BOTANICAL SURVEY
OF THE GOAT FLAT
PROPOSED RESEARCH NATURAL AREA
DEERLODGE NATIONAL FOREST

by

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and

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INTRODUCTION

The Goat Flat Proposed Research Natural Area is located southwest of Anaconda in the Anaconda Range along the Continental Divide on the Deerlodge National Forest. The area extends from Storm Lake mostly south to Mount Tiny and Goat Flat (Fig. 1) and is centered at about 46°03'N 113°15'W. A portion of the area is within the Anaconda-Pintlar Wilderness. The Goat Flat Proposed Research Natural Area contains 10 special plant species, five of which are Sensitive in Region 1, and a wide variety of upper subalpine and alpine plant communities.

A preliminary survey of the botanical features of the Goat Flat Proposed Research Natural Area was conducted by the Montana Natural Heritage Program in July and August 1991.

TOPOGRAPHY AND GEOLOGY

Altitudes in the Goat Flat Proposed Research Natural Area range from about 8200 ft along the shore of Storm Lake to 9989 ft at the top of Little Rainbow Mountain. Topographically, the area is mountainous and includes gently sloping terrain southeast of Storm Lake, steep mountain slopes rising above the lake basin to a number of peaks, and two small, high-altitude plateaus including Goat Flat and the northeastern portion of the area.

Storm Lake sits in a glacial cirque surrounded by steep, colluvial slopes. Snow avalanching occurs on several of the colluvial slopes and fans. Much of the glacial moraine in the bottom of the cirque south of the lake appears to have been reworked or overlain by fluvial action. Fluvial fans and aprons occur on the gentler terrain especially southeast of Storm Lake. At high elevations, the landforms are predominantly weathered bedrock and colluvial rubble. Active, frost-patterned, polygonal ground and solifluction terraces occur in portions of Goat Flat itself.

The bedrock geology of the Goat Flat Proposed Research Natural Area includes both sedimentary and igneous rocks (Calkin and Emmons 1915). The mountain east of Storm Lake is composed predominantly of medium and basic, granular granodiorite of Tertiary age that is irruptive into the surrounding sedimentary rocks and contains abundant sedimentary inclusions. The area south and west of Storm Lake, including Mount Tiny and Goat Flat, is composed primarily of calcareous shales and impure limestones of Cambrian and Precambrian age. The impure limestones include a great deal of quartz. At higher elevations, some sandstones and quartzitic sandstones occur also.
Figure 1. The Goat Flat Proposed Research Natural Area
FLORA

The vascular flora of the Goat Flat Proposed Research Natural Area currently consists of 190 species (Appendix 1). The list is based on limited survey and additional species undoubtedly will be found with further effort. Ten of these species are considered Species of Special Concern by the Montana Natural Heritage Program (Achuff 1991) and five are Sensitive within Region 1 of the U.S. Forest Service (Table 1). The current status of the five sensitive species is described briefly below. Locations within the area are in Appendix 2.

Table 1. Sensitive Plant Species and Species of Special Concern in the Goat Flat Proposed Research Natural Area. See Achuff (1991) for an explanation of ranks and sensitivity status.

<table>
<thead>
<tr>
<th>Species</th>
<th>Rank</th>
<th>Sensitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agoseris lackschewitzii</td>
<td>G3/S2</td>
<td>yes</td>
</tr>
<tr>
<td>Antennaria densifolia</td>
<td>G3/S1</td>
<td>yes</td>
</tr>
<tr>
<td>Carex maritima</td>
<td>G4-5/S1</td>
<td>no</td>
</tr>
<tr>
<td>Gentiana prostrata</td>
<td>G5/S2</td>
<td>no</td>
</tr>
<tr>
<td>Polystichum kruckebergii</td>
<td>G3-4/S1</td>
<td>no</td>
</tr>
<tr>
<td>Salix cascadensis</td>
<td>G4-5/S1</td>
<td>no</td>
</tr>
<tr>
<td>Salix wolfii var. wolfii</td>
<td>G4T4/S1</td>
<td>yes</td>
</tr>
<tr>
<td>Saussurea weberi</td>
<td>G3/S1</td>
<td>yes</td>
</tr>
<tr>
<td>Saxifraga tempestiva</td>
<td>G2/S2</td>
<td>yes</td>
</tr>
<tr>
<td>Selaginella selaginoides</td>
<td>G5/S1</td>
<td>no</td>
</tr>
</tbody>
</table>

