

PLANTS AND VEGETATION OF THE  
POTENTIAL GRIZZLY CREEK RESEARCH NATURAL AREA  
WITHIN THE SHOSHONE NATIONAL FOREST,  
PARK COUNTY, WYOMING

Prepared for the

Shoshone National Forest, USDA Forest Service

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## **INTRODUCTION**

This report presents information on the rare plants and the vegetation types in the potential Grizzly Creek Research Natural Area (RNA). The information is arranged in the structure used in a research natural area establishment report, to allow its easy incorporation into an RNA establishment report for Grizzly Creek, should the area be designated as a research natural area.

Much of the information in this report is derived from an earlier report about the potential Grizzly Creek RNA (Jones and Fertig 1999). The information from that earlier report has been updated in several ways. First, the proposed boundary of this potential RNA may differ slightly from that shown in the original report, as a result of changes made by Forest Service staff. Second, when necessary, names of vascular plant species have been converted to those used in the PLANTS database (USDA, Natural Resources Conservation Service 2009), which is now the standard for plant names used by U.S. Department of Agriculture agencies. Third, names of plant associations have been brought up to date. Fourth, new information about rare plants, within the potential RNA and outside it, has been included. This information may have changed our understanding of the distribution of some plants in the potential RNA, and may have caused some plant species to be dropped from the list of rare plants in the area. Fifth, the maps of cover-types have been digitized using digital raster graphic files (i.e., digital topographic maps) and true-color aerial photographs as backgrounds, and boundaries of cover-types have been changed slightly during digitizing when the topographic maps and aerial photographs indicated mistakes in the original maps. Consequently, the area covered by each cover-type may have changed slightly.

## **LAND MANAGEMENT PLANNING**

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## **OBJECTIVES**

One of the primary objectives of research natural areas is to "...preserve a wide spectrum of pristine representative areas that typify important forest, shrubland, grassland, alpine, aquatic, geologic and similar natural situations..." (Forest Service Manual 4063.02).

The objectives of a Grizzly Creek RNA would be to 1) maintain a reference area for (a) monitoring effects of resource management techniques and practices applied to similar ecosystems, (b) comparing results from manipulative research, and (c) determining the range of natural variability; 2) protect elements of biological diversity; 3) provide a site for non-manipulative scientific research; and 4) provide on-site and extension educational opportunities.

## **PRINCIPAL DISTINGUISHING FEATURES**

The principal distinguishing features of the potential Grizzly Creek RNA are a variety of Douglas-fir woodlands, several types of sagebrush shrub steppe, and populations of four rare vascular plant species.

## **LOCATION**

The potential Grizzly Creek RNA is located within the Shoshone National Forest in northwestern Wyoming. The approximate center of the potential RNA is at latitude 44°34'15" and longitude 109°37'55"W.

The potential RNA includes all or parts of the following sections (all on the 6th Principal Meridian): Township 52N, Range 105W, Sections 6, 7, 18, 19, 20; T52N, R106W, Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24; T53N, R105W, Sections 30, 31; T53N, R106W, Sections 23, 24, 25, 26, 35, 36.

## **BOUNDARY**

The proposed boundary follows drainage divides on the northern end and eastern side of the potential RNA (Figure 2). On the western side, the proposed boundary follows drainage divides for the most part, except where it crosses the valley of Horse Creek. On the southern end, it follows the northern bank of the Shoshone River.

## **AREA**

The total area of the potential Grizzly Creek RNA is 11,685 acres (4,729 ha).<sup>1</sup>

## **ELEVATION**

The elevation of the potential Grizzly Creek RNA ranges from approximately 5,760 feet (1,756 m) on the North Fork of the Shoshone River at the southeastern corner to approximately 10,850 feet (3,307 m) at the northern end.

## **ACCESS**

The potential Grizzly Creek RNA may be reached via 2 different routes, all on public roads or public lands. To reach the eastern side of the potential RNA, travel on U.S. Highway 14/16/20 from Cody, Wyoming west approximately 30 miles (48 km) to the Shoshone National Forest boundary and a gravel road turning off of the highway to the north, thence north on that road across the Shoshone River and west immediately after crossing the river to the trailhead of Forest Trail 795, thence west approximately 0.5 mile (0.8 km) on that trail to the southeastern corner of the potential RNA. Trail 795 runs north along the eastern side of the area.

To reach the western side of the potential RNA, continue west on Highway 14/16/20 approximately 2 additional miles (3.2 km) to the Wapiti Campground, thence north on Low Standard Forest Road 423 across the Shoshone River, thence east (by foot or horseback) across the drainage divide into the Horse Creek drainage basin and the western side of the potential RNA.

## **ECOREGION**

The potential Grizzly Creek RNA lies within the Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province, Yellowstone Highlands Section (M331A) of the ecoregion classification of Bailey *et al.* (1994) (Freeouf 1996).

## **MAPS**

USDA Forest Service 1/2 inch = 1 mile scale map of the Shoshone National Forest.

USDI Geological Survey 7.5-minute topographic quadrangle maps: Dead Indian Peak, Wyo. and Flag Peak, Wyo.

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1. The area of the potential Grizzly Creek RNA was computed by WYNDD staff with the ESRI® ArcMap™ 9.3 software, using a digital version of the boundary supplied by the Forest Service.

## AREA BY COVER-TYPE

This information on plant associations, habitat types, Kuchler vegetation types, and Society of American Foresters forest cover-types is based on 1998 field work conducted by Natural Diversity Database biologists, reported in an earlier document (Jones and Fertig 1999), and revised to reflect new names for plant associations. Maps of these cover-types were digitized on-screen by Natural Diversity Database staff, using the ESRI® ArcMap™ 9 software; boundaries are based on the hand-drawn map in the earlier report (Jones and Fertig 1999) and were digitized using digital raster graphic files (digital topographic maps) and 2009 National Agriculture Imagery Program true-color aerial photographs (USDA, Farm Services Administration, Aerial Photography Field Office) as backgrounds. The areas of these various cover-types were computed in the ArcMap™ software.

### PLANT ASSOCIATIONS

The major plant associations (Table 1 and Figure 3) are (i) shrub steppe dominated by *Artemisia tridentata* ssp. *vaseyana* and *Festuca idahoensis* or by *Artemisia nova* and *Pseudoroegneria spicata*, which are common in a mosaic of shrub steppe, grass, and woodland vegetation in the southern half of the area; and (ii) woodlands of *Pseudotsuga menziesii* with a variety of species in the undergrowth, that form the matrix vegetation in most of the potential RNA. *Abies lasiocarpa* – *Picea engelmannii* subalpine forest is a major component of the vegetation at the highest elevations, but this vegetation covers only a small area in the potential RNA.

Narrow riparian zones along the perennial streams support small stands of *Alnus incana* shrub vegetation and *Populus angustifolia* – *Pseudotsuga menziesii* woodland. *Populus balsamifera* is common in the latter.

### KUCHLER VEGETATION TYPES

The potential Grizzly Creek Research Natural Area supports vegetation in three Kuchler (1964) types (Table 2 and Figure 4). Douglas-fir Forest is the most common by far of the three. The Wheatgrass-Needlegrass Shrubsteppe covers much of the landscape at the southern end of the potential RNA, and the Western Spruce-Fir Forest is common at high elevations at the northern end.

### HABITAT TYPES

*Artemisia tridentata* ssp. *vaseyana* and *Artemisia nova* shrub habitat types (Tweit and Houston 1980), and habitat types in the *Pseudotsuga menziesii* Series (Steele *et al.* 1983) cover most of the potential Grizzly Creek RNA (Table 3 and Figure 5). High-elevation sites in the northern part of the area, with subalpine forest, likely belong to the *Abies lasiocarpa* Series (Steele *et al.* 1983), but insufficient information was collected during field survey (Jones and Fertig 1999) to assign them to habitat type.

### SOCIETY OF AMERICAN FORESTERS COVER TYPES

Only two Society of American Foresters forest cover types (Eyre 1980) occur in the potential RNA (Table 4 and Figure 6). The Interior Douglas-fir type is common over nearly 80% of the area, and the Engelmann spruce-subalpine fir type grows on less than 10% of the area, at the northern end. The sagebrush steppe vegetation in the southern part of the area does not fall into the SAF forest cover type classification.

Table 1. Occurrence of plant alliances and associations in complexes mapped in the potential Grizzly Creek Research Natural Area. See Figure 3. “M” in a cell indicates that a plant alliance or association is a major component of a complex, and “m” indicates that it is a minor component of the complex. Names of alliances and associations are from NatureServe (2010).

Plant Associations & Alliances	Association Complex			
	Sagebrush & grassland. 1,825 acres, 738 hectares	Douglas-fir & wheatgrass grassland. 5,510 ac, 2,230 ha	Douglas-fir & fescue grassland. 3,681 acres, 1,490 hectares	Engelmann spruce – subalpine fir. 669 acres, 271
Herbaceous				
<i>Pseudoroegneria spicata</i> Herbaceous Alliance	m	m	m	
Shrub				
<i>Alnus incana</i> / <i>Cornus sericea</i> Shrubland Association	m	m	m	
<i>Artemisia nova</i> / <i>Pseudoroegneria spicata</i> Shrubland Association	M			
<i>Artemisia tridentata</i> (ssp. <i>tridentata</i> , ssp. <i>xericensis</i> ) / <i>Pseudoroegneria spicata</i> Shrub Herbaceous Vegetation Association	m			
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Festuca idahoensis</i> Shrub Herbaceous Alliance	M	m	m	
Forest & Woodland				
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> Forest Alliance			m	M
<i>Populus angustifolia</i> - <i>Pseudotsuga menziesii</i> Woodland	m	m	m	
<i>Pseudotsuga menziesii</i> / <i>Cornus sericea</i> Forest Association	m	m	m	
<i>Pseudotsuga menziesii</i> / <i>Festuca idahoensis</i> Woodland Association		m	M	m
<i>Pseudotsuga menziesii</i> / <i>Pseudoroegneria spicata</i> Woodland Association	m	M	m	
<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos albus</i> Forest Association		m	m	m

Table 2. Kuchler vegetation types mapped in complexes in the potential Grizzly Creek Research Natural Area. See Figure 4. “M” in a cell indicates that a Kuchler type is a major component of a complex, and “m” indicates that it is a minor component of the complex.

