). 1967. MONT.

Balsamorhiza macrophylla

I. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Balsamorhiza macrophylla Nutt.
2. COMMON NAME: Large-leaved balsamroot
3. FAMILY: Asteraceae (Sunflower family)
4. GENUS: There are approximately 12 species in the genus Balsamorhiza (Cronquist 1955), all occurring in western North America. Two members of the genus are widespread in the northern Rocky Mountain region: B. sagittata and B. incana.
5. SPECIES: Balsamorhiza macrophylla is a Great Basin species that reaches its northern range limit in Gallatin County, Montana. Cronquist (1955) notes that "any two species will hybridize where they grow together" due to the lack of strong genetic barriers. However, no obvious hybrids were noted in the Montana population of B. macrophylla, where B. sagittata also occurs.

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. FEDERAL STATUS
 - a. U.S. FISH AND WILDLIFE SERVICE: Balsamorhiza macrophylla is not currently listed in the U.S.F.W.S. Notice of Review (U.S. Department of Interior 1985).
 - b. U.S. FOREST SERVICE: Balsamorhiza macrophylla is currently included on the list of sensitive plant species for Region 1 (Northern Region) of the U.S. Forest Service (U.S. Department of Agriculture 1988).
2. STATE: Balsamorhiza macrophylla is currently listed by the Montana Natural Heritage Program (Shelly 1989) as "critically imperiled in the state" (state rank = S1). This state rank does not currently provide any direct legal protection for B. macrophylla. Through its inclusion on the Region 1 sensitive plant list, the taxon has legal protection under U.S. Forest Service agency policies (W. Ruediger, pers. comm.).

C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Balsamorhiza macrophylla is a robust perennial herb arising from a large taproot. Several branches may surmount the taproot. The large (3-6 dm) lobed leaves are clustered at the base and may be sparsely to evidently hairy with long hairs. One to several large sunflower-like heads arise from the center. The heads consist of yellow tubular flowers in the center surrounded by yellow ray flowers which are 3.5-5.5 cm long. Montana plants bloom in June and July.
2. **TECHNICAL DESCRIPTION:** Robust perennial herb from a taproot surmounted by erect branches arising underground; leaves 3-6 dm long divided into large few-toothed to entire segments 5-12 cm long, glandular below, sparsely to evidently hirsute above; stems 3-10 dm; heads large, subtended by long, leafy bracts which may surpass the disk; achenes glabrous (adapted from Cronquist 1955).
3. **LOCAL FIELD CHARACTERS:** Balsamorhiza macrophylla is easily distinguished from the more common B. sagittata by its segmented leaves. In addition, the leaves of B. macrophylla lack the dense leaf pubescence of B. sagittata, and therefore appear greener.

D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Balsamorhiza macrophylla is a Great Basin species occurring in the Wasatch area of northern Utah, extending into the mountains of southeast Idaho, through western Wyoming to the edge of the Snake River plains, then extending east to Clark County, Idaho and north to Gallatin County, Montana (Cronquist 1955).
2. **CURRENT SITES (MONTANA):** Balsamorhiza macrophylla is currently known from only one site in Montana. This site occurs on Gallatin National Forest lands. Location data are provided in the element occurrence print-out, p. 53, and the population location is indicated on the map on p. 54. Photographs are provided on pp. 55-56. Field surveys were conducted by the author and Lisa Schassberger (Montana Natural Heritage Program) on 16 June 1989, and by the author on 5-6 July 1989, 3 August 1989, and 24 August 1989.
3. **HISTORICAL SITES (MONTANA):** Two collections of Balsamorhiza macrophylla from the Gallatin National

Forest exist in the Montana State University Herbarium (MONT), Bozeman. It is believed that the survey in the vicinity of the Cinnamon Creek Ranger Station was successful in relocating the June 1928 collection from this area. The second collection was from the Cabin Creek area, north of Hebgen Lake, in July 1931. An extensive survey to relocate the population represented by the latter collection was not successful. There is much seemingly suitable meadow habitat in the Cabin Creek drainage, although these sites vary in both exposure and species composition from the site where Balsamorhiza macrophylla was found in the vicinity of Cinnamon Creek. The collection predates the 1959 earthquake, which noticeably affected the Cabin Creek scarp. The existing information for this historical record is provided in the element occurrence print-out on p. 57.

4. **AREAS SURVEYED BUT TAXON NOT LOCATED:** Habitats in the vicinities of the historical collections which appeared suitable on topographic maps were surveyed and are listed below:
- a. T8S, R4E, Section 22, SW 1/4, SE 1/4
Section 27, NW 1/4
Section 28, NE 1/4, SE 1/4
 - b. T11S, R3E, Section 1, NW 1/4, NE 1/4, SE 1/4
T11S, R4E, Section 6, NW 1/4, SW 1/4
Section 5, NE 1/4, NW 1/4, SE 1/4
Section 4, SW 1/4

E. HABITAT

1. **ASSOCIATED VEGETATION:** In the Cinnamon Creek vicinity, Balsamorhiza macrophylla occurs on two types of sites. The main population is found in a sagebrush-forb community on a gently sloping open ridgetop. Outliers are scattered through the Douglas-fir/lodgepole pine forest, and in meadow openings on east-facing slopes below. The lower sites are steeper and rockier and support a different combination of plant species. Species associated with the main ridgetop population include:

Artemisia tridentata (big sagebrush) ·
Castilleja miniata (scarlet paintbrush)
Delphinium bicolor (little larkspur)
Delphinium occidentale (western larkspur)
Festuca sp. (fescue)
Geranium viscosissimum (sticky geranium)
Heracleum lanatum (cow-parsnip)

Lithophragma parviflora (smallflowered fringecup)
Lomatium triternatum (nine-leaf lomatium)
Lupinus argenteus (silvery lupine)
Melica spectabilis (showy oniongrass)
Myosotis alpestris (wood forget-me-not)
Poa sp. (bluegrass)
Populus tremuloides (aspen)
Potentilla gracilis (slender cinquefoil)

