# Sensitive Plant Surveys

# and Status of Rare Plant Species

# on Bridger-Teton National Forest,

# 1997-1998

Prepared for the USDA Forest Service
Bridger-Teton National Forest

By

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## INTRODUCTION

The US Forest Service (USFS) is directed by the Endangered Species Act and internal policy (through the Forest Service Manual) to manage for listed and candidate Threatened and Endangered plant species on lands under its jurisdiction. In the Intermountain Region (USFS Region 4), Sensitive species lists and policies have been developed to address the management needs of rare plant species that might qualify for listing under the Endangered Species Act (Joslin 1994). The objective of these policies is to prevent agency actions from leading to the further endangerment of Sensitive species and the subsequent need for listing them under the Endangered Species Act. In addition, the Forest Service is required to manage for other rare species and biological diversity under provisions of the National Forest Management Act.

In order to meet its management obligations for rare plant species, the Bridger-Teton National Forest (BTNF) has been working in cooperation with the Wyoming Natural Diversity Database (WYNDD) since 1989 to assemble information on the identification, distribution, and management needs of Threatened, Endangered, Sensitive, and other plant species of special concern on Forest lands. In 1995, BTNF contracted with WYNDD on a cost-share basis to conduct status surveys on six listed and potential Sensitive plant species. Two of these species (*Lesquerella carinata* var. *carinata* and *Lesquerella paysonii*) have been addressed in previous reports (Fertig 1997 b, 1997 c). This report contains survey information on the remaining four species: Soft aster (*Aster mollis*), Incurved sedge (*Carex incurviformis*), Rockcress draba (*Draba globosa* or *D. densifolia* var. *apiculata*), and Woolly fleabane (*Erigeron lanatus*). Appendix C provides a summary of the current and potential protection status of all Sensitive and other rare plant species known on BTNF.

## METHODS

Data on the distribution, abundance, trends, and management needs of the four target species were obtained from published and unpublished literature, specimens at the Rocky Mountain Herbarium (RM), and WYNDD files. USGS topographic maps, geologic maps, and US Forest Service maps were consulted to identify areas of potential habitat for survey.

Field surveys were conducted in August 1994, August 1997, and late July-early August 1998 (survey routes are depicted in Appendix B). Data on the biology, habitat, population size, and management needs of each species were collected using WYNDD plant survey forms. Locations of occurrences were mapped on 7.5 minute USGS topographic maps and transferred to Arc/View coverages. If populations were sufficiently large, voucher specimens were collected for deposit at the RM. Color photographs were taken of plants and their habitat at each site. Information gathered in the field was entered into the computerized Element Occurrence database at WYNDD.

The protection status of each Sensitive or rare plant species on the BTNF was assessed using a 4-part scale originally developed by the US Geological Survey's National Gap Program for ranking the protection level of different management areas (Merrill *et al.* 1996). The score for each species was based on the highest possible protection score for any individual population. Species were ranked 1 if at least one population occurred on Gap Status 1 lands that are permanently protected and managed to maintain biological processes. Such sites include designated wilderness areas, national parks and monuments, most national wildlife refuges, and Nature Conservancy preserves.

A rank of 2 was given to species that occur in designated management areas that still allow some land uses that may reduce the quality of natural communities (Gap status 2 lands). These lands include national recreation areas, research natural areas, areas of critical environmental concern, special interest areas, and wildlife habitat management areas. Category 3 species are those in which the best protected populations occur on public lands managed for multiple use. Status 3 lands include undesignated BLM, US Forest Service, and state park lands and wilderness study areas. Lastly, species were ranked 4 if they occur only on private, state, or reservation lands with no legally binding protection mandate. Each species was also scored on its current status statewide (including areas outside of the BTNF).

## RESULTS

### Species Surveys

Surveys in 1994 and 1997-1998 focussed primarily on potential rare plant habitats in alpine calcareous sites in the northern Wind River and Gros Ventre ranges and montane slopes in the Hoback Canyon area. Known occurrences of all four target species were revisited, although only *Draba globosa* and *Erigeron lanatus* colonies were found.

*Aster mollis* is known from a single, vague, historical record from Cliff Creek Canyon* that was last observed by Edwin and Lois Payson in 1922. The Cliff Creek and Hoback Canyon areas were resurveyed in July 1998, but no specimens of *A. mollis* were found. 1998 surveys did reveal an extensive population of *Aster ascendens*, a close relative of *A. mollis* which is known to hybridize with it in the Bighorn Range. Although the *A. ascendens* population was unusually pubescent (like *A. mollis*), the morphology of the leaf hairs was markedly different, suggesting that hybridization was not taking place in the Hoback Canyon area.

Potential habitat was also surveyed unsuccessfully for *Carex incurviformis*, an alpine wetland sedge species known only from the summit of Osborn Mountain on the BTNF (but also found in the Absaroka and northeast Wind River ranges on Shoshone National Forest). Late snowpack conditions in 1998 may have hampered efforts to relocate the known population and prevented discovery of the plant in suitable sites in the Gros Ventre Range. Due to its small stature and specialized habitat, *C. incurviformis* is readily overlooked in surveys and may be more abundant or widespread in the BTNF than previously recognized.

Five colonies of *Draba globosa* were found in alpine turf and rock slide communities on Osborn Mountain and in the Darwin-Triangle-Doubletop Peak area of the BTNF in August 1998. These colonies contained over 4000 flowering and fruiting individuals, making them the largest known populations in the state. Six other populations are currently known from the BTNF, four of which occur in designated wilderness areas. Much additional potential habitat for *Draba globosa* is present on calcareous scree slopes and meadows in the Gros Ventre, Salt River, and northern Wind River ranges. Like *C. incurviformis*, this species is easily missed in surveys and may be more common than currently known.

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* Payson's specimen label at the RM indicates the location as "Hoback Canyon", but his original field book indicates the site as Cliff Creek Canyon.

Large areas of potential habitat would appear to exist for *Erigeron lanatus* on alpine limestone talus slopes in the Gros Ventre and northern Wind River ranges, but no additional populations could be found during 1998 surveys. This species is still known from only two occurrences on Gypsum and Big Sheep mountains on the BTNF. Both of these populations were surveyed by the author in August 1994 and found to contain approximately 1500-1800 plants. This species may occasionally hybridize with the more widespread species *Erigeron compositus*, which differs in having compound leaves divided into narrow segments. Some unusually large-flowered *E. compositus* specimens were found on south-facing talus slopes on Triangle Peak in the Gros Ventre Range in 1998, suggesting that introgression or hybridization may be taking place in the local area.

