

ECOLOGICAL EVALUATION OF
THE POTENTIAL ROARING FORK MOUNTAIN RESEARCH NATURAL AREA
WITHIN THE SHOSHONE NATIONAL FOREST,
FREMONT COUNTY, WYOMING

Prepared for the
Shoshone National Forest,
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INTRODUCTION

The potential Roaring Fork Mountain Research Natural Area (RNA) is located in the southeastern part of the Wind River Mountains of west-central Wyoming. The area includes subalpine forests, alpine tundra, and riparian and wetland meadows and shrublands. The potential RNA is in the Shoshone National Forest and is used primarily for recreation, watershed protection, and wildlife habitat.

In 1997, The Nature Conservancy entered a contract with the USDA Forest Service, Shoshone National Forest, to prepare ecological evaluations of areas in the Forest for use by the Forest Service in examining the suitability of the areas as research natural areas. The evaluation of the Roaring Fork Mountain area was done by the Wyoming Natural Diversity Database. This report presents the results of that evaluation.

LAND MANAGEMENT PLANNING

In 1997, Roaring Fork Mountain was selected by USDA Forest Service staff as a potential RNA for possible analysis during revision of the Land and Resource Management Plan. This ecological evaluation is intended to aid the Forest Service staff in that analysis.

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.

PRINCIPAL 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.

LOCATION

The potential Roaring Fork Mountain RNA is located within the Lander Ranger District of the Shoshone National Forest in west-central Wyoming. 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):

T31N, R101W, Sec 7, 8, 17, 18, 19, 20, 30
T31N, R102W, Sec 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, 36

BOUNDARY

See Figure 1. The boundary of the potential RNA, as evaluated in this report, is drawn between hilltops and in places follows drainage divides. On the east and northeast, the boundary is drawn to include the upper part of the drainage basin of Roaring Fork. 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 total area evaluated for the potential Roaring Fork Mountain RNA is approximately 13,387 acres (5422 ha).

ELEVATION

The elevation of the potential Roaring Fork Mountain RNA ranges from approx. 9320 feet (2843 m) on Roaring Fork along the northeastern boundary to 12,490 feet (3809 m) on Atlantic Peak on the southern boundary.

ACCESS

The potential Roaring Fork Mountain RNA may be reached via several 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 into the northeastern part of the area. On the east, National Forest Road 306 (a four-wheel drive road) reaches to 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, then 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, then 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)

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

VEGETATION

DESCRIPTION

Information on the vegetation in the potential Roaring Fork Mountain RNA comes from the 1998 field survey. Names of plant associations come from the National Vegetation Classification (Anderson et al. 1998) when known. Synonyms are shown in Appendix 4. Data from sample plots and descriptions of vegetation at various locations are given in Appendix 3.

Upland vegetation

Most of the potential RNA is above timberline, and the major vegetation type in the area is *Geum rossii* turf. The composition of this turf varies with aspect, but much of it appears to belong to the *Geum rossii*-*Polygonum bistortoides* association (Table 3-1, locations 10a, 13). West- and south-facing slopes support stands of the *Geum rossii*-*Selaginella densa* association (Table 3-1) and small stands of *Carex elynoides* association (locations 9, 11c). Patches of *Salix reticulata* dwarf-shrubland covering up to ca. 250 square meters also occur in the *Geum* turf (Table 3-2, location 10b), mainly on north-facing slopes.

At timberline, the *Geum rossii* turf is mixed with stands of *Salix glauca* and *Salix planifolia* on east-facing slopes (location 4b) and patches of *Pinus albicaulis* woodland, most of which can be placed into the *P. albicaulis*/*Vaccinium scoparium* association (locations 4a, 6, 7a, 16, 17, 23, 25, 26a). *Abies lasiocarpa* is present in some stands (locations 23, 25, 26a) 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 ridgetops, and it gives way at lower elevations to *Picea engelmannii* forest (location 20). The subalpine forest is a mosaic of the *Picea engelmannii/Vaccinium scoparium* association on north-facing slopes (locations 1a, 3, 18a, 26b), the *Pinus contorta/Vaccinium scoparium* forest on ridges and rolling uplands (locations 2, 27), with the *Pinus albicaulis/Vaccinium scoparium* forest appearing on ridgetops at higher elevations.

Riparian vegetation

Riparian vegetation is restricted to lake margins and streamsides and covers little area in the potential RNA. In the alpine zone, shrublands of *Salix planifolia*, often with *Salix glauca* as a co-dominant or sub-dominant shrub, grow along stream courses (locations 5b, 7c, 11b, 12, 15). 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 (locations 1b, 24).

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 (locations 7b, 11a. *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 (location 11d). A wetland of *Deschampsia cespitosa-Caltha leptosepala* vegetation was noted on a north-facing slope at timberline in the eastern part of the area (location 18b) and this type may occur elsewhere in the potential RNA.

AREA BY TYPE

Complexes of Kuchler vegetation types (Kuchler 1966) were mapped on 1:24,000-scale topographic maps using aerial photographs and field reconnaissance, and the area of each complex was estimated from the maps by use of a digital planimeter. (The vegetation map shows complexes because delineating stands of individual vegetation types was impossible.) Areas of complexes of plant community types (Table 3) were estimated in the same manner.

Table 1. Areas of Kuchler Types (Kuchler 1966) in the potential Roaring Fork Mountain RNA See Figure 1.

Cover Type	Acres	Hectares
Western spruce-fir forest (14)	3342	1353
Alpine meadows and barrens (45)	10,045	4068

Table 2. Area of SAF Cover Types (Eyre 1980) in the potential Roaring Fork Mountain RNA See Figure 1. The area includes all of the SAF types, which occur as a mosaic of stands.

Cover Type	Acres	Hectares
Engelmann spruce-Subalpine fir (206)		
Whitebark pine (208)	3342	1353
Lodgepole pine (218)		

Table 3. Areas of complexes of plant community types in the potential Roaring Fork Mountain RNA. Major communities in each complex are indicated by "(M)" following the names, and minor communities by "(m)". Appendix 4 contains synonyms.

Complex	Acres	Hectares
<i>Geum rossii</i> - <i>Polygonum bistortoides</i> (M) + <i>Geum rossii</i> - <i>Selaginella densa</i> (m) + <i>Carex elynoides</i> (m) + <i>Salix reticulata</i> (m) + <i>Salix planifolia</i> (m) + <i>Salix glauca</i> (m) + Unvegetated rock (m)	9037	3660
<i>Vaccinium occidentale</i> (m) + <i>Salix planifolia</i> (m) + <i>Caltha leptosepala</i> (m)	1008	408
<i>Picea engelmannii</i> / <i>Vaccinium scoparium</i> (M) + <i>Pinus albicaulis</i> / <i>Vaccinium scoparium</i> (M) + <i>Pinus contorta</i> / <i>Vaccinium scoparium</i> (m) + <i>Salix planifolia</i> (m) + <i>Deschampsia cespitosa</i> - <i>Caltha leptosepala</i> (m)	3342	1353

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) and of the Little Popo Agie River. The major landforms are broad, rolling alpine ridges separated by u-shaped glacial valleys in the northern part (Stough Creek Basin) and the southeastern part

(Silas Canyon, Atlantic Canyon) of the area. Local relief in the glacial valleys is 800-1000 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 drainage, lies atop Quaternary glacial deposits of till and outwash (Love and Christensen 1985).

DESCRIPTION OF VALUES

VEGETATION TYPES

See Table 1 for a list of the Kuchler (1966) vegetation types present in the area and the estimated acreage of each, and Table 3 for a list of the plant associations present.

