

Appendix A
Status of Plant Species of Special Concern
in the Bighorn Landscape

I. High Priority Species

Adoxa moschatellina

Occurrences in Wyoming: Known from 8 extant occurrences (these have been observed since 1979), and 2-3 historical records (dating from the 1890s) in Wyoming.

Population Abundance: Populations generally are small and restricted to small areas of suitable habitat.

Range: Sparse; In Wyoming, known from the Yellowstone Plateau, Black Hills (Crook Co.), Absaroka Mountains (Park Co.), Bighorn Mountains (Sheridan and Washakie Counties), and the Medicine Bow Range (Albany Co).

Trends: Not known.

Protection Status: One occurrence is protected in TNC's Tensleep Preserve and one extant record is found in Yellowstone National Park. Two other populations are found in the potential Tensleep Canyon Research Natural Area and the potential Sand Creek Special Botanical Area in Bighorn and Black Hills National Forests.

Threats: Small, isolated populations and limited areas of suitable habitat make this species vulnerable to habitat disturbance. Logging may be a threat in some forests.

Managed Areas: Occurs on lands managed by Bighorn, Black Hills, and Shoshone NFs and Yellowstone NP. May also occur on Medicine Bow NF (record is old and vague).

Status in the Bighorn Landscape: Three populations are known from the Bighorn region, including a medium-sized occurrence that is protected in TNC's Tensleep Preserve, and a large population within the potential Tensleep Canyon RNA. The third colony occurs near the potential Tongue River RNA. Additional populations may occur in cool, shady canyons and cave entrances along the east or west slope of the Bighorn Range. Populations are often locally secure due to poor accessibility, although they could be impacted by high recreation use.

References: Cronquist *et al.* 1984; Dorn 1992; Fertig 1998 b; Lesica and Shelly 1991; Ode and Marriott 1990; Welp *et al.* 1998 a, 1998 b.

Anemone narcissiflora ssp. *zephyra*

Occurrences in Wyoming: Known from 4 extant occurrences in Wyoming (dating since 1965) and one historical record (last observed in 1909).

Population Abundance: Unknown.

Range: Ssp. *zephyra* is a regional endemic of Colorado and Wyoming. In Wyoming, it is known only from the Bighorn Mountains (Bighorn, Johnson, and Sheridan counties).

Trends: Not known.

Protection Status: Four occurrences are found within the Cloud Peak Wilderness Area (a fifth, somewhat vague record may also occur within the wilderness).

Threats: Threats appear to be low.

Managed Areas: All known populations in Wyoming are found in Bighorn National Forest.

Status in the Bighorn Landscape: The entire known state range of this taxon is found within the Bighorn landscape. Most of the fellfield habitat of this species is probably secure.

References: Dorn 1992; Dutton *et al.* 1997; Nelson 1906; Scott 1997.

Antennaria monocephala

Occurrences in Wyoming: Known from 7 occurrences in Wyoming, all located since 1985 (5 have been discovered since 1991).

Population Abundance: Little population data are available, but known occurrences tend to be limited in area and probably contain very few individuals.

Range: Disjunct; in Wyoming known from the Wind River, northern Absaroka, Bighorn, and Teton ranges in Fremont, Johnson, Park, Sublette, and Teton counties.

Trends: Not known, but probably stable.

Protection Status: At least 5 occurrences are found within established Wilderness Areas (North Absaroka, Bridger,

Fitzpatrick, and Cloud Peak areas). Other occurrences are on public lands managed for multiple use.
Threats: Threats low due to rugged, alpine scree habitat.
Managed Areas: Found in Bighorn, Bridger-Teton, Shoshone, and Targhee National Forests.
Status in the Bighorn Landscape: Known from a single occurrence in the study area (within the Cloud Peak Wilderness). Additional habitat may be present in fellfields and rocky meadows in the alpine zone.
References: Bayer and Stebbins 1993; Dorn 1992; Fertig 1992 a, Fertig 1998 b; Rosenthal 1998; Scott 1997; Welsh 1974.

Antennaria neglecta

Occurrences in Wyoming: Known from 4 confirmed and one additional unconfirmed report in Wyoming, all of which have been observed since 1982.
Population Abundance: Not known.
Range: Peripheral; in Wyoming, known from the Black Hills in Crook and Weston counties and the east slope of the Bighorn Range in Sheridan County. An unconfirmed report may also occur in Johnson County.
Trends: Not known.
Protection Status: All known occurrences are on public, private, or state lands managed for multiple use.
Threats: Loss of habitat to forestry and agricultural development are potential threats.
Managed Areas: Occurs on lands managed by Black Hills National Forest and the state of Wyoming (Story Fish Hatchery).
Status in the Bighorn Landscape: One small population is found in a heavily disturbed area at the Story Fish Hatchery (Evert 1985). This site contains a number of other rare plant species and has been recommended as a priority conservation site by WYNDD (1996). An additional, unconfirmed record is reported from Johnson County.
References: Bayer and Stebbins 1982; Cronquist 1955, 1994; Dorn 1992; Evert no date a.

Arnica lonchophylla

Occurrences in Wyoming: Known from 6 extant occurrences in Wyoming and one historical record that has not been relocated since 1901. Four occurrences have been discovered since 1992.
Population Abundance: Population size is poorly known in Wyoming. Most occurrences have been reported as being patchy and small. The largest known occurrence in the state contains ca 1400-2400 plants in 7 small colonies covering ca 10 acres. In the South Dakota Black Hills, populations range in size from "dozens to hundreds" (Dave Ode, personal comm.). Recent surveys by Ode and Gary Larson have documented nearly 30 new populations in South Dakota, prompting them to recommend dropping the species from the USFS Region 2 Sensitive list.
Range: Disjunct in Wyoming. If variety *arnoglossa* is accepted as a legitimate entity, this taxon becomes a regional endemic. In Wyoming, it is known only from the Bighorn Mountains in Big Horn, Johnson, and Sheridan Counties. An historical record from the "headwaters of the Powder River" is suspected to be from Washakie Co. This taxon also occurs in the Black Hills of South Dakota, but has not yet been located on the Wyoming side.
Trends: Unknown.
Protection Status: Three occurrences are found within the potential Mann Creek, Crazy Woman Creek, and McLain Lake Research Natural Areas on Bighorn National Forest. All other known occurrences are on public lands managed for multiple use. This species is listed as Sensitive in US Forest Service Region 2.
Threats: Not known. Potentially threatened by grazing or logging activities, but no analysis has been completed.
Managed Areas: Occurs on Bighorn National Forest and possibly the BLM Worland District.
Status in the Bighorn Landscape: The entire known state population is found within the study area.
References: Barkley 1986; Bighorn National Forest 1992; Ediger and Barkley 1978; Fertig 1993 a; Fertig *et al.* 1994; Jones and Fertig 1998; Maguire 1943; Van Bruggen 1985; Welp *et al.* 1998 b, 1998 c, 1998 d.

Asplenium trichomanes-ramosum [synonym = *Asplenium viride*]

Occurrences in Wyoming: Known from 9 extant and 2 historical records in Wyoming. Seven occurrences have been discovered or relocated since 1985.
Population Abundance: Individual populations are often small and highly localized, with fewer than 50 clusters of plants. Evert (no date b), however, reports that this can be "the most frequently encountered fern of mesic limestone crevices in the Teton-Darby Canyon area".
Range: Disjunct; in Wyoming known from the Medicine Bow, Teton, Bighorn, and Gros Ventre ranges in Carbon, Sheridan, Sublette, Teton, and Washakie counties.

Trends: Not known.

Protection Status: Three occurrences are protected within the Gros Ventre Wilderness Area (Bridger-Teton NF) and one is within the potential Tensleep Canyon Research Natural Area on Bighorn NF. All other known populations occur on public lands managed for multiple use.

Threats: May be impacted by logging, trampling, or over-collection.

Managed Areas: Occurs on Bighorn, Bridger-Teton, Medicine Bow, and Targhee National Forests.

Status in the Bighorn Landscape: Three populations occur in Bighorn National Forest, including one within a potential RNA. Populations in the Bighorns often occur on limestone cliffs or boulders in shady, narrow canyons and may be somewhat protected by poor accessibility. Additional habitat may occur in the Tensleep Preserve or other canyon areas on the east and west sides of the Bighorn Range.

References: Cronquist *et al.* 1972; Dorn 1992; Evert no date b; Hartman 1995; Hitchcock *et al.* 1969; Ode and Marriott 1990; Penskar 1993; Scott 1997; Welp *et al.* 1998 a, 1998 b.

Aster mollis

Occurrences in Wyoming: Known from 32 extant and 2 historical records in Wyoming, 27 of which have been discovered or relocated since 1990.

Population Abundance: Many populations are locally abundant, containing several thousand individual plants. Accurate censuses have been difficult to attain at some sites, however, due to the presence of hybrid individuals and other difficulties in making positive identifications.

Range: Endemic to Wyoming. Restricted to the Bighorn Range in Big Horn, Johnson, Natrona, Sheridan, and Washakie Counties and Hoback Canyon (Gros Ventre Range) in Sublette County.

Trends: Probably stable, although trend data are lacking for most populations.

Protection Status: Three occurrences are protected in The Nature Conservancy's Tensleep Preserve. One population also occurs within the Bull Elk Park Research Natural Area. Ten populations are found within the potential Devil Canyon, Dry Fork, Elephant Head, Pete's Hole, McLain Lake, Poison Creek, Tongue River, and Mann Creek Research Natural Areas. This species is listed as Sensitive in US Forest Service Regions 2 and 4 and was formerly a C2 candidate for listing under the Endangered Species Act.

Threats: Grazing and trampling have been identified as potential threats, although low levels of herbivory or disturbance do not appear to have a negative impact.

Managed Areas: Found on lands managed by Bighorn and Bridger-Teton National Forests and the BLM Casper and Worland Districts.

Status in the Bighorn Landscape: 33 occurrences are found in the study area. Recent surveys suggest that this species is more widespread and abundant than originally suspected. It is often abundant in semi-disturbed montane rangelands, especially in areas with deep, lime-rich soils. *A. mollis* may be sufficiently secure in the Bighorn area to be removed from the Forest Sensitive and WYNDD high priority lists.

References: Bighorn National Forest 1992; Croft *et al.* 1997; Dorn 1992; Fertig 1992 c; Fertig *et al.* 1994; Hartman and Nelson 1993, 1994 a; Jones 1984; Jones and Fertig 1998; Marriott 1992; Welp *et al.* 1998 b, 1998 c, 1998 d, 1998 e, 1998 f, 1998 g, 1998 h, 1998 i.