Plant species associated with the scattered subpopulations include:

Amelanchier alnifolia (western snowberry)
Antennaria microphylla (rosy pussytoes)
Arenaria congesta (capitate sandwort)
Artemisia tridentata (big sage)
Balsamorhiza sagittata (arrowleaf balsamroot)
Berberis repens (creeping Oregongrape)
Bromus carinatus (California brome)
Danthonia unispicata (onespike danthonia)
Eriogonum umbellatum (sulfurflower)
Juniperus communis (common juniper)
Microseris nutans (nodding microseris)
Poa pratensis (Kentucky bluegrass)
Pseudotsuga menziesii (Douglas-fir)

2. **TOPOGRAPHY AND SOILS:** Populations of Balsamorhiza macrophylla in the Cinnamon Creek vicinity occur on open east-facing slopes, from 2300 m. (7100 ft.) to 2500 m. (7400 ft.). The slope supporting the main population is gentle (8-15%). The soil is loamy and without rocks. The plant community indicates a moderately moist site. Subpopulations are found on 45% slopes where the soils are rockier with more clay, and tend to be more closely associated with Douglas-fir trees or saplings which are scattered in the openings.

F. POPULATION DEMOGRAPHY AND BIOLOGY

1. **REPRODUCTIVE BIOLOGY:** Balsamorhiza macrophylla reproduces by seed. Seeds give rise to plants producing large taproots and which become relatively long-lived perennials.
2. **POPULATION SIZE AND CONDITION:** The main population of Balsamorhiza macrophylla at Cinnamon Creek consists of well over 1000 individuals. The subpopulations together total around 100 plants. It was estimated that at least 10% of the total is made up of young plants, i.e., those in leaf only and with unbranched crowns. Mature plants were vigorous.

3. **BIOLOGICAL INTERACTIONS:** It was noted that Balsamorhiza sagittata is associated with the main population of Balsamorhiza macrophylla only at its lower edge where it meets the forest boundary. On the steeper, rockier sites where subpopulations of Balsamorhiza macrophylla are found, B. sagittata is the more common species. No hybridization was evident.

II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. **THREATS TO THE POPULATION:** Braided horse trails are extensive on the lower, steeper slopes where the subpopulations occur. The associated erosion and mechanical damage are the most serious threats to the Balsamorhiza macrophylla population. The main trail from the Cinnamon Creek Ranger Station to Taylor Fork winds through the ridgetop population of B. macrophylla. The trail is used by both trail bikers and horseback riders. Off trail riding by either of these users poses a threat of physical damage to the population.
- B. **RECOMMENDATIONS FOR MAINTAINING VIABLE POPUALTIIONS:** The braided trails are presumably made by riders from the 320 Ranch traveling the slopes upward to join the ridgetop trail to Taylor Fork. Provision of a single well-marked trail skirting the lower Balsamorhiza macrophylla populations would very simply avoid further damage to them. In a similar way, trail bikers were observed crossing the terrain off trail from their starting point at the Cinnamon Creek Ranger Station until they found the main trail. Monitoring of off-trail use should be a priority.
- C. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** The trail to Taylor Fork should provide good access to meadows in T9S, R4E, Sections 3 & 4, which may be likely habitat for Balsamorhiza macrophylla. Further surveys along the Middle and South forks of Cabin Creek are also recommended.
- D. **SUMMARY:** Balsamorhiza macrophylla is a Great Basin and Snake River Plains species that has its northernmost known occurrence in Montana, in the vicinity of Cinnamon Creek Ranger Station on the Gallatin National Forest. While there is much seemingly suitable habitat for the species between this disjunct site and the main range of the species, Balsamorhiza macrophylla has not been recently recorded at other sites in Montana. The single population currently known in Montana occurs on Gallatin National Forest lands, and could easily be protected at this time following the recommendations made above.

BALSAMORHIZA MACROPHYLLA
LARGE-LEAFED BALSAMROOT

Element occurrence code: PDAST11070.001

Global rank: G3G4 Forest Service status: WATCH LIST
State rank: S1

Survey site name: TAYLOR FORK TRAIL (FLINTS/CINNAMON CREEK)
County: Gallatin

USGS quadrangle: SUNSHINE POINT

Township-range: 008S004E Section: 33
Township-range comments: NE4;28SE4SE4;27SW4SW4

Survey date: 1989-07-06	Elevation: 7400
First observation: 1928	Slope/aspect: 8-15%, 35% / VERTICAL/EAST
Last observation: 1989-07-06	Size (acres): 30

Location:

GALLATIN RIVER DRAINAGE, RIDGE BETWEEN FLINTS AND CINNAMON CREEKS, 0.5-1.0 AIR MILES WEST OF U.S. HWY 191, CA. 5 MILES NORTHWEST OF YELLOWSTONE NATIONAL PARK BOUNDARY.

Element occurrence data:

LARGE POPULATION, 1001-10,000 PLANTS; MAIN POPULATION ON OPEN RIDGETOP, FOUR OUTLYING CLUSTERS ON STEEPER SLOPES BELOW; HORSE TRAILS AND TRAIL BIKE USE HAVE RESULTED IN TRAMPLING AND EROSION.

General site description:

LOAM OR CLAY LOAM SOILS; SAGEBRUSH-FORB HABITAT BELOW PSEUDOTSUGA MENZIESII/PINUS CONTORTA FOREST, WITH POPULUS TREMULOIDES, DELPHINIUM SPP., GERANIUM VISCOSISSIMUM, LUPINUS ARGENTEUS, HERACLEUM LANATUM, LOMATIUM TRITERNATUM, MELICA SPECTABILIS, FESTUCA, POA.

