

**Plant Species of Special Concern  
On Shoshone National Forest:  
1996 Survey Results**

**Prepared for the USDA Forest Service  
Shoshone 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 Rocky Mountain Region (USFS Region 2), 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 (Estill 1993). 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 (A. Kratz, personal communication).

In order to meet its management obligations for rare plant species, the Shoshone National Forest (SNF) has been working in cooperation with The Nature Conservancy's Wyoming Natural Diversity Database (WYNDD) to assemble information on the identification and distribution of Threatened, Endangered, Sensitive, and other plant species of special concern on SNF lands in northwest Wyoming. As part of an on-going cost-share agreement, WYNDD has produced an illustrated field guide to rare plant species on the Forest (Mills and Fertig 1996 a) and conducted field surveys to collect information on the location, habitat, population size, and management needs of target species of concern (Marriott 1988; Mills and Fertig 1996 b). The data gathered during these studies have been used by SNF resource personnel in developing and guiding management actions for rare species on the Forest.

In 1996, SNF contracted with WYNDD to conduct a 2-year field survey of rare plant species in order to provide Forest planners with additional management and distribution information for use in the upcoming revision of the SNF Forest Plan. This report contains results from surveys completed by WYNDD staff in 1996. A final report, summarizing results from 1996-97, will be produced in the Spring of 1998.

## METHODS

Surveys in 1996 focussed on the 17 SNF plants species currently listed as Sensitive (Estill 1993; Fertig et al. 1994) and the 91 other SNF species of special concern tracked by WYNDD (Fertig 1997). Prior to conducting field work, information on the habitat needs and distribution of high priority target species was obtained from secondary sources, including WYNDD files and computer databases, collections of the Rocky Mountain Herbarium (RM), the literature, and knowledgeable individuals. USGS topographic maps, geologic maps (Love and Christiansen 1985), and US Forest Service maps were used to identify areas of potential habitat for ground surveys.

Field work was conducted from mid July to late August 1996. Surveys were directed at rare and Sensitive plants of the Beartooth Range, Clarks Fork Valley, North Fork Shoshone River drainage, Brooks Lake/Togwotee Pass area, and the northeastern Wind

River Range (Appendix B). Data on the biology, habitat, population size, and management needs of target species were collected using WYNDD plant survey forms (Appendix C). Where populations were large enough, voucher specimens were collected for deposit in the RM and SNF herbaria. Locations of occurrences were plotted on 7.5 minute USGS topographic maps. Information gathered in the field was entered into the computerized Element Occurrence database of WYNDD.

## RESULTS

A total of 46 plant species of special concern, (including 10 SNF Sensitive species) was encountered during 1996 surveys on the Forest (Tables 1-2). Of these taxa, 6 had not previously been documented from the SNF and 2 (*Arnica angustifolia* ssp. *tomentosa* and *Braya humilis*) were new reports for the state of Wyoming (Fertig 1996).

Seventy-four rare plant occurrences were studied in 1996, of which 32 represented new location records. Four new populations of SNF Sensitive species were discovered and 12 known occurrences were resurveyed, and, in most cases, found to be more abundant or extensive than previously reported. Fifty-eight populations of WYNDD species of special concern were surveyed, of which 28 represented new occurrences and 30 were previously known sites. Six of the new occurrences represented first records for a species in Fremont or Park counties.

Printouts and location maps for each of the rare plant populations studied in 1996 are included in Appendix A.

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Table 1.  
Summary of 1996 Survey Results

	Sensitive Species	Other Species	Total
Number of Species Surveyed	10	36	46
New Occurrence Records	4	28	32
Revised Occurrence Records	12	30	42
New Species for SNF	0	6	6
New County Records	0	6	6
New State Records	0	2	2

Table 2. Status of Shoshone NF Rare Plants Surveyed in 1996

Species	Common Name	Heritage Rank	Shoshone NF Status	Other Federal Status	Notes
<i>Agoseris lackschewitzii</i>	Pink agoseris	G3Q/S2S3	Sensitive	USFS R2 Sensitive USFS R4 Sensitive	
<i>Amerorchis rotundifolia</i> [ <i>Orchis rotundifolia</i> ]	Round-leaved orchid	G5/S1	Sensitive	USFWS former C2 USFS R2 Sensitive	
<i>Androsace chamaejasme</i> ssp. <i>carinata</i>	Sweet-flowered rock jasmine	G5T4/S2		Bridger-Teton NF Forest Sensitive Targhee NF Forest Sensitive	
<i>Antennaria aromatica</i>	Aromatic pussytoes	G3G4/S2			
<i>Arnica angustifolia</i> ssp. <i>tomentosa</i>	Alpine arnica	G5T5/S1			New to SNF WY state record Fremont Co. record
<i>Astragalus gilviflorus</i> var. <i>purpureus</i>	Dubois milkvetch	G5T2/S2		USFWS former C2	New to SNF
<i>Braya humilis</i>	Low braya	G4/S1			New to SNF WY state record Fremont Co. record
<i>Carex buxbaumii</i>	Buxbaum's sedge	G5/S2			
<i>Carex diandra</i>	Lesser panicled sedge	G5/S1S2			
<i>Carex leptalea</i>	Bristly-stalk sedge	G5/S1			
<i>Carex limosa</i>	Mud sedge	G5/S2			
<i>Carex nelsonii</i>	Nelson's sedge	G3/S2			
<i>Castilleja nivea</i>	Snow paintbrush	G3/S2			
<i>Descurainia torulosa</i>	Wyoming tansymustard	G1/S1	Sensitive	USFWS former C2 USFS R2 Sensitive USFS R4 Sensitive Rock Springs BLM Spec. Status	
<i>Draba globosa</i> [ <i>D. apiculata</i> var. <i>apiculata</i> ; <i>D. densifolia</i> var. <i>apiculata</i> ]	Rockcress draba	G3G4/S2		USFS R4 Sensitive	
<i>Draba paysonii</i> var. <i>paysonii</i>	Payson's draba	G5T3?/S1			
<i>Draba pectinipila</i> [ <i>Draba oligosperma</i> var. <i>pectinipila</i> ]	Comb-hair whitlow-grass	G1Q/S1		USFWS former C2	
<i>Draba porsildii</i> var. <i>brevicula</i> [ <i>Draba nivalis</i> var. <i>brevicaule</i> ]	Little snow draba	G3T1/S1			
<i>Drosera anglica</i>	English sundew	G5/S2			
<i>Epilobium palustre</i> var. <i>palustre</i>	Swamp willow-herb	G5/S1			New to SNF Park Co. record
<i>Equisetum fluviatile</i>	Water horsetail	G5/S1			New to SNF Park Co. record
<i>Erigeron humilis</i>	Low fleabane	G4/S2			
<i>Erigeron radicans</i>	Taprooted fleabane	G3/S1			
<i>Eriophorum callitrix</i>	Sheathed cotton-grass	G5/S1			
<i>Eriophorum gracile</i>	Slender cotton-grass	G5/S1			
<i>Eritrichium howardii</i>	Howard forget-me-not	G4/S1			
<i>Festuca hallii</i> [ <i>Festuca altaica</i> ssp. <i>hallii</i> ; incl. in <i>F. scabrella</i> by some authors]	Hall's fescue	G3G4/S1	Sensitive	USFS R2 Sensitive	
<i>Gayophytum humile</i>	Low ground-smoke	G5/S1			Fremont Co. record
<i>Ipomopsis spicata</i> ssp. <i>robruthii</i> [ <i>I. spicata</i> var. <i>robruthiorum</i> ]	Kirkpatrick's ipomopsis	G4?T2/S2	Sensitive	USFWS former C2 USFS R2 Sensitive	

Table 2. Status of Shoshone NF Rare Plants Surveyed in 1996

Species	Common Name	Heritage Rank	Shoshone NF Status	Other Federal Status	Notes
<i>Kobresia macrocarpa</i> [ <i>Kobresia schoenoides</i> ; <i>Kobresia sibirica</i> ]	Siberian kobresia	G5/S1			
<i>Koenigia islandica</i>	Koenigia	G4/S1			
<i>Lesquerella fremontii</i>	Fremont bladderpod	G2/S2	Sensitive	USFS R2 Sensitive	
<i>Lomatium attenuatum</i>	Absaroka biscuitroot	G2/S2			
<i>Parrya nudicaulis</i>	Naked-stemmed parrya	G5/S2	Sensitive	USFS R2 Sensitive USFS R4 Sensitive	
<i>Pedicularis oederi</i>	Oeder's lousewort	G5/S1			
<i>Penstemon absarokensis</i>	Absaroka beardtongue	G2/S2			
<i>Phippsia algida</i>	Ice grass	G5/S1			
<i>Physaria saximontana</i> var. <i>saximontana</i>	Rocky Mountain twinpod	G3T2/S2		USFWS former C2	
<i>Potamogeton praelongus</i>	White-stem pondweed	G5/S1			
<i>Pyrrocoma carthamoides</i> var. <i>subsquarrosa</i> [ <i>Haplopappus carthamoides</i> var. <i>subsquarrosus</i> ]	Absaroka goldenweed	G5T2T3/ S2	Sensitive	USFWS former C2 USFS R2 Sensitive	
<i>Salix farriae</i>	Farr's willow	G4/S1S2			
<i>Saussurea weberi</i>	Weber's saw-wort	G3Q/S2		USFS R4 Sensitive	
<i>Senecio fuscatus</i>	Twice-hairy groundsel	G4/S2			
<i>Shoshonea pulvinata</i>	Shoshonea	G2G3/S2	Sensitive	USFWS former C2 USFS R2 Sensitive	
<i>Townsendia condensata</i> var. <i>anomala</i> [ <i>Townsendia anomala</i> ]	North Fork Easter-daisy	G4T2/S2	Sensitive	USFS R2 Sensitive	
<i>Utricularia minor</i>	Lesser bladderwort	G5/S1			New to SNF Park Co. record

## DISCUSSION AND MANAGEMENT RECOMMENDATIONS

The current status and management needs of each of the species studied on SNF in 1996 is summarized below. Areas of significant conservation value (due to the concentration of large numbers of rare species or because they contain particularly high quality examples of rare plant habitat) are briefly discussed on page 35.

