Biological Report

on the Proposed

Bald Ridge Research Natural Area

Prepared for the

USDA Forest Service Shoshone National Forest

by

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INTRODUCTION

The Bald Ridge proposed Research Natural Area (pRNA) is located east of the Clarks Fork River Canyon in the northeastern foothills of the Absaroka Mountains, approximately 23 miles northwest of Cody, Wyoming. The pRNA includes the east slopes and crest of Bald Ridge, a calcareous north-south oriented ridge system. Bald ridge contains outstanding examples of limber pine (Pinus flexilis)¹ woodland and bluebunch wheatgrass (Agropyron [Elymus] spicatum) community types (Jones 1991). Forested slopes on the west side of Bald Ridge, although not currently included within the boundaries of the pRNA, have outstanding examples of Douglas-fir (Pseudotsuga menziesii) and Engelmann spruce (Picea engelmannii) communities and provide habitat for several rare and Sensitive plant species (Jones 1991).

The Bald Ridge area was originally recommended as a Research Natural Area (RNA) by the Region 2 Research Natural Areas Committee in 1979 (Rupp, no date). An Establishment Report was prepared for the Bald Ridge pRNA in 1985 (Scott 1985) and the area was listed as a pRNA in the Land and Resource Management Plan for Shoshone National Forest in 1986 (USDA Forest Service 1986), but no action has since been taken to formally establish the area as an RNA. A larger area that includes the pRNA was recommended for designation as a Special Botanical Area (SBA) by Marriott (1988). In 1990, Shoshone National Forest contracted with the Wyoming Natural Diversity Database (WYNDD) to identify and map plant communities and survey rare plant species in the Bald Ridge SBA (Jones 1991).

In 1994, the US Forest Service (USFS) contracted with WYNDD to conduct a follow-up field survey of the area and to prepare a biological report for use in drafting a revised Establishment Report for the Bald Ridge RNA. This report includes data on objectives, justification, and principal distinguishing features of the RNA, maps of plant communities, and a discussion of the vegetation, flora, fauna, and geology of the area.

¹Nomenclature for vascular plants (except trees) follows Dorn (1992) for scientific names and Hitchcock and Cronquist (1973) and Welsh et al. (1993) for most common names. Tree nomenclature follows Little (1979) and rare plant names are based on Fertig (1994). Nomenclature for vertebrates follows Baxter and Stone (1985), Clark and Stromberg (1987), and Dorn and Dorn (1990).

Community nomenclature is based on Jones (1992). OBJECTIVES

The main objectives of the Bald Ridge pRNA are to maintain and preserve coniferous forest and grassland community types and to protect the habitat of several Forest Sensitive plant and animal species. In addition, the pRNA provides areas for scientific research on natural processes and provides baseline areas for determining long and short-term ecological changes. The pRNA serves as a comparison area or "benchmark" for assessing effects of resource management practices applied to similar ecosystems. Lastly, the pRNA provides a safety net against the loss of species and biotic communities (Andrews 1993).

JUSTIFICATION

Andrews (1993) recognized four criteria for selecting sites as potential RNAs in Region 2: quality, condition, viability, and defensibility. Bald Ridge ranks high or moderately high for all of these criteria.

Quality

The Bald Ridge pRNA contains excellent examples of <u>Pinus</u> <u>flexilis/Juniperus</u> communis and <u>Agropyron</u> <u>spicatum/Poa</u> <u>secunda</u> community types. Neither type is currently represented within an established RNA in Region 2 (Andrews 1993), nor within the RNA network in the Greater Yellowstone area (Moseley 1989). The stands on Bald Ridge occur near the elevational midpoint occupied by these two community types and are believed to represent an important segment of the range of variability within these communities.

The west side of Bald Ridge supports high quality examples of <u>Pseudotsuga menziesii/Juniperus communis</u> and <u>Picea</u> <u>engelmannii/Hypnum revolutum</u> community types. These communities are also poorly represented in the RNA system in Region 2 and the Greater Yellowstone region (Moseley 1989; Andrews 1993). These stands are not included in the boundaries of the pRNA as originally proposed (USDA Forest Service 1986), but are within the recommended boundaries of Jones (1991).

Calcareous outcrops on the crest and east side of Bald Ridge provide habitat for <u>Pyrrocoma</u> <u>carthamoides</u> var. <u>subsquarrosus</u> and <u>Shoshonea</u> <u>pulvinata</u>, two plant species currently designated as Sensitive in Region 2 and as C2 candidates for listing as Threatened or Endangered by the US Fish and Wildlife Service (USFWS) (Estill 1993; US Fish and Wildlife Service 1993; Kratz 1994). In addition, potential habitat exists for lynx and upland plover, two animal species listed as Sensitive in Region 2 (Estill 1993). Bald Ridge provides known or suspected habitat for several other state or regionally rare plant and animal species monitored by WYNDD.

The original boundaries of the pRNA may be too small to adequately protect the limber pine/grassland communities and completely exclude the Douglas-fir/Engelmann spruce communities on the west slope of Bald Ridge. The larger boundaries recommended by Jones (Figure 1) would provide greater representation of the variability within these communities and protect a wider range of biological diversity.

Condition

The forested lands within the recommended boundaries of Bald Ridge pRNA have not been seriously impacted by human activities and structures. Tree cover in the limber pine woodlands has been too low to support commercial logging activity in the past. Steep slopes on the west side of the ridge have likewise precluded logging of the more productive Douglas-fir and Engelmann spruce forests. Roads are not found in these parts of the pRNA.