FLORA

Threatened, Endangered, and Sensitive Plant Species

No federally listed Threatened or Endangered plant species, or plant species on the USDA Forest Service Region 2 Sensitive Species List (Estill 1993), are known from the potential Roaring Fork Mountain RNA.

Plant Species List

The following species checklist is based on the August 1998 field survey. Family acronyms are based on Weber (1982). Non-native species are indicated by "!" before the species name.

Scientific Name	Family
TREES	
Abies lasiocarpa	PIN
Picea engelmannii	PIN
Pinus albicaulis	PIN
Pinus contorta	PIN
SHRUBS	
Betula glandulosa	SAL
Salix geyeriana	SAL
Salix glauca var. villosa	SAL
Salix planifolia var. monica	SAL
Salix reticulata var. nana	SAL
Salix tweedyi	SAL
Vaccinium occidentale	ERI
GRAMINOIDS	
Agrostis humilis	POA
Calamagrostis canadensis	POA
Carex atrata or C. nova (immature)	CYP
Carex atrata var. chalceolepis	CYP
Carex capitata	CYP
Carex elynoides	CYP

Carex nigricans	CYP
Carex obtusata	CYP
Carex phaeocephala	CYP
Carex rupestris	CYP
Carex scirpoidea var. pseudoscirpoidea	CYP
Carex sp.	
Carex stenoptila	CYP
Deschampsia caspitosa	POA
Elymus scribneri	POA
Festuca brachyphylla	POA
Festuca saximontana	POA
Juncus drummondii	JUN
Luzula spicata	JUN
Phleum alpinum	POA
Poa alpina	POA
Poa cusickii var. epilis	POA
Poa leptocoma	POA
Poa nervosa var. wheeleri	POA
Poa rupicola	POA
Poa secunda var. incurva	POA
Trisetum spicatum	POA
FORBS	
Allium cernuum	LIL
Antennaria umbrinella	AST
Arabis lyallii	BRA
Arenaria obtusiloba	CRY
Arnica latifolia	AST
Artemisia scopulorum	AST
Astragalus alpinus	FAB
Astragalus kentrophyta var. tegetarius	FAB
Besseya wyomingensis	SCR
Caltha leptosepala	RAN
Campanula uniflora	CAM
Castilleja pulchella	SCR
Cymopterus longilobus	API
Erigeron peregrinus var. scaposus	AST
Erigeron simplex	AST
Eritrichium nanum	BOR
Geum rossii	ROS
Haplopappus lyallii	AST
Hieraceum gracile	AST
Hymenoxys grandiflora	AST
Ivesia gordonii	ROS
Kalmia microphylla	ERI
Lewisia pygmaea	POR
Mertensia oblongifolia	BOR

Myosotis alpestris	BOR
Oxytropis campestris var. cusickii	FAB
Pedicularis groenlandica	SCR
Pedicularis parryi	SCR
Phacelia sericea var. sericea	HYD
Phlox pulvinata	PLM
Polemonium viscosum	PLM
Polygonum bistortoides	PLG
Polygonum viviparum	PLG
Potentilla diversifolia var. diversifolia	ROS
Saxifraga rhomboidea	SAX
Sedum integrifolium	CRS
Sedum lanceolatum	CRS
Sibbaldia procumbens	ROS
Silene acaulis var. subacaulescens	CRY
Smelowskia calycina var. americana	BRA
Solidago multiradiata var. scopulorum	AST
Taraxacum ceratophorum? (immature)	AST
Trifolium dasyphyllum	FAB
Trifolium nanum	FAB
Veronica wormskjoldii	SCR

FAUNA

Threatened, Endangered, and Sensitive Vertebrates

As of May 1999, WYNDD files contain no extant occurrences of Federally threatened or endangered species from this site. However, it is likely that Canada lynx (*Lynx canadensis*), a USDA Forest Service Region 2 Sensitive Species, will soon be listed as threatened under the U. S. Endangered Species Act. Lynx presence was documented in the vicinity by the Wyoming Game and Fish Department in 1997. The relatively small amount of subalpine forest on the site has the potential to support some lynx activity.

Animal Species List

The field work in the potential Roaring Fork Mountain RNA did not include identification of the animal species present.

LANDS

The potential Roaring Fork Mountain RNA is National Forest System land of the Lander Ranger District of the Shoshone National Forest, and is surrounded by National Forest System lands. The potential RNA lies within the Popo Agie Wilderness.

SUITABILITY FOR RESEARCH NATURAL AREA SELECTION

An area is suitable for designation as a research natural area according to how well it meets four criteria: quality, condition, viability, and defensibility (USDA Forest Service Region 2, 1993). Each criterion is briefly defined below, and the information collected during field work that is pertinent to each criterion is described.

QUALITY

The degree to which the potential RNA represents the range in variability within the ecosystem types that it contains.

Alpine turf dominated by *Geum rossii* is common on the Shoshone National Forest (Tweit and Houston 1980) and is widespread throughout the Rocky Mountains from Montana through Colorado (Cooper et al. 1997). Evidence from Montana suggests that this type of vegetation occurs predominantly on granitic rocks (Cooper et al. 1997). Several literature sources (Johnson 1987, Potkin and Munn 1989, Cooper et al. 1997) suggest that throughout the region, vegetation equivalent to the *Geum rossii*-*Polygonum bistortoides* association grows on sites with moderate environment and vegetation equivalent to the *G. rossii*-*Selaginella densa* association occupies harsher sites. *Salix reticulata* also indicates moderate environments (Potkin and Munn 1989, Cooper et al. 1997). *Carex elynoides* turf also occupies harsh environments (Cooper et al. 1997). The 1998 field survey of the potential Roaring Fork Mountain RNA suggests that the *Geum rossii*-*Polygonum bistortoides* association (with patches of *Salix reticulata*) covers much of the alpine zone, and the *G. rossii*-*Selaginella densa* vegetation and *Carex elynoides* vegetation cover little area. Hence the potential RNA appears to represent the moderate alpine environments on granitic rocks of the region.

The vegetation types of the subalpine forest in the potential RNA also occur throughout the region. The two most common types, the *Picea engelmannii*/*Vaccinium scoparium* forest and the *Pinus albicaulis*/*Vaccinium scoparium* forest, are major types in the Wind River Mountains but their ranges extend to other areas (Steele et al. 1983): the *Picea engelmannii*/*Vaccinium scoparium* type occurs northward to the Bighorn Mountains and the Absaroka Mountains (and into Montana) and southwestward to the Unita Mountains, and the *Pinus albicaulis*/*Vaccinium scoparium* type also extends into the Absaroka Mountains. The *Pinus contorta*/*Vaccinium* type, a minor part of the subalpine forest in the potential RNA, is even more widespread, occurring in Idaho (Pfister et al. 1977). The arrangement of these types in the potential RNA, with the *Pinus contorta* forest giving way to the *Picea* forest at higher elevations, and the *Pinus albicaulis* forest in turn replacing the *Picea* forest at the highest elevations, is typical of the situation in the region (Steele et al. 1983).

In the riparian and wetland zones, the potential RNA appears to contain examples of widespread types. *Salix planifolia* shrublands occur in many of the mountain ranges in the Rocky Mountains (reviewed in Walford et al. 1997), and *Vaccinium occidentale* vegetation has been described from wetlands in northern Wyoming (Mattson 1984) and the Uinta Mountains (Padgett et al. 1989).

The potential Roaring Fork Mountain RNA thus appears to contain examples of ecosystem types common throughout the upper subalpine and alpine zones of the region.

CONDITION

The degree to which the potential RNA has been altered from pre-settlement conditions.