In addition to the target species, new occurrences were discovered for several other species of concern on the BTNF in 1997-98, including *Astragalus shultziorum* (Corner, Darwin, and Triangle peaks), *Draba crassa* (Corner and Doubletop peaks), *Epilobium palustre* var. *palustre* (Green River Lakes), *Erigeron humilis* (Triangle Peak), *Erigeron radicatus* (Darwin, Triangle, and Doubletop peaks), *Haplopappus macronema* var. *linearis* (Green River Lakes), *Lesquerella paysonii* (Corner, Darwin, and Doubletop peaks and the Brewster Lake trail), *Parrya nudicaulis* (Triangle and Doubletop peaks), *Pedicularis pulchella* (Darwin and Doubletop peaks), *Potentilla uniflora* (Doubletop Peak), and *Saussurea weberi* (Darwin Peak). The most notable discovery, however, was a small population of *Braya glabella* along the divide between Doubletop and Palmer peaks in the Gros Ventre Range which represented the first record of this arctic disjunct mustard in Wyoming (Fertig 1998 b).

Current and Potential Protection Status of Plant Species of Special Concern

WYNDD currently tracks seventy-nine plant species from the BTNF as "species of special concern" or "watch list" taxa (Fertig and Beauvais 1999). Thirty-five of these species (44.3%) are currently found on Gap "Status 1" lands on the Forest (Bridger, Gros Ventre, and Teton wilderness areas). All other rare plant species on the BTNF (44 taxa, or 55.7%) occur solely on Gap "Status 3" lands managed for multiple use (Appendix C).

Six research natural areas or special interest areas have recently been proposed for designation on the BTNF (Fertig 1995, 1996; Fertig and Jones 1994 a, 1994 b, 1994 c, 1994 d). If designated, these Gap "Status 2" lands would increase the number of protected plant species on the Forest to 42 (53.2%). The total number of Status 1 and 2 species on the BTNF increases to 64 (81%) when populations found outside the Forest are considered (Appendix C).

Species Summaries

Information on the biology and conservation status of each of the four target plant species is presented in the following species summaries. Element Occurrence Records and location maps for these species are included in Appendix A.

*Aster mollis* Rydb.
Soft aster
Asteraceae or Compositae (Sunflower Family)

Legal Status: USFS Region 4 Sensitive, USFS Region 2 Sensitive.

Natural Heritage Rank: G3/S3.

Description: Soft aster is a perennial, multi-stemmed herb averaging 30-50 cm high (Figures 1-2). The leaves and stems are covered with soft, multi-celled, wavy, non-glandular hairs, giving the entire plant a grayish appearance. Leaves are entire, alternate, and largest near the base, with blades up to 10 cm long and 2.5 cm wide. The lower leaves are long-petioled, while those higher on the stem are clasping. The sparsely-leafy, broad inflorescence is composed of numerous heads

Figure 1. *Aster mollis*. Illustration by W. Fertig from Fertig *et al.* (1994).

Figure 2 (page 9). Photo of *Aster mollis* from the Tensleep Preserve (TNC) in the Bighorn Mountains of Washakie County, Wyoming. WYNDD photo by W. Fertig, August 1993.

Fig 3

of violet or purple ray flowers surrounding yellowish disk flowers. The 8-9 mm long involucre consists of 4-5 rows of overlapping, grayish hairy bracts that are purple and green at the tips and whitish at the thickened base. Fruits are achenes 2.5-3.5 mm long with soft, white pappus bristles (Dorn 1992; Fertig *et al.* 1994; Jones 1984; Marriott 1992).

Similar Species: *Erigeron* spp. have a single row of non-overlapping and uniformly green involucre bracts. *Aster ascendens, A. foliaceus,* and *A. occidentalis* have glabrous leaf surfaces. Hybrids between *A. mollis* and these species can be recognized by their sparse leaf pubescence (Fertig *et al.* 1994).

Taxonomic Relationships: *Aster mollis* was originally described by Rydberg (1901) based on a 1899 collection by Frank Tweedy from the east slope of the Bighorn Range in Sheridan County, Wyoming (*Tweedy 2029*, NY). Rydberg (1917) and Cronquist (1943) later placed *A. mollis* under synonymy with *Aster jessicae*, an endemic of southeast Washington and adjacent Idaho restricted to riparian habitats. Jones (1984) relocated Tweedy's type locality in 1980 and correctly determined that *A. mollis* was distinct from *A. jessicae.* Among the features distinguishing *A. mollis* from *A. jessicae* are its shorter stature, smaller leaves, less leafy inflorescence, smaller achenes, drier upland habitat, and base chromosome number (Jones 1984).

Both *Aster mollis* and *A. jessicae* are members of *Aster* subgenus *Symphotrichum*. Jones (1984) considers *A. mollis* to be most closely related to *Aster foliaceus* var. *apricus, A. foliaceus* var. *parryi, A. occidentalis*, and *A. ascendens*. Numerous hybrid or introgressant specimens involving *A. mollis* and these taxa have been identified by Jones and others in the Bighorn Range. *A. mollis* has a relatively low chromosome number of $2n = 32$, suggesting that it has evolved via reticulate evolution, rather than allopolyploidy (Jones 1984). Despite some evidence of hybridization, *A. mollis* appears to breed true (Jones 1984).

Geographic Distribution: Soft aster is a regional endemic of the Bighorn Mountains of north-central Wyoming (Big Horn, Johnson, Natrona, Sheridan, and Washakie counties), with a single, disjunct population in the Cliff Creek/Hoback Canyon area in western Wyoming (Sublette County) (Fertig *et al.* 1994). Jones (1984) also reports a specimen of *Aster ascendens* "with possible influence of *A. mollis*" from Fremont County, Wyoming (Figure 3). Potential habitat probably exists at the far northern end of the Bighorn Range on the Crow Indian Reservation in southern Montana.

Habitat: *Aster mollis* occurs primarily on deep, rocky calcareous soils in dry mountain big sagebrush (*Artemisia tridentata* var. *vaseyana*) or shrubby cinquefoil (*Pentaphylloides floribunda*) grasslands and mountain meadows bordered by aspen or conifer woods (Figure 4) (Fertig *et al.* 1994; Jones and Fertig 1998). Populations have also been documented from limestone outcrops and redbeds (Marriott 1992). Common associated species include *Festuca idahoensis*, *Elymus trachycaulus, Stipa nelsonii, Leucopoa kingii, Erigeron subtrinervis, Eriogonum umbellatum, Aster foliaceus, Potentilla arguta,* and *Penstemon procerus*. Many populations in the Bighorns occur in semi-disturbed sites where soils are churned by burrowing rodent activity (Jones and Fertig 1998). This predisposition for disturbed soils appears to allow *A. mollis* to persist or colonize meadows that have been moderately to heavily grazed by cattle and sheep. The Cliff Creek population was

reported from "crevices of sandstone sliderock" on dry slopes (Edwin Payson's 1922 collection book at the RM). Rangewide, soft aster occurs at elevations of 6400-8500 feet (1950-2590 m).

Population Size and Trends: In the Bighorn Range, *Aster mollis* is currently known from 32 extant populations and one historical occurrence, 27 of which have been discovered or relocated since 1990 (Fertig 1999). Although census data are lacking for many occurrences, populations surveyed in 1996-97 were often found to be locally abundant, numbering in the low hundreds to thousands. One of the largest known populations contains 6700-9700 plants (Fertig and Jones 1998). The historical Cliff Creek/Hoback Canyon population is the only record known outside the Bighorn Range. No population data are available for this occurrence.