Kuchler Vegetation Type	Complexes		
	Wheatgrass-needlegrass. 1,825 acres, 738 hectares	Douglas fir. 9,191 acres, 3,720 hectares	Spruce-fir. 669 acres, 271 hectares
Wheatgrass-needlegrass shrubsteppe	M	m	
Douglas fir forest	m	M	m
Western spruce-fir forest		m	M

Table 3. Occurrence of habitat types and series mapped in complexes in the potential Grizzly Creek Research Natural Area. See Figure 5. “M” in a cell indicates that a habitat type is a major component of a complex, and “m” indicates that it is a minor component of the complex.

Habitat Types	Complexes		
	<i>Artemisia</i> shrub Habitat Types. 1,825 acres, 738 hectares	<i>Pseudotsuga</i> <i>menziesii</i> Series. 9,191 acres, 3,720 hectares	<i>Abies</i> <i>lasiocarpa</i> Series. 669 acres, 271 hectares
Shrub			
<i>Artemisia nova</i> / <i>Pseudoroegneria spicata</i> habitat type	M		
<i>Artemisia tridentata</i> ssp. <i>tridentata</i> / <i>Pseudoroegneria spicata</i> habitat type	m	m	
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Festuca idahoensis</i> habitat type	M	m	
Forest & Woodland			
<i>Abies lasiocarpa</i> Series			M
<i>Pseudotsuga menziesii</i> / <i>Festuca idahoensis</i> habitat type	m	M	
<i>Pseudotsuga menziesii</i> / <i>Symphoricarpos albus</i> habitat type		M	

Table 4. Society of American Foresters Cover Types in the potential Grizzly Creek Research Natural Area. See Figure 6.

Cover Type (Eyre 1980)	Acres	Hectares
Engelmann spruce-subalpine fir (206)	669	271
Interior Douglas-fir (210)	9,191	3,720
None	1,825	738

## ECOLOGICAL SYSTEMS

The U.S. Forest Service’s Landscape Fire and Resource Management Planning Tools Project (Landfire Project) (<http://www.landfire.gov/>) uses ecological systems as a way to display general vegetation/ environment types nation-wide. Descriptions of those ecological systems are available at <http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol>. Figure 7 shows the distribution of ecological systems in the potential Grizzly Creek RNA. This figure was produced from data extracted from the nation-wide map of ecological systems and a few additional cover-types, updated to 2008 (<http://landfire.cr.usgs.gov/viewer/>). Two changes were made to those data in producing Figure 7: the area originally mapped as the *Pseudotsuga menziesii* Plant Alliance was re-classified to the Middle Rocky Mountains Montane Douglas-fir Forest and Woodland Ecological System, and the area originally mapped as the *Artemisia tridentata* ssp. *vaseyana* Plant Alliance was re-classified as the Inter-Mountain Basins

Montane Sagebrush Steppe Ecological System. Table 5 shows the area of each ecological system within the potential RNA.

Ten ecological systems have each been mapped over at least 1% of the potential RNA, and an additional 20 ecological systems each have been mapped on less than 1% of the area (Table 5). The Middle Rocky Mountain Montane Douglas-fir Forest and Woodland system accounts for 49% of the area, and the Inter-Mountain Basins Big Sagebrush Steppe system covers 19%. Forest and woodland systems are the most common of the remaining systems. The Northern Rocky Mountain Subalpine Woodland and Parkland system is the most common of those, covering over 7% of the high-elevation portion of the area, but its putative presence in the area seems to be at odds with information gathered during the field survey (Jones and Fertig 1999). Researchers in the Landfire Project caution that the information from the project should be augmented with knowledge of local conditions ([http://www.landfire.gov/dp\\_quality\\_assessment.php](http://www.landfire.gov/dp_quality_assessment.php)), and the field survey suggests that the subalpine woodland and parkland should actually be mapped as the Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland Ecological System, the Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland Ecological System, or the Rocky Mountain Lodgepole Pine Forest Ecological System. All three are mapped elsewhere in the potential RNA.

Several additional systems -- Agriculture-Pasture and Hay, Columbia Plateau Low Sagebrush Steppe, Developed-Low Intensity, Developed-Open Space – are erroneously mapped in the potential RNA. Field work turned up no evidence of these systems, and their putative presence in the area is a consequence of the automatic classification of pixels on satellite images.

## **PHYSICAL AND CLIMATIC CONDITIONS**

### **PHYSICAL SETTING**

The potential Grizzly Creek RNA is located in the valley of the North Fork of the Shoshone River. The topography consists of narrow stream valleys with steep sides and sharp drainage divides. Local relief, from valley bottoms to ridge tops, is 500 – 1,000 feet (150 - 300 m). The southern edge of the area lies on broad alluvial and colluvial fans and fluvial terraces.

Two perennial streams flow through the potential RNA. Grizzly Creek flows south through the center of the area and drains most of the potential RNA, which includes the entire drainage basin of Grizzly Creek. Horse Creek flows south through the far western part of the potential RNA.

### **GEOLOGY**

Bedrock in the potential RNA is Tertiary volcanic rock, primarily andesitic rock of the Wapiti Formation (Love and Christiansen 1985). The northern end of the potential RNA includes a small area of trachyandesite of the Trout Peak Formation.

### **SOILS**

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### **CLIMATE**

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Table 5. Ecological systems in the potential Grizzly Creek Research Natural Area. See Figure 7. Normal type-face indicates systems that each cover at least 1% of the area, and italic type-face indicates systems that each cover < 1% of the area.

<b>Ecological System</b>	<b>Acres</b>	<b>Hectares</b>
Barren	427.44	172.98
Inter-Mountain Basins Montane Sagebrush Steppe	2222.57	899.45
Middle Rocky Mountain Montane Douglas-fir Forest and Woodland	5722.90	2315.98
Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	447.97	181.29
Northern Rocky Mountain Subalpine Woodland and Parkland	845.10	342.00
Rocky Mountain Aspen Forest and Woodland	169.84	68.73
Rocky Mountain Lodgepole Pine Forest	431.14	174.48
Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland	261.30	105.75
Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland	637.48	257.98
Rocky Mountain Subalpine-Montane Mesic Meadow	138.79	56.17
<i>Agriculture-Pasture and Hay</i>	<i>1.33</i>	<i>0.54</i>
<i>Columbia Plateau Low Sagebrush Steppe</i>	<i>0.22</i>	<i>0.09</i>
<i>Developed-Low Intensity</i>	<i>0.44</i>	<i>0.18</i>
<i>Developed-Open Space</i>	<i>1.25</i>	<i>0.51</i>
<i>Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland</i>	<i>60.16</i>	<i>24.35</i>
<i>Inter-Mountain Basins Big Sagebrush Shrubland</i>	<i>13.86</i>	<i>5.61</i>
<i>Inter-Mountain Basins Big Sagebrush Steppe</i>	<i>44.01</i>	<i>17.81</i>
<i>Introduced Upland Vegetation-Perennial Grassland and Forbland</i>	<i>0.22</i>	<i>0.09</i>
<i>Northern Rocky Mountain Conifer Swamp</i>	<i>5.49</i>	<i>2.22</i>
<i>Northern Rocky Mountain Lower Montane-Foothill-Valley Grassland</i>	<i>1.48</i>	<i>0.60</i>
<i>Northern Rocky Mountain Mesic Montane Mixed Conifer Forest</i>	<i>3.80</i>	<i>1.54</i>
<i>Northern Rocky Mountain Subalpine Deciduous Shrubland</i>	<i>69.63</i>	<i>28.18</i>
<i>Northern Rocky Mountain Subalpine-Upper Montane Grassland</i>	<i>28.96</i>	<i>11.72</i>
<i>Open Water</i>	<i>17.36</i>	<i>7.02</i>
<i>Rocky Mountain Alpine Dwarf-Shrubland</i>	<i>7.40</i>	<i>3.00</i>
<i>Rocky Mountain Alpine Turf</i>	<i>13.58</i>	<i>5.50</i>
<i>Rocky Mountain Foothill Limber Pine-Juniper Woodland</i>	<i>60.33</i>	<i>24.41</i>
<i>Rocky Mountain Montane Riparian Systems</i>	<i>21.81</i>	<i>8.83</i>
<i>Rocky Mountain Poor-Site Lodgepole Pine Forest</i>	<i>1.64</i>	<i>0.67</i>
<i>Rocky Mountain Subalpine/Upper Montane Riparian Systems</i>	<i>30.60</i>	<i>12.39</i>

## DESCRIPTION OF VALUES

### VEGETATION

The potential Grizzly Creek RNA contains substantial areas of the sagebrush-dominated shrub steppe and the Douglas-fir woodlands that form the vegetation mosaic on the relatively dry foothill and montane zones in the Absaroka Mountains. The area illustrates well the nature of vegetation change in this mountainous landscape: plant species composition and vegetation structure vary gradually with changes in

elevation or along gentle topographic gradients, but abruptly from one slope to another in rough topography and from riparian areas to uplands.

## **FLORA**

### Plant Species List

A list of 261 vascular plant species documented in the potential Grizzly Creek Research Natural Area is included in Appendix I.

### Threatened, Endangered, and Sensitive Plant Species

No federally listed Threatened or Endangered plant species are found in the potential Grizzly Creek Research Natural Area. One USDA Forest Service Region 2 Sensitive plant species is known to occur in the area. Three other plants listed by the Wyoming Natural Diversity Database as species of concern are also known from the potential RNA. Information about each is summarized below. The heritage ranks, assigned by the Natural Diversity Database botanists, are explained in Appendix 2.

#### ***Ipomopsis spicata ssp. robruthii*** (Kirkpatrick's ipomopsis)

Synonym: *Ipomopsis spicata* var. *robruthiorum*

Heritage Rank: G4?T2/S2.

Federal Status: None. Previously USFS Region 2 Sensitive.

Geographic Range: Endemic to the Absaroka Mountains in Park County, Wyoming (Fertig *et al.* 1994, Pokorny 2005).

