

PLANTS AND VEGETATION OF THE  
POTENTIAL ROARING FORK MOUNTAIN RESEARCH NATURAL AREA  
WITHIN THE SHOSHONE NATIONAL FOREST,  
FREMONT COUNTY, WYOMING

Prepared for the

Shoshone National Forest, USDA Forest Service

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March, 2011

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## INTRODUCTION

This report presents information on the rare plants and the vegetation types in the potential Roaring Fork Mountain 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 Roaring Fork Mountain, 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 Roaring Fork Mountain 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 Roaring Fork Mountain 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.

## PRINCIPLE DISTINGUISHING FEATURES

The principal distinguishing features of the potential Roaring Fork Mountain RNA are broad, rolling ridges clothed in alpine tundra and subalpine forest; and glacial valleys with lakes, shrublands, and meadows. The area also supports a population of a rare vascular plant species.

## LOCATION

The potential Roaring Fork Mountain RNA is located within the Shoshone National Forest in west-central Wyoming (Figure 1). The approximate center of the potential RNA is at latitude 42°39'30" N and longitude 108°59'00" W.

The potential RNA includes all or parts of the following sections (all on the 6th Principal Meridian): Township 31 North, Range 101 West, Sections 7, 8, 17, 18, 19, 20, and 30; Township 31 North, Range 102 West, Sections 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, and 36

## **BOUNDARY**

The proposed boundary of the potential RNA is drawn between hilltops and in places follows drainage divides (Figure 2). On the east and northeast, the boundary is drawn to include the upper part of the drainage basin of Roaring Fork Creek. On the north and west, the boundary is drawn to include primarily the non-forested part of the Stough Creek Basin. The southwestern part of the boundary follows the divide between the drainages of Stough Creek on the east and the Sweetwater River on the west. On the south, the boundary is drawn to include Atlantic Canyon and Silas Canyon.

## **AREA**

The area of the potential Roaring Fork Mountain RNA is 13,437 acres (5,438 ha).<sup>1</sup>

## **ELEVATION**

The elevation of the potential Roaring Fork Mountain RNA ranges from approximately 9,320 feet (2,843 m) on Roaring Fork Creek along the northeastern boundary to 12,490 feet (3,809 m) on Atlantic Peak on the southern boundary.

## **ACCESS**

The potential Roaring Fork Mountain RNA may be reached via several USDA Forest Service trails. On the north, two trails give access to most of the area: (1) National Forest Trail 702 gives access to the Stough Creek Basin from the trailhead at Worthen Meadow Reservoir; (2) an unmaintained trail leaves Trail 702 at Roaring Fork Lake and runs up Roaring Fork Creek into the northeastern part of the area. On the east, National Forest Road 306 (a four-wheel drive road) reaches a point approx. 1 air mile (1.6 km) southeast of the boundary at Cony Mountain, and the potential RNA may be reached by cross-country foot or horseback travel from the end of that road. Much of the potential RNA may eventually be reached by this route.

On the southeast, two routes give access to limited parts of the potential RNA: (1) Silas Canyon may be reached from National Forest Road 300 at Fiddler's Lake via National Forest Trails 721 (the Christina Lake Trail) and 722 into Upper Silas Lake approx. 3/4 mile (1.2 km) east of the boundary, thence by an unmaintained trail up Silas Canyon; (2) Atlantic Canyon may be reached via National Forest Road 355 (a four-wheel drive road) to Christina Lake, then National Forest Trail 723 to Atlantic Lake approx. 0.5 mile (0.8 km) from the boundary, thence up Atlantic Canyon to the potential RNA. Travel out of Silas Canyon and Atlantic Canyon to other parts of the area is difficult.

## **ECOREGION**

The potential Roaring Fork Mountain RNA lies within the Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province, Wind River Mountains Section (M331J) 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 (South Half)

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1. The area of the potential Roaring Fork Mountain 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.

USDI Geological Survey 7.5-minute topographic Quadrangle Maps: Christina Lake, Wyo.; Cony Mountain, Wyo.; Sweetwater Gap, Wyo.; and Sweetwater Needles, Wyo.

### 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

#### Upland vegetation

Most of the potential RNA is above upper tree-line, and the major vegetation type in the area is *Geum rossii* turf (Figure 3). The composition of this turf varies with aspect, but much of it appears to belong to the *Geum rossii*-*Polygonum bistortoides* association (Table 1). West- and south-facing slopes support stands of the *Geum rossii*-*Selaginella densa* association and small stands of the *Carex elynoides* association. Patches of *Salix reticulata* dwarf-shrubland covering up to ca. 250 square meters also occur in the *Geum* turf, mainly on north-facing slopes.

At upper tree-line, the *Geum rossii* turf is mixed with stands of *Salix glauca* and *Salix planifolia* on east-facing slopes and with patches of *Pinus albicaulis* woodland, most of which can be placed into the *P. albicaulis*/*Vaccinium scoparium* association (Table 1). *Abies lasiocarpa* is present in some stands but is a minor species in the potential RNA. With decreasing elevation, the *P. albicaulis* forest is increasingly restricted to south- and west-facing slopes and to ridge-tops. The subalpine forest in the potential RNA is a mosaic of the *Picea engelmannii*/*Vaccinium scoparium* forest association on north-facing slopes, the *Pinus contorta*/*Vaccinium scoparium* forest association on ridges and rolling uplands, and the *Pinus albicaulis*/*Vaccinium scoparium* forest association on ridgetops at higher elevations.

#### Riparian vegetation

Riparian vegetation is restricted to lake margins and streamsides and covers little area in the potential RNA (Figure 3, Table 1). In the alpine zone, shrublands of *Salix planifolia*, often with *Salix glauca* as a co-dominant or sub-dominant shrub, grow along stream courses. This vegetation was not studied in detail and is placed into a general *Salix planifolia* shrubland type. *Salix planifolia* shrublands also occur along the larger streams in the subalpine zone.

The wet bottom of Stough Creek Basin is a mix of wetland types. Much of the valley bottom appears to be patchy *Vaccinium occidentale* dwarf-shrub vegetation, especially around the margins of lakes. *Salix planifolia* shrubland grows along the larger streams, and patches of *Caltha leptosepala* herbaceous vegetation covering up to several hundred square meters each occur along some streams. A wetland of *Deschampsia cespitosa*-*Caltha leptosepala* vegetation was noted on a north-facing slope at upper tree-line in the eastern part of the area and this type may occur elsewhere in the potential RNA.

Table 1. Complexes of plant associations in the potential Roaring Fork Mountain Research Natural Area. See Figure 3. “M” in a cell indicates that a plant association is a major component of a complex, and “m” indicates that it is a minor component of the complex.