Population Biology and Ecology: Recent attempts to relocate Payson's 1922 collection of *Aster mollis* in the Cliff Creek/Hoback Canyon area have all been unsuccessful, including a two-day survey in late July 1998 by Laura Welp and W. Fertig and general floristic surveys of the area by staff of the Rocky Mountain Herbarium from 1990-93 (Hartman *et al.* 1991; Hartman and Nelson 1993, 1994). Welp and Fertig located an extensive population of atypically-hairy *Aster ascendens* on semi-barren sagebrush-grassland slopes and rockslide habitats along Cliff Creek in 1998. Upon closer inspection, however, these plants were found to have sparse pubescence of short, straight, stiff hairs with prominent medial thickenings or without intercellular walls. The leaf hairs of these individuals clearly differed from the distinctive crinkly, multi-celled hairs of pure or hybrid *A. mollis* from the Bighorn Range and from Payson's specimen.

*Aster mollis* may still occur in the Hoback Canyon area, although probably at low densities or within an extremely localized area. It is also possible that the taxon has been extirpated since 1922 or has been genetically "swamped out" by its more abundant relative, *A. ascendens*. Genetic surveys of the Cliff Creek population of *A. ascendens* and Bighorn populations of *A. mollis* could shed light on the relationship between these two taxa.

Existing and Potential Threats: Marriott (1992) identified grazing and trampling by livestock as a potential threat to *Aster mollis* populations in the southern Bighorn Range. Subsequent surveys and observations by Forest Service and WYNDD staff suggest that livestock impacts may be relatively minor, at least under low to moderate usage (Fertig 1999). No evidence of herbivory by livestock has been noted and the species appears to thrive on semi-disturbed, deep soils where competing cover is kept low. Such sites could, however, be prone to invasion by exotic plants.

Current Management: Four occurrences of *Aster mollis* in the Bighorn Range are currently protected within The Nature Conservancy's Tensleep Preserve and the Bull Elk Park Research Natural Area on Bighorn National Forest (Fertig 1999). Ten other populations in the Bighorns occur in potential research natural areas. The Cliff Creek population is the only colony currently known to occur on Bridger-Teton National Forest and is managed for multiple use (primarily recreation and dispersed camping).

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Figure 4 (page 13). Photo of *Aster mollis* habitat from the northern Bighorn Range in Sheridan County, Wyoming. Plants occur on deep, lime-rich soils covered by limestone gravel in meadows bordered by conifer or aspen forests. WYNDD photo by W. Fertig, 10 August 1996.

Conservation Recommendations: Recent surveys in the Bighorn Range have found *Aster mollis* to be far more widespread and abundant than originally suspected. In addition, the species appears to be resilient to moderate grazing pressure and other disturbances. As a result of these studies, *A. mollis* may no longer warrant Sensitive status in USFS Region 2 (although as a regional endemic it still deserves some management attention to ensure that it does not begin to trend toward extinction) (Fertig 1999).

The conservation status of this species in the BTNF is more complicated. Intensive surveys of the Cliff Creek Canyon area in 1998 failed to positively document the only known *Aster mollis* population on the Forest. If *A. mollis* still exists in the region, it is probably restricted to localized patches of suitable habitat. Site-specific surveys for this species should continue whenever new surface-disturbing projects are proposed within areas of potential habitat in the Hoback Canyon area.

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*Carex incurviformis* Mack.
Incurved sedge
Cyperaceae (Sedge Family)

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Synonyms: *Carex maritima*, *Carex maritima* var. *incurviformis, Carex danaensis*, *Carex incurviformis* var. *danaensis.*

Legal Status: USFS Region 4 Sensitive.

Natural Heritage Rank: G4G5T3/S2.

Description: Incurved sedge is a loosely-tufted perennial graminoid with creeping rhizomes and culms 2-4 cm high (Figure 5). Leaves are mostly basal and exceed the culms and flowering heads in height. Leaf blades are less than 1.5 mm wide, thick, and flat (but becoming inrolled at the very tips). The inflorescence is an egg or globe-shaped head 8-14 mm wide and composed of 2 or more densely aggregated spikes. Staminate flowers are inconspicuous and located above the pistillate flowers (androgynous). Pistillate flowers have round-tipped, brown scales with wide, membranous margins. The perigynia are dark, glossy, brown, about 3.25 mm long, and have a gradually tapering beak with 2 stigmas. The achenes are 2-sided (lens-shaped) and 1.5 mm long (Dorn 1992; Fertig *et al.* 1994; Hermann 1970; Mills and Fertig 1996; Scott 1997).

Similar Species: *Carex foetida* var. *vernacula* has leaves that are shorter than the flowering spikes and over 1.5 mm wide. *Carex capitata* has a single spike per stem. Other alpine sedges in Wyoming with congested, ball-like inflorescences have 3 stigmas and 3-sided achenes, or deciduous pistillate scales, or lack rhizomes (Dorn 1992; Fertig *et al.* 1994).

Taxonomic Relationships: *Carex incurviformis* was originally described by Mackenzie from a single specimen collected in Alberta in 1891 (Rydberg 1917). Until the 1950s, this species was known from only three historical records, all from the Canadian Rockies. Hermann (1955) reported

a collection by W.A. Weber from central Colorado that closely resembled both *C. incurviformis* and *C. danaensis*, an endemic of the Sierra Nevada of California (Stacey 1939). Based on a study of all available specimens, Hermann concluded that the Colorado and California plants represented the same taxon and differed from the Canadian material in having more broadly rounded pistillate scales with wider membranous margins. The obvious relationship with *C. incurviformis* led Hermann to make the new combination *C. incurviformis* var. *danaensis* for the California and Colorado specimens. Hulten (1968) considered *C. incurviformis* to be synonymous with the circumpolar littoral species *C. maritima*, despite differences in habitat, range, and technical features of the perigynia. Boivin (1967) recognized the Rocky Mountain material as distinct, under the name *C. maritima* var. *incurviformis*. This latter name has been applied to specimens from Montana (Lesica and Shelly 1991), east-central Idaho (Mancuso 1997), northwest Wyoming (Scott 1997), and central Colorado (Weber 1987). Dorn (1988, 1992) continues to use the name *C. incurviformis* var. *danaensis* for Wyoming plants, as does Mastroguiseppe (1993) for California. A thorough study, employing current biosystematic techniques, is badly needed to unravel the taxonomy of this sedge in the Rocky Mountains.

Geographic Distribution: *Carex incurviformis* (*sensu stricto*) occurs sporadically from central Alberta to northwestern Montana, east-central Idaho, and northwestern Wyoming (Mancuso 1997; Scott 1997), with disjunct populations in central California and central Colorado (Hermann 1970). In Wyoming, Incurved sedge is known from the Absaroka and Wind River ranges in Fremont, Park, and Sublette counties (Fertig *et al.* 1994).

Figure 5. Line drawing of *Carex incurviformis*. Illustration from Hermann (1970).