Land owner/manager:

GALLATIN NATIONAL FOREST, HEBGEN LAKE RANGER DISTRICT

Comments:

VOUCHER - MATHEWS, S. (150), 1989, MONT; PROBABLE VERIFICATION OF HISTORICAL COLLECTION SITE: WHITE, E.P. (140), 1928, SPECIMEN #60460, RM (USFS).

Information source:

MATHEWS, SARAH. DEPT. OF BIOLOGY, MONTANA STATE UNIVERSITY, BOZEMAN, MT 59717.

Balsamorhiza macrophylla - Taylor Fork Trail (Flints/Cinnamon
Creek) site (001).

Balsamorhiza macrophylla - Taylor Fork Trail (Flints/Cinnamon
Creek) site (001).

BALSAMORHIZA MACROPHYLLA
LARGE-LEAFED BALSAMROOT

Element occurrence code: PDAST11070.003

Global rank: G3G4 Forest Service status: WATCH LIST
State rank: S1Survey site name: CABIN CREEK
County: Gallatin

USGS quadrangle: PIKA POINT

Township-range: 011S004E Section: 05
Township-range comments: E2

Survey date: 1931-07-14	Elevation: 7520
First observation: 1931	Slope/aspect: - / SOUTH
Last observation: 1931-07-14	Size (acres): 0

Location:

5 MILES UP CABIN CREEK FROM HIGHWAY. ABOUT 20 MILES
NORTHWEST OF WEST YELLOWSTONE. ABOUT 5 AIR MILES NORTH OF
HEBGEN LAKE.Element occurrence data:
SCARCE.General site description:
SOUTH SLOPE; DRY GRAVELLY SOIL; OPEN HILLSIDES.Land owner/manager:
GALLATIN NATIONAL FOREST, HEBGEN LAKE RANGER DISTRICTComments:
POPULATION NOT RELOCATED DURING FIELD SURVEYS BY S. MATHEWS
IN 1989.Information source:
WHITHAM AND WHITE (78). 1931. MT.

Castilleja gracillima

I. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Castilleja gracillima Rydb.
2. COMMON NAME: Slender paintbrush
3. FAMILY: Scrophulariaceae (Figwort family)
4. SPECIES: Castilleja gracillima is a narrowly distributed species found in northwest Wyoming, adjacent Montana and central Idaho. According to Ownbey (Hitchcock et al. 1959), C. gracillima has affinities with C. sulphurea and C. miniata, but is distinguishable from them.
5. GENUS: Castilleja consists of 150-200 species (Hitchcock et al. 1959), distributed in western North and South America. The greatest number of species occurs in the western United States. Hybridization and polyploid complexes are common in the genus, and are the source of taxonomic difficulties.

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. FEDERAL STATUS
 - a. U.S. FISH AND WILDLIFE SERVICE: Castilleja gracillima is not currently listed in the U.S.F.W.S. Notice of Review (U.S. Department of Interior 1985).
 - b. U.S. FOREST SERVICE: Castilleja gracillima is currently included on the list of sensitive species for Region 1 (Northern Region) of the U.S. Forest Service (U.S. Department of Agriculture 1988).
2. STATE: Castilleja gracillima is currently listed by the Montana Natural Heritage Program (Shelly 1989) as "possibly in peril in the Montana, status uncertain; more information needed" (state rank = SU). This state rank does not currently provide any direct legal protection for C. gracillima. Through its inclusion on the Region 1 sensitive plant list, the taxon has legal protection under U.S. Forest Service agency policies (W. Ruediger, pers. comm.).

C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Castilleja gracillima is a perennial herb with slender stems arising more or less distantly from one another. The stems are usually unbranched and grow 2-5 dm tall. Leaves are longer than wide and may be lance-shaped, or they may be narrower and have sides which are parallel to one another. Stems and leaves are smooth to hairy. The inflorescence is made up of green tubular flowers, each with two lips. The upper lip forms an extension nearly as long as the tubular portion, and the lower lip is reduced to three small teeth. Below each flower is an oblong bract which is yellow to orange. In Montana, plants bloom from late June to August.
2. **TECHNICAL DESCRIPTION:** Slender perennial from a rhizome or remote woody caudex, 2-5 dm, usually unbranched, glabrous to villous; leaves entire, linear to lanceolate; inflorescence yellow to orange or sometimes red; bracts oblong, entire to lobed distally with a pair of lateral lobes, villous-puberulent; calyx 15-22 mm, deeply subequally cleft above and below, the primary lobes divided into 2 acute segments 2-4 mm long; corolla 20-30 mm, galea densely puberulent, shorter than the tube and about 5 times as long as the dark green lower lip (adapted from Hitchcock et al. 1959).

D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Castilleja gracillima is a regional endemic occurring in northwestern Wyoming and adjacent Montana, and extending to central Idaho.
2. **CURRENT SITES (GALLATIN NATIONAL FOREST):** Castilleja gracillima is known from two sites on the Gallatin National Forest. Both sites are near the boundaries of Yellowstone National Park, one along Grayling Creek, and the other on the Gallatin River. Location data providing legal and topographic details are provided in the element occurrence print-outs, pp. 64 and 66, and the maps, pp. 65 and 67. Photographs are provided on pp. 68-69. Between these two sites, populations of C. gracillima occur along both drainages on Yellowstone National Park lands. Field surveys were conducted by the author on 7 July 1989 and 2 August 1989.
3. **HISTORICAL SITES (GALLATIN NATIONAL FOREST):** Two historical collections of Castilleja gracillima

represent populations occurring on Gallatin National Forest lands. It is believed that the site of the original Grayling Creek population was rediscovered in the July 1989 survey. A second historical site was recorded in the Gallatin Canyon at "Daly Creek." There is a Dailey Creek joining the Gallatin River on Yellowstone Park lands. The lands to the west of the river in this vicinity are State of Montana lands (Gallatin Wildlife Management Area) or Gallatin National Forest lands. No populations of C. gracillima were located in this area, on Forest, State or Park lands. The site is represented by a poor specimen of uncertain identification (RM #70471). Descriptive data for the historical site ("10% east slope. Shallow coarse soil. Woodland.") is not characteristic of sites where C. gracillima is found.

