

PLANTS AND VEGETATION OF THE  
POTENTIAL SWAMP LAKE SPECIAL INTEREST AREA  
WITHIN THE SHOSHONE NATIONAL FOREST,  
PARK COUNTY, WYOMING

Prepared for the

Shoshone National Forest, USDA Forest Service

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March, 2011

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## **INTRODUCTION**

This report presents information on the rare plants and the vegetation types in the potential Swamp Lake Special Interest Area (SIA). The information is arranged in the structure used in a special interest area establishment report, to allow its easy incorporation into an establishment report for Swamp Lake, should the area be designated as a special interest area.

Much of the information in this report is derived from an earlier report about Swamp Lake (Fertig and Jones 1992). The information from that earlier report has been updated in several ways. First, the proposed boundary of the potential SIA 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 SIA and outside it, has been included. This information may have changed our understanding of the distribution of some plants in the potential SIA, 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 earlier maps. Consequently, the area covered by each cover-type may have changed slightly.

## **LAND MANAGEMENT PLANNING**

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## **OBJECTIVES**

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## **PRINCIPAL DISTINGUISHING FEATURES**

The principal distinguishing feature of the potential Swamp Lake SIA is a wetland composed of areas fine-textured calcareous sediments (marl), floating vegetation mats, shallow water with emergent vegetation, and open water. This wetland contains an remarkably large number of regionally rare plant species.

## **LOCATION**

The potential Swamp Lake SIA is located within the Shoshone National Forest in northwestern Wyoming (Figure 1). The potential SIA includes parts of the following public land survey system sections (all on the 6th Principal Meridian): Township 56 North, Range 106 West, Sections 10, 11, 12, 13, 14, and 15.

## **BOUNDARY**

The boundary on the south side of the potential SIA follows a road that runs along the foot of the Cathedral Cliffs (Figure 2). On the north side, the eastern two-thirds of the boundary follows Wyoming

Highway 296, and the western third is drawn between that highway and a hill on the western side of the potential SIA. On the western end of the area, the boundary is drawn between two hilltops.

#### **AREA**

The area of the potential Swamp Lake SIA is 581 acres (235 ha).<sup>1</sup>

#### **ELEVATION**

The wetland in the potential Swamp Lake SIA lies at an elevation of 6,600 feet (2,005 meters). The highest point, at 6,918 feet (2,109 meters) is a hill at the western end of the area.

#### **ACCESS**

Wyoming Highway 296, which forms part of the northern boundary of the potential Swamp Lake SIA, provides access to virtually the entire area. The southern part of the area may be reached on foot, along the unpaved road that forms the area's southern boundary.

#### **ECOREGION**

The potential Swamp Lake SIA lies within the Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province, Yellowstone Highlands Section, Beartooth Mountains Subsection (M331Ah) of the ecoregion classification of Bailey *et al.* (1994) (Freeouf 1996).

#### **MAPS**

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

USDI Geological Survey 7.5 minute topographic Quadrangle Maps: Windy Mountain, Wyo.

#### **AREA BY COVER-TYPE**

Knowledge of the distributions of plant associations, habitat types, Kuchler vegetation types, and Society of American Foresters forest cover-types is based on field work conducted by several investigators at different times and reported in Fertig and Jones (1992). The earlier information has been revised with additional information gained from recent aerial photographs and from more detailed descriptions of 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 maps in the earlier report (Fertig and Jones 1992) 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.

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

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

Vegetation in the potential Swamp Lake SIA is classified into eight plant associations and one plant alliance (Table 1, Figure 3). *Typha (latifolia, angustifolia)* (cattail) herbaceous association and *Schoenoplectus acutus* (bulrush) herbaceous association constitute the emergent vegetation in deep water, and *Carex utriculata* herbaceous association is the emergent vegetation in shallow water. Vegetation on the marl deposits in the southern part of the area, and on some of the floating mats, is classified as the *Eleocharis rostellata* (spikerush) herbaceous vegetation, in which (in the potential SIA), *Eleocharis rostellata*, *Eleocharis pauciflora*, *Triglochin maritimum*, and *Scirpus pumilus* all are common plant species.. The *Carex simulata* herbaceous association also grows on floating mats. The forested wetland along the southern part of the area is a white spruce (*Picea glauca*) muskeg that may belong in the *Picea engelmannii* / *Calamagrostis canadensis* forest association. The unforested uplands surrounding the wetland support a mosaic of the *Festuca idahoensis-Pseudoroegneria spicata* (Idaho fescue-bluebunch wheatgrass) herbaceous association and the *Artemisia tridentata* ssp. *vaseyana* / *Festuca idahoensis* (mountain big sagebrush / Idaho fescue) shrub-herbaceous association. Stands of lodgepole pine growing on the granitic knobs in and around the potential SIA are classified into the general *Pinus contorta* plant alliance.

## KUCHLER VEGETATION TYPES

The wetlands in the potential Swamp Lake Special Interest Area are classified into Kuchler's (1964) Tule Marshes type (Table 2, Figure 4). All of the conifer forest seems to fit into the Western Spruce-Fir (*Picea-Abies*) type. In the unforested uplands, the grass vegetation is classified into the Foothills Prairie (*Agropyron-Festuca-Stipa*) type, and the sagebrush steppe into the Wheatgrass-Needlegrass Shrubsteppe (*Agropyron-Stipa-Artemisia*) type.

## HABITAT TYPES

Wetland vegetation is largely outside the scope of the habitat type classifications used on the Shoshone National Forest, so the wetland vegetation in the potential SIA is not classified by habitat type (Table 3, Figure 5). The upland vegetation in the potential SIA has not been characterized in detail, so it is assigned tentatively to habitat types. The lodgepole pine-dominated forests are assigned to the *Pinus contorta* Series, and the spruce forests to the *Abies lasiocarpa* Series (Steele *et al.* 1983). Species composition of the undergrowth in the forests is too poorly known to identify habitat types within those series. The grassland vegetation is assigned to the *Festuca idahoensis* / *Agropyron spicatum* Habitat Type, and the shrub steppe to the *Artemisia tridentata* ssp. *vaseyana* / *Festuca idahoensis* Habitat Type (Tweit and Houston 1980).

## SOCIETY OF AMERICAN FORESTERS COVER TYPES

This forested cover-type classification applies only to forest and woodland vegetation and so much of the potential SIA is unclassified (Figure 6, Table 4). The lodgepole pine-dominated stands on granitic knobs are placed into the Lodgepole pine (218) type or the Engelmann Spruce-Subalpine Fir (206) type, depending on the amount of spruce and fir growing in the overstory. The white spruce muskeg and the white spruce forest along the southern side of the area are tentatively classified into the White Spruce (201) cover type.

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

Table 1. Plant associations in the potential Swamp Lake Special Interest Area. See Figure 3. “M” in a cell indicates that a plant association or alliance is a major component of a complex, and “m” indicates that it is a minor component of the complex.

Plant Association or Alliance	Complexes of Plant Associations (and areas)							
	Open Water & Floating Mats (24 acres, 10 ha)	Cattail & Bulrush (147 acres, 60 ha)	Wet Sedge (32 acres, 13 ha)	Arrowgrass – Spikerush (54 acres, 22 ha)	White Spruce Muskeg (13 acres, 5 ha)	White Spruce Forests & Upland Meadow (31 acres, 13 ha)	Upland Herb & Shrub Vegetation (106 acres, 43 ha)	Upland Forest & Woodland (174 acres, 70 ha)
<b>Herbaceous Vegetation</b>								
<i>Typha (latifolia, angustifolia)</i> Western Herbaceous Vegetation	m	M	m	m				
<i>Schoenoplectus acutus</i> Herbaceous Vegetation	m	M	m	m				
<i>Carex utriculata</i> Herbaceous Vegetation	m	m	M	m				
<i>Carex simulata</i> Herbaceous Vegetation	m		m	m				
<i>Eleocharis rostellata</i> Herbaceous Vegetation		m	m	M	m			
<i>Festuca idahoensis</i> - <i>Pseudoroegneria spicata</i> Herbaceous Vegetation?							M	m
<b>Shrub Vegetation</b>								
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Festuca idahoensis</i> Shrub Herbaceous Vegetation							M	m
<b>Forest &amp; Woodland</b>								
<i>Picea engelmannii</i> / <i>Calamagrostis canadensis</i> Forest?					M	M		
<i>Pinus contorta</i> Alliance							m	M

Table 2. Kuchler vegetation types in the potential Swamp Lake Special Interest Area. See Figure 4.

Vegetation Type (Kuchler 1964)	Acres	Hectares
Tule marshes ( <i>Scirpus-Typha</i> )	257	104
Foothills prairie ( <i>Agropyron-Festuca-Stipa</i> ) & Wheatgrass-needlegrass shrubsteppe ( <i>Agropyron-Stipa-Artemisia</i> )	106	43
Western spruce-fir forest ( <i>Picea-Abies</i> )	218	88

Table 3. Occurrence of habitat types in the potential Swamp Lake Special Interest Area. See Figure 5. “M” in a cell indicates that a habitat type is a major component of a complex, and “m” indicates that it is a minor component of the complex.

Habitat Type	Complexes of Habitat Types and Community Types (and areas)	
	Grassland & Shrubland (106 acres, 43 ha)	Upland Conifers (174 acres, 70 ha)
<i>Festuca idahoensis</i> / <i>Agropyron spicatum</i> Habitat Type?	M	
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Festuca idahoensis</i> Habitat Type?	M	
<i>Pinus contorta</i> Series		M
<i>Abies lasiocarpa</i> Series?		M

Table 4. Society of American Foresters Cover Types in the potential Swamp Lake Special Interest Area. See Figure 6.

Cover Type (Eyre 1980)	Complex of Cover Types (and areas)	
	Upland Conifer (174 acres, 70 ha)	White Spruce (44 acres, 18 ha)
Lodgepole pine (218)	M	
Engelmann spruce-subalpine fir (206)	M	
White spruce (201)?		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 ecological systems in the potential Swamp Lake SIA. This figure was produced from data extracted from the nation-wide Landfire 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 SIA.