Habitat: Montane, sandy to rocky, volcanic scree slopes; alpine meadows and turf mats; and open Douglas-fir forests on soils derived from volcanic andesite rock (Fertig *et al.* 1994; Mills and Fertig 1996, Houston *et al.* 2001, Pokorny 2005, Taylor *et al.* 2005).

Comments: Two small populations were discovered within the potential Grizzly Creek Research Natural Area during the 1997 surveys. The larger colony, located along the divide between Sweetwater and Horse Creeks about 2 miles north of the Wapiti Campground, consists of 50-100 widely scattered individuals. A much smaller and probably ephemeral colony of four plants was observed along a shady, dry tributary wash of Horse Creek, 1 mile north of the campground. This latter population may be derived from seeds that washed downstream from the plant's more typical subalpine habitat (Fertig 1998).

#### ***Lomatium attenuatum*** (Absaroka biscuitroot)

Heritage Rank: G3/S2.

Federal Status: None.

Geographic Range: Regional endemic, in the Absaroka Mountains in Park County, Wyoming and four mountain ranges in southwestern Montana (Mills and Fertig 1996, Vanderhorst and Heidel 1998).

Habitat: Volcanic or calcareous mountain slopes and cliffs, growing in sparse sagebrush or cushion plant/bunchgrass communities in openings in Douglas-fir/limber pine woodlands

Comments: Absaroka biscuitroot is known from 3 occurrences in the potential Grizzly Creek Research Natural Area. Erwin Evert discovered a small population in sagebrush grasslands south of "The Wall" (at the north end of the potential RNA) in 1987 (Wyoming Natural Diversity Database Element Occurrence # 017). Eight small to medium-sized colonies were discovered by Walt Fertig and George Jones along the divide between Sweetwater and Horse Creeks and on the east side of Horse Creek in 1997 (Element Occurrence # 004). These populations were sparse to locally common on volcanic ridge-crests with sparse vegetation. A cluster of 4 small colonies consisting of 2,500-5,000 individuals was also located at the southeastern end of the potential RNA in 1997 (Element Occurrence # 015) (Fertig 1998).

***Penstemon absarokensis*** (Absaroka beardtongue)

Heritage Rank: G2/S2.

Federal Status: None.

Geographic Range: Endemic to the Absaroka and northeastern Wind River Mountains in Fremont and Park Counties, Wyoming (Fertig *et al.* 1994, Beatty *et al.* 2003)

Habitat: Sparsely vegetated openings in Douglas-fir/limber pine woodlands on steep slopes and creek bottoms, with loose, volcanic scree and talus (Mills and Fertig 1996, Beatty *et al.* 2003).

Comments: Absaroka beardtongue is known from two occurrences in the potential Grizzly Creek Research Natural Area. Three small to medium-sized colonies with a total of 520-850 plants were discovered by Fertig between Signal Peak and Anvil Rock in the southeastern corner of the area in 1997 (Wyoming Natural Diversity Database Element Occurrence # 020). Six additional colonies were observed at the western side of the area on ridges along the eastern and western sides of Horse Creek (Element Occurrence # 004, in part). These colonies contained 315-670 individuals in small patches of largely undisturbed habitat.

***Townsendia condensata var. anomala*** (North Fork Easter-daisy)

Heritage Rank: G4T2/S2.

Federal Status: USFS Region 2 Sensitive (Houston *et al.* 2001).

Geographic Range: Endemic to the Absaroka Mountains in Park County, Wyoming (Fertig *et al.* 1994, Marriott and Lyman 2006).

Habitat: Sparsely-vegetated, barren ridges and slopes in openings in Douglas-fir/limber pine woodlands on volcanic andesite scree and talus (Fertig 1997, Houston *et al.* 2001, Marriott and Lyman 2006).

Comments: This taxon is currently known from two occurrences in the potential Grizzly Creek Research Natural Area. One occurrence consists of four small subpopulations with an estimated 150-250 plants, located along the divide between Signal Peak and Anvil Rock at the southeastern end of the area. A larger occurrence with 10 colonies is found along the ridge-crests of the Sweetwater Creek, Horse Creek, and Grizzly Creek divides. The latter consist of at least 500-800 individuals in largely pristine habitat (Fertig 1998). The North Fork Easter-daisy is known from 33 occurrences in total, 12 of which are found in designated wilderness areas on the Shoshone National Forest.

## **FAUNA**

### **Threatened, Endangered, and Sensitive Vertebrates**

Grizzly bear (*Ursos arctos*).

The grizzly bear is listed as threatened under the provisions of the federal Endangered Species Act (USDI Fish and Wildlife Service, No date). The approximate distribution area of the bear in Wyoming, as mapped by the Wyoming Game and Fish Department, includes the potential Grizzly Creek RNA (Wyoming Game and Fish Department, No date). The portion of the potential RNA inside the North Absaroka Wilderness Area is within the primary conservation area for grizzly bears (USDI, Fish and Wildlife Service, No date).

Gray wolf (*Canis lupus*).

The potential Grizzly Creek RNA is within the Greater Yellowstone Recovery Area for the Northern Rocky Mountain Distinct Population Segment of the gray wolf (*Canis lupus*) (USDI, Fish and Wildlife Service 1987), which is protected under the provisions of the federal Endangered Species Act.

## Animal Species List

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## **LANDS**

The potential Grizzly Creek RNA is National Forest System land and is surrounded by National Forest System land of the Wapiti Ranger District of the Shoshone National Forest. Sixty-eight percent of the area (7,994 acres; 3,235 ha) lies within the North Absaroka Wilderness Area (Figure 1).

## **IMPACTS AND POSSIBLE CONFLICTS**

### **MINERAL RESOURCES**

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### **GRAZING**

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### **TIMBER**

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### **WATERSHED VALUES**

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### **RECREATION VALUES**

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### **WILDLIFE AND PLANT VALUES**

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### **TRANSPORTATION VALUES**

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## **MANAGEMENT CONCERNS**

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## FIGURES

Figure 1. Location and boundary of the potential Grizzly Creek Research Natural Area.  
The inset map shows position of the potential RNA within the Shoshone National Forest and the State of Wyoming.

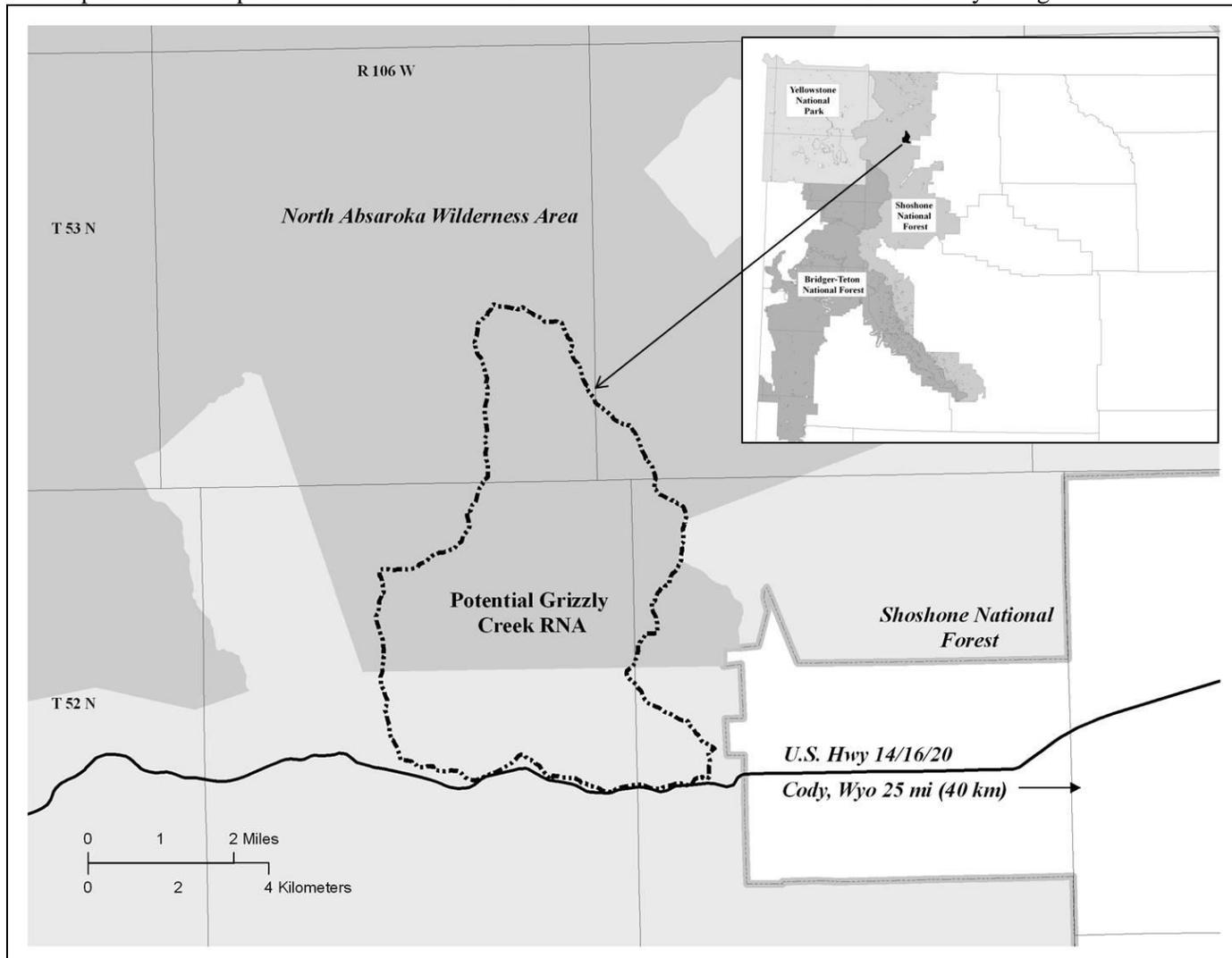


Figure 2. Proposed boundary of the potential Grizzly Creek Research Natural Area.