Habitat: In the Rocky Mountains, *Carex incurviformis* occurs primarily on moist alpine or subalpine tundra, wet rock ledges, frost scars, or fellfields (Fertig *et al.* 1994; Lesica and Shelly 1991; Scott 1997). The closely related species, *C. maritima* is found mostly on sandy or gravelly beaches or turfy areas near the ocean, although some inland populations can reach elevations of 9100 feet (Hulten 1968).

Population Size and Trends: Erwin Evert discovered the first, and only known occurrence of this species in Bridger-Teton National Forest while botanizing on Osborn Mountain in 1984 (Evert 1985), but did not conduct a census of the population. Fertig and Welp attempted to relocate this occurrence in August 1998, but were unsuccessful. The 1998 Osborn Mountain survey focussed on wet gravelly areas and small ponds on the summit of the mountain, most of which still were covered with remnant snow and ice, perhaps retarding the phenology of this species. Other alpine sedges observed in the area (*Carex breweri* var. *paddoensis, C. nardina, C. capitata,* and *C. elynoides*) were mostly in vegetative condition or had aborted flowers due to the unseasonably cold and wet conditions. Other recent surveys of the Wind River (Fertig 1992 a, 1992 b), Gros Ventre (Hartman 1995) and Wyoming/Salt River ranges (Hartman and Nelson 1993, 1994) have also failed to locate additional populations of this species.

Nine other populations of Incurved sedge are currently known in Wyoming, all of which occur on the Shoshone National Forest in the Absaroka and northeastern Wind River ranges (Fertig 1998 a). No population census or trend data are available for these occurrences. All of these populations have been discovered since 1981 (Evert 1982).

Population Biology and Ecology: Evert (1985) observed *Carex incurviformis* in a 20 square foot boggy area on Osborn Mountain with *Phippsia algida, Juncus biglumis, Carex bipartita, Poa lettermanii,* and *Saxifraga chrysantha* (all of which are rare or uncommon in the Wind River Range and elsewhere in Wyoming). Incurved sedge produces flowers and fruits from July to August.

Existing and Potential Threats: Due to its rugged, high elevation habitat, *Carex incurviformis* does not appear to be threatened by human activities at any of its known populations in Wyoming (Fertig 1998 a).

Current Management: At least seven occurrences of this species in Wyoming are found within the Bridger, Fitzpatrick, North Absaroka, and Washakie wilderness areas in Bridger-Teton and Shoshone National Forests. Two of these populations are also in proposed or potential research natural areas at Osborn and Arrow mountains (Fertig and Jones 1994). All other known populations are on public lands managed for multiple use.

Conservation Recommendations: Incurved sedge was added to the USFS Region 4 Sensitive list in 1994, following its discovery on National Forest lands in Idaho (Joslin 1994). Only two populations are presently found in Region 4. Although threats appear low, the limited geographic range and high habitat specificity of this species makes it potentially vulnerable to extirpation. In light of our current limited knowledge, it would be prudent to maintain *C. incurviformis* as Sensitive until its status can be better determined.

Figure 6. Wyoming distribution of *Carex incurviformis*

*Draba globosa*
Rockcress draba
Brassicaceae or Cruciferae (Mustard Family)

Synonyms: *Draba densifolia* var. *apiculata*; *Draba apiculata.*

Legal Status: USFS Region 4 Sensitive.

Natural Heritage Rank: G3/S2.

Description: Rockcress draba is a mat-forming perennial herb from a branched caudex with stems 0.5-3 cm tall (Figures 7-8). Leaves are densely imbricated in a basal rosettes, lance-shaped with pointed tips, 3-6 mm long and less than 3 mm wide. The thick leaves lack a prominent midrib and are glabrous except for short (under 0.5 mm), unbranched, ciliate hairs along the margins. The inflorescence consists of 2-5 pale yellow (rarely white) 4-petaled flowers on leafless flowering

Figure 7. Line drawing of *Draba globosa*. Illustration by Marjorie Leggitt from Spackman *et al.* (1997).

Figure 8 (page 19). Photo of *Draba globosa* in flower amid granitic-gneiss boulders on the summit of Osborn Mountain in the northwestern Wind River Range (Sublette County). WYNDD photograph by Laura Welp, 2 August 1998.

stalks. Fruits are egg-shaped, glabrous siliques 3-6 mm long with thick styles 0.3-0.6 mm long (Hitchcock and Cronquist 1964; Fertig *et al.* 1994; Mills and Fertig 1996; Rollins 1993; Spackman *et al.* 1997; Stone 1995).

Similar Species: *Draba densifolia* has glabrous or pubescent fruits with slender styles over 0.5 mm long, non-fleshy leaves with prominent midribs and ciliate hairs 0.5-1 mm long along the margins, and a 3-15 flowered raceme of bright yellow flowers. *D. crassa* has leaves over 10 mm long and 5 mm wide. Other alpine *Draba* species in Wyoming have more densely pubescent leaves with forked or pectinate (comb-like) hairs (Fertig *et al.* 1994; Stone 1995).

Taxonomic Relationships: Rockcress draba has an unusually complex nomenclatural history. *Draba globosa* was originally described by Payson (1917) based on densely caespitose specimens with "globose tufts" of ciliate-margined, glabrous leaves and glabrous fruits from Wyoming's Medicine Bow Range and the Wasatch and Uinta mountains of northeastern Utah. Schulz (1927) expanded the concept of *D. globosa* to include *D. sphaerula*, a pubescent-fruited taxon from alpine areas of central Idaho. In his monograph of *Draba,* Hitchcock (1941) proposed the new name *D. apiculata* for the glabrous leaved and fruited specimens previously attributed to *D. globosa*, citing confusion between Payson's type specimen and several related taxa with long-ciliate leaf margins which were now considered synonyms of *D. densifolia*. Hitchcock later recognized two varieties within *D. apiculata*: the typical form with narrow, short ciliate-margined apiculate leaves, short scapes, and few flowers from northeastern Utah and western Wyoming, and var. *daviesiae* of western Montana characterized by longer, broader, round-tipped leaves with long-ciliate margins, and a more open, multi-flowered inflorescence (Hitchcock and Cronquist 1964). Both varieties of *D. apiculata* were later transferred to the wide-ranging, hairy-leaved *D. densifolia* by Welsh *et al.* (1993) as *D. densifolia* var. *apiculata*. Welsh noted that var. *apiculata* and var. *densifolia* were "weakly defined, arbitrarily separable, sympatric variants" in Utah (Welsh *et al.* 1993).

More recently, Dorn (1988, p. 302) and Rollins (1993) have revived Payson's original name *Draba globosa*, noting that the type specimen of *D. globosa* is identical with Hitchcock's type for *D. apiculata*, and thus has priority. Although closely related, careful morphological and breeding studies strongly suggest that *D. globosa, D. densifolia,* and *D. daviesiae* are separate taxa, a position adopted by most current students of the genus (Rollins 1993; Stone 1995).