Grassland areas in the southeastern corner of the pRNA have been more impacted by past and current human activities. Several two-track roads are present in the area and could serve as conduits for invasion by exotic plants. Grazing also occurs in the area, although its effect on the <u>Agropyron spicatum/Poa</u> <u>secunda</u> community type is not known. Historically, grazing has not had an observed negative impact on the populations of rare and sensitive plants on Bald Ridge (Jones 1991). The high diversity of the grasslands and low number of exotic species also suggest that the effects of grazing have been minimal.

Viability

The long-term viability of natural elements within the Bald Ridge pRNA is relatively good. The pRNA is sufficiently isolated that natural disturbances and ecological processes can be allowed to continue without human intervention. Surrounding lands are in relatively natural condition and currently receive low use by humans. Future growth and habitat fragmentation in the adjacent area, however, could have a negative impact on large animal species that require extensive home ranges or occur at low population densities.

Viability of natural communities would be increased if the larger boundaries recommended by Jones are adopted. Special management status should also be sought for lands managed by the Bureau of Land Management to the east and northeast of Bald Ridge. This would allow for more logical, ecologically-based management of the entire Bald Ridge area (Jones 1991).

Defensibility

Bald Ridge is defensible from extrinsic, human disturbances due to its isolation from population centers and its rugged topography.

PRINCIPAL DISTINGUISHING FEATURES

Important features of the area include:

-- Outstanding examples of several coniferous forest and foothills grassland plant communities, including limber pine woodland, Douglas-fir and Engelmann spruce forests, and bluebunch wheatgrass grassland. This assortment of communities represents a large sample of the community variation found in the ecotone between the Absaroka Mountains and the Bighorn Basin and serves as an important repository of native biological diversity.

-- Potential habitat for four USFS Region 2 and USFWS candidate plant and animal species. This area also provides habitat for several state or regionally rare plant and animal species monitored by WYNDD.

-- The pRNA protects the upper watershed of several minor drainages, including Newmeyer Creek and a tributary of the Clarks Fork of the Yellowstone River.

-- The pRNA protects important winter range for elk and mule deer (Rupp, no date; Hendzel 1985).

LOCATION

The Bald Ridge pRNA is located within the Clarks Fork Ranger District of Shoshone National Forest. Figures 1 and 7 show the location of the pRNA and recommended boundaries.

Latitude and Longitude

Proposed boundaries (USDA Forest Service 1986):

Northern border: latitude 44° 48' 39" north Southern border: latitude 44° 47' 10" north Eastern border: longitude 109° 19' 14" west Western border: longitude 109° 20' 39" west

Centrum: latitude: 44° 47' 55" north longitude: 109° 19' 57" west Recommended boundaries (Figure 1)

Northern border: latitude 44° 50' 23" north Southern border: latitude 44° 46' 44" north Eastern border: longitude 109° 19' 14" west Western border: longitude 109° 21' 45" west

Centrum: latitude: 44° 48' 37" north longitude 109° 20' 30" west

Boundary

Bald Ridge pRNA is a parcel of land located in Sections 25 (E2 and SW4) and 36 (NW4) of Township 56 North, Range 104 West of the Sixth Principal Meridian (USDA Forest Service 1986). The recommended boundaries of the pRNA include Sections 1 (NW4) and 2 (NE4) of Township 55 North, Range 104 West; and Sections 13 (SE4NE4 & S2), 14 (SE4SE4), 23 (E2), 24, 25, 26 (E2 & SE4SW4), 34 (NE4SE4), 35 (E2 & NW4 & NE4SW4), and 36 (except for extreme SE4) (Jones 1991).

The original boundary of the pRNA follows topographic and land ownership lines (Figure 1). The western border follows the crest of Bald Ridge from just south of the head of a small tributary of the Clarks Fork of the Yellowstone River (in Section 35) to the section line dividing Sections 24 and 25 of Township 56 North, Range 104 West. The northern border follows this same section line 0.5 miles east to the Forest boundary. The eastern border follows the Forest boundary south for about 0.75 miles, and then continues southwest from the summit of hill 7458 to the summit of hill 7662.

The larger boundary recommended by Jones (1991) follows the Clarks Fork Canyon along the 4800 foot elevation contour line from benchmark 5757 to the northeast corner of Section 13 (Township 56 North, Range 104 West) (Figure 1). The eastern border continues south along the Forest boundary approximately 3.75 miles to the crest of hill 7396. The southern boundary is formed by the crest of the drainage divide connecting hill 7396 with hill 7750 and benchmark 5757.

Area

As originally proposed, the area of the Bald Ridge pRNA is approximately 200 acres (81 hectares) (USDA Forest Service 1986). Based on boundaries supplied by Shoshone National Forest, however, the proposed area is 577 acres (233.5 hectares). The area of the recommended boundaries of the pRNA is 3115 acres (1260 hectares).

Elevation

Elevations within the pRNA, as originally proposed, range from 6860 ft (2091 m) at the head of Newmeyer Creek in the southeastern corner to 8633 ft (2631 m) at the summit of Bald Peak at the northern tip. If the boundaries of the Bald Ridge SBA are included in the pRNA, the minimum elevation becomes 4496 ft (1370 m).

Access

Bald Ridge pRNA is located approximately 23 miles northwest of Cody, Wyoming. From Cody, proceed north on Wyoming state highway 120 about 16 miles to state highway 296 (Chief Joseph Scenic Highway). Travel west on highway 296 approximately 11.2 miles to Forest Service Road 100. Proceed north on Road 100 for about 6 miles. This road is an unimproved dirt two-track. Proceed on foot from the road to the base of Bald Ridge.