Astragalus jejunus var. *articulatus*

Occurrences in Wyoming: Known from a single occurrence southeast of Hyattville, Wyoming.

Population Abundance: Dorn (1989) estimated the total population to be about 6750 plants in an area of 35 acres.

Range: Endemic to the foothills along the boundary of the eastern Bighorn Basin and the western Bighorn Range in Big Horn County, Wyoming.

Trends: Dorn reported population as stable and vigorous. No trend data are available.

Protection Status: No populations are currently protected. This species was formerly a C2 candidate for listing under the Endangered Species Act.

Threats: Some off-road vehicle use may be a threat due to trampling. Dorn (1989) cited no major threats.

Managed Areas: Occurs on lands managed by the BLM Worland District (Bighorn Basin Resource Area) and state of Wyoming.

Status in the Bighorn Landscape: Endemic to the Bighorn Landscape, but not currently protected and potentially vulnerable to large scale disturbances or changes in land management. The Hyattville location has been recommended as a potential B1 conservation site by WYNDD.

References: Dorn 1988, 1989, 1992; Fertig 1997 c; Fertig *et al.* 1994.

Botrychium crenulatum

Occurrences in Wyoming: Known from a single report in Wyoming, observed in 1997. Previously reported for Wyoming by Wagner and Wagner (1993), but no specific locations were given.

Population Abundance: Single known occurrence appears to be extremely small (1 plant observed).

Range: Peripheral; In Wyoming, confirmed only from the Bighorn Range in Johnson County. Reports from western Wyoming (Wagner and Wagner 1993) are based on the presence of suitable potential habitat, rather than actual documented occurrences (H. Wagner, personal communication, 1998).

Trends: Not known.

Protection Status: The only confirmed occurrence in Wyoming is on public land managed for multiple use.

Threats: Not known, although populations could be impacted by surface disturbances in riparian habitats.

Managed Areas: Occurs on Bighorn National Forest.

Status in the Bighorn Landscape: The entire known state distribution is found within the Bighorn Landscape.

Additional potential habitat for this low-growing fern is likely to occur along montane streams in Bighorn National Forest. This type of habitat is poorly represented within the existing protective network in the Bighorn Landscape.

References: Croft *et al.* 1997; Fertig 1995 c; Wagner 1992; Wagner and Wagner 1981, 1993.

Botrychium minganense

Occurrences in Wyoming: Known from at least 4 locations in Wyoming. In the past, this species has been treated as a synonym of *B. lunaria* or as *B. lunaria* var. *onondagense* (Dorn 1992). Additional specimens may be present in herbaria outside of Wyoming, based on range maps in Wagner and Wagner (1993).

Population Abundance: Population size is not known, although confirmed sites are extremely small.

Range: Sparse; in Wyoming, known from the Bighorn and Absaroka ranges in Fremont, Johnson, Park, and Sheridan counties. Reported from western Wyoming in Wagner and Wagner (1993), but the exact location of these populations is not known.

Trends: Unknown.

Protection Status: One occurrence is located within the potential Mann Creek Research Natural Area on Bighorn NF. A vague, unconfirmed record is also known from the Beartooth Butte area (possibly within the potential Beartooth Butte RNA on Shoshone NF). All other known populations occur on public lands managed for multiple use.

Threats: Not known. Small habitat size and numbers may make colonies vulnerable to disturbance.

Managed Areas: Occurs on lands managed by Bighorn and Shoshone National Forests.

Status in the Bighorn Landscape: Two populations occur in the study area. The Mann Creek potential RNA occurrence is limited to mossy, well-shaded streambanks near a waterfall. The small size of this plant makes surveys difficult.

References: Fertig 1995 c, 1998 b; Jones and Fertig 1998; Lellinger 1985; Lesica and Shelly 1991; Wagner 1992; Wagner and Wagner 1993.

Botrychium virginianum

Occurrences in Wyoming: Known from 6-7 occurrences in Wyoming, 4 of which have been observed or discovered since 1982. Reported from Yellowstone National Park by Jennifer Whipple based on a specimen at the Denver Botanical Garden herbarium (confirmation is still needed).

Population Abundance: Most Wyoming populations are small in area and number of individuals.

Range: Peripheral in Wyoming. Known from the Black Hills (Crook Co.), Teton Range (Teton Co.), Bighorn Range (Sheridan Co.), and Clarks Fork Valley (Park Co). Also reported for Yellowstone National Park.

Trends: Trends are not known. Populations in the Black Hills may be vulnerable to habitat loss from logging and grazing.

Protection Status: Known from the Swamp Lake Special Botanical Area (Shoshone National Forest). A population in the Black Hills occurs within the proposed Dugout Gulch Special Botanical Area. The Bighorn Range population is within the potential Mann Creek Research Natural Area.

Threats: May be threatened by forestry and road construction activities in the Black Hills and recreational development in the Tetons.

Managed Areas: Known occurrences in Wyoming are found on lands managed by Bighorn, Black Hills, Shoshone, and Targhee National Forests. Reports from Yellowstone National Park still need confirmation.

Status in the Bighorn Landscape: Known from a single observation within the potential Mann Creek RNA by Jones

and Fertig (1998). Additional potential habitat may occur in wet, well-shaded limestone canyons along the east slope of the Bighorn Range.

References: Dorn 1992; Fertig 1998 b; Fertig and Jones 1992; Hitchcock *et al.* 1969; Jones and Fertig 1998; Lellinger 1985; Markow and Fertig 1993; Spackman *et al.* 1997; Wagner 1992; Wagner and Wagner 1993.

Carex limosa

Occurrences in Wyoming: Known from 10-11 occurrences in Wyoming, 9 of which have been observed since 1988.

Population Abundance: Populations may be locally abundant but are restricted to small areas of specialized habitat.

Range: Peripheral; known from the Bighorn, Absaroka, Wind River, Sierra Madre, and Beartooth ranges and Yellowstone Plateau in Big Horn, Carbon, Park, Sublette, and Teton counties and Yellowstone NP.

Trends: Extant populations appear to be stable at present, but the species may have declined in the last century due to loss or degradation of wetland habitats.

Protection Status: At least 5 occurrences are protected in the Absaroka-Beartooth and Bridger Wilderness Areas, Swamp Lake Special Botanical Area, and Yellowstone National Park. At least one population is found in the potential Lake Creek Bogs and Beartooth Butte RNAs on Shoshone National Forest.

Threats: May be threatened by degradation of wetland habitats due to trampling, grazing, or recreation activities.

Managed Areas: Found on lands managed by Bighorn, Bridger-Teton, Medicine Bow, Shoshone, and Targhee National Forests and Yellowstone National Park.

Status in the Bighorn Landscape: Known from a single historical record, last observed by Alan Beetle in 1951 near the inlet of Meadowlark Lake on Bighorn National Forest. This species could occur in fen or bog habitats throughout the montane zone of the Bighorns. Intensive survey of such habitats is a high priority research need on the Bighorn National Forest.

References: Cronquist *et al.* 1977; Dorn 1992; Evert 1986; Fertig 1992 a, 1992 b, 1997 b, 1998 b; Fertig and Jones 1992; Hermann 1970; Hitchcock *et al.* 1969; Mills and Fertig 1996 b; Rosenthal 1998.

Carex misandra

Occurrences in Wyoming: Known from 3-4 occurrences in Wyoming, all of which have been observed since 1985.

Population Abundance: Not known.

Range: Peripheral; found only in the Beartooth Plateau (Park Co.), northeast Wind River Range (Fremont Co.), and Bighorn Range (Johnson County).

Trends: Not known.

Protection Status: 1-2 occurrences are found in the Fitzpatrick Wilderness area (including one population in the Arrow Mountain potential Research Natural Area). The Beartooth population is found just outside the boundaries of the proposed Line Creek/Twin Lakes RNA. The Bighorn Range occurrence is within the potential McLain Lakes Research Natural Area, just outside the boundary of the Cloud Peak Wilderness (Welp *et al.* 1998 c).

Threats: May be vulnerable to high grazing pressure.

Managed Areas: Occurs on Shoshone and Bighorn National Forests.

Status in the Bighorn Landscape: One population was discovered in the Bighorn Landscape in 1997. Additional habitat may occur in alpine or subalpine meadows in the Cloud Peak Wilderness Area. Little is known about the biology of this species and its potential threats in Wyoming.

References: Cronquist *et al.* 1977; Dorn 1992; Fertig 1998 b; Hermann 1970; Hitchcock *et al.* 1969; Johnson 1962; Lesica and Shelly 1991; Scott 1997; Welp *et al.* 1998 c.

Carex sartwellii

Occurrences in Wyoming: Known from 5 extant and 1 vague historical record in Wyoming, only 2 of which have been observed since 1985 (2 since 1994)..

Population Abundance: Only 1 population has been censused thoroughly and consists of several thousand culms (representing an unknown number of genets since the species is rhizomatous). Colonies on the National Elk Refuge may be locally dominant within small microsites.

Range: Sparse. In Wyoming, known from scattered locations in the Laramie Range, Yellowstone Plateau, western Powder River Basin, Wind River Basin, and Jackson Hole (Albany, Fremont, Johnson?, Sheridan?, and Teton counties and Yellowstone NP).

Trends: Not known.

Protection Status: Three populations occur on public lands managed for biodiversity (Grand Teton and Yellowstone National Parks and the National Elk Refuge). Other populations are on public or private lands managed for multiple use.

Threats: May be threatened by draining of wetlands and grazing.

Managed Areas: Occurs on lands managed by Medicine Bow NF, Grand Teton NP, Yellowstone NP, and the National Elk Refuge.

Status in the Bighorn Landscape: Known only from one vague, historical collection by Tweedy from the "rolling plains between Sheridan and Buffalo" in 1900. It is not known with certainty whether this species is still extant within the Bighorn Landscape. Potential habitat could occur in wetland habitats on the high plains or the foothills of the east slope of the Bighorn Range.

References: Dorn 1992; Fertig 1998 a; Hitchcock *et al.* 1969.

Celtis occidentalis

Occurrences in Wyoming: Known from 3 occurrences in Wyoming, 2 of which have been located since 1994.

Population Abundance: Not known.

Range: Peripheral; in Wyoming known from the Bighorn Range, Hartville Uplift, and Southeast Plains in Sheridan, Goshen, and Platte counties.

Trends: Not known.