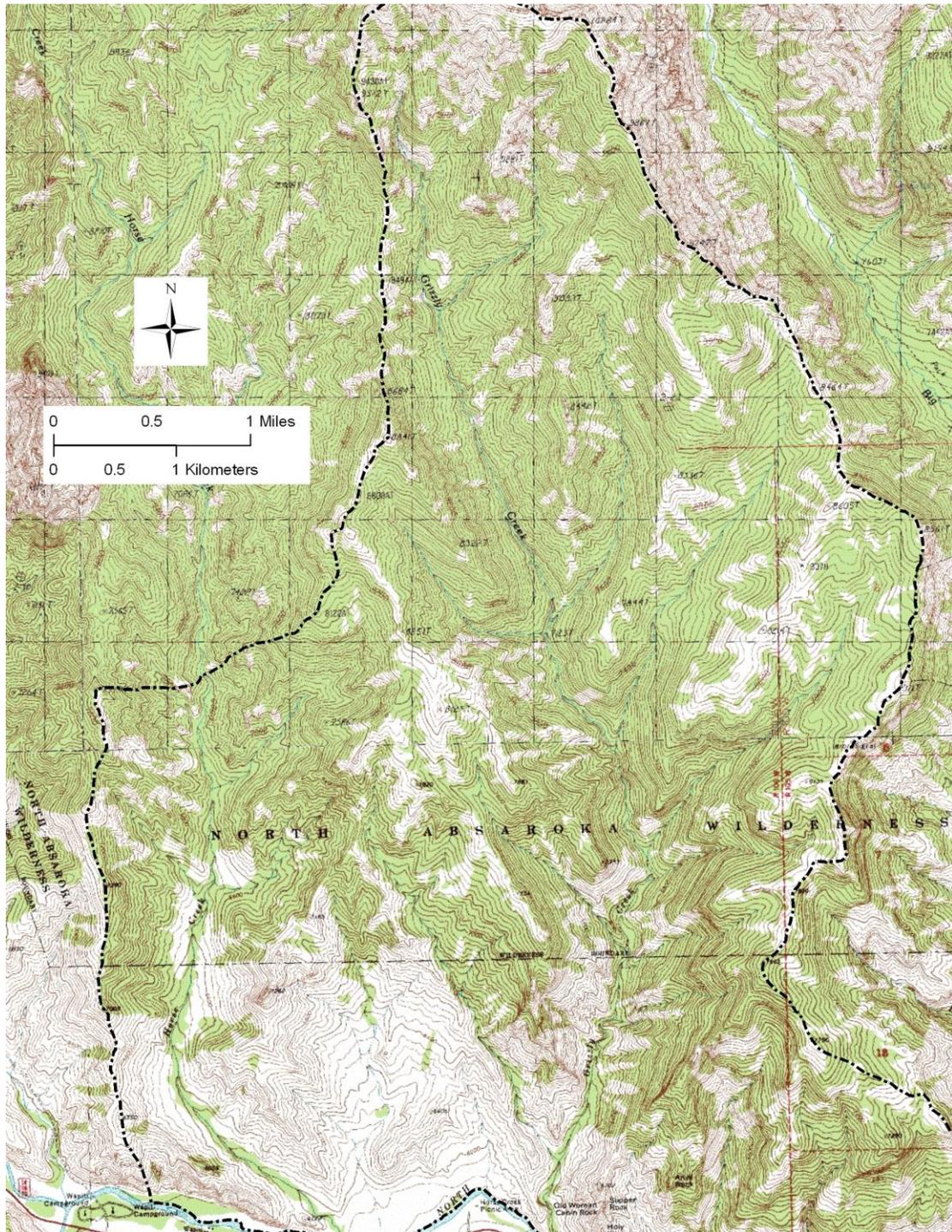


Figure 3. Complexes of plant associations in the potential Grizzly Creek Research Natural Area  
The plant associations present in each complex are listed in Table 1.

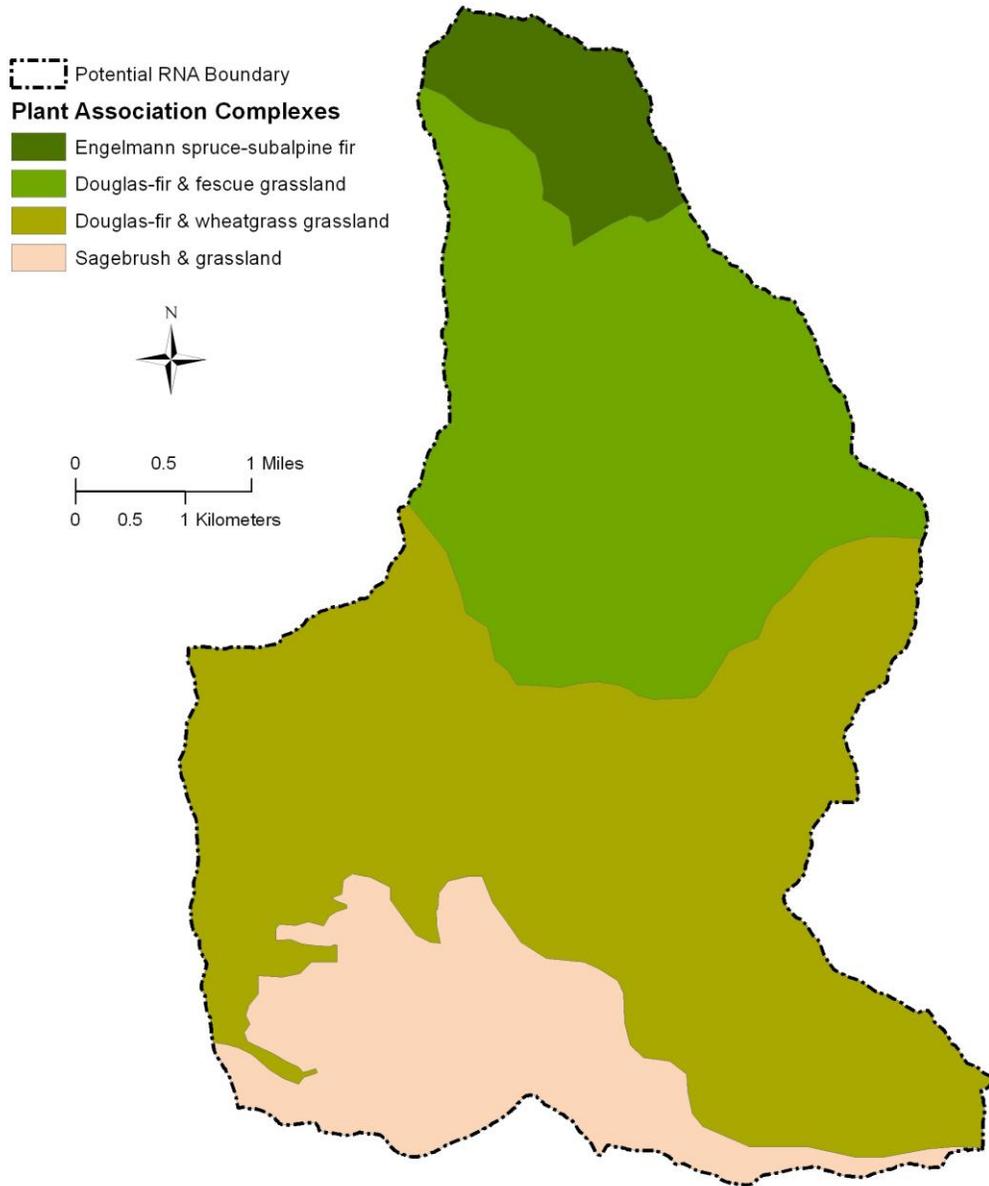


Figure 4. Complexes of Kuchler vegetation types (Kuchler 1964) in the potential Grizzly Creek Research Natural Area. Areas of these types are listed in Table 2.

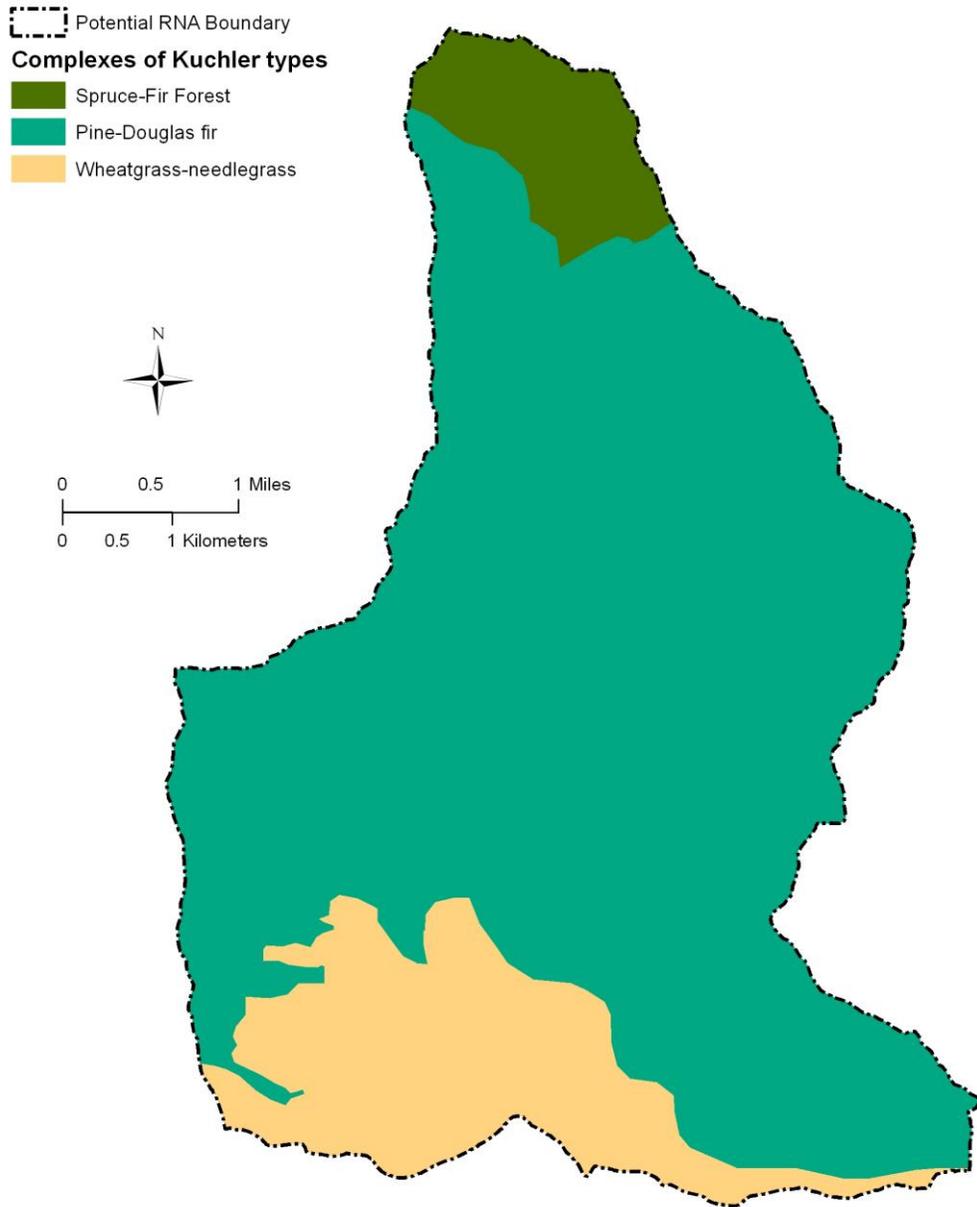


Figure 5. Complexes of habitat types (Steele *et al.* 1983, Tweit & Houston 1980) in the potential Grizzly Creek Research Natural Area. The habitat types present in each complex are listed in Table 3.