Field survey suggests that the potential Roaring Fork Mountain RNA has been little altered from pre-settlement conditions. Direct human impacts appear to be minor, and limited to unmaintained trails (perhaps created by wildlife and anglers) in the bottom of Silas Canyon, in the riparian zone of Roaring Fork in the north central part of the area (location 24), at Boulder Lake in the eastern part of the area (location 19), and in the Stough Creek Basin. A handful of fire rings (no more than 10) were also noted in the eastern part of Silas Canyon, at Boulder Lake, and in the upland forest along the north side of the Roaring Fork Creek bottom. More fire rings may be present around the Stough Creek Lakes.

Exotic plant species appear to be minor constituents of the vegetation in the potential RNA. None were noted during field survey, but the ubiquitous Kentucky bluegrass (*Poa pratensis*) and exotic dandelions (*Taraxacum officinale* or *T. laevigatum*) may be present in the subalpine riparian zones and mesic meadows.

VIABILITY

The prospect for long-term maintenance of the ecosystem types in the area and the survival of their constituent species.

The long-term maintenance of the ecosystem types in the potential RNA depends in large part on maintenance of the ecological processes that shaped those ecosystems. In the alpine ecosystems, physical environmental factors are the main controls on ecosystem structure and function (Billings 1988), and management practices probably will have little effect on these controls.

In Rocky Mountain forests in general, fire has been a major ecological factor (Peet 1988). Details about the role of fire in the forests of the potential Roaring Fork Mountain RNA can be determined only from research in that area, but some aspects of fire's role can be inferred from research elsewhere. Fischer and Clayton (1983) have summarized information on fire in groups of habitat types (fire groups) in Montana, and their review can serve as a starting point for consideration of fire in the potential Arrow Mountain RNA. The high-elevation forests of the

potential RNA appear to belong to fire group 10, in which fire plays a minor role compared to physical environment factors.

DEFENSIBILITY

The extent to which the area can be protected from extrinsic, anthropogenic factors that might worsen the condition of the area or threaten the viability of the ecosystems present.

The potential Roaring Fork Mountain RNA lies within a wilderness area, so current management excludes direct human impacts from vehicles. Information from the 1998 field survey suggests that most human use of the area is concentrated in the Stough Creek Basin, Silas Canyon, and lakes and streams in the Roaring Fork drainage, all of which appear to provide fishing. Access to these areas is easy for hikers and horseback riders from trailheads on the eastern and southeastern sides of the area, but the 1998 field survey revealed only minor impacts from human use.

DEGREE TO WHICH THE POTENTIAL RNA MEETS CRITERIA

Field survey in the potential Roaring Fork Mountain RNA indicates that the area represents high elevation ecosystems typical of the region. No evidence was noted that these ecosystems have been altered by changes in pre-settlement conditions, or that their viability is likely to be threatened by changes in the ecological factors that shape them. Impacts affecting the condition of the ecosystems appear to be minor and restricted to stream valleys.

IMPACTS AND POSSIBLE CONFLICTS

This section is limited to the conflicts obvious from field survey and from conversations with USDA Forest Service staff.

MINERAL RESOURCES

No evidence was noted of mineral exploration or production. The area is withdrawn from mineral entry because of its status as wilderness.

GRAZING

No evidence of livestock grazing was observed in the area. Elk were observed in the area, but their influence on the area is unknown.

TIMBER

The location of the potential RNA within a wilderness area removes the potential for conflicts with the timber program.

WATERSHED VALUES

No watershed structures were noted that might conflict with RNA designation.

RECREATION VALUES

Recreational use apparently is limited to fishing and camping in the Stough Creek Basin in the north-central part of the area, the Roaring Fork drainage in the northeastern part, and the eastern end of Silas Canyon in the southeastern part. Hunters may also use the potential RNA in the fall, although hunting probably is limited by the high elevation of the area. If the area is designated as an RNA, the recreational use of Stough Creek Basin may need to be monitored to insure that impacts remain within limits acceptable for an RNA.

WILDLIFE AND PLANT VALUES

No evidence was noted of wildlife or plant values that would conflict with RNA designation.

TRANSPORTATION VALUES

The potential RNA is within a wilderness area and therefore contains no roads. National Forest Trail 702 extends from the northern boundary of the area southward for approximately a mile (1.6 km) into the Stough Creek Basin, and a section of National Forest Trail 704 less than 0.25 mile (0.4 km) long crosses through the northern edge of the area in the Stough Creek Basin. Other trails established by incidental use were observed in the Roaring Fork valley in the northeastern part of the area and in the eastern part of Silas Canyon in the southeastern part, but field survey suggests that use of these trails is relatively light.

MANAGEMENT CONCERNS

The only potential management concern revealed by the 1998 field survey is recreational use of the Stough Creek Basin. An assessment of the amount of use in that area was beyond the scope of this evaluation and may be required by the Forest Service.

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APPENDIXES

APPENDIX 1. MAPS OF THE POTENTIAL ROARING FORK MOUNTAIN RESEARCH
NATURAL AREA

Figure 1. Contour map showing complexes of Kuchler (1966) vegetation types and SAF cover types (Eyre 1980) in the potential Roaring Fork Mountain RNA.

Kuchler/SAF Types	Map Symbol
Kuchler: Western spruce-fir forest (14) SAF: Engelmann spruce-subalpine fir (206) + Whitebark pine (208) + Lodgepole pine (218)	
Alpine meadows and barrens (45)	 and 
Sample plots	
Locations of vegetation descriptions	

Figure 2. Contour map showing complexes of plant communities in the potential Roaring Fork Mountain RNA. Synonyms for community names are listed in Appendix 4.

Communities	Map Symbol
<i>Geum rossii</i> - <i>Polygonum bistortoides</i> (M) + <i>Geum rossii</i> - <i>Selaginella densa</i> (m) + <i>Carex elynoides</i> (m) + <i>Salix reticulata</i> (m) + <i>Salix planifolia</i> (m) + <i>Salix glauca</i> (m) + Unvegetated rock (m)	
<i>Vaccinium occidentale</i> (m) + <i>Salix planifolia</i> (m) + <i>Caltha leptosepala</i> (m)	
<i>Picea engelmannii</i> / <i>Vaccinium scoparium</i> (M) + <i>Pinus albicaulis</i> / <i>Vaccinium scoparium</i> (M) + <i>Pinus contorta</i> / <i>Vaccinium scoparium</i> (m) + <i>Salix planifolia</i> (m) + <i>Deschampsia cespitosa</i> - <i>Caltha leptosepala</i> (m)	
Sample plots	
Locations of vegetation descriptions	

APPENDIX 2. PHOTOGRAPHS FROM THE POTENTIAL ROARING FORK MOUNTAIN
RNA

All photographs were taken by G. Jones, August 10 - 11,
1998.

Photo 98GJ4.1

Roaring Fork drainage, northeastern part of area.
Vegetation is matrix of lodgepole pine forest, Engelmann spruce
forest, and whitebark pine woodland. Ponds are surrounded by
Salix planifolia shrubland and wet meadows.

Photo 98GJ4.11

Looking north down Stough Creek Basin, northwestern part of
area. Vegetation of the alpine zone is primarily *Geum rossii*
turf; forest is mosaic of Engelmann spruce and whitebark pine;
bottom of valley supports *Salix planifolia*-*Salix glauca*
shrubland, *Vaccinium uliginosum* shrubland, *Deschampsia cespitosa*
wet meadows, and *Caltha leptosepala* wet forb vegetation.

Photo 98GJ4.13

Geum rossii-*Selaginella densa* turf (plot 60.5) at head of
Stough Creek Basin.

Photo 98GJ4.10

Salix reticulata dwarf shrubland in alpine zone on north-
facing slope.

Photo 98GJ4.5

Caltha leptosepala forb vegetation in wet site alongside
Stough Creek, bottom of Stough Creek Basin.

Photo 98GJ4.19

Pinus albicaulis/*Vaccinium scoparium* forest in Silas Canyon.