AREA BY COVER TYPES

Cover types were mapped based on 1:24,000 scale topographic maps using aerial photographs and field reconnaissance. The area of each cover type was estimated from the maps.

SAF	Cover Types (Eyre 1980), Figure 2.	Acres	Hectares
206 210 219	Engelmann spruce-subalpine fir Interior Douglas-fir Limber pine	265 550 640	106 220 256

(Acreage from Jones 1991)

Kuc	hler	Types	(Kuchler	1966),	Figure	3.	Acres	Hectares
11 14 17 44	Doug West Pine Agro	glas-fi cern sp e-Dougl opyron-	ir forest pruce-fir Las-fir fo - <u>Poa</u>	(<u>Pseud</u> forest prest (<u>otsuga</u>) (<u>Picea</u> Pinus-Pa	- <u>Abies</u>) seudotsuga)	550 265 640 410	220 106 256 164
	(Ac	creage	from Jone	es 1991)			

Habitat Types and Community TypesAcresHectares(Jones 1992), Figure 4.

1	Pinus flexilis/Juniperus communis community (Steele et al. 1983; Johnston 1987).		640		256
2	<u>Agropyron</u> <u>spicatum</u> - <u>Poa</u> <u>secunda</u> var. <u>secunda</u> community (Tweit and Houston 1980). Synonym = <u>Roegneria</u> <u>spicata</u> - <u>Poa</u> <u>secunda</u> plant association (Johnston 1987).		410		164
3	Pseudotsuga menziesii/Juniperus communis community and Picea engelmannii/Hypnum revolutum community (Steele et al. 1983; Johnston 1987).		815		326
4	Sparsely vegetated cliff bands and talus slopes of the escarpment	1250		514	

(Jones 1991).

(Acreage from Jones 1991)

PHYSICAL AND CLIMATIC CONDITIONS

Physical Conditions

The primary feature of the pRNA is Bald Ridge, a northeastsouthwest trending ridge that forms the eastern wall of the Clarks Fork Canyon. Bald Peak, at an elevation of 8633 feet (2631 m) is the highest point on the ridge. The western edge of the ridge (in the area included in the recommended boundaries of the Bald Ridge SBA) is rimmed by a steep escarpment composed of vertical cliff bands, small ledges, and steep, unstable talus slopes. The headwaters of Newmeyer Creek and several other small drainages of the Clarks Fork of the Yellowstone originate on the western and southeastern slopes of Bald Ridge.

Climatic Conditions

No climate stations are maintained in the mountainous areas of the Absaroka Range or in the immediate vicinity of Bald Ridge. The nearest station is located about 23 miles to the southeast in Cody (Martner 1986). This station is at a lower elevation than most of the Bald Ridge pRNA. Data from the Cody station provide only an approximation of climate conditions in the pRNA.

Based on state-wide maps provided by Martner (1986), the mean annual temperature of the Bald Ridge area is $30-40^{\circ}$ F (- 1.1-4.4° C). Winters are cold, with a January mean daily low

temperature of $6-8^{\circ}$ F (- 14° C) and a mean daily high temperature of $32-34^{\circ}$ F (0.5° C). Summer high temperatures are also relatively low, with a July mean daily low temperature of $48-50^{\circ}$ F (9.4° C) and a mean daily high of $82-84^{\circ}$ F (28.3° C). The region has 200-225 days annually with a minimum temperature under 32° F. The frost-free period averages 75-100 days. Mean annual precipitation is 12-14 inches and mean annual snowfall is 40-60 inches (Jones 1991).

Summary of Monthly Climate Values, Cody, Wyoming Elevation 5248 feet (1600 m), 1951-1980 (From Martner 1986)

Month °F°CI	<u>Mean Temperature</u> nches mm	Average Precipitation
January	23.5- 4.7 0.4812.2	
February	28.6- 1.9 0.31 7.9	
March	31.5- 0.3 0.7218.3	
April	40.7 4.8 1.6241.1	
May 48.5	9.2 1.9950.5	
June 58.6	14.8 1.2431.5	
July 65.1	18.4 1.1729.7	
August	62.9 17.2 0.9423.9	
September	53.7 12.1 1.2832.5	
October	46.2 7.9 1.1930.2	
November	33.1 0.6 0.5514.0	
December	27.6- 2.4 0.5113.0	

Mean Annual 43.3 6.3 12.00 304.8

Mean April-Sept. 54.9 12.7 8.24 209.3

DESCRIPTION OF VALUES

Flora

Plant Communities

Most of the area of the pRNA east of the crest of Bald Ridge is covered by open conifer woodlands dominated by limber pine (<u>Pinus flexilis</u>). These woodlands occur primarily on eastwarddipping limestone beds. The tree canopy is low and rather open, consisting mainly of limber pines of various size classes with occasional Douglas-fir (<u>Pseudotsuga menziesii</u>) and Engelmann spruce (<u>Picea engelmannii</u>). <u>Shepherdia canadensis</u> and <u>Juniperus</u> <u>communis</u> dominate a sparse shrub layer. The herbaceous layer is equally sparse, although <u>Agropyron spicatum</u> may be locally dominant (Jones 1991).

Lodgepole pine (<u>Pinus contorta</u>) codominates the canopy with limber pine along the edge of Bald Ridge near the southern boundary of the pRNA (Jones 1991). In small areas of this woodland lodgepole pine is the only tree present. Due to the small size of this stand, it has not been mapped as a separate community.

Conifer forests dominate the escarpment on the west side of Bald Ridge in the area recommended for SBA designation (Jones 1991). This area is a mosaic of Engelmann spruce and Douglas-fir stands, with spruce dominating the more mesic, north-facing sites and Douglas-fir dominating drier slopes.