Forest and woodland systems are mapped over much of the potential SIA, including the wetland (Figure 7). The Middle Rocky Mountain Montane Douglas-fir Forest and Woodland system and the Rocky Mountain Lodgepole Pine Forest system are the predominant systems (Table 5). Researchers in the Landfire Project caution that the information from the project should be augmented with knowledge of local conditions ([http://www.landfire.gov/dp\\_quality\\_assessment.php](http://www.landfire.gov/dp_quality_assessment.php)), and information from the field surveys indicates that the Landfire Project has incorrectly mapped much of the potential Swamp Lake SIA. The extensive wetlands have been incorrectly mapped as forest or woodland, instead of a riparian or wetland systems. While Douglas-fir grows in the area and dominates overstories in stands around the potential SIA, it does not dominate the overstories within the boundaries of the potential SIA. Hence the forested part of the potential SIA likely should be largely as the Rocky Mountain Lodgepole Pine Forest System. These errors likely are consequences of the procedure used in producing the Landfire data-set, which used automatic classification of pixels on satellite images.

## **PHYSICAL AND CLIMATIC CONDITIONS**

### **PHYSICAL SETTING**

The potential Swamp Lake SIA lies in the valley of the Clark's Fork of the Yellowstone River, at the foot of the Cathedral Cliffs, which form the valley's south side. The landscape in the valley bottom, in and around the potential SIA, consists of smooth granitic knobs interspersed among ponds and wetlands lying in small basins in the bedrock. Local relief in the area is 350 to 400 feet (107 to 122 meters). Relief between the valley bottom and the top of the Cathedral Cliffs is over 1,600 feet (500 meters).

### **GEOLOGY**

Bedrock beneath the potential Swamp Lake SIA is Precambrian granitic rock (Love and Christiansen 1985) that has been shaped into knobs and depressions by glaciers. Quaternary glacial deposits mantle the bedrock in places, and Quaternary landslide deposits, colluvium, and alluvium reach into the southern side of the potential SIA from the Cathedral Cliffs immediately above. Those cliffs are formed in limestone and dolomite.

### **SOILS**

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

<b>Ecological System</b>	<b>Acres</b>	<b>Ha</b>
Developed-Open Space	13	5
Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland	14	6
Inter-Mountain Basins Montane Sagebrush Steppe	36	14
Middle Rocky Mountain Montane Douglas-fir Forest and Woodland	121	49
Northern Rocky Mountain Conifer Swamp	48	19
Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	22	9
Open Water	74	30
Rocky Mountain Aspen Forest and Woodland	40	16
Rocky Mountain Lodgepole Pine Forest	97	39
Rocky Mountain Montane Riparian Systems	9	3
Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland	9	4
Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland	8	3
Rocky Mountain Subalpine/Upper Montane Riparian Systems	64	26
Rocky Mountain Subalpine-Montane Mesic Meadow	15	6
<i>Agriculture-Pasture and Hay</i>	<i>1</i>	<i>0</i>
<i>Barren</i>	<i>4</i>	<i>2</i>
<i>Developed-Low Intensity</i>	<i>0</i>	<i>0</i>
<i>Inter-Mountain Basins Big Sagebrush Steppe</i>	<i>1</i>	<i>1</i>
<i>Inter-Mountain Basins Semi-Desert Shrub-Steppe</i>	<i>1</i>	<i>0</i>
<i>Introduced Upland Vegetation-Perennial Grassland and Forbland</i>	<i>2</i>	<i>1</i>
<i>Northern Rocky Mountain Lower Montane-Foothill-Valley Grassland</i>	<i>1</i>	<i>1</i>
<i>Northern Rocky Mountain Subalpine Deciduous Shrubland</i>	<i>0</i>	<i>0</i>
<i>Northern Rocky Mountain Subalpine-Upper Montane Grassland</i>	<i>1</i>	<i>1</i>
<i>Rocky Mountain Foothill Limber Pine-Juniper Woodland</i>	<i>0</i>	<i>0</i>
<i>Rocky Mountain Poor-Site Lodgepole Pine Forest</i>	<i>0</i>	<i>0</i>

## CLIMATE

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## DESCRIPTION OF VALUES

### VEGETATION

The wetland in the potential Swamp Lake Special Interest Area is a large example of a mix of environments, from deep open water, through shallow water, to floating mats, and saturated soils.

### FLORA

#### Plant Species List

A list of 231 vascular plant species documented in the potential Swamp Lake Special Interest Area is included in Appendix 1.

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

No federally listed Threatened or Endangered plant species are found in the potential Swamp Lake Botanical Interest Area. Eight USDA Forest Service Region 2 Sensitive plant species are known from the area, and Swamp Lake contains the greatest concentration of Sensitive plant species known in Wyoming. Twelve other plants listed as species of concern by the Wyoming Natural Diversity Database are also known from Swamp Lake Special Interest Area. Information about each is summarized below. The heritage ranks, assigned by the Wyoming Natural Diversity Database, are explained in Appendix 2.

#### ***Amerorchis rotundifolia*** (Round-leaved orchid)

Synonym: *Orchis rotundifolia*

Heritage Rank: G5/S1.

Federal Status: USDA Forest Service Region 2 Sensitive.

Geographic Range: Newfoundland to western Alaska and south to New York, Michigan, Minnesota, Montana, and Wyoming (Luer 1975). In Wyoming, it is known only from the Clark's Fork valley between the Beartooth and northern Absaroka Mountains.

Habitat: Mossy, moist seeps in spruce swamps, associated with white spruce and sedges (Fertig *et al.* 1994, Handley and Heidel 2004). Wyoming populations occur at elevations from 6,600 to 6,880 feet. At Swamp Lake, the orchids grow on moss-covered tops of woody lateral roots at the bases of large spruce trees.

Comments: Four patches of round-leaved orchid are known in the wet *Picea glauca* forests of the western and southern edges of the potential SIA (Fertig and Jones 1992). Numbers in each patch are low, with 2 to 7 flowering, fruiting, or vegetative individuals per tree, and the plants are widely dispersed. Population size was estimated at several hundred individuals in 1996.

#### ***Arctous rubra*** (Red manzanita)

Synonym: *Arctous alpina* var. *rubra*, *Arctostaphylos rubra*

Heritage Rank: G5/S1.

Federal Status: None.

Geographic Range: From eastern Siberia east to Newfoundland, extending southward in the Rocky Mountains to southern Alberta (Porsild and Cody 1980). This species is disjunct in the contiguous United States, occurring only at Swamp Lake (Evert *et al.* 1986).

Habitat: Red manzanita occurs in mossy places in open conifer woodlands and on peat soils (Porsild and Cody 1980). At Swamp Lake, it occurs primarily in open canopy *Picea glauca* muskeg, where it is often one of the dominant shrubs. Associated species include *Juniperus horizontalis*, *Betula glandulosa*, *Pentaphylloides floribunda*, *Lonicera involucrata*, *Salix candida*, and *S. planifolia*. This vegetation occurs along the *Picea glauca* swamp, around scattered trees, and in areas of marl and floating mat.

**Comments:** Red manzanita grows at seven locations in the potential SIA, mostly in the southeastern corner of the wetland (Fertig and Jones 1992). It used to grow at an eighth location that but was killed there by the 1988 fires that burned into the wetland.

***Botrychium virginianum*** (Rattlesnake fern)

**Heritage Rank:** G5/S3.

**Federal Status:** None.

**Geographic Range:** From southern Alaska east to Labrador, south to Oregon, Arizona, Texas, Kansas, and Florida. In Wyoming, it is known from the Black Hills and the Bighorn, Absaroka, and Teton Mountains in Crook, Park, Sheridan, and Teton Counties.

**Habitat:** Rattlesnake fern grows in moist, shaded areas, in gulch bottoms, the understories of spruce forests, and on limestone cliffs. Elevation ranges from 3,900-7,000 feet. At Swamp Lake, it has been collected in spruce forest around springs, associated with *Petasites sagittatus*, *Carex capillaris*, and *Linnaea borealis*.

**Comments:** Rattlesnake fern was originally collected at Swamp Lake in 1984 by Erwin Evert and has not been relocated.

***Carex concinna*** (Beautiful sedge)

**Heritage Rank:** G4G5/S1.

**Federal Status:** None.

**Geographic Range:** From Newfoundland west to Alaska and south to Quebec, Wisconsin, South Dakota, Colorado, and Oregon. In Wyoming, it is known from Yellowstone National Park, the western Wind River Mountains, and Swamp Lake.

**Habitat:** Beautiful sedge grows in woods or clearings in rich, peat soil, often in calcareous areas (Hermann 1970). At Swamp Lake it is found only on relatively dry, well-drained soils in deep shade associated with *Linnaea borealis*, *Equisetum arvense*, *Bromus carinatus*, *Erigeron peregrinus*, and various mosses (Fertig and Jones 1992).

**Comments:** Beautiful sedge is known from two small colonies in the *Picea glauca* forests of the southern boundary of the potential SIA (Fertig and Jones 1992).

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

**Heritage Rank:** G5/S2.

**Federal Status:** USDA Forest Service Region 2 Sensitive.

**Geographic Range:** Circumpolar; in North America it occurs from Newfoundland to the Yukon, south to New Jersey, Indiana, Colorado, and California. In Wyoming, lesser panicled sedge is known from the Absaroka, Beartooth, Medicine Bow, Teton, and Big Horn Mountains, from the Yellowstone Plateau, and from Jackson Hole, in Albany, Park, Sheridan, and Teton Counties.

**Habitat:** Fens and groundwater discharge areas around lakes and ponds (Gage and Cooper 2006a). At Swamp Lake, it grows on moist hummocks at the edge of *Triglochin-Eleocharis* marl vegetation and *Carex utriculata*-*C. aquatilis* marshland.

**Comments:** Lesser panicled sedge is locally abundant within the southeastern part of Swamp Lake. It may be more widespread in the area than 1992 survey results indicate because it is easily confused with the morphologically similar *C. simulata*, and was probably overlooked at many sites where the two species co-occur (Fertig and Jones 1992).

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

Heritage Rank: G5/S3

Federal Status: None.

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

Habitat: Fen margins, shrub fens and wet spruce forest (Gage and Cooper 2006b). At Swamp Lake, bristly-stalk sedge grows next to a colony of *Petasites sagittatus* at the edge of wet *Picea glauca* forest and open *Carex utriculata* marsh, and at the edge of muskeg. The sedge grows on mossy soil overlying woody lateral roots of spruce trees.

Comments: Bristly-stalk sedge is short and has fine leaves and is easily overlooked. Additional populations of bristly stalk sedge are likely to occur in the white spruce forests at the southern and western edge of the study area.

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

Heritage Rank: G5/S3

Federal Status: None.

Geographic Range: Circumboreal; in North America, south to the Great Lakes, Iowa, Wyoming, Utah, and California. In Wyoming, it is known from 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: Extremely rich to poor fens, often forming floating mats, or associated with floating mats of *Sphagnum* (Gage and Cooper 2006c). In Swamp Lake, it is most commonly found on hummocks in *Triglochin-Eleocharis* marl or on floating mats dominated by *Carex simulata* and *Menyanthes trifoliata*. Occasionally it is also found at the edge of *Picea glauca* muskeg. It is absent from the *Carex utriculata* marsh and *Picea glauca* forest.

