

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

Prepared for the

Shoshone National Forest, USDA Forest Service

By

George Jones and Bonnie Heidel  
(Wyoming Natural Diversity Database, University of Wyoming)

and Walter Fertig  
(Moenave Botanical Consulting)

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## INTRODUCTION

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

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

## LAND MANAGEMENT PLANNING

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## OBJECTIVES

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

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

## PRINCIPAL DISTINGUISHING FEATURES

The principal distinguishing features of the potential Lake Creek RNA are (1) fens and willow carrs (and a small area of *Sphagnum*-dominated wetland) around ponds and along streams, (2) a subalpine forest of lodgepole pine (*Pinus contorta*), subalpine fir (*Abies lasiocarpa*), and Engelmann spruce (*Picea engelmannii*) growing on a rolling surface of glaciated granitic bedrock, and 9 rare plant species (6 on the USDA Forest Service Region 2 Sensitive Species List, and an additional 3 tracked by the Wyoming Natural Diversity Database).

## LOCATION

The potential Lake Creek RNA is located within the Shoshone National Forest in northwestern Wyoming. The approximate center of the potential RNA is at latitude 44°57'50" N and longitude 109°41'05" W. The potential RNA includes all or parts of the following sections (all on the 6th Principal Meridian): T57N, R107W, Sections 3, 4, 5, 6, 8, 9, and 10; T58N, R107W, Sections 27, 28, 29, 30, 31, 32, 33, and 34.

## BOUNDARY

The proposed boundary of the potential RNA follows an administrative boundary, cultural features, and landscape features (Figure 2). The eastern boundary follows National Forest Trail 568 and a ridgeline west of Muddy Creek. The northern boundary runs between a series of hilltops as it crosses Lake Creek, then lies on the divide between the drainages of Lake Creek to the southeast and Gilbert Creek to the northwest. The boundary on the southwest and the south follows the southern boundary of the Absaroka - Beartooth Wilderness Area.

## AREA

The total area of the potential Lake Creek RNA is 5,860 acres (2,371 ha).<sup>1</sup>

## ELEVATION

The elevation of the potential Lake Creek RNA ranges from approximately 7,710 feet (2,255 m) on Lake Creek on the southwestern boundary to 8,920 feet (2,721 m) in the north-central part.

## ACCESS

The potential Lake Creek RNA may be reached via foot and horseback travel from public roads and trails. The western and northwestern portions are accessible from National Forest Roads 130 and 189 and National Forest Trail 617. The eastern and northeastern portions of the area are accessible from National Forest Road 136 and National Forest Trails 568 and 612.

## ECOREGION

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

## MAPS

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

USDI Geological Survey 7.5-minute topographic Quadrangle Map: Muddy Creek, Wyoming.

## AREA BY COVER-TYPE

This information on plant associations, habitat types, Kuchler vegetation types, and Society of American Foresters forest cover-types is based on 1998 field work conducted by Natural Diversity

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

Database biologists, reported in an earlier document (Jones and Fertig 1999), and revised to reflect new names for plant associations. Maps of these cover-types were digitized on-screen by Natural Diversity Database staff, using the ESRI® ArcMap™ 9 software; boundaries are based on the hand-drawn map in the earlier report (Jones and Fertig 1999) and were digitized using digital raster graphic files (digital topographic maps) and 2006 National Agriculture Imagery Program true-color aerial photographs (USDA, Farm Services Administration, Aerial Photography Field Office) as backgrounds. The areas of these various cover-types were computed in the ArcMap™ software.

## PLANT ASSOCIATIONS<sup>2</sup>

The major plant associations in the potential Lake Creek RNA are forests and woodlands dominated by conifers (Table 1, Figure 3). The field survey suggested that *Pinus contorta* is the most widespread dominant conifer, and most of the lodgepole pine forest has an undergrowth with substantial amounts of *Vaccinium scoparium*. *Picea engelmannii* and *Abies lasiocarpa* dominate wet stands at the bases of slopes and around wetlands, and *Pseudotsuga menziesii* dominates small areas of woodland on south-facing slopes at the southern end of the potential RNA. The large area of conifer forest also contains many sparsely vegetated rock outcrops.

The wetlands in the potential RNA are largely dominated by stands of *Carex utriculata*. Small stands of *Salix planifolia* and *Salix wolfii* are present in the wetlands as well. *Carex limosa* dominates a handful of floating mats.

Table 1. Occurrence of plant associations in complexes mapped in the potential Lake Creek Research Natural Area. See Figure 3. “M” in a cell indicates that a plant association is a major component of a complex, and “m” indicates that it is a minor component of the complex.

Plant Associations & Alliances	Complex Names and Areas		
	Upland Forest. 5,439 ac, 2,201 ha	Wetland Vegetation. 339 ac, 137 ha	Open Water. 82 ac, 33 ha
Herbaceous			
<i>Carex limosa</i> Herbaceous Association			m
<i>Carex utriculata</i> Herbaceous Association		M	
Shrub			
<i>Salix planifolia</i> / <i>Carex aquatilis</i> Shrub Association		m	
<i>Salix wolfii</i> / <i>Carex aquatilis</i> Shrub Association		m	
Forest & Woodland			
<i>Abies lasiocarpa</i> - <i>Picea engelmannii</i> / <i>Vaccinium scoparium</i> Forest Association	m	m	
<i>Picea engelmannii</i> / <i>Linnaea borealis</i> Forest Association	m	m	
<i>Pinus contorta</i> / <i>Vaccinium scoparium</i> Forest Association	M		
<i>Pseudotsuga menziesii</i> / <i>Festuca idahoensis</i> Woodland Association?	m		

## KUCHLER VEGETATION TYPES

The forest vegetation and the wetlands in the potential Lake Creek Research Natural Area fall mainly within Kuchler’s (1964) Western Spruce – Fir Forest (*Picea-Abies*) type (Table 2, Figure 4). The small area of *Pseudotsuga menziesii* woodland in the southern part of the area qualifies as the Douglas fir Forest (*Pseudotsuga*) type. The open water in the potential RNA does not belong to a Kuchler type.

2. Names of plant associations are from NatureServe (2010).

Table 2. Kuchler vegetation types in the potential Lake Creek Research Natural Area. See Figure 4. “M” indicates a major vegetation type, and “m” indicates a minor type.

<b>Vegetation Types (Kuchler 1964)</b>	<b>Forest &amp; Wetland Vegetation. 5,439 acres, 2,201 hectares</b>
Western Spruce-Fir Forest ( <i>Picea-Abies</i> )	M
Douglas Fir Forest ( <i>Pseudotsuga</i> )	m

### HABITAT TYPES

The forests and woodlands in the potential Lake Creek RNA grow on three forest habitat types (Steele *et al.* 1983) (Table 3). The drier forests over most of the area, largely dominated by *Pinus contorta*, grow on the *Abies lasiocarpa/Vaccinium scoparium* Habitat Type. Wetter forested sites belong to the *Picea engelmannii/Linnaea borealis* Habitat Type. The *Pseudotsuga menziesii* woodlands in the southern part of the area likely grow on the *Pseudotsuga menziesii/Festuca idahoensis* Habitat Type. Sites supporting the herbaceous and shrub-dominated wetland vegetation do not belong to a habitat type.

Table 3. Habitat types in the potential Lake Creek Research Natural Area. The habitat type classification applies only to the portion of the area mapped as coniferous forest (Figure 5). “M” indicates a major habitat type, and “m” indicates a minor type.