Geographic Distribution: Rockcress draba is a regional endemic of alpine areas of the central Rocky Mountains, extending intermittently from central Idaho to southwestern Montana, western and southeastern Wyoming, northern Utah, and central Colorado (Fox and Moseley 1991; Lesica and Shelly 1991; Spackman *et al.* 1997; Stone 1995). In Wyoming, it occurs in the Absaroka, Teton, Wind River, Gros Ventre, Salt River, and Medicine Bow ranges in Albany, Fremont, Lincoln, Park, Sublette, and Teton counties (Figure 9) (Fertig *et al.* 1994; Mills and Fertig 1996).

Habitat: In Wyoming, *Draba globosa* occurs primarily on talus slopes or moist, gravelly alpine meadows between 10,400-12,000 feet (3170-3655 m) in elevation. Most populations in the Wind River, Teton, and Gros Ventre ranges are associated with Devonian or Mississippian age dolomite or limestone substrates. Occasionally, populations may occur on granitic gneiss (Figure 10) or Precambrian quartzites and schists (Love and Christiansen 1985). Associated vegetation includes cushion plant communities dominated by *Phlox pulvinata, Carex nardina, Dryas octopetala,* and

*Astragalus kentrophyta*, loamy turf meadows of *Carex elynoides* and *Festuca brachyphylla*, rocky meadows of *Carex* and *Ranunculus* amid late-melting snowfields, and sparsely-vegetated rock outcrops and stable talus slopes. Associated species include *Draba oligosperma, D. lonchocarpa, D. incerta, Smelowskia calycina, Silene acaulis, Saxifraga oppositifolia, Erigeron radicatus, Sibbaldia procumbens, Claytonia megarrhiza, Senecio fremontii, Oxytropis deflexa,* and *Antennaria media.*

Population Size and Trends: Few populations of *Draba globosa* have been adequately surveyed in Wyoming. Five colonies surveyed in 1998 contained approximately 4000 individuals, usually in scattered clusters of 25-50 plants. Trend data are lacking for nearly all occurrences, although based on the plant's rugged habitat and low degree of threat, populations are assumed to be stable at present.

Eight extant occurrences are presently known from Bridger-Teton National Forest. Several vague, historical records have also been reported from the BTNF or surrounding area by Hitchcock (1941). These reports include "Teton Canyon", "Teton Forest Preserve", "Sheep Mountain", and "Green River Lakes".

Population Biology and Ecology: Like many other alpine *Draba*s, *D. globosa* apparently reproduces by agamospermy, an asexual process by which viable seeds are produced without fertilization and sexual recombination (R. Price in Stone 1995). Flower and fruit production occurs from June to late August, depending on yearly climate conditions. Populations often consist of scattered clumps of 2-4 individual plants. Seedling establishment is probably the most difficult phase of the plant's life cycle. Once established, individuals are probably long-lived, as suggested by the plant's thick rhizomes.

Existing and Potential Threats: Although population size is often small, most colonies of *Draba globosa* are largely unthreatened by natural or human-caused factors. Most occurrences are found in alpine wilderness areas that currently receive little use for recreation or grazing. Although some mining has historically occurred in the vicinity of the Medicine Bow Range population, most other occurrences in the state have been little affected by mineral development.

Current Management: Rockcress draba is currently known from 17 occurrences in Wyoming, at least 9 of which have been discovered or relocated since 1990 (Fertig 1992 a, 1998 a; Hartman 1995; Markow 1996). Thirteen populations are protected in Grand Teton National Park and the Absaroka-Beartooth, Bridger, Gros Ventre, North Absaroka, and Popo Agie wilderness areas in Bridger-Teton and Shoshone National Forests. Two populations are also found within the proposed Osborn Mountain RNA and potential Beartooth Butte RNA (Fertig and Jones 1994). All other known occurrences are on public lands managed for multiple use (including the type population in Medicine Bow National Forest).

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Figure 10 (page 23). Habitat photo of *Draba globosa* on grassy alpine tundra and granitic rock barrens interspersed with granitic-gneiss boulders on Osborn Mountain (Wind River Range). More commonly, this species occurs on gravelly tundra or talus slopes derived from limestone substrates. WYNDD photo by Laura Welp, 2 August 1998.

Six of the eight known occurrences on Bridger-Teton National Forest are found in designated wilderness areas. Of the remaining two populations on the Forest, one in the Salt River Range has not been relocated since 1978 (Hartman and Nelson 1993, 1994). The other occurrence is found on Rendezvous Mountain near the Bridger Ridge Ski Development Area. Although outside the main development area, this small population may be vulnerable to increased impacts from hiking (Markow 1996).

Conservation Recommendations: Recent surveys have found this species to be relatively widespread and largely unthreatened in the high mountains of western Wyoming, prompting WYNDD to reclassify *Draba globosa* as a "Watch List" species in 1999 (Fertig and Beauvais 1999). Based on similar abundance patterns in Utah, Stone (1995) recommended that this species be dropped from the Region 4 Sensitive list, although it should still be managed as "sensitive" on individual Forests if deemed necessary.

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*Erigeron lanatus* Hook.
Woolly fleabane
Asteraceae or Compositae (Sunflower Family)

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Heritage Rank: G3/S1.

Federal Status: USFS Region 4 Sensitive, USFS Region 2 Sensitive.

Description: Woolly fleabane is a perennial herb with leafless, white-woolly stems to 5 cm tall from a branched caudex (Figures 11-12). The soft, woolly-hairy leaves are clustered at the base of the plant and have oblanceolate blades 3 cm long and 5 mm wide with entire or shallowly 3-toothed tips. Flower heads are solitary with a 9-13 mm long involucre of purple-tipped bracts covered by multi-celled, white hairs (these sometimes with purplish cross-walls). The numerous 8-11 mm long ray flowers are usually white (although occasionally blue or pink) and surround bright yellow, 5-6.5 mm long disk flowers. Pappus bristles are white and usually in a single set (Cronquist 1947, 1955; Dorn 1992; Fertig 1992 a; Fertig *et al.* 1994; Scott 1997).

Similar Species: *Erigeron flabellifolius* has broadly fan-shaped leaves and glabrous or short-hairy stems and involucres. *Erigeron compositus* has twice-compound leaves divided into linear segments (Fertig *et al.* 1994). Other alpine *Erigeron* species in Wyoming have narrower, entire leaves, glabrate or glandular stems, or thick taproots (Dorn 1992).

Geographic Distribution: *Erigeron lanatus* occurs from southern British Columbia and Alberta to northwestern Montana, with disjunct populations in west-central Wyoming and central Colorado (Scott 1997; Spackman *et al.* 1997). In Wyoming, it is known only from the northwestern Wind River Range in Sublette County (Figure 13).

Habitat: Woolly fleabane is restricted to thin patches of tan, pinkish, or reddish sandy soils and fine gravels among limestone boulders and talus on steep alpine slopes or rims (Figure 14). These sites often have a rich cryptogamic crust component and very sparse vegetative cover (often less than 5%). Common associated species include *Saussurea weberi, Erigeron compositus, Polemonium viscosum, Senecio amplectens, Parrya nudicaulis, Smelowskia calycina, Claytonia megarrhiza,* and *Draba ventosa*. Wyoming populations occur at elevations of 10,800-11,100 feet.