Comments: Mud sedge is second only to *Salix candida* as the most widely-distributed species of concern within the Swamp Lake area, and is locally dominant or co-dominant.

***Carex livida*** (Livid sedge)

Heritage Rank: G5/S2.

Federal Status: USDA Forest Service Region 2 Sensitive.

Geographic Range: Circumpolar; in North America, from southern Alaska east to Newfoundland and south to northwestern California, Idaho, Montana, Michigan, and New Jersey (Hermann 1970). Disjunct populations also occur as far south in the Rocky Mountains as Colorado. In Wyoming, it is known from the Beartooth Mountains, eastern slope of the Wind River Mountains, and Yellowstone Plateau, in Fremont and Park Counties.

Habitat: Livid sedge grows in sphagnum-dominated fens and in extremely rich, calcareous fens. At Swamp Lake, it is restricted to moist hummocks in *Triglochin-Eleocharis* dominated marl or to floating mats dominated by *Carex simulata*. Livid sedge is often abundant, and the populations in the northern portion of the potential SIA tend to be larger than those in the southern half. Common associates include *Carex limosa*, *Eriophorum viridicarinatum*, *Salix candida*, *Symphyotrichum boreale*, and *Kobresia simpliciuscula*.

Comments: Robert Dorn was the first botanist to document livid sedge in Wyoming, at Swamp Lake in 1984. It has been found at five places within Swamp Lake (Fertig and Jones 1992).

***Carex microglochin*** (False uncinia sedge)

Heritage Rank: G5/S2

Federal Status: None

Geographic Range: Circumpolar; in North America, from Greenland west to Alaska, south to Alberta and Quebec. Disjunct populations occur in the Rocky Mountains in Montana, Wyoming, Colorado, and Utah (Hermann 1970; Evert *et al.* 1986). In Wyoming it is known from the Yellowstone Plateau and the northern Absaroka and Wind River Mountains, in Fremont, Park, and Sublette Counties.

Habitat: False uncinia sedge grows in moist, sunny, usually calcareous habitats, often at high elevations. At Swamp Lake, it is restricted to the margins of marl pools, to mounds in *Triglochin-Eleocharis* vegetation, and to floating mats dominated by *Carex simulata*. Associated species include *Scirpus pumilus*, *Primula egalikensis*, *C. limosa*, and *Kobresia simpliciuscula*.

Comments: Erwin Evert was the first botanist to document false uncinia sedge in Wyoming, at Swamp Lake in 1984. It has been found at 11 places within the potential SIA (Fertig and Jones 1992).

***Carex scirpoidea var. scirpiformis*** (Canadian single-spike sedge)

Accepted PLANTS Name: *Carex scirpoidea* Michx. ssp. *scirpoidea*

Heritage Rank: G5/S1

Federal Status: None

Geographic Range: From Manitoba to Alberta and south to North Dakota, Wyoming, and Utah (Hermann 1970). In Wyoming, it is known only from the potential Swamp Lake SIA and from Jackson Hole, in Park and Teton Counties.

Habitat: Canadian single-spike sedge grows in open, sunny sites, often at the edges of wet meadows, on calcareous substrates (Hermann 1970). At Swamp Lake, it grows on moist hummocks in *Triglochin-Eleocharis* marl, on floating mats of *Carex simulata* and *Calamagrostis inexpansa*., and at the edge of *Picea glauca* muskeg.

Comments: Erwin Evert was the first botanist to document Canadian single-spike sedge in Wyoming, at Swamp Lake in 1984. It has been found at four scattered places in the potential SIA (Fertig and Jones 1992). It is accepted as a valid species in the current state flora (Dorn 2001) but is treated as indistinct from *Carex scirpoidea* ssp. *scirpoidea* in the *Flora of North America*. It appears that there are distinguishing characteristics as well as habitat differences between *C. s.* ssp. *scirpoidea* and *C. s.* ssp. *scirpiformis* in Wyoming. It is known from only one other occurrence in the state.

***Eriophorum viridicarinatum*** (Green keeled cottongrass)

Heritage Rank: G5/S1

Federal Status: None

Geographic Range: From Newfoundland west to Alaska and south to New York, Michigan, Colorado, and northern Idaho (Hitchcock *et al.* 1969). In Wyoming, it is known only from Park and Teton Counties.

Habitat: Green keeled cotton-grass occurs in swamps and fens. At Swamp Lake, it grows mainly in association with *Arctous rubra* in *Picea glauca* muskeg and on hummocks in *Triglochin-Eleocharis* marl. It has also been found in flooded *Carex utriculata* marsh and on floating mats of *C. simulata*.

Comments: Green-keeled cotton-grass was first collected at Swamp Lake by Robert Dorn and Erwin Evert in 1984. It is one of the most conspicuous and easily recognized species at Swamp Lake, where it is known from ten places in the southern half of the potential SIA (Fertig and Jones 1992).

***Kobresia simpliciuscula*** (Simple kobresia)

Heritage Rank: G5/S1

Federal Status: None

Geographic Range: From Newfoundland, Quebec, and Alberta (Porsild and Cody 1980), south to the central Rocky Mountains in Montana, Wyoming, Utah, and Colorado. In Wyoming, it is known only from

Swamp Lake and from the Upper Green River Basin, in Park and Sublette Counties.

Habitat: Simple kobresia grows in bogs and fens in montane areas (Hitchcock *et al.* 1969). In Wyoming, it is known from extremely rich fens in the Clark's Fork Valley and in the Upper Green River Basin. At Swamp Lake, it is most abundant on floating mats where it can be a co-dominant with *Carex simulata*. Populations have also been found on marl hummocks and quaking ground associated with *Eleocharis* and *Triglochin*.

Comments: Erwin Evert was the first botanist to document simple kobresia in Wyoming, at Swamp Lake in 1984. It has been documented from six places in the potential SIA (Fertig and Jones 1992). Due to the large area covered by floating mats and marl substrate, and to the difficulty of distinguishing *Kobresia* in the field, it is likely that this species is more widespread within the study area than the 1992 survey revealed. It is known from only one other occurrence in the state.

***Muhlenbergia glomerata*** (Marsh muhly)

Heritage Rank: G5/S2

Federal Status: None

Geographic Range: From Newfoundland west to the southern Yukon Territory and south to West Virginia, Iowa, Colorado, and Nevada (Moss 1983). In Wyoming, it is known from the Black Hills, Big Horn and Medicine Bow Mountains, and Green River Basin, in Albany, Big Horn, Crook, Sheridan and Sublette Counties.

Habitat: Marsh muhly grows in bogs, peat meadows, and wet shores (Moss 1983). In Wyoming, most occurrences are in fens, but in the Black Hills it appears to occur in a much wider range of wetland habitats that approach upland conditions. At Swamp Lake, it is common on floating mats of *Carex simulata*, marl hummocks of *Triglochin-Eleocharis*, and adjacent to *Picea glauca* muskeg. Common associates include *Eriophorum viridicarinatum*, *Primula egaliksensis*, *Salix candida*, and *Carex limosa*.

Comments: Marsh muhly has been found at ten widely scattered places within the potential SIA (Fertig and Jones 1992).

***Packera indecora*** (Plains ragwort)

Heritage Rank: G5/S2

Federal Status: None

Geographic Range: From Yukon Territory, British Columbia and Alberta south to Washington, California, Idaho and Wyoming. In Wyoming, it is known from the Beartooth Mountains and Clark's Fork Valley in Park County.

Habitat: Fens, swamps, river bars, wetland draw-down zones, shallow marshes, and beaver dams. At Swamp Lake, it is uncommon at the margins with upland habitat and in a shallow marsh directly connected to the main wetland, where the water table drops below the surface by late in the growing season.

Comments: Plains ragwort was first collected at Swamp Lake in 2007 by Bonnie Heidel and is found in small numbers at two places within the potential SIA.

***Primula egaliksensis*** (Greenland primrose)

Heritage Rank: G5/S1

Federal Status: USFS Region 2 Sensitive

Geographic Range: Circumboreal across northern Canada, Greenland, Alaska, and northeastern Asia. Disjunct populations are known from Wyoming and Colorado (Kelso 1991). In Wyoming, it is known from Swamp Lake and one other occurrence on the west slope of the Wind River Range, in Park and Fremont Counties.

Habitat: Greenland primrose grows in wet meadows along streams and in calcareous montane fens. At Swamp Lake, the largest colonies occur on moist marl hummocks dominated by *Eleocharis* and *Triglochin*. It is much rarer on floating mats of *Carex simulata* and absent from all other vegetation types.

Common associates include *Carex microglochin*, *C. limosa*, and *Muhlenbergia glomerata*.

Comments: Erwin Evert was the first botanist to document Greenland primrose in Wyoming, at Swamp Lake in 1984. Greenland primrose has been found at 14 places in Swamp Lake (Fertig and Jones 1992). It is known from only one other occurrence in Wyoming.

***Salix candida* (Hoary willow)**

Heritage Rank: G5/S2

Federal Status: USFS Region 2 Sensitive

Geographic Range: From Labrador west to Alaska and south to the Great Lakes states, South Dakota, Colorado, and Idaho (Hitchcock and Cronquist 1964). In Wyoming, it is known from the Absaroka, Beartooth, Laramie, Medicine Bow and Wind River Mountains, Yellowstone Plateau, and upper Green River Basin, in Albany, Fremont, Park, Sublette and Teton Counties.

Habitat: Moss (1983) describes the habitat of this willow as river floodplains, fens, marl bogs, and meadows. In the Rocky Mountains, it grows in fens (Decker 2006). At Swamp Lake, hoary willow is most abundant on floating mats of *Carex simulata* and on marl hummocks dominated by *Eleocharis* and *Triglochin*. Small colonies may also be found in *Carex utriculata* marshes, *Alnus* woodlands, *Picea glauca* muskeg, and occasionally at the edge of *Picea glauca* swamp forest. At most sites it is the dominant (and usually only) shrub species.

Comment: Hoary willow is common throughout most of the potential SIA and in nearly every wetland vegetation type, and is the most widespread of the species of concern.

***Salix myrtilifolia* (Myrtleleaf willow)**

Heritage Rank: G5/S1

Federal Status: USFS Region 2 Sensitive

Geographic Range: From Alaska east to Newfoundland, south to southern Alberta and Manitoba. Two disjunct populations occur in Wyoming and Colorado. In Wyoming, it is only known from Swamp Lake.