<b>Habitat Types (Steele <i>et al.</i> 1983)</b>	<b>Area of Coniferous Forest 5,439 ac, 2,201 ha</b>
<i>Abies lasiocarpa / Vaccinium scoparium</i> Habitat Type	M
<i>Picea engelmannii / Linnaea borealis</i> Habitat Type	m
<i>Pseudotsuga menziesii / Festuca idahoensis</i> Habitat Type?	m

### SOCIETY OF AMERICAN FORESTERS COVER TYPES

The Lodgepole Pine type (218) is the major forested cover type (Eyre 1980) in the potential Lake Creek RNA (Table 4). The Engelmann Spruce-Subalpine Fir type (206) and the Interior Douglas-Fir type (210) are minor cover types, the former on the wetter forested sites and the latter on south-facing slopes in the southern part of the potential RNA.

Table 4. Society of American Foresters Forest Cover Types in the potential Lake Creek Research Natural Area. Forest cover types grow only in the portion of the area mapped as coniferous forest (Figure 6). “M” indicates a major cover type, and “m” indicates a minor type.

Forest Cover Types (Eyre 1980)	Area of Coniferous Forest 5,439 ac, 2,201 ha
Engelmann Spruce – Subalpine Fir (206)	m
Lodgepole Pine (281)	M
Interior Douglas-Fir (210)	m

## ECOLOGICAL SYSTEMS

The U.S. Forest Service’s Landscape Fire and Resource Management Planning Tools Project (Landfire) Project (<http://www.landfire.gov/>) uses ecological systems as a way to display general vegetation/environment types nation-wide. Descriptions of ecological systems are available at <http://www.natureserve.org/explorer/servlet/NatureServe?init=Ecol>. Figure 7 shows the distribution of ecological systems in the potential Lake Creek RNA. This figure was produced from data extracted from the nation-wide map of ecological systems and a few additional cover-types, updated to 2008 (<http://landfire.cr.usgs.gov/viewer/>). Two changes were made to those data in producing Figure 7: the area originally mapped as the *Pseudotsuga menziesii* Plant Alliance was re-classified to the Middle Rocky Mountains Montane Douglas-fir Forest and Woodland Ecological System, and the area originally mapped as the *Artemisia tridentata* ssp. *vaseyana* Plant Alliance was re-classified as the Inter-Mountain Basins Montane Sagebrush Steppe Ecological System. Table 5 shows the area of each ecological system within the potential RNA.

Ten ecological systems have been mapped in at least 1% (each) of the potential RNA (Table 5). Roughly the northern half of the area is mapped as primarily the Northern Rocky Mountain Subalpine Woodland and Parkland (Figure 7), while the southern half is mapped primarily as the Middle Rocky Mountain Montane Douglas-fir Forest and Woodland system, the Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland system, the Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland system, and the Rocky Mountain Lodgepole Pine Forest system.

Researchers in the Landfire Program caution that the national Landfire Project information should be augmented with knowledge of local conditions ([http://www.landfire.gov/dp\\_quality\\_assessment.php](http://www.landfire.gov/dp_quality_assessment.php)), and the field survey suggests that the ecological systems map is in error in three respects. First, the composition of the tree overstory, as determined by the field survey, suggests that the northern half of the area would be better mapped as the lodgepole pine system or one of the two spruce-fir forest and woodland systems than as the Northern Rocky Mountain Subalpine Woodland and Parkland system. Second, the field survey suggests that the montane Douglas-fir forest and woodland system is more restricted in the southern part of the area than indicated on the ecological systems map, and most of the forested vegetation there should be mapped as the lodgepole pine system. Third, the field survey suggests that much of the area mapped as the Rocky Mountain Subalpine-Montane Mesic Meadow actually is a wetland and would be better mapped as a wetland or riparian system.

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

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

<b>Ecological Systems</b>	<b>Acres</b>	<b>Hectares</b>
Barren	77	31
Inter-Mountain Basins Montane Sagebrush Steppe	107	43
Middle Rocky Mountain Montane Douglas-fir Forest and Woodland	869	352
Northern Rocky Mountain Subalpine Woodland and Parkland	1971	797
Open Water	69	28
Rocky Mountain Lodgepole Pine Forest	666	270
Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland	588	238
Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland	1152	466
Rocky Mountain Subalpine-Montane Mesic Meadow	137	55
Rocky Mountain Subalpine/Upper Montane Riparian Systems	58	23
<i>Agriculture-Pasture and Hay</i>	5	2
<i>Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland</i>	5	2
<i>Northern Rocky Mountain Conifer Swamp</i>	18	7
<i>Northern Rocky Mountain Mesic Montane Mixed Conifer Forest</i>	27	11
<i>Northern Rocky Mountain Montane-Foothill Deciduous Shrubland</i>	0	0
<i>Northern Rocky Mountain Subalpine Deciduous Shrubland</i>	25	10
<i>Northern Rocky Mountain Subalpine-Upper Montane Grassland</i>	51	20
<i>Rocky Mountain Alpine Turf</i>	4	2
<i>Rocky Mountain Aspen Forest and Woodland</i>	11	5
<i>Rocky Mountain Montane Riparian Systems</i>	16	6
<i>Rocky Mountain Poor-Site Lodgepole Pine Forest</i>	3	1

## PHYSICAL AND CLIMATIC CONDITIONS

### PHYSICAL SETTING

The potential Lake Creek RNA is located at the southern edge of the Beartooth Plateau. The terrain of the area consists of rounded, glaciated hills with local relief up to 500 feet (approx. 150 m). Most of the potential RNA lies within the drainage basin of Lake Creek, a high-gradient, perennial stream flowing southward through the middle of the area. The eastern edge of the area lies within the drainage basin of Muddy Creek, a southward-flowing, perennial stream with a gentler gradient. Throughout the potential RNA, low-gradient, first- and second-order streams form wetlands between the hills, and Muddy Creek forms a large wetland along the eastern boundary.

### GEOLOGY

The bedrock in the proposed RNA is mainly Precambrian granitic rock (chiefly granitic gneiss and granite) (Pierce and Nelson 1971). Quaternary moraine deposits and Quaternary alluvium occur along the

eastern boundary in the valley of Muddy Creek and in small areas (primarily wetlands) within the area.

## **SOILS**

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## **CLIMATE**

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## **DESCRIPTION OF VALUES**

### **VEGETATION**

The potential Lake Creek RNA illustrates clearly the vegetation mosaic that develops on glaciated granitic landscapes at higher elevations. Graminoid-dominated and shrub wetlands, some with rich moss ground-cover, have developed around kettle ponds and along flowing streams. These wetlands, and also many sparsely vegetated rock outcrops, are set in a matrix of subalpine forest dominated by lodgepole pine, Engelmann spruce, and subalpine fir.

### **FLORA**

#### Plant Species List

A list of 92 vascular plant species and mosses documented in the potential Lake Creek Research Natural Area is included in Appendix 1.

#### Rare Plants

No federally listed Threatened or Endangered plant species are known from the potential Lake Creek Research Natural Area. Five vascular plant species and one species of moss on the USDA Forest Service Region 2 Sensitive Species List (USDA Forest Service Rocky Mountain Region 2009) have been documented from the potential RNA, and three additional vascular plant species tracked by the Wyoming Natural Diversity Database as species of concern also are known from the area. The greatest concentration of sensitive species is found in a fen about 0.7 miles northeast of Lily Lake, referred to in this report as the Lily Lake East Fen. The status of each of the six species is briefly summarized below.