Protection Status: One population is found in the potential Tongue River RNA on Bighorn National Forest and extends into the adjacent Amsden Creek Wildlife Habitat Management Unit (WY Game and Fish Dept). All other known occurrences are on public or private lands managed for multiple use.

Threats: Not known, although may be vulnerable to habitat destruction in streamside areas.

Managed Areas: Occurs on Bighorn National Forest and potentially on lands managed by the BLM Casper District.

Status in the Bighorn Landscape: Known from a single native occurrence in the Tongue River Canyon on the east slope of the Bighorn Range. A population from the Bighorn Canyon area is found at an old homestead site and is thought to be introduced (Lichvar *et al.* 1984). Potential habitat for this low to mid-sized shrub includes streamsidings and rock outcrops along the eastern edge of the Bighorn Range and western boundary of the Great Plains.

References: Barker 1986; Dorn 1992; Fertig 1994 a; Hartman *et al.* 1985; Heidel 1996; Sherman-Boyles *et al.* 1997; Welp *et al.* 1998 b.

Cirsium foliosum

Occurrences in Wyoming: Known from only two collections in Wyoming, both last observed in 1971.

Population Abundance: Unknown

Range: Peripheral in Wyoming; known only from the Bighorn Mountains (Sheridan Co.) and Yellowstone National Park.

Trends: Unknown.

Protection Status: One occurrence is protected within Yellowstone National Park.

Threats: Potentially threatened by expansion of roads (although this might also create new habitat).

Managed Areas: Occurs in Bighorn National Forest and Yellowstone National Park.

Status in the Bighorn Landscape: Known from a single occurrence along Alt Highway 14 west of Burgess Junction. This species closely resembles the more widespread *Cirsium scariosum* (elk thistle), differing in having extremely long pappus and slender-tipped phyllaries. Careful inspection of tall, leafy-stemmed thistles in montane forests may reveal that this species is more widespread in the Bighorns than currently recognized.

Comments: Cronquist (1955) lumped *C. scariosum* with *C. foliosum* in the Flora of the Pacific Northwest, but then reversed this decision in the Intermountain Flora (Cronquist 1994).

References: Cronquist 1955, 1994; Dorn 1992; Moore and Frankton 1964.

Cryptogramma stelleri

Occurrences in Wyoming: Known from 6 occurrences in Wyoming, 3 of which have been located since 1990.

Population Abundance: Little census data are available, but this species appears to be extremely uncommon and restricted to small microsites within a specialized habitat (ledges with thin mossy soil in shady limestone cliffs near water).

Range: Disjunct; in Wyoming, known from the Wind River, Teton, Wyoming, and Bighorn ranges and Yellowstone Plateau (Fremont, Sheridan, and Teton counties and Yellowstone NP).

Trends: Not known.

Protection Status: The only protected occurrence in the state is in Yellowstone National Park. One occurrence is located within the potential Mann Creek Research Natural Area on Bighorn National Forest (Jones and Fertig 1998). All other populations are on public lands managed for multiple use.

Threats: May be threatened by logging activity or road construction in its habitat.

Managed Areas: Occurs on Bighorn, Bridger-Teton, Shoshone, and Targhee National Forests and Yellowstone NP.

Status in the Bighorn Landscape: This species was first discovered in the Bighorn Range in 1996 during an inventory of the potential Mann Creek RNA. In the Bighorns, this species is restricted to mossy, wet well-shaded grotto-like canyons with perennial streams. Similar habitats may occur along the east slope of the Bighorns. Populations may be secure due to their rocky, poorly accessible habitat.

References: Cronquist *et al.* 1972; Dorn 1992; Fertig 1998 b; Hartman *et al.* 1991; Hitchcock *et al.* 1969; Jones and Fertig 1998; Lellinger 1985; Markow and Fertig 1993.

Cymopterus williamsii

Occurrences in Wyoming: Known from 23 extant occurrences, and 1 historical record. Several recognized populations are in close proximity and might be better recognized as metapopulations, rather than individual occurrences.

Population Abundance: Populations are often quite large and this species can be one of the dominant plants in specific microsites. Approximately 72,000 plants were located during 1992 surveys on BLM lands in the southern Bighorn Range (Fertig 1993 c).

Range: State Endemic, restricted to the southern Bighorn Mountains in Big Horn, Johnson, Natrona, and Washakie counties.

Trends: Populations are probably stable. Long-term monitoring is recommended to determine trends.

Protection Status: All known occurrences are found on public lands managed for multiple use. One or two populations are found within the North Fork Wilderness Study Area (Casper BLM) and one population occurs within the Bud Love Wildlife Habitat Management Area.

Threats: Threats are low. Cattle and sheep do not graze this plant. Large scale habitat modification, such as limestone quarrying, would have a negative impact.

Managed Areas: Occurs on lands managed by Bighorn National Forest and the BLM Casper and Worland Districts.

Status in the Bighorn Landscape: The entire world population of Williams' wafer-parsnip is restricted to the Bighorn Landscape at the southern end of the Bighorn Range. Only one population is currently found in a special management area (Bud Love WHMA). Several large populations near the Thirty-three mile road north of Arminto and in the Gardner Mountain area west of Mayoworth are good candidates for protection within a BLM ACEC. Several occurrences in the southern Bighorns may extend onto private lands. This part of the Bighorn Landscape has received relatively little conservation attention, but also contains several other rare species and numerous dry grassland and conifer savanna community types that are poorly represented elsewhere in the region.

References: Bighorn National Forest 1992; Dorn 1992; Fertig 1993 c; Fertig *et al.* 1994; Hartman and Constance 1985; Hartman and Nelson 1995; Welp *et al.* 1998 d, 1998 j.

Cypripedium calceolus var. *pubescens*

Occurrences in Wyoming: Known from 7 extant occurrences, all observed since 1979 and 2 historical populations.

Population Abundance: Population size poorly known, but thought to be small.

Range: Peripheral; in Wyoming known from the Bighorn Mountains (Big Horn, Sheridan, and Washakie counties), Black Hills (Crook County), and Wind River Range (Fremont County).

Trends: Historically, this species is probably declining.

Protection Status: The Black Hills population occurs in the vicinity of the proposed Dugout Gulch Special Botanical Area on Black Hills National Forest. One population on Bighorn National Forest is found within the potential Dry Fork Research Natural Area. All other known populations are found on public, state, or private lands managed for multiple use. At least 2 populations on state lands are at fish hatcheries.

Threats: Threatened by grazing at some sites (the plants persist, but are unable to reproduce by seed due to herbivory of flowers). Also threatened by picking by wildflower enthusiasts and gardeners and by habitat loss from development.

Managed Areas: Found on lands managed by Black Hills NF, Bighorn NF, and on the Wind River Indian Reservation.

Status in the Bighorn Landscape: Seven occurrences (2 of which are vague and historical) are found within the study area. None of these populations are currently protected, and most are potentially highly vulnerable. The Story Fish Hatchery site has been recommended as a conservation target by WYNDD (1996). Additional habitat may occur in cool, moist, forested canyons along the flanks of the Bighorn Range, including the Tensleep Preserve.

References: Bighorn National Forest 1992; Cronquist *et al.* 1977; Dorn 1992; Evert no date a; Hitchcock *et al.* 1969; Ode and Marriott 1990; Welp *et al.* 1998 e.

Cypripedium montanum

Occurrences in Wyoming: Known from 3 extant and 1 historical record in Wyoming.

Population Abundance: Populations range from very sparse (less than 50) to over 500 individuals.

Range: Peripheral; in Wyoming, known only from the east slope of the Bighorn Range in Johnson and Sheridan counties.

Trends: Not known. May be in decline in the last 100 years.

Protection Status: Three populations occur on National Forest lands managed for multiple use. One additional occurrence is on private lands just outside the Forest. Formerly a C2 candidate for listing under the Endangered Species Act.

Threats: Threatened by grazing, habitat loss, and over-harvesting.

Managed Areas: Occurs on Bighorn National Forest.

Status in the Bighorn Landscape: The entire state population is found within the Bighorn Landscape. Additional habitat may occur in shaded canyons, riparian areas, and slopes on the east side of the Bighorn Range.

References: Bighorn National Forest 1992; Dorn 1992; Evert no date a; Fertig 1994 b; Fertig *et al.* 1994; Hitchcock *et al.* 1969.

Draba fladnizensis var. *pattersonii*

Occurrences in Wyoming: Known from 6-7 occurrences. Four of these have been discovered or revisited since 1983.

Population Abundance: Census data are lacking for all occurrences, but populations are thought to be small.

Range: Regional endemic found in the Absaroka, Beartooth, and Bighorn ranges Park and Johnson counties. Also reported for the Medicine Bow and Teton ranges in Albany and Teton counties.

Trends: Not known.

Protection Status: At least 3 populations occur in the North Absaroka and Cloud Peak Wilderness Areas and another is in the Line Creek/Twin Lakes proposed Research Natural Area. This species may also occur in Grand Teton National Park.

Threats: Threats low due to inaccessible habitat.

Managed Areas: Found on lands managed by Shoshone and Bighorn National Forests. Also reported for the Medicine Bow National Forest and Grand Teton National Park.

Status in the Bighorn Landscape: Known from a single record in the Bighorn Landscape, discovered by Erwin Evert near Lost Twin Lakes in the Cloud Peak Wilderness in 1983. Additional habitat may occur in alpine rock outcrops and slopes in the wilderness area.

References: Dorn 1992; Fertig 1992 a, 1998 b; Hitchcock and Cronquist 1964; Lesica and Shelly 1991; Nelson 1984; Rollins 1993; Scott 1997.

Epipactis gigantea

Occurrences in Wyoming: Known from 3 extant occurrences in Wyoming (all of which have been discovered or relocated since 1991) and 1 historical record (last observed in 1896).

Population Abundance: State population estimated at 1100-3200 plants in less than 10 acres of total habitat at 3 main sites.

Range: Peripheral; in Wyoming known only from the Yellowstone Plateau, Jackson Hole, and eastern Bighorn Basin in Big Horn and Teton counties and Yellowstone National Park.

Trends: Populations in the Jackson Hole area are probably declining. The Bighorn Basin population has not been relocated in over 100 years and may be extirpated. Appears to be stable in Yellowstone National Park.

Protection Status: Two occurrences are protected in Yellowstone and Grand Teton National Parks (although the Grand Teton is being impacted by grazing). Other known populations are on private lands. This species is listed as Sensitive in USFS Region 2.

Threats: Populations in Grand Teton National Park are being impacted by grazing and heavy recreational use (Marriott 1991).