Population Size and Trends: *Erigeron lanatus* was first discovered in Wyoming along the west slope of Gypsum Mountain by W. Fertig in 1990 (Fertig 1992 c; Fertig *et al.* 1991). This population was resurveyed in 1991 and found to contain 200-300 plants (Fertig 1992 a). Three additional colonies consisting of 50-200 plants were found on the north and southwest slopes of Gypsum Mountain by Fertig in August 1994, bringing the entire population on Gypsum Mountain to approximately 700-800 plants in less than 15 acres of habitat.

Figure 11. Line drawing of *Erigeron lanatus*. Illustrations by J. Rumley (Cronquist 1955) and W. Fertig.

A second population on nearby Big Sheep Mountain was discovered by Ron Hartman and Jonathan Hughes in 1991 (Fertig 1992 a, 1992 c). This colony was resurveyed by Fertig in 1994 and estimated at 800-1000 plants in a 10-acre area. No other populations have been found in recent surveys of potential habitat on Osborn Mountain or alpine areas of the Gros Ventre or Wyoming/Salt River ranges.

Population Biology and Ecology: This species is apparently restricted to semi-stable soil patches within talus slopes and rock fields. The plant's slender branching caudex may be an adaptation to the shifting soils of these sites. Populations are typically small and consist of widely scattered individuals. *Erigeron lanatus* may co-occur with *E. compositus*, and some apparently intermediate individuals may occasionally be found. Large-headed *E. compositus* specimens have also been documented in alpine limestone scree habitat on Triangle Peak in the Gros Ventre Range, possibly representing some introgression between the two taxa.

Existing and Potential Threats: Threats appear to be low at the present time due to the ruggedness and inaccessibility of all known populations. Colonies on Gypsum and Big Sheep mountains occur in areas that receive relatively little recreational use and no grazing.

Current Management: Both known occurrences of *Erigeron lanatus* in Wyoming occur within the Bridger Wilderness in Bridger-Teton National Forest. These sites are noteworthy for their high concentration of other regionally endemic or disjunct alpine forb species, many of which are also classified as Sensitive in US Forest Service Region 4.

Conservation Recommendations: Under current wilderness management, the entire known range of *Erigeron lanatus* appears to be secure. Occasional monitoring is desirable to ensure that populations remain unthreatened.

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Figure 12 (page 27). Photo of *Erigeron lanatus* from sparsely-vegetated limestone boulder and talus slopes on Gypsum Mountain in the northern Wind River Range (Sublette County). WYNDD photo by W. Fertig, August 1993.

Figure 13. Wyoming distribution of *Erigeron lanatus*.

## DISCUSSION

Of the four BTNF Sensitive plant species surveyed in 1997-98, three are restricted to high elevation talus slopes and turf meadow communities within designated wilderness areas. *Carex incurviformis* and *Erigeron lanatus* are undeniably rare within Wyoming and the Rocky Mountain region, but are probably secure under present management on the BTNF. *Draba globosa* also appears to be secure on the Forest and has been found to be much more widespread and abundant in Wyoming and Utah during the past decade (Fertig 1998 a; Stone 1995). This species is probably sufficiently protected, abundant, and unthreatened to be removed from the regional Sensitive list (Stone 1995).

*Aster mollis* has not been relocated on the BTNF since 1922 and is either extirpated or surviving at very low density. Although it is sufficiently widespread and abundant to be considered for down-listing from the Regional Sensitive list in US Forest Service Region 2, it remains a species of potentially high conservation concern in Region 4. The habitat of *A. mollis* in the Cliff Creek area receives high recreation use and may be sensitive to competition from other species and loss of habitat quality. Additional surveys should be conducted in potential habitat in the Hoback Canyon region whenever new land-disturbing activities are proposed on BTNF lands. A long-term conservation strategy that includes reintroduction and habitat experimentation should be considered.

Recent floristic and rare plant surveys of the BTNF have provided a clearer picture of the current protection status of species of special concern on the Forest (Appendix C). These results indicate that about 45% of the rare species of BTNF are currently protected on the Forest (although 81% receive some form of protection statewide). By comparison, nearly 75% of the plants of special concern on the adjacent Shoshone National Forest receive equally high levels of protection (Fertig 1998 a). Designation of proposed research natural areas and special interest areas would improve the level of plant protection on the BTNF to nearly 54%. Additional increases in the protection score for BTNF would require targeting montane wetland and foothills sagebrush-grassland habitats.

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Appendix A.

Element Occurrence Records and Maps from 1994 and 1997-98 surveys

Appendix B.

1997-98 Survey Routes

# Appendix C.

## Current and Potential Protection Status of Plant Species of Special Concern on Bridger-Teton National Forest

Key: **Heritage Ranks** are explained in Appendix D. **Dist. Pattern** is based on the statewide geographic distribution of each species (peripheral, disjunct, sparse, regional endemic, and state endemic). **Protection Status** is based on a modified 4-part scale developed for ranking the protection status of different land areas for Gap Analysis (Merrill *et al.* 1996). Species ranked **1** occur on at least one site that is permanently protected from conversion of natural land cover and managed to maintain natural processes [designated wilderness areas, national parks and monuments, national wildlife refuges, and Nature Conservancy preserves]. Species ranked **2** occur on at least one site that is protected from conversion of natural land cover, but which may be subject to some management practices that may reduce the quality of natural communities [BLM ACECs, Forest Service research natural areas and special botanical areas, and National Park Service-managed national recreation areas]. Species ranked **3** occur on at least one site that is managed as public land for multiple use. [undesignated BLM, US Forest Service, and state park lands]. Species ranked **4** occur only on lands that lack legally binding mandates for management of natural land cover or species [private, state, and reservation lands]. **Current BTNF** status represents the highest possible score for a species in Bridger-Teton National Forest under present management. **Potential BTNF** status represents the maximum score possible for a species if populations in potential or proposed Research Natural Areas in Bridger-Teton National Forest are designated. **Current WY** status represents the highest possible score for a species if populations throughout the state are considered.
"?" indicates the rank is uncertain., and "*" indicates a species is on the Region 4 or BTNF Sensitive List.