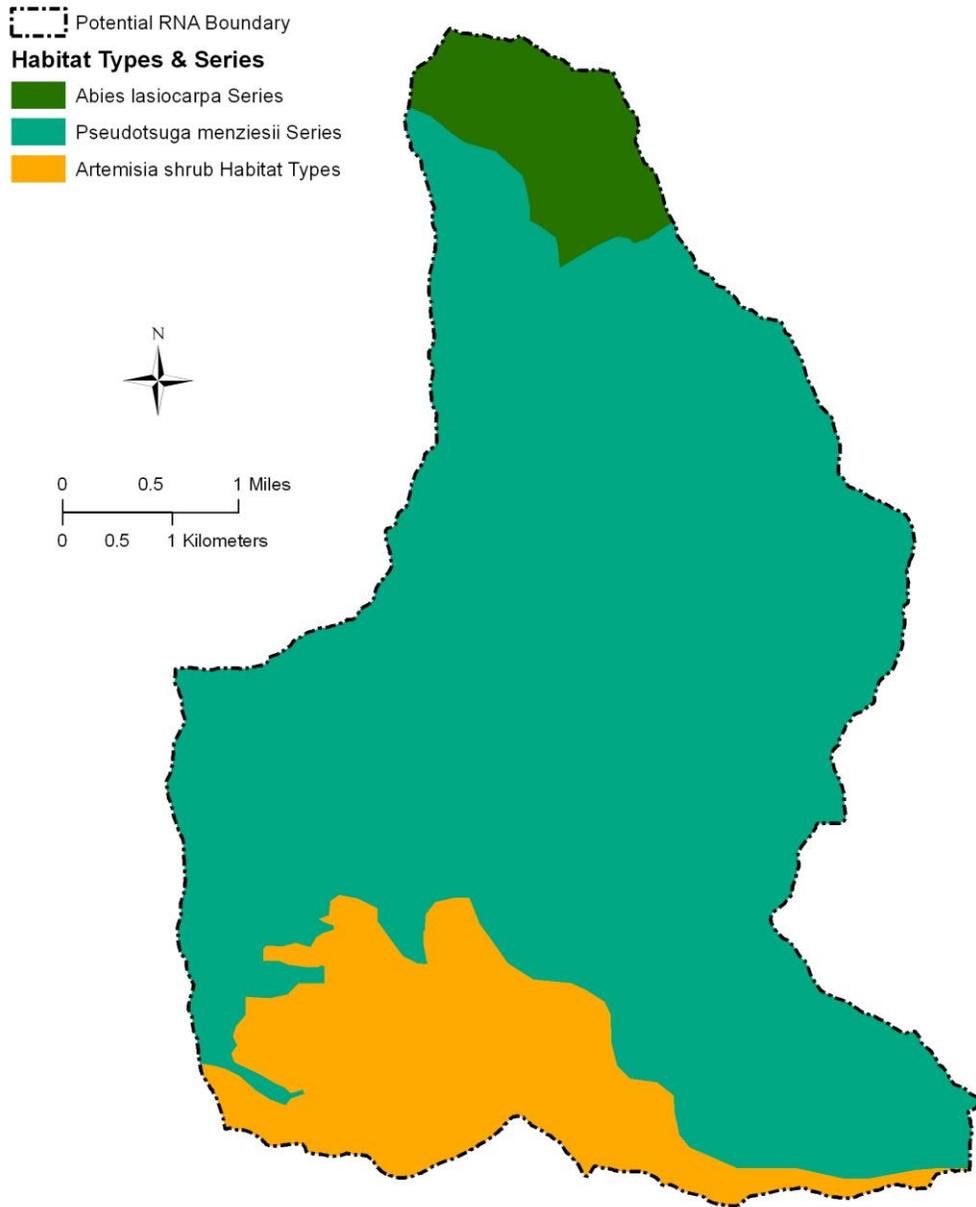


Figure 6. Society of American Foresters Cover Types (Eyre 1980) in the potential Grizzly Creek Research Natural Area. Areas of these types are shown in Table 4.

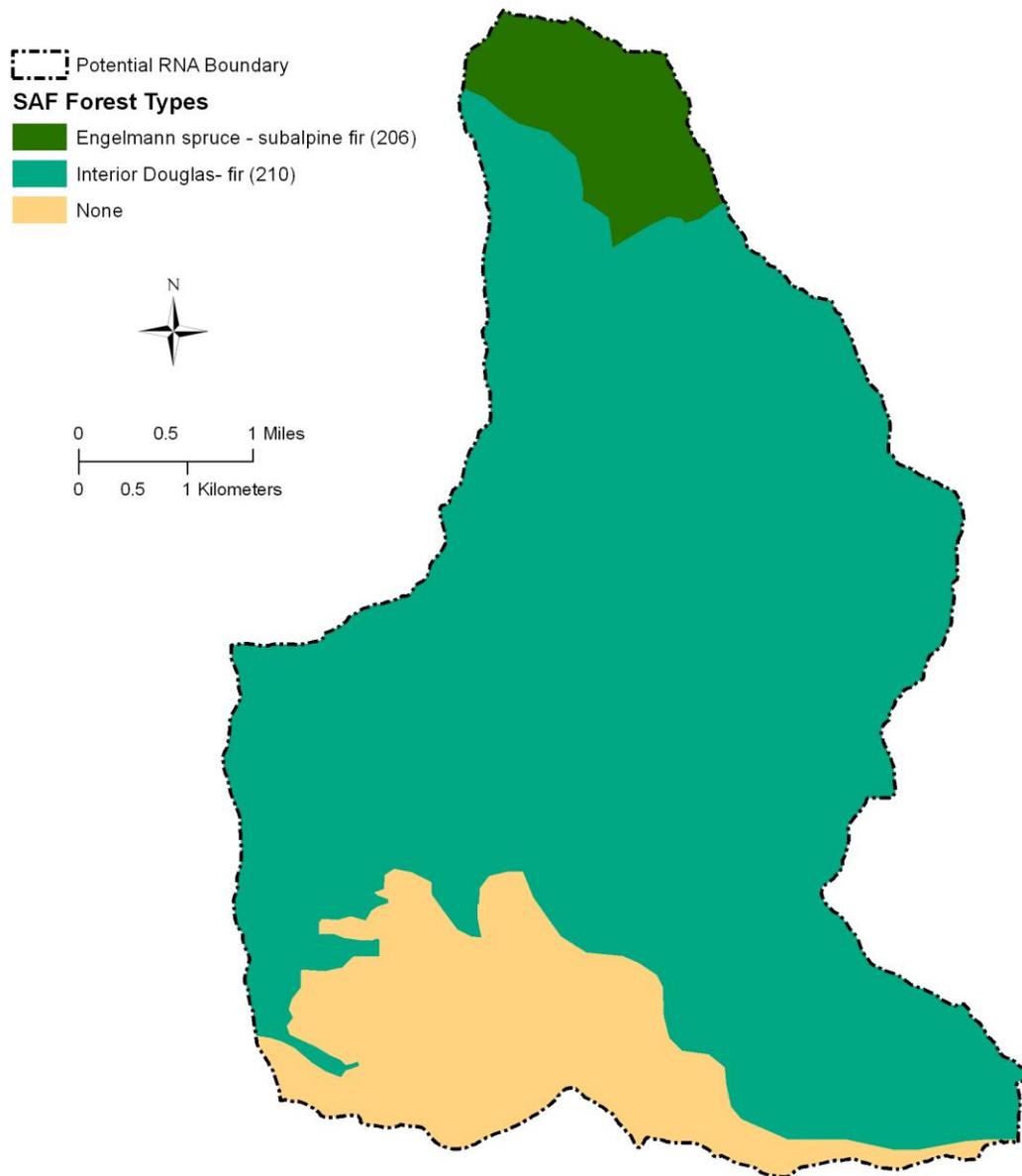


Figure 7. Ecological systems in the potential Grizzly Creek Research Natural Area. See following page for legend. Areas of these types are listed in Table 5