Agoseris lackschewitzii (pink agoseris)

Species Information: Agoseris lackschewitzii is one of four species in the genus that occurs in Montana. None of the other species is special, rare or sensitive (Lesica and Shelly 1991). Agoseris lackschewitzii has pink petals when flowering which differentiates it from the closely related species A. glauca which has yellow flowers and from A. aurantiaca which has reddish-orange flowers. The flowers of the latter two species may age or dry to a pinkish color.
Present Legal or Other Formal Status: *Agoseris lackschewitzii* currently has no status under the Endangered Species Act but is on the Sensitive list for Region 1 of the U.S. Forest Service. It is currently ranked by the Montana Natural Heritage Program globally as G3 (either rare and local or locally in a restricted range, 21-100 occurrences) and in Montana as S2 (imperiled because of rarity, 6-20 occurrences). The state rank is currently under review because of many new locations reported from the 1991 field season; it will likely be revised to S3. In addition, a population of this species was found in the Banff National Park, Alberta area in 1991 (Achuff 1992) and thus, the global ranking may also need to be revised.

Geographic Distribution: *Agoseris lackschewitzii* is currently known from 27 locations in eight counties of central and southwestern Montana (Cascade, Deer Lodge, Judith Basin, Madison, Meagher, Park, Silverbow, Sweetgrass) and two counties in southcentral Idaho (Fremont, Lemhi). A disjunct occurrence is also known from the Sunshine Meadows area of western Banff National Park, Alberta and adjacent British Columbia.

Habitat and Associated Species: *Agoseris lackschewitzii* occurs primarily in moist herbaceous meadows and in the ecotone between moist meadows and forest. Associated species in Montana include:

- Androsace septentrionalis
- Antennaria alpina
- Arnica mollis
- Caltha leptosepala
- Carex rostrata
- Carex scopulina
- Castilleja rhexifolia
- Deschampsia caespitosa
- Erigeron peregrinus
- Habenaria dilatata
- Juncus balticus
- Pedicularis groenlandica
- Phleum alpinum
- Poa leptocoma
- Polygonum bistortoides
- Potentilla diversifolia
- Salix drummondiana
- Saxifraga oregana
- Veronica wormskjoldii
- Zygadenus elegans

- fairy candelabra
- alpine pussytoes
- hairy arnica
- elkslip
- beaked sedge
- Holm's sedge
- rhexia-leaved paintbrush
- tufted hairgrass
- subalpine daisy
- white bog-orchid
- Baltic rush
- elephant's head
- alpine timothy
- bog bluegrass
- bistort
- diverse-leaved cinquefoil
- Drummond willow
- bog saxifrage
- alpine speedwell
- glaucous death-camas

Population Biology and Ecology: Populations of *Agoseris lackschewitzii* are generally small, ranging from 15-100 plants. Flowering is generally in July and August. Reproduction is primarily by seed with some vegetative reproduction by splitting of the caudices.
Threats: The primary threats to *Agoseris lackschewitzii* are from grazing by domestic livestock and trampling associated with grazing or trails. The moist meadows in which the species occurs are quite susceptible to trampling damage due to their low bearing capacity. Such sites may also be susceptible to water erosion.

Recommendations for Maintaining Viable Populations: Management plans should take the occurrence of this species fully into account and prevent disturbance to the sites. To prevent inadvertent impacts, detailed information on the location of *Agoseris lackschewitzii* populations in the Goat Flat Proposed Research Natural Area should be made known to all personnel involved in planning activities in the area. Additional surveys of the moist and wet meadows in the Goat Flat Proposed Research Natural Area should be done to fully delineate the extent of *Agoseris lackschewitzii* populations in the area.

**Antennaria densifolia** (tufted pussytoes)

Species Information: The genus *Antennaria* contains perhaps 30 species (Hitchcock et al. 1955-1969), about 13 of which are currently known from Montana (Dorn 1984). *Antennaria densifolia* is closely related to *Antennaria aromatica* (Bayer 1989a) and is the only member of the genus in Montana to have sensitive status.