### 1. High priority species

| **Species/ Common Name** | **Heritage Rank/ Dist. Pattern** | **Protection Status** | | |
|---|---|---|---|---|
| | | **Current BTNF** | **Potential BTNF** | **Current WY** |
| *Agrostis oregonensis* Oregon bentgrass | G4/S1 Peripheral | 3? | 3? | 1 |
| *Antennaria monocephala* Single-head pussytoes | G4G5/S1 Disjunct | 1 | 1 | 1 |
| *Asclepias cryptoceras ssp. davisii* Davis' milkweed | G4T?/SH Peripheral | 3? | 3? | 3? |
| *Asplenium trichomanes-ramosum [Asplenium viride]* Green spleenwort | G4/S2 Disjunct | 1 | 1 | 1 |
| * *Aster mollis* Soft aster | G3/S3 State Endemic | 3 | 3 | 1 |
| * *Astragalus paysonii* Payson's milkvetch | G3/S2 Reg. Endemic | 3 | 2 | 3 |
| *Astragalus robbinsii var. minor* Robbins' milkvetch | G5T5/S1 Peripheral | 3 | 2 | 3 |
| *Astragalus terminalis* Railhead milkvetch | G3/S1 Reg. Endemic | 3 | 3 | 1 |
| *Braya glabella* Arctic braya | G5/S1 Disjunct | 1 | 1 | 1 |
| *Calamagrostis koelerioides* Dense pine reed-grass | G5/SH Disjunct | 3 | 3 | 3 |
| *Carex concinna* Beautiful sedge | G4G5/S1 Peripheral | 1 | 1 | 1 |
| *Carex deweyana var. bolanderi* [*Carex bolanderi*] Bolander's sedge | G5T5/S1 Peripheral | 3 | 2 | 3 |

| Species/ Common Name | Heritage Rank/ Dist. Pattern | Current BTNF | Potential BTNF | Current WY |
|---|---|---|---|---|
| * *Carex incurviformis* [*Carex maritima*] Incurved sedge | G4G5T3/S2 Sparse | 1 | 1 | 1 |
| *Carex limosa* Mud sedge | G5/S2 Peripheral | 1 | 1 | 1 |
| * *Carex luzulina var. atropurpurea* Black and purple sedge | G5T3/S2 Reg. Endemic | 1 | 1 | 1 |
| *Carex microglochin* False uncinia sedge | G5?/S1 Disjunct | 3 | 2 | 1 |
| *Carex parryana var. parryana* Parry sedge | G4T4/S2 Peripheral | 3 | 3 | 1 |
| *Carex proposita* Smoky Mountain sedge | G4/SH Peripheral | 3? | 3? | 3? |
| *Clarkia pulchella* Large-flower clarkia | G4G5/SH Peripheral | 3? | 3? | 3? |
| *Cryptogramma stelleri* Fragile rockbrake | G5/S1 Disjunct | 3 | 3 | 1 |
| * *Descurainia torulosa* Wyoming tansymustard | G1/S1 State Endemic | 3 | 3 | 1 |
| *Draba borealis* Boreal draba | G4/S2 Disjunct | 1 | 1 | 1 |
| *Draba paysonii var. paysonii* Payson's draba | G5T3?/S2 Reg. Endemic | 1 | 1 | 1 |
| *Draba porsildii var. porsildii* Porsild's draba | G3G4T3T4/S1 Peripheral | 1 | 1 | 1 |
| *Epilobium palustre var. palustre* Swamp willow-herb | G5/S1S2 Sparse | 3 | 2 | 1 |
| *Erigeron humilis* Low fleabane | G4/S2 Sparse | 1 | 1 | 1 |
| * *Erigeron lanatus* Woolly fleabane | G3/S1 Disjunct | 1 | 1 | 1 |
| *Erigeron radicatus* Taprooted fleabane | G3/S2 Disjunct | 1 | 1 | 1 |
| *Eriophorum gracile* Sheathed cotton-grass | G5/S1 Peripheral | 3? | 3? | 1 |
| *Eriophorum scheuchzeri* Scheuchzer cotton-grass | G5/S1 Disjunct | 1 | 1 | 1 |
| * *Haplopappus macronema* var. *linearis* *[Ericameria discoidea* var. *linearis]* Narrowleaf goldenweed | G4G5T3/S2 Reg. Endemic | 1 | 1 | 1 |
| *Hieracium scouleri* Scouler hawkweed | G4G5/S1 Peripheral | 3 | 3 | 1 |
| *Juncus triglumis var. albescens* Northern white rush | G5T5/S1 Disjunct | 1 | 1 | 1 |
| *Juncus vaseyi* Vasey rush | G5?/S1 Sparse | 3 | 3 | 3 |
| *Kelloggia galioides* Milk kelloggia | G5/S1 Peripheral | 3? | 3? | 1 |
| *Lepidium paysonii* Payson's peppergrass | G3?/SH Reg. Endemic | 3 | 3 | 3 |

| Species/ Common Name | Heritage Rank/ Dist. Pattern | Current BTNF | Potential BTNF | Current WY |
|---|---|---|---|---|
| * *Lesquerella carinata var. carinata* Keeled bladderpod | G3G4T3T4/S1 Reg. Endemic | 3 | 3 | 1 |
| *Ligusticum canbyi* Canby's lovage | G5/S1 Peripheral | 1 | 1 | 1 |
| *Lonicera caerulea* Western honeysuckle | G5/S1 Peripheral | 1 | 1 | 1 |
| *Luzula glabrata* var. *hitchcockii* Smooth wood-rush | G5T4/S1 Peripheral | 3 | 3 | 1 |
| *Marsilea vestita* var. *oligospora* [*M. oligospora*] Pepperwort | G5/S1 Peripheral | 3 | 3 | 1 |
| *Minuartia filiorum* [formerly called *Minuartia macrantha*] Thread-branch stitchwort | G3G4/S1 Reg. Endemic | 1 | 1 | 1 |
| *Monardella odoratissima var. glauca* Mountain wild-mint | G4G5T?/S1 Peripheral | 3 | 3 | 3 |
| *Najas guadalupensis* Southern naiad | G5/S1 Peripheral | 3 | 2? | 1 |
| *Orobanche corymbosa var. corymbosa* Flat-top broomrape | G4T4/S1 Peripheral | 3 | 3 | 1 |
| *Papaver kluanense* [*P. lapponicum var. occidentale; P. radicatum ssp. kluanensis*] Alpine poppy | G3?Q/S2 Disjunct | 1 | 1 | 1 |
| * *Parrya nudicaulis* Naked-stemmed parrya | G5/S2 Disjunct | 1 | 1 | 1 |
| *Pedicularis pulchella* Mountain lousewort | G3/S2 Reg. Endemic | 1 | 1 | 1 |
| *Phippsia algida* Ice grass | G5/S1 Disjunct | 1 | 1 | 1 |
| *Potamogeton amplifolius* Large-leaved pondweed | G5/S1 Sparse | 3 | 3 | 1 |
| *Potamogeton friesii* Fries pondweed | G4/S1 Disjunct | 3 | 3 | 1 |
| *Potamogeton illinoensis* Illinois pondweed | G5/S1 Sparse | 3 | 3 | 3 |
| *Potamogeton robbinsii* Flatleaf pondweed | G5/S1 Disjunct | 1 | 1 | 1 |
| *Potamogeton strictifolius* Strict-leaved pondweed | G5/S1 Disjunct | 3 | 3 | 1 |
| *Potentilla hyparctica* [*P. nana*] Arctic cinquefoil | G4G5/S1 Disjunct | 1 | 1 | 1 |
| *Potentilla uniflora* One-flower cinquefoil | G5/S2 Disjunct | 1 | 1 | 1 |
| * *Primula egaliksensis* Greenland primrose | G4/S1 Disjunct | 3 | 3 | 2 |
| *Salix candida* Hoary willow | G5/S2 Sparse | 3 | 2 | 1 |