APPENDIX 3. CANOPY COVER OF PLANTS IN PLOTS AND AT LOCATIONS OF VEGETATION DESCRIPTIONS IN THE POTENTIAL ROARING FORK MOUNTAIN RESEARCH NATURAL AREA

Estimates of canopy cover from sample plots are shown in tables. The cover values for species are midpoints of the following cover classes:

<u>Cover Value</u>	<u>Range of Canopy Cover</u>
1	<1%
3	1% - 5%
10	5% - 15%
20	15% - 25%
30	25% - 35%
40	35% - 45%
50	45% - 55%
60	55% - 65%
70	65% - 75%
80	75% - 85%
90	85% - 95%
97	95% - 100%

The vegetation descriptions are for parts of stands and were not made for formal sample plots. At each location, the species in each stratum of the vegetation are listed approximately in order from those with the most canopy cover to those with the least.

Locations of sample plots and of vegetation descriptions are shown on Figure 2.

Table 3-1. Canopy cover of plants in the *Geum rossii* sample plots in the potential Roaring Fork Mountain RNA.

Community*	Geuros/Selden		Geuros	Geuros/Polbis	
Plot #	60.1	60.5	60.3	60.7	60.4
Species					
GRAMINOIDS	10	10	10	40	30
<i>Calamagrostis purpurascens?</i>	1	1		10	1
<i>Carex atrata</i> var. <i>chalceolepis</i>	3	1			
<i>Carex capitata</i>	1				1
<i>Carex elynoides</i>			1	20	3
<i>Carex obtusata</i>	3	1			3
<i>Carex phaeocephala</i>					3
<i>Carex rupestris</i>	10	10		3	1
<i>Carex scirpoidea</i> var. <i>pseudoscirpoidea</i>	3		3	30	3
<i>Carex</i> sp.					
<i>Elymus scribneri</i>			1		
<i>Festuca brachyphylla</i>	1	1	1	1	1
<i>Festuca saximontana</i>				1	
<i>Luzula spicata</i>	1	1	1	1	1
<i>Poa alpina</i>	1				
<i>Poa cusickii</i> var. <i>epilis</i>			3		3
<i>Poa rupicola</i>	1			1	1
<i>Poa secunda</i> var. <i>incurva</i>			3		
<i>Trisetum spicatum</i>	1			1	1
FORBS	40	60	50	60	70
<i>Antennaria umbrinella</i>			1	3	
<i>Arabis lyallii</i>			1		
<i>Arenaria obtusiloba</i>	1	1	1	1	1
<i>Artemisia scopulorum</i>	3	1		10	20
<i>Astragalus alpinus</i>					1
<i>Astragalus kentrophyta</i> var. <i>tegetarius</i>			3		
<i>Besseyia wyomingensis</i>			1		
<i>Castilleja pulchella</i>	1	1		1	
<i>Cymopterus longilobus</i>			3		
<i>Erigeron simplex</i>	1			1	1
<i>Geum rossii</i>	20	30	40	40	50
<i>Haplopappus lyallii</i>			1		
<i>Hymenoxys grandiflora</i>				1	1
<i>Ivesia gordonii</i>			3		
<i>Mertensia oblongifolia</i>					1

Community*	Geuros/Selden		Geuros	Geuros/Polbis	
Plot #	60.1	60.5	60.3	60.7	60.4
Species					
Myosotis alpestris		1			1
Oxytropis campestris var. cusickii		30		1	
Pedicularis parryi				1	
Phacelia sericea var. sericea			1		
Phlox pulvinata	1	3	1	3	1
Polemonium viscosum			3		
Polygonum bistortoides	3	3		1	1
Polygonum viviparum	1				
Potentilla diversifolia var. diversifolia	1		1	3	30
Saxifraga rhomboidea		1			1
Sedum integrifolium					1
Sedum lanceolatum	1		1	1	
Silene acaulis var. subacaulescens	10	20	1	1	1
Smelowskia calycina var. americana					1
Solidago multiradiata var. scopulorum				1	
Taraxacum ceratophorum					1
Trifolium dasyphyllum					1
Trifolium nanum	10			10	
OTHER					
Selaginella densa	30	20		1	1
TOTAL VEG COVER	50	60	60	80	80
GROUND COVER (%)					
Soil	5	2	20	1	1
Gravel	5	25	25	1	
Rock	40	35	40	8	20
Bedrock					
Litter	15	14	10	10	70
Wood					
Basal Veg	5	4	5	7	8
Lichen & Moss	30	20		76	2
LANDSCAPE					
Slope (degrees)	0	5	30	3	12
Aspect (degrees)		300	90	250	250

*Acronyms: Geuros = Geum rossii, Polbis = Polygonum
bistortoides, Selden = Selaginella densa

Notes:

- Plot 60.1: 30 m x 30 m, on granite substrate. Represents west side of saddle. Elevation 11,100 feet.
- Plot 60.5: 20 m x 20 m, on granite. Represents low turf (<5cm tall) on high alpine surfaces. Elevation 11,700 feet.
- Plot 60.3: 10 m x 40 m, on granite. Steep slope in talus chute. Elevation 11,000 feet.
- Plot 60.7: 10 m x 40 m, on granite. Bench on knob; seems to represent vegetation on drier locations in valley bottom (much of valley bottom). Elevation 11,050 feet.
- Plot 60.4: 30 m x 30 m, on granite. Represents turf patches among boulder patches. Elevation 11,500 feet.
-

Table 3-2. Canopy cover of plants in the *Salix reticulata* sample plot in the potential Roaring Fork Mountain RNA.

Species	Plot 60.6
SHRUBS	50
<i>Salix reticulata</i> var. <i>nana</i>	50
GRAMINOIDS	10
<i>Carex atrata</i> var. <i>chalceolepis</i>	10
<i>Carex rupestris</i>	1
<i>Festuca brachyphylla</i>	1
<i>Luzula spicata</i>	1
<i>Poa rupicola</i>	1
<i>Trisetum spicatum</i>	1
FORBS	40
<i>Allium cernuum</i>	1
<i>Arenaria obtusiloba</i>	1
<i>Artemisia scopulorum</i>	1
<i>Campanula uniflora</i>	1
<i>Castilleja pulchella</i>	1
<i>Erigeron simplex</i>	1
<i>Geum rossii</i>	30
<i>Phlox pulvinata</i>	1
<i>Polygonum bistortoides</i>	1
<i>Polygonum viviparum</i>	1
<i>Potentilla diversifolia</i> var. <i>diversifolia</i>	10
<i>Saxifraga rhomboidea</i>	1
<i>Sedum integrifolium</i>	1
<i>Silene acaulis</i> var. <i>subacaulescens</i>	1
<i>Trifolium nanum</i>	20
TOTAL VEG COVER	70
GROUND COVER (%)	
Soil	1
Gravel	1
Rock	10
Bedrock	
Litter	41
Wood	
Basal Veg	7
Lichen & Moss	50
LANDSCAPE	
Slope (degrees)	6
Aspect (degrees)	335

Notes:

Plot 60.6: 10 m x 25 m, on granite. Represents turf with *Salix* patch. Elevation 11,500 feet.

Table 3-3. Canopy cover of plants in the *Caltha leptosepala* sample plot in the potential Roaring Fork Mountain RNA.