4. AREAS SURVEYED BUT TAXON NOT LOCATED: Suitable habitat along the Gallatin River, from the Yellowstone National Park boundary to Big Sky, was surveyed for Castilleja gracillima. The population near Snowflake Springs (007) was the only one located along the Gallatin River outside Yellowstone National Park.

E. HABITAT

1. ASSOCIATED VEGETATION: Castilleja gracillima occurs in wet meadows where the soil is saturated during at least part of the growing season. Species found growing with C. gracillima at the Grayling Creek site include:

Arnica chamissonis ssp. foliosa (leafy arnica)
Astragalus miser (weedy milk-vetch)
Carex spp. (sedges)
Castilleja miniata (scarlet paintbrush)
Epilobium glaberrimum (smooth willow-herb)
Equisetum sp. (horsetail)
Geranium richardsonii (white geranium)
Geum macrophyllum (largeleaved avens)
Habenaria dilatata (white bog-orchid)
Lonicera involucreta (bearberry honeysuckle)
Pedicularis groenlandica (elephant's head)
Phleum pratense (timothy)
Potentilla gracilis (slender cinquefoil)
Prunella vulgaris (self-heal)
Salix spp. (willows)

Plant species associated with Castilleja gracillima at the Snowflake Springs site include:

Artemisia tridentata (big sagebrush)

Betula glandulosa (bog birch)
Campanula rotundifolia (harebell)
Castilleja miniata (scarlet paintbrush)
Eriogonum umbellatum (sulfurflower)
Galium boreale (northern bedstraw)
Gentianopsis detonsa (fringed gentian)
Geranium richardsonii (white geranium)
Geum macrophyllum (largeleaved avens)
Habenaria hyperborea (northern green bog-orchid)
Heracleum lanatum (cow-parsnip)
Mimulus guttatus (yellow monkey-flower)
Potentilla fruticosa (shrubby cinquefoil)
Rhamnus alnifolia (alder buckthorn)
Rorippa nasturtium-aquaticum (water-cress)
Rudbeckia occidentalis (black head)
Salix wolfii (Wolf's willow)
Senecio crassulus (thick-leaved groundsel)
Senecio serra (butterweed groundsel)
Solidago canadensis (Canadian goldenrod)
Symphoricarpos albus (snowberry)

2. TOPOGRAPHY AND SOILS: Castilleja gracillima was found to occur at the edges of running water, on stream or river bottoms, or on slopes of nearly 10% at Snowflake Springs. Streamside or bottom sites are sandy or gravelly, while the Snowflake Springs site occurs on a vegetated limestone terrace that was deposited by the springs.

F. POPULATION BIOLOGY, DEMOGRAPHY AND ECOLOGY

1. PHENOLOGY AND REPRODUCTIVE BIOLOGY: Castilleja gracillima blooms from June to August in Montana. The inflorescence elongates as fruiting begins, the bracts remaining colorful through July as seed set begins. Castillejas produce many seeds following out-crossing with other individuals. Hummingbirds and insects are the usual pollination agents. The seeds are very light and easily airborne. Castilleja gracillima is one of the few species that is at least partially rhizomatous. New individuals may therefore arise as a result of either sexual or vegetative reproduction.
2. POPULATION SIZE AND CONDITION: Populations of Castilleja gracillima were observed to be vigorous, but restricted in the area they covered. Up to 1000 plants occur at the Snowflake Springs site, covering an area of 2-5 acres. This estimate is based on the number of ramets (above-ground stems) rather than genets (separate individuals), as individual genets are not easily discernible without knowledge of the root system. The Grayling Creek site supports 100-500 plants on a small sandy

peninsula approximately 150 square meters in area, and in meadows close to the peninsula.

3. **BIOLOGICAL INTERACTIONS:** It is difficult to define the factors restricting the distribution of Castilleja gracillima. Competition is not easily observed, and soil moisture is more likely to be a limiting factor. Castillejas are subject to herbivory by noctuid larvae; however, C. gracillima does not seem to be as heavily fed upon as many other species (pers. obs.). Hybridization is common amongst Castilleja species, and is possibly responsible for some of the more robust, non-rhizomatous members of the observed populations.

- G. **LAND OWNERSHIP:** Along Grayling Creek, Castilleja gracillima occurs on both U.S. Forest Service lands and Yellowstone National Park lands. The population at Snowflake Springs may occur at least partially on private lands that border the springs to the north. The smaller subpopulations, along the Gallatin River toward the Park boundary, are on Gallatin National Forest lands or State of Montana lands (Gallatin Wildlife Management Area).

II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. **THREATS TO POPULATIONS:** Populations of C. gracillima appear to be stable at this time. The most likely threats would stem from environmental rather than man-caused events. Disturbance and re-establishment probably occur at relatively frequent intervals due to the stream and river bank habitats where populations occur.
- B. **RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS:** Recreation in the form of fishing is the main use of the two Gallatin National Forest sites where C. gracillima is known to occur. No altered management practices seem to be called for at this time. Should further surveys reveal populations in drainages where livestock grazing takes place, monitoring of such populations would be called for to assess whether or not livestock use posed a threat.
- C. **RECOMMENDATION FOR FURTHER ASSESSMENT:** Castilleja gracillima occurs in Yellowstone National Park in saturated meadow habitats not so closely associated with major drainages. Similar habitats in the southern regions of the Gallatin National Forest may also support populations of C. gracillima. Potential sites could be located with the use of topographic maps, and subsequently surveyed.

- D. **SUMMARY:** Castilleja gracillima is a regional endemic known from only two sites on the Gallatin National Forest. Because much of the Gallatin National Forest does occur within the range of the species, further surveys are called for to assess the rarity or abundance of the species on Forest lands.