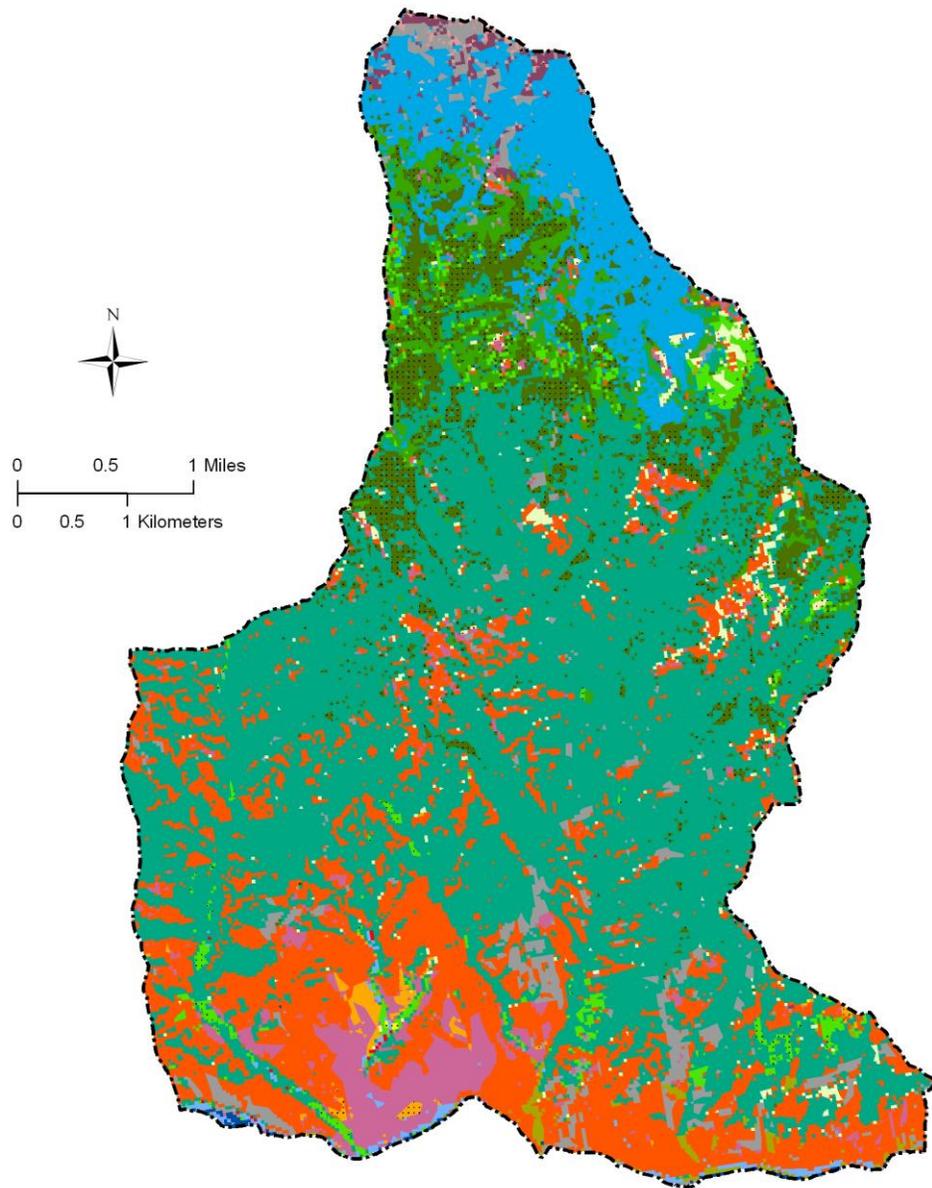


Figure 7 (continued). Legend for map of ecological systems in the potential Grizzly Creek Research Natural Area.

System names are listed alphabetically in two groups. Systems in the first group (“Barren” through “Rocky Mountain Subalpine-Montane Mesic Meadow”) each cover  $\geq 1\%$  of the area; systems in the second group each cover  $<1\%$  of the area.



## **APPENDICES**

**APPENDIX 1. VASCULAR PLANT SPECIES DOCUMENTED IN THE POTENTIAL GRIZZLY CREEK RESEARCH NATURAL AREA.**

This list of plant species was compiled from several surveys of the area. Scientific and common names are from the PLANTS Database, September 2009 (USDA, Natural Resources Conservation Service, 2009). “!” indicates an introduced taxon.

PLANTS Accepted Scientific Name with Authorities	PLANTS Common Name
<b>Trees</b>	
<i>Abies lasiocarpa</i> (Hook.) Nutt.	subalpine fir
<i>Betula occidentalis</i> Hook.	water birch
<i>Picea engelmannii</i> Parry ex Engelm.	Engelmann spruce
<i>Pinus contorta</i> Douglas ex Louden	lodgepole pine
<i>Pinus flexilis</i> James	limber pine
<i>Populus angustifolia</i> James	narrowleaf cottonwood
<i>Populus tremuloides</i> Michx.	quaking aspen
<i>Pseudotsuga menziesii</i> (Mirb.) Franco var. <i>glauca</i> (Beissn.) Franco	Rocky Mountain Douglas-fir
<b>Shrubs</b>	
<i>Acer glabrum</i> Torr.	Rocky Mountain maple
<i>Alnus incana</i> (L.) Moench ssp. <i>tenuifolia</i> (Nutt.) Breitung	thinleaf alder
<i>Artemisia nova</i> A. Nelson	black sagebrush
<i>Artemisia tridentata</i> Nutt. ssp. <i>tridentata</i>	Basin big sagebrush
<i>Artemisia tridentata</i> Nutt. ssp. <i>vaseyana</i> (Rydb.) Beetle	mountain big sagebrush
<i>Artemisia tridentata</i> Nutt. ssp. <i>wyomingensis</i> Beetle & Young	Wyoming big sagebrush
<i>Atriplex confertifolia</i> (Torr. & Frém.) S. Watson	shadscale saltbush
<i>Ceanothus velutinus</i> Douglas ex Hook.	snowbrush ceanothus
<i>Chrysothamnus viscidiflorus</i> (Hook.) Nutt. ssp. <i>viscidiflorus</i>	yellow rabbitbrush
<i>Cornus sericea</i> L.	redosier dogwood
<i>Elaeagnus commutata</i> Bernh. ex Rydb.	silverberry
<i>Ericameria nauseosa</i> (Pall. ex Pursh) G.L. Nesom & Baird ssp. <i>nauseosa</i> var. <i>nauseosa</i>	rubber rabbitbrush
<i>Juniperus communis</i> L. var. <i>depressa</i> Pursh	common juniper
<i>Juniperus scopulorum</i> Sarg.	Rocky Mountain juniper
<i>Krascheninnikovia lanata</i> (Pursh) A.Meeuse & Smit	winterfat
<i>Prunus virginiana</i> L. var. <i>melanocarpa</i> (A. Nelson) Sarg.	black chokecherry
<i>Rhus trilobata</i> Nutt.	skunkbush sumac
<i>Ribes cereum</i> Douglas var. <i>pedicellare</i> W.H. Brewer & S. Watson	whisky currant
<i>Ribes oxycanthoides</i> L.	Canadian gooseberry
<i>Rosa acicularis</i> Lindl. ssp. <i>sayi</i> (Schwein.) W.H. Lewis	prickly rose
<i>Rosa woodsii</i> Lindl.	Woods' rose
<i>Salix bebbiana</i> Sarg.	Bebb willow
<i>Salix lucida</i> Muhl. ssp. <i>caudata</i> (Nutt.) E. Murray	greenleaf willow
<i>Salix lutea</i> Nutt.	yellow willow
<i>Salix melanopsis</i> Nutt.	dusky willow
<i>Sarcobatus vermiculatus</i> (Hook.) Torr.	greasewood
<i>Shepherdia canadensis</i> (L.) Nutt.	russet buffaloberry
<i>Symphoricarpos oreophilus</i> A. Gray var. <i>utahensis</i> (Rydb.) A. Nelson	Utah snowberry

## Appendix I (continued)

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<b>Forbs</b>	
<i>Achillea millefolium</i> L.	common yarrow
<i>Actaea rubra</i> (Aiton) Willd.	red baneberry
<i>Agoseris glauca</i> (Pursh) Raf. var. <i>laciniata</i> (D.C. Eaton) Smiley	false agoseris
<i>Allium brevistylum</i> S. Watson	shortstyle onion
<i>Allium cernuum</i> Roth	nodding onion
<i>Allium geeyeri</i> S. Watson	Geyer's onion
<i>Allium textile</i> A. Nelson & J.F. Macbr.	textile onion
<i>Angelica</i> L.	angelica
<i>Antennaria media</i> Greene	Rocky Mountain pussytoes
<i>Antennaria microphylla</i> Rydb.	littleleaf pussytoes
<i>Antennaria racemosa</i> Hook.	raceme pussytoes
<i>Antennaria rosea</i> Greene	rosy pussytoes
<i>Antennaria rosea</i> Greene ssp. <i>pulvinata</i> (Greene) Bayer	pulvinate pussytoes
<i>Antennaria umbrinella</i> Rydb.	umber pussytoes
<i>Apocynum androsaemifolium</i> L.	spreading dogbane
<i>Arabis xdivaricarpa</i> A. Nelson (pro. sp.) [ <i>drummondii</i> x <i>holboellii</i> ]	spreadingpod rockcress
<i>Arabis glabra</i> (L.) Bernh.	tower rockcress
<i>Arabis holboellii</i> Hornem.	Holboell's rockcress
<i>Arenaria congesta</i> Nutt. var. <i>congesta</i>	ballhead sandwort
<i>Arenaria hookeri</i> Nutt. ssp. <i>hookeri</i>	Hooker's sandwort
<i>Arnica cordifolia</i> Hook.	heartleaf arnica
<i>Artemisia dracunculus</i> L.	tarragon
<i>Artemisia frigida</i> Willd.	prairie sagewort
<i>Artemisia michauxiana</i> Besser	Michaux's wormwood
<i>Asclepias viridiflora</i> Raf.	green comet milkweed
<i>Astragalus australis</i> (L.) Lam.	Indian milkvetch
<i>Astragalus miser</i> Douglas ex Hook. var. <i>decumbens</i> (Nutt. ex Torr. & A. Gray) Cronquist	prostrate milkvetch
<i>Astragalus miser</i> Douglas ex Hook. var. <i>hylophilus</i> (Rydb.) Barneby	woody milkvetch
<i>Astragalus purshii</i> Douglas ex Hook.	woollypod milkvetch
<i>Astragalus vexilliflexus</i> Sheldon	bentflower milkvetch
<i>Balsamorhiza sagittata</i> (Pursh) Nutt.	arrowleaf balsamroot
<i>Brickellia grandiflora</i> (Hook.) Nutt.	tasselflower brickellbush
! <i>Camelina microcarpa</i> Andrz. ex DC.	littlepod false flax
<i>Campanula rotundifolia</i> L.	bluebell bellflower
<i>Cardamine</i> L.	bittercress
! <i>Carduus nutans</i> L.	nodding plumeless thistle
<i>Castilleja angustifolia</i> (Nutt.) G. Don var. <i>angustifolia</i>	northwestern Indian paintbrush
<i>Castilleja linariifolia</i> Benth.	Wyoming Indian paintbrush
<i>Chaenactis douglasii</i> (Hook.) Hook. & Arn. var. <i>douglasii</i>	Douglas' dustymaiden
<i>Chamerion angustifolium</i> (L.) Holub ssp. <i>angustifolium</i>	fireweed
<i>Chenopodium atrovirens</i> Rydb.	pinyon goosefoot
<i>Chenopodium berlandieri</i> Moq. var. <i>zschackii</i> (Murr) Murr ex Asch.	Zschack's goosefoot
! <i>Cirsium arvense</i> (L.) Scop.	Canada thistle
<i>Cirsium scariosum</i> Nutt.	meadow thistle
! <i>Cirsium vulgare</i> (Savi) Ten.	bull thistle