Species	Plot 60.2
SHRUBS	1
<i>Salix glauca</i> var. <i>villosa</i>	1
<i>Salix planifolia</i>	1
GRAMINOIDS	10
<i>Agrostis humilis</i>	1
<i>Carex atrata</i> var. <i>chalceolepis</i>	1
<i>Carex nigricans</i>	3
<i>Deschampsia cespitosa</i>	1
<i>Juncus drummondii</i>	3
<i>Phleum alpinum</i>	1
<i>Poa alpina</i>	1
FORBS	60
<i>Antennaria umbrinella</i>	1
<i>Caltha leptosepala</i>	30
<i>Erigeron peregrinus</i> var. <i>scaposus</i>	1
<i>Lewisia pygmaea</i>	1
<i>Pedicularis groenlandica</i>	1
<i>Pedicularis parryi</i>	1
<i>Polygonum bistortoides</i>	1
<i>Potentilla diversifolia</i> var. <i>diversifolia</i>	10
<i>Sibbaldia procumbens</i>	3
<i>Veronica wormskjoldii</i>	3
TOTAL VEG COVER	70
GROUND COVER (%)	
Soil	<1
Gravel	
Rock	6
Bedrock	
Litter	58
Wood	
Basal Veg	5
Lichen & Moss	30
LANDSCAPE	
Slope (degrees)	
Aspect (degrees)	280

Notes:

Plot 60.2: 10 m x 30 m, on granite. Represents wet area in narrow valley along stream. North end grazed by horses. Elevation 10,650 feet.

VEGETATION DESCRIPTIONS

Numbers following species names indicate canopy cover classes.

LOCATION 1. Northeastern border of area, along forks of Roaring Fork Creek

1a.

VEGETATION TYPE: *Picea engelmannii*/*Vaccinium scoparium* Forest
ELEVATION: 9600 feet (2928 meters). ASPECT: North
TOPOGRAPHIC POSITION: Slope between forks of creek
DESCRIPTION: Forest of *Picea engelmannii* with *Pinus albicaulis*; overstory cover approx. 60%. Trees of mixed sizes. Few small *Abies lasiocarpa* in understory, and few *Pinus contorta* in overstory. *Juniperus communis* present (scattered) plants; *Ribes montigenum* present (<1% cover). Undergrowth is *Vaccinium scoparium* in large patches
Trees: *Picea engelmannii*, *Pinus albicaulis*; few *Pinus contorta*; *Abies lasiocarpa* in understory
Shrubs: *Juniperus communis*, *Ribes montigenum*
Dwarf Shrubs:
Graminoids & Forbs: *Vaccinium scoparium* 25, *Arnica cordifolia*, *Arnica latifolia*.
NOTES: This description appears to apply to many of the north-facing slopes in the northeastern part of the area. Adjacent level sites are forested with *Pinus contorta* forest.

1b.

VEGETATION TYPE: *Salix planifolia* Shrubland
ELEVATION: 9600 feet (2928 meters). ASPECT: North
TOPOGRAPHIC POSITION: Slope, along creek
DESCRIPTION: Patchy vegetation along steep stream. Patches of *Salix planifolia* form shrub layer beneath open overstory of *Picea engelmannii*.
Trees: *Picea engelmannii*
Shrubs: *Salix planifolia*, *Vaccinium occidentale*
Dwarf Shrubs:
Graminoids & Forbs: *Senecio triangularis*, *Mimulus* sp., *Saxifraga odontoloma*, *Mertensia ciliata*.
NOTES: Stream channel of boulders

LOCATION 2. Northeastern part of area

VEGETATION TYPE: *Pinus contorta*/*Vaccinium scoparium* Forest
ELEVATION: 9900 feet (3019 meters). ASPECT: East
TOPOGRAPHIC POSITION: Slopes and nearly level benches
DESCRIPTION: Overstory with approx. 60% cover, dominated by *Pinus contorta*. Undergrowth dominated by patchy *Vaccinium scoparium*.
Trees: *Pinus contorta* 60; *Picea engelmannii* and *Pinus albicaulis* minor in canopy; *Abies lasiocarpa* in understory (minor)
Shrubs:
Dwarf Shrubs:

Graminoids & Forbs: *Vaccinium scoparium* 30, *Arnica cordifolia*,
Arnica latifolia

NOTES: This description appears to apply to the forest on west-
and south-facing slopes and on benches at this elevation. North-
facing slopes support *Picea engelmannii* forest.

LOCATION 3. Northeastern part of area

VEGETATION TYPE: *Picea engelmannii*/*Vaccinium scoparium* Forest

ELEVATION: 10,100 feet (3080 meters). ASPECT: Various

TOPOGRAPHIC POSITION: Slopes

DESCRIPTION: Forest of *Picea engelmannii* and *Pinus albicaulis*;
former dominates on north- and east-facing slopes, latter on
west-facing slopes where it is wind-flagged.

Trees: *Pinus albicaulis*, *Picea engelmannii*

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs: *Vaccinium scoparium* 20 (strongly dominant),
Arnica cordifolia, *Arnica latifolia* (latter two spp. 1%)

NOTES: This forest extends to timberline, with *Pinus albicaulis*
becoming dominant on all aspects.

LOCATION 4. Timberline in north-central part of area

ELEVATION: 10,600 feet (3233 meters). ASPECT: Various

4a.

VEGETATION TYPE: *Pinus albicaulis*/*Vaccinium scoparium* Forest

TOPOGRAPHIC POSITION: Slopes

DESCRIPTION: Patchy forest of *Pinus albicaulis* and *Picea*
engelmannii with *Vaccinium scoparium* undergrowth

Trees: *Pinus albicaulis* (dominates), *Picea engelmannii*

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs: *Vaccinium scoparium*, *Arnica* spp.

NOTES: Mixed with rock outcrops, wet meadows (in valley
bottoms), and willow shrublands (see 4b.)

4b.

VEGETATION TYPE: *Salix glauca* Shrubland?

TOPOGRAPHIC POSITION: Slopes

DESCRIPTION: Willows to approx. 50 cm tall are common in alpine
vegetation.

Trees:

Shrubs: *Salix planifolia*, *Salix glauca*

Dwarf Shrubs: *Salix reticulata*

Graminoids & Forbs: *Carex scirpoidea*, *Potentilla diversifolia*,
Artemisia scopulorum, *Saxifraga rhomboidea* are main species; *Geum*
rossii present

NOTES: Mixed with rock outcrops, wet meadows (in valley
bottoms), and *Pinus albicaulis* forest (see 4a.)

**LOCATION 5. West-facing alpine slope in north-central part of
area**

ELEVATION: 10,900 feet (3325 meters). ASPECT: West

5a.

VEGETATION TYPE: *Geum rossii*-*Polygonum bistortoides* Herbaceous Vegetation

TOPOGRAPHIC POSITION: Lower 1/2 - 2/3 of slope

DESCRIPTION: Dense alpine turf with scattered shrubs

Trees:

Shrubs: *Pentaphylloides floribunda* (scattered)

Dwarf Shrubs:

Graminoids & Forbs: *Geum rossii*, *Solidago multiradiata*, *Potentilla diversifolia*, *Polygonum bistortoides*, *Artemisia scopulorum*, *Trifolium dasyphyllum*, *Carex scirpoidea*.

NOTES: Matrix for willow thickets along channels (5b).

5b.

VEGETATION TYPE: *Salix glauca* Shrubland?

TOPOGRAPHIC POSITION: Watercourses along lower 1/2 of slope

DESCRIPTION: Dense willow patches to 75 cm tall.

Trees:

Shrubs: *Salix planifolia*, *Salix glaucifolia*; *Betula glandulosa* present

Dwarf Shrubs:

Graminoids & Forbs: *Carex atrata*, *Pedicularis groenlandica*, *Sedum integrifolium*

NOTES: Occur in matrix of *Geum rossii* turf (5a).

LOCATION 6. Bottom of Stough Cr. valley by lakes

VEGETATION TYPE: *Pinus albicaulis*/*Vaccinium scoparium* Forest

ELEVATION: 10,600 feet (3233 meters). ASPECT: South

TOPOGRAPHIC POSITION: Valley bottom

DESCRIPTION: Patch of woodland on south side of knob in bottom of valley.