Stands dominated by Engelmann spruce, or codominated by spruce and an understory of mosses (<u>Hypnum revolutum and Tortula</u> <u>ruralis</u>) suggest that these areas belong to the <u>Picea</u> <u>engelmannii/Hypnum revolutum</u> community (Steele et al. 1983). The understory consists of scattered shrubs, including <u>Acer glabrum</u>, <u>Juniperus communis</u>, <u>Shepherdia canadensis</u>, <u>Physocarpus monogynus</u>, and <u>Rosa nutkana</u>. Vascular plant species diversity and cover is low in the understory. Occasional specimens of white spruce (Picea glauca) have also been observed in this area (Jones 1991).

Douglas-fir vegetation in the pRNA has an understory dominated by <u>Juniperus</u> communis. The herbaceous layer is generally sparse, except for openings in the forest. Patches of downed trees are common and contain dense growth of Douglas-fir saplings, shrubs, and forbs (especially <u>Arnica</u> <u>cordifolia</u>). Stands of the Douglas-fir community often have Engelmann spruce seedlings and saplings, and in many cliff areas the two community types appear to intergrade (Jones 1991).

Stands of the <u>Agropyron spicatum-Poa secunda</u> community occur on the dipslope in the southeastern part of the pRNA, primarily on east- and south-facing slopes. <u>A. spicatum</u> is either dominant throughout or codominant with <u>Carex rupestris</u> or <u>Artemisia</u> frigida and Phlox hoodii. Few young trees were observed in these grasslands, suggesting that these stands are not seral (Jones 1991).

Extensive areas to the south of the pRNA are dominated by Festuca idahoensis-Agropyron spicatum communities. Small patches of these grasslands may occur interspersed with Agropyron-Poa dominated vegetation on north-facing slopes in the southeastern corner of the Bald Ridge area (Jones 1991). Rare Plants

No federally listed Threatened or Endangered plant species are found in the Bald Ridge pRNA. Two USFWS Category 2 candidates and USFS Region 2 Sensitive plants and six other state and regionally rare species (monitored by WYNDD) are found in the pRNA (Fertig 1994). These species include:

Androsace chamaejasme var. carinata (Sweet-flowered rock jasmine) Heritage Rank : G5T4/S2 (WYNDD limited distribution list).² Federal Status: Bridger-Teton NF: Sensitive. Geographic Range: Eurasia, Alaska and western Canada south to Colorado.

- Habitat: Montane rock crevices and rocky soils derived from limestone or dolomite (Fertig et al. 1994, in ed.).
- Comments: This species is abundant on exposed limestone bedrock and shallow, rocky soils along the crest of Bald Ridge and two smaller locations on the southeast slopes (Figure 6). Additional potential habitat occurs along the east side of Bald Ridge and extends onto adjacent BLM lands east of the Forest boundary. In Wyoming, rock jasmine is also known from the Owl Creek and Wind River mountains (WYNDD records).

Antennaria aromatica (Aromatic pussytoes)

Heritage Rank : G4/S2 (WYNDD limited distribution list). Federal Status: USFWS: 3C. Geographic Range: Montana and northwestern Wyoming. Habitat: Limestone talus slopes and rock crevices, often on calcareous substrates.

Comments: Aromatic pussytoes occupies the same habitat as Androsace chamaejasme within the pRNA, but exhibits a more patchy distribution pattern (Figure 6). Recent surveys have found this species to be more widespread in Wyoming than originally believed.

Aquilegia jonesii (Jones' columbine)

Heritage Rank : G4/S3 (WY Federal Status: USFWS: 3C. (WYNDD watch list).

Geographic Range: Regional endemic of southern Alberta, Montana, and northern Wyoming.

Habitat: Upper montane to alpine limestone talus and rock crevices.

<u>Comments</u>: Only about 20 individuals of Jones' columbine were observed at a single site south of Bald Peak in 1988 (Jones 1991). This population occurs on limestone bedrock and shallow, rocky colluvium (Figure 6). Jones' columbine is now known to be more widespread in Montana and Wyoming than once thought.

²Heritage Ranks are explained in Appendix D. **Castilleja nivea** (Snow paintbrush) Heritage Rank : G3/S2 (WYNDD limited distribution list). Federal Status: None. Geographic Range: Montana and northwestern Wyoming. Habitat: Alpine and subalpine rocky meadows, often on calcareous substrates. Comments: Snow paintbrush was discovered in the pRNA for the first time in 1994 vegetation surveys. It occurs locally on the open ridge crest less than 0.5 miles south of Bald Peak (Figure 6). Eritrichium howardii (Howard forget-me-not) Heritage Rank : G4/S2 (WYNDD watch list). Federal Status: None. Geographic Range: Regional endemic of Montana and northern Wyoming. Habitat: Rocky slopes and ridges (Dorn 1992). Comments: Howard forget-me-not is known to occur on the east side of Bald Ridge on sparsely-vegetated limestone bedrock (Jones 1991) (Figure 6). Although specific survey data are lacking, it is suspected to be common within the pRNA. Kelseya uniflora (Kelseya) Heritage Rank : G5/S2 (WYNDD watch list). Federal Status: None. Geographic Range: Regional endemic of Montana, Idaho, and northern Wyoming. Habitat: Limestone rock crevices at medium to high elevations. Comments: Kelseya is locally abundant on exposed limestone bedrock along the crest of Bald Ridge and on isolated outcrops on the southeast slopes (Figure 6). Pyrrocoma carthamoides var. subsquarrosus (Absaroka goldenweed) [syn = Haplopappus carthamoides var. subsquarrosus] Heritage Rank : G5T2?/S2 (WYNDD limited distribution list). Federal Status: USFWS: C2; USFS R2: Sensitive. Geographic Range: Regional endemic of northwest Wyoming and southwestern Montana (Lesica 1993; Fertig et al. 1994, in ed.). Habitat: Open meadows. slopes, and ridges on sandstone or

limestone substrates (Fertig et al. 1994, in ed.).