### *Agoseris lackschewitzii* - Pink agoseris (Figure 1)

This USFS Region 2 Sensitive species is restricted to wet meadow habitats in the mountains of east-central Idaho, southwest Montana, and northwest Wyoming (Mills and Fertig 1996 a). It is currently known from 32 extant populations in Wyoming, all of which have been discovered or relocated since 1991. One new population (EO # 034) was discovered in 1996 on the Beartooth Plateau, bringing the total number of known occurrences on SNF to seven. One of the 3 subpopulations of this occurrence is located within the proposed Line Creek/Twin Lakes Research Natural Area (Fertig and Bynum 1994 a). A second occurrence in the Beartooth Range (EO # 007) was resurveyed and found to be more extensive than previously reported by Mills and Fertig (1996 b). Four new and locally abundant subpopulations were discovered along Little Bear Creek, Fantan Lake, and Beartooth Lake, bringing the total number of known subpopulations in this occurrence to 8. Nearly 500 individuals were observed at the Little Bear Creek colony, making this one of the largest reported populations in the state.

In Wyoming, *A. lackschewitzii* appears to be adequately protected, with nearly 1/3 of all known occurrences being found in designated or proposed special management areas. Studies in the Bighorn Mountains and observations on SNF suggest that impacts from grazing are relatively low and that the species is able to persist in areas that receive low to moderate use (Fertig 1995 c). Impacts from trampling and vehicle disturbance may be detrimental in areas used extensively for recreation. These impacts could be mitigated by re-routing hiking trails and roads away from wetland areas. Recent surveys have demonstrated that this species is more widespread, more abundant, and less threatened than once suspected. A change in Sensitive status may be warranted in the near future.

### *Amerorchis rotundifolia* (*Orchis rotundifolia*) - Round-leaved orchid (Figure 1)

Round-leaved orchid is a USFS Region 2 Sensitive species that ranges across Alaska and northern Canada south to New York, Michigan, and northwest Wyoming (Fertig et al. 1994). It is known from two occurrences in Wyoming, both of which are located in the Clarks Fork Valley on the SNF. The population at Swamp Lake (EO # 002) was resurveyed in 1996 and found to be much larger and more extensive than previously reported (Fertig and Jones 1992). Several hundred plants were observed at the east end of the wetland (in less than 1/10 of the total available habitat), suggesting that the total population of the occurrence may number in the low thousands. The sharp increase in numbers (only 75 plants were observed in 1992) may have been the result of improved growing conditions or more thorough sampling in 1996. Although protected within a Special Botanical Area, this population remains threatened by grazing or disturbance from trespass cattle and horses. Over-collection by orchid fanciers and removal of white spruce trees are also potential threats at the site.



Figure 1. Line drawings of rare plants of Shoshone National Forest: **A.** *Agoseris lackschewitzii* (by A. Cholewa in Henderson et al. 1990); **B.** *Amerorchis rotundifolia* (by J. Janish in Hitchcock et al. 1969); **C.** *Androsace chamaejasme* var. *carinata* (by J. Janish in Hitchcock and Cronquist 1961); **D.** *Antennaria aromatica* (by W. Fertig in Mills and Fertig 1996 b); **E.** *Arnica angustifolia* ssp. *tomentosa* (by W. Fertig in Fertig 1996).



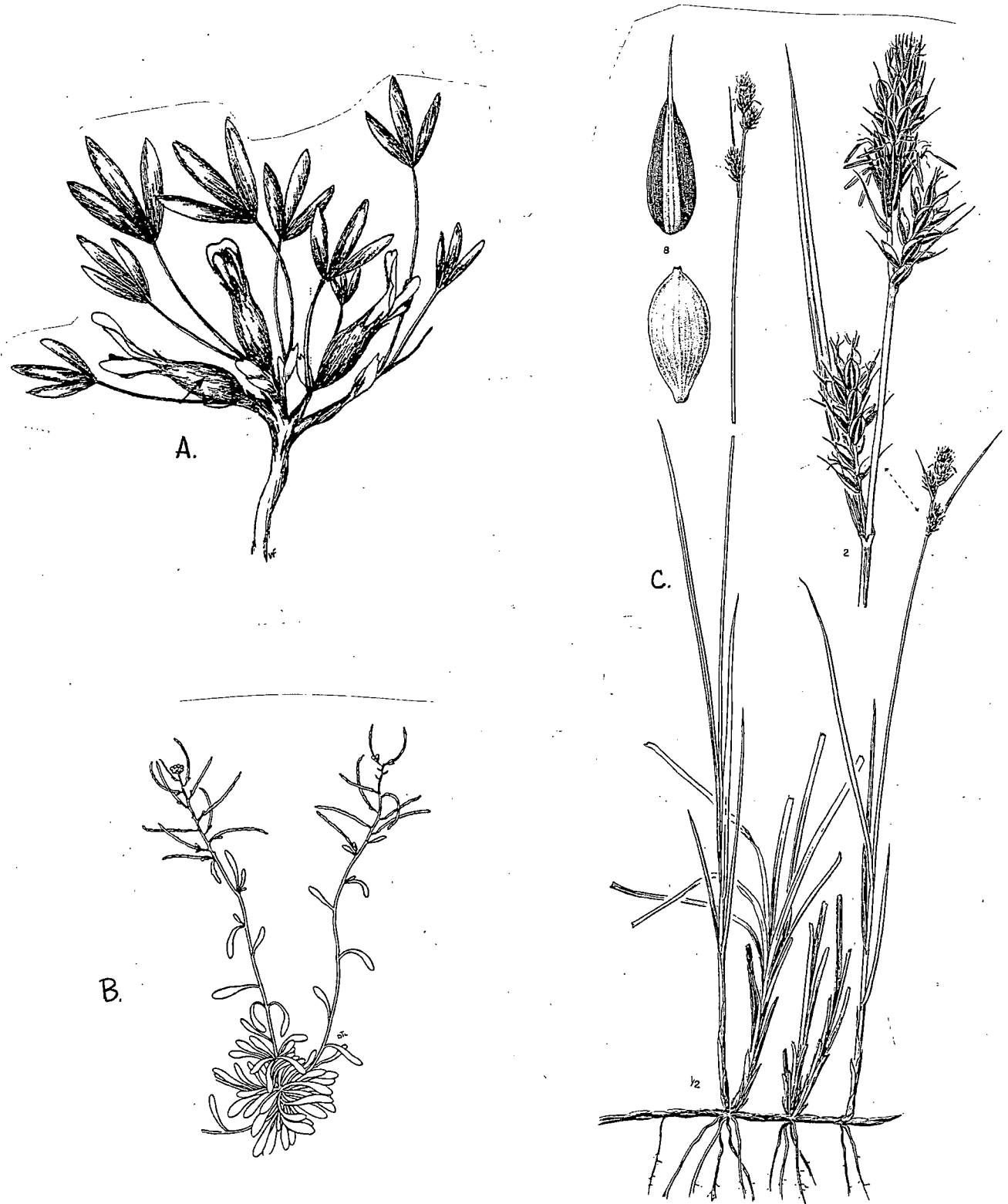
*Androsace chamaejasme* var. *carinata* – Sweet-flowered rock jasmine (Figure 1)  
Sweet-flowered rock jasmine is found from Alaska and western Canada south in the Rocky Mountains to central Colorado. In Wyoming, it is known from 8 populations in the northeastern Wind River, eastern Absaroka, and Owl Creek ranges (Fertig et al. 1994). On the SNF, it is known from 7 occurrences, 2 of which were resurveyed in 1996. An estimated 10,000 plants were observed on Arrow Mountain (EO # 002), confirming earlier reports of high densities at this site. A smaller colony was located at the south end of Bald Ridge (EO # 005), within the boundaries of the proposed Bald Ridge Research Natural Area. These colonies were found in dense shrub thickets along the edge of limber pine woodlands and on moist hummocks in a Baltic rush marsh, both of which represent new vegetation types not previously reported for this taxon (Marriott 1991 a; Fertig et al. 1994). The Arrow Mountain occurrence is largely unthreatened, while the Bald Ridge site could be impacted by grazing and disturbance from vehicles. Impacts from the August 1996 wildfire on Bald Ridge are not known.

This taxon is currently listed as Sensitive on Bridger-Teton National Forest, but has no formal protective status on the SNF. At least 5 occurrences in the SNF are protected in designated wilderness areas.

*Antennaria aromatica* – Aromatic pussytoes (Figure 1)  
Aromatic pussytoes is a regional endemic of the high mountains of southern Alberta, western Montana and northwestern Wyoming (Bayer 1989), although some authors contend that it is more widespread, or perhaps not a good taxon (Chmielewski 1993). As a result of recent survey efforts, this species is now known from 27 occurrences in Wyoming, at least 9 of which are found in designated wilderness areas or proposed research natural areas. One existing colony and one new population were located on SNF lands in 1996, bringing the total number of populations on the Forest to 13. The population on Clay and Beartooth buttes (EO # 002) was found to be more populous and extensive (especially on Beartooth Butte) than previously reported (Mills and Fertig 1996 b). The new colony at the east end of Arrow Mountain (EO # 027) was found to consist of several thousand pistillate individuals (suggesting that this population may be reproducing only through asexual means). These and other populations of aromatic pussytoes are largely unthreatened due to the ruggedness and inaccessibility of its alpine habitat. Due to low threats, the large number of populations, and adequate degree of protection, this species was not recommended for Sensitive status on SNF by Marriott (1988) and has been downlisted to "watch list" status by WYNDD (Fertig 1997).

*Arnica angustifolia* ssp. *tomentosa* - Alpine arnica (Figure 1)  
In 1996, a single population of this arctic and northern Rocky Mountains species was discovered on the south side of Arrow Mountain (EO # 001), marking the first record of the species in the state of Wyoming, the SNF, and Fremont County (Fertig 1996). Alpine arnica was observed to be locally abundant, although restricted to approximately 5 acres of suitable, semi-barren alpine calcareous-gravel habitat. It is not known at present if this species is threatened by grazing or recreational use of its limited range. Additional habitat remains to be surveyed in the vicinity. This population occurs within the Fitzpatrick Wilderness Area.

Figure 2. Line drawings of rare plants of Shoshone National Forest: A. *Astragalus gilviflorus* var. *purpureus* (by W. Fertig in Fertig et al. 1994); B. *Braya humilis* (from Porsild and Cody 1980); C. *Carex buxbaumii* (by J. Janish in Hitchcock et al. 1969).



*Astragalus gilviflorus* var. *purpureus* - Dubois milkvetch (Figure 2)

This taxon is endemic to the Dubois badlands and the foothills of the northeast Wind River Range in northwestern Fremont County, Wyoming (Fertig et al. 1994). In 1996, Dubois milkvetch was documented from SNF lands for the first time. A single population is currently known on the Forest, located along the base of Torrey Rim along the boundary of SNF and the Wyoming Game and Fish Department's Whiskey Mountain Bighorn Sheep Winter Range Habitat Management Area (EO # 003). This population consists of 800-1000 rosettes in an area of about 2 acres. Very little additional habitat is likely to occur on SNF lands in the vicinity, although some suitable habitat may be present in the foothills of Arrow Mountain to the east. Observations by Marriott (personal communication) suggest that this taxon is tolerant of grazing and limited disturbances.