Plant Association	Complexes of Plant Associations (and areas)			
	<i>Picea – Pinus contorta</i> (3,068 acres, 1,242 ha)	<i>Picea – Pinus albicaulis</i> (2,135 acres, 864 ha)	<i>Vaccinium – Salix – Caltha</i> (952 acres, 385 ha)	<i>Geum – Carex – rock</i> (7,283 acres 2,947 ha)
<b>Herbaceous</b>				
<i>Carex elynoides</i> Herbaceous Vegetation				m
<i>Caltha leptosepala</i> Herbaceous Vegetation	m		M	
<i>Deschampsia cespitosa – Caltha leptosepala</i> Herbaceous Vegetation				m
<i>Carex scirpoidea / Potentilla diversifolia</i>				m
<i>Geum rossii / Polygonum bistortoides</i> Herbaceous Vegetation				M
<i>Geum rossii – Selaginella dense</i> Herbaceous Vegetation	m			m
<b>Shrub</b>				
<i>Salix glauca</i> Shrubland	m			m
<i>Salix planifolia</i> Shrubland	m		M	m
<i>Salix reticulata</i> Dwarf-shrubland				m
<i>Vaccinium uliginosum</i> Dwarf-shrubland	m		M	
<b>Forest &amp; Woodland</b>				
<i>Picea engelmannii / Vaccinium scoparium</i> Forest	M	M	m	m
<i>Pinus albicaulis / Vaccinium scoparium</i> Woodland	m	M		m
<i>Pinus contorta / Vaccinium scoparium</i> Forest	M	m		

## KUCHLER VEGETATION TYPES

The vegetation in the potential Roaring Fork Mountain RNA belongs to two Kuchler cover-types (Kuchler 1966) (Figure 4, Table 2). The alpine vegetation of the area is classified in the Alpine Meadows and Barrens type, and the various subalpine forests are classified in the Western Spruce-Fir Forest type.

Table 2. Kuchler vegetation types in the potential Roaring Fork Mountain Research Natural Area. See Figure 4.

Vegetation Type (Kuchler 1964)	Acres	Hectares
Western Spruce-Fir Forest ( <i>Picea – Abies</i> )	5,203	2,106
Alpine Meadows & Barrens ( <i>Agrostis, Carex, Festuca, Poa</i> )	8,234	3,332

## HABITAT TYPES

The subalpine forest in the potential RNA grows on three habitat types known from western Wyoming (Steele *et al.* 1983), with each of the three forest-types growing on a habitat type named for the same dominant tree species: *Picea engelmannii*, *Pinus albicaulis*, and *Pinus contorta* (Figure 5, Table 3). (The paucity of *Abies lasiocarpa* in the *Pinus contorta*-dominated forest indicates that that forest grows on the *P. contorta* habitat type instead of an *A. lasiocarpa* habitat type.) The alpine vegetation corresponds to several herbaceous community-types described from the Shoshone National Forest but not to any of the shrub or herbaceous habitat types described for the Forest (Tweit and Houston 1980).

Table 3. Habitat types in the potential Roaring Fork Mountain 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 Type or Community Type	Complexes of Habitat Types and Community Types (and areas)			
	<i>P. engelmannii</i> / <i>V. scoparium</i> , <i>P. contorta</i> / <i>V. scoparium</i> (3,068 acres, 1,242 ha)	<i>P. engelmannii</i> / <i>V. scoparium</i> , <i>P. albicaulis</i> / <i>V. scoparium</i> (2,135 acres, 864 ha)	<i>Deschampsia</i> Meadow? <i>Carex scopulorum</i> Bog? (982 acres, 385 ha)	<i>Geum rossii</i> Turf, <i>Deschampsia</i> Meadow, Cushion Plant (7,283 acres, 2,947 ha)
Herbaceous				
<i>Carex scopulorum</i> Bog community type	m	m	M	
<i>Deschampsia caespitosa</i> Meadow Community Type	m	m	M	m
<i>Geum rossii</i> Turf community type		m	m	M
Cushion Plant community type		m		M
Forest & Woodland				
<i>Picea engelmannii</i> / <i>Vaccinium scoparium</i> Habitat Type	M	M	m	m
<i>Pinus albicaulis</i> / <i>Vaccinium scoparium</i> Habitat Type	m	M	m	m
<i>Pinus contorta</i> / <i>Vaccinium scoparium</i> Habitat Type	M	m		

## SOCIETY OF AMERICAN FORESTERS COVER TYPES

Three Society of American Foresters forest cover types (Eyre 1980) occur in the potential RNA (Table 4 and Figure 6), with each cover type corresponding to one of the overstory tree dominants (*Picea engelmannii*, *Pinus albicaulis*, and *Pinus contorta*). The alpine vegetation is not covered by the forest cover type classification.

Table 4. Society of American Foresters Cover Types in the potential Roaring Fork Mountain Research Natural Area. See Figure 6. “M” in a cell indicates that a cover-type is a major component of a complex, and “m” indicates that it is a minor component of the complex.

Cover Type (Eyre 1980)	Complex of Cover Types (and areas)	
	Engelmann Spruce-Subalpine Fir (216) & Lodgepole Pine (218) (3,068 acres, 1,242 ha)	Engelmann Spruce-Subalpine Fir (216) & Whitebark Pine (208) (2,135 acres, 864 ha)
Engelmann Spruce – Subalpine Fir (206)	M	M
Whitebark Pine (208)	m	M
Lodgepole Pine (218)	M	m

## 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 Roaring Fork Mountain 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/>). The area originally mapped in the Landfire project data-set as the *Artemisia tridentata* ssp. *vaseyana* Plant Alliance was re-classified for this report to the Inter-Mountain Basins Montane Sagebrush Steppe Ecological System.

Table 5 shows the area of each ecological system within the potential RNA. Eight ecological systems have each been mapped over at least 1% of the potential RNA, and an additional 11 ecological systems each have been mapped on less than 1% of the area. The forest vegetation is mapped as the Northern Rocky Mountain Subalpine Woodland and Parkland system, and the alpine vegetation mainly as the Rocky Mountain Alpine Turf system. Large patches of the Northern Rocky Mountain Subalpine-Upper Montane Grassland system also are mapped at or above upper tree-line.

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)). The information gathered during field survey (and reported in Jones and Fertig 1999) suggests that much (if not all) of the area mapped as the Northern Rocky Mountain Subalpine Woodland and Parkland system has plant species composition and vegetation structure consistent with the either the Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland system or the Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland system.

Two additional systems – Agriculture-Pasture and Hay, and Northern Rocky Mountain Conifer Swamp – also are erroneously mapped in the area. The potential RNA contains no agricultural land, and field survey turned up no evidence of swamp vegetation. The putative presence of these systems is an artifact of the automatic classification of pixels on satellite images.