Managed Areas: Occurs on lands managed by Grand Teton and Yellowstone National Parks.

Status in the Bighorn Landscape: Known from a single, historical record near Shell (probably at the warm springs).

Very little suitable habitat for this species is likely to occur in the Bighorn area. Most populations in Wyoming and South Dakota are associated with thermal features and are often highly threatened by development and high recreation use.

References: Bighorn National Forest 1992; Cronquist *et al.* 1977; Dorn 1992; Fertig 1993 a; Fertig *et al.* 1994; Hitchcock *et al.* 1969; Lesica and Shelly 1991; Marriott 1991; Spackman *et al.* 1997.

Equisetum sylvaticum

Occurrences in Wyoming: Known from 3 occurrences in Wyoming, all of which have been located since 1983.

Population Abundance: Not known.

Range: Disjunct; in Wyoming, known only from the Black Hills and Bighorn Range in Crook and Sheridan counties.

Trends: Not known.

Protection Needs: One population is found within the Preacher Rock Bog Special Botanical Area on Bighorn National Forest. A population in the Black Hills may be within the Sand Draw Special Botanical Area.

Threats: May be vulnerable to habitat loss from wetland draining, logging, or high recreation use.

Managed Areas: Occurs on Black Hills and Bighorn National Forests.

Status in the Bighorn Landscape: Known only from the Preacher Rock Bog population.

References: Dorn 1992; Evert and Hartman 1984; Hitchcock *et al.* 1969; Neighbours and Culver 1990.

Erigeron allocotus

Occurrences in Wyoming: Known from 18 extant occurrences in Wyoming, 11 of which have been discovered or relocated since 1989.

Population Abundance: Populations range from small and localized to extensive and abundant, depending on the amount of available habitat.

Range: Regional endemic of north-central Wyoming and adjacent Montana. in Wyoming, known only from the Bighorn Mountains in Big Horn, Sheridan, and Washakie counties.

Trends: Populations that have been surveyed appear to be stable.

Protection Status: One large population is protected within The Nature Conservancy's Tensleep Preserve and 7 others are found in the Spanish Point Karst and Little Mountain ACECs, Shell Canyon Research Natural Area, and Bighorn Canyon National Recreation Area. One population is also found within a TNC conservation easement on the east slope of the Bighorn Range. Six populations are found in the potential Elephant Head, Tensleep Canyon, and Dry Fork Research Natural Areas and the Medicine Lodge and Trapper Peak Wilderness Study Areas. All other occurrences are on public lands managed for multiple use.

Threats: Threats are mostly low, although individual colonies may be impacted by road construction and recreation activities. Most populations are in relatively inaccessible areas with low forage, making grazing a low threat.

Managed Areas: Occurs on lands managed by Bighorn National Forest, Bighorn Canyon National Recreation Area, and the BLM Worland District.

Status in the Bighorn Landscape: The entire state population is found within the Bighorn Landscape. Two extensive populations were discovered along the east and west side of Yellowtail Reservoir in Bighorn Canyon National Recreation Area by Fertig in 1998. This species is relatively well protected within the Bighorn area and is becoming a lower priority for conservation attention.

References: Blake 1937; Clark and Dorn 1979; Dorn 1992; Lesica and Achuff 1992; Lesica and Shelly 1991; Marriott and Jones 1989; Teton Science School 1994; Welp *et al.* 1998 a, 1998 e, 1998 i.

Erigeron humilis

Occurrences in Wyoming: Known from 9 records in Wyoming, 8 of which are recent and presumed extant (the oldest known record dates from 1955). Three sites have been located since 1990.

Population Abundance: Known populations are small in number and occupied area. Surveys in 1996 in the Beartooth Mountains reported colonies of 10-25 plants.

Range: Peripheral; in Wyoming known from the Wind River, Beartooth, Bighorn, Gros Ventre, and Absaroka ranges in Big Horn, Park, and Sublette counties.

Trends: Presumed to be stable at present, although no trend data are available.

Protection Status: 8 of the 9 known occurrences are protected within designated wilderness areas (Bridger, Gros Ventre, Absaroka-Beartooth, North Absaroka, Cloud Peak, and Washakie).

Threats: Not known, but presumed to be low.

Managed Areas: Known from the Bighorn, Bridger-Teton, and Shoshone National Forests.

Status in the Bighorn Landscape: Known from a single record in the Cloud Peak Wilderness, collected by L. Lofgren in 1955. Additional habitat may occur in wet, mossy seeps among alpine rock outcrops and tundra in the study area.

References: Cronquist 1955; Dorn 1992; Evert 1986; Fertig 1997 b, 1998 b; Lofgren 1956; Mills and Fertig 1996 b; Moseley 1989; Scott 1997.

Eriogonum brevicaule var. *canum* [synonym = *Eriogonum lagopus*]

Occurrences in Wyoming: Known from 6 extant and 1 historical record in Wyoming.

Population Abundance: Populations surveyed in Bighorn Canyon by W. Fertig in 1998 numbered in the hundreds of thousands and covered extensive areas (often as one of the primary forb species). Large population sizes have also been documented in Montana (Lesica and Achuff 1992).

Range: Regional endemic of north-central Wyoming and southern Montana. In Wyoming, known from the Bighorn Basin (Big Horn and Park counties) and an historical occurrence on the east slope of the Bighorn Mountains (Sheridan County).

Trends: Probably stable in Wyoming. More abundant in Montana (Lesica and Achuff 1992).

Protection Needs: Two extensive Wyoming populations are protected within Bighorn Canyon National Recreation Area (one of which may extend into the Little Mountain ACEC). An historical occurrence is found on state or private lands near the Tongue River potential RNA on Bighorn National Forest. This species was formerly a C2 candidate for listing under the Endangered Species Act.

Threats: Appear low at most sites.

Managed Areas: Occurs in Bighorn Canyon National Recreation Area and the BLM Worland District. An historical record from the east slope of the Bighorns may occur on state or private lands (near a TNC conservation easement).

Status in the Bighorn Landscape: Two extant and one historical occurrence are found in the study area (the remainder of the state range is found just outside the Bighorn Landscape on the west bank of the Bighorn River).

Comments: There has been much confusion in the literature regarding the taxonomy of this plant. The taxon was originally described as a separate species (*E. lagopus*) by Rydberg in 1917, based on Tweedy's collection from the Dayton area in 1899 (Rydberg 1917). Stokes (1936) created the name *E. multiceps* ssp. *canum* for Montana plants representing this same taxon. Reveal later synonymized this name under *E. pauciflorum* var. *canum* in 1967, but later revived the name *E. lagopus* for the whole species (Reveal 1967, 1969). Reveal recognized that this taxon was of hybrid origin between *E. brevicaule* and *E. pauciflorum*. Dorn and others have studied the type specimen of *E. lagopus* and found that it does not cleanly represent the characteristic features of the taxon. Dorn proposed the name *E. brevicaule* ssp. *canum* to underscore the hybrid origin of the plant (Clark and Dorn 1979).

References: Dorn 1988, 1992; Fertig *et al.* 1994; Lesica and Achuff 1992; Lesica and Shelly 1991; Reveal 1967, 1969; Rydberg 1917; Stokes 1936; Welp *et al.* 1998 b.

Eriogonum mancum

Occurrences in Wyoming: Known from 2 occurrences in Wyoming, both discovered from 1980-1992.

Population Abundance: Not known.

Range: Regional endemic of southwestern Montana, east-central Idaho, and north-central Wyoming. In Wyoming, known only from the Bighorn Basin and foothills of the Bighorn Range in Big Horn and Washakie counties.

Trends: Not known.

Protection Status: One occurrence is found within The Nature Conservancy's Tensleep Preserve or an adjacent conservation easement. The only other known population in the state is on public lands managed for multiple use.

Threats: Not known.

Managed Areas: Occurs in the BLM Worland District.

Status in the Bighorn Landscape: The entire state range is within the study area. Additional potential habitat may occur in the Bighorn Canyon area and desert mountain slopes along the west side of the Bighorn Range.

References: Dorn 1992; Hitchcock and Cronquist 1964; Reveal 1969.

Eriophorum chamissonis

Occurrences in Wyoming: Known from 6 extant occurrences and 4 historical records in Wyoming.

Population Abundance: Population size not known. Reported as "rare and scarce" at one location in SE Absarokas.

Range: Peripheral; In Wyoming, known from the Yellowstone Plateau, Absaroka Range, and Bighorn Range in Park and Sheridan counties.

Trends: Not known, but at least 4 historical sites have not been relocated in recent years, suggesting a possible downward trend.

Protection Status: At least 7 occurrences (4 of which are historical) occur in Yellowstone National Park. One population is also found in the Preacher Rock Bog Special Interest Area (Bighorn National Forest). Other populations are found on public lands managed for multiple use.

Threats: May be sensitive to degradation of wetland habitats from grazing, high recreation use, or logging.
Managed Areas: Occurs on lands managed by Bighorn and Shoshone National Forests and Yellowstone National Park.
Status in the Bighorn Landscape: The only confirmed population in the Bighorn Range is found in the Preacher Rock Bog wetland. Similar bogs may occur in the kettle pond country of the Cloud Peak Wilderness Area.
References: Dorn 1992; Fertig 1998 b; Hitchcock *et al.* 1969; Jensen 1987; Raymond 1954.

Eritrichium howardii

Occurrences in Wyoming: Known from 6 extant occurrences and one vague, historical record. Three occurrences have been discovered or relocated since 1989.
Population Abundance: Not known. Most populations appear to be small and restricted to specialized microsites.
Range: Regional endemic of N Wyoming, Montana, and Idaho. In Wyoming, known from the eastern Absaroka and Bighorn Ranges and Heart Mountain area of the Bighorn Basin in Johnson, Park, and Sheridan counties.
Trends: Not known.
Protection Status: Two populations are found within proposed or potential Research Natural Areas on Bald Ridge (Shoshone NF) and Mann Creek (Bighorn NF). All other known occurrences are on public lands managed for multiple use.
Threats: Not known, but small population size and specialized habitat requirements may make this species vulnerable to large scale disturbances.
Managed Areas: Known populations are found on lands managed by Bighorn and Shoshone National Forests and the BLM Casper and Worland districts.
Status in the Bighorn Landscape: Three populations occur within the Bighorn Landscape, one of which is historical. Additional populations may exist in cushion plant communities on limestone or dolomite outcrops and canyon walls at the northern end of Bighorn National Forest
References: Dorn 1992; Fertig 1997 b, 1998 b; Hitchcock *et al.* 1959; Jones and Fertig 1998.