*Braya humilis* - Low braya (Figure 2)

Low braya is primarily an arctic species that is also found in disjunct, alpine locations in southwest Montana and central Colorado. In 1996, this species was discovered for the first time in the state of Wyoming on the south side of Arrow Mountain (EO # 001) (Fertig 1996). Only 50 plants were observed in a small area of barren, whitish, calcareous gravel, although some additional potential habitat may occur in the surrounding area. This area (located within the Fitzpatrick Wilderness) is currently managed primarily for recreation, although sheep grazing has been conducted in the past. Studies in Colorado suggest that low braya is adapted to colonize recently disturbed sites with poor soil development, but it is not known how the species responds to large scale human-induced perturbations (Neely and Carpenter 1986).

*Carex buxbaumii* - Buxbaum's sedge (Figure 2)

Buxbaum's sedge is a boreal species currently known from 14 extant populations in the mountains of western Wyoming (Mills and Fertig 1996 b). One new population was discovered along the shores of a pair of bog lakes northeast of Lily Lake in the Beartooth Range in 1996, bringing the total number of occurrences on the SNF to 4. This population (EO # 013) was estimated at 500-1000 individuals and was observed to be one of the dominant species in a small sedge community located between the pond edge and the surrounding conifer forests. The bog population is one of 11 populations in the state found within designated wilderness areas, national parks, or other special management areas. Although known from a large number of sites, the total range of this species in Wyoming is quite restricted and specialized, making it vulnerable to loss or degradation of its wetland habitat from grazing, water projects, and trampling.

*Carex diandra* - Lesser panicled sedge (Figure 3)

Lesser panicled sedge is a boreal species found at the edge of its range in the mountains of Wyoming and Colorado (Mills and Fertig 1996 b). In Wyoming, it is currently known from 9 occurrence records, including 6 on the SNF. Three populations were surveyed in 1996, all within a small area of wetlands in the Ivy and Lake creek drainages of the southwestern Beartooth Range (EOs # 006, 008, & 009). These populations were observed to be locally abundant within small areas of suitable habitat. The populations at Little Moose Lake and Lily Lake are potentially threatened by livestock grazing or

Figure 3. Line drawings of rare plants of Shoshone National Forest: A. *Carex diandra* (by J. Janish in Hitchcock et al. 1969); B. *Carex leptalea* (from Hermann 1970); C. *Carex limosa* (by J. Janish in Hitchcock et al. 1969).



trampling by hikers or fishermen (Mills and Fertig 1996 b). The bog population northeast of Lily Lake is located within the Absaroka-Beartooth Wilderness and is only the second occurrence to be found in a special management area on the SNF.

*Carex leptalea* - Bristly-stalk sedge (Figure 3)

Bristly-stalk sedge is found throughout western North America, but is located at the edge of its range in Wyoming (Fertig and Jones 1992). Two of the 6 extant populations known in the state were discovered in swamp forests in the southwestern Beartooth Range on the SNF in 1996 (EOs 008 & 009). Both populations were found to be quite small and restricted to semi-shady hummocks dominated by Engelmann spruce and lodgepole pine. These and other populations on the Forest may be threatened by logging, grazing, or recreational activities. Currently, only 2 of the 5 known occurrences on the SNF are protected (within the Swamp Lake Special Botanical Area and the Absaroka-Beartooth Wilderness), although 3 other historical populations are also protected within Grand Teton National Park.

*Carex limosa* - Mud sedge (Figure 3)

Mud sedge is a circumboreal species known from at least 10 populations in wet (often calcareous) meadows in the mountains of Wyoming (Fertig and Jones 1992). One new occurrence (EO # 009) and one known population (EO # 008) were surveyed on the SNF in 1996, bringing the total number of populations on the Forest to 5. Both populations were observed to be locally abundant on floating mats and adjacent sedge meadows. These sites are potentially threatened by trampling and livestock grazing. The Lily Lake bogs occurrence (EO # 009) is found within the Absaroka-Beartooth Wilderness Area, and appears to receive little human use. Recent surveys have found that this species is more abundant and widespread in Wyoming than previously thought, although the plant's specialized habitat requirements continue to make it vulnerable to extirpation.

*Carex nelsonii* - Nelson's sedge (Figure 4)

Nelson's sedge is a regional endemic of the high mountains of Wyoming, Colorado, and Utah (Hermann 1970). In Wyoming, it is known from 7 occurrences, including 2 sites in the Wind River and Beartooth ranges on the SNF. The Beartooth Plateau population (EO # 003) was relocated in 1996, and one additional subpopulation was discovered south of the head of Wyoming Creek. This colony is located just outside the boundaries of the proposed Line Creek/Twin Lakes Research Natural Area (Fertig and Bynum 1994 a). This species strongly resembles *Carex albonigra* and *C. nova*, and has been reduced to synonymy by some authors (Scott 1997). Colonies in the Beartooth Range are potentially threatened by sheep grazing and recreational activities, although existing populations appear to be stable at the present time.

*Castilleja nivea* - Snow paintbrush (Figure 4)

Snow paintbrush is a regional endemic of the mountains of northwestern Wyoming and adjacent Montana. In Wyoming, it is known from nearly 20 populations in the Absaroka Range. One known population along Bald Ridge (EO # 002) was resurveyed in 1996 and found to be slightly larger than previously reported (Jones 1991; Fertig and Bynum 1994 b). Although populations may be scattered and sparse, this species does not appear to be

Figure 4. Line drawings of rare plants of Shoshone National Forest: A. *Carex nelsonii* (from Hermann 1970); B. *Castilleja nivea* (by J. Janish in Hitchcock et al. 1959); C. *Descurainia torulosa* (by K. Thorne in Fertig et al. 1994); D. *Draba globosa* (by J. Janish in Hitchcock and Cronquist 1964); E. *Draba paysonii* var. *paysonii* (by J. Janish in Hitchcock and Cronquist 1964).



seriously threatened, and has been downlisted to "watch list" status by WYNDD (Fertig 1997).

*Descurainia torulosa* - Wyoming tansymustard (Figure 4)

This USFS Region 2 Sensitive species is reported from 9 occurrences worldwide, all restricted to the southern Absaroka Range and the Rock Springs Uplift in Fremont, Park, Sweetwater, and Teton counties, Wyoming (Marriott 1991 b, 1992). A recent treatment by Rollins (1993), however, recognized only the type locality near Brooks Lake (EO # 001) as representing this species. The type location was resurveyed in 1996, and one small colony containing 75-100 rosettes and 6 flowering individuals was observed on a 7 foot long ledge of volcanic breccia. An additional colony of 150 rosettes was also located, but the identity of these plants could not be confirmed due to the lack of flowering or fruiting material. At least 1-3 other colonies have been reported from this site in the past, all containing fewer than 100 individuals (Dorn 1989 a). Threats to this and other sites are minimal, due to the rugged nature of the terrain and the lack of forage for livestock (Fertig 1995 c). Monitoring studies suggest that populations may fluctuate greatly in size from year to year, making the species vulnerable to natural disturbances.

*Draba globosa* (*D. apiculata* var. *apiculata*.; *D. densifolia* var. *apiculata*) – Rockcress draba (Figure 4)

Rockcress draba is a regional endemic of alpine calcareous habitats in southwest Montana, Wyoming, central Colorado, and northwest Utah. In Wyoming, it is currently known from 17 occurrences, 4 of which are found in the SNF. A known occurrence on Clay and Beartooth buttes (EO # 007) was resurveyed in 1996 and found to be extremely small. Fewer than 50 plants are thought to occur at 2 sites on the buttes occupying a total area of 3-5 acres. Although this population was first reported in 1939, it is not known how it is responding to hiking, past grazing, and other disturbances in its habitat. Elsewhere in Wyoming, populations appear to be small, but stable. At least 9 populations in the state are currently protected within designated wilderness areas and national parks. Recent studies in Utah (Stone 1995) have indicated that this species is more abundant than once suspected and no longer in need of Sensitive designation.

*Draba paysonii* var. *paysonii* - Payson's draba (Figure 4)

Payson's draba is a regional endemic of Montana and northwestern Wyoming (Rollins 1993). In Wyoming, it is known from only 3 extant populations, 2 of which occur in the Beartooth and Wind River ranges on the SNF. An existing occurrence on Beartooth and Clay buttes (EO # 001) was resurveyed in 1996 and found to contain several hundred individuals in 3 small colonies. Although restricted in area, these colonies do not appear to be highly threatened by current management actions in the area.

*Draba pectinipila* (*D. oligosperma* var. *pectinipila*) – Comb-hair whitlow-grass (Figure 5)

The entire global range of this species is restricted to Beartooth and Clay buttes in the Beartooth Range of the SNF (Mills and Fertig 1996 a). This single population (EO # 001) was resurveyed in 1996 and observed to be more extensive than previously recognized (Mills and Fertig 1996 b). The colony along the western rim of Clay Butte



was estimated to contain 500-750 plants, while a smaller colony at the north end of Beartooth Butte contained fewer than 20 individuals. This species was often found to occur with *D. oligosperma*, and hybrid individuals between these two taxa were also present. The range of comb-hair whitlow-grass is entirely contained within the Absaroka-Beartooth Wilderness and does not appear to be adversely impacted by livestock grazing (Dorn 1980; Fertig 1995 c). Trampling by hikers and erosion may be threats at some sites, however, especially along the rim of Clay Butte.

The occurrence of hybrids has led some authors to recognize *Draba pectinipila* as a variety of *D. oligosperma*. More recently, Rollins (1993) has reduced *D. pectinipila* to a synonym of *D. oligosperma*, citing pollen fertility studies by Mulligan and Findlay (1970) that suggest that the *D. oligosperma* complex is agamospermous, with morphologically distinctive segregate taxa merely representing asexual lines unworthy of recognition as true species. As a result of the taxonomic questions raised by Rollins, this species was dropped as a Sensitive species in USFS Region 2 (A. Kratz, personal communication). Studies of pollen fertility and reproductive behavior of *D. pectinipila* are needed to resolve these taxonomic problems (Mills and Fertig 1996 b).