Table 5. Ecological systems in the potential Roaring Fork Mountain 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>Ha</b>
Barren	1365	552
Northern Rocky Mountain Subalpine Deciduous Shrubland	1091	441
Northern Rocky Mountain Subalpine Woodland and Parkland	3876	1569
Northern Rocky Mountain Subalpine-Upper Montane Grassland	830	336
Open Water	286	116
Rocky Mountain Alpine Dwarf-Shrubland	623	252
Rocky Mountain Alpine Turf	4376	1771
Rocky Mountain Subalpine-Montane Mesic Meadow	687	278
<i>Agriculture-Pasture and Hay</i>	6	2
<i>Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland</i>	0	0
<i>Inter-Mountain Basins Montane Sagebrush Steppe</i>	39	16
<i>Northern Rocky Mountain Conifer Swamp</i>	0	0
<i>Northern Rocky Mountain Mesic Montane Mixed Conifer Forest</i>	1	0
<i>Rocky Mountain Aspen Forest and Woodland</i>	1	0
<i>Rocky Mountain Lodgepole Pine Forest</i>	4	2
<i>Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland</i>	133	54
<i>Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland</i>	0	0
<i>Rocky Mountain Subalpine/Upper Montane Riparian Systems</i>	88	36
<i>Snow-Ice</i>	42	17

## PHYSICAL AND CLIMATIC CONDITIONS

### PHYSICAL SETTING

The potential Roaring Fork Mountain RNA is located at the southeastern end of the Wind River Mountains and encompasses the headwaters of tributaries to the Middle Fork of the Popo Agie River (Basco Creek, Stough Creek, and Roaring Fork Creek) and to the Little Popo Agie River. The major landforms are broad, rolling alpine ridges separated by u-shaped glacial valleys of the Stough Creek Basin in the northern part of the area, and of Atlantic Canyon and Silas Canyon in the southeastern part (Figure 2). Local relief in the glacial valleys is 800 - 1,000 feet (244 - 305 m).

### GEOLOGY

The bedrock in most of the proposed RNA is Precambrian (Late Archaen) granite and granodiorite. The northeastern part of the area, in the Roaring Fork Creek drainage, lies atop Quaternary glacial deposits of till and outwash (Love and Christensen 1985).

## SOILS

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## DESCRIPTION OF VALUES

### VEGETATION TYPES

The vegetation in the potential Roaring Fork Mountain RNA illustrates patterns common at the highest elevations of the Rocky Mountains, with overstory dominance in the subalpine forest shifting from lodgepole pine in the lower-elevation parts of the area to Engelmann spruce and then whitebark pine at the higher elevations, and the subalpine forest giving way to alpine turf and dwarf-shrub vegetation. Superimposed on this elevation gradient is the more rapid change in species composition, and vegetation structure, between wetlands and uplands. Above upper tree-line, the vegetation demonstrates the effect of wind exposure, with the shortest, sparsest vegetation on south- and west-facing slopes.

### FLORA

#### Plant Species List

A list of 84 vascular plant species documented in the potential Roaring Fork Research Natural Area is included in Appendix 1.

#### Threatened, Endangered, and Sensitive Plant Species

No federally listed Threatened or Endangered plant species, or species on the USDA Forest Service Region 2 Sensitive Species List, are found in the potential Roaring Fork Mountain Research Natural Area. One species considered by the Wyoming Natural Diversity Database as a species of concern is known from the potential area. Information about it is summarized below. The heritage ranks are explained in Appendix 2.

*Draba fladnizensis* var. *pattersonii* (Austrian draba)

Heritage Rank: G4T2T3/S2

Federal Status: Species of Local Concern on Bighorn National Forest.

Geographic Range: Regional endemic of western Wyoming, Colorado, and Utah. In Wyoming, it is known from the Absaroka, Beartooth, Bighorn and Teton Mountains in Park, Johnson and Teton counties. Reports from the Wind River Mountains other than this one in the potential RNA (Fertig 1992), and from Medicine Bow Mountains (Nelson 1984) are based on misidentified specimens of *D. crassifolia*.

Habitat: Fellfields, talus slopes, alpine turf, and mountain meadows (Scott 1997).

Comments: One collection of White arctic whitlow-grass was made on Roaring Fork Mountain by Richard Scott in 1965.

### 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 Roaring Fork

Mountain RNA (Wyoming Game and Fish Department, No date). The potential RNA also is within the conservation strategy management area of Greater Yellowstone Area Distinct Population Segment of the grizzly bear, but outside the primary conservation area for the distinct population segment (USDI Fish and Wildlife Service, No date).

### Animal Species List

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### **LANDS**

The potential Roaring Fork Mountain RNA is National Forest System land administered within the Washakie Ranger District of the Shoshone National Forest, and is surrounded by National Forest System lands. The potential RNA lies entirely within the Popo Agie 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 Roaring Fork Mountain Research Natural Area. The inset map shows position of the potential RNA within the Shoshone National Forest and the State of Wyoming.