These are the six species on the USDA Forest Service Region 2 (R2) sensitive species list.

***Carex diandra*** (Lesser panicled sedge)

Heritage Rank: G5/S1S2

Federal Status: USDA Forest Service R2 Sensitive.

Geographic Range: Circumpolar; in North America it occurs from Newfoundland to Yukon south to New Jersey, Indiana, Colorado, and California. In Wyoming, it is known from the Absaroka, Bighorn, Beartooth, Medicine Bow, and Teton Mountains and from the Yellowstone Plateau.

Habitat: Fens and groundwater discharge areas around lakes and ponds at montane to subalpine elevations (Gage and Cooper 2006a). At the potential Lake Creek Research Natural Area, lesser panicled sedge grows on floating mats of *Sphagnum* at the edge of small pools in the Lily Lake East Fen.

Comments: A population of this species was discovered at the Lily Lake East Fen along the floating mat bordering pools by Fertig and Mellmann-Brown in 1996 (Fertig 1997).

***Drosera anglica*** (English sundew)

Heritage Rank: G5/S2.

Federal Status: USDA Forest Service R2 Sensitive.

Geographic Range: Eurasia and Alaska to California, in the Rockies south to Colorado, and east to the Great Lakes. In Wyoming, it is known from the Yellowstone Plateau, Jackson Hole, and Beartooth Mountains.

Habitat: Floating mats in fens at montane to subalpine elevations (Wolf *et al.* 2006). At the potential Lake Creek Research Natural Area, English sundew occurs on floating *Sphagnum* mats with *Carex diandra*, *C. limosa*, and *Potentilla palustris*.

Comments: Fertig and Mellmann-Brown observed 5,000-7,000 plants at a population in the Lily Lake East Fen (Fertig 1997). This species and its habitat are extremely sensitive to overharvest and trampling damage. Another large colony was discovered on a Muddy Creek tributary in the potential Lake Creek Research Natural Area by Sabine Mellmann-Brown in 2004.

***Eriophorum chamissonis*** (Chamisso's cottongrass)

Heritage Rank: G5/S2

Federal Status: USDA Forest Service R2 Sensitive.

Geographic Range: Circumboreal; eastern Siberia to Newfoundland, south to Minnesota, northern Wyoming, and Oregon. In Wyoming, it is known from the Yellowstone Plateau and Absaroka, Bighorn and Wind River Mountains.

Habitat: Saturated soils of montane fens (Decker *et al.* 2006).

Comments: A colony of this species was discovered in a *Sphagnum*-dominated corner of the Muddy Creek wetland complex within the potential RNA by Bonnie Heidel in 2006.

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

Heritage Rank: G5/S2

Federal Status: USDA Forest Service R2 Sensitive.

Geographic Range: Circumboreal; in North America, south to Pennsylvania, Iowa, Colorado, and California. In Wyoming, it is known from the Beartooth Mountains and Jackson Hole in Park and Teton Counties.

Habitat: Saturated or flooded soils of montane fens (Decker *et al.* 2006b).

Comments: Walt Fertig and Sabine Mellmann-Brown discovered a colony of this species in the Lily Lake East Fen in 1996 (Fertig 1997).

***Sphagnum angustifolium*** (Narrowleaf peatmoss)

Heritage Rank: G5/S1

Federal Status: USDA Forest Service R2 Sensitive.

Geographic Range: Circumboreal and in South America; in North America, from Alaska east to Newfoundland, south to Virginia and Colorado. In Wyoming, it is known only from the Beartooth Mountains.

Habitat: Floating mats in fens at montane to subalpine elevations.

Comments: The species was collected twice in 2002 at the Lily Lake East Fen by Booth and Zygmunt (2005) and separately by Heidel and Laursen (2003). It represents one of the habitat specialists among the rich bryophyte flora of the Beartooth Mountains (Kosovich-Anderson 2009). This is the only population known from Wyoming.

***Utricularia minor*** (Lesser bladderwort)

Heritage Rank: G5/S2

Federal Status: USDA Forest Service R2 Sensitive.

Geographic Range: Circumboreal, extending south in North America to California, Colorado, Indiana and New Jersey. In Wyoming, it is known from the Absaroka, Big Horn, Laramie, Medicine Bow and Wind River Mountains, the Yellowstone Plateau, and Jackson Hole.

Habitat: Submerged or floating in pools of fens at montane to subalpine elevations (Neid 2006).

Comments: A population of lesser bladderwort was first discovered in the Lily Lake East Fen by Heidel in 2009.

These three species are on the Wyoming Natural Diversity Database's list of plant species of concern.

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

Heritage Rank: G5/S3.

Federal Status: None.

Geographic Range: Labrador to Alaska south to Florida, Texas, Colorado, and northern California. In Wyoming, known from the Absaroka, Beartooth, Medicine Bow and Teton Mountains, the Black Hills, Jackson Hole, and the Yellowstone Plateau.

Habitat: Fen margins, shrub fens and wet spruce forest (Gage and Cooper 2006b). It occurs among isolated trees and outer margins of the Lake Creek East Fen.

Comments: Fertig and Mellmann-Brown discovered a population of bristly-stalk sedge in the potential Lake Cree Research Natural Area in 1996 at the Lily Lake East Fen (Fertig 1997).

***Carex limosa*** (Mud sedge)

Heritage Rank: G5/S3. Its tracking status may be reconsidered in future list updates.

Federal Status: None.

Geographic Range: Circumboreal; south in North America to the Great Lakes, Iowa, Wyoming, Utah, and California. In Wyoming, it occurs in the Bighorn, Absaroka, Wind River, Medicine Bow, Teton and Beartooth Mountains, the Sierra Madre, and the Yellowstone Plateau, in Big Horn, Carbon, Park, Sheridan, Sublette, and Teton Counties.

Habitat: Floating mats in fens at montane to alpine elevations (Gage and Cooper 2006c). Populations in the Lake Creek area occur on floating mats of *Sphagnum* and peat zones with *Carex aquatilis* and *C. buxbaumii*.

Comments: A large colony of several thousand plants was discovered in the potential Lake Creek Research Natural Area at the Lily Lake East Fen by Walt Fertig and Sabine Mellmann-Brown in 1996 (Fertig 1997). Another large colony was discovered on a Muddy Creek tributary in the potential RNA by Mellmann-Brown in 2004.

***Equisetum fluviatile*** (Water horsetail)

Heritage Rank: G5/S1.

Federal Status: None.

Geographic Range: Labrador to Alaska, south to Virginia, Illinois, northwestern Wyoming, northern Idaho, and Washington. In Wyoming, it is known from Jackson Hole, the Yellowstone Plateau, and Beartooth Mountains in Park and Teton Counties.

Habitat: Shallow water and muddy shores of small ponds. The Lake Creek potential RNA colony is found in dried ponds within an extensive sedge meadow dominated by *Carex utriculata* and *C. aquatilis*.

Comments: Fertig, Mellmann-Brown, and Houston discovered a small colony in the potential Lake Creek Research Natural Area along dried ponds bordering Muddy Creek in 1996 (Fertig 1997).

The potential Lake Creek RNA appears to include suitable habitat for four additional plant species of special concern that are known from wetlands near Lily Lake, Little Moose Lake, and Poke Lake, just outside the boundaries of the potential RNA (Mills and Fertig 1996; Fertig 1997, Heidel and Rodemaker 2008): *Juncus filiformis*, *Potamogeton amplifolius*, *P. praelongus*, and *Salix candida*.. These species may grow in the potential RNA as well.