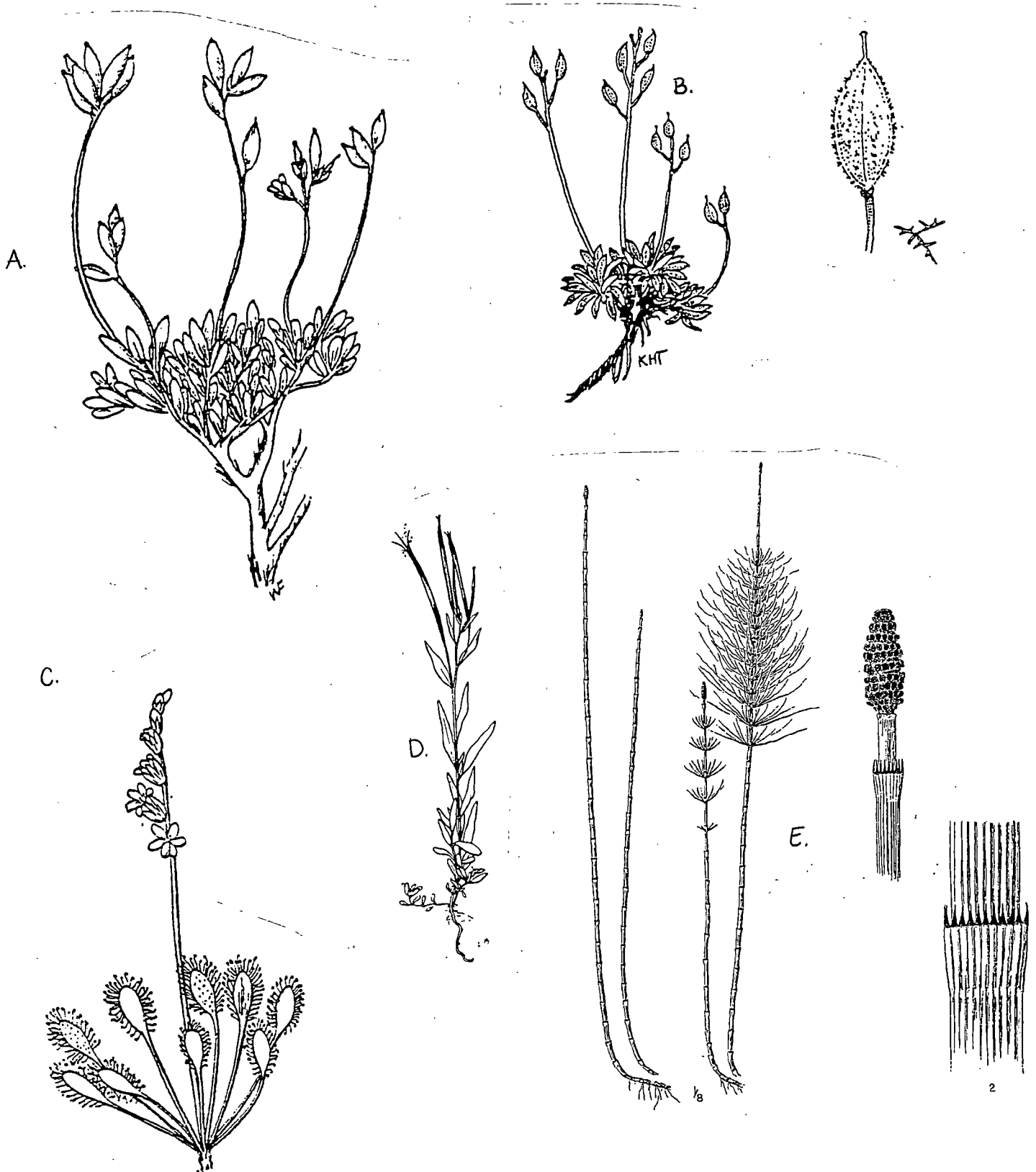
*Draba porsildii* var. *brevicula* (*D. nivalis* var. *brevicaule*) – Little snow draba (Figure 5)

Little snow draba is a regional endemic of northwest Wyoming and adjacent Montana (Rollins 1993). In Wyoming, it is known from a single occurrence on Clay and Beartooth buttes (EO # 001) in the Beartooth Range on SNF. This occurrence was resurveyed in 1996 and found to be more extensive than previously reported (Dorn 1980; Mills and Fertig 1996 b). Four main colonies were observed (3 of which had not been previously documented), with a total population size estimated in the low thousands. Threats appear to be low at these sites due to the rugged nature of the plant's habitat. This occurrence is found entirely within the Absaroka-Beartooth Wilderness Area.

*Drosera anglica* - English sundew (Figure 5)

English sundew is a circumboreal species that extends south to California, northwest Wyoming, and the Great Lakes. In Wyoming, it is known from 7 occurrences, including 2 sites on the SNF. The Little Moose Lake population (EO # 005) was resurveyed in 1996 and found to number in the low thousands. Densities were observed to be as high as 19 plants per square meter on floating *Sphagnum* bog sites. A new occurrence (EO # 007) was discovered bordering the small ponds 0.7 miles northeast of Lily Lake. The population at this site was conservatively estimated to contain 5000-7500 plants in an area of 4 acres and was often one of the dominant species present. This occurrence is located within the Absaroka-Beartooth Wilderness and is one of 6 Wyoming occurrences found in a wilderness area or national park. Despite its abundance and protected status, English sundew is considered a high priority species due to its highly specific habitat requirements and limited range.

Figure 5. Line drawings of rare plants of Shoshone National Forest: **A.** *Draba pectinipila* (by K. Thorne in Fertig et al. 1994); **B.** *Draba porsildii* var. *brevicula* (by W. Fertig in Mills and Fertig 1996 a); **C.** *Drosera anglica* (from Britton and Brown 1913); **D.** *Epilobium palustre* var. *palustre* (from Porsild and Cody 1980); **E.** *Equisetum fluviatile* (by J. Janish in Hitchcock et al. 1969).



*Epilobium palustre* var. *palustre* - Swamp willow-herb (Figure 5)

Swamp willow herb has a circumboreal distribution, extending south in North America to Washington, Colorado, Wisconsin, and Pennsylvania. In Wyoming, it is currently known from 8 extant populations, 3 of which were discovered on the SNF in 1996. Two populations, containing fewer than 50 plants each, were found at Little Moose Lake (EO # 008) and the bogs northeast of Lily Lake in the Beartooth Range (EO # 010). A third, unsurveyed, population was discovered at Swamp Lake and is protected within the Swamp Lake Special Botanical Area (EO # 009). Although now known from 11 occurrences in Wyoming, all of the extant populations are extremely small and restricted to specialized bog or fen habitats that are themselves extremely uncommon in Wyoming.

*Equisetum fluviatile* - Water horsetail (Figure 5)

Water horsetail occurs from Labrador to Alaska, south to Virginia, Illinois, northwest Wyoming, and Washington. In Wyoming, it is known from only 2 extant populations, one of which was discovered for the first time in SNF and Park County in 1996. This small, but locally abundant, population was found in the bottom of a dried pond in the Muddy Creek wetland (EO # 003), approximately 1 mile west of Clay Butte (within the Absaroka-Beartooth Wilderness). Although located near a popular hiking trail, this wetland site does not appear to be threatened by recreational use.

*Erigeron humilis* - Low fleabane (Figure 6)

Low fleabane is a boreal species found at the edge of its range in the mountains of northern Wyoming. It is currently known from 7 extant occurrences in the state, 6 of which occur in the Absaroka and Beartooth mountains on SNF. The population on Clay and Beartooth buttes (EO # 002) was resurveyed in 1996 and found to be slightly larger than previously reported by Mills and Fertig (1996 b). A new colony of about 20 plants was observed growing among prostrate mats of arctic willow on the west rim of Clay Butte. Throughout its range in Wyoming, this species apparently is found in small colonies of less than 50 individuals, making it vulnerable to extirpation from human or natural disturbances.

*Erigeron radicans* - Taprooted fleabane (Figure 6)

This regional endemic of southern Canada, east-central Idaho, southwest Montana, and western Wyoming was discovered at 2 new sites on the SNF in 1996, raising the total number of known occurrences in Wyoming to 7. Small populations (estimated at several hundred individuals) were located at the south end of Arrow Mountain in the Wind River Range (EO # 006), and on Clay and Beartooth buttes in the Beartooth Range (EO # 007). Both of these populations occur within designated wilderness areas and appear to be secure from human-induced threats. Recent surveys in Wyoming and Idaho (Moseley 1989) have found this species to be more widespread and abundant than previously suspected.

*Eriophorum callitrix* - Sheathed cotton-grass (Figure 6)

Sheathed cotton-grass is a circumpolar species with disjunct populations in the Beartooth and Wind River ranges in northwestern Wyoming. It is currently known from 5 populations in the state, one of which was resurveyed in 1996. An extensive colony of

over 1000 plants was observed in a broad, moist tundra meadow near the head of Littlerock Creek on the Beartooth Plateau, (EO # 001) just south of the proposed Line Creek/Twin Lakes Research Natural Area (Fertig and Bynum 1994 a). This area is grazed extensively by sheep, but it is not known whether this activity is having a negative impact on the population. Three populations of this species (all on the SNF) are currently found within designated wilderness areas in Wyoming.

*Eriophorum gracile* - Slender cotton-grass (Figure 6)

Slender cottongrass is a circumboreal species found at the southern edge of its range in northwestern Wyoming. Prior to 1995, it was known from a single extant population in the Jackson Hole area in Wyoming. Stephanie Mills discovered the first two populations for SNF and Park County during rare plant surveys in 1995 (Mills and Fertig 1996 b). One of these colonies was resurveyed in 1996, and one additional occurrence was discovered. The Little Moose Lake population (EO # 004) was observed to be extremely uncommon and potentially threatened by trampling and grazing in its floating mat habitat. A slightly larger, but more secure population was found at the bog site 0.7 miles northeast of Lily Lake (EO # 005). This latter population contained 50-75 individuals within an area not receiving grazing use or regular human visitation. Although 2 populations in the state are protected, this species is considered highly vulnerable due to its small population size, specialized habitat, and moderate degree of threat.