Present Legal or Other Formal Status: *Antennaria densifolia* currently has no status under the Endangered Species Act but is on the Sensitive list for Region 1 of the U.S. Forest Service. It is currently ranked by the Montana Natural Heritage Program globally as G3 (either rare and local or locally in a restricted range, 21-100 occurrences) and in Montana as S1 (imperiled because of rarity, <5 occurrences).

Geographic Distribution: *Antennaria densifolia* occurs primarily on the unglaciated eastern slopes of the Mackenzie, Richardson and Ogilvie mountains of the Northwest Territories and the Yukon Territory (Bayer 1989a & b). The occurrence in the Goat Flat Proposed Research Natural Area is a disjunction of ca. 1850 km and is the only site known for Montana or the U.S.

Habitat: The habitat at Goat Flat is limestone talus in alpine tundra at ca. 9150 ft which is typical of its habitat elsewhere. *Antennaria densifolia* appears to be a narrowly restricted endemic that occurs on calcareous, unglaciated habitats (Bayer 1989a).

Population Biology and Ecology: Some populations of this species in Canada contain only pistillate plants which suggests that they are apomictic. However, the Goat Flat population contains both staminate and pistillate plants (Bayer 1989a) and reproduces sexually. The Goat Flat population is diploid as are the plants in Canada (Bayer 1989a). The plants flower in July and August.
Threats: The precise location of the Antennaria densifolia population at Goat Flat is not known but it is likely that the only threat would be from trampling or trail development. Also, the size and areal extent of the population is unknown which makes it impossible to gauge the results of possible impacts.

Recommendations for Maintaining Viable Populations: Management plans should take the occurrence of this species fully into account and prevent disturbance to the sites. To prevent inadvertent impacts, detailed information on the location of populations in the Goat Flat Proposed Research Natural Area should be made known to all personnel involved in planning activities in the area. Additional surveys of talus slopes in the Goat Flat area should be done to fully delineate the extent and size of populations in the Goat Flat Proposed Research Natural Area.

Salix wolfii var. wolfii (Wolf's willow)

Species Information: The genus Salix contains about 300 species, mostly in the Northern Hemisphere (Hitchcock et al. 1955-1969). Thirty-four species are reported for Montana (Dorn 1984). Salix wolfii contains two varieties which are differentiated primarily by whether the capsules are hairy or not. Variety wolfii has glabrous, or occasionally subglabrous, capsules and occurs mainly in Colorado, Utah and Wyoming, barely entering southwestern Montana and eastern Idaho (Hitchcock et al. 1955-1969). Variety idahoensis has hairy capsules and occurs more in the northern and western parts of the range, although both varieties are sympatric in southwest Montana.

Present Legal or Other Formal Status: Salix wolfii var. wolfii currently has no status under the Endangered Species Act but is on the Sensitive list for Region 1 of the U.S. Forest Service. It is currently ranked by the Montana Natural Heritage Program globally as G4T4 (apparently secure globally although it may be rare at the periphery of its range, >100 occurrences; T refers to the variety) and in Montana as S1 (imperiled because of rarity, <5 occurrences).

Geographic Distribution: The species as a whole occurs widely from Oregon to Montana and south to Nevada, Utah and Colorado. The variety wolfii occurs from southwest Montana and eastern Idaho south to Colorado and Utah, and is currently known from four locations in Montana. The other three locations are in southern Madison and Gallatin counties. Thus, the population at the Goat Flat Proposed Research Natural Area is peripheral and the most northeasterly location known for the species.

Habitat: Salix wolfii var. wolfii occurs along streambanks and in wet meadows in the subalpine zone.
Population Biology and Ecology: The capsules of this plant mature in July and August but little is known of other specific aspects of its biology or ecology. It presumably reproduces both sexually by seeds and vegetatively.

Threats: No threats are known to this species.

Recommendations for Maintaining Viable Populations: Management plans should take the occurrence of this species fully into account and prevent disturbance to the sites. To prevent inadvertent impacts, detailed information on the location of populations in the Goat Flat Proposed Research Natural Area should be made known to all personnel involved in planning activities in the area. Additional surveys of the moist and wet meadows south of Storm Lake should be done to fully delineate the extent and size of populations in the Goat Flat Proposed Research Natural Area.