Trees: *Pinus albicaulis*, *Picea engelmannii* (minor)

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs: *Vaccinium scoparium*, *Poa nervosa* var. *wheeleri*(?), *Arnica latifolia*, *Hieracium gracile*

NOTES:

LOCATION 7. West side of Stough Cr. valley**7a.**

VEGETATION TYPE: *Pinus albicaulis*/*Vaccinium scoparium* Forest

ELEVATION: 10,700 feet (3264 meters). ASPECT: East

TOPOGRAPHIC POSITION: Middle slope

DESCRIPTION: Patchy, stunted woodland

Trees: *Pinus albicaulis*

Shrubs: *Ribes montigenum* (few, scattered)

Dwarf Shrubs:

Graminoids & Forbs: *Vaccinium scoparium*

NOTES: Mixed with patches of *Salix glauca* and *S. planifolia*, and with sparsely vegetated patches of *Juncus drummondii*

7b.

VEGETATION TYPE: Vacoci near lakes

ELEVATION: 10,600 feet (3233 meters). ASPECT: Various
TOPOGRAPHIC POSITION: Bottom of valley around margins of lakes
DESCRIPTION: Shrub patches ca. 5 cm tall.
Trees:
Shrubs:
Dwarf Shrubs: *Vaccinium occidentale*
Graminoids & Forbs: *Carex atrata*, *Kalmia microphylla* (scattered)
NOTES: This patchy vegetation type is present in wet areas
around the Stough Creek Lakes.

7c.

VEGETATION TYPE: *Salix planifolia* Shrubland
ELEVATION: 10,700 feet (3264 meters). ASPECT: East
TOPOGRAPHIC POSITION: Lower slope
DESCRIPTION: Fringe of willow shrubs along water courses
Trees:
Shrubs: *Salix planifolia*, *Salix glauca*
Dwarf Shrubs:
Graminoids & Forbs: *Mertensia ciliata*; some *Carex atrata* and
Calamagrostis canadensis
NOTES: Willow fringes are common along the stream channels in the
alpine zone.

LOCATION 9. Southwestern boundary of area

VEGETATION TYPE: Alpine herbaceous
ELEVATION: 12,000 feet (3660 meters). ASPECT: West
TOPOGRAPHIC POSITION: Upper slope
DESCRIPTION: Dense herbaceous vegetation (cover approx. 70%)
covering several acres
Trees:
Shrubs:
Dwarf Shrubs:
Graminoids & Forbs: *Oxytropis campestris* var. *cusickii*, *Phlox*
sp., *Carex elynoides*, *Carex* sp. (*C. scirpoidea* or *C. rupestris*);
Geum rossii present but mainly near boulders.
NOTES: This area has substantially less *Geum rossii* than other
alpine vegetation in the area.

LOCATION 10. Southwestern part of area, head of Stough Cr. Basin

ELEVATION: 11,200 feet (3416 meters). ASPECT: North

10a.

VEGETATION TYPE: *Geum rossii*-*Polygonum bistortoides* Herbaceous
Vegetation
TOPOGRAPHIC POSITION: Upper slope
DESCRIPTION: Patchy herbaceous vegetation.
Trees:
Shrubs:
Dwarf Shrubs:
Graminoids & Forbs: *Geum rossii*, *Polygonum bistortoides*, *Carex*
scirpoidea, *Phlox* sp., *Polygonum viviparum*, *Myosotis* sp.; some
Carex elynoides.
NOTES: On bouldery slope. Resembles plot 60.4, but *Geum rossii*
dominates more strongly here. Appears to be matrix surrounding

Salix reticulata patches (10b).

10b.

VEGETATION TYPE: Salret

TOPOGRAPHIC POSITION: Lower slope

DESCRIPTION: Patches of dwarf willow with forbs and graminoids from surrounding vegetation

Trees:

Shrubs:

Dwarf Shrubs: *Salix reticulata*

Graminoids & Forbs: *Geum rossii*; *Carex scirpoidea* and *Carex elynoides* secondary.

NOTES: These willow patches cover up to approx. 100 square meters each, in a matrix of *Geum rossii* vegetation (10a). The willow patches seem to grow mainly on lower, north-facing slopes.

LOCATION 11. Bottom of Stough Creek Basin, at south end.

ELEVATION: 10,700 feet (3264 meters). ASPECT: Various

TOPOGRAPHIC POSITION: Valley bottom

11a.

VEGETATION TYPE: Vacoco

DESCRIPTION: Low shrubland with patches of taller willows.

Trees:

Shrubs: *Salix planifolia*, *Salix glauca* (both in small patches)

Dwarf Shrubs: *Vaccinium occidentale*

Graminoids & Forbs: *Sedum integrifolium*, *Polygonum bistortoides*, *Kalmia microphylla*, *Pedicularis groenlandica*, *Veronica wormskjoldii*, *Juncus drummondii*

NOTES: This appears to be the most widespread type in the valley bottom, growing on wet flats around lakes.

11b.

VEGETATION TYPE: *Salix planifolia* Shrubland

DESCRIPTION: Dense willow shrubland growing along larger streams

Trees:

Shrubs: *Salix planifolia*, *Salix glauca*

Dwarf Shrubs:

Graminoids & Forbs: *Carex stenoptila* (?), *Sedum integrifolium*

NOTES: This type occurs in a matrix of *Vaccinium occidentale* dwarf-shrubland (11a).

11c.

VEGETATION TYPE: Carely

DESCRIPTION:

Trees:

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs: *Carex elynoides*, *Erigeron* sp., *Luzula* sp., *Sibbaldia procumbens* (latter in wet spots)

NOTES: This sparse vegetation type occurs on rocky slopes (most facing south), in a matrix of *Vaccinium occidentale* dwarf-shrubland

11d.

VEGETATION TYPE: Callep

DESCRIPTION: Low herbaceous vegetation in saturated soil

Trees:

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs: *Caltha leptosepala*

NOTES: This sparse vegetation type occurs along some stream channels, in a matrix of *Vaccinium occidentale* dwarf-shrubland. Plot 60.2 appears to represent this type.

LOCATION 12. East side of saddle west of Leg Lake

VEGETATION TYPE: *Salix planifolia* Shrubland

ELEVATION: 10,900 feet (3325 meters). ASPECT: East

TOPOGRAPHIC POSITION: Middle slope

DESCRIPTION: Willow thickets (to approx. 1 m tall) along stream channel.

Trees:

Shrubs: *Salix planifolia*, *Salix glauca*

Dwarf Shrubs:

Graminoids & Forbs: *Mertensia ciliata*, *Poa leptocoma* (?), *Calamagrostis canadensis* (?) all common

NOTES:

LOCATION 13. Divide east of Stough Creek Basin, near south end

VEGETATION TYPE: *Geum rossii*-*Polygonum bistortoides* Herbaceous Vegetation

ELEVATION: 11,500 feet (3508 meters). ASPECT: West

TOPOGRAPHIC POSITION: Middle slope

DESCRIPTION: Dense alpine turf mixed with boulder fields.

Trees:

Shrubs:

Dwarf Shrubs: *Salix reticulata* (patches in sparser vegetation)

Graminoids & Forbs: *Geum rossii*, *Artemisia scopulorum*,
Potentilla diversifolia, *Trifolium nanum*, *Carex scirpoidea*.

NOTES:

LOCATION 14. Silas Canyon

VEGETATION TYPE: *Pinus albicaulis* Woodland

ELEVATION: 11,100 feet (3386 meters). ASPECT: South

TOPOGRAPHIC POSITION: Bench at foot of north canyon wall.