| Species/ Common Name | Heritage Rank/ Dist. Pattern | Current BTNF | Potential BTNF | Current WY |
|---|---|---|---|---|
| *Salix eriocephala var. mackenzieana* [*S. prolixa*] Mackenzie's willow | G5T4/S1 Peripheral | 3 | 3 | 1 |
| *Salix farriae* Farr's willow | G4/S1S2 Peripheral | 3 | 3 | 1 |
| * *Saussurea weberi* Weber's saw-wort | G3Q/S2 Reg. Endemic | 1 | 1 | 1 |
| *Saxifraga serpyllifolia var. chrysantha* [*S. chrysantha*] Golden saxifrage | G4/S1 Sparse | 1 | 1 | 1 |
| *Scirpus rollandii* [*S. pumilus*] Pygmy bulrush | G3Q/S1 Disjunct | 3 | 3 | 1 |
| *Selaginella selaginoides* Low spike-moss | G5/S1 Peripheral | 3 | 3 | 1 |
| *Silene repens* var. *australe* Creeping campion | G5T?/S1 Reg. Endemic | 3 | 3 | 3 |
| *Townsendia leptotes* Common Easter-daisy | G4/S1 Peripheral | 1 | 1 | 1 |
| *Triteleia grandiflora* Large flower triteleia | G4/S1 Peripheral | 3 | 3 | 1 |
| *Viola renifolia var. brainerdii* Kidney leaf white violet | G5T5/S1 Disjunct | 3 | 3 | 3 |

## 2. Watch List species

| Species/ Common Name | Heritage Rank/ Dist. Pattern | Protection Status Current BTNF | Potential BTNF | Current WY |
|---|---|---|---|---|
| * *Agoseris lackschewitzii* Pink agoseris | G4Q/S3 Reg. Endemic | 1 | 1 | 1 |
| *Antennaria aromatica* Aromatic pussytoes | G3G4/S2 Reg. Endemic | 1 | 1 | 1 |
| *Arabis williamsii* var. *williamsii* [*Arabis pendulocarpa var. saximontana*] Williams' rockcress | G3QT3/S3 State Endemic | 3 | 3 | 1 |
| *Astragalus drabelliformis* Big Piney milkvetch | G2G3/S2S3 State Endemic | 3 | 3 | 3 |
| *Astragalus shultziorum* [*A. molybdenus, A. m. var. shultziorum*] Shultz's milkvetch | G3Q/S3 State Endemic | 1 | 1 | 1 |
| *Draba crassa* Thickleaf whitlow-grass | G3/S2 Reg. Endemic | 1 | 1 | 1 |
| * *Draba globosa* [*Draba apiculata, D. densifolia var. apiculata*] Rockcress draba | G3/S2 Reg. Endemic | 1 | 1 | 1 |

| | | | | |
|---|---|---|---|---|
| *Heterotheca depressa* [*H. villosa* var. *depressa*] Teton golden-aster | G5T3/S3 Reg. Endemic | 3 | 3 | 1 |
| *Ipomopsis crebrifolia* Compact gilia | G3/S2S3 Reg. Endemic | 3 | 3 | 2 |
| * *Lesquerella paysonii* Payson's bladderpod | G3/S3 Reg. Endemic | 1 | 1 | 1 |
| *Lomatium bicolor var. bicolor* Wasatch bisquitroot | G4T3/S2 Reg. Endemic | 3 | 3 | 3 |

The following R4 or BTNF Sensitive species are not currently known from BTNF lands or are not tracked by WYNDD: *Androsace chamaejasme var. carinata, Astragalus diversifolius var. diversifolius, Astragalus jejunus var. jejunus,* and *Physaria integrifolia var. monticola.*

The following BTNF taxa have been dropped as species of concern by WYNDD since 1997 (Fertig 1997 a; Fertig and Beauvais 1999):

*Artemisia spiciformis* (*sensu* Goodrich, McArthur, and Winward, 1985, not later interpretations): more widespread than formerly suspected.
*Aster borealis*: more common than originally thought.
*Bromus vulgaris*: more common than originally thought.
*Calyptridium roseum*: more common than originally thought.
*Conimitella williamsii*: more widespread than formerly suspected.
*Erigeron uintahensis*: more widespread than formerly suspected.
*Gentianella amarella* var. *heterosepala*: more common than originally thought.
*Veronica scutellata*: more common than originally thought.

## Protection Summary

### A. Current Bridger-Teton National Forest Status

| | **Status 1** | **Status 2** | **Status 3** | **Status 4** |
|---|---|---|---|---|
| # of High Priority Species | 29 | 0 | 39 | 0 |
| # of Watch List Species | 6 | 0 | 5 | 0 |
| Total # [High priority & Watch List] and % | 35 (44.3%) | 0 (0%) | 44 (55.7%) | 0 (0%) |

### B. Potential Bridger-Teton National Forest Status

| | **Status 1** | **Status 2** | **Status 3** | **Status 4** |
|---|---|---|---|---|
| # of High Priority Species | 29 | 7 | 32 | 0 |
| # of Watch List Species | 6 | 0 | 5 | 0 |
| Total # [High priority & Watch List] and % | 35 (44.3%) | 7 (8.9%) | 37 (46.8%) | 0 (0%) |

### C. Current Statewide Wyoming Status

| | **Status 1** | **Status 2** | **Status 3** | **Status 4** |
|---|---|---|---|---|
| # of High Priority Species | 54 | 1 | 13 | 0 |
| # of Watch List Species | 8 | 1 | 2 | 0 |
| Total # [High priority & Watch List] and % | 62 (78.5%) | 2 (2.5%) | 15 (19%) | 0 (0%) |

Appendix D.

Natural Heritage Ranking System

WYNDD uses The Nature Conservancy's standardized ranking system to assess the global and state rarity of all plant and animal species, subspecies, and varieties. Each taxon is ranked on a scale of 1-5 (rarest to most common) based on population size, geographic range, habitat specificity, and downward trend at the state and global levels. Codes are as follows:

G Global rank: based on the rangewide status of a species.

T Trinomial rank: based on the rangewide status of a subspecies or variety.

S State rank: based on the status of a taxon in Wyoming (state ranks may differ in other states).

1 Critically imperiled because of extreme rarity (5 or fewer extant occurrences, or very few remaining individuals), or because of some factor of a species' life history that makes it vulnerable to extinction.

2 Imperiled because of rarity (6-20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.

3 Rare or local throughout its range or found locally in a restricted range (21-100 occurrences).

4 Apparently secure, although the species may be quite rare in parts of its range, especially at the periphery.

5 Demonstrably secure, although the species may be quite rare in parts of its range, especially at the periphery.

H Known only from historical records (last observed prior to 1950).

U Status uncertain, more information is needed.

Q Questions exist regarding the taxonomic validity of a species, subspecies, or variety.

? Questions exist regarding the assigned G, T, or S rank of a taxon.