## **FAUNA**

### Threatened, Endangered, and Sensitive Vertebrates

Grizzly bear (*Ursos arctos*).

The grizzly bear is listed as threatened under the provisions of the federal Endangered Species Act (USDI Fish and Wildlife Service, No date). The approximate distribution area of the bear in Wyoming, as mapped by the Wyoming Game and Fish Department, includes the potential Lake Creek RNA (Wyoming Game and Fish Department, No date). The potential RNA also lies within the Conservation Strategy Management Area for the Yellowstone Distinct Population Segment of the grizzly bear, and within the area occupied by bears in 2004 (USDI Fish and Wildlife Service, No date).

Gray wolf (*Canis lupus*).

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

### Animal Species List

*U.S. Forest Service staff will write this section.*

## **LANDS**

The potential Lake Creek RNA is National Forest System land and is surrounded by National Forest System land of the Clark's Fork Ranger District of the Shoshone National Forest. The potential RNA lies entirely within the Absaroka - Beartooth Wilderness Area.

## **IMPACTS AND POSSIBLE CONFLICTS**

### **MINERAL RESOURCES**

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### **GRAZING**

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### **TIMBER**

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### **WATERSHED VALUES**

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## **RECREATION VALUES**

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## **WILDLIFE AND PLANT VALUES**

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## **TRANSPORTATION VALUES**