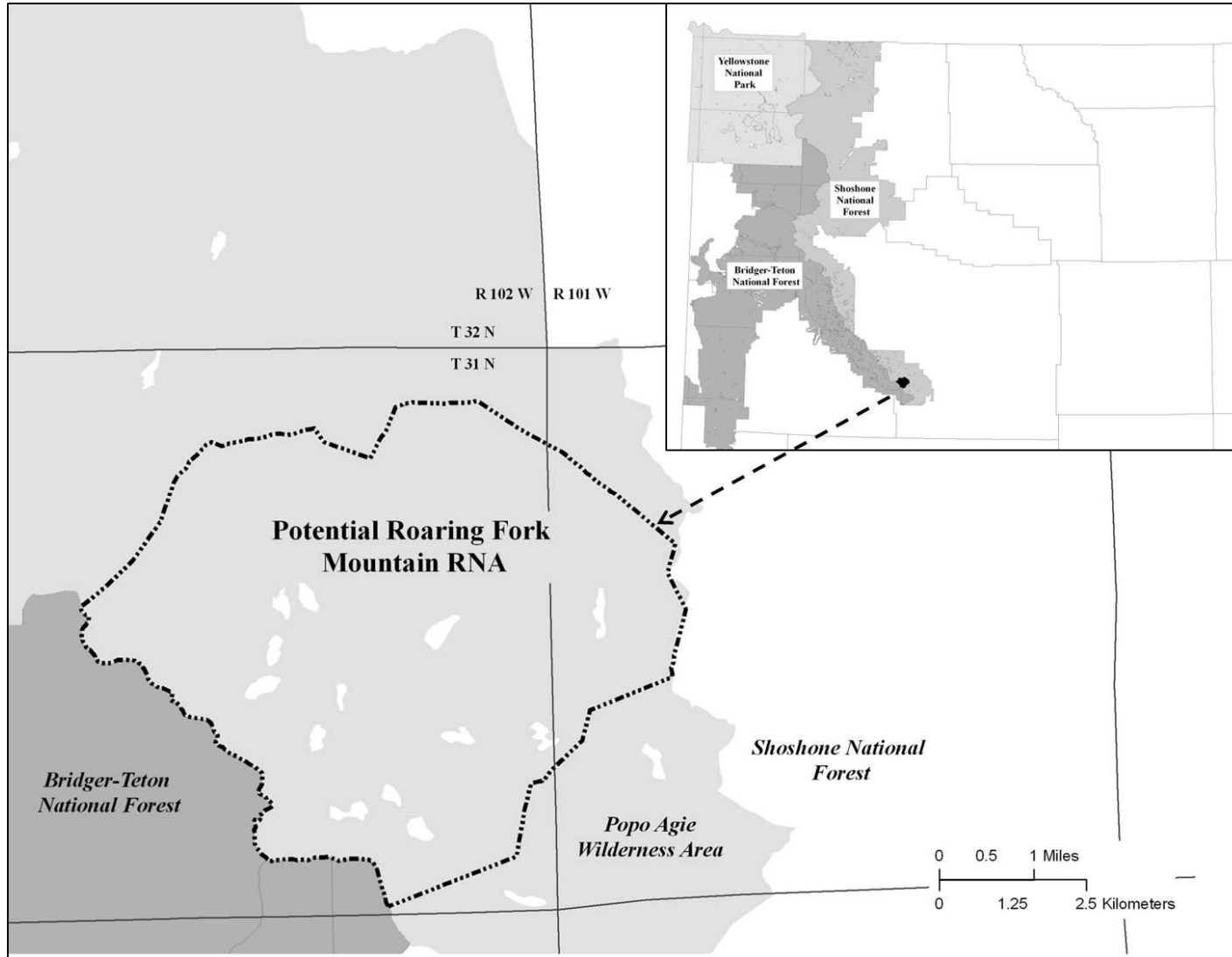


Figure 2. Proposed boundary of the potential Roaring Fork Mountain Research Natural Area.

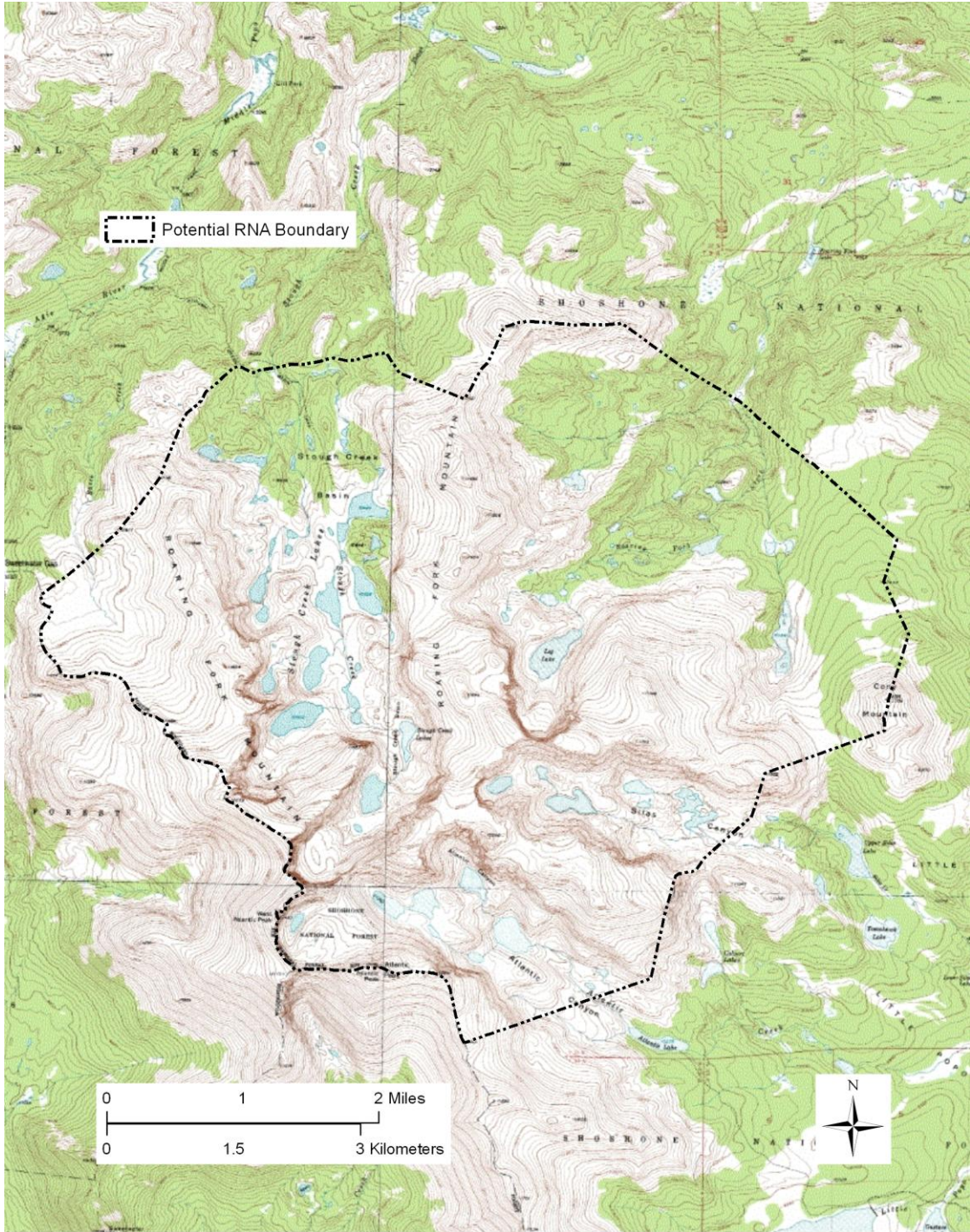


Figure 3. Complexes of plant associations in the potential Roaring Fork Mountain Research Natural Area. The plant associations present in each complex are listed in Table 1.