DESCRIPTION: Scattered patches of trees

Trees: *Pinus albicaulis*, some *Abies lasiocarpa*

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs:

NOTES: *Pinus albicaulis* appears to dominate most patches in the valley.

LOCATION 15. Silas Canyon

VEGETATION TYPE: *Salix planifolia* Shrubland

ELEVATION: 11,000 feet (3355 meters). ASPECT: East

TOPOGRAPHIC POSITION: Riparian zone in valley bottom

DESCRIPTION: Dense shrub thicket along bouldery stream channel.

Trees:

Shrubs: *Salix planifolia*

Dwarf Shrubs:

Graminoids & Forbs: *Juncus drummondii*, *Mertensia ciliata*, *Carex stenoptila* (?)

NOTES:

LOCATION 16. Silas Canyon at eastern boundary

VEGETATION TYPE: *Pinus albicaulis*/*Vaccinium scoparium* Forest?

ELEVATION: 10,600 feet (3233 meters). ASPECT: North

TOPOGRAPHIC POSITION: Lower slope (lower part of south valley wall)

DESCRIPTION: Woodland just below timberline, with very sparse undergrowth

Trees: *Pinus albicaulis*, *Picea engelmannii*

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs: *Arnica cordifolia* (present but <1% cover)

NOTES: This stand has more *Picea engelmannii* than does stand across valley, on north wall (loc. 17)

LOCATION 17. Silas Canyon at eastern boundary

VEGETATION TYPE: *Pinus albicaulis*/*Vaccinium scoparium* Forest

ELEVATION: 10,700 feet (3264 meters). ASPECT: South
TOPOGRAPHIC POSITION: Slopes (knobs in valley bottom)
DESCRIPTION: Woodland with sparse undergrowth
Trees: *Pinus albicaulis*, few *Picea engelmannii*
Shrubs:
Dwarf Shrubs:
Graminoids & Forbs: *Vaccinium scoparium*
NOTES: This woodland has less *Picea engelmannii* and more
Vaccinium scoparium than does stand across valley, on south wall
(loc. 16).

LOCATION 18. Saddle west of Cony Mountain, east side of area

ELEVATION: 10,500 feet (3203 meters). ASPECT: North
TOPOGRAPHIC POSITION: Upper and middle slope

18a.

VEGETATION TYPE: *Picea engelmannii/Vaccinium scoparium* Forest

DESCRIPTION: Open overstory (canopy cover <60%) of *Picea engelmannii* (many saplings) with some *Pinus albicaulis*

Trees: *Picea engelmannii* (dominant), *Pinus albicaulis*

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs: *Vaccinium scoparium* dominates; some *Arnica sp.*, *Potentilla sp.*,

NOTES: This appears to be the timberline type on the north-facing slopes below the saddle.

18b.

VEGETATION TYPE: *Deschampsia cespitosa-Caltha leptosepala*
Herbaceous Vegetation

DESCRIPTION: Wet meadow on gentle slope in opening in *Pinus albicaulis* woodland; covers several acres, at least.

Trees:

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs: *Carex stenoptila*, *Juncus drummondii*,
Deschampsia cespitosa, *Caltha leptosepala*, *Erigeron peregrinus*,
Pedicularis groenlandica, *Poa leptocoma*

NOTES:

LOCATION 20. West-facing slope north of Cony Mountain

VEGETATION TYPE: *Pinus albicaulis/Vaccinium scoparium* Forest?

ELEVATION: 10,200-10,500 feet (3111-3203 meters).

ASPECT: West

TOPOGRAPHIC POSITION: Upper and middle slope

DESCRIPTION: Woodland near upper timberline. *Pinus albicaulis* and *Picea engelmannii* appear to share dominance, with *Pinus* on the more westerly slopes and *Picea* on more northerly slopes.

Trees: *Pinus albicaulis*, *Picea engelmannii*

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs:

NOTES: Observed through binoculars from approx. 1/3 mile (approx. 500 m) away, across lake to west

LOCATION 23. Roaring Fork Valley, northeastern part of area

VEGETATION TYPE: *Pinus albicaulis/Vaccinium scoparium* Forest?

ELEVATION: 10,200 feet (3111 meters). ASPECT: North

TOPOGRAPHIC POSITION: Lower and middle slope

DESCRIPTION: Timberline woodland on north-facing slope, formed by trees of *Pinus albicaulis* (on higher slopes and on rocky knobs) and *Abies lasiocarpa* (lower slope near stream, and in draws). Patches of *Vaccinium scoparium* dominate the undergrowth.

Trees: *Pinus albicaulis*, *Abies lasiocarpa*

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs: *Vaccinium scoparium*, *Arnica cordifolia* (1%)

NOTES:

LOCATION 24. Roaring Fork, northeastern part of area

VEGETATION TYPE: *Salix planifolia* Shrubland

ELEVATION: 10,160 feet (3099 meters). ASPECT: East

TOPOGRAPHIC POSITION: Valley bottom

DESCRIPTION: Broad riparian zone (ca. 100 m wide) with old beaver dams (ponds filled with sediment). Wet meadow with scattered willow thickets.

Trees:

Shrubs: *Salix planifolia*; some *Salix glauca*, *Betula glandulosa*

Dwarf Shrubs:

Graminoids & Forbs: *Carex* spp., *Calamagrostis canadensis*, *Mertensia ciliata* (immediately along channel)

NOTES:

LOCATION 25. Forest north of Roaring Fork, northeastern part of area

VEGETATION TYPE: *Pinus albicaulis/Vaccinium scoparium* Forest

ELEVATION: 10,200 feet (3111 meters). ASPECT: North

TOPOGRAPHIC POSITION: Slopes

DESCRIPTION: Forest on slopes and rolling uplands. *Pinus albicaulis* and *Picea engelmannii* form the overstory, which includes small amounts of *Abies lasiocarpa* and *Pinus contorta*. *Vaccinium scoparium* strongly dominates the undergrowth, which contains a small amount of *Arnica cordifolia* and *Arnica latifolia* (together <1%).

Trees:

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs:

NOTES:

LOCATION 26. Forest north of Roaring Fork, northeastern part of area

ELEVATION: 10,200 feet (3111 meters).

26a.

VEGETATION TYPE: *Pinus albicaulis/Vaccinium scoparium* Forest

ASPECT: Various

TOPOGRAPHIC POSITION: Ridges and upper slopes (facing west, south, and east)

DESCRIPTION: *Pinus albicaulus* and *Picea engelmannii* form the overstory (former probably dominant), which includes small amounts of *Abies lasiocarpa* and *Pinus contorta*. *Vaccinium scoparium* strongly dominates the undergrowth, which contains small amounts of *Arnica* spp., *Poa nervosa*, *Potentilla* sp., and *Senecio* sp.

Trees:

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs:

NOTES: This type and type 26b form a mosaic.

26b.

VEGETATION TYPE: *Picea engelmannii*/*Vaccinium scoparium* Forest

ASPECT: North

TOPOGRAPHIC POSITION: Slopes

DESCRIPTION: *Picea engelmannii* dominates the overstory, which contains *Abies lasiocarpa* as a secondary species and small amounts of *Pinus contorta*. *Vaccinium scoparium* strongly dominates the undergrowth, which contains small amounts of *Arnica* spp., *Poa nervosa*, *Potentilla* sp., and *Senecio* sp.

Trees:

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs:

NOTES: This type and type 26a form a mosaic

LOCATION 27. Forest at northeastern edge of area

VEGETATION TYPE: *Pinus contorta*/*Vaccinium scoparium* Forest

ELEVATION: 10,000 feet (3050 meters). ASPECT: Various

TOPOGRAPHIC POSITION: Broad ridgetop

DESCRIPTION: *Pinus contorta* forms an overstory that contains small amounts of *Picea engelmannii* and *Pinus albicaulis*. *Vaccinium scoparium* dominates the undergrowth, which contains *Arnica cordifolia* and *Poa nervosa*.