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## **MANAGEMENT CONCERNS**

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## **FIGURES**

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

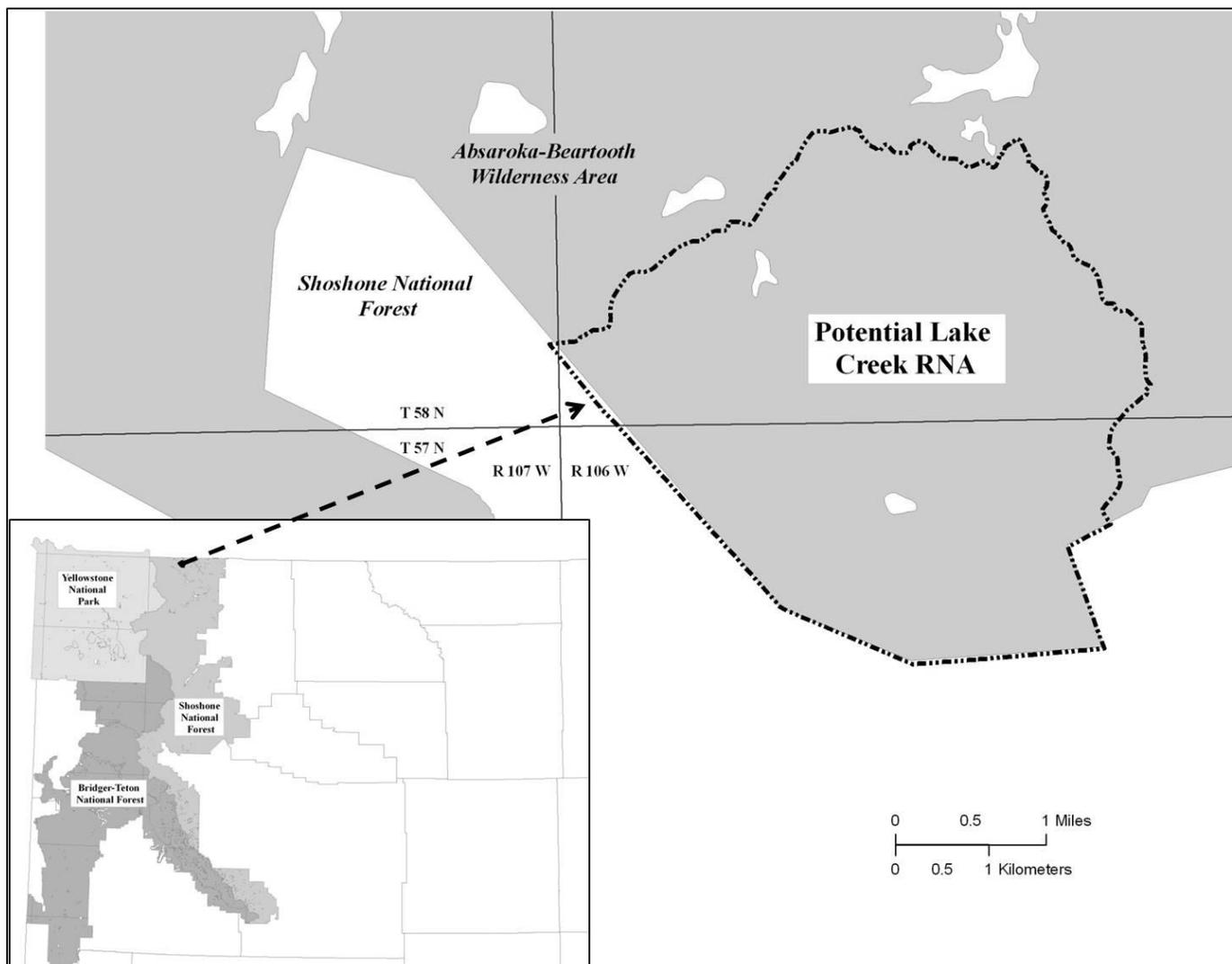


Figure 2. Proposed boundary of the potential Lake Creek Research Natural Area

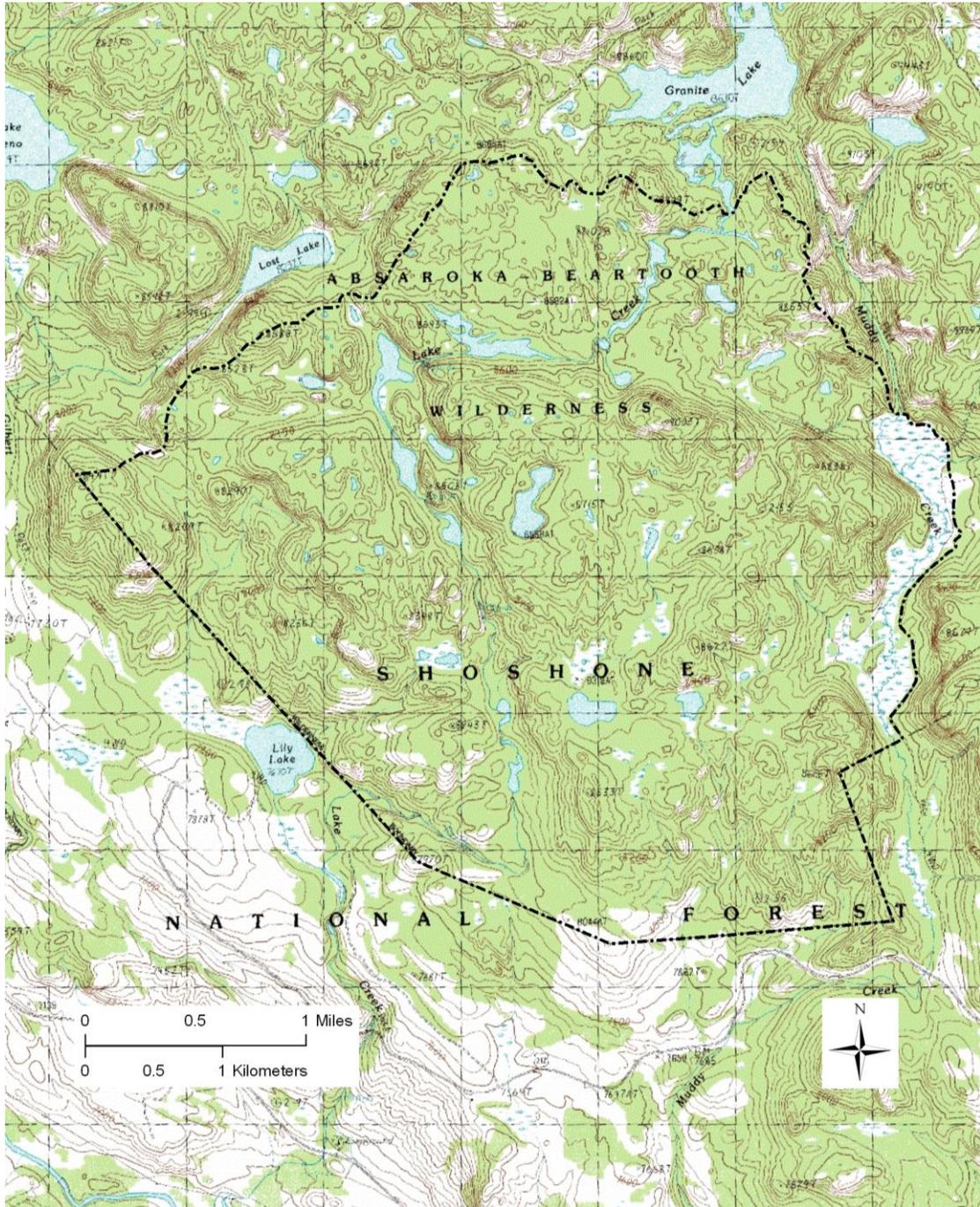


Figure 3. Complexes of plant associations in the potential Lake Creek Research Natural Area  
The plant associations present in each complex are listed in Table 1.

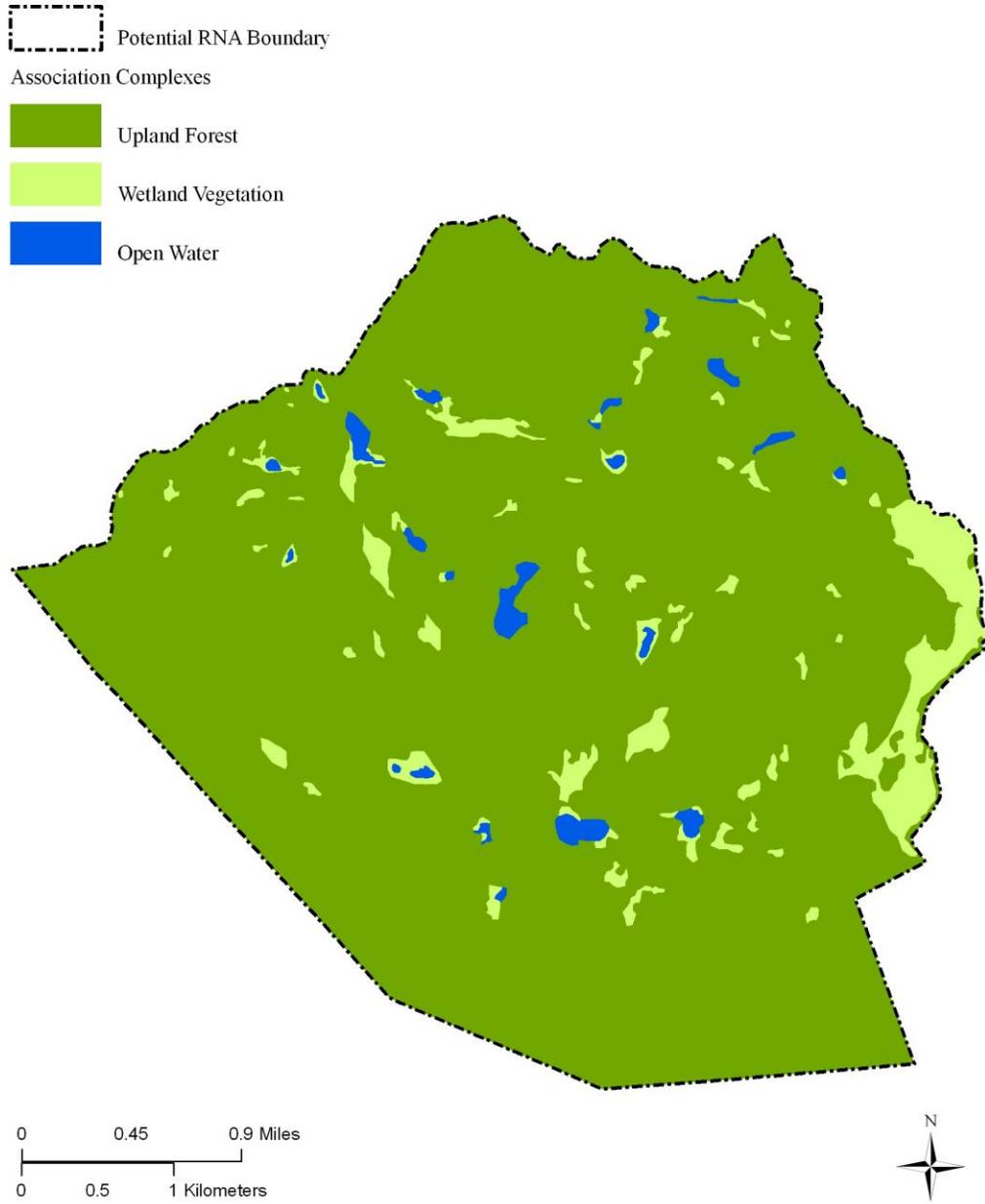


Figure 4. Kuchler vegetation types (Kuchler 1964) in the potential Lake Creek Research Natural Area. Areas of these types are listed in Table 2.