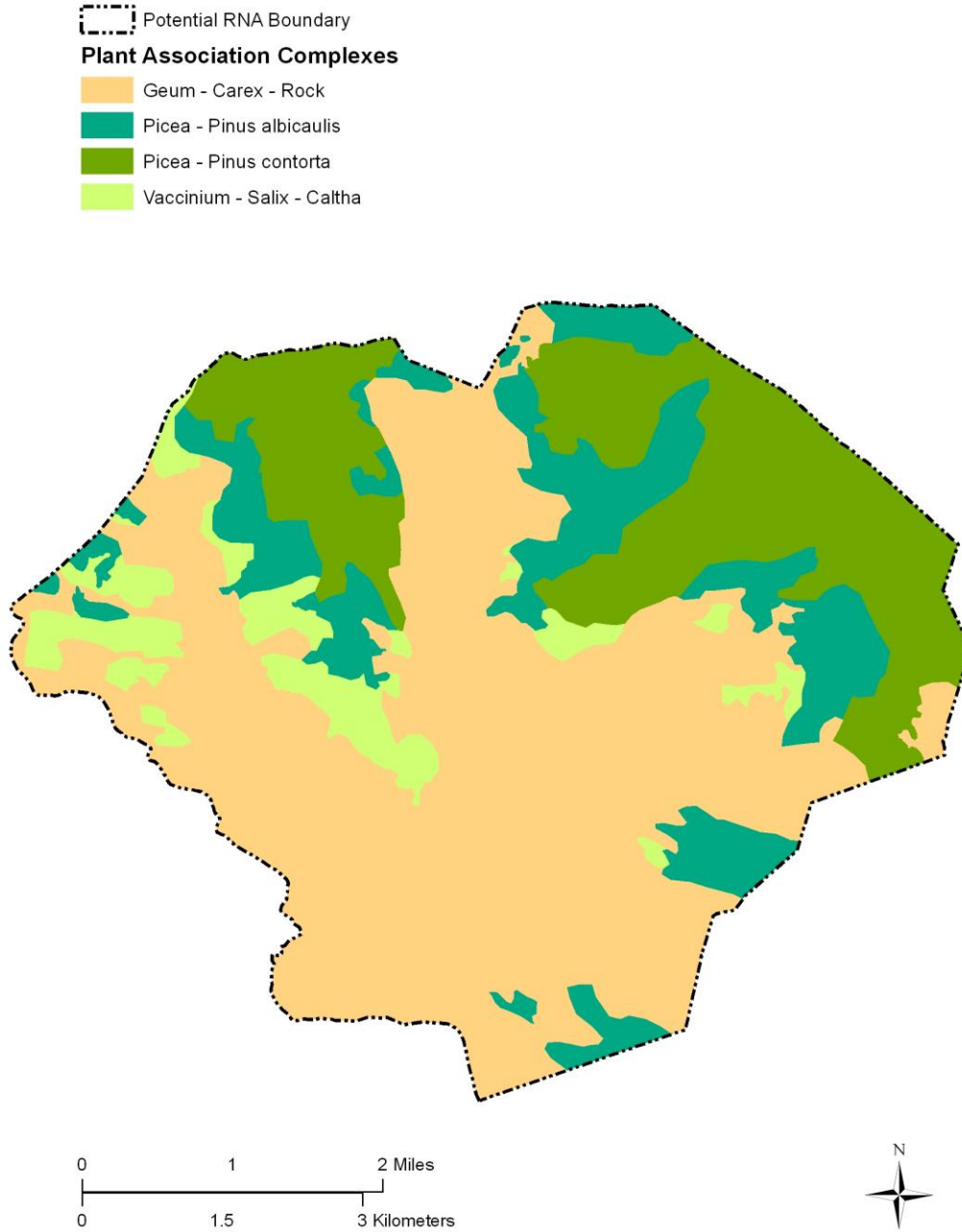




Figure 4. Complexes of Kuchler vegetation types (Kuchler 1966) in the potential Roaring Fork Mountain Research Natural Area. Areas of these types are listed in Table 2.

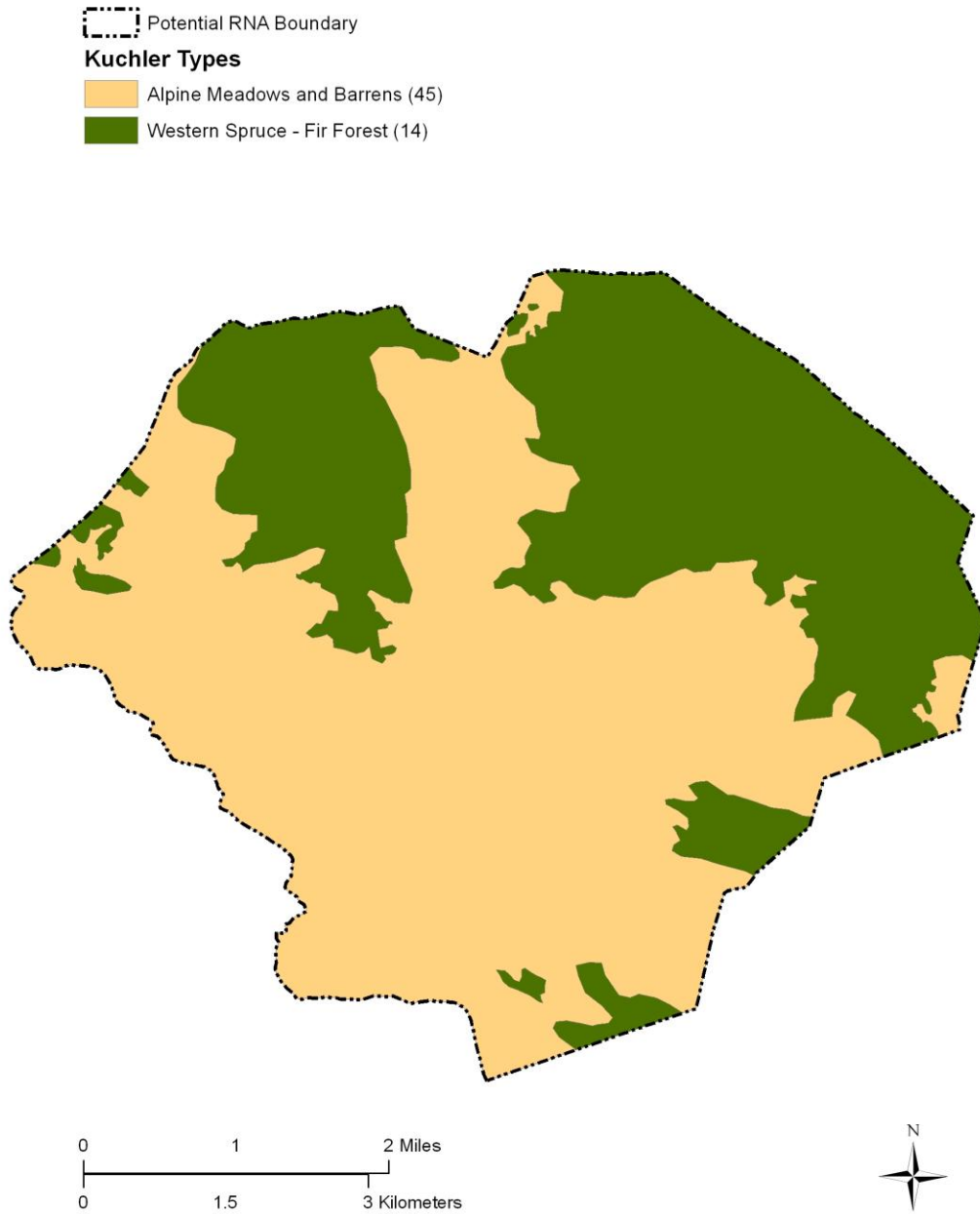


Figure 5. Complexes of habitat types (Steele *et al.* 1983, Tweit & Houston 1980) in the potential Roaring Fork Mountain Research Natural Area. The habitat types present in each complex are listed in Table 3.