Habitat: Myrtleleaf willow grows on lake and stream banks, in floodplain thickets, muskegs, marl bogs, and moist coniferous forests (Moss 1983). At Swamp Lake, it grows in the wet, shady understory of the *Picea glauca* forest with *Carex utriculata*, *C. aquatilis*, *Glyceria striata*, *Salix boothii*, *S. pseudomonticola*, and *S. wolfii*.

Comments: Erwin Evert was the first botanist to document myrtleleaf willow in Wyoming, at Swamp Lake in 1984. It is known from three places in the Swamp Lake wetland, all in *Picea glauca* forest along the southern edge of the potential SIA (Fertig and Jones 1992). Due to the difficulty in distinguishing this species from other willows, no population estimates were made. A fourth local in the western part of the potential SIA, described by Evert *et al.* (1986), could not be relocated in 1992. The entire known population of *Salix myrtilifolia* at Swamp Lake consists of pistillate plants. Without staminate plants, this population is incapable of reproducing sexually. Continued searches should be made to locate staminate plants in the area. Although it can reproduce asexually, the long-term survival of myrtleleaf willow at Swamp Lake may depend on the establishment of a viable, sexually reproducing population.

***Sparganium natans* (Small bur-reed)**

Synonym: *Sparganium minimum*

Heritage Rank: G5/S2

Federal Status: None

Geographic Range: Circumboreal; in North America, south to Oregon, New Mexico, Indiana, and Pennsylvania. In Wyoming, the species is known from the Yellowstone Plateau, Jackson Hole, and Absaroka, Wind River, and Medicine Bow Mountains, in Carbon, Fremont, Park, and Teton Counties.

Habitat: Small bur-reed grows in shallow water of montane lakes, pools and fens, or rooted in wet mud.

Comments:

***Trichophorum pumilum*** (Pygmy bulrush)

Synonym: *Scirpus pumilus*

Heritage Rank: G5/S1

Federal Status: USFS Region 2 Sensitive

Geographic Range: Circumboreal, with disjunct populations in Wyoming, Colorado, Montana, and California (Hitchcock and Cronquist 1973; Evert *et al* 1986). In Wyoming, it is known from the Medicine Bow and Northern Gros Ventre Mountains, Jackson Hole, Upper Green River Basin, and Swamp Lake, in Albany, Park, Sublette and Teton Counties.

Habitat: Pygmy bulrush grows in mountain meadows and calcareous montane bogs. At Swamp Lake, it is found on shallowly flooded marl deposits with *Carex microglochin*, on marl-rich hummocks dominated by *Triglochin* and *Eleocharis*, and at the edge of wet *Picea glauca* muskeg.

Comments: Robert Dorn was the first botanist to document pygmy bulrush in Wyoming, at Swamp Lake in 1984. It is known from only three places in the southern half of the potential SIA (Fertig and Jones 1992). Where it occurs, pygmy bulrush is often abundant. It may be more widespread within the study area, but due to its diminutive size it is easily overlooked.

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

Heritage Rank: G5/S2

Federal Status: USFS Region 2 Sensitive

Geographic Range: Circumboreal, in North America extending south to California, Colorado, Indiana and New Jersey. In Wyoming, known from the Yellowstone Plateau, Jackson Hole, Laramie Valley, and the Bighorn, Absaroka, and Laramie Mountains, in Albany, Park, Teton, and Washakie Counties.

Habitat: In the Rocky Mountain Region, lesser bladderwort is generally found in montane fens or in small seeps at higher elevations (Neid 2006). At Swamp Lake, it is found in marl pools in the southeastern end, where patterned fen mounds are dominated by *Triglochin* and *Eleocharis*.

Comments: Walter Fertig was the first botanist to document lesser bladderwort at Swamp Lake in 1996. At Swamp Lake, it often grows encased in calcium bicarbonate or in dense of *Chara* spp., both of which may obscure it.

## 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 Swamp Lake SIA (Wyoming Game and Fish Department, No date). The potential SIA also lies within the Conservation Strategy Management Area for the Greater Yellowstone Distinct Population Segment of the grizzly bear (USDI Fish and Wildlife Service, No date).

Gray wolf (*Canis lupus*).

The potential Swamp Lake SIA is within the Greater Yellowstone Recovery Area for the Northern Rocky Mountain Distinct Population Segment of the gray wolf (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**

Lands within and surrounding the potential Swamp Lake SIA are National Forest System lands, administered by the Clark's Fork Ranger District of the Shoshone National Forest.

## **IMPACTS AND POSSIBLE CONFLICTS**

### **MINERAL RESOURCES**

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

### **GRAZING**

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

### **TIMBER**

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

### **WATERSHED VALUES**

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

### **RECREATION VALUES**

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

### **WILDLIFE AND PLANT VALUES**

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

### **TRANSPORTATION VALUES**

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

## **MANAGEMENT CONCERNS**

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

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## FIGURES

Figure 1. Location of the potential Swamp Lake Special Interest Area.  
The inset map shows position of the potential SIA within the Shoshone National Forest and the State of Wyoming.

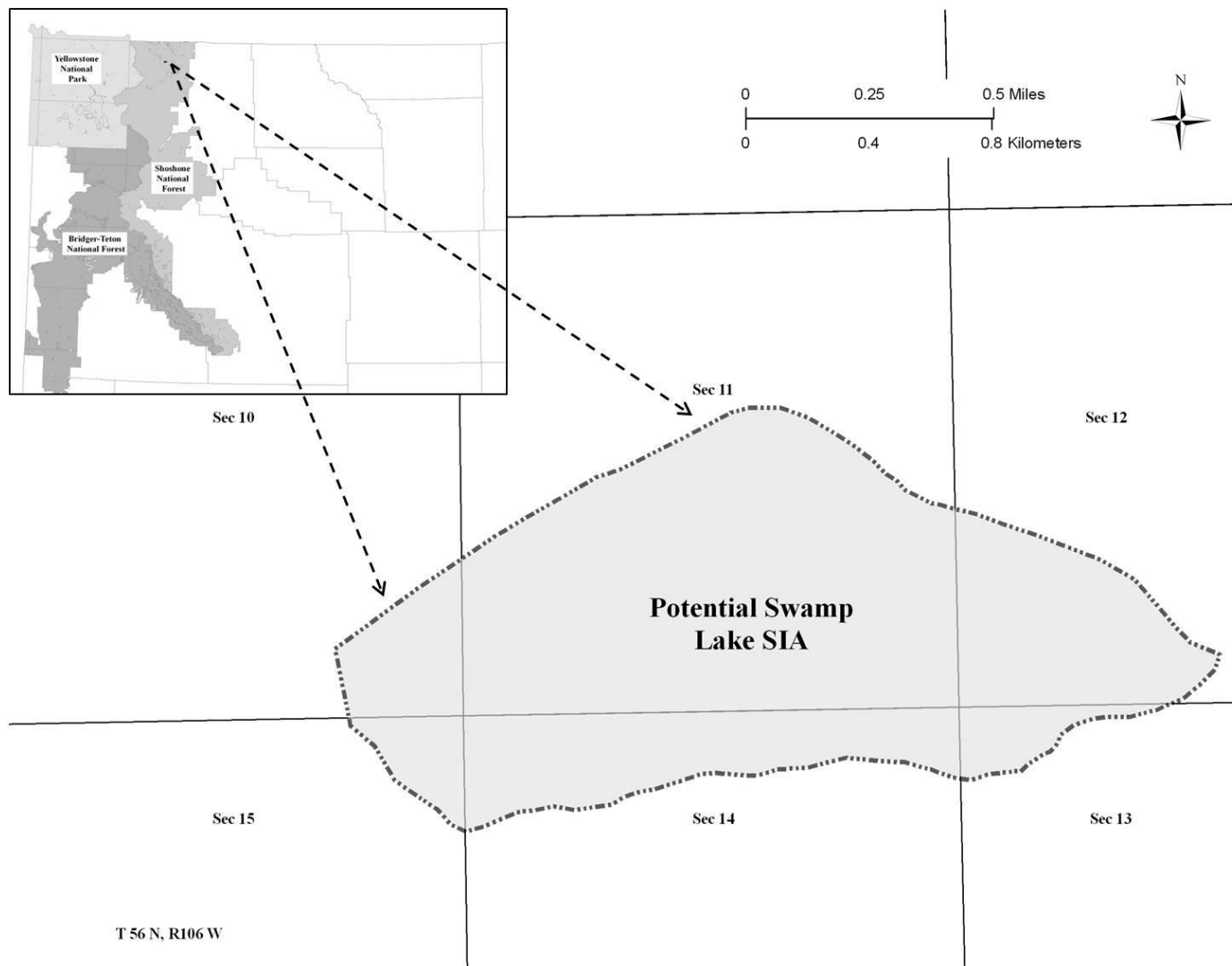




Figure 3. Complexes of plant associations in the potential Swamp Lake Special Interest Area  
 The plant associations present in each complex are listed in Table 1.

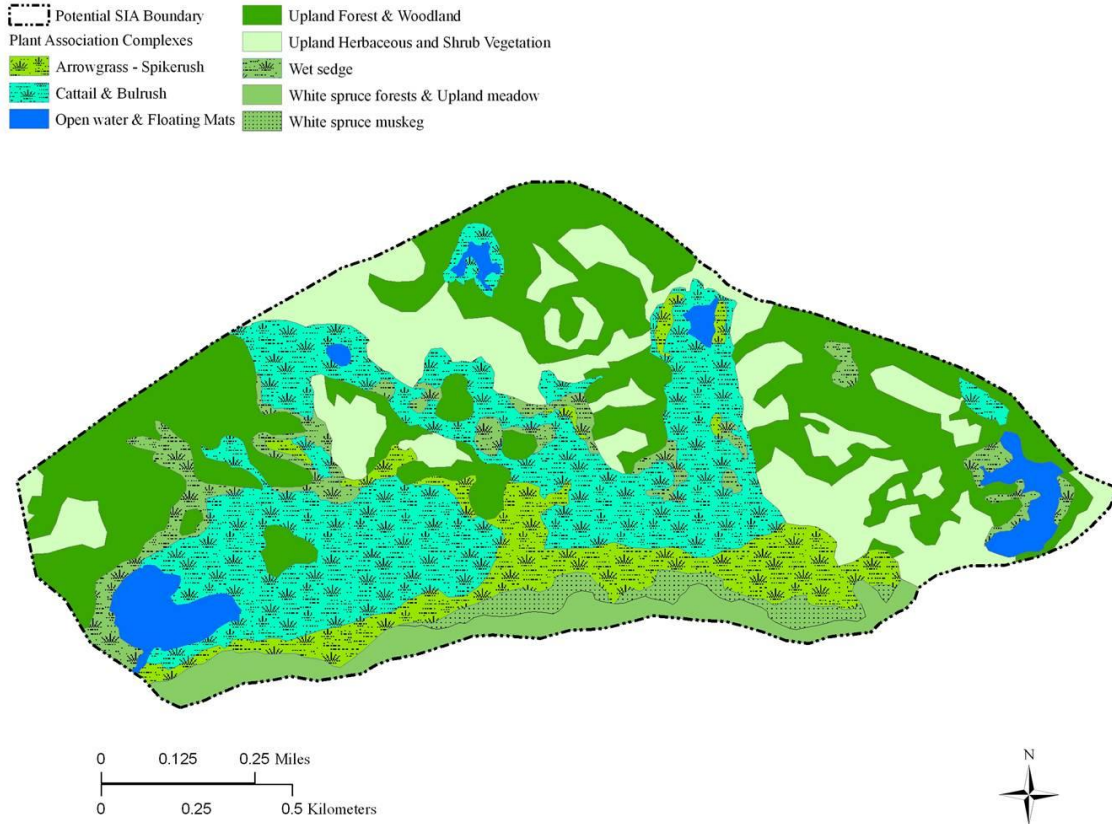


Figure 4. Kuchler vegetation types (Kuchler 1964) in the potential Swamp Lake Special Interest Area. Areas of these types are listed in Table 2.