**Saussurea weberi** (Weber's sawwort)

Species Information: The genus *Saussurea* contains more than 50 species most of which are in Eurasia. Three species occur in Montana (Dorn 1984). *Saussurea weberi* is distinguished from *S. densa*, which also is a short plant occurring at high altitudes, by having broadly rounded involucral bracts rather than the narrow, pointed bracts of *S. densa*.

Present Legal or Other Formal Status: *Saussurea weberi* currently has 3C status (more abundant or widespread than previously believed and/or not subject to identifiable threat) under the Endangered Species Act and also is on the Sensitive list for Region 1 of the U.S. Forest Service. It is currently ranked by the Montana Natural Heritage Program globally as G3 (either rare and local or locally in a restricted range, 21-100 occurrences) and in Montana as S1 (imperiled because of rarity, <5 occurrences).

Geographic Distribution: *Saussurea weberi* occurs from Colorado north to southwestern Montana with the Montana population being disjunct from westcentral Wyoming (Dorn 1988). The population at Goat Flat is the only known occurrence in Montana.

Habitat and Associated Species: At Goat Flat, *Saussurea weberi* occurs in a moist alpine meadow with a southwest aspect at 9400 ft. Associated species include *Poa interior*, *Senecio lugens* and *Arnica rydbergii*.

Population Biology and Ecology: The population at Goat Flat consists of 500-1000 plants scattered in small colonies across the meadow. The population was first discovered in 1973 and was last observed in 1978. This species flowers in July and early August.
Threats: The only current potential threat to the population is from a nearby hiking trail.

Recommendations for Maintaining Viable Populations: Management plans should take the occurrence of this species fully into account and prevent disturbance to the sites. To prevent inadvertent impacts, detailed information on the location of populations in the Goat Flat Proposed Research Natural Area should be made known to all personnel involved in planning activities in the area. Additional surveys of the high altitude meadows of Goat Flat and also east of Storm Lake should be done to fully delineate the extent and size of populations in the Goat Flat Proposed Research Natural Area.

Saxifraga tempestiva (storm saxifrage)

Species Information: Saxifraga is a large genus of ca. 300 species, most of which are in the Northern Hemisphere and including many that are circumboreal. In contrast, Saxifraga tempestiva is endemic to southwestern Montana. Thirteen locations are currently known for it in Montana and the Goat Flat populations are at the center of the range. It can be distinguished from other high-altitude members of this genus by the combination of small size, more nearly linear leaves, and petals that are smaller than the sepals, rather than longer or absent.

Present Legal or Other Formal Status: Saxifraga tempestiva currently has no status under the Endangered Species Act but is on the Sensitive list for Region 1 of the U.S. Forest Service. It is currently ranked by the Montana Natural Heritage Program globally as G2 (imperiled globally because of rarity, 6-20 occurrences) and in Montana as S2 (imperiled because of rarity, 6-20 occurrences).

Geographic Distribution: The global range of Saxifraga tempestiva currently comprises thirteen locations in Ravalli, Beaverhead, Deer Lodge and Granite counties. It is endemic to southwestern Montana. Four populations of Saxifraga tempestiva are currently known from the Goat Flat Proposed Research Natural Area.

Habitat and Associated Species: Saxifraga tempestiva occurs in vernally moist, exposed mineral soil in meadows or on rock ledges near or above treeline. The sites receive snowmelt through the early part of the growing season. Associated species include:

- Dodecatheon pulchellum
- Erigeron peregrinus
- Erigeron simplex
- Pedicularis pulchella
- Poa alpina
- Poa cusickii

Few-flowered shooting star
Subalpine daisy
Alpine daisy
Pretty dwarf lousewort
Alpine bluegrass
Cusick's bluegrass
Population Biology and Ecology: *Saxifraga tempestiva* flowers in June and July and sets seed quickly, usually by mid-summer before the site dries out as run-off from snow melt ends. The populations are often large, consisting of hundreds of plants.

**Threats:** No threats are currently known.

**Recommendations for Maintaining Viable Populations:** Management plans should take the occurrence of this species fully into account and prevent disturbance to the sites. To prevent inadvertent impacts, detailed information on the location of populations in the Goat Flat Proposed Research Natural Area should be made known to all personnel involved in planning activities in the area. Populations of this species are often hard to detect from a distance and thus, additional surveys of the high altitude meadows of Goat Flat and also east of Storm Lake should be done during early summer to fully delineate the extent and size of populations in the Goat Flat Proposed Research Natural Area.