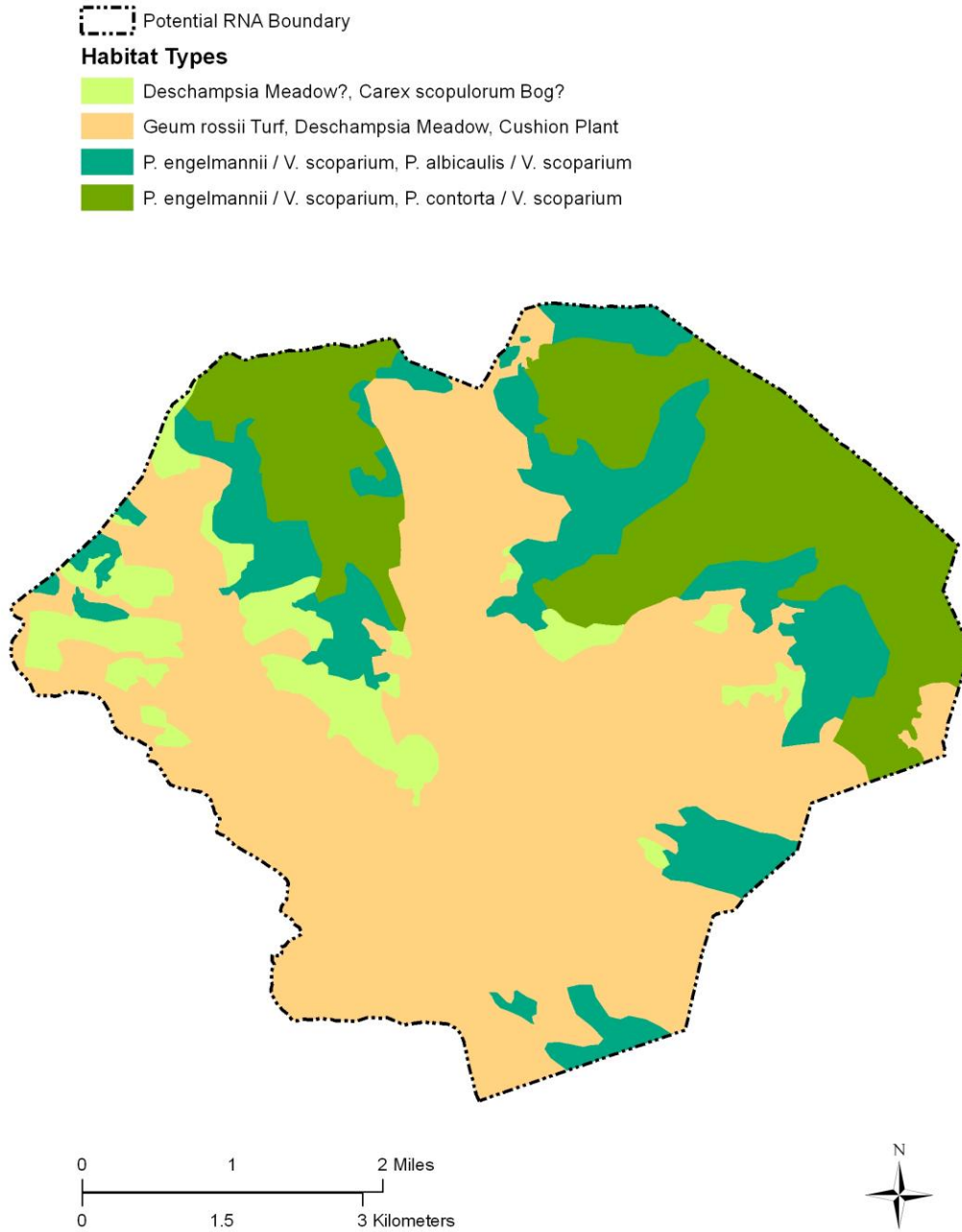


Figure 6. Society of American Foresters Cover Types (Eyre 1980) in the potential Roaring Fork Mountain Research Natural Area. Areas of these types are shown in Table 4.