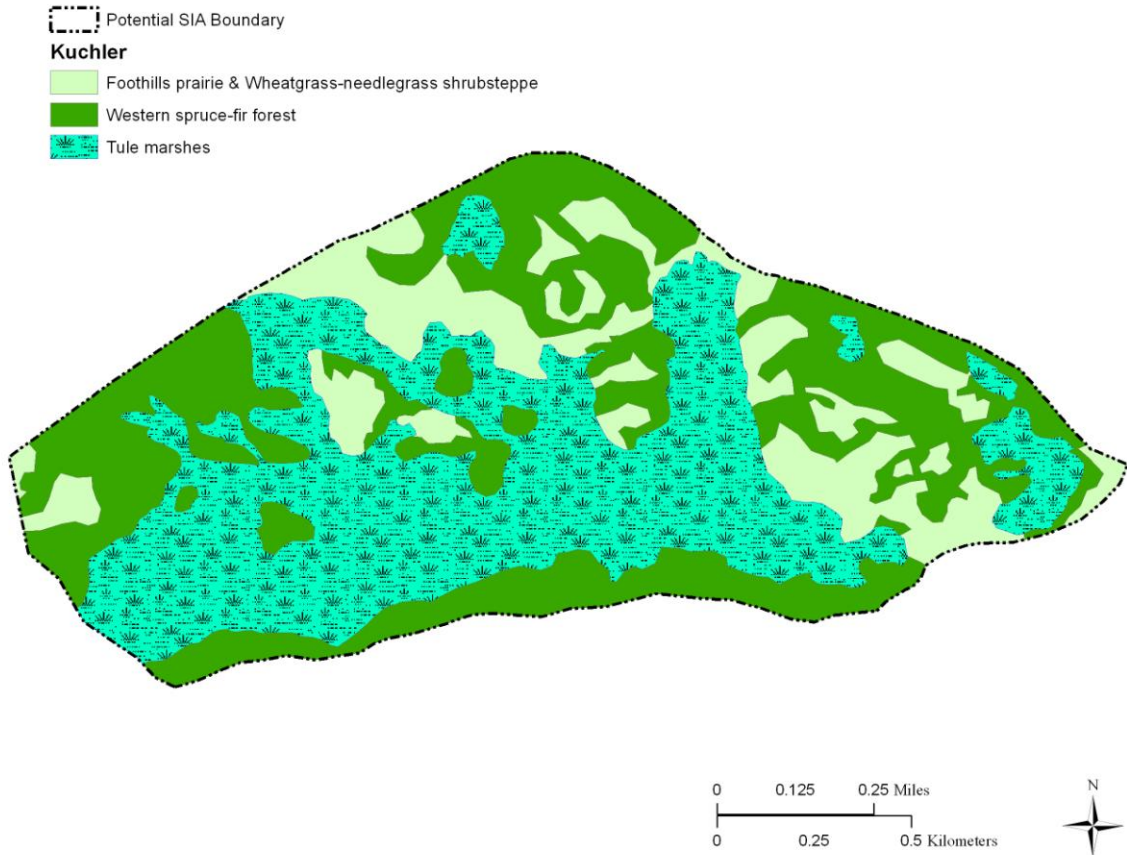




Figure 5. Habitat types in the potential Swamp Lake Special Interest Area. Each map unit is named for the dominant habitat type present. Other habitat types in the map units are listed in Table 3.

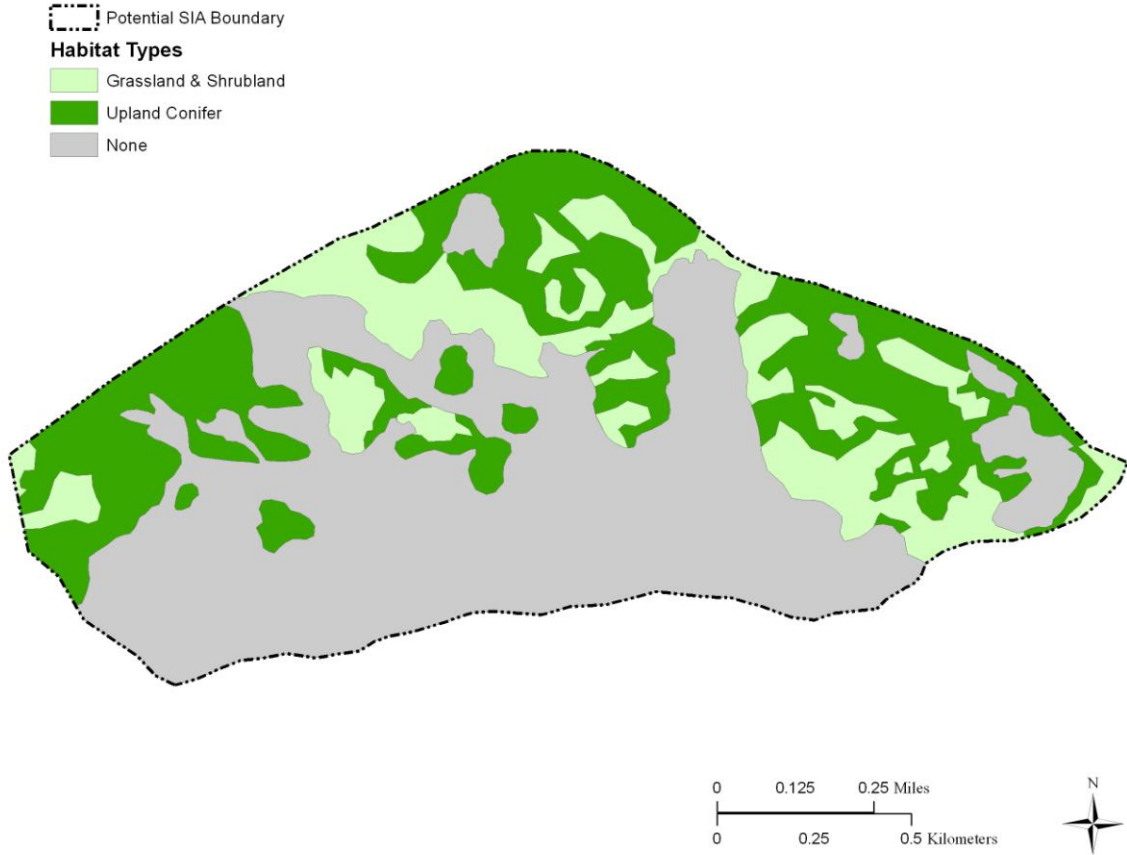


Figure 6. Society of American Foresters Cover Type (Eyre 1980) in the potential Swamp Lake Special Interest Area. The area of this type is shown in Table 4.

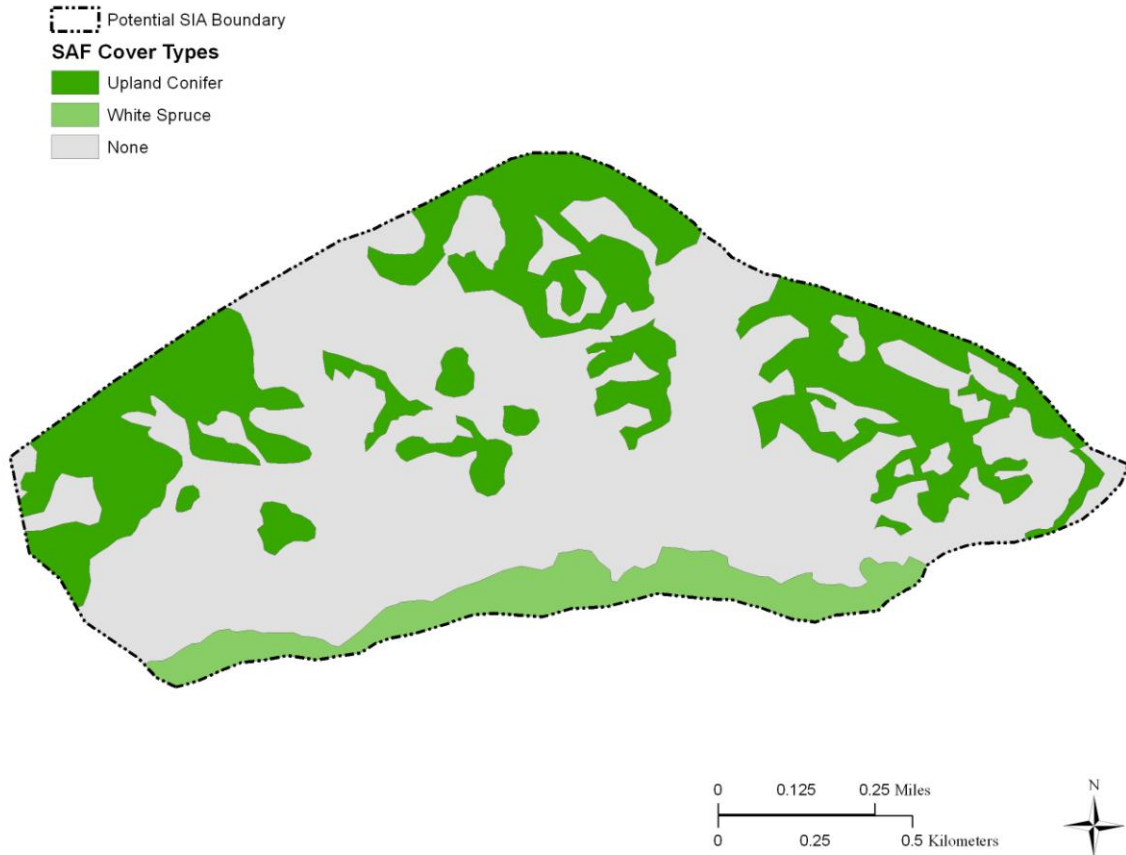


Figure 7. Ecological systems in the potential Swamp Lake Special Interest Area. See following page for legend. Areas of these types are listed in Table 5.