CASTILLEJA GRACILLIMA
SLENDER PAINTBRUSH

Element occurrence code: PDSCROD150.004

Global rank: G3G4 Forest Service status: WATCH LIST
State rank: SU

Survey site name: GRAYLING CREEK
County: Gallatin

USGS quadrangle: RICHARDS CREEK

Township-range: 012S005E Section: 10
Township-range comments: NE4

Survey date: 1989-07-07	Elevation: 6710
First observation: 1938	Slope/aspect: 0-3% / NW
Last observation: 1989-07-07	Size (acres): 1

Location:

GRAYLING CREEK, CA. 10 MILES NORTH OF WEST YELLOWSTONE ON
U.S. HWY. 191, ALONG CREEK SOUTH OF HWY., 0.2 MILE EAST OF
JCT. WITH GALLATIN N.F. ROAD 986.

Element occurrence data:

100-300 STEMS, REPRODUCING VEGETATIVELY AND BY SEED; MANY
PLANTS ARE MORE BRANCHED AND LESS RHIZOMATOUS THAN
DESCRIBED; THESE CHARACTERISTICS AND THE COLOR RANGE MAY
INDICATE HYBRIDIZATION WITH *C. MINIATA*.

General site description:

SANDY LOAM SOILS AND GRAVELLY BANKS; SALIX-SEDGE-GRASS
BOTTOM, WITH PEDICULARIS GROENLANDICA, PHELEUM PRATENSE,
ASTRAGALUS MISER, HABENARIA DILATATA, GEUM MACROPHYLLUM,
GERANIUM RICHARDSONII, PRUNELLA VULGARIS, LONICERA
INVOLUCRATA, CASTILLEJA MINIATA.

Land owner/manager:

GALLATIN NATIONAL FOREST, HEBGEN LAKE RANGER DISTRICT

Comments:

VOUCHER - MATHEWS, S. (152), 1989, MONT; PROBABLE
VERIFICATION OF HISTORICAL COLLECTION SITE: COTNER, F.B.
(S.N.), 1938, SPECIMEN #47695, MONT.

Information source:

MATHEWS, SARAH. DEPT. OF BIOLOGY, MONTANA STATE UNIVERSITY,
BOZEMAN, MT 59717.

CASTILLEJA GRACILLIMA
SLENDER PAINTBRUSH

Element occurrence code: PDSCROD150.007

Global rank: G3G4 Forest Service status: WATCH LIST
State rank: SU

Survey site name: SNOWFLAKE SPRINGS
County: Gallatin

USGS quadrangle: SUNSHINE POINT

Township-range: 009S004E Section: 12
Township-range comments: SE4;T9SR5E:18NE4NW4

Survey date: 1989-08-02	Elevation: 6680
First observation: 1989	Slope/aspect: 8-15% /
NORTH	
Last observation: 1989-08-02	Size (acres): 15

Location:

GALLATIN RIVER DRAINAGE, SNOWFLAKE SPRINGS, AND ALONG THE RIVER 0.85 AIR MILES SOUTHEAST OF THE SPRINGS, 0.2-1.2 MILES NORTHWEST OF YELLOWSTONE NATIONAL PARK BOUNDARY, ALONG U.S. HWY. 191, SOUTH OF ROAD.

Element occurrence data:

1001-10,000 STEMS ESTIMATED, REPRODUCING VEGETATIVELY AND BY SEED; MANY PLANTS ARE MORE BRANCHED AND LESS RHIZOMATOUS THAN DESCRIBED; THESE CHARACTERISTICS AND THE COLOR RANGE INDICATE PROBABLE HYBRIDIZATION WITH C. MINIATA.

General site description:

IN SATURATED MEADOW AROUND LIMESTONE SPRINGS; RIVER BOTTOM-FOREST ECOTONE, WITH CASTILLEJA MINIATA, ZYGADENUS ELEGANS, POTENTILLA FRUTICOSA, SALIX WOLFII, MIMULUS GUTTATUS, GENTIANOPSIS DETONSA, HERACLEUM LANATUM, RHAMNUS ALNIFOLIA, SYMPHORICARPOS ALBUS.

Land owner/manager:

GALLATIN NATIONAL FOREST, HEBGEN LAKE RANGER DISTRICT

Comments:

VOUCHER - MATHEWS, S. (273), 1989, MONT.

Information source:

MATHEWS, SARAH. DEPT. OF BIOLOGY, MONTANA STATE UNIVERSITY, BOZEMAN, MT 59717.

Castilleja gracillima - Grayling Creek site (004).

Castilleja gracillima - Grayling Creek site (004).

Erigeron eatonii var. eatonii

I. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Erigeron eatonii (Gray) Howell var. eatonii
2. COMMON NAME: Eaton's daisy
3. FAMILY: Asteraceae (Sunflower family)
4. GENUS: According to Cronquist (1955), there are approximately 200 species of Erigeron, 130 of which are centered in the western cordillera in North America north of Mexico.
5. SPECIES/VARIETY: Erigeron eatonii is a species of mountains and foothills, occurring from northern Arizona to northern Wyoming and adjacent Montana, and west into central Washington and California. Cronquist (1955) recognizes three varieties, each occupying different portions of the species' range. Variety eatonii is found from southwest Montana, Wyoming and southern Idaho southward. Variety villosus is found in central and western Idaho, southern Oregon and Washington, while var. plantagineus occurs in California, adjacent Nevada and southern Oregon.

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. FEDERAL STATUS

- a. U.S. FISH AND WILDLIFE SERVICE: Erigeron eatonii var. eatonii is not currently listed in the U.S.F.W.S. Notice of Review (U.S. Department of Interior 1985).
 - b. U.S. FOREST SERVICE: Erigeron eatonii var. eatonii is currently included on the list of sensitive plant species for Region 1 (Northern Region) of the U.S. Forest Service (U.S. Department of Agriculture 1988).
2. STATE: Erigeron eatonii var. eatonii is currently listed by the Montana Natural Heritage Program (Shelly 1989) as "critically imperiled in the state" (state rank = S1). This state rank does not currently provide any direct legal protection. Through its inclusion on the Region 1 sensitive plant list, the taxon has legal protection under

U.S. Forest Service agency policies (W. Ruediger, pers. comm.).