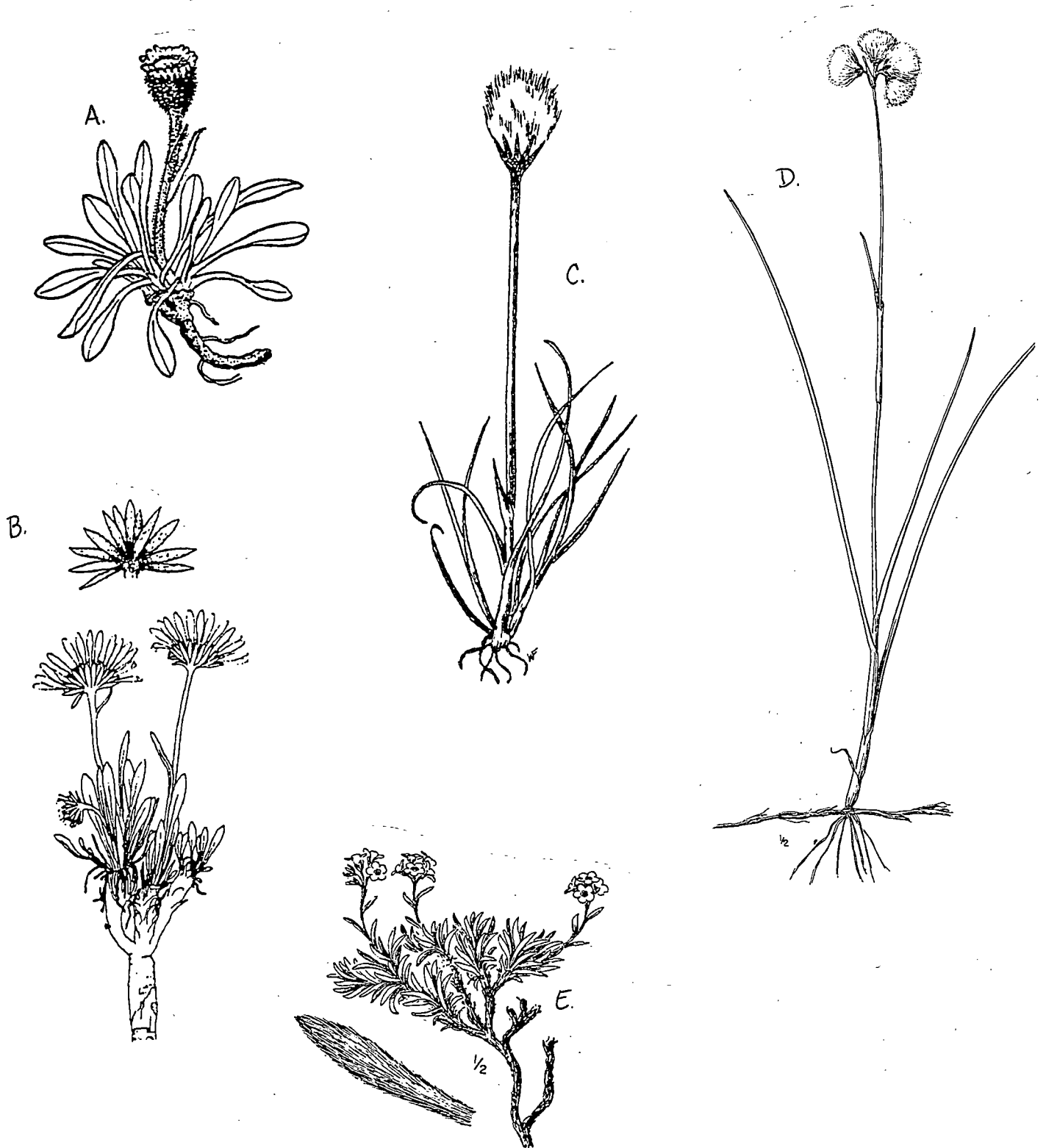
*Eritrichium howardii* - Howard forget-me-not (Figure 6)

Howard forget-me-not is a regional endemic of northern Wyoming and adjacent Idaho and Montana and was recently added to WYNDD's rare species list due to concerns over the plant's limited range in the state (Fertig 1997). Only 6 extant populations of this species are known in Wyoming, 3 of which occur on the SNF. A single, small colony was located at the south end of Bald Ridge in 1996, just outside the boundary of the proposed Bald Ridge Research Natural Area (Fertig and Bynum 1994 b). This area burned in August 1996, but it is not known what impacts (if any) the fire had on this species or its calcareous gravel-cushion plant habitat. The small population size, restricted range, and specialized habitat of this species makes it vulnerable to large scale disturbances or chance natural events.

*Festuca hallii* (*F. altaica* ssp. *hallii*; *F. scabrella*) - Hall's fescue (Figure 7)

This USFS Region 2 Sensitive species is found from northern Alberta to Ontario and south to Colorado and North Dakota. In Wyoming, it is currently known from 7 extant populations in the eastern Absaroka Range on SNF lands and 2 historical or unconfirmed locations in the Bighorn and Medicine Bow ranges (Mills and Fertig 1996 a). One new occurrence was discovered at the south end of Bald Ridge during 1996 rare plant surveys on SNF (EO # 009). This species was often codominant with *Festuca idahoensis* and *Poa secunda* in small patches of suitable habitat. Hall's fescue is thought to be highly palatable to livestock, and many of the associated species in *F. hallii* plant associations are known to be decreasers under heavy grazing (Tweit and Houston 1980; Fertig 1995 c). Mills, however, noted that *F. hallii* did not appear to be a favored late-season forage species at one site in the Sunlight Basin surveyed in 1995 (Mills and Fertig 1996 b). The impact of the August 1996 Bald Ridge fire on the population of *F. hallii* is not known.

Figure 6. Line drawings of rare plants of Shoshone National Forest: A. *Erigeron humilis* (from Hulten 1968); B. *Erigeron radicans* (by J. Rumley in Cronquist 1955); C. *Eriophorum callitrix* (by W. Fertig in Mills and Fertig 1996 b); D. *Eriophorum gracile* (by J. Janish in Hitchcock et al. 1969); E. *Eritrichium howardii* (by J. Janish in Hitchcock et al. 1959).



Follow-up surveys are recommended at this site to determine the effects of grazing and fire on this population. Only 2 occurrences of Hall's fescue occur in protected areas on the SNF (both in the North Absaroka Wilderness Area), but it is not known whether these populations are receiving adequate management attention.

*Gayophytum humile* - Low ground-smoke (Figure 7)

Low ground smoke occurs from central Washington and southern California east to Idaho and northwest Wyoming, with a disjunct population in Chile (Hitchcock and Cronquist 1961). In Wyoming, it is known from only 4 extant populations in the Yellowstone Plateau and northern Absaroka Range, including one new occurrence discovered during surveys on the SNF in 1996. A population of 1000-1500 plants was observed along the drier margins of a small seep spring on the north side of Bonneville Creek, about 2 miles northeast of Brooks Lake (EO # 006). Although not located within a special management area, this population appears to be secure due to the inaccessibility and ruggedness of its volcanic habitat. This diminutive plant tends to occur in small, specialized microsites, and is probably under-collected in Wyoming.

*Ipomopsis spicata* ssp. *robruthii* (*I. spicata* var. *robruthiorum*) – Kirkpatrick's ipomopsis (Figure 7)

This USFS Region 2 Sensitive species is restricted to volcanic scree and tundra habitats in the Absaroka Range in Park County, Wyoming (Mills and Fertig 1996 a). Only 13 populations are known, all of which occur within the SNF. At least 10 of these occurrences are found within designated wilderness areas. One existing population on the north side of Ptarmigan Mountain (EO # 001) was resurveyed in 1996. Three small to medium-sized colonies containing 500-650 individuals were located on semi-bare eroded slopes of light brownish-white andesite volcanic gravel. An additional known site at Clayton Mountain (EO # 002) was resurveyed in 1996, but no individuals of Kirkpatrick's ipomopsis could be located. More surveys are planned for this species in 1997 to better determine its distribution, abundance, and management needs on the SNF.

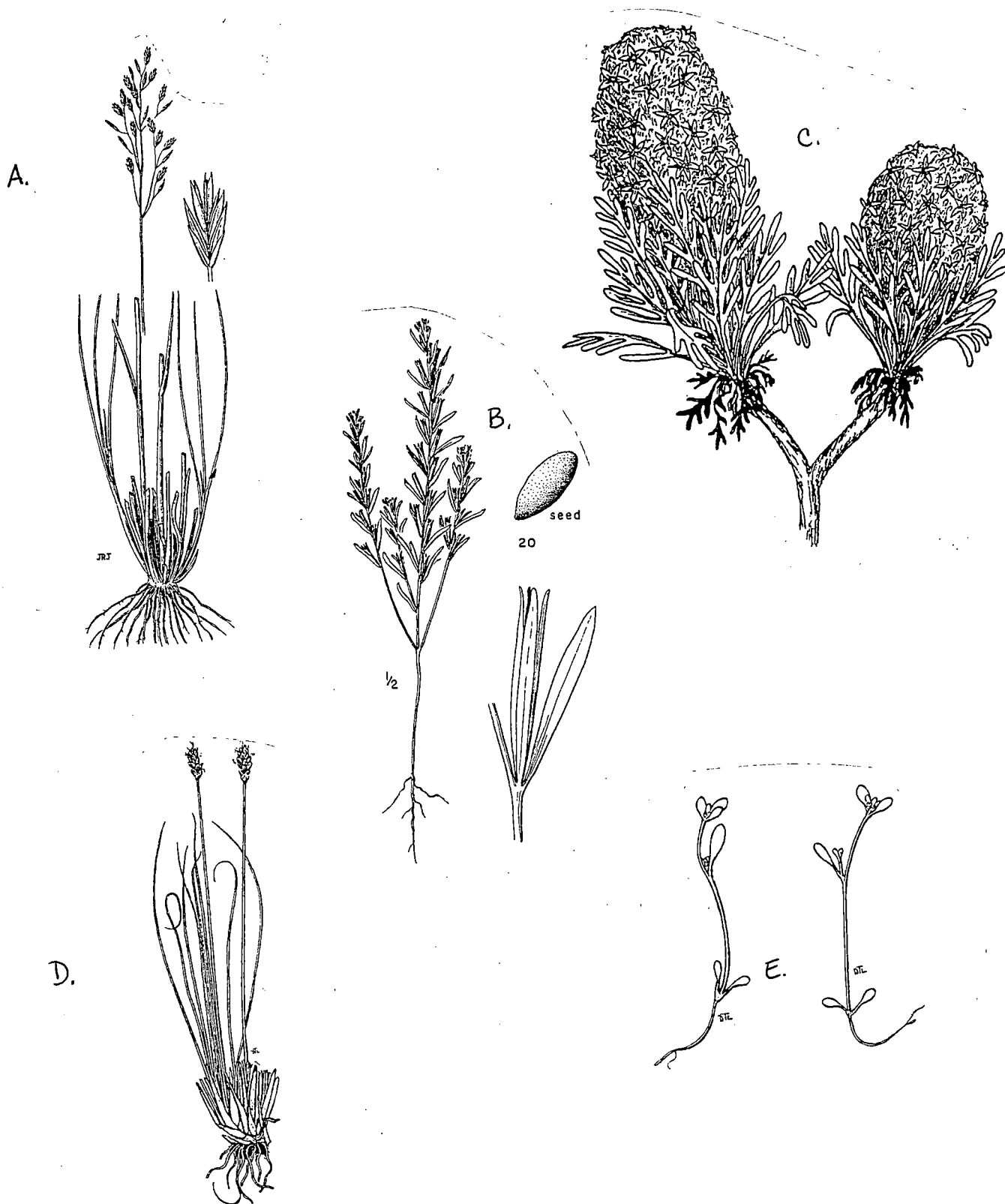
*Kobresia macrocarpa* (*K. schoenoides*; *K. sibirica*) – Siberian kobresia (Figure 7)

Siberian kobresia is a circumpolar species at the southern edge of its range in northwestern Wyoming and Colorado. It is known from only 3 occurrences in the Beartooth and northern Absaroka ranges in Wyoming (all on the SNF). An existing occurrence on the Beartooth Plateau (EO # 001) was relocated in 1996, and found to be more extensive than previously reported (Fertig and Bynum 1994 a). Although locally abundant, the population appears to be restricted to dry, wind-exposed ridgetop microsites. This population is located within the boundaries of the proposed Line Creek/Twin Lakes Research Natural Area. Colonies on the Beartooth Range may be impacted by sheep grazing, trampling, or disturbances from recreational activities. All other known populations on the SNF are within designated wilderness areas.