Festuca hallii

Occurrences in Wyoming: Known from 8 confirmed records in Wyoming and one vague, historical record. Four populations have been discovered or relocated since 1994.
Population Abundance: Surveyed occurrences contain 500-1000 plants. Most populations, however, have not been censused. Populations may be restricted to specialized habitats.
Range: Peripheral; in Wyoming, known from the Medicine Bow and eastern Absaroka ranges (Albany and Park counties). A single historical record is known from the east slope of the Bighorn Range (Johnson County).
Trends: This species may be a decreaser under heavy grazing, although observations in 1995 suggest that it is not a preferred forage species for livestock (Fertig 1995 c; Mills and Fertig 1996 b).
Protection Status: Two occurrences are within the North Absaroka Wilderness Area. Populations also occur in the potential Pat O'Hara Mountain RNA and just outside the proposed Bald Ridge RNA. An occurrence is also present in the Cinnabar Park Special Management Area on Medicine Bow National Forest. All other populations are on state or public lands managed for multiple use. This species is listed as Sensitive in US Forest Service Region 2.
Threats: May be threatened by grazing, competition from exotics, and habitat disturbance.
Managed Areas: Found on lands managed by Shoshone and Medicine Bow National Forests and the BLM Worland District. An historical record may be from Bighorn National Forest.
Status in the Bighorn Landscape: Known only from a vague 1898 collection by Williams and Griffiths near Crazy Woman Creek on the east side of the Bighorn Range. Potential habitat exists in rocky meadows and plains on calcareous soils. This species may have been extirpated from the range.
References: Bighorn National Forest 1992; Cronquist *et al.* 1977; Dorn 1992; Fertig 1995 a, 1997 b, 1998 b; Fertig *et al.* 1994; Harms 1985; Hitchcock *et al.* 1969; Mills and Fertig 1996 a, 1996 b; Pavlick and Looman 1984; Spackman *et al.* 1997; Tweit and Houston 1980.

Juncus triglumis var. *triglumis*

Occurrences in Wyoming: Known from 2 extant occurrences in Wyoming, both located since 1983.
Population Abundance: Not known.
Range: Peripheral; in Wyoming known from the Bighorn and Beartooth ranges in Johnson and Park counties.
Trends: Not known.
Protection Status: One occurrence is protected in the Cloud Peak Wilderness Area. Another population is located just outside the proposed Line Creek/Twin Lakes Research Natural Area.

Threats: Not known.

Managed Areas: Occurs on Bighorn and Shoshone National Forests.

Status in the Bighorn Landscape: Currently known from a single collection in the Cloud Peak Wilderness Area by Erwin Evert in 1983. Additional habitat may occur in boggy areas in the high mountains.

References: Dorn 1992; Fertig 1998 b; Hitchcock *et al.* 1969; Hermann and Weber 1977.

Leptodactylon watsonii

Occurrences in Wyoming: Known from 5 occurrences in Wyoming, all of which have been relocated or discovered since 1984 (3 have been observed since 1991).

Population Abundance: Known populations are all very small (often fewer than 10 plants) and often quite restricted to specialized microsites.

Range: Peripheral; in Wyoming, known from the Wind River Canyon (Fremont and Hot Springs counties), Flaming Gorge (Sweetwater County), and the west slope of the Bighorn Range (Washakie County).

Trends: Populations may be stable, but trends are not well established.

Protection Status: One small colony is found within the potential Tensleep Canyon Research Natural Area on Bighorn National Forest. All other known occurrences in the state are on public lands managed for multiple use.

Threats: Threats appear to be minimal at known sites due to the ruggedness of the plant's habitat.

Managed Areas: Occurs on lands managed by Bighorn National Forest, Flaming Gorge National Recreation Area (Ashley NF), and the Wind River Indian Reservation.

Status in the Bighorn Landscape: Discovered for the first time in the area by Fertig and Welp in 1997 in Leigh Canyon. Additional potential habitat may occur on steep dolomite or limestone canyon walls on the west slope of the Bighorn Range, including the Tensleep Preserve. Populations are probably secure due to their rugged habitat.

References: Cronquist *et al.* 1984; Dorn 1992; Fertig *et al.* 1998; Hartman *et al.* 1985; Welp *et al.* 1998 a.

Listera convallarioides

Occurrences in Wyoming: Known from 5 extant occurrences and 2 historical records.

Population Abundance: Evert (no date a) noted populations of several hundred individuals near Story in 1985.

Range: Peripheral; in Wyoming, known from the Laramie, Medicine Bow, Bighorn, and Teton ranges in Albany, Converse, Sheridan, and Teton counties.

Trends: Not known.

Protection Needs: Three populations are protected within Grand Teton National Park. Other known occurrences are on public or state lands managed for multiple use.

Threats: May be threatened by overcollection, loss of moist forest habitat to logging, and impacts from recreation.

Managed Areas: Occurs on Bighorn, Medicine Bow, and Targhee National Forests and Grand Teton National Park. An historical record from the Laramie Range may be on lands managed by the BLM Rawlins District.

Status in the Bighorn Landscape: Two reports are known from the Bighorn Range, including an historical record from Wolf Creek Canyon last observed in 1896. The only known extant population is found near the Story Fish Hatchery, an area that has been recommended for conservation attention by Evert (no date a) and WYNDD (1996). Additional habitat may occur in moist, shady forests and wet depressions around beaver ponds along the east slope of the Bighorns (Evert no date a).

References: Bighorn National Forest 1992; Cronquist *et al.* 1977; Dorn 1992; Evert no date a; Hitchcock *et al.* 1969.

Musineon vaginatum

Occurrences in Wyoming: Known from 10 occurrences in Wyoming, most recently observed in 1994.

Population Abundance: Not known, although occasionally reported as locally common.

Range: Regional endemic of north-central Wyoming and southern Montana (reports from northern Utah by Mathias and Constance [1944]) are believed to be in error). In Wyoming, known from the Bighorn Range in Big Horn and Sheridan counties.

Trends: Probably stable.

Protection Status: Three populations are found in the Amsden Creek Big Game Range, Little Mountain ACEC, and a TNC conservation easement in the Columbus Creek area. Populations are also known from the Montana portion of Bighorn Canyon National Recreation Area (Lichvar *et al.* 1984, 1985). Two populations occur in the potential Mann Creek and Dry Fork RNAs on Bighorn National Forest. All other known populations are on public lands managed for multiple use.

Threats: Not known.

Managed Areas: Occurs in Bighorn National Forest and the BLM Casper and Worland districts.

Status in the Bighorn Landscape: The entire state range of this species is within the study area. Little is currently known about its abundance and distribution in the Bighorns, mostly because it has only recently been recognized as a species of potential conservation concern. Potential habitat may exist in meadows and forest edges on redbeds and limestone soils.

References: Cronquist *et al.* 1997; Dorn 1992; Lichvar *et al.* 1984, 1985; Hitchcock and Cronquist 1961; Mathias and Constance 1944.

Papaver kluanense

Occurrences in Wyoming: Known from at least 9 extant occurrences in Wyoming and 1 historical record. Four populations have been observed since 1990. Additional populations have been reported for Fremont and Johnson counties by Scott (1997).

Population Abundance: Census data are lacking for nearly all known populations. Occurrences studied by Fertig (1990-97) have all been small and highly localized.

Range: Disjunct; in Wyoming, known only from the Bighorn, Wind River, and Absaroka ranges in Big Horn, Fremont, Johnson, Park, and Sublette counties.

Trends: Not known.

Protection Status: At least 4 occurrences are protected within National Forest Wilderness Areas (Cloud Peak, Bridger, and Washakie). An additional population is also protected within the BLM Carter Mountain ACEC. One population is found within the potential Sheep Mesa Research Natural Area. This species is listed as Sensitive on the Idaho National Forests within USFS Region 4.

Threats: Probably unthreatened in rugged alpine habitat.

Managed Areas: Occurs on lands managed by Bighorn, Bridger-Teton, and Shoshone National Forests and the BLM Worland District.

Status in the Bighorn Landscape: Known from 1-3 locations in the alpine zone of the Cloud Peak Wilderness (Lofgren 1956; Scott 1997). Additional habitat may occur on scree slopes above 11,000 feet.

References: Fertig 1992 a, 1998 b; Kiger 1975; Lesica and Shelly 1991; Lofgren 1956; Love 1969; Moseley 1989; Rosenthal 1998; Scott 1997; Spackman *et al.* 1997; USDA Forest Service 1991.

Pedicularis contorta var. *ctenophora*

Occurrences in Wyoming: Known from 8 extant and 2-4 historical records in Wyoming. Three populations have been discovered or relocated since 1992.

Population Abundance: Not known, but most populations appear to be small.

Range: Regional endemic of north-central Wyoming, southwestern Montana, and northeastern Idaho. In Wyoming, known only from the Bighorn Range in Big Horn, Johnson, and Sheridan counties.

Trends: Not known.

Protection Status: Two occurrences are found within the Cloud Peak Wilderness Area. Two additional populations are in the McLain Lake and Devil Canyon potential Research Natural Areas on Bighorn National Forest. All other known populations are on public lands managed for multiple use.

Threats: Not known.

Managed Areas: Occurs on Bighorn National Forest and the BLM Casper District.

Status in the Bighorn Landscape: The entire state range of this species is found within the Bighorn Landscape. Additional habitat may occur in montane and subalpine meadows and forest edges. Little information is currently available on the population size and distribution of this species, which was added to the WYNDD list of target species in 1998.

References: Dorn 1992; Hitchcock *et al.* 1959; Lesica and Shelly 1991; Welp *et al.* 1998 c, 1998 g.

Pedicularis parryi var. *mogollonica*

Occurrences in Wyoming: Known from 2 occurrences in Wyoming, one of which is historical.

Population Abundance: Not known.

Range: Peripheral; in Wyoming, known from the Uinta Range and a questionable record from the Bighorn Range in Uinta and Big Horn counties.

Trends: Not known.

Protection Status: All known occurrences are on public lands managed for multiple use.

Threats: Not known.

Managed Areas: Occurs in Wasatch-Cache and Bighorn National Forests.

Status in the Bighorn Landscape: Known from a single, historical collection by Pennell in 1949 near Granite Pass. The specimen was described as "intergradient with ssp. *parryi*" by Carr (1971) and may represent an unusually robust variant of var. *parryi*, rather than the more southerly distributed var. *mogollonica*. These two taxa differ mostly in stature and the serrated terminal lobe of the flower bracts in var. *mogollonica*. Additional habitat may occur in montane and subalpine meadows in the Bighorns.