C. DESCRIPTION

1. GENERAL NONTECHNICAL DESCRIPTION: Erigeron eatonii var. eatonii is a medium-sized perennial herb (5-30 cm) from a taproot. The stems and foliage have appressed hairs. A tuft of leaves, each with three veins, arises from the base of the plant. These leaves are longer than wide, are sharp at the tip and narrowed at the base. The flowering stems arise from the center of the plant, bearing 1-7 daisy-like heads and several much smaller leaves. The heads bear many white ray flowers that surround the center of yellow disk flowers.
2. TECHNICAL DESCRIPTION: Perennial from a taproot, 5-30 cm, with appressed hairs; stems decumbent and purplish at the base; basal leaves tufted, triprenerved, entire, acute, tapering to a long petiole; stem leaves several, reduced; heads 1-7, the involucre 5-7 mm, distinctly imbricate and glandular and sometimes slightly hirsute; rays 20-50, mostly white, 5-10 mm long, 1-3 mm wide; disk corollas 3.5-5 mm long; inner pappus bristles 15-20 or 25, the outer setose and obscure (adapted from Cronquist 1955).

D. GEOGRAPHICAL DISTRIBUTION

1. RANGE: Erigeron eatonii var. eatonii is the northeasternmost-occurring variety of Erigeron eatonii. It ranges southward from southwest Montana, Wyoming and southern Idaho.
2. CURRENT SITES (GALLATIN NATIONAL FOREST): No populations of Erigeron eatonii var. eatonii are currently documented on the Gallatin National Forest.
3. HISTORICAL SITES: One collection of Erigeron eatonii var. eatonii was made from the Haystack Peak area, and represents the only known occurrence of the variety on the Gallatin National Forest (and in Montana). The specimen was taken by C.L. Hitchcock and C.V. Muhlick (13414) on 8 August 1945. The population represented by this collection was the focus of a survey by the author on 31 July 1989, but the plants were not relocated. The existing information for this historical record is provided in the element occurrence print-out on p. 73.

4. **AREAS SURVEYED BUT TAXON NOT LOCATED:** Haystack Peak is in the northwest 1/4 of section 26, T7S, R12E. Personnel from the Big Timber Ranger District provided transportation to the Haystack Peak area, and the area at the north base of the mountain was surveyed. This was in accordance with the herbarium label location data. Data from the label specifically reads, "Stillwater County...at north base of Mt. Haystack, head of Boulder Creek." Haystack Peak and the Boulder River are in adjacent Sweet Grass County, but the county boundaries are listed as indefinite on the 1942 Cutoff Mountain Quadrangle (USGS 15' series).

- E. **LAND OWNERSHIP:** If the population represented by the 1945 collection is relocated in a future survey at the north base of Haystack Peak, it would lie wholly on Gallatin National Forest lands, and within the Absaroka-Beartooth Wilderness Area.

- II. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** Haystack Peak is truly at the head of neither the Boulder River nor the East Boulder River. It is uncertain what the collectors meant by "head of Boulder Creek." Shepherd Peak, to the south of Monument and Haystack peaks, is closer to the vicinity of the heads of both rivers. If further surveys are conducted in the area, the heads of both drainages at the base of Shepherd Peak might be checked, along with more extensive surveys of the Haystack and Monument peaks area.

SUMMARY: In Montana, Erigeron eatonii var. eatonii is a taxon occurring at the edge of the range for both the species and the variety. A single historical collection documents the occurrence of the species on the Gallatin National Forest. A survey to relocate this population in 1989 was unsuccessful.

ERIGERON EATONII SSP EATONII
EATON'S DAISY

Element occurrence code: PDAST3M171.001

Global rank: G4T4 Forest Service status: WATCH LIST
State rank: S1

Survey site name: HAYSTACK PEAK
County: Sweet Grass

USGS quadrangle: CUTOFF MOUNTAIN

Township-range: 007S012E Section: 23
Township-range comments:

Survey date:	Elevation: 8825
First observation: 1945	Slope/aspect:
Last observation: 1945-08-08	Size (acres):

Location:

AT NORTH BASE OF MT. HAYSTACK, HEAD OF BOULDER CREEK.

Element occurrence data:
IN FLOWER.

General site description:
MEADOWLAND

Land owner/manager:
ABSAROKA-BEARTOOTH WILDERNESS AREA
GALLATIN NATIONAL FOREST, BIG TIMBER RANGER DISTRICT

Comments:

SPECIMEN LABEL SAYS STILLWATER COUNTY, BUT HAYSTACK PEAK ("MT. HAYSTACK") AND BOULDER RIVER ("CREEK") ARE IN ADJACENT SWEET GRASS COUNTY; POPULATION NOT RELOCATED DURING FIELD SEARCHES BY S. MATHEWS IN 1989.

Information source:
HITCHCOCK, C., AND MUHLICK (13414). 1945. WTU.

Salix wolfii var. wolfii

I. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Salix wolfii Bebb. var. wolfii
2. COMMON NAME: Wolf's willow
3. FAMILY: Salicaceae (Willow family)
4. GENUS: Salix is a genus of approximately 300 species (Hitchcock and Cronquist 1964). These are mostly of the cool temperate regions in the Northern Hemisphere.
5. SPECIES/VARIETY: Salix wolfii is a Rocky Mountain species consisting of two varieties. Salix wolfii var. idahoensis occupies the northwestern part of the range of the species, while var. wolfii occurs in the southern portions, "barely entering southwest Montana" (Hitchcock and Cronquist 1964).