*Koenigia islandica* - Koenigia (Figure 7)

Koenigia is a circumpolar, low arctic annual with disjunct populations in southwestern Montana, northwestern Wyoming, and central Colorado (Johnson 1962). In Wyoming, it is known from 2 occurrences in the Beartooth and Wind River ranges, both on SNF

Figure 7. Line drawings of rare plants of Shoshone National Forest: **A.** *Festuca hallii* (by J. Janish in Hitchcock et al. 1969); **B.** *Gayophytum humile* (by J. Janish in Hitchcock and Cronquist 1961); **C.** *Ipomopsis spicata* ssp. *robruthii* (by W. Fertig in Mills and Fertig 1996 a); **D.** *Kobresia macrocarpa* (from Porsild and Cody 1980); **E.** *Koenigia islandica* (from Porsild and Cody 1980).



lands. Six small colonies were observed within the Beartooth Plateau occurrence (EO # 002) during surveys in 1996. These colonies were found to be extremely dense and locally abundant (averaging several thousand individuals), although typically restricted to small areas of suitably wet, organic or moss-rich soils along streams below melting snow banks. Several colonies were observed in areas frequented by sheep or horses. Although levels of grazing, trampling, and nitrate deposition are presumed to be high, these colonies did not appear to be adversely impacted by livestock. At least 2 of these colonies were found within the boundaries of the proposed Line Creek/Twin Lakes Research Natural Area (Fertig and Bynum 1994 a). Trend data are lacking for this species, but due to its annual life history and the harsh environment of its habitat, large fluctuations in numbers may be expected from year to year.

*Lesquerella fremontii* - Fremont bladderpod (Figure 8)

Fremont bladderpod is a USFS Region 2 Sensitive species that is restricted to the east slope of the Wind River Range in Fremont County, Wyoming. It is currently known from 9 extant occurrences, including 6 on SNF lands. In 1996, a new occurrence was discovered on Arrow Mountain (EO # 014) in the northern Wind River Range, approximately 56 air miles northwest of the nearest known population west of Lander. Several hundred plants were observed in an area of less than 5 acres in a calcareous alpine cushion plant community. This colony is the only one on the SNF that is currently located within a protected area (Fitzpatrick Wilderness). Lower elevation populations on the Forest may be threatened by limestone quarrying, erosion and soil compaction from off-road vehicles, and trampling by livestock (Fertig 1995 a).

*Lomatium attenuatum* - Absaroka biscuitroot (Figure 8)

Absaroka biscuitroot is a regional endemic of the Absaroka and Tendoy Mountains of northwestern Wyoming and adjacent Montana (Mills and Fertig 1996 a). In Wyoming, it is apparently restricted to semi-barren volcanic and calcareous mountain slopes in the North Fork Shoshone River drainage. WYNDD currently recognizes 12 extant populations in Wyoming, 9 of which occur on lands managed by SNF. Two existing populations (EOs 003 & 004) and 2 new locations near Mummy Cave (EO # 011) and on the west slope of Clayton Mountain (EO # 012) were surveyed in 1996. These populations were found to consist of numerous, small and widely scattered colonies averaging 30-50 individuals. The largest population was observed on the ridge-system between Clearwater and Sweetwater creeks (EO # 004), where an estimated 1500-2000 plants were observed in 1996. Based on the amount of available habitat in the North Fork watershed, the total state population is probably close to 10,000 individuals, up from an estimate of 4000 plants in an earlier study (Dorn 1989 b). Threats appear to be low due to the rugged nature of the plant's habitat and the minimal amount of forage present for grazing species. Both Marriott (1988) and Dorn (1989 b) recommended that Absaroka biscuitroot not be listed as Sensitive on SNF or under the Endangered Species Act due to the low degree of threats.



Figure 8. Line drawings of rare plants of Shoshone National Forest: A. *Lesquerella fremontii* (by I. Nichols in Fertig et al. 1994); B. *Lomatium attenuatum* (by W. Fertig in Mills and Fertig 1996 a); C. *Parrya nudicaulis* (by K. Thorne in Fertig et al. 1994); D. *Pedicularis oederi* (by J. Janish in Hitchcock et al. 1959).



*Parrya nudicaulis* - Naked-stemmed parrya (Figure 8)

This USFS Region 2 Sensitive species occurs from Siberia to northwestern Canada, with disjunct populations in the Beartooth, Wind River, and Gros Ventre ranges of northwest Wyoming (Mills and Fertig 1996 a). Eight populations are currently known in Wyoming, 3 of which are found on the SNF. The population on Beartooth Butte (EO # 002) was resurveyed in 1996 and found to be more extensive and abundant than previously reported by Mills and Fertig (1996 b). An estimated 25,000-30,000 plants were observed on the summit and west-facing limestone-sandstone talus slopes of the butte. Most of this population lies within the Absaroka-Beartooth Wilderness Area and is largely unthreatened due to the rugged terrain. Recent surveys have demonstrated that this species is far more abundant and less threatened than once suspected, and it has been recommended for delisting as Sensitive in USFS Region 4 (Fertig 1995 b)

*Parrya nudicaulis* is an unusually variable taxon that has historically been divided into numerous species or varieties (Fertig 1995 b). Disjunct populations in the Uinta Mountains of northeastern Utah and the mountains of northwestern Wyoming are morphologically distinct enough to have been treated as separate species by some authors (Welsh et al. 1993). Rollins (1993) however, has observed the same morphological characters distinguishing these segregate taxa in populations throughout northern Eurasia, and has chosen to recognize *P. nudicaulis* as a single, polymorphic species.

*Pedicularis oederi* - Oeder's lousewort (Figure 8)

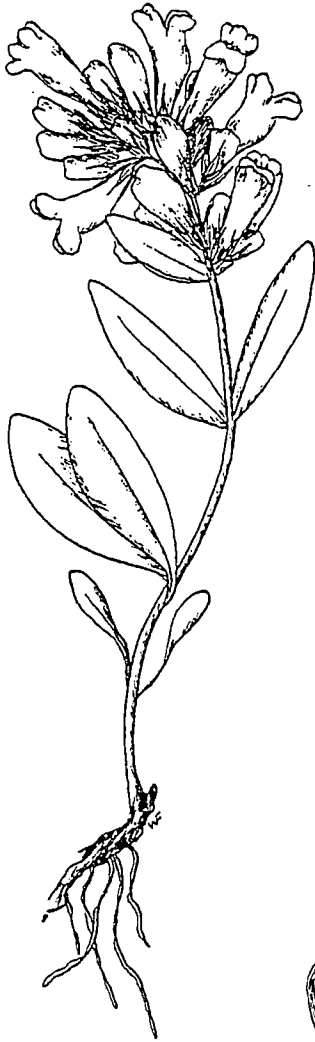
Oeder's lousewort is a circumpolar species with disjunct populations in the Beartooth Mountains of Wyoming and Montana (Scott 1997). In 1996, 10 colonies were surveyed on the Beartooth Plateau (EO # 001) in an area of about 150 acres. This species was observed to be locally common, but was often widely scattered and rarely contributed more than a trace amount of cover. Much additional unsurveyed potential habitat is present on the Beartooth Plateau, particularly in moist peatlands, willow communities, and *Geum rossii* turf communities. Portions of this occurrence are located within the proposed Line Creek/Twin Lakes Research Natural Area (Fertig and Bynum 1994 a). Although individual sites may be impacted by sheep grazing, trampling, and high recreational use, most colonies of this species appear to be secure at present.

*Penstemon absarokensis* - Absaroka beardtongue (Figure 9)

Absaroka beardtongue is endemic to the Absaroka and northeast Wind River Range in Park and Fremont counties, Wyoming (Mills and Fertig 1996 a). WYNDD currently recognizes 17 occurrences of this species, 15 of which are found on the SNF. Five occurrences were surveyed in 1996, including one new population (EO # 015) on the ridge west of Libby Creek in the North Fork Shoshone River drainage. Most populations were found to consist of numerous, small, and sparsely populated colonies restricted to microsites within continuous expanses of seemingly suitable, unoccupied barren volcanic scree habitat. Individual colonies were observed to contain an average of 20-50 individuals, which was consistent with earlier studies by Marriott (1988) and Dorn (1989 c). One exceptional colony on a barren ridge north of Cougar Creek (EO # 006) was observed to have an estimated 3000-5000 plants in an area that was disturbed by a game and outfitter's trail. Based on studies in 1996, the entire population of Absaroka

Figure 9. Line drawings of rare plants of Shoshone National Forest: **A.** *Penstemon absarokensis* (by W. Fertig in Mills and Fertig 1996 a); **B.** *Phippsia algida* (from Porsild and Cody 1980); **C.** *Physaria saximontana* var. *saximontana* (by R. Jones in Fertig et al. 1994); **D.** *Potamogeton praelongus* (by J. Janish in Hitchcock et al. 1969).