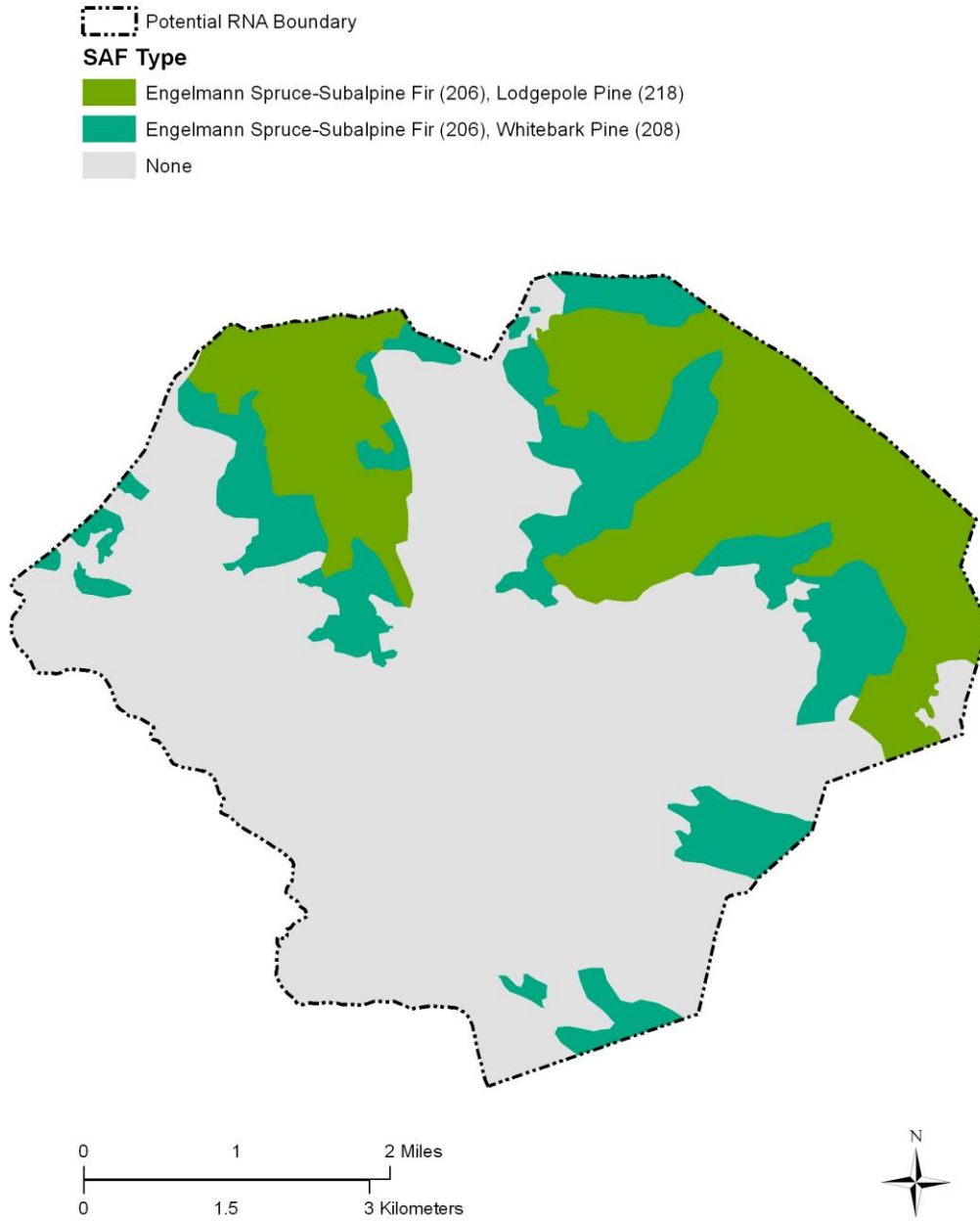


Figure 7. Ecological systems in the potential Roaring Fork Mountain Research Natural Area. See following page for legend. Areas of these types are listed in Table 5

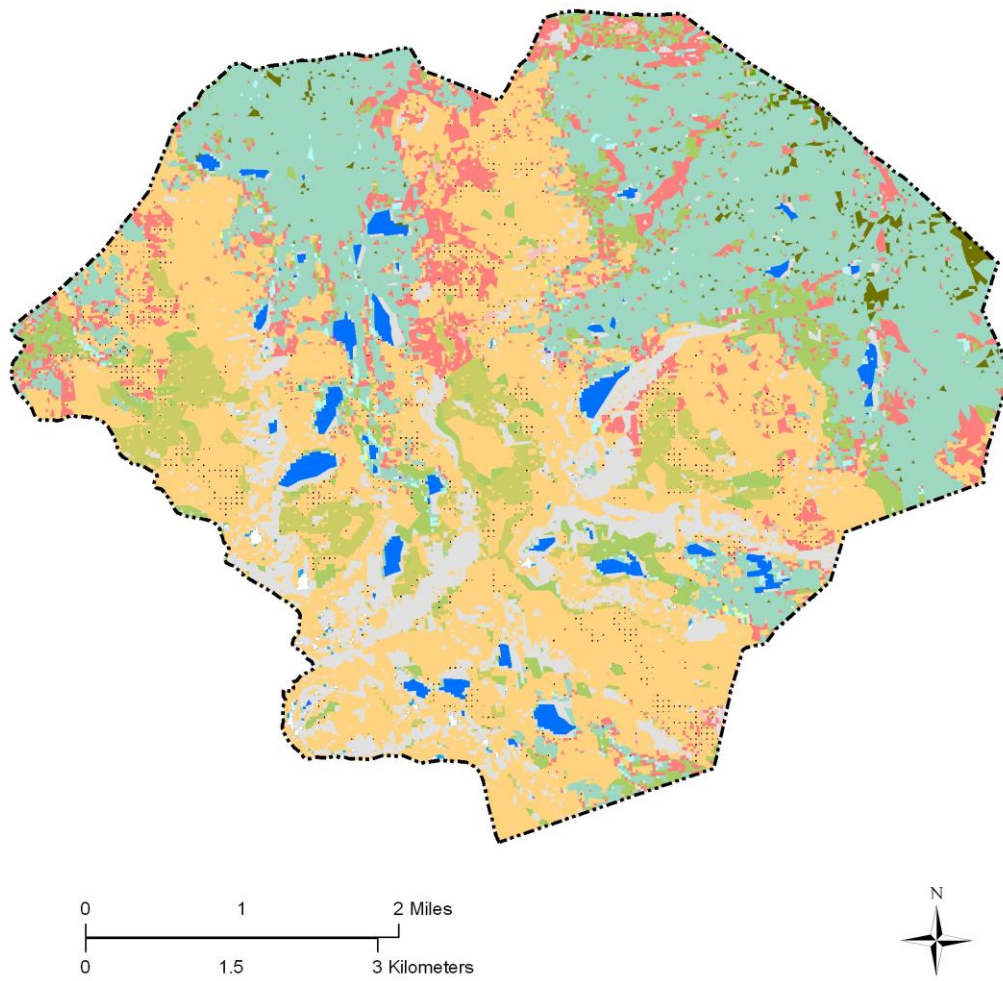


Figure 7 (continued). Legend for map of ecological systems in the potential Roaring Fork Mountain Research Natural Area. System names are listed alphabetically in two groups. Systems in the first group (“Barren” through “Rocky Mountain Alpine-Turf”) each cover  $\geq 1\%$  of the area; systems in the second group each cover  $<1\%$  of the area.