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. FEDERAL STATUS

- a. U.S. FISH AND WILDLIFE SERVICE: Salix wolfii var. wolfii is not currently listed in the U.S.F.W.S. Notice of Review (U.S. Department of Interior 1985).
- b. U.S. FOREST SERVICE: Salix wolfii var. wolfii is currently included on the list of sensitive species for Region 1 (Northern Region) of the U.S. Forest Service (U.S. Department of Agriculture 1988).

2. STATE: Salix wolfii var. wolfii is currently listed by the Montana Natural Heritage Program (Shelly 1989) as "critically imperiled in the state" (state rank = S1). This state rank does not currently provide any direct legal protection for S. wolfii var. wolfii. Through its inclusion on the Region 1 sensitive plant list, the taxon has legal protection under U.S. Forest Service agency policies (W. Ruediger, pers. comm.).

C. DESCRIPTION

1. GENERAL NONTECHNICAL DESCRIPTION: Salix wolfii

var. wolfii is a low, spreading shrub of stream and river banks, growing to a maximum height of 2 meters. The leaves are on short stems with evident leafy stipules at their bases. The leaf blades have smooth margins, and are longer than wide, with sharpish tips. They may be as long as 4.5 cm and as wide as 1.5 cm. Leaves are silky with soft, long appressed hairs, appearing grayish, usually more so below than above. The catkins appear at the same time as the leaves, on short leafy stems. Male catkins are 1-2 cm long and usually less than 1 cm thick. Female catkins are 1.5-4 cm long. Both catkins bear dark brown or black scales which are persistent and woolly. Capsules of the female catkins are hairy.

2. **TECHNICAL DESCRIPTION:** Freely branched shrub from 6-20 dm tall; current season twigs sparsely villous-puberulent; leaves with petioles 2-10 mm long and foliaceous stipules 1-5 mm long which may be glandular-serrate and are sooner or later deciduous; leaf blades entire, acute, elliptic, 3-4.5 times as long as wide, up to 4.5 cm long and 1.5 cm wide, sparsely to densely sericeous; aments coetaneous on short leafy-bracted peduncles, bracts often over 1 cm; scales dark-brown to black, persistent, woolly-villous; staminate aments 1-2 cm long, usually less than 1 cm wide; stamens 2, filaments glabrous; pistillate aments 1.5-4 cm long; capsules 3.5-5 mm long, villous-puberulent, pedicels under 1 mm; style 0.5-1.1 mm long, longer than the short, bilobed stigma (adapted from Hitchcock and Cronquist 1964).
3. **LOCAL FIELD CHARACTERS:** Salix wolfii var. wolfii forms low, spreading bushes, often not much taller than surrounding sedges and grasses and usually less than waist high. The pubescence of the leaves reflects light and gives the shrubs a silvery-grayish look.

D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Salix wolfii var. wolfii occurs mainly in Colorado, northeast Utah and Wyoming, entering southwest Montana and eastern Idaho.
2. **CURRENT SITES (GALLATIN NATIONAL FOREST):** Salix wolfii var. wolfii is recently documented (1989) from two sites on the Gallatin National Forest. These sites occur wholly or partially on U.S. Forest Service lands. Locations, including legal and topographic data, are provided in the element occurrence print-outs, pp. 78 and 80, and on the

maps on pp. 79 and 81. Photographs are provided on pp. 82-83. Field surveys were conducted by the author on 6-7 July 1989 and 2 August 1989.

3. **HISTORICAL SITES (GALLATIN NATIONAL FOREST):** A survey at the Cinnamon Creek Ranger Station was successful in relocating a population of Salix wolfii var. wolfii collected in 1947. Extending the survey from Cinnamon Creek to the nearby Gallatin River confirmed the occurrence of the species there as well.

E. HABITAT

1. **ASSOCIATED VEGETATION:** Salix wolfii var. wolfii occurs on streambanks and low ground where the vegetation is dominated by other willows, bog birch, grasses and sedges. Plants associated with S. wolfii var. wolfii along Cinnamon Creek include:

Agrostis variabilis (variant bentgrass)
Artemisia ludoviciana (prairie sage)
Aster eatonii (Eaton's aster)
A. foliaceus (leafy aster)
Astragalus americanus (American milk-vetch)
Betula glandulosa (bog birch)
Castilleja miniata (scarlet paintbrush)
Gentiana affinis (pleated gentian)
Geum macrophyllum (largeleaved avens)
Glyceria elata (tall mannagrass)
Heraclium lanatum (cow-parsnip)
Mimulus guttatus (yellow monkey-flower)
Phleum pratense (timothy)
Potentilla fruticosa (shrubby cinquefoil)
P. gracilis (slender cinquefoil)
Ribes inerme (whitestem gooseberry)
Symphoricarpos albus (snowberry)

2. **TOPOGRAPHY AND SOILS:** Salix wolfii var. wolfii occurs at elevations from 1900 to 2000 m (6400 to 6600 ft.). Populations were found on low ground associated with streams and riverbanks, in places where the soil is likely to be saturated during at least part of the growing season. Soils were either loams or sandy loams.

F. POPULATION DEMOGRAPHY AND BIOLOGY

1. **POPULATION SIZE AND CONDITION:** In the 0.8 km of streambanks and floodplains surveyed at Cinnamon Creek (003), 86 plants were noted. These were vigorous individuals of unknown age. The number of plants found along the Gallatin River (004) was not

estimated. These, too, were vigorous individuals of unknown age.

2. **REPRODUCTIVE BIOLOGY:** Salix species may reproduce vegetatively via rooting of decumbent stems, or sexually by seeds. Although fruits were present on some plants, no seedlings were observed. Seedlings could easily have been overlooked, but the age structure of the population was characterized by at least 90% mature plants, with about 10% of these showing partial senescence. Occurrence of suitable sites for germination is ephemeral, and most likely varies from year to year; conditions in some years may result in little or no sexual reproduction.