References: Carr 1971; Cronquist *et al.* 1984; Dorn 1992.

Pedicularis pulchella

Occurrences in Wyoming: Known from 13 extant occurrences, 6 of which have been relocated or discovered since 1989.

Population Abundance: Population data are lacking for most occurrences, but the total range of the species is small.

Range: Regional endemic of Montana and Wyoming; in Wyoming known from the Bighorn, Absaroka, and Gros Ventre ranges in Big Horn, Fremont, Hot Springs, Johnson, Park, Sublette, and Teton counties.

Trends: Not known, but thought to be stable.

Protection Status: Twelve of the 13 known occurrences are found in designated wilderness areas (Gros Ventre, Washakie, and Cloud Peak Wilderness Areas).

Threats: Not known.

Managed Areas: Found on lands managed by the Bighorn, Bridger-Teton, and Shoshone National Forests.

Status in the Bighorn Landscape: Two occurrences are found near Penrose Peak and Lake Elsa in the Cloud Peak Wilderness Area within the study area. Additional habitat may occur in alpine talus slopes and meadows in the wilderness. This species is probably secure due to the ruggedness and remoteness of its habitat.

References: Bighorn National Forest 1992; Dorn 1992; Evert 1986; Fertig 1998 b; Hartman 1995, 1996; Hitchcock *et al.* 1959; Pennell 1942.

Penstemon caryi

Occurrences in Wyoming: Known from 13 extant and 2 historical occurrences in Wyoming, 7 of which have been discovered or relocated since 1989.

Population Abundance: Populations are typically small and localized in specialized microhabitats. Of the few populations that have been censused, most contain 50-100 individuals per colony. One of the larger populations on TNC's Tensleep Preserve contains over 2500 plants.

Range: Regional endemic of north-central Wyoming and adjacent Montana; in Wyoming, restricted to the Bighorn Range in Big Horn, Sheridan, and Washakie counties.

Trends: Trend data are lacking for most occurrences, but the species is thought to be relatively stable at present.

Protection Status: Two occurrences are protected within the Nature Conservancy's Tensleep Preserve. Two populations are also found in the Spanish Point Karst and Little Mountain ACECs and potentially within the Shell Canyon RNA. At least four populations occur in the Medicine Lodge and Trapper Canyon Wilderness Study Areas. Populations may also occur within the potential Elephant Head and Mann Creek RNAs. All other known occurrences are on public or private lands managed for multiple use. This species is listed as Sensitive in USFS Region 2 and was formerly a C2 candidate for listing under the Endangered Species Act.

Threats: May be threatened by livestock grazing and trampling, road construction, quarrying, and loss of habitat to development.

Managed Areas: Occurs on lands managed by Bighorn National Forest and the BLM Worland District.

Status in the Bighorn Landscape: The entire state population is restricted to the Bighorn Landscape. Additional populations may occur at the southern end of the Bighorn Range and in the canyon country along the western rim of the Bighorn Basin. No populations have yet been found in the Wyoming portion of Bighorn Canyon National Recreation Area.

References: Bighorn National Forest 1992; Dorn 1992; Fertig *et al.* 1994; Humphrey and Shephard 1994; Lesica and Shelly 1991; Payson 1924; Pennell 1920; Welp *et al.* 1998 i.

Physaria lanata

Occurrences in Wyoming: Known from 14 extant occurrences in Wyoming, all of which have been discovered or relocated since 1979.

Population Abundance: Individual populations range from small to locally common (within a restricted habitat).

Range: Regional endemic of north-central Wyoming and adjacent Montana. In Wyoming, known from the foothills

of the Bighorn Range and Powder River Basin in Big Horn, Campbell, Johnson, and Sheridan counties.

Trends: Not known.

Protection Status: Two populations are located within TNC Conservation Easements on the east slope of the Bighorn Range. Two additional occurrences are found in the Amsden Creek and Bud Love WHMAs. One population is found in the vicinity of the Tongue River potential RNA on Bighorn National Forest. All other populations are on public, state, or private lands managed for multiple use.

Threats: May be impacted by livestock trampling, recreational use of its habitat, and mining.

Managed Areas: Occurs on lands managed by Bighorn National Forest and the BLM Casper District.

Status in the Bighorn Landscape: 13 of the 14 known occurrences in Wyoming are found in the study area. Potential habitat is likely to occur on foothill slopes and mesas on the east slope of the Bighorn Range, especially on outcrops of limestone and Chugwater redbeds.

References: Dorn 1992; Heidel 1996; Nelson 1904; Rollins 1993; Welp *et al.* 1998 b, 1998 d.

Polygonum spergulariiforme

Occurrences in Wyoming: Known from one extant population (last observed in 1980) and two vague historical records in Wyoming.

Population Abundance: Unknown. ~~This species may be extirpated in Wyoming.~~

Range: Peripheral; known from the western edge of the Powder River Basin (Sheridan and possibly Johnson counties) and the Bighorn Basin (Washakie County).

Trends: Unknown.

Protection Status: The only known extant population occurs on public lands managed for multiple use. Historical occurrences are on private or state lands.

Threats: Not known.

Managed Areas: Occurs in the BLM Worland District.

Status in the Bighorn Landscape: Two historical populations are found along the eastern margin of the study area on unprotected state or private lands managed mostly for agriculture. The single extant population is found just outside the western boundary of the Bighorn Landscape. Although collected in 1980, it remained "unknown" in the unmounted backlog of the Rocky Mountain Herbarium until 1999. This species may be adaptable to semi-disturbed sites.

References: Dorn 1992; Hitchcock and Cronquist 1964.

Potamogeton amplifolius

Occurrences in Wyoming: Known from 4 occurrences in Wyoming, only 2 of which have been located since 1980.

Population Abundance: Not known.

Range: Peripheral; in Wyoming known from the Sierra Madre, Bighorn, and Wind River ranges in Carbon, Johnson, Fremont and Sublette counties.

Trends: Not known.

Protection Status: One population occurs within the Cloud Peak Wilderness Area. All other known occurrences are on public lands managed for multiple use.

Threats: May occur in lakes used for motorized boat recreation.

Managed Areas: Occurs in Bighorn, Bridger-Teton, and Medicine Bow National Forests.

Status in the Bighorn Landscape: One population is found in the study area within the Cloud Peak Wilderness Area. Additional habitat may occur throughout the montane zone of the Bighorn Range. This species was added to WYNDD's list of species of special concern in 1998.

References: Cronquist *et al.* 1977; Dorn 1992; Hitchcock *et al.* 1969.

Potentilla concinna var. *bicrenata* [*Potentilla bicrenata*]

Occurrences in Wyoming: Known from 4 historical records in Wyoming, the most recent of which was observed in 1934. A 1992 collection of *P. concinna* var. *concinna* from Jelm Mountain (Albany County) appears to intergrade with this taxon.

Population Abundance: Not known.

Range: Peripheral; in Wyoming, known from the Laramie, Medicine Bow, and Bighorn ranges in Albany and Sheridan counties.

Trends: Not known, may be extirpated.

Protection Status: All known occurrences are thought to be from public lands managed for multiple use.

Threats: Not known.

Managed Areas: Occurs on lands managed by the Bighorn and Medicine Bow National Forests.

Status in the Bighorn Landscape: Known from a single historical record “near [the] Rapid Creek Observation Point”, last observed in 1934. This species may occur in limber pine or ponderosa pine savannas in the foothill and montane zones of the Bighorns. It closely resembles the more widespread var. *concinna*, but differs in having entire leaflets with 2-3 apical teeth. Var. *bicrenata* was added to WYNDD’s list of Species of Special Concern in 1999.

References: Cronquist *et al.* 1997; Dorn 1992.

Puccinellia cusickii

Occurrences in Wyoming: Known from 4 extant and 1 historical record in Wyoming. Two new populations were discovered in 1993.

Population Abundance: Not known.

Range: Peripheral; in Wyoming, known from the Wind River and Laramie basins and the foothills of the Bighorns and Black Hills in Albany, Crook, Johnson, and Natrona counties.

Trends: Not known.

Protection Status: All known occurrences are on public or private lands managed for multiple use areas.

Threats: May be impacted by livestock grazing, wetland draining, or other modifications to its alkaline wetland habitat.

Managed Areas: Occurs on lands managed by the BLM Casper District.

Status in the Bighorn Landscape: Known from a single occurrence in the study area, last observed in 1983.

References: Dorn 1992; Hallsten *et al.* 1987; Hartman and Nelson 1994 b, 1995; Hitchcock *et al.* 1969.

Pyrrocoma clementis [synonym = *Haplopappus clementis*]

Occurrences in Wyoming: Known from 5 records in Wyoming, of which 1 is historical and 2 date from the 1950s.

Population Abundance: Not known.

Range: Sparse; Known from the Bighorn and Wind River ranges in Big Horn, Fremont, Johnson, Sheridan, and Washakie counties. Also reported from Carbon County by Mayes (1976).

Trends: Not known.

Protection Status: One somewhat vague, old record may occur in the Spanish Karst ACEC and Trapper Canyon Wilderness Study Area. All other known populations are from public or tribal lands managed for multiple use.

Threats: Not known.

Managed Areas: Occurs on lands managed by the BLM Worland District, Bighorn National Forest, and the Wind River Indian Reservation.

Status in the Bighorn Landscape: Known from 4 records in the study area and an unconfirmed report from TNC’s Tensleep Preserve. Potential habitat may occur in rocky, dry meadows in the foothills and montane zones of the Bighorn Range and on the eastern margin of the Bighorn Basin.

Comments: This species intergrades with *Pyrrocoma integrifolia* and *P. uniflora*, differing primarily in involucre size and color. Mayes (1976) described the Bighorn mountain material of *P. clementis* to represent a distinct, locally endemic taxon that he named var. *villosa*. Cronquist (1994) considered *P. clementis* var. *villosa* to be synonymous with *P. integrifolia*. The identification of *Pyrrocoma* taxa in the Bighorns remains problematic and additional material is needed for study.

References: Cronquist 1994; Dorn 1992; Hall 1928; Mayes 1976; Welp *et al.* 1998 i.

Pyrrocoma integrifolia [synonym = *Haplopappus integrifolius*]

Occurrences in Wyoming: Known from 4 occurrences in the state, 3 of which are historical. The one extant occurrence is from 1995.

Population Abundance: No census information is provided in reports.