Additionally, two species of *Botrychium* (grapefern) are known from a meadow on the northeast shore of Storm Lake, just north of the current boundary of the area. *Botrychium paradoxum* is currently on the Region 1 Sensitive plant list and is ranked G1/S1. *B. hesperium* is not a Sensitive species and is ranked G3/S1. These species are often difficult to find and were not located in 1991. If further survey finds them at the previously reported site, the boundary of the Goat Flat Proposed Research Natural Area should be changed to include them.

**VEGETATION**

This preliminary survey concentrated on the plant species present in the Goat Flat Proposed Research Natural Area and little was done with the plant communities. The following is based on sketchy field notes and no plots or releves were done. Some of the major vegetation types are briefly noted (Table 2) but additional types occur in the area.

The Goat Flat Proposed Research Natural Area lies within both the Upper Subalpine and Alpine vegetation zones. The Upper Subalpine here includes the timberline transition from a treed Subalpine to a treeless Alpine. At the lowest elevations in the area, closed forests predominate. As elevations increase and climatic conditions become more rigorous, the forests become more open as the distance between trees or tree clumps increases.

Closed forests dominated by *Picea engelmannii* and *Abies lasiocarpa* with an understory characterized by *Vaccinium scoparium* are most common south of the lake. At higher elevations, an open forest of *Picea engelmannii* and *Abies*
Table 2. Preliminary list of vegetation types in the Goat Flat Proposed Research Natural Area.

Upper Subalpine

Picea engelmannii-Abies lasiocarpa/Vaccinium scoparium
Picea engelmannii-Abies lasiocarpa/Phyllodoce spp.
Larix lyallii/Luzula hitchcockii
Larix lyallii/Vaccinium scoparium
Trollius albiflorus-Senecio triangularis-Erigeron peregrinus
Caltha leptosepala

Alpine

Dryas octopetala-Salix reticulata ssp. nivalis
Carex nigricans
Antennaria lanata
Phyllodoce glanduliflora
Festuca ovina-Carex spp.

lasiocarpa with an understory dominated by Phyllodoce spp. and Vaccinium scoparium is characteristic.

Forests dominated by Larix lyallii generally occur at higher elevations than the Picea-Abies forests although the two overlap to some degree. Both open and closed forests of Larix lyallii occur in the area. On moister sites, the vegetation type is Larix lyallii/Luzula hitchcockii while on somewhat drier sites, Larix lyallii/Vaccinium scoparium is more common.

Moist herb meadows occur at low elevation, south of the lake near streams and in seepy areas. This species-rich vegetation type is characterized by Trollius albiflorus, Senecio triangularis and Erigeron peregrinus. Other common species include Deschampsia caespitosa, Valeriana sitchensis, Potentilla diversifolia and Veronica wormskjoldii.

In the wettest sites, a vegetation type dominated by Caltha leptosepala occurs.
Vegetation patterning in the Alpine is controlled primarily by winter snow depth-exposure and summer moisture. The vegetation types noted here can be arranged along these gradients. The vegetation in the deepest, latest-melting snowbeds that are often in hollows is dominated by Carex nigricans. In slightly shallower snowbeds, often forming a ring around the Carex nigricans vegetation, is a vegetation type dominated by Antennaria lanata.

Areas with moderate snow depths are characterized by a heath tundra dominated by Phyllodoce glanduliflora but also commonly containing Vaccinium scoparium and Cassiope mertensiana. The most exposed sites, which typically have very little snow cover in the winter, contain the Dryas octopetala-Salix reticulata ssp. nivalis vegetation type. Also characteristic of these sites are Kobresia myosuroides and Carex nardina communities.

On some sites, a graminoid tundra occurs with Festuca ovina, Carex spp. (especially Carex phaeocephala), Poa cusickii and Poa pattersonii most common.

SUMMARY

The Goat Flat Proposed Research Natural Area is located southwest of Anaconda in the Anaconda Range along the Continental Divide on the Deerlodge National Forest. Altitudes range from about 8200 ft along the shore of Storm Lake to 9989 ft at the top of Little Rainbow Mountain.