- G. **LAND OWNERSHIP:** Salix wolfii var. wolfii at the Cinnamon Creek site (003) occurs wholly on Gallatin National Forest lands. It is probable that the species also occurs on private lands along the river. Along the Gallatin River near Snowflake Springs (004), it occurs on both Gallatin National Forest lands and State of Montana lands (Gallatin Wildlife Management Area).

II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

- A. **POPULATION CONDITION:** Both documented populations of Salix wolfii var. wolfii appear to be stable at this time.
- B. **THREATS TO POPULATIONS:** Threats to these two populations of Salix wolfii var. wolfii appear to be minimal at this time. Horse pasturing immediately behind the Cinnamon Creek Ranger Station may cause some damage to individuals at that site, but is not likely to severely threaten the viability of the population.
- C. **RECOMMENDATIONS FOR FURTHER ASSESSMENT:** It is likely that Salix wolfii var. wolfii occurs more extensively in the northern regions of the Gallatin National Forest and its extent should be assessed. Surveys should be conducted at the most likely time of fruiting (mid-June through July), as the vestiture of the capsules is diagnostic of the variety.
- D. **SUMMARY:** Salix wolfii var. wolfii is a southerly variety of the species which extends into southwest Montana. In the Gallatin National Forest it is documented from two sites, both in the Gallatin Canyon. Further surveys are likely to reveal that the variety occurs more extensively in the northern regions of the Gallatin National Forest.

SALIX WOLFII VAR WOLFII
WOLF'S WILLOW

Element occurrence code: PDSAL02341.003

Global rank: G4T4 Forest Service status: SENSITIVE LIST
State rank: S1

Survey site name: CINNAMON CREEK RANGER STATION
County: Gallatin

USGS quadrangle: SUNSHINE POINT

Township-range: 008S004E Section: 27
Township-range comments: W2NW4;28E2NE4

Survey date: 1989-08-02	Elevation: 6540
First observation: 1947	Slope/aspect: 0-3% / NE
Last observation: 1989-08-02	Size (acres): 10

Location:

GALLATIN RIVER DRAINAGE, ALONG CINNAMON CREEK 0.2-0.5 MILE
UPSTREAM FROM ITS CONFLUENCE WITH GALLATIN RIVER, AT
CINNAMON RANGER STATION, CA. 6 MILES NW OF YELLOWSTONE N.P.
BOUNDARY ON U.S. HWY. 191.

Element occurrence data:

86 GENETS, ESTIMATED BY APPROXIMATE COUNT; SOME SLIGHT
DAMAGE IN AREAS OF HORSE PASTURING; OCCURS ALONG CREEK
BEGINNING BEHIND BARN AND CONTINUING AN UNKNOWN DISTANCE;
MOSTLY ASEQUAL REPRODUCTION, BUT A FEW SEEDLINGS NOTED.

General site description:

ROCKY CLAY LOAM SOILS; WILLOW-MEADOW BOTTOM CONTAINING
SCATTERED LODGEPOLE PINES, WITH BETULA GLANDULOSA, JUNIPERUS
COMMUNIS, SALIX SPP., GERANIUM RICHARDSONII, G.
VISCOSISSIMUM, HERACLEUM LANATUM, ACHILLEA MILLEFOLIUM, GEUM
MACROPHYLLUM, CAMPANULA ROTUNDIFOLIA.

Land owner/manager:

GALLATIN NATIONAL FOREST, HEBGEN LAKE RANGER DISTRICT

Comments:

VOUCHER - MATHEWS, S. (146, 147), 1989, MONT; PROBABLE
VERIFICATION OF HISTORICAL COLLECTION SITE: WHITE, W.W.
(S.N.), 1947, SPECIMEN #58834, MONTU.

Information source:

MATHEWS, SARAH. DEPT. OF BIOLOGY, MONTANA STATE UNIVERSITY,
BOZEMAN, MT 59717.

SALIX WOLFII VAR WOLFII
WOLF'S WILLOW

Element occurrence code: PDSAL02341.004

Global rank: G4T4 Forest Service status: SENSITIVE LIST
State rank: S1

Survey site name: GALLATIN RIVER
County: Gallatin

USGS quadrangle: SUNSHINE POINT

Township-range: 009S005E Section: 7
Township-range comments: SW4SW4;18N2

Survey date: 1989-08-02	Elevation: 6680
First observation: 1989	Slope/aspect: LEVEL
Last observation: 1989-08-02	Size (acres): 10

Location:

GALLATIN RIVER DRAINAGE, ALONG RIVER ON SOUTHWEST SIDE OF
U.S. HWY. 191, 0.1-0.85 MILES NORTHWEST OF YELLOWSTONE
NATIONAL PARK BOUNDARY.

Element occurrence data:

NUMBER OF INDIVIDUALS NOT COUNTED; OCCURRENCE IS MORE OR
LESS CONTINUOUS ALONG RIVER IN AREA SURVEYED.

General site description:

LOAM SOILS; WILLOW-GRASS-SEDGE RIVER BOTTOM, WITH BETULA
GLANDULOSA, POLEMONIUM OCCIDENTALE, GENTIANA AFFINIS,
GENTIANOPSIS DETONSA, CASTILLEJA GRACILLIMA.

Land owner/manager:

GALLATIN WILDLIFE MANAGEMENT AREA
GALLATIN NATIONAL FOREST, HEBGEN LAKE RANGER DISTRICT
GALLATIN NATIONAL FOREST, BOZEMAN RANGER DISTRICT

Comments:

VOUCHER - MATHEWS, S. (149), 1989, MONT.

Information source:

MATHEWS, SARAH. DEPT. OF BIOLOGY, MONTANA STATE UNIVERSITY,
BOZEMAN, MT 59717.

Salix wolfii var. wolfii - Cinnamon Creek Ranger Station site
(003).

Salix wolfii var. wolfii - Cinnamon Creek Ranger Station site
(003).

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