## APPENDICES

**APPENDIX 1. VASCULAR PLANT SPECIES DOCUMENTED IN THE POTENTIAL ROARING FORK MOUNTAIN 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 Author	PLANTS Common Name
<b>Trees</b>	
<i>Abies lasiocarpa</i> (Hook.) Nutt.	subalpine fir
<i>Picea engelmannii</i> Parry ex Engelm.	Engelmann spruce
<i>Pinus albicaulis</i> Engelm.	whitebark pine
<i>Pinus contorta</i> Douglas ex Louden	lodgepole pine
<b>Shrubs</b>	
<i>Betula glandulosa</i> Michx.	resin birch
<i>Salix geeyeriana</i> Andersson	Geyer willow
<i>Salix glauca</i> L.	grayleaf willow
<i>Salix nivalis</i> Hook.	snow willow
<i>Salix planifolia</i> Pursh ssp. <i>planifolia</i>	diamondleaf willow
<i>Salix tweedyi</i> (Bebb ex Rose) C.R. Ball	Tweedy's willow
<i>Vaccinium scoparium</i> Leiberg ex Coville	grouse whortleberry
<i>Vaccinium uliginosum</i> L.	bog blueberry
<b>Forbs</b>	
<i>Allium cernuum</i> Roth	nodding onion
<i>Antennaria rosea</i> Greene ssp. <i>pulvinata</i> (Greene) Bayer	pulvinate pussytoes
<i>Antennaria umbrinella</i> Rydb.	umber pussytoes
<i>Arabis lyallii</i> S. Watson	Lyall's rockcress
<i>Arnica latifolia</i> Bong.	broadleaf arnica
<i>Artemisia scopulorum</i> A. Gray	alpine sagebrush
<i>Astragalus alpinus</i> L.	alpine milkvetch
<i>Astragalus kentrophyta</i> A. Gray var. <i>tegetarius</i> (S. Watson) Dorn	mat milkvetch
<i>Besseyia wyomingensis</i> (A. Nelson) Rydb.	Wyoming besseyia
<i>Caltha leptosepala</i> DC.	white marsh marigold
<i>Campanula uniflora</i> L.	arctic bellflower
<i>Castilleja pulchella</i> Rydb.	beautiful Indian paintbrush
<i>Draba fladnizensis</i> Wulfen var. <i>pattersonii</i> (O.E. Schultz) Rollins	Austrian draba
<i>Erigeron peregrinus</i> (Banks ex Pursh) Greene ssp. <i>callianthemus</i> (Greene)	
<i>Cronquist</i> var. <i>callianthemus</i>	subalpine fleabane
<i>Erigeron simplex</i> Greene	onestem fleabane
<i>Eritrichium nanum</i> (Vill.) Schrad. ex Gaudin	arctic alpine forget-me-not
<i>Geum rossii</i> (R. Br.) Ser.	Ross' avens
<i>Ivesia gordonii</i> (Hook.) Torr. & A. Gray	Gordon's ivesia
<i>Kalmia microphylla</i> (Hook.) A. Heller	alpine laurel
<i>Lewisia pygmaea</i> (A. Gray) B.L. Rob.	alpine lewisia
<i>Mertensia oblongifolia</i> (Nutt.) G. Don	oblongleaf bluebells
<i>Minuartia obtusiloba</i> (Rydb.) House	twinflower sandwort
<i>Myosotis asiatica</i> (Vesterg.) Schischkin & Sergievskaja	Asian forget-me-not
<i>Oxytropis campestris</i> (L.) DC. var. <i>cusickii</i> (Greenm.) Barneby	Cusick's locoweed
<i>Pedicularis groenlandica</i> Retz.	elephanthead lousewort

## Appendix 1 (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Pedicularis parryi</i> A. Gray	Parry's lousewort
<i>Phacelia sericea</i> (Graham) A. Gray ssp. <i>sericea</i>	silky phacelia
<i>Phlox pulvinata</i> (Wherry) Cronquist	cushion phlox
<i>Polemonium viscosum</i> Nutt.	sticky polemonium
<i>Polygonum bistortoides</i> Pursh	American bistort
<i>Polygonum viviparum</i> L.	alpine bistort
<i>Potentilla diversifolia</i> Lehm. var. <i>diversifolia</i>	varileaf cinquefoil
<i>Pteryxia hendersonii</i> (J.M. Coult. & Rose) Mathias & Constance	Henderson's wavewing
<i>Rhodiola integrifolia</i> Raf. ssp. <i>integrifolia</i>	ledge stonecrop
<i>Saxifraga rhomboidea</i> Greene	diamondleaf saxifrage
<i>Sedum lanceolatum</i> Torr.	spearleaf stonecrop
<i>Sibbaldia procumbens</i> L.	creeping sibbaldia
<i>Silene acaulis</i> (L.) Jacq. var. <i>subacaulescens</i> (F.N. Williams) Fernald & H. St. John	moss campion
<i>Smelowskia calycina</i> (Stephan ex Willd.) C.A. Mey. var. <i>americana</i> (Regel & Herder) Drury & Rollins	American false candytuft
<i>Solidago multiradiata</i> Aiton var. <i>scopulorum</i> A. Gray	manyray goldenrod
<i>Taraxacum officinale</i> F.H. Wigg. ssp. <i>ceratophorum</i> (Ledeb.) Schinz ex Thell.	common dandelion
<i>Tetranneuris grandiflora</i> (Torr. & A. Gray ex A. Gray) K.F. Parker	graylocks four-nerve daisy
<i>Tonestus lyallii</i> (A. Gray) A. Nelson	Lyall's goldenweed
<i>Trifolium dasyphyllum</i> Torr. & A. Gray	alpine clover
<i>Trifolium nanum</i> Torr.	dwarf clover
<i>Veronica wormskjoldii</i> Roem. & Schult.	American alpine speedwell
<b>Graminoids</b>	
<i>Agrostis humilis</i> Vasey	alpine bentgrass
<i>Calamagrostis canadensis</i> (Michx.) P. Beauv.	bluejoint
<i>Carex</i> L.	sedge
<i>Carex atrata</i> L. or <i>C. nova</i> L.H. Bailey	black sedge
<i>Carex capitata</i> L.	capitate sedge
<i>Carex elynoides</i> T. Holm	blackroot sedge
<i>Carex nigricans</i> C.A. Mey.	black alpine sedge
<i>Carex obtusata</i> Lilj.	obtuse sedge
<i>Carex phaeocephala</i> Piper	dunhead sedge
<i>Carex rupestris</i> All.	curly sedge
<i>Carex scirpoidea</i> Michx. ssp. <i>pseudoscirpoidea</i> (Rydb.) Dunlop	western singlespike sedge
<i>Carex stenoptila</i> F.J. Herm.	riverbank sedge
<i>Deschampsia cespitosa</i> (L.) P. Beauv.	tufted hairgrass
<i>Elymus scribneri</i> (Vasey) M.E. Jones	spreading wheatgrass
<i>Festuca brachyphylla</i> Schult. ex Schult. & Schult. f.	alpine fescue
<i>Festuca saximontana</i> Rydb.	Rocky Mountain fescue
<i>Juncus drummondii</i> E. Mey.	Drummond's rush
<i>Luzula spicata</i> (L.) DC.	spiked woodrush
<i>Pheum alpinum</i> L.	alpine timothy
<i>Poa alpina</i> L.	alpine bluegrass
<i>Poa cusickii</i> Vasey ssp. <i>epilis</i> (Scribn.) W.A. Weber	Cusick's bluegrass
<i>Poa glauca</i> Vahl ssp. <i>rupicola</i> (Nash ex Rydb.) W.A. Weber	timberline bluegrass



Table 1 (continued).

<b>PLANTS Accepted Scientific Name with Author</b>	<b>PLANTS Common Name</b>
Poa leptocoma Trin.	marsh bluegrass
Poa secunda J. Presl	Sandberg bluegrass
Poa wheeleri Vasey	Wheeler's bluegrass
Trisetum spicatum (L.) K. Richt.	spike trisetum

## 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.