Topographically, the area is mountainous and includes gently sloping terrain southeast of Storm Lake, steep mountain slopes rising above the lake basin to a number of peaks, and two small, high-altitude plateaus including Goat Flat and the northeastern portion of the area. Active, frost-patterned, polygonal ground and solifluction terraces occur in portions of Goat Flat itself. The bedrock geology includes both sedimentary and igneous rocks.

The vascular flora of the Goat Flat Proposed Research Natural Area currently consists of 190 species. Ten of these species are considered Species of Special Concern by the Montana Natural Heritage Program and five are Sensitive within Region 1 of the U.S. Forest Service.

The occurrence of Antennaria densifolia in the Goat Flat Proposed Research Natural Area is a disjunction of ca. 1850 km from the main part of its range in Canada and is the only site known for this species in Montana or the U.S.

Saussurea weberi occurs from Colorado north to southwestern Montana with the Montana population being disjunct from westcentral Wyoming (Dorn 1988). The population at Goat Flat is the only known occurrence in Montana.
The global range of *Saxifraga tempestiva* currently comprises thirteen locations in southwestern Montana where it is endemic. Four populations of *Saxifraga tempestiva* are currently known from the Goat Flat Proposed Research Natural Area.

The Goat Flat Proposed Research Natural Area lies within both the Upper Subalpine and Alpine vegetation zones. Forests are dominated by *Picea engelmannii*, *Abies lasiocarpa* and *Larix lyallii*. Moist, species-rich herb meadows occur at low elevation near Storm Lake and a variety of herb and dwarf shrub vegetation types occur above treeline in the alpine tundra. Eleven major vegetation types are recognized preliminarily but additional types occur in the area.

Additional survey work is needed for both the flora and the vegetation of the Goat Flat Proposed Research Natural Area.
LITERATURE CITED


APPENDIX 1 - FLORA OF THE GOAT FLAT PROPOSED RNA

The following list of plant species is derived from information in the Montana Natural Heritage Program database and from field surveys done in the summer of 1991. The species are arranged alphabetically by family and species. Nomenclature primarily follows Dorn (1984) and Hitchcock et al. (1955-1969).

APIACEAE

Bupleurum americanum
Lomatium ambiguum
Lomatium cous
Osmorhiza depauperata

American thorough-wax
swale desert-parsley
cous
blunt-fruit sweet-cicely

ASTERACEAE

Achillea millefolium
Agoseris aurantiaca
Agoseris glauca
Agoseris lackschewitzii
Antennaria alpina
Antennaria anaphaloides
Antennaria densifolia
Antennaria lanata
Antennaria microphylla
Antennaria racemosa
Antennaria rosea
Arnica cordifolia
Arnica diversifolia
Arnica mollis
Arnica rydbergii
Artemisia campestris
Aster alpinus
Chaenactis alpina
Erigeron compositus
Erigeron humilis
Erigeron lanatus
Erigeron peregrinus
Erigeron simplex
Erigeron subtrinervis
Haplopappus lyallii
Hieracium gracile
Hulsea algida
Saussurea weberi
Senecio cymbalarioides
Senecio fremontii
Senecio integerrimus
Senecio lugens
Senecio triangularis

yarrow
orange agoseris
pale agoseris
pink agoseris
alpine pussytoes
tall pussytoes
pussytoes
wooly pussytoes
small-leaved pussytoes
raceme pussytoes
rosy pussytoes
heart-leaf arnica
sticky arnica
hairy arnica
Rydberg's arnica
Pacific sagewort
alpine aster
alpine chaenactis
cut-leaved daisy
arctic-alpine daisy
wooly daisy
subalpine daisy
alpine daisy
three-veined fleabane
Lyall's goldenweed
slender hawkweed
alpine hulsea
Weber's sawwort
few-leaved groundsel
dwarf mountain butterweed
western groundsel
black-tipped butterweed
arrowleaf groundsel
Solidago *multiradiata*  
Solidago *spathulata*  
northern goldenrod  
dune goldenrod

BORAGINACEAE

Eritrichium *nanum*  
Mertensia *viridis*  
pale alpine forget-me-not  
green bluebells

BRASSICACEAE

Arabis *lemmonii*  
Arabis *lyallii*  
Draba *oligosperma*  
Smelowskia *calycina*  
Leannon's rockcress  
Lyall's rockcress  
few-seeded draba  
alpine smelowskia