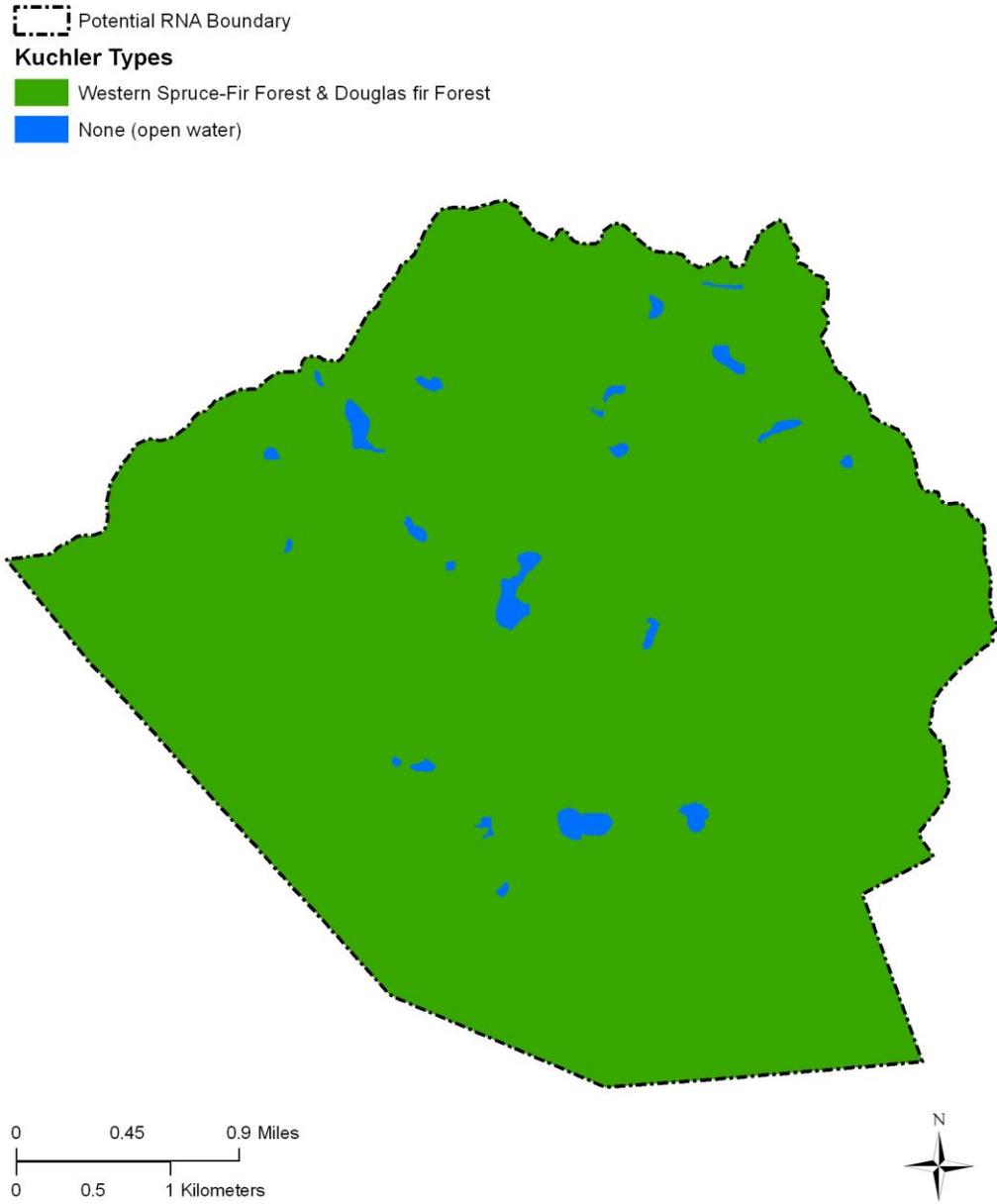


Figure 5. Habitat types in the potential Lake Creek Research Natural Area. The habitat types present in each part of the area are listed in Table 3.

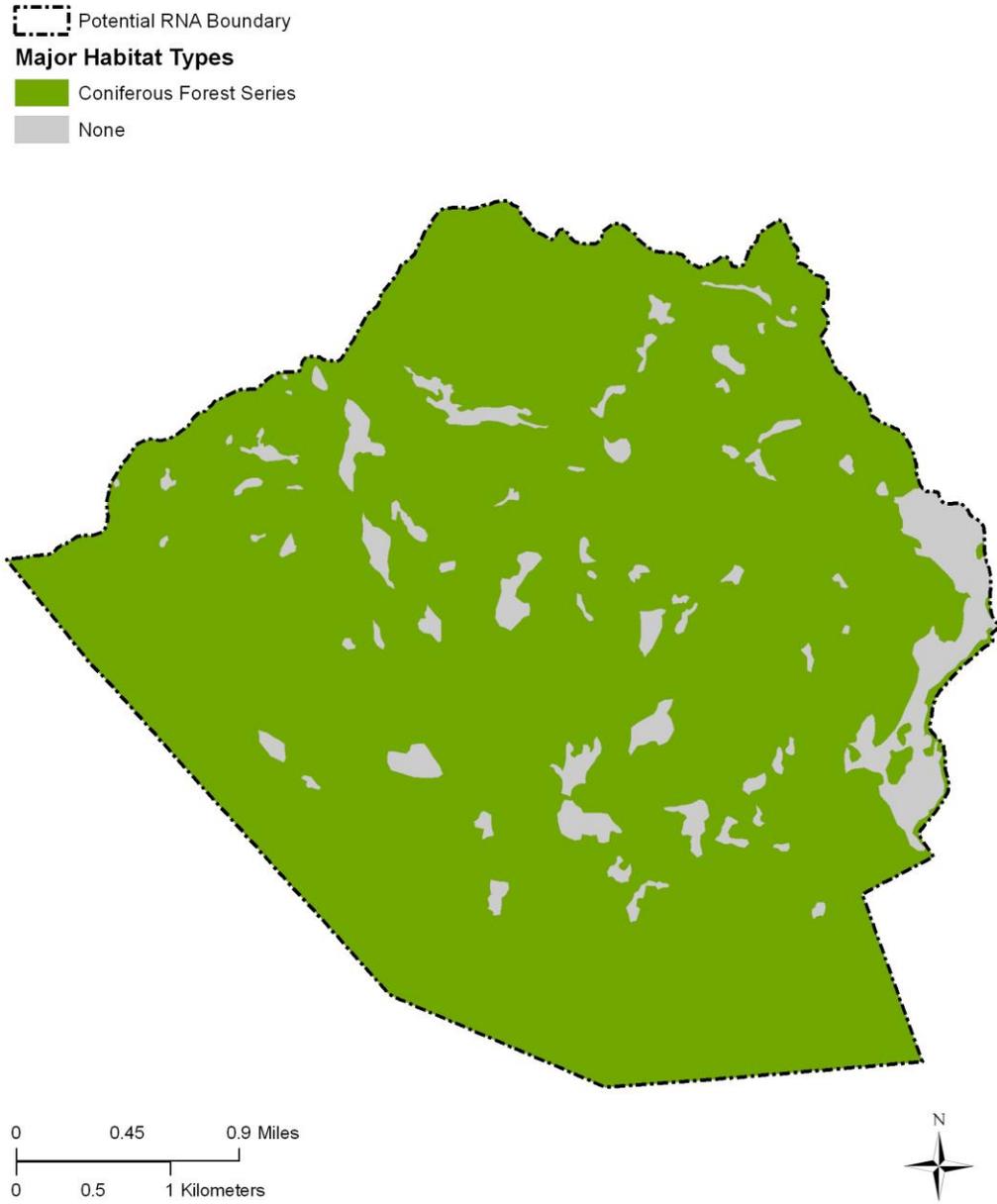


Figure 6. Society of American Foresters Forest Cover Types in the potential Lake Creek Research Natural Area. Individual types are listed in Table 4.