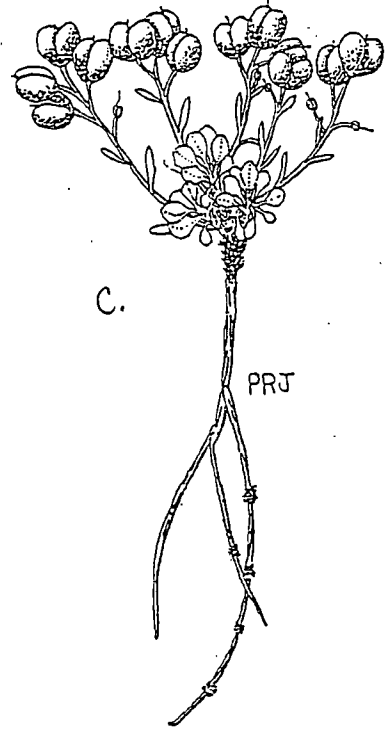
A.



B.



C.



D.



beardtongue is estimated at 8000-15,000 individuals, a significant increase over an earlier estimate of 2000 plants (Dorn 1989 c). Most populations are unthreatened due to the ruggedness of the plant's habitat, although some low elevation colonies may be impacted by recreational activities, competition from weeds, road construction, and copper mining. Marriott (1988) recommended against listing Absaroka beardtongue as a USFS Region 2 Sensitive species based on the overall low degree of threat. Dorn (1989 c) also cited low threats in recommending against listing this species under the Endangered Species act, but suggested that Sensitive designation was appropriate due to the plant's low population size. Better population estimates are needed from known occurrences on the SNF and unsurveyed potential habitat should be investigated before a final decision on listing this species as regionally Sensitive is made.

*Phippsia algida* - Ice grass (Figure 9)

Ice grass is a circumpolar, high arctic species, known from several disjunct locations in the high mountains of south-central Montana, northwest Wyoming and central Colorado. In Wyoming, it is known from only 3 locations in the Beartooth and Wind River ranges. The SNF's only population, located on the Beartooth Plateau (EO # 001), was resurveyed in 1996 and found to be slightly larger than previously documented (Johnson 1962; Fertig and Bynum 1994 a). Three small colonies averaging 30-50 plants were observed on bare gravels bordering small snowmelt streams south of Wyoming Creek and near the head of Bennett Creek. Johnson (1962) reports that this species is strongly nitrophilous, which may explain its presence in habitats frequented by high numbers of sheep. Additional potential habitat is probably present along other snowmelt streams on the Beartooth Plateau, including lands within the proposed Line Creek/Twin Lakes Research Natural Area.

*Physaria saximontana* var. *saximontana* - Rocky Mountain twinpod (Figure 9)

Rocky Mountain twinpod is known from 18 extant populations, all restricted to the Wind River and Bighorn basins and foothills of the Owl Creek and Wind River mountains in Fremont and Hot Springs counties, Wyoming (Fertig et al. 1994). This species was first documented on the SNF near Fossil Hill in the southern Wind River Range during 1995 rare plant surveys (Mills and Fertig 1996 b). A second population on the SNF was discovered on the south slopes of Torrey Rim, just north of the Trail Lake trailhead (EO # 006) in 1996. This new occurrence was found to consist of 500-700 flowering and vegetative individuals in an area of 2-3 acres of fine, grey shale slopes. Most of the known occurrences and suitable habitat for this species are found on public lands managed by the BLM. At present, however, only the populations on The Nature Conservancy's Red Canyon Ranch and the BLM's Beaver Rim Area of Critical Environmental Concern are protected (Jones 1989; Fertig 1995). Mills and Fertig (1996 b) recommended that Rocky Mountain twinpod be considered for Sensitive designation in USFS Region 2 due to its limited distribution and inadequate protection.

*Potamogeton praelongus* - White-stem pondweed (Figure 9)

This boreal, aquatic species is found at the southern edge of its range in high mountain lakes and bogs in Wyoming and Colorado. Three extant populations are known from SNF lands in Wyoming, 2 of which were discovered during rare plant surveys in the

Beartooth Range in 1996. Populations from Little Moose Lake (EO # 003) and Lily Lake (EO # 004) were observed to be locally common, numbering from 200 to over one thousand or more individuals. These populations appear to be secure at the present time, although impacts from high recreation use and pollution could be a potential threat at the Lily Lake site. This species, like many other rare species of pondweed, may be more widespread than currently recognized due to lack of study.

*Pyrrocoma carthamoides* var. *subsquarrosa* (*Haplopappus carthamoides* var. *subsquarrosus*) – Absaroka goldenweed (Figure 10)

Absaroka goldenweed is a regional endemic of the Absaroka Mountains of northwest Wyoming and the Beartooth and Pryor ranges in south-central Montana (Lesica 1995; Mills and Fertig 1996 a). This USFS Region 2 Sensitive species is currently known from 12 occurrences in Wyoming, all of which are found partially or completely on lands managed by the SNF. Past surveys have suggested that the total population in Wyoming and Montana may number 200,000 individuals (Lesica 1995). Populations on Bald Ridge (EO # 001) and the Clarks Fork Valley (EO # 006) were resurveyed in 1996 and found to be even more abundant and widespread than previously known (Fertig and Bynum 1994 b; Mills and Fertig 1996 b). Individual subpopulations were found to number in the low hundreds to thousands. The largest occurrences were found in calcareous grasslands with little to no cover of *Festuca idahoensis* or woody shrubs. Most of the surveyed sites were grazed by cattle or used for recreation by off-road vehicles. Both activities may result in trampling of plants, soil compaction, erosion, or the spread of noxious weeds. There is some evidence, however, to suggest that this species may benefit from some surface disturbances (Fertig 1995 c; Lesica 1995). The plant is believed to be unpalatable to livestock and does not appear to be grazed (Fertig 1995 c). Lesica (1995) also identified fire suppression as a potential threat to the survival of this species. A wildfire in August 1996 burned much of the habitat of the Bald Ridge population, providing an excellent opportunity for follow-up studies to test Lesica's hypothesis. This population is partially contained within the proposed Bald Ridge Research Natural Area (Fertig and Bynum 1994 b), and is one of only 4 occurrences on the SNF within a designated or potential special management or wilderness area.

*Salix farriae* - Farr's willow (Figure 10)

Farr's willow occurs from British Columbia to Alberta and south to Oregon and northwestern Wyoming. It is presently known from 8-9 extant populations in Wyoming, 6 of which occur on the SNF. One known occurrence, and three newly discovered populations were surveyed on the SNF in 1996. A population of at least 150 individuals was relocated along the banks of the Wind River about 3 miles southeast of Togwotee Pass (EO # 004). This area receives high recreational use by fishermen and sightseers, but does not appear to be adversely impacted at the present time. New populations were found in the northern Absarokas along Republic Creek (EO # 006), and in the Beartooth Range on the west side of Beartooth Lake (EO # 007) and at Little Moose Lake (EO # 008). Of these populations, only the Beartooth Lake colony was notably abundant, with this species accounting for nearly 30% of the local willow cover. These and other recent surveys in the Gros Ventre and Jackson Hole area (Hartman 1995) suggest that Farr's

Figure 10. Line drawings of rare plants of Shoshone National Forest: A. *Pyrrhoma carthamoides* var. *subsquarrosa* (by W. Fertig in Fertig et al. 1994); B. *Salix farriac* (by W. Fertig); C. *Saussurea weberi* (by W. Fertig in Scott 1997).



willow may be more abundant and widespread in the state than previously recognized and not in need of special management attention.

*Saussurea weberi* - (*S. densa*) Weber's saw-wort (Figure 10)

Weber's saw-wort is a regional endemic of southwestern Montana, northwestern Wyoming, and central Colorado (Mills and Fertig 1996 a). In Wyoming, it is currently known from 6 occurrences, 2 of which are found in the SNF. A large population was relocated on the south slopes of Arrow Mountain in 1996 (EO # 001). Several thousand plants were observed at 3 main sites on the mountain, including a new site just off the Glacier Trail southeast of the Williamson Corrals. This colony was unusual in that it occurred within a thicket of *Betula glandulosa* and *Salix glauca* on quartz gravel, rather than in more typical semi-barren cushion plant communities on sandstone or limestone. The Arrow Mountain population appears to be stable and unthreatened by livestock grazing or human trampling. All known populations of this species are located within designated wilderness areas.

*Senecio fuscatus* - Twice-hairy goldenweed (Figure 11)

Twice-hairy goldenweed is native to northern Eurasia, Alaska, and the Yukon, with disjunct populations in the Beartooth and Absaroka ranges in northwestern Wyoming (Porsild and Cody 1980). It is currently known from 18 populations in the SNF and Yellowstone National Park. An extensive population on the Beartooth Plateau (EO # 002) was relocated in 1996 and found to be extremely abundant and widespread. At least 13 colonies are now known from this population, several of which occur within the proposed Line Creek/Twin Lakes Research Natural Area. These populations appear to be stable, although some colonies may be impacted by sheep grazing or recreational activities. Other populations in the state are found primarily in wilderness areas or parks and appear to be adequately protected. At one time, the Beartooth population of twice-hairy goldenweed was considered a distinct species (Cronquist 1950), suggesting that this disjunct population may be of added conservation interest. Given the low degree of threat and the adequacy of existing protection, however, this species may no longer be a high management priority.

*Shoshonea pulvinata* - Shoshonea (Figure 11)

Shoshonea is a regional endemic of northwest Wyoming and south-central Montana (Fertig et al. 1994). In Wyoming, this USFS Region 2 Sensitive species is known from 9 occurrences, of which 3 are partly or completely located within the SNF. A known population at the south end of Bald Ridge (EO # 004) was resurveyed in 1996 and observed to be locally abundant within patches of suitable limestone bedrock habitat. Few threats were observed, although some patches were found near dirt roads and could be disturbed by off-road vehicles. This population is found within the proposed Bald Ridge Research Natural Area (Fertig and Bynum 1994 b). No other sites containing this species are currently protected in Wyoming.

Figure 11. Line drawings of rare plants of Shoshone National Forest. **A.** *Senecio fuscatus* (from Porsild and Cody 1980); **B.** *Shoshonea pulvinata* (by W. Fertig in Mills and Fertig 1996 a); **C.** *Townsendia condensata* var. *anomala* (by L. Shoemaker in Fertig et al. 1994); **D.** *Utricularia minor* (by J. Janish in Hitchcock et al. 1959).