Trees:

Shrubs:

Dwarf Shrubs:

Graminoids & Forbs:

NOTES: This type merges with the *Pinus albicaulis* forest of 26a and the *Picea engelmannii* forest of 26b.

APPENDIX 4. PLANT COMMUNITY TYPES IN THE POTENTIAL ROARING FORK MOUNTAIN RESEARCH NATURAL AREA

The vegetation types are listed by the names used for them in the national vegetation classification (Anderson et al. 1998). The code in parentheses following the name is the last four digits of the element code from the national classification. Citations refer to these sources:

- Johnston (1987): equivalent plant association from the list for USDA Forest Service Region 2;
- Tweit and Houston (198): equivalent Shoshone National Forest grassland or shrubland habitat type (if any);
- Steele et al. (1983): equivalent forest habitat type (if any);
- Federal Geographic Data Committee (1997): type in the hierarchy of the National Vegetation Classification Standard to which the association belongs;
- Kuchler (1966): Kuchler vegetation type to which the association belongs;
- Eyre (1980): Society of American Foresters forest cover type to which the association belongs (if any).

FORESTS AND WOODLANDS

Picea engelmannii/Vaccinium scoparium Forest (0381)

- Johnston (1987): *Picea engelmannii/Vaccinium scoparium* Plant association
- Tweit and Houston (1980): None
- Steele et al. (1983): *Picea engelmannii/Vaccinium scoparium* Habitat type
- Federal Geographic Data Committee (1997): I.A.8.N.c.; Conical-crowned, temperate or subpolar, needle-leaved, evergreen forest
- Kuchler (1966): Western spruce-fir forest (14)
- Eyre (1980): Engelmann spruce-subalpine fir (206)

Pinus albicaulis Woodland (0127)

- Johnston (1987): *Pinus albicaulis/Vaccinium scoparium* Plant association
- Tweit and Houston (1980): None
- Steele et al. (1983): *Pinus albicaulis/Vaccinium scoparium* Habitat Type?
- Federal Geographic Data Committee (1997): II.A.4.N.a.; Rounded-crowned, temperate or subpolar, needle-leaved, evergreen woodland
- Kuchler (1966): Western spruce-fir forest (14)
- Eyre (1980): Whitebark pine (208)

Pinus albicaulis/Vaccinium scoparium Forest (0131)

- Johnston (1987): *Pinus albicaulis/Vaccinium scoparium* Plant association
- Tweit and Houston (1980): None
- Steele et al. (1983): *Pinus albicaulis/Vaccinium scoparium* Habitat type
- Federal Geographic Data Committee (1997): I.A.8.N.b.; Rounded-crowned, temperate or subpolar, needle-leaved, evergreen forest
- Kuchler (1966): Western spruce-fir forest (14)
- Eyre (1980): Whitebark pine (208)

Pinus contorta/Vaccinium scoparium Forest (0172)

- Johnston (1987): *Pinus contorta/Vaccinium scoparium* Plant association
- Tweit and Houston (1980): None
- Steele et al. (1983): *Pinus contorta/Vaccinium scoparium* Community type
- Federal Geographic Data Committee (1997): I.A.8.N.b.; Rounded-crowned, temperate or subpolar, needle-leaved, evergreen forest
- Kuchler (1966): Western spruce-fir forest (14)
- Eyre (1980): Lodgepole pine (218)

SHRUBLANDS AND DWARF-SHRUBLANDS

Salix glauca Shrubland (1136)

- Johnston (1987): *Salix glauca-Salix* spp./*Carex* spp. Plant association?
- Tweit and Houston (1980): None
- Steele et al. (1983): None
- Federal Geographic Data Committee (1997): III.B.2.N.d.; Temporarily-flooded, cold-deciduous shrubland
- Kuchler (1966): Alpine meadows and barrens (45)
- Eyre (1980): None

Salix planifolia Shrubland (no code)

- Johnston (1987): *Salix phyllificifolia* ssp. *planifolia/Carex aquatilis* Plant association?
- Tweit and Houston (1980): None
- Steele et al. (1983): None
- Federal Geographic Data Committee (1997): III.B.2.N.d.; Temporarily-flooded, cold-deciduous shrubland
- Kuchler (1966): Alpine meadows and barrens (45)?
- Eyre (1980): None

Salix reticulata Dwarf-Shrubland (no code)

- Johnston (1987): None?
- Tweit and Houston (1980): *Geum rossii* turf Habitat type?
- Steele et al. (1983): None
- Federal Geographic Data Committee (1997): IV.B.2.N.b.; Creeping or matted, cold-deciduous dwarf-shrubland
- Kuchler (1966): Alpine meadows and barrens (45)
- Eyre (1980): None

Vaccinium uliginosum (= *V. occidentale*) Dwarf-Shrubland (no code)

Vaccinium occidentale is the name used in Wyoming. The National Vegetation Classification System uses *V. uliginosum* as a synonym.

- Johnston (1987): None
- Tweit and Houston (1980): None
- Steele et al. (1983): None
- Federal Geographic Data Committee (1997): IV.B.2.N.d.; Saturated, cold-deciduous dwarf-shrubland
- Kuchler (1966): Alpine meadows and barrens (45)?
- Eyre (1980): None

HERBACEOUS VEGETATION

Carex elynoides Herbaceous Vegetation (1852)

- Johnston (1987): *Carex elynoides/Acomastylis rossii* Plant association?
- Tweit and Houston (1980): *Geum rossii* turf Community type?
- Steele et al. (1983): None
- Federal Geographic Data Committee (1997): V.A.5.N.g.; Short, alpine or subalpine sod grassland
- Kuchler (1966): Alpine meadows and barrens (45)
- Eyre (1980): None

Caltha leptosepala Herbaceous Vegetation (1954)

- Johnston (1987): None?
- Tweit and Houston (1980): None
- Steele et al. (1983): None
- Federal Geographic Data Committee (1997): V.B.2.N.f.; Semipermanently flooded, temperate, perennial forb vegetation
- Kuchler (1966): Alpine meadows and barrens (45)
- Eyre (1980): None

Deschampsia cespitosa-Caltha leptosepala Herbaceous Vegetation (1882)

- Johnston (1987): *Deschampsia cespitosa/Caltha leptosepala* Plant association
- Tweit and Houston (1980): *Deschampsia cespitosa* Meadow community type
- Steele et al. (1983): None
- Federal Geographic Data Committee (1997): V.A.5.N.m.; Saturated temperate or subpolar grassland
- Kuchler (1966): Alpine meadows and barrens (45)
- Eyre (1980): None

Geum rossii-Polygonum bistortoides Herbaceous Vegetation (1967)

- Johnston (1987): *Acomastylis rossii/Bistorta bistortoides* Plant association
- Tweit and Houston (1980): *Geum rossii* turf Community type
- Steele et al. (1983): None
- Federal Geographic Data Committee (1997): V.B.2.N.b.; Low, temperate or subpolar, perennial forb vegetation
- Kuchler (1966): Alpine meadows and barrens (45)
- Eyre (1980): None

Geum rossii-*Selaginella densa* Herbaceous Vegetation (1968)

- Johnston (1987): *Acomastylis rossii*/*Bistorta bistortoides*
Plant association
- Tweit and Houston (1980): *Geum rossii* turf Community type
- Steele et al. (1983): None
- Federal Geographic Data Committee (1997): V.B.2.N.b.; Low,
temperate or subpolar, perennial forb vegetation
- Kuchler (1966): Alpine meadows and barrens (45)
- Eyre (1980): None