## Appendix I (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Clematis ligusticifolia</i> Nutt.	western white clematis
<i>Clematis occidentalis</i> (Hornem.) DC. var. <i>grosseserrata</i> (Rydb.) J. Pringle	western blue virginsbower
<i>Collinsia parviflora</i> Lindl.	maiden blue eyed Mary
<i>Collomia linearis</i> Nutt.	tiny trumpet
<i>Collomia tenella</i> A. Gray	diffuse collomia
<i>Comandra umbellata</i> (L.) Nutt. ssp. <i>pallida</i> (A. DC.) Piehl	pale bastard toadflax
<i>Conyza canadensis</i> (L.) Cronquist	Canadian horsetweed
<i>Crepis acuminata</i> Nutt.	tapertip hawksbeard
<i>Crepis atribarba</i> A. Heller	slender hawksbeard
<i>Crepis intermedia</i> A. Gray	limestone hawksbeard
<i>Cryptantha ambigua</i> (A. Gray) Greene	basin cryptantha
<i>Cryptantha celosioides</i> (Eastw.) Payson	buttecandle
<i>Cymopterus acaulis</i> (Pursh) Raf.	plains springparsley
<i>Delphinium nuttallianum</i> Pritz. ex Walp.	twolobe larkspur
<i>Descurainia incana</i> (Bernh. ex Fisch. & C.A. Mey.) Dorn ssp. <i>incana</i>	mountain tansymustard
<i>Dodecatheon pulchellum</i> (Raf.) Merr.	darkthroat shootingstar
<i>Epilobium brachycarpum</i> C. Presl	tall annual willowherb
<i>Epilobium canum</i> (Greene) P.H. Raven ssp. <i>garrettii</i> (A. Nelson) P.H. Raven	Garrett's firechalice
<i>Epilobium ciliatum</i> Raf. ssp. <i>ciliatum</i>	fringed willowherb
<i>Erigeron caespitosus</i> Nutt.	tufted fleabane
<i>Erigeron compositus</i> Pursh	cutleaf daisy
<i>Erigeron divergens</i> Torr. & A. Gray	spreading fleabane
<i>Erigeron glabellus</i> Nutt.	streamside fleabane
<i>Eriogonum ovalifolium</i> Nutt.	cushion buckwheat
<i>Eriogonum pauciflorum</i> Pursh	fewflower buckwheat
<i>Eriogonum umbellatum</i> Torr. var. <i>majus</i> Hook.	sulphur-flower buckwheat
<i>Erysimum</i> L.	wallflower
<i>Eucephalus elegans</i> Nutt.	elegant aster
<i>Euphorbia brachycera</i> Engelm.	horned spurge
<i>Eurybia conspicua</i> (Lindl.) G.L. Nesom	western showy aster
<i>Eurybia glauca</i> (Nutt.) G.L. Nesom	gray aster
<i>Fragaria vesca</i> L.	woodland strawberry
<i>Fragaria virginiana</i> Duchesne	Virginia strawberry
<i>Fritillaria atropurpurea</i> Nutt.	spotted fritillary
<i>Galium aparine</i> L.	stickywilly
<i>Gayophytum diffusum</i> Torr. & A. Gray ssp. <i>parviflorum</i> F.H. Lewis & Szweykowski	spreading groundsmoke
<i>Geum triflorum</i> Pursh	old man's whiskers
<i>Gilia tweedyi</i> Rydb.	Tweedy's gila
<i>Glycyrrhiza lepidota</i> Pursh	American licorice
<i>Gnaphalium palustre</i> Nutt.	western marsh cudweed
<i>Hackelia floribunda</i> (Lehm.) I.M. Johnst.	manyflower stickseed
<i>Heracleum maximum</i> Bartram	common cowparsnip
<i>Heuchera cylindrica</i> Douglas ex Hook. var. <i>cylindrica</i>	roundleaf alumroot
<i>Heuchera parvifolia</i> Nutt. ex Torr. & A. Gray	littleleaf alumroot
<i>Hieracium albiflorum</i> Hook.	white hawkweed
<i>Ipomopsis spicata</i> (Nutt.) V.E. Grant ssp. <i>robruthii</i> Wilken & R.L. Hartm.	spiked ipomopsis
<i>Lactuca serriola</i> L.	prickly lettuce

## Appendix I (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Lappula occidentalis</i> (S. Watson) Greene var. <i>occidentalis</i>	flatspine stickseed
<i>Lepidium densiflorum</i> Schrad. var. <i>macrocarpum</i> G. Mulligan	bigseed pepperweed
<i>Lewisia rediviva</i> Pursh	bitter root
<i>Linum lewisii</i> Pursh	Lewis flax
<i>Lithospermum ruderales</i> Douglas ex Lehm.	western stoneseed
<i>Lomatium attenuatum</i> Evert	tapertip desertparsley
<i>Lupinus argenteus</i> Pursh	silvery lupine
<i>Machaeranthera canescens</i> (Pursh) A. Gray	hoary tansyaster
<i>Maianthemum stellatum</i> (L.) Link	starry false lily of the valley
<i>Melilotus officinalis</i> (L.) Lam.	yellow sweetclover
<i>Mentha arvensis</i> L.	wild mint
<i>Mentzelia dispersa</i> S. Watson	bushy blazingstar
<i>Mentzelia laevicaulis</i> (Hook.) Torr. & A. Gray	smoothstem blazingstar
<i>Mertensia oblongifolia</i> (Nutt.) G. Don	oblongleaf bluebells
<i>Microsteris gracilis</i> (Hook.) Greene	slender phlox
<i>Mimulus guttatus</i> DC.	seep monkeyflower
<i>Mimulus washingtonensis</i> Gandog.	Washington monkeyflower
<i>Minuartia nuttallii</i> (Pax) Briq.	Nuttall's sandwort
<i>Monolepis nuttalliana</i> (Schult.) Greene	Nuttall's povertyweed
<i>Oenothera caespitosa</i> Nutt. ssp. <i>caespitosa</i>	tufted evening primrose
<i>Oenothera nuttallii</i> Sweet	Nuttall's evening primrose
<i>Oenothera villosa</i> Thunb.	hairy evening primrose
<i>Opuntia polyacantha</i> Haw. var. <i>polyacantha</i>	hairspine pricklypear
<i>Orobanche fasciculata</i> Nutt.	clustered broomrape
<i>Osmorhiza depauperata</i> Phil.	bluntseed sweetroot
<i>Oxytropis besseyi</i> (Rydb.) Blank. var. <i>ventosa</i> (Greene) Barneby	Bessey's locoweed
<i>Oxytropis sericea</i> Nutt.	white locoweed
<i>Packera cana</i> (Hook.) W.A. Weber & A. Löve	woolly groundsel
<i>Packera streptanthifolia</i> (Greene) W.A. Weber & A. Löve	Rocky Mountain groundsel
<i>Penstemon absarokensis</i> Evert	Absaroka Range beardtongue
<i>Penstemon arenicola</i> A. Nelson	sand penstemon
<i>Penstemon deustus</i> Douglas ex Lindl.	scabland penstemon
<i>Penstemon eriantherus</i> Pursh var. <i>eriantherus</i>	fuzzytongue penstemon
<i>Penstemon glaber</i> Pursh var. <i>glaber</i>	sawsepal penstemon
<i>Phacelia hastata</i> Douglas ex Lehm.	silverleaf phacelia
<i>Phacelia sericea</i> (Graham) A. Gray	silky phacelia
<i>Phlox hoodii</i> Richardson	spiny phlox
<i>Phlox multiflora</i> A. Nelson	flowery phlox
<i>Physaria didymocarpa</i> (Hook.) A. Gray	common twinpod
<i>Polemonium pulcherrimum</i> Hook.	Jacob's-ladder
<i>Polygonum aviculare</i> L.	prostrate knotweed
<i>Polygonum douglasii</i> Greene ssp. <i>douglasii</i>	Douglas' knotweed
<i>Potentilla arguta</i> Pursh	tall cinquefoil
<i>Potentilla effusa</i> Douglas ex Lehm.	branched cinquefoil
<i>Potentilla gracilis</i> Douglas ex Hook.	slender cinquefoil
<i>Potentilla ovina</i> Macoun ex J.M. Macoun var. <i>ovina</i>	sheep cinquefoil
<i>Prosartes trachycarpa</i> S. Watson	roughfruit fairybells