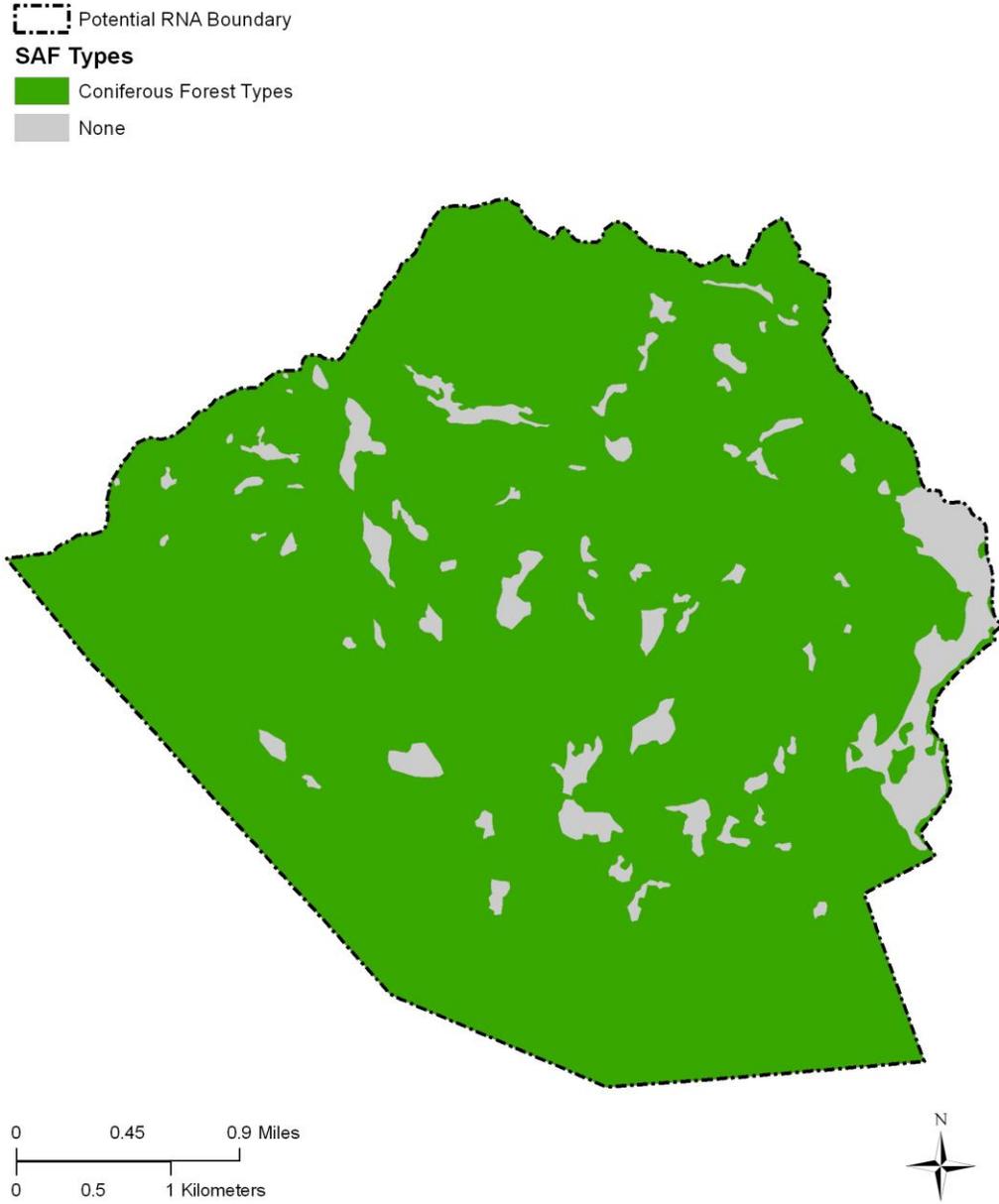


Figure 7. Ecological systems in the potential Lake Creek Research Natural Area. See following page for legend. Areas of these types are listed in Table 5

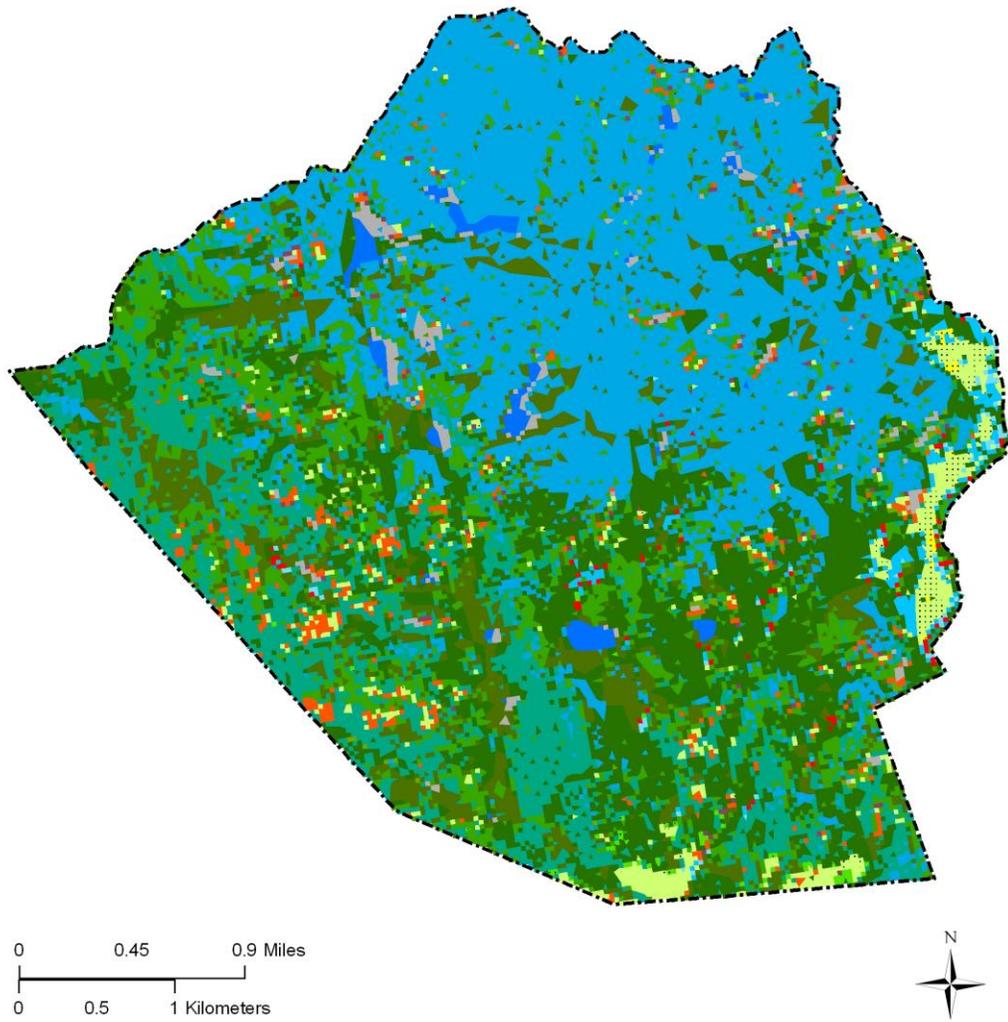


Figure 7 (continued). Legend for map of ecological systems in the potential Lake Creek Research Natural Area. System names are listed alphabetically in two groups. Systems in the first group (“Barren” through “Rocky Mountain Subalpine/Upper Montane Riparian Systems”) each cover  $\geq 1\%$  of the area; systems in the second group each cover  $<1\%$  of the area.