CAMPANULACEAE

Campanula *rotundifolia*  
Campanula *scabrella*  
harebell  
rough harebell

CARYOPHYLLACEAE

Arenaria *obtusiloba*  
Arenaria *rossii*  
Cerastium *arvense*  
Cerastium *beeringianum*  
Silene *acaulis*  
arctic sandwort  
Ross sandwort  
mouse-ear chickweed  
alpine chickweed  
moss campion

CRASSULACEAE

Sedum *lanceolatum*  
Sedum *roseum*  
lanceleaved stonecrop  
roseroot

CUPRESSACEAE

Juniperus *communis*  
common juniper

CYPERACEAE

Carex *atrata*  
Carex *elynoidees*  
Carex *filifolia*  
Carex *geyeri*  
Carex *lenticularis*  
Carex *maritima*  
blackened sedge  
kobresia-like sedge  
thread-leaved sedge  
elk sedge  
lenticular sedge  
seaside sedge
Carex nardina
Carex neurophora
Carex nigricans
Carex phaeocephala
Carex prionophylla
Carex scirpoidea
Carex scopulorum
Eleocharis pauciflora
Kobresia myosuroides

**EQUISETACEAE**

**Equisetum arvense**
field horsetail

**ERICACEAE**

Cassiope mertensiana
Gaultheria humifusa
Kalmia microphylla
Ledum glandulosum
Phyllocladus empetrifolius
Phyllocladus glanduliflorus
Rhododendron albiflorum
Vaccinium scoparium

Mertens' mountain heather
alpine wintergreen
small-leaved laurel
trapper's tea
red mountain-heather
yellow mountain-heather
white rhododendron
grouseberry

**FABACEAE**

Astragalus aboriginum
Astragalus alpinus
Astragalus bourgovii
Astragalus miser
Hedysarum sulphurescens
Lupinus argenteus
Oxytropis cusickii
Oxytropis viscidii

Indian milk-vetch
alpine milk-vetch
Bourgeau's milk-vetch
weedy milk-vetch
yellow hedysarum
silvery lupine
Cusick's milk-vetch
sticky crazyweed

**GENTIANACEAE**

Frasera speciosa
Gentiana algida
Gentiana calycosa
Gentiana prostrata
Swertia perennis

giant frasera
whitish gentian
mountain bog gentian
moss gentian
swertia

**HYDROPHYLLACEAE**

Phacelia hastata

silverleaf phacelia
Phacelia lyallii  
Lyall's phacelia

JUNCACEAE

Juncus drummondii  
Drummond's rush
Juncus mertensianus  
Mertens' rush
Juncus parryi  
Parryi's rush
Juncus tracyi  
Tracy's rush
Luzula campestris  
field woodrush
Luzula hitchcockii  
smooth woodrush
Luzula parviflora  
smallflowered woodrush
Luzula spicata  
spiked woodrush

LILIACEAE

Allium schoenoprasum  
chives
Erythronium grandiflorum  
glacier lily
Lloydia serotina  
alpine lily
Tofieldia glutinosa  
sticky tofiedlia
Xerophyllum tenax  
beargrass
Zygodenus elegans  
glaucous death-camas

LINACEAE

Linum perenne  
wild blue flax

ONAGRACEAE

Epilobium anagallidifolium  
alpine fireweed

ORCHIDACEAE

Habenaria dilatata  
white bog orchid

PINACEAE

Abies lasiocarpa  
subalpine fir
Larix lyallii  
subalpine larch
Picea engelmannii  
Engelmann spruce

POACEAE

Danhania intermedia  
timber oatgrass
Deschampsia caespitosa  
tufted hairgrass
Festuca idahoensis  
Idaho fescue
Festuca ovina  
sheep fescue
Koeleria macrantha  June grass  
Phleum alpinum  alpine timothy  
Poa alpina  alpine bluegrass  
Poa cusickii  Cusick's bluegrass  
Poa interior  inland bluegrass  
Poa nervosa  Wheeler's bluegrass  
Poa pattersonii  Patterson's bluegrass  
Poa rupicola  timberline bluegrass  
Poa stenantha  Trinius' bluegrass  
Trisetum spicatum  spike trisetum  