<u>Comments</u>: Absaroka goldenweed is known from two subpopulations in <u>Agropyron</u> <u>spicatum-Poa</u> <u>secunda</u> grasslands in the southeastern corner of the pRNA (just outside of the boundaries originally proposed by Shoshone National Forest) (Figure 6). Jones (1991) estimated this population to be uncommon in the local area. In Wyoming, this taxon is known from fewer than 15 occurrences, all restricted to a small area on the east flank of the Absaroka Mountains. Of these, only three currently occur within designated protected areas (all in the Northern Absaroka Wilderness Area) (WYNDD records).

Shoshonea pulvinata (Shoshonea)

Heritage Rank : G2G3/S2 (WYNDD limited distribution list). Federal Status: USFWS: C2; USFS Region 2: Sensitive.

Geographic Range: Regional endemic of southwestern Montana and northwestern Wyoming.

- Habitat: Shallow, stony, calcareous soils of exposed limestone outcrops, ridgetops, and talus slopes (Fertig et al. 1994, in ed.).
- <u>Comments</u>: Shoshonea occurs in pockets of coarse soil in limestone outcrops along the crest of Bald Ridge and in two smaller sites on the southeast slope of the ridge (Figure 6). Marriott (1988) estimated that the Bald Ridge population contained over 10,000 individuals. Additional habitat also exists on adjacent BLM lands. Although numerically abundant, shoshonea is known from fewer than 12 major populations worldwide (Dorn 1989). At present, no populations of shoshonea occur within a formally protected area in Wyoming (WYNND records).

Plants of Bald Ridge pRNA

A brief and incomplete floristic survey was conducted in the Bald Ridge pRNA in July, 1994. The following species checklist is based on field studies by M. Bynum (unpublished records 1994), K. Houston (cited in Rupp, no date), Marriott (1988) and Jones (1991). For additional information on the vascular flora of the Absaroka Mountains, consult Evert (1991).

Scientific Name Common Name

Trees

PiceaengelmaniiEngelmann sprucePiceaglaucaWhite sprucePinuscontortaLodgepole pinevar.latifoliaPinusflexilisLimber pine

<u>Pseudotsuga</u> <u>menziesii</u> Douglas-fir var. glauca

Shrubs

Acer glabrum Rocky Mountain maple Artemisia frigida Fringed sagewort Artemisia tridentata var. vaseyana f. vaseyana Mountain big sagebrush Chrysothamnus nauseosus Rubber rabbitbrush Juniperus communis Common juniper Juniperus horizontalis Creeping juniper Juniperus scopulorum Rocky Mountain juniper Pentaphylloides floribunda Shrubby cinquefoil [syn = Potentilla fruticosa] Physocarpus monogynus Mountain ninebark Ribes sp. gooseberry Rosa nutkana Nootka rose Rubus sp. raspberry Shepherdia canadensis Soapberry Symphoricarpos oreophilus Mountain snowberry var. utahensis

Forbs

Achillea millefolium Common yarrow var. lanulosa Pale agoseris Agoseris glauca var. dasycephala Allium sp. Androsace chamaejasme Sweet-jasmine Sweet-flowered rock var. <u>carinata</u> jasmine Anemone multifida Cliff anemone Anemone patens Pasqueflower var. multifida Antennaria aromatica Aromatic pussytoes AntennariamicrophyllaSmall-leavedpussytoesAntennariaparvifoliaCommonpussytoes Aquilegia jonesii Jones' columbine Arabis nuttallii Nuttall's rock cress Arabis pendulocarpa Deflexed rock cress var. pendulocarpa Arenaria congesta Ballhead sandwort var. congesta Hooker's sandwort Arenaria hookeri Arenaria obtusiloba Arctic sandwort Arnica cordifolia Heart-leaf arnica Artemisia campestris Northern wormwood var. scouleriana Aster conspicuus Showy aster

Aster foliaceus Leafy-bract aster var. apricus Aster meritus Arctic aster Astragalus flexuosus Wiry milkvetch Astragalus kentrophyta Thistle milkvetch var. tegetarius Astragalus miser Weedy milkvetch var. decumbens Astragalus missouriensis Missouri milkvetch Astragalus vexilliflexus Bent-flowered milkvetch Bupleurum americanum
Calochortus gunnisonii
Calochortus nuttalliiAmerican thorough-wax
Gunnison's mariposa
Sego-lily
Harebell Castilleja linariifolia Wyoming paintbrush Castilleja nivea Snow paintbrush Cerastium arvense Field chickweed Clematis columbiana Matted purple virgin'svar. tenuiloba bower Cymopterus longilobus Henderson's cymopterus Cymopterus nivalis Snowline cymopterus Cymopterus terebinthinus Turpentine cymopterus var. albiflorus Dodecatheon pulchellum Dark-throat shooting-star Draba oligosperma Few-seeded draba Erigeron caespitosus Tufted fleabane Erigeron ochroleucus Buff fleabane var. scribneri Yellow buckwheat Eriogonum flavum var. flavum Eriogonum ovalifolium Oval-leaved wild var. ochroleucum buckwheat Eritrichium howardii Howard's forget-me-not Fragaria vesca Woods strawberry Gaillardia aristata Blanket-flower Galium boreale Northern bedstraw Gentiana affinis Pleated gentian var. affinis Gentianella amarella Northern gentian var. amarella Haplopappus armerioides Thrifty goldenweed Haplopappus carthamoides Absaroka goldenweed var. subsquarrosus [syn = Pyrrocoma c. var. s.] Hedysarum sulphurescens Yellow hedysarum Heterotheca villosa Hairy golden-aster var. hispida Heuchera cylindrica Roundleaf alumroot Hieracium albiflorum White-flowered hawkweed Hymenopappus filifolius Columbia cut-leaf var. luteus