Range: Regional endemic; found in the Bighorn Mountains (Washakie County), the southern Wind River Range (Fremont County), and Yellowstone National Park.

Trends: Not known.

Protection Status: Two occurrences, including the extant one, are protected in Yellowstone National Park, and another population may be on public lands within The Nature Conservancy’s Red Canyon Preserve.

Threats: Not known.

Managed Areas: Occurs on lands managed by Shoshone National Forest and Yellowstone National Park and possibly the BLM Worland District.

Status in the Bighorn Landscape: Known from 1-3 locations in the Bighorn Range, depending on the taxonomic treatment that is used. The only confirmed record at the Rocky Mountain Herbarium is based on a Goodding

collection from the southern Bighorns in 1901 (near the head of the Middle Fork of the Powder River).

Comments: Bighorn populations assigned to *P. clementis* var. *villosa* may belong in this taxon (Cronquist 1994; Mayes 1976). Additional taxonomic study is desirable to resolve the "Pyrocoma problem" in the Bighorn area.

References: Cronquist 1994, 1955; Dorn 1992; Fertig 1998 b; Mayes 1976.

Rorippa calycina

Occurrences in Wyoming: Known from 23 occurrences in Wyoming, all of which have been observed since 1977.

Total population consists of more than 70 subpopulations, some of which were formerly recognized as separate occurrences.

Population Abundance: Fertig and Welp (1998) conservatively estimated the total state population at 15,000-25,000 plants based on surveys of 27 subpopulations in 1997.

Range: Regional endemic of Wyoming, North Dakota, and Montana with one disjunct population in the Northwest Territories of Canada. In Wyoming, it is known from the North Platte River drainage, and Bighorn, Green River, Laramie, Great Divide, and Wind River basins (Albany, Big Horn, Carbon, Fremont, Park, Sweetwater, and Washakie counties).

Trends: Long-term trend data are not available for most populations. Individual colonies appear to vary in size and area from year to year in response to flooding levels.

Protection Status: Eleven populations are on protected lands managed by The Nature Conservancy (Red Canyon Ranch), US Fish and Wildlife Service (Pathfinder National Wildlife Refuge), BLM Red Canyon ACEC (Rawlins District), and Wyoming state parks (Boysen, Buffalo Bill, and Seminoe). All other known populations are on public or private lands managed for multiple use. This species was formerly a C2 candidate for listing under the Endangered Species Act.

Threats: The primary threat comes from changes in water management that reduce the periodicity of flooding. Other threats include competition from exotic plants, herbicide spraying, trampling by livestock, recreational activities, and coal mining.

Managed Areas: Occurs on lands managed by Ashley National Forest (Flaming Gorge National Recreation Area), Bighorn Canyon National Recreation Area, Pathfinder National Wildlife Refuge, and the BLM Rawlins and Worland districts. Also present on Wyoming state park lands at Boysen, Buffalo Bill, and Seminoe Reservoirs.

Status in the Bighorn Landscape: Known from a single occurrence along several inlets on the east and west shores of Yellowtail Reservoir in Bighorn Canyon National Recreation Area. These populations are often small and restricted to muddy flats that are seasonally flooded. Additional habitat could occur along the margins of stock ponds or natural lakes at the lower elevations of the study area.

References: Clark and Dorn 1979; Dorn 1992; Dorn and Dorn 1980; Fertig 1995 b; Fertig and Welp 1998; Fertig *et al.* 1994, 1998; Hitchcock and Cronquist 1964; Lesica and Shelly 1991; Lichvar 1981; Lichvar *et al.* 1984, 1985; Refsdal 1996; Rollins 1993; Stuckey 1972; Welp 1997.

Rubus acaulis

Occurrences in Wyoming: Known from 2 extant records (both observed since 1995) and 1 vague historical report in Wyoming.

Population Abundance: Population size not known. Reported as "relatively abundant" at one site in Yellowstone National Park by J. Whipple.

Range: Peripheral; in Wyoming known from the Bighorn Range and Yellowstone Plateau (Johnson County and Yellowstone National Park).

Trends: Not known.

Protection Status: One occurrence is protected within Yellowstone NP. Population in Bighorn Range is on National Forest lands managed for multiple use. This species is listed as Sensitive in USFS Region 2.

Threats: May be impacted by reservoir development in Bighorns, logging, and high recreation use.

Managed Areas: Occurs in Bighorn National Forest and Yellowstone National Park. Listed as Sensitive in USFS Region 2.

Status in the Bighorn Landscape: Known from a single extant population and one historical record in the study area.

The extant site is near the Tie Hack Dam and is in the vicinity of a proposed clearcut. Additional habitat may occur in Engelmann spruce/twinberry forests on granite substrates on the east slope of the Bighorns.

References: Bighorn National Forest 1992; Dorn 1992; Fertig *et al.* 1994; Hitchcock and Cronquist 1961; Spackman *et al.* 1997.

Sambucus cerulea

Occurrences in Wyoming: Known from a single extant population in Wyoming (last observed in 1980) and 2 historical records (predating 1932).

Population Abundance: Not known.

Range: Peripheral; known from the foothills of the Bighorn Range (Sheridan County) and the Green River Basin (Sweetwater County).

Trends: Not known.

Protection Status: All populations are on public or private lands managed for multiple use.

Threats: Not known.

Managed Areas: Occurs on lands managed by the BLM Rock Springs District (Green River Resource Area) and possibly by Bighorn National Forest.

Status in the Bighorn Landscape: Known from two historical records in the study area on Wolf and Goose creeks. Potential habitat may occur on private lands and existing TNC easements in the eastern foothills of the Bighorns.

References: Cronquist *et al.* 1984; Dorn 1992; Fertig *et al.* 1998.

Sparganium eurycarpum

Occurrences in Wyoming: Known from 2 extant and one historical occurrences in Wyoming.

Population Abundance: Not known.

Range: Peripheral; in Wyoming, known from the Black Hills, western Powder River Basin, and southeastern Plains in Crook, Niobrara, and Sheridan counties. This species may also occur in the Laramie Basin in Albany County.

Trends: Not known.

Protection Status: Known occurrences are on public, state, or private lands managed for multiple use.

Threats: May be impacted by development of wetland sites and water pollution.

Managed Areas: Occurs in the Black Hills National Forest.

Status in the Bighorn Landscape: One historical population is known from the Sheridan area at the eastern edge of the study area.

References: Cronquist *et al.* 1977; Dorn 1992; Hitchcock *et al.* 1969.

Stanleya tomentosa var. *tomentosa*

Occurrences in Wyoming: Known from 17 extant occurrences in Wyoming, 7 of which have been relocated or discovered since 1991.

Population Abundance: All of the occurrences that have been carefully censused have been found to contain very few individuals (usually less than 50) in small areas (often less than 5 acres). Similar patterns have been observed in Montana (Lesica and Achuff 1992).

Range: Regional endemic of northcentral Wyoming and adjacent Montana. In Wyoming, it is known only from the Big Horn Basin and adjacent mountain foothills in the Big Horn, Bridger, Owl Creek, and Absaroka ranges (Big Horn, Fremont, Hot Springs, and Park counties).

Trends: Trend data are lacking, but populations are mostly thought to be stable at present.

Protection Status: Two occurrences are found in Bighorn Canyon NRA (managed by the National Park Service) and the BLM Little Mountain ACEC. All other occurrences are on public, state, or private lands that do not receive special management attention.

Threats: May be threatened by surface disturbances associated with mineral development, although most habitats are on steep slopes or other areas where development may be carefully controlled. Plants appear to be readily browsed by deer, but the impacts to populations from herbivory are still not fully known.

Managed Areas: Occurs on lands managed by Bighorn National Forest, Bighorn Canyon NRA, and the BLM Rawlins and Worland districts.

Status in the Bighorn Landscape: Four records are known from the Bighorn Landscape. Potential habitat occurs in low elevation canyons and rough breaks on the eastern rim of the Bighorn Basin. Populations of this plant are often very small and heavily browsed by herbivores. No populations were located during surveys of Bighorn Canyon NRA by Fertig in 1998.

References: Dorn 1992; Fertig and Jones 1997; Hitchcock and Cronquist 1964; Lesica and Achuff 1992; Lesica and Shelly 1991; Rollins 1939, 1993; Welp *et al.* 1998 i.

Sullivantia hapemanii var. *hapemanii*

Occurrences in Wyoming: Known from 24 extant and 1 historical records in Wyoming. 20 of the 24 extant populations

have been discovered or relocated since 1988.

Population Abundance: Populations often locally abundant, but restricted to highly specialized habitats that themselves may be limited. The largest occurrences number in the 10,000s, but many smaller sites may contain fewer than 100 plants.

Range: Regional endemic of NC Wyoming, S Montana, and C Idaho. In Wyoming, known from the Bighorn, Owl Creek, and northern Laramie ranges in Big Horn, Hot Springs, Johnson, Natrona, Sheridan, and Washakie counties.

Trends: Although formal trend data are lacking for most populations, the species is presumed to be stable under current conditions.

Protection Status: At least 7 populations are protected within Nature Conservancy Conservation Easements on private lands and in the Conservancy's Tensleep Preserve. Four populations occur within the Five Springs and Spanish Karst ACECs, Shell Canyon RNA, and Amsden Creek Wildlife Habitat Management Area. Seven additional populations are found within the Crazy Woman Creek, Tensleep Canyon, Dry Fork, Tongue River, Elephant Head, and Mann Creek potential Research Natural Areas and the Trapper Canyon Wilderness Study Area. This species is listed as Sensitive in USFS Region 2 and was formerly a C2 candidate for listing under the Endangered Species Act.

Threats: Threatened primarily by water development projects, either from flooding by dams or removal of water for irrigation. Most habitats are extremely rugged and protected by natural barriers.

Managed Areas: Found on lands managed by the Bighorn National Forest and the Casper and Worland Districts of the BLM.

Status in the Bighorn Landscape: 23 occurrences are found in the study area. Recent surveys suggest that *sullivantia* is relatively abundant and present in most of the large limestone canyons with perennial streams on both the east and west slopes of the Bighorns. This species is now well protected in at least 11 locations and has become a low priority for additional conservation attention in the landscape.

References: Bighorn National Forest 1992; Croft *et al.* 1997; Dorn 1992; Fertig 1993 c; Fertig *et al.* 1994; Humphrey 1998; Jones and Fertig 1992, Jones and Fertig 1998; Lesica and Shelly 1991; Rosendahl 1927; Soltis 1991; Welp *et al.* 1998 a, 1998 b, 1998 d, 1998 e, 1998 i, 1998 j.