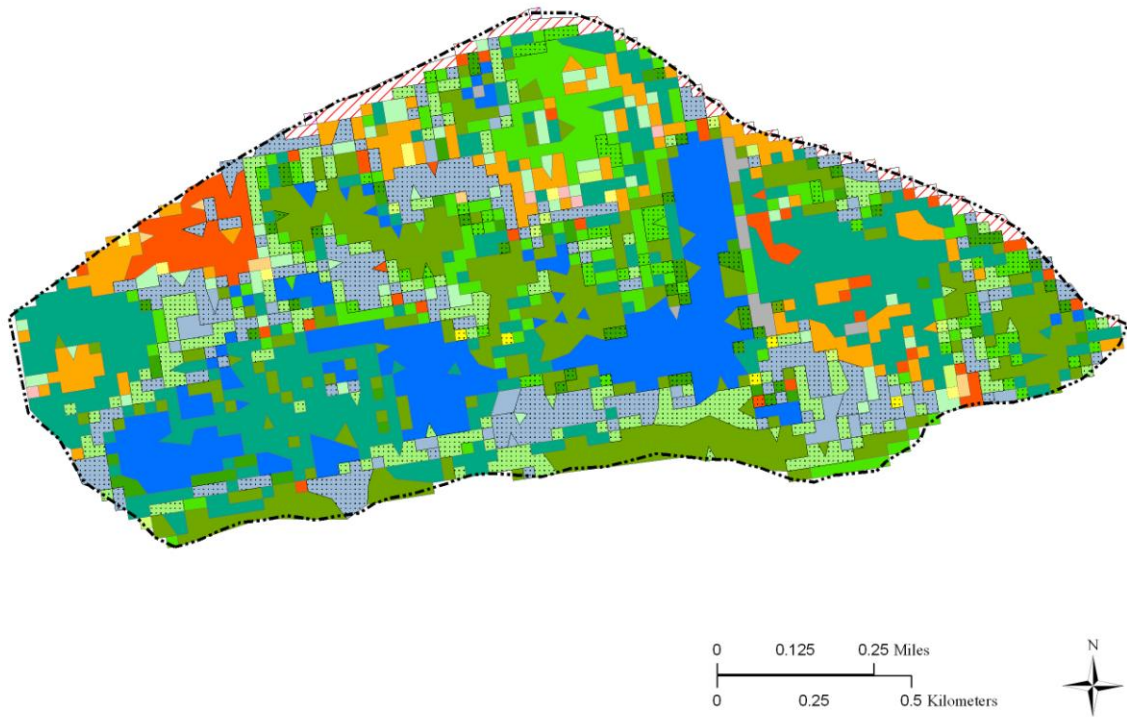


Figure 7 (continued). Legend for map of ecological systems in the potential Swamp Lake Special Interest Area.

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



## **APPENDICES**

**APPENDIX 1. VASCULAR PLANT SPECIES DOCUMENTED IN THE POTENTIAL SWAMP LAKE SPECIAL INTEREST AREA.**

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

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<b>Trees</b>	
<i>Abies lasiocarpa</i> (Hook.) Nutt.	subalpine fir
<i>Picea engelmannii</i> Parry ex Engelm.	Engelmann spruce
<i>Picea glauca</i> (Moench) Voss	white spruce
<i>Pinus contorta</i> Douglas ex Louden var. <i>latifolia</i> Engelm. ex S. Watson	lodgepole pine
<i>Pinus flexilis</i> James	limber pine
<i>Populus tremuloides</i> Michx.	quaking aspen
<i>Pseudotsuga menziesii</i> (Mirb.) Franco var. <i>glauca</i> (Beissn.) Franco	Rocky Mountain Douglas-fir
<b>Shrubs</b>	
<i>Acer glabrum</i> Torr.	Rocky Mountain maple
<i>Alnus incana</i> (L.) Moench ssp. <i>tenuifolia</i> (Nutt.) Breitung	thinleaf alder
<i>Arctostaphylos rubra</i> (Rehder & Wilson) Fernald	red fruit bearberry
<i>Arctostaphylos uva-ursi</i> (L.) Spreng.	kinnikinnick
<i>Artemisia tridentata</i> Nutt. ssp. <i>vaseyana</i> (Rydb.) Beetle	mountain big sagebrush
<i>Artemisia tridentata</i> Nutt. ssp. <i>vaseyana</i> (Rydb.) Beetle	mountain big sagebrush
<i>Betula glandulosa</i> Michx.	resin birch
<i>Chrysothamnus viscidiflorus</i> (Hook.) Nutt.	yellow rabbitbrush
<i>Cornus sericea</i> L.	redosier dogwood
<i>Dasiphora fruticosa</i> (L.) Rydb. ssp. <i>floribunda</i> (Pursh) Kartesz	shrubby cinquefoil
<i>Ericameria nauseosa</i> (Pall. ex Pursh) G.L. Nesom & Baird	rubber rabbitbrush
<i>Juniperus communis</i> L. var. <i>depressa</i> Pursh	common juniper
<i>Juniperus horizontalis</i> Moench	creeping juniper
<i>Lonicera involucrata</i> (Richardson) Banks ex Spreng.	twinberry honeysuckle
<i>Mahonia repens</i> (Lindl.) G. Don	creeping barberry
<i>Ribes cereum</i> Douglas var. <i>pedicellare</i> W.H. Brewer & S. Watson	whisky currant
<i>Rosa woodsii</i> Lindl.	Woods' rose
<i>Rubus idaeus</i> L. ssp. <i>strigosus</i> (Michx.) Focke	grayleaf red raspberry
<i>Rubus parviflorus</i> Nutt.	thimbleberry
<i>Salix bebbiana</i> Sarg.	Bebb willow
<i>Salix boothii</i> Dorn	Booth's willow
<i>Salix brachycarpa</i> Nutt.	shortfruit willow
<i>Salix candida</i> Flueggé ex Willd.	sageleaf willow
<i>Salix geyeriana</i> Andersson	Geyer willow
<i>Salix interior</i> Rowlee	sandbar willow
<i>Salix myrtilifolia</i> Andersson	blueberry willow
<i>Salix planifolia</i> Pursh	diamondleaf willow
<i>Salix pseudomonticola</i> C.R. Ball	false mountain willow
<i>Salix wolfii</i> Bebb	Wolf's willow
<i>Sambucus racemosa</i> L. var. <i>melanocarpa</i> (A. Gray) McMinn	Rocky Mountain elder
<i>Shepherdia canadensis</i> (L.) Nutt.	russet buffaloberry

Appendix 1 (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Sorbus scopulina</i> Greene var. <i>scopulina</i>	Greene's mountain ash
<i>Spiraea betulifolia</i> Pall. var. <i>lucida</i> (Douglas ex Greene) C.L. Hitchc.	shinyleaf spirea
<i>Symphoricarpos albus</i> (L.) S.F. Blake	common snowberry
<b>Forbs</b>	
<i>Achillea millefolium</i> L. var. <i>occidentalis</i> DC.	western yarrow
<i>Actaea rubra</i> (Aiton) Willd.	red baneberry
<i>Allium brevistylum</i> S. Watson	shortstyle onion
<i>Allium cernuum</i> Roth	nodding onion
<i>Amerorchis rotundifolia</i> (Banks ex Pursh) Hultén	roundleaf orchid
<i>Anaphalis margaritacea</i> (L.) Benth.	western pearly everlasting
<i>Anemone multifida</i> Poir. var. <i>multifida</i>	Pacific anemone
<i>Anemone parviflora</i> Michx.	smallflowered anemone
<i>Angelica arguta</i> Nutt.	Lyall's angelica
<i>Antennaria microphylla</i> Rydb.	littleleaf pussytoes
<i>Antennaria pulcherrima</i> (Hook.) Greene	showy pussytoes
<i>Aquilegia coerulea</i> James	Colorado blue columbine
<i>Arabis holboellii</i> Hornem. var. <i>pinetorum</i> (Tidestr.) Rollins	Holboell's rockcress
<i>Arceuthobium americanum</i> Nutt. ex Engelm.	American dwarf mistletoe
<i>Artemisia ludoviciana</i> Nutt.	white sagebrush
<i>Astragalus eucosmus</i> B.L. Rob.	elegant milkvetch
<i>Astragalus miser</i> Douglas ex Hook.	timber milkvetch
<i>Calypso bulbosa</i> (L.) Oakes	fairy slipper
<i>Campanula rotundifolia</i> L.	bluebell bellflower
<i>Cardamine breweri</i> S. Watson	Brewer's bittercress
<i>Ceratophyllum demersum</i> L.	coon's tail
<i>Chamerion angustifolium</i> (L.) Holub ssp. <i>angustifolium</i>	fireweed
<i>Chenopodium capitatum</i> (L.) Asch.	blite goosefoot
<i>Chenopodium foliosum</i> (Moench) Asch.	leafy goosefoot
<i>Chimaphila umbellata</i> (L.) W. Bartram ssp. <i>occidentalis</i> (Rydb.) Hultén	pipsissewa
<i>Cirsium arvense</i> (L.) Scop.	Canada thistle
<i>Cirsium scariosum</i> Nutt.	meadow thistle
<i>Cirsium vulgare</i> (Savi) Ten.	bull thistle
<i>Comarum palustre</i> L.	purple marshlocks
<i>Epilobium ciliatum</i> Raf. ssp. <i>ciliatum</i>	fringed willowherb
<i>Epilobium palustre</i> L.	marsh willowherb
<i>Erigeron acris</i> L.	bitter fleabane
<i>Erigeron acris</i> L. ssp. <i>debilis</i> (A. Gray) Piper	bitter fleabane
<i>Erigeron acris</i> L. ssp. <i>politus</i> (Fr.) Schinz & R. Keller	bitter fleabane
<i>Erigeron peregrinus</i> (Banks ex Pursh) Greene ssp. <i>callianthemus</i> (Greene) Cronquist var. <i>callianthemus</i>	subalpine fleabane
<i>Eriogonum umbellatum</i> Torr.	sulphur-flower buckwheat
<i>Euclidium syriacum</i> (L.) W.T. Aiton	Syrian mustard
<i>Eurybia conspicua</i> (Lindl.) G.L. Nesom	western showy aster
<i>Fragaria vesca</i> L.	woodland strawberry
<i>Fragaria virginiana</i> Duchesne	Virginia strawberry