*Townsendia condensata* var. *anomala* (*T. anomala*) – North Fork Easter-daisy  
(Figure 11)

This USFS Region 2 Sensitive species is restricted to the semi-barren volcanic slopes of the mountains bordering the North Fork of the Shoshone River in Park County, Wyoming (Mills and Fertig 1996 a). It is currently known from 13 occurrences, all of which are found on lands managed by the SNF. Four known sites and one new population were surveyed in 1996 (EOs 001, 002, 011, 012, & 017). Prior to this study, little census data existed for this plant, and populations were presumed to be small and restricted in area. Several large occurrences were found in 1996, especially on broad, concave-shaped, south and east-facing ridgecrests of semi-barren, brown andesite clay-gravel in openings in Douglas-fir and limber pine woods. Smaller colonies, often consisting of 4-10 plants, were found on steep slopes of bare, loose volcanic gravel below small cliffs. The total population at these 5 sites was estimated at 4100-5500 plants in an area of about 130 acres. Given the amount of potential habitat in the North Fork Shoshone drainage, this taxon may number in the 20,000-30,000 range. Threats are believed to be low due to the ruggedness of the plant's habitat and the low degree of grazing activity in the area. Low elevation sites, however, could be impacted by competition from weeds, trampling, or road construction. Additional survey is needed to determine the full extent of the plant's range and management needs before changes in its Sensitive status can be recommended.

*Utricularia minor* – Lesser bladderwort (Figure 11)

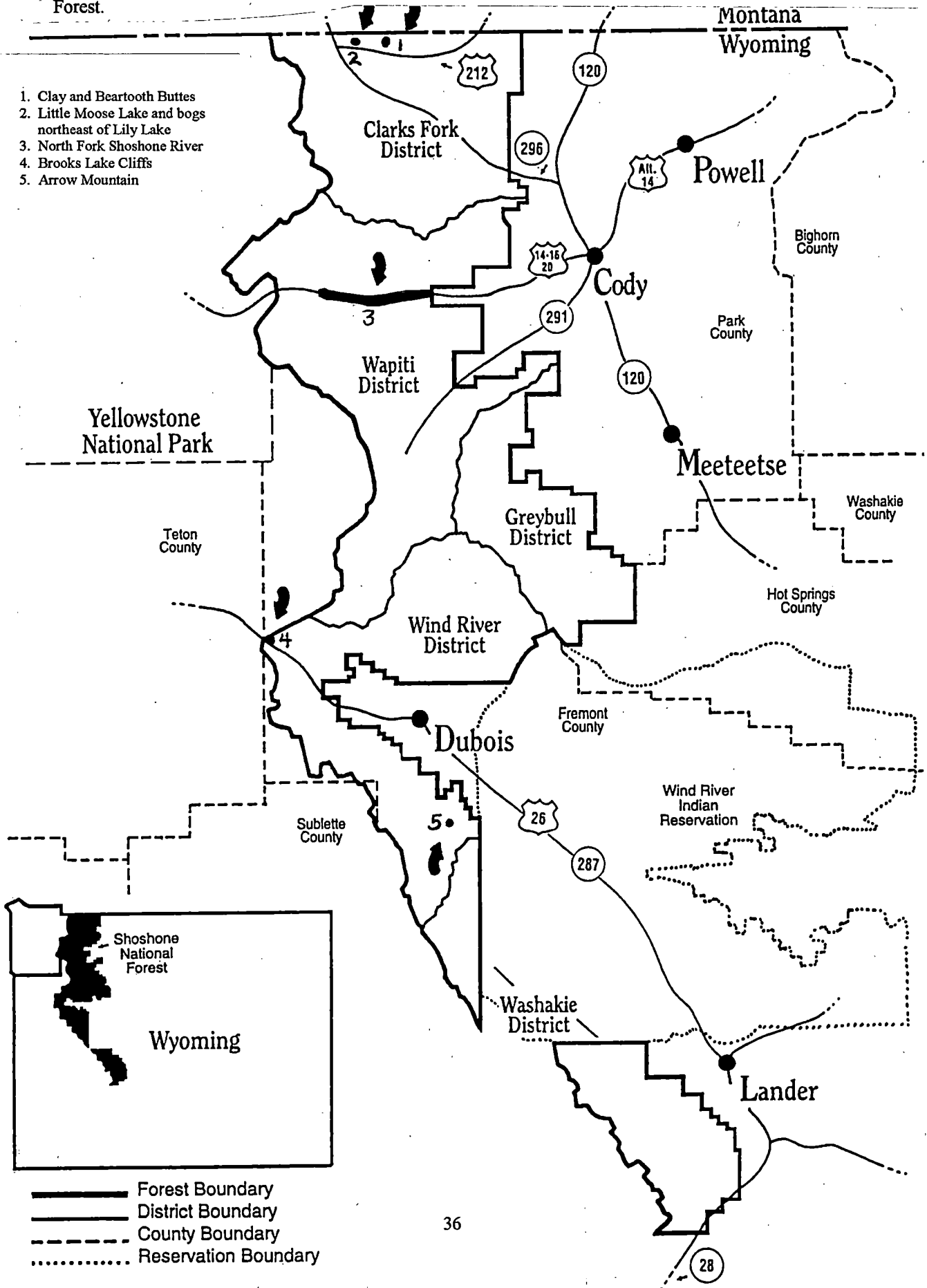
Lesser bladderwort is a circumboreal species at the southern edge of its range in Wyoming. Prior to 1996, it was known from only 3 extant populations in the state, and had not been collected in 25 years. A small population (the first for the SNF) was discovered at Swamp Lake in July 1996 (EO # 005). Although not thoroughly surveyed, at least two dozen flowering plants were observed in a small area of flooded marl amid quaking mats of *Triglochin* and *Eleocharis*. This species rarely flowers in the wild, and thus is extremely difficult to locate and census. Additional populations may occur in mountain lakes and bogs in Wyoming, but have not been found due to this problem. The Swamp Lake site is well protected as a special botanical area, but may be impacted by trespass cattle and horse grazing and by human trampling (Fertig and Jones 1992).

#### Recommended Conservation Areas

One of the primary means of protecting rare and Sensitive plant habitat is through the designation and proper management of conservation areas. Past surveys of the SNF have resulted in several noteworthy sites being recommended for designation as special botanical areas or research natural areas, including Bald Ridge, Twin Lakes, and Swamp Lake (Jones 1991; Fertig and Jones 1992; Fertig and Bynum 1994 a, 1994 b). To date, however, only Swamp Lake has been officially designated.

Several other significant botanical areas on the SNF are worthy of some form of special management designation. Five of these are briefly discussed in the following section.

Figure 12. Recommended special management areas for rare and sensitive plants on Shoshone National Forest.



### 1. Clay and Beartooth Buttes (Figure 12)

This pair of buttes on the northwest side of Beartooth Lake contains the only alpine calcareous habitats in the Beartooth Range. Eight high priority rare plant species are found at this site, including one SNF Sensitive species (*Parrya nudicaulis*). In addition, two globally rare mustard species (*Draba pectinipila* and *Draba porsildii* var. *brevicula*) are nearly restricted to the dolomite cliffs and scree slopes of the buttes. Although most of the area is located within the Absaroka-Beartooth Wilderness Area, the unusual plant species and research potential of the site makes it an outstanding candidate for the added recognition brought by designation as a research natural area or special botanical area.

### 2. Little Moose Lake and the bogs northeast of Lily Lake (Figure 12)

Little Moose Lake was the first *Sphagnum* bog to be described from the west flank of the Beartooth Range in Wyoming (Mills and Fertig 1996 b). In 1996, the unusual floating mat, wet sedge meadow, and Engelmann spruce swamp forest communities were surveyed as part of the SNF riparian classification project. Eight plant species of special concern were observed at the site, including 4 new species (*Carex leptalea*, *Epilobium palustre* var. *palustre*, *Potamogeton praelongus*, and *Salix farriae*) not previously reported from the area. Little Moose Lake is currently managed for multiple use and is used primarily for recreation and grazing. Both of these activities are potentially damaging to the fragile floating mat habitats on the east shore of the lake.

A second *Sphagnum* bog site was discovered about 0.7 miles northeast of Lily Lake in 1996 riparian surveys. This site contains 7 WYNDD species of special concern (*Carex buxbaumii*, *C. diandra*, *C. leptalea*, *C. limosa*, *Drosera anglica*, *Epilobium plaustre*, and *Eriophorum gracile*) and several unusual sedge, *Sphagnum*, floating mat, and swamp forest community types. Although similar floristically to the Little Moose Lake site, the Lily Lake bogs are located within designated wilderness and appear to receive little (if any) recreational or grazing use. Due to the lack of access and conflicts, this latter site may be better suited for special area designation.

### 3. North Fork Shoshone River corridor (Figure 12)

The andesite volcanic mountains bordering the North Fork of the Shoshone River drainage contain an unusually high concentration of rare plant species, including 4 recently described state and regional endemics: *Lomatium attenuatum*, *Ipomopsis spicata* ssp. *robruthii*, *Penstemon absarokensis*, and *Townsendia condensata* var. *anomala* (Evert 1991). Some of the best habitat for these species occurs on the foothill slopes and summits of Clayton Mountain and Ptarmigan Mountain on the south side of the Shoshone River. Additional, unsurveyed potential habitat occurs on the flanks and summit of Sheep Mesa and the Grizzly Creek drainage. At present, none of these rare species or their associated plant communities are located within designated special management areas, although some high elevation habitat is located in wilderness areas.

### 4. Brooks Lake Cliffs (Figure 12)

This site consists of the rugged subalpine volcanic cliffs and ridges along the Continental Divide west of Brooks Lake. The area contains several small colonies of *Descurainia*

*torulosa*, a Wyoming endemic and SNF Sensitive plant species. Although located near a popular campground and recreation area, the rugged cliff habitats appear to be little used by humans or livestock and largely unthreatened by existing management. Designation of the site as a special management area would draw attention to the conservation needs of *D. torulosa* and provide an area for research on the plant's specialized habitat.

#### 5. Arrow Mountain (Figure 12)

The northern Wind River Range contains a small number of alpine peaks bearing a cap of remnant calcareous bedrock. These sites provide habitat for a suite of regionally endemic alpine calceophilic plants, many of which are listed as Sensitive by USFS Region 2 or Bridger-Teton National Forest. Arrow Mountain, located about 10 miles southeast of Dubois in the SNF, contains one of the largest concentrations of rare calceophilic plants in the Wind River Range. Seven rare plants species were located at this site during 1996 surveys, including two new state records (*Arnica angustifolia* ssp. *tomentosa* and *Braya humilis*). The Arrow Mountain site is located just east of the popular Glacier Trail, but appears to receive few negative impacts from existing recreational activity. Although protected within the Fitzpatrick Wilderness Area, the site is worthy of recognition as a special management area to bring the proper emphasis to its uncommon botanical features.

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