Triodanis leptocarpa

Occurrences in Wyoming: Known from 6 extant and 1 historical record in Wyoming. All extant records have been located since 1978 (most recently in 1995).

Population Abundance: Not known.

Range: Peripheral; in Wyoming known from the Black Hills, Bighorn Range, and Powder River Basin in Campbell, Crook, Johnson, and Sheridan counties.

Trends: Not known.

Protection Status: One population occurs within a TNC conservation easement on the east slope of the Bighorn Range. All other known occurrences are on public or private lands managed for multiple use.

Threats: Not known.

Managed Areas: Occurs on Black Hills National Forest and possibly the Bighorn National Forest.

Status in the Bighorn Landscape: Known from one extant and one historical record in the Bighorn Landscape.

Additional habitat may occur along streambanks, limestone outcrops, and grasslands along the eastern foothills of the Bighorns.

References: Dorn 1992; Hitchcock *et al.* 1959; McVaugh 1945.

Utricularia minor

Occurrences in Wyoming: Known from at least 6 records in Wyoming (one of which is historical, dating from 1900). Two records have been relocated since 1996.

Population Abundance: Known populations are all very small and restricted to specialized microsites.

Range: Sparse; in Wyoming known from scattered locations in the Big Horn, Laramie, and Absaroka ranges, Yellowstone Plateau, and the Laramie and Jackson Hole basins (Albany, Teton, Park, and Washakie counties, and Yellowstone National Park).

Trends: Not known.

Protection Status: One occurrence is protected within the Swamp Lake Special Botanical Area (Shoshone NF) and at least 2 others are found within Grand Teton and Yellowstone National Parks. All other known populations are on unprotected private lands or public lands managed for multiple use.

Threats: May be threatened by loss or deterioration of wetland habitat.

Managed Areas: Found on lands managed by Bighorn, Shoshone and Medicine Bow National Forests and Grand Teton and Yellowstone National Parks.

Status in the Bighorn Landscape: One record is known from the study area, last observed by Porter “near the head of Tensleep Creek” in 1963. This species can be extremely difficult to identify when it is not in flower, and may be more widespread than currently known. Potential habitat occurs in slow-moving streams and ponds throughout the range.

References: Ceska and Bell 1973; Dorn 1992; Fertig 1997 b, Fertig 1998 b; Hitchcock *et al.* 1959; Rossbach 1939; Taylor 1989.

2. Watch List Species

Agoseris lackschewitzii

Occurrences in Wyoming: Known from at least 39 extant occurrences (36 of which have been discovered or relocated since 1991) and one historical record. This species was not known to occur in WY until 1993, when herbarium material was determined to be *A. lackschewitzii* by the late Dr. Doug Henderson of the University of Idaho. The species was first collected in the state in 1951 by C.L. Porter.

Population Abundance: Population estimates are lacking for many occurrences, but those which have been sampled typically average 25-50 individuals in small areas of sufficiently wet habitat. The largest known populations have 300-500 plants.

Range: Regional endemic of EC Idaho, SW Montana, and NW Wyoming. In Wyoming, it is known from the Beartooth, Wind River, Gros Ventre, and Bighorn ranges and the Yellowstone Plateau in Big Horn, Fremont, Johnson, Park, Sheridan, Sublette, Teton and Washakie counties (and Yellowstone NP).

Trends: Trend data are lacking for nearly all occurrences, but are probably stable at the present time. Long-range trends, however, may be downward given the degree of historical loss of riparian habitats.

Protection Status: 15 occurrences are protected within designated Wilderness Areas (North Absaroka, Cloud Peak, Gros Ventre, and Bridger) or in Yellowstone and Grand Teton National Parks. One population is also found within the potential McLain Lake Research Natural Area on Bighorn National Forest. This species is designated Sensitive in Forest Service Regions 2 and 4.

Threats: Threats are probably low. Some Wind River and Bighorn Range populations are found near trails where trampling by hikers and horses is a potential threat. Populations in the Bighorns have been observed to persist in disturbed areas. Grazing by livestock is a potential threat in some areas.

Managed Areas: Occurs on Bridger-Teton, Bighorn, and Shoshone National Forests, the JDR Parkway, and Grand Teton and Yellowstone National Parks.

Status in the Bighorn Landscape: 19 new populations of pink agoseris have been discovered on Bighorn National Forest since 1994. This species has been observed in partially-disturbed meadows with moderate livestock grazing. Additional populations are likely to occur in montane and subalpine areas. Any new populations should have a voucher specimen to confirm identification.

Comments: Since first being reported for the state (Fertig 1993 b), the number of collections and reports of this taxon has climbed to nearly 40. Identifications can be tricky, however, especially without diagnostic fruit characters (the beak of *A. lackschewitzii* is intermediate in length between the long-beaked *A. aurantiaca* and beakless *A. glauca*). The seemingly distinctive pink ligulate flowers of *A. lackschewitzii* are also not always diagnostic, as individuals may also have whitish flowers and dried specimens of other *Agoseris* species may turn pinkish. Populations on the Beartooth Plateau can be especially difficult to identify. Some researchers have concluded that *A. lackschewitzii* may not warrant taxonomic status, but definitive breeding and genetic studies have not yet been completed.

References: Clark *et al.* 1989; Fertig 1993 b, 1997 b, 1998 b; Fertig *et al.* 1994; Hartman 1996; Henderson *et al.* 1990; Lesica and Shelly 1991; Mills and Fertig 1996 a, 1996 b; Rosenthal 1998; USDA Forest Service 1989, 1991; Welp *et al.* 1998 c.

Antennaria aromatica

Occurrences in Wyoming: Known from over 27 occurrences in Wyoming, 21 of which have been observed since 1988.

Population Abundance: May be locally abundant when found, although sometimes colonies can be mixed with other *Antennaria* taxa and censusing can be difficult.

Range: Regional endemic of SW Montana and NW Wyoming. Reports from elsewhere in NW North America have largely proven to be false. In Wyoming, the species is known from the Absaroka, Beartooth, Bighorn, Wind

River, Gros Ventre, and Wyoming/Salt River ranges (Big Horn, Fremont, Lincoln, Park, Sublette, and Teton counties).

Trends: Although trend data are lacking for most occurrences, there appears to be little evidence of decline in numbers or range.

Protection Status: At least 10 populations are known to occur in designated Wilderness areas (Gros Ventre, Fitzpatrick, Absaroka-Beartooth, North Absaroka, and Bridger) and Grand Teton National Park. Populations are also found in the proposed Bald Ridge and potential Beartooth Butte, Arrow Mountain, and Pat O'Hara Mountain Research Natural Areas.

Threats: Threats minimal due to the ruggedness and inaccessibility of the species' alpine habitat.

Managed Areas: Known occurrences are found on lands managed by Bighorn, Bridger-Teton, and Shoshone National Forests, Grand Teton NP, and the Worland District, BLM.

Status in the Bighorn Landscape: Known from a single population near Medicine Mountain in the Bighorns, last observed in 1988. Additional habitat may occur on rocky limestone slopes and meadows at the northern end of the Range.

References: Bayer 1989; Bayer *et al.* 1996; Chmielewski, 1993; Clark and Dorn 1989; Evert 1984 b, 1986; Fertig 1992 a, 1992 b, 1997 b, 1998 b; Hartman 1995; Hartman and Nelson 1993, 1994 a; Marriott 1988; Mills and Fertig 1996 b; Scott 1997.

Astragalus barrii

Occurrences in Wyoming: Currently known from 34 extant populations and one additional historical record in WY.

Population Abundance: Populations surveyed by Marriott (1992) ranged in size from several hundred to over 10,000 individuals.

Range: Regional endemic of SE Montana, NE Wyoming, and SW South Dakota. In Wyoming, it is found in the Powder River and Cheyenne River basins in Campbell, Converse, Johnson, Natrona, Niobrara, Sheridan, and Weston counties.

Trends: Most populations appear to be stable.

Protection Status: All known populations are found on public, state, or private lands managed for multiple use.

Threats: Overall, most populations are not threatened (Marriott 1992). Specific populations may be threatened by expansion of coal mining and future oil and gas development. In South Dakota, zeolite mining and Off-road vehicle trampling are considered threats (Dave Ode, pers. comm. to H. Marriott, 1992).

Managed Areas: Occurrences are found on lands managed by the BLM Casper District and Thunder Basin National Grassland.

Status in the Bighorn Landscape: Three populations of Barr's milkvetch are found along the western edge of the Powder River Basin near the eastern boundary of the Bighorn Landscape. This species is more widely distributed on the high plains of northeastern Wyoming and is a more appropriate target for protection in the Northern Great Plains ecoregion. Recent surveys have found the species to be more abundant than originally suspected, although populations remain vulnerable to surface disturbance associated with coal strip-mining.

References: Barneby 1964; Dorn 1992; Hartman and Nelson 1994 b, 1995; Lesica and Shelly 1991; Marriott 1992; Ode 1988, 1990; Schassberger 1990.

Astragalus simplicifolius

Occurrences in Wyoming: Known from ca 50 occurrences in Wyoming, over 20 of which have been documented since 1980.

Population Abundance: Populations may be locally abundant, although often restricted to patches of suitable habitat. The species' range in the state is relatively large.

Range: Endemic to Wyoming. Restricted to the central basins of the state, including the Green River, Shirley, Wind River, Washakie, and Powder River basins, as well as the Sweetwater River Plateau, Beaver Rim, and the Green, Ferris, and Bridger Mountains (Campbell, Carbon, Fremont, Natrona, Sweetwater, and Uinta counties).

Trends: Populations appear to be stable, although specific trend data are lacking for most occurrences.

Protection Status: One occurrence is protected within the Beaver Rim ACEC and at least one population is present in the Wyoming TNC's Sweetwater River Preserve. Most of the other known occurrences are on public lands managed for multiple use.

Threats: Some habitats may be potentially impacted by oil and gas development, but most occurrences are on ridgetop habitats that receive little use.

Managed Areas: Known occurrences are found on lands managed by the BLM Casper, Rawlins, and Rock

Springs Districts and the Wind River Indian Reservation.

Status in the Bighorn Landscape: One occurrence is known from the southern Bighorn Range near the boundary of the study area. This species is more widely distributed in the basins of central Wyoming and is not likely to be commonly found in the Bighorn Landscape.

References: Barneby 1964; Dorn 1992; Hartman and Nelson 1994 b, 1995; Welp 1997.