POLEMONIACEAE  
Polemonium viscosum  skunk polemonium  

POLYGONACEAE  
Eriogonum capistratum var. muhlickii  wild buckwheat  
Eriogonum ovalifolium  oval-leafed eriogonum  
Oxyria digyna  mountain sorrel  
Polygonum bistortoides  western bistort  
Polygonum viviparum  alpine bistort  

POLYPODIACEAE  
Cryptogramma crispa  parsley fern  
Polystichum kruckebergii  Kruckeberg's sword fern  

PORTULACACEAE  
Claytonia lanceolata var. lanceolata  western springbeauty  
Claytonia megarhiza  alpine springbeauty  
Lewisia pygmaea  dwarf lewisia  

PRIMULACEAE  
Androsace septentrionalis  fairy candelabra  
Dodecatheon conjugens  slimpod shooting star  
Dodecatheon jeffreyi  Jeffrey's shooting star  
Dodecatheon pulchellum  few-flowered shooting star  
Douglasia montana  Rocky Mountain douglasia  
Primula parryi  Parry's primrose
RANUNCULACEAE

Anemone lithophila
Anemone multifida
Anemone patens
Aquilegia flaveszens
Caltha leptosepala
Delphinium bicolor
Ranunculus eschscholtzii
Thalictrum occidentale
Trollius albiflorus

Drummond's anemone
cut-leafed anemone
pasque flower
yellow columbine
elkslip
Montana larkspur
subalpine buttercup
western meadow rue
American globeflower

ROSACEAE

Dryas octopetala
Fragaria virginiana
Geum rossii
Potentilla diversifolia
Potentilla fissa
Potentilla fruticosa
Potentilla gracilis
Sibbaldia procumbens

white mountain avens
common strawberry
Ross' avens
diverse-leaved cinquefoil
cinquefoil
shrubby cinquefoil
slender cinquefoil
creeping sibbaldia

SALICACEAE

Salix boothii
Salix cascadensis
Salix reticulata ssp. nivalis
Salix farriae
Salix wolfii var. wolfii

Booth's willow
cascade willow
snow willow
Farr's willow
Wolf's willow

SAXIFRAGACEAE

Lithophraqma parviflora
Mitella pentandra
Parnassia fimbriata
Ribes montigenum
Saxifraga bronchialis
Saxifraga lyallii
Saxifraga odontoloma
Saxifraga rhomboidea
Saxifraga tempestiva

smallflower fringecup
alpine mitrewort
fringed grass-of-panassus
mountain gooseberry
spotted saxifrage
red-stemmed saxifrage
brook saxifrage
diamondleaf saxifrage
storm saxifrage

SCROPHULARIACEAE

Besseya wyomingensis
Castilleja crista-gali
Castilleja miniata

Wyoming besseya
cockscomb paintbrush
scarlet paintbrush
Chionophila tweedyi  
Pedicularis bracteosa  
Pedicularis contorta  
Pedicularis groenlandica  
Pedicularis pulchella  
Penstemon attenuatus  
Synthyris pinnatifida  
Veronica wormskejoldii  

chionophila  
bracted lousewort  
white coiled-beak lousewort  
elephant's head  
pretty dwarf lousewort  
sulphur penstemon  
cut-leaf synthyris  
alpine speedwell  

SELAGINELLACEAE  

Selaginella selaginoides  

lesser clubmoss  

VALERIANACEAE  

Valeriana sitchensis  

Sitka valerian  

VIOLACEAE  

Viola nephrophylla  

kidney-leaved violet
APPENDIX 2 - LOCATIONS OF SPECIAL PLANT SPECIES
Location of *Agoseris lackschewitzii* in the Goat Flat PRNA.
Location of *Antennaria densifolia* in the Goat Flat PRNA.
Location of *Carex maritima* in the Goat Flat PRNA.
Location of *Gentiana prostrata* in the Goat Flat PRNA.
Location of Polystichum kruckebergii in the Goat Flat PRNA.
Location of *Salix cascadensis* in the Goat Flat PRNA.
Location of *Salix wolfii* var. *wolfii* in the Goat Flat PRNA.
Location of *Saussurea weberi* in the Goat Flat PRNA.
Location of *Saxifraga tempestiva* in the Goat Flat PRNA.
Location of *Selaginella selaginoides* in the Goat Flat PRNA.