Appendix 1 (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Frasera speciosa</i> Douglas ex Griseb.	elkweed
<i>Fritillaria atropurpurea</i> Nutt.	spotted fritillary
<i>Galium boreale</i> L.	northern bedstraw
<i>Galium trifidum</i> L.	threepetal bedstraw
<i>Gentiana affinis</i> Griseb.	pleated gentian
<i>Gentianella amarella</i> (L.) Boerner	autumn dwarf gentian
<i>Gentianopsis thermalis</i> (Kuntze) Iltis	Rocky Mountain fringed gentian
<i>Geranium viscosissimum</i> Fisch. & C.A. Mey. ex C.A. Mey.	sticky purple geranium
<i>Geum macrophyllum</i> Willd. var. <i>perincisum</i> (Rydb.) Raup	largeleaf avens
<i>Goodyera oblongifolia</i> Raf.	western rattlesnake plantain
<i>Heracleum maximum</i> Bartram	common cowparsnip
<i>Heuchera cylindrica</i> Douglas ex Hook. var. <i>cylindrica</i>	roundleaf alumroot
<i>Hippuris vulgaris</i> L.	common mare's-tail
<i>Lactuca tatarica</i> (L.) C.A. Mey. var. <i>pulchella</i> (Pursh) Breitung	blue lettuce
<i>Lappula squarrosa</i> (Retz.) Dumort.	European stickseed
<i>Lemna turionifera</i> Landolt	turion duckweed
<i>Leptosiphon septentrionalis</i> (H. Mason) J.M. Porter & L.A. Johnson	northern linanthus
<i>Leucanthemum vulgare</i> Lam.	oxeye daisy
<i>Linnaea borealis</i> L.	twinflower
<i>Listera cordata</i> (L.) R.Br.	heartleaf twayblade
<i>Lupinus argenteus</i> Pursh	silvery lupine
<i>Maianthemum racemosum</i> (L.) Link ssp. <i>amplexicaule</i> (Nutt.) LaFrankie	feathery false lily of the valley
<i>Maianthemum stellatum</i> (L.) Link	starry false lily of the valley
<i>Matricaria discoidea</i> DC.	disc mayweed
<i>Medicago lupulina</i> L.	black medick
<i>Medicago sativa</i> L.	alfalfa
<i>Melilotus officinalis</i> (L.) Lam.	yellow sweetclover
<i>Menyanthes trifoliata</i> L.	buckbean
<i>Mitella pentandra</i> Hook.	five-stamen miterwort
<i>Mitella stauropetala</i> Piper	smallflower miterwort
<i>Moneses uniflora</i> (L.) A. Gray	single delight
<i>Myriophyllum sibiricum</i> Kom.	shortspike watermilfoil
<i>Orthilia secunda</i> (L.) House	sidebells wintergreen
<i>Osmorhiza depauperata</i> Phil.	bluntseed sweetroot
<i>Oxytropis deflexa</i> (Pall.) DC. var. <i>sericea</i> Torr. & A. Gray	blue nodding locoweed
<i>Packera indecora</i> (Greene) A. Love & D. Love	elegant groundsel
<i>Packera paupercula</i> (Michx.) A. Löve & D. Löve	balsam groundsel
<i>Parnassia fimbriata</i> K.D. Koenig var. <i>fimbriata</i>	fringed grass of Parnassus
<i>Parnassia palustris</i> L. var. <i>montanensis</i> (Fernald & Rydb. ex Rydb.) C.L. Hitchc.	mountain grass of Parnassus
<i>Pedicularis groenlandica</i> Retz.	elephanthead lousewort
<i>Penstemon fruticosus</i> (Pursh) Greene	bush penstemon
<i>Penstemon procerus</i> Douglas ex Graham var. <i>procerus</i>	pin-cushion beardtongue
<i>Petasites frigidus</i> (L.) Fr. var. <i>sagittatus</i> (Banks ex Pursh) Cherniawsky	arrowleaf sweet coltsfoot
<i>Plantago major</i> L.	common plantain



## Appendix 1 (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Platanthera aquilonis</i> or <i>P. huronensis</i>	northern or Huron green orchid
<i>Platanthera obtusata</i> (Banks ex Pursh) Lindl.	bluntleaved orchid
<i>Polygonum achoreum</i> S.F. Blake	leathery knotweed
<i>Polygonum amphibium</i> L.	water knotweed
<i>Polygonum aviculare</i> L.	prostrate knotweed
<i>Polygonum douglasii</i> Greene ssp. <i>douglasii</i>	Douglas' knotweed
<i>Polygonum viviparum</i> L.	alpine bistort
<i>Potamogeton pusillus</i> L. ssp. <i>pusillus</i>	small pondweed
<i>Potentilla gracilis</i> Douglas ex Hook.	slender cinquefoil
<i>Potentilla hippiana</i> Lehm.	woolly cinquefoil
<i>Primula egaliksensis</i> Wormsk. ex Hornem.	Greenland primrose
<i>Prosartes trachycarpa</i> S. Watson	roughfruit fairybells
<i>Pyrola asarifolia</i> Michx.	liverleaf wintergreen
<i>Pyrola chlorantha</i> Sw.	greenflowered wintergreen
<i>Ranunculus cymbalaria</i> Pursh	alkali buttercup
<i>Ranunculus sceleratus</i> L. var. <i>multifidus</i> Nutt.	cursed buttercup
<i>Rumex crispus</i> L.	curly dock
<i>Sedum lanceolatum</i> Torr.	spearleaf stonecrop
<i>Senecio lugens</i> Richardson	small blacktip ragwort
<i>Senecio serra</i> Hook.	tall ragwort
<i>Silene latifolia</i> Poir.	bladder campion
<i>Silene vulgaris</i> (Moench) Garcke	maidenstears
<i>Sisyrinchium idahoense</i> E.P. Bicknell var. <i>occidentale</i> (E.P. Bicknell) Douglass M. Hend.	Idaho blue-eyed grass
<i>Sparganium natans</i> L.	small bur-reed
<i>Spiranthes romanzoffiana</i> Cham.	hooded lady's tresses
<i>Stellaria longifolia</i> Muhl. ex Willd.	longleaf starwort
<i>Stellaria longipes</i> Goldie	longstalk starwort
<i>Stuckenia filiformis</i> (Pers.) Böerner	fineleaf pondweed
<i>Swertia perennis</i> L.	felwort
<i>Symphotrichum boreale</i> (Torr. & A. Gray) A. Löve & D. Löve	northern bog aster
<i>Symphotrichum lanceolatum</i> (Willd.) G.L. Nesom ssp. <i>hesperium</i> (A. Gray) G.L. Nesom	white panicle aster
! <i>Taraxacum laevigatum</i> (Willd.) DC.	rock dandelion
! <i>Taraxacum officinale</i> F.H. Wigg.	common dandelion
<i>Thalictrum alpinum</i> L.	alpine meadow-rue
<i>Thalictrum occidentale</i> A. Gray	western meadow-rue
! <i>Tragopogon dubius</i> Scop.	yellow salsify
<i>Trifolium dasyphyllum</i> Torr. & A. Gray	alpine clover
<i>Trifolium haydenii</i> Porter	Hayden's clover
! <i>Trifolium hybridum</i> L.	alsike clover
! <i>Trifolium hybridum</i> L.	alsike clover
<i>Trifolium nanum</i> Torr.	dwarf clover
<i>Trifolium parryi</i> A. Gray	Parry's clover
<i>Trifolium parryi</i> A. Gray ssp. <i>montanense</i> (Rydb.) J.M. Gillett	Parry's clover

Appendix 1 (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Trifolium pratense</i> L.	red clover
<i>Trifolium pratense</i> L.	red clover
<i>Trifolium repens</i> L.	white clover
<i>Trifolium repens</i> L.	white clover
<i>Triglochin maritima</i> L.	seaside arrowgrass
<i>Triglochin palustris</i> L.	marsh arrowgrass
<i>Trollius laxus</i> Salisb. ssp. <i>albiflorus</i> (A. Gray) A. Love & D. Love & Kapoor	American globeflower
<i>Typha latifolia</i> L.	broadleaf cattail
<i>Urtica dioica</i> L.	stinging nettle
<i>Utricularia</i> L.	bladderwort
<i>Utricularia macrorhiza</i> Leconte	common bladderwort
<i>Utricularia minor</i> L.	lesser bladderwort
<i>Valeriana dioica</i> L.	marsh valerian
<i>Valeriana edulis</i> Nutt. ex Torr. & A. Gray	tobacco root
<i>Valeriana occidentalis</i> A. Heller	western valerian
<i>Verbascum thapsus</i> L.	common mullein
<i>Veronica americana</i> Schwein. ex Benth.	American speedwell
<i>Veronica wormskjoldii</i> Roem. & Schult.	American alpine speedwell
<i>Vicia americana</i> Muhl. ex Willd.	American vetch
<i>Viola</i> L.	violet
<i>Viola macloskeyi</i> Lloyd ssp. <i>pallens</i> (Banks ex Ging) M.S. Baker	smooth white violet
<i>Viola praemorsa</i> Douglas ex Lindl.	canary violet
<i>Viola purpurea</i> Kellogg ssp. <i>venosa</i> (S. Watson) M.S. Baker & J.C. Clausen	goosefoot violet
<i>Viola vallicola</i> A. Nelson	sagebrush violet
<i>Zigadenus elegans</i> Pursh	mountain deathcamas
<i>Zigadenus venenosus</i> S. Watson var. <i>gramineus</i> (Rydb.) Walsh ex M. Peck	grassy deathcamas
<b>Graminoids</b>	
<i>Achnatherum hymenoides</i> (Roem. & Schult.) Barkworth	Indian ricegrass
<i>Achnatherum lettermanii</i> (Vasey) Barkworth	Letterman's needlegrass
<i>Achnatherum nelsonii</i> (Scribn.) Barkworth	Columbia needlegrass
<i>Achnatherum nelsonii</i> (Scribn.) Barkworth ssp. <i>dorei</i> (Barkworth & Maze) Barkworth	Dore's needlegrass
<i>Achnatherum nelsonii</i> (Scribn.) Barkworth ssp. <i>nelsonii</i>	Columbia needlegrass
<i>Achnatherum occidentale</i> (Thurb.) Barkworth	western needlegrass
<i>Achnatherum occidentale</i> (Thurb.) Barkworth ssp. <i>occidentale</i>	western needlegrass
<i>Achnatherum richardsonii</i> (Link) Barkworth	Richardson's needlegrass
<i>Agrostis exarata</i> Trin.	spike bentgrass
<i>Agrostis humilis</i> Vasey	alpine bentgrass
<i>Agrostis mertensii</i> Trin.	northern bentgrass
<i>Agrostis scabra</i> Willd.	rough bentgrass
<i>Alopecurus pratensis</i> L.	meadow foxtail
<i>Bromus carinatus</i> Hook. & Arn.	California brome
<i>Bromus ciliatus</i> L.	fringed brome