Hymenoxys acaulis Stemless hymenoxys var. acaulis Ipomopsis congesta Ballhead gilia var. congesta Ipomopsis spicata Spicate gilia var. capitata Kelseya uniflora Kelseya Lesquerella alpina Alpine bladderpod var. alpina Canby's lovage Ligusticum canbyi Linum lewisii Wild blue flax Lupinus argenteus Silvery lupine <u>Mertensia</u> viridis Green bluebells Orobanche ludoviciana Louisiana cancerroot var. ludoviciana Orthilia secunda Sidebells pyrola Osmorhiza depauperata Blunt-root sweet-cicely Oxytropis besseyi Wind River locoweed var. ventosa Paronychia sessiliflora Stalkless paronychia Penstemon arenicola Phacelia hastata Silverleaf phacelia Phlox hoodii Hood's phlox Potentilla pensylvanica Prairie cinquefoil Pterospora andromeda Woodland pinedrops Pyrola chlorantha Greenish wintergreen Saxifraga bronchialis Spotted saxifrage var. austromontana Sedum lanceolatum Lanceleaved stonecrop Senecio canus Woolly groundsel <u>Senecio</u> <u>integerrimus</u> Western groundsel var. exaltatus Senecio streptanthifolius Cleft-leaf groundsel var. streptanthifolius Shoshonea pulvinata Shoshonea Menzies' silene Silene menziesii var. viscosa Solidago missouriensis Missouri goldenrod var. missouriensis Solidago simplex Swertia radiata Green gentian [syn = Frasera speciosa] Taraxacum officinale Common dandelion Townsendia parryi Parry's townsendia Tragopogon dubius Yellow salsify Valeriana occidentalis Western valerian Viola vallicola Valley yellow violet Zigadenus elegans Elegant death-camas Zigadenus venenosus Meadow death-camas var. gramineus

Graminoids

Nodding brome Bromus anomalus Calamagrostis purpurascens Purple pinegrass Carex filifolia Thread-leaved sedge Carex rossii Ross sedge Carex rupestris Curly sedge Danthonia intermedia Timber oatgrass Elymus elymoides Bottlebrush squirreltail Elymus lanceolatus Thickspike wheatgrass Elymus spicatus Bluebunch wheatgrass Elymus trachycaulus Slender wheatgrass var. trachycaulus Festuca idahoensis Idaho fescue Koeleria macrantha Prairie junegrass Leucopoa kingii Spike-fescue Poa interior Inland bluegrass Poa secunda Sandberg bluegrass var. secunda Stipa nelsonii Nelson's needlegrass var. dorei Stipa occidentalis Western needlegrass

Ferns

<u>Cystopteris</u> <u>fragilis</u> Brittle bladder-fern Selaginella densa Compact selaginella

Bryophytes and Lichens

<u>Hypnum revolutum</u> <u>Parmelia</u> sp. <u>Peltigera</u> caninum Tortula ruralis

Fauna

Rare Vertebrates

No federally listed Threatened or Endangered vertebrate species are currently known to occur in the Bald Ridge pRNA. Potential habitat may exist for four USFS Region 2 Sensitive species, USFWS candidates, and WYNDD "rare, uncommon, or imperiled" species in the vicinity of the pRNA (Garber 1991; US Fish and Wildlife Service 1991; Estill 1993). These species include:

Mountain lion (Felis concolor) Heritage Rank: G4/S3? Federal Status: None.

Geographic Range: Alaska and Canada to Argentina.

Habitat: Remote areas with dense cover, rocky terrain, and abundant deer (Oakleaf et al. 1992).

<u>Comments</u>: The rocky, rugged terrain and high concentration of deer in the Bald Ridge area provide suitable habitat for mountain lions in the pRNA. The Wyoming Game and Fish Department (WGFD) manages mountain lion as a trophy game species (Oakleaf et al. 1992).

Lynx (Felis lynx canadensis)

Heritage Rank: G5/S2.

Federal Status: USFWS: C2; USFS Region 2: Sensitive.

Geographic Range: Alaska and Canada south to the Great Lakes and northern Rocky Mountain states.

Habitat: Dense Engelmann spruce/subalpine fir forests at high elevations (Oakleaf et al. 1992).

<u>Comments</u>: Three historical reports of lynx have been documented within a 5 mile radius of Bald Ridge (Reeve et al. 1986; WYNDD records). Potential habitat may exist in Engelmann spruce/Douglas-fir forests on the west side of Bald Ridge (within the recommended boundaries of Jones [1991]). WGFD lists lynx as a Priority III species "whose needs should be accommodated in resource management planning" (Wyoming Game and Fish Department 1987).

Cooper's hawk (Accipiter cooperi)

Heritage Rank: G4/S3S4B.

Federal Status: None.

<u>Geographic Range</u>: Southern Canada to the southern US, winters in Latin America.

Habitat: Coniferous forests, aspen, cottonwood-riparian and woodland chapparal (Oakleaf et al. 1992).

<u>Comments</u>: Potential habitat exists for the Cooper's hawk in the coniferous forests and woodlands of the pRNA. This neotropical migrant is listed by WYNDD as rare or uncommon.