## **APPENDICES**

**APPENDIX 1. LIST OF PLANT SPECIES KNOWN FROM THE POTENTIAL LAKE CREEK RESEARCH NATURAL AREA.**

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

<b>PLANTS Accepted Scientific Name with Author</b>	<b>PLANTS Common Name</b>
<b>Trees</b>	
<i>Abies lasiocarpa</i> (Hook.) Nutt.	subalpine fir
<i>Picea engelmannii</i> Parry ex Engelm.	Engelmann spruce
<i>Picea glauca</i> (Moench) Voss	white spruce
<i>Pinus contorta</i> Douglas ex Louden var. <i>latifolia</i> Engelm. ex S. Watson	lodgepole pine
<b>Shrubs</b>	
<i>Alnus incana</i> (L.) Moench ssp. <i>tenuifolia</i> (Nutt.) Breitung	thinleaf alder
<i>Betula glandulosa</i> Michx.	resin birch
<i>Juniperus communis</i> L. var. <i>depressa</i> Pursh	common juniper
<i>Ledum glandulosum</i> Nutt.	western Labrador tea
<i>Lonicera involucrata</i> (Richardson) Banks ex Spreng.	twinberry honeysuckle
<i>Rosa acicularis</i> Lindl. ssp. <i>sayi</i> (Schwein.) W.H. Lewis	prickly rose
<i>Salix boothii</i> Dorn	Booth's willow
<i>Salix geyeriana</i> Andersson	Geyer willow
<i>Salix planifolia</i> Pursh	diamondleaf willow
<i>Salix wolfii</i> Bebb	Wolf's willow
<i>Shepherdia canadensis</i> (L.) Nutt.	russet buffaloberry
<i>Vaccinium membranaceum</i> Douglas ex Torr.	thinleaf huckleberry
<i>Vaccinium scoparium</i> Leiberg ex Coville	grouse whortleberry
<b>Forbs</b>	
<i>Agoseris lackschewitzii</i> Douglass M. Hend. & R. Moseley	Mill Creek agoseris
<i>Allium brevistylum</i> S. Watson	shortstyle onion
<i>Angelica</i> L.	angelica
<i>Antennaria anaphaloides</i> Rydb.	pearly pussytoes
<i>Chamerion angustifolium</i> (L.) Holub ssp. <i>angustifolium</i>	fireweed
<i>Comarum palustre</i> L.	purple marshlocks
<i>Drosera anglica</i> Huds.	English sundew
<i>Epilobium palustre</i> L.	marsh willowherb
<i>Eriophorum chamissonis</i> C.A. Mey.	Chamisso's cottongrass
<i>Eriophorum gracile</i> W.D.J. Koch	slender cottongrass
<i>Fragaria virginiana</i> Duchesne	Virginia strawberry
<i>Galium trifidum</i> L.	threepetal bedstraw
<i>Gentianopsis thermalis</i> (Kuntze) Iltis	Rocky Mountain fringed gentian
<i>Geranium richardsonii</i> Fisch. & Trautv.	Richardson's geranium
<i>Geum macrophyllum</i> Willd. var. <i>perincisum</i> (Rydb.) Raup	largeleaf avens
<i>Linnaea borealis</i> L.	twinflower
<i>Listera borealis</i> Morong	northern twayblade
<i>Maianthemum stellatum</i> (L.) Link	starry false lily of the valley
<i>Mentha arvensis</i> L.	wild mint

Appendix I (continued).

<b>PLANTS Accepted Scientific Name with Author</b>	<b>PLANTS Common Name</b>
<i>Menyanthes trifoliata</i> L.	buckbean
<i>Mitella</i> L.	miterwort
<i>Moneses uniflora</i> (L.) A. Gray	single delight
<i>Nuphar lutea</i> (L.) Sm. ssp. <i>polysepala</i> (Engelm.) E.O. Beal	Rocky Mountain pond-lily
<i>Packera streptanthifolia</i> (Greene) W.A. Weber & A. Löve	Rocky Mountain groundsel
<i>Packera subnuda</i> (DC.) D.K. Trock & T.M. Barkley	Buek's groundsel
<i>Parnassia fimbriata</i> K.D. Koenig	fringed grass of Parnassus
<i>Pedicularis groenlandica</i> Retz.	elephanthead lousewort
<i>Platanthera dilatata</i> (Pursh) Lindl. ex Beck var. <i>dilatata</i>	scentbottle
<i>Platanthera obtusata</i> (Banks ex Pursh) Lindl. ssp. <i>obtusata</i>	bluntleaved orchid
<i>Potentilla gracilis</i> Douglas ex Hook.	slender cinquefoil
<i>Pyrola asarifolia</i> Michx.	liverleaf wintergreen
<i>Spiranthes romanzoffiana</i> Cham.	hooded lady's tresses
<i>Stellaria longipes</i> Goldie	longstalk starwort
<i>Streptopus amplexifolius</i> (L.) DC.	claspleaf twistedstalk
<i>Symphotrichum foliaceum</i> (Lindl. ex DC.) G.L. Nesom var. <i>foliaceum</i>	Parry's aster
<i>Thalictrum</i> L.	meadow-rue
<i>Trollius laxus</i> Salisb. ssp. <i>albiflorus</i> (A. Gray) A. Love & D. Love & Kapoor	American globeflower
<i>Utricularia</i> L.	bladderwort
<i>Utricularia minor</i> L.	lesser bladderwort
<i>Viola</i> L.	violet
<b>Graminoids</b>	
<i>Bromus ciliatus</i> L.	fringed brome
<i>Calamagrostis canadensis</i> (Michx.) P. Beauv.	bluejoint
<i>Carex aquatilis</i> Wahlenb.	water sedge
<i>Carex aurea</i> Nutt.	golden sedge
<i>Carex buxbaumii</i> Wahlenb.	Buxbaum's sedge
<i>Carex canescens</i> L.	silvery sedge
<i>Carex diandra</i> Schrank	lesser panicled sedge
<i>Carex disperma</i> Dewey	softleaf sedge
<i>Carex gynocrates</i> Wormsk. ex Drejer	northern bog sedge
<i>Carex interior</i> L.H. Bailey	inland sedge
<i>Carex lasiocarpa</i> Ehrh.	woollyfruit sedge
<i>Carex leptalea</i> Wahlenb.	bristlystalked sedge
<i>Carex limosa</i> L.	mud sedge
<i>Carex praegracilis</i> W. Boott	clustered field sedge
<i>Carex saxatilis</i> L.	rock sedge
<i>Carex utriculata</i> Boott	Northwest Territory sedge
<i>Deschampsia cespitosa</i> (L.) P. Beauv.	tufted hairgrass
<i>Eleocharis</i> R. Br.	spikerush
<i>Eriophorum angustifolium</i> Honck. ssp. <i>angustifolium</i>	tall cottongrass

Appendix I (continued)

<b>PLANTS Accepted Scientific Name with Author</b>	<b>PLANTS Common Name</b>
Eriophorum gracile W.D.J. Koch	slender cottongrass
Glyceria borealis (Nash) Batchelder	small floating mannagrass
Glyceria striata (Lam.) Hitchc.	fowl mannagrass
Juncus mertensianus Bong.	Mertens' rush
Juncus tracyi Rydb.	Tracy's rush
Luzula parviflora (Ehrh.) Desv.	smallflowered woodrush
Pheum alpinum L.	alpine timothy
Poa palustris L.	fowl bluegrass
<b>Ferns</b>	
Equisetum arvense L.	field horsetail
Equisetum fluviatile L.	water horsetail
Equisetum hyemale L. var. affine (Engelm.) A.A. Eaton	scouringrush horsetail
Equisetum laevigatum A. Braun	smooth horsetail
Lycopodium annotinum L.	stiff clubmoss
Selaginella densa Rydb.	lesser spikemoss
<b>Mosses</b>	
Sphagnum angustifolium (C.E.O. Jensen ex Russow) C.E.O. Jensen	sphagnum

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

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

### Global Ranks

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

### State Ranks

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

### Migratory Ranks

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

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