## Appendix 1 (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Bromus inermis</i> Leyss. ssp. <i>pumpellianus</i> (Scribn.) Wagnon var. <i>pumpellianus</i> (Scribn.) C.L. Hitchc.	Pumpelly's brome
! <i>Bromus inermis</i> Leyss. var. <i>inermis</i>	smooth brome
! <i>Bromus inermis</i> Leyss. var. <i>inermis</i>	smooth brome
<i>Bromus porteri</i> (J.M. Coult.) Nash	Porter brome
! <i>Bromus tectorum</i> L.	cheatgrass
<i>Calamagrostis canadensis</i> (Michx.) P. Beauv.	bluejoint
<i>Calamagrostis purpurascens</i> R. Br.	purple reedgrass
<i>Calamagrostis rubescens</i> Buckley	pinegrass
<i>Calamagrostis stricta</i> (Timm) Koeler ssp. <i>inexpansa</i> (A. Gray) C.W. Greene	northern reedgrass
<i>Carex</i> L.	sedge
<i>Carex albonigra</i> Mack.	blackandwhite sedge
<i>Carex aquatilis</i> Wahlenb.	water sedge
<i>Carex atrata</i> L. or <i>C. nova</i> L.H. Bailey	black 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 capillaris</i> L.	hair-like sedge
<i>Carex capitata</i> L.	capitate sedge
<i>Carex concinna</i> R. Br.	low northern sedge
<i>Carex diandra</i> Schrank	lesser paniced sedge
<i>Carex disperma</i> Dewey	softleaf sedge
<i>Carex duriuscula</i> C.A. Mey.	needleleaf sedge
<i>Carex elynoides</i> T. Holm	blackroot sedge
<i>Carex filifolia</i> Nutt.	threadleaf sedge
<i>Carex gynocrates</i> Wormsk. ex Drejer	northern bog sedge
<i>Carex haydeniana</i> Olney	cloud sedge
<i>Carex heteroneura</i> W. Boott var. <i>epapillosa</i> (Mack.) F.J. Herm.	different-nerve sedge
<i>Carex hoodii</i> Boott	Hood's sedge
<i>Carex illota</i> L.H. Bailey	sheep sedge
<i>Carex incurviformis</i> Mack. var. <i>danaensis</i> (Stacey) F.J. Herm.	coastal sand sedge
<i>Carex interior</i> L.H. Bailey	inland sedge
<i>Carex lachenalii</i> Schkuhr	twotipped sedge
<i>Carex lasiocarpa</i> Ehrh.	woollyfruit sedge
<i>Carex leptalea</i> Wahlenb.	bristlystalked sedge
<i>Carex limosa</i> L.	mud sedge
<i>Carex livida</i> (Wahlenb.) Willd.	livid sedge
<i>Carex macloviana</i> d'Urv.	Thickhead sedge
<i>Carex microglochin</i> Wahlenb.	fewseeded bog sedge
<i>Carex microptera</i> Mack.	smallwing sedge
<i>Carex misandra</i> R. Br.	shortleaved sedge
<i>Carex nardina</i> Fr.	spike sedge
<i>Carex nelsonii</i> Mack.	Nelson's sedge
<i>Carex neurophora</i> Mack.	alpine nerve sedge
<i>Carex nigricans</i> C.A. Mey.	black alpine sedge

## Appendix 1 (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Carex norvegica</i> Retz. ssp. <i>stevenii</i> (T. Holm) E. Murray	Steven's sedge
<i>Carex obtusata</i> Lilj.	obtuse sedge
<i>Carex paysonis</i> Clokey	Payson's sedge
<i>Carex pellita</i> Muhl. ex Willd.	woolly sedge
<i>Carex petasata</i> Dewey	Liddon sedge
<i>Carex phaeocephala</i> Piper	dunhead sedge
<i>Carex praegracilis</i> W. Boott	clustered field sedge
<i>Carex raynoldsii</i> Dewey	Raynolds' sedge
<i>Carex rossii</i> Boott	Ross' sedge
<i>Carex rupestris</i> All.	curly sedge
<i>Carex saxatilis</i> L.	rock sedge
<i>Carex scirpoidea</i> Michx.	northern singlespike sedge
<i>Carex scirpoidea</i> Michx. ssp. <i>pseudoscirpoidea</i> (Rydb.) Dunlop	western singlespike sedge
<i>Carex scirpoidea</i> Michx. ssp. <i>scirpoidea</i>	northern singlespike sedge
<i>Carex scopulorum</i> T. Holm	mountain sedge
<i>Carex simulata</i> Mack.	analogue sedge
<i>Carex stenoptila</i> F.J. Herm.	riverbank sedge
<i>Carex stipata</i> Muhl. ex Willd.	awlfruit sedge
<i>Carex utriculata</i> Boott	Northwest Territory sedge
<i>Carex vallicola</i> Dewey	valley sedge
<i>Carex vesicaria</i> L.	blister sedge
<i>Danthonia intermedia</i> Vasey	timber oatgrass
<i>Danthonia unispicata</i> (Thurb.) Munro ex Macoun	onespike danthonia
<i>Deschampsia cespitosa</i> (L.) P. Beauv.	tufted hairgrass
<i>Eleocharis</i> R. Br.	spikerush
<i>Eleocharis quinqueflora</i> (Hartmann) O. Schwarz	fewflower spikerush
<i>Eleocharis rostellata</i> (Torr.) Torr.	beaked spikerush
<i>Elymus elymoides</i> (Raf.) Swezey	squirreltail
<i>Elymus glaucus</i> Buckley	blue wildrye
<i>Elymus lanceolatus</i> (Scribn. & J.G. Sm.) Gould ssp. <i>lanceolatus</i>	thickspike wheatgrass
<i>Elymus scribneri</i> (Vasey) M.E. Jones	spreading wheatgrass
<i>Elymus trachycaulus</i> (Link) Gould ex Shinnars	slender wheatgrass
<i>Elymus trachycaulus</i> (Link) Gould ex Shinnars ssp. <i>trachycaulus</i>	slender wheatgrass
<i>Eriophorum angustifolium</i> Honck. ssp. <i>angustifolium</i>	tall cottongrass
<i>Eriophorum gracile</i> W.D.J. Koch	slender cottongrass
<i>Eriophorum viridicarinatum</i> (Engelm.) Fernald	thinleaf cottongsedge
<i>Festuca baffinensis</i> Polunin	Baffin fescue
<i>Festuca brachyphylla</i> Schult. ex Schult. & Schult. f.	alpine fescue
<i>Festuca brachyphylla</i> Schult. ex Schult. & Schult. f. ssp. <i>brachyphylla</i>	alpine fescue
<i>Festuca brachyphylla</i> Schult. ex Schult. & Schult. f. ssp. <i>coloradensis</i> Frederiksen	Colorado fescue
<i>Festuca hallii</i> (Vasey) Piper	plains rough fescue
<i>Festuca idahoensis</i> Elmer	Idaho fescue
<i>Festuca saximontana</i> Rydb.	Rocky Mountain fescue
<i>Festuca saximontana</i> Rydb. var. <i>saximontana</i>	Rocky Mountain fescue

## Appendix 1 (continued).

PLANTS Accepted Scientific Name with Author	PLANTS Common Name
<i>Glyceria borealis</i> (Nash) Batchelder	small floating mannagrass
<i>Glyceria striata</i> (Lam.) Hitchc.	fowl mannagrass
<i>Helictotrichon mortonianum</i> (Scribn.) Henr.	Morton's alpine oatgrass
<i>Hesperostipa comata</i> (Trin. & Rupr.) Barkworth ssp. <i>intermedia</i> (Scribn. & Tweedy) Barkworth	intermediate needle and thread
<i>Juncus albescens</i> (Lange) Fernald	northern white rush
<i>Juncus arcticus</i> Willd. ssp. <i>littoralis</i> (Engelm.) Hultén	mountain rush
<i>Juncus bufonius</i> L.	toad rush
<i>Juncus drummondii</i> E. Mey.	Drummond's rush
<i>Juncus hallii</i> Engelm.	Hall's rush
<i>Juncus longistylis</i> Torr.	longstyle rush
<i>Juncus mertensianus</i> Bong.	Mertens' rush
<i>Juncus tracyi</i> Rydb.	Tracy's rush
<i>Juncus tweedyi</i> Rydb.	Tweedy's rush
<i>Kobresia myosuroides</i> (Vill.) Fiori	Bellardi bog sedge
<i>Kobresia simpliciuscula</i> (Wahlenb.) Mack.	simple bog sedge
<i>Koeleria macrantha</i> (Ledeb.) Schult.	prairie Junegrass
<i>Leucopoa kingii</i> (S. Watson) W.A. Weber	spike fescue
<i>Leymus cinereus</i> (Scribn. & Merr.) A. Löve	basin wildrye
<i>Luzula glabrata</i> (Hoppe ex Rostk.) Desv. var. <i>hitchcockii</i> (Hämet-Ahti) Dorn	Hitchcock's smooth woodrush
<i>Luzula parviflora</i> (Ehrh.) Desv.	smallflowered woodrush
<i>Luzula spicata</i> (L.) DC.	spiked woodrush
<i>Melica spectabilis</i> Scribn.	purple oniongrass
<i>Muhlenbergia andina</i> (Nutt.) Hitchc.	foxtail muhly
<i>Muhlenbergia glomerata</i> (Willd.) Trin.	spiked muhly
<i>Muhlenbergia richardsonis</i> (Trin.) Rydb.	mat muhly
<i>Oryzopsis asperifolia</i> Michx.	roughleaf ricegrass
<i>Phleum alpinum</i> L.	alpine timothy
! <i>Phleum pratense</i> L.	