## Appendix I (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Psoralidium lanceolatum</i> (Pursh) Rydb.	lemon scurfpea
<i>Pteryxia terebinthina</i> (Hook.) J.M. Coult. & Rose var. <i>albiflora</i> (Torr. & A. Gray) Mathias	turpentine wavewing
<i>Pulsatilla patens</i> (L.) Mill. ssp. <i>multifida</i> (Pritz.) Zamels	cutleaf anemone
<i>Rumex aquaticus</i> L. var. <i>fenestratus</i> (Greene) Dorn	western dock
<i>Saxifraga bronchialis</i> L. ssp. <i>austromontana</i> (Wiegand) Piper	matted saxifrage
<i>Sedum lanceolatum</i> Torr.	spearleaf stonecrop
<i>Senecio serra</i> Hook.	tall ragwort
<i>Silene drummondii</i> Hook.	Drummond's campion
<i>Sisymbrium altissimum</i> L.	tall tumbledustard
<i>Sisyrinchium idahoense</i> E.P. Bicknell var. <i>occidentale</i> (E.P. Bicknell) Douglass M. Hend.	Idaho blue-eyed grass
<i>Solidago canadensis</i> L.	Canada goldenrod
<i>Solidago missouriensis</i> Nutt. var. <i>missouriensis</i>	Missouri goldenrod
<i>Solidago multiradiata</i> Aiton var. <i>scopulorum</i> A. Gray	manyray goldenrod
<i>Sonchus</i> L.	wallflower
<i>Sphaeralcea coccinea</i> (Nutt.) Rydb.	scarlet globemallow
<i>Stellaria longipes</i> Goldie	longstalk starwort
<i>Stenotus acaulis</i> (Nutt.) Nutt.	stemless mock goldenweed
<i>Stephanomeria minor</i> (Hook.) Nutt. var. <i>minor</i>	narrowleaf wirelettuce
<i>Stephanomeria runcinata</i> Nutt.	desert wirelettuce
<i>Symphyotrichum ascendens</i> (Lindl.) G.L. Nesom	western aster
<i>Symphyotrichum eatonii</i> (A. Gray) G.L. Nesom	Eaton's aster
<i>Symphyotrichum foliaceum</i> (Lindl. ex DC.) G.L. Nesom var. <i>foliaceum</i>	Parry's aster
<i>Symphyotrichum spathulatum</i> (Lindl.) G.L. Nesom var. <i>spathulatum</i>	western mountain aster
<i>Taraxacum laevigatum</i> (Willd.) DC.	rock dandelion
<i>Taraxacum officinale</i> F.H. Wigg.	common dandelion
<i>Thalictrum fendleri</i> Engelm. ex A. Gray	Fendler's meadow-rue
<i>Thlaspi arvense</i> L.	field pennycress
<i>Townsendia condensata</i> Parry ex A. Gray var. <i>anomala</i> (Heiser) Dorn	cushion Townsend daisy
<i>Toxicodendron rydbergii</i> (Small ex Rydb.) Greene	western poison ivy
<i>Tragopogon dubius</i> Scop.	yellow salsify
<i>Trifolium hybridum</i> L.	alsike clover
<i>Trifolium repens</i> L.	white clover
<i>Valeriana dioica</i> L.	marsh valerian
<i>Vicia americana</i> Muhl. ex Willd.	American vetch
<i>Viola purpurea</i> Kellogg ssp. <i>venosa</i> (S. Watson) M.S. Baker & J.C. Clausen	goosefoot violet
<i>Zigadenus venenosus</i> S. Watson var. <i>gramineus</i> (Rydb.) Walsh ex M. Peck	grassy deathcamas
<b>Graminoids</b>	
<i>Achnatherum hymenoides</i> (Roem. & Schult.) Barkworth	Indian ricegrass
<i>Achnatherum nelsonii</i> (Scribn.) Barkworth ssp. <i>dorei</i> (Barkworth & Maze) Barkworth	Dore's needlegrass
<i>Achnatherum nelsonii</i> (Scribn.) Barkworth ssp. <i>nelsonii</i>	Columbia needlegrass
<i>Agrostis scabra</i> Willd.	rough bentgrass
<i>Bromus carinatus</i> Hook. & Arn.	California brome
<i>Bromus inermis</i> Leyss. var. <i>inermis</i>	smooth brome
<i>Bromus porteri</i> (J.M. Coult.) Nash	Porter brome
<i>Bromus tectorum</i> L.	cheatgrass
<i>Calamagrostis canadensis</i> (Michx.) P. Beauv.	bluejoint
<i>Carex aurea</i> Nutt.	golden sedge

## Appendix I (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Carex duriuscula</i> C.A. Mey.	needleleaf sedge
<i>Carex filifolia</i> Nutt.	threadleaf sedge
<i>Carex hoodii</i> Boott	Hood's sedge
<i>Carex interior</i> L.H. Bailey	inland sedge
<i>Carex microptera</i> Mack.	smallwing sedge
<i>Carex pellita</i> Muhl. ex Willd.	woolly sedge
<i>Carex praegracilis</i> W. Boott	clustered field sedge
<i>Carex rossii</i> Boott	Ross' sedge
<i>Carex stipata</i> Muhl. ex Willd.	awlfruit sedge
<i>Carex utriculata</i> Boott	Northwest Territory sedge
<i>Eleocharis</i> R. Br.	spikerush
<i>Elymus glaucus</i> Buckley	blue wildrye
<i>Elymus lanceolatus</i> (Scribn. & J.G. Sm.) Gould ssp. <i>lanceolatus</i>	thickspike wheatgrass
<i>Elymus trachycaulus</i> (Link) Gould ex Shinners	slender wheatgrass
<i>Festuca idahoensis</i> Elmer	Idaho fescue
<i>Glyceria striata</i> (Lam.) Hitchc.	fowl mannagrass
<i>Hesperostipa comata</i> (Trin. & Rupr.) Barkworth ssp. <i>intermedia</i> (Scribn. & Tweedy) Barkworth	intermediate needle and thread
<i>Juncus arcticus</i> Willd. ssp. <i>littoralis</i> (Engelm.) Hultén	mountain rush
<i>Juncus bufonius</i> L.	toad rush
<i>Juncus longistylis</i> Torr.	longstyle rush
<i>Juncus tracyi</i> Rydb.	Tracy's rush
<i>Koeleria macrantha</i> (Ledeb.) Schult.	prairie Junegrass
<i>Leucopoa kingii</i> (S. Watson) W.A. Weber	spike fescue
<i>Leymus cinereus</i> (Scribn. & Merr.) A. Löve	basin wildrye
<i>Muhlenbergia richardsonis</i> (Trin.) Rydb.	mat muhly
! <i>Phleum pratense</i> L.	timothy
<i>Piptatherum exiguum</i> (Thurb.) Dorn	little ricegrass
<i>Poa cusickii</i> Vasey ssp. <i>epilis</i> (Scribn.) W.A. Weber	Cusick's bluegrass
<i>Poa fendleriana</i> (Steud.) Vasey	muttongrass
<i>Poa nemoralis</i> L. ssp. <i>interior</i> (Rydb.) W.A. Weber	inland bluegrass
! <i>Poa pratensis</i> L.	Kentucky bluegrass
<i>Poa secunda</i> J. Presl	Sandberg bluegrass
! <i>Psathyrostachys juncea</i> (Fisch.) Nevski	Russian wildrye
<i>Pseudoroegneria spicata</i> (Pursh) A. Löve ssp. <i>spicata</i>	bluebunch wheatgrass
! <i>Thinopyrum intermedium</i> (Host) Barkworth & D.R. Dewey	intermediate wheatgrass
x <i>Pseudelymus saxicola</i> (Scribn. & J.G. Sm.) Barkworth & D.R. Dewey ([ <i>Elymus elymoides</i> x <i>Pseudoroegneria spicata</i> ])	foxtail wheatgrass
<b>Ferns</b>	
<i>Cystopteris fragilis</i> (L.) Bernh.	brittle bladderfern
<i>Equisetum arvense</i> L.	field horsetail
<i>Equisetum hyemale</i> L. var. <i>affine</i> (Engelm.) A.A. Eaton	scouringrush horsetail
<i>Equisetum laevigatum</i> A. Braun	smooth horsetail

## **APPENDIX 2. EXPLANATIONS OF RANKS USED BY THE WYOMING NATURAL DIVERSITY DATABASE**

As part of the North American network of natural heritage programs, the Wyoming Natural Diversity Database (WYNDD) uses the natural heritage element ranking system developed by The Nature Conservancy. In this system, each element (in this case, species) is assigned a two-part rank that reflects its rarity and security both globally (the G part of the rank) and within a state or province (the S part of the rank). Both the global rank and the state rank can range from 1 (extremely rare or threatened) to 5 (common and secure). Ranks are defined as follows:

### Global Ranks

- G1: Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals) or because of some factors making it especially vulnerable to extinction.
- G2: Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals) or because of factors making it very vulnerable to extinction.
- G3: Either very rare and localized throughout its range, or found locally (and perhaps abundantly at some sites) throughout a restricted range, or vulnerable to extinction throughout its range.
- G4: Apparently secure globally, although it may be quite rare in parts of its range, especially at the periphery.
- G5: Demonstrably secure globally and essentially ineradicable under present conditions.
- T: A "T" following the global rank (G#T#) refers to a rank assigned to a subspecific taxon. The number following the "G" is the rank of the species, and the number following the "T" is the rank of the subspecific taxon.
- Q: Taxonomic questions or problems exist about the taxon; more information is needed. A "G#Q" rank implies that the taxonomic distinctiveness of the taxon may be of questionable validity. A "G#T#Q" rank implies that the taxonomic distinctiveness of the subspecific taxon is of questionable validity.

### State Ranks

- S1: Critically imperiled in the state or province because of extreme rarity (5 or fewer occurrences or very few remaining individuals) or because of some factors making it especially vulnerable to extinction.
- S2: Imperiled in the state or province because of rarity (6 to 20 occurrences or few remaining individuals) or because of factors making it very vulnerable to extinction.
- S3: Rare or uncommon in the state (on the order of 21 to 100 occurrences).
- S4: Apparently secure in the state or province, with many occurrences.
- G5: Demonstrably secure in the state or province and essentially ineradicable under present conditions.
- SU: Possibly imperiled in the state but status is uncertain; more information needed before a numerical rank can be assigned.
- S?: Status uncertain due to lack of information. The "?" is usually combined with any of the numerical ranks, as in "S3?".

### Migratory Ranks

- B: A "B" following a rank (e.g., S3B) indicates that the rank refers to the breeding status of the species within the state. B ranks are usually assigned to birds.
- N: An "N" following a rank (e.g., S3N) indicates that the preceding rank refers to the non-breeding status of the species in the state. N ranks are usually assigned to birds.

A state rank of S2BS5N indicates that the species is rare in the state as a breeder, but abundant as a non-breeder.