Upland sandpiper (Bartramia longicauda)

Heritage Rank: G5/S2B.

Federal Status: USFS Region 2: Sensitive.

<u>Geographic Range</u>: Alaska and central Canada south to eastern Wyoming, Oklahoma, and Virginia.

Habitat: Native Great Plains grasslands.

<u>Comments</u>: A small population of upland sandpipers was observed approximately 2 miles south of the pRNA in July, 1990 (Jones 1991). At least three birds were observed displaying, suggesting that they may be breeding in the area. Potential habitat for the species may occur in the bluebunch wheatgrass-Sandberg bluegrass communities in the southeastern part of the pRNA. Upland sandpiper is listed by WGFD as a Priority II species "in need of additional study to determine whether intensive management is warranted" (Wyoming Game and Fish Department 1987).

Vertebrates of Bald Ridge pRNA

Vertebrate species have not been systematically inventoried in the Bald Ridge pRNA. The following tentative species list is derived from literature sources (Baxter and Stone 1985; Clark and Stromberg 1987; Dorn and Dorn 1990; Oakleaf et al. 1992). Species for which suitable habitat is lacking in the pRNA have been excluded from this list.

Common Name Scientific Name

Mammals

Nuttall's cottontail Sylvilagus nuttallii grangeri White-tailed jackrabbit Lepus townsendii campanius Least chipmunk Tamias minimus consobrinus Marmota flaviventris Yellow-bellied marmot Golden-mantled ground squirrel Spermophilus lateralis cinerascens Red squirrel Tamiasciurus hudsonicus Deer mouse Peromyscus maniculatus artemisiae Bushy-tailed woodrat Neotoma cinerea Meadow vole <u>Microtus</u> pennsylvanicus Porcupine Erethizon dorsatum Coyote Canis latrans Black bear Ursus americanus cinnamomum Long-tailed weasel Mustela frenata Mountain lion Felis concolor Felis lynx canadensis Lynx Felis rufus pallescens Bobcat ElkCervus elaphus nelsoni Mule deer Odocoileus hemionus hemionus

Birds

Cooper's hawk <u>Accipiter cooperi</u> Red-tailed hawk <u>Buteo jamaicensis</u> Golden eagle <u>Aquila chrysaetos</u> American kestrel <u>Falco sparverius</u> Prairie falcon <u>Falco mexicanus</u>

Blue grouse Dendragapus obscurus Ruffed grouse Bonasa umbellus Upland sandpiper Bartramia longicauda Mourning dove Zenaida macroura Common nighthawk Chordeiles minor White-throated swift Aeronautes saxatilis Broad-tailed hummingbird Selasphorus platyceras Downy woodpecker Picoides pubescens Red-shafted flicker Colaptes auratus cafer Western wood-pewee Contopus sordidulus Horned lark Eremophila alpestris Tachycineta bicolor Tree swallow Gray jay Perisoreus candensis Steller's jay Cyanocitta stelleri Clark's nutcracker Nucifraga columbiana Black-billed magpie Pica pica Common raven Corvus corvax Mountain chickadee Parus gambeli Red-breasted nuthatch <u>Sitta</u> canadensis White-breasted nuthatch Sitta carolinensis Rock wren Salpinctes obsoletus Mountain bluebird Sialia currucoides Hermit thrush Catharus guttatus American robin Turdus migratorius Audubon's warbler Dendroica coronata auduboni Western tanager Piranga ludoviciana Green-tailed towhee Pipilo chlorurus Chipping sparrow Spizella passerina Vesper sparrow Pooectes gramineus Chondestes grammacus Lark sparrow White-crowned sparrow Zonotricha leucophrys Dark-eyed junco Junco hyemalis Western meadowlark Sturnella neglecta Brewer's blackbird Euphagus cyanocephalus Cassin's finch Carpodacus cassinii

Reptiles

Wandering garter snake <u>Thamnophis</u> <u>elegans</u> <u>vagrans</u> Prairie rattlesnake Crotalus viridis viridis

Geology

Bald Ridge is at the northern end of a series of ridges of Paleozoic and Mesozoic sedimentary strata on the eastern flank of the Absaroka Mountains (Lageson and Spearing 1988). Strata east of the crest of Bald Ridge are primarily limestones, dolomites, and red shales of the Mississippian Madison and Amsden formations (Pierce 1965). The escarpment on the west side of Bald Ridge is composed of bands of Paleozoic sediments overlying Precambrian granite gneiss and granite. These sedimentary formations are composed of siltstone, conglomerate, shale, limestone, and dolomite. The exposed formations, from the summit to the base of the escarpment, are the Madison, Three Forks, Jefferson, Bighorn, Grove Creek, Snowy Range, Pilgrim, Gros Ventre, and Flathead formations (Pierce 1965).

Calceophilic plants (including most of the rare and Sensitive species known to occur in the pRNA) grow primarily on the Madison limestone outcrops on the crest and east side of Bald Ridge. They may also occur on limestone and dolomite outcrops on the west-facing escarpment of Bald Ridge. <u>Pyrrocoma carthamoides</u> var. <u>subsquarrosus</u> grows primarily on strata of the Amsden Formation in the southeastern area of the pRNA. Stands of the <u>Pinus flexilis/Juniperus communis</u> community type are strongly associated with soils derived from the Madison and Amsden formations. The <u>Agropyron spicatum-Poa secunda</u> community is best developed on soils derived from Amsden shales. Douglas-fir and Engelmann spruce communities occur primarily on limestone talus derived from the sedimentary formations on the west side of Bald Ridge (Jones 1991).

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Appendix A.

Stand Data

A single 37 ft diameter circular plot was sampled in the limber pine/common juniper community type in the Bald Ridge pRNA in 1994. The location of the Ecodata plot is shown in figures 5 and 6. Information on species cover is summarized in the following table. Jones (1991) includes plot data for seven other stands in the pRNA, including bluebunch wheatgrass-Sandberg bluegrass, Engelmann spruce/moss, and Douglas-fir/common juniper community types.

Cover Values

T0-1% P1-5% 15-15% 215-25% 325-35% 435-45% 545-55% 655-65% 765-75% 875-85% 985-95% F95-100%

25

Survey Site: Bald Ridge Plot # 001 Date: 28 July 1994 Surveyor: Mike Bynum Location: T56N R104W S25 NE4 NE4. County:Park Directions: follow crest of Bald Ridge to 8100-8200 ft contour interval, walk NW 200-300 yards to plot. Map Name: Bald Peak 7.5' USGS Quad. Plot Radius: 37 ft. Community Type: Pinus flexilis/Juniperus communis Limber pine/Common juniper Parent Material: Calcareous substrates. Soil: Elevation: 8120 feet Aspect: 96° Slope: 20° Position: Upper slope Species Cover Species Percent Stratum Cover Height 18 ft. TREES Pinus flexilis Seedlings Т Saplings 2 Poles 2 Ρ Pseudotsuga menziesii TOTAL 45% SHRUBS .6-1.8 ft. Artemisia tridentata Var. <u>vaseyana</u> Ρ Juniperus communis 1 Pentaphylloides floribunda Τ Shepherdia canadensis 1 TOTAL 20% GRAMINOIDS 2 feet Carex rossii P Elymus spicatus 1 Leucopoa kingii Ρ Stipa nelsonii var. dorei Т TOTAL 15% FORBS 1.4 feet Achillea millefolium Τ Т Anemone multifida Т Arenaria congesta Aster foliaceus Т

Astragalus miser	P
Astragalus vexilliflexu	IS
Calochortus gunnisonii	
Campanula rotundifolia	
Castilleja linariifolia	a
Cerastium arvense	P
Clematis columbiana	Т
Cymopterus longilobus	
Cymopterus terebinthinu	IS
Erigeron caespitosus	
Gaillardia aristata	Т
Galium boreale P	
Gentianella amarella	
Heterotheca villosa	Т
Ipomopsis congesta	Т
Phacelia hastata	Т
Sedum lanceolatum	Т
Senecio streptanthifoli	us
Solidago simplex	Т
Swertia radiata	Ρ
[Frasera speciosa]	
Taraxacum officinale	
Viola vallicola	Т
TOTAL 30%	
TOTAL 30%	

Т

Т

Т

T T T T

1 T T

Т

Т

BRYOPHYTES

GROUND COVER Wood P Litter/Duff Bare soil T Gravel 3 Cobble 1 Stone T Boulder T Bedrock T Appendix B.

Element Occurrence Records for Rare and Sensitive Plant Species

Locations of rare plant species are mapped in Figure 6.

Appendix C.

Element Occurrence Records for Sensitive Animal Species

Printouts of computerized WYNDD Element Occurrence Records are included for populations of lynx and upland sandpiper known from the vicinity of Bald Ridge pRNA. No records are available for mountain lion and Cooper's hawk in the immediate vicinity.

Appendix D.

Explanation of Natural Heritage Ranks (TNC)

The Wyoming Natural Diversity Database (WYNDD) uses The Nature Conservancy's standardized ranking system to assess the global and state rarity of each plant and animal species, subspecies, and variety. Each taxon is ranked on a scale of 1-5, from rarest to most common. Codes are as follows:

GGlobal rank; based on the rangewide status of a species.

- TTrinomial rank; based on the rangewide status of a subspecific taxon (subspecies or variety).
- SState rank; based on the status of a species in Wyoming (state ranks may differ in other states).
- 1Critically imperiled because of extreme rarity (5 or fewer extant occurrences, or very few remaining individuals) or because of some factor of a species life history that makes it especially vulnerable to extinction.
- 2Imperiled because of rarity (6-20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.
- 3Rare or local throughout its range or found locally in a restricted range (21-100 occurrences).
- 4Apparently secure, although it may be quite rare in parts of its range, especially at the periphery.
- 5Demonstrably secure, although it may be quite rare in parts of its range, especially at the periphery.
- HKnown only from historical records, but suspected to still occur in the state (for plants, not documented in

Wyoming since 1920).

UStatus unknown.

- QQuestions exist regarding the taxonomic validity of a species, subspecies, or variety.
- ?Questions exist regarding the assigned G, T, or S rank of a taxon.
- BBreeding status of a taxon in Wyoming (applies only to birds).
- NNon-breeding status of a taxon in Wyoming (applies only to birds).
- ZNSpecies that are not of significant concern when migrating through Wyoming. May apply to common species that occur only as seasonal migrants or to uncommon species that are only transient in the state.

Figures

- Figure 1. Location and boundary of the Bald Ridge pRNA.
- Figure 2. Contour map showing Society of American Foresters cover types in the Bald Ridge pRNA.
- Figure 3. Contour map showing Kuchler vegetation types in the Bald Ridge pRNA.
- Figure 4. Contour map showing habitat and community types in the Bald Ridge pRNA.
- Figure 5. Location of Ecodata plots in the Bald Ridge pRNA.
- Figure 6. Locations of rare plants in the Bald Ridge pRNA.
- Figure 7. Location of Bald Ridge pRNA within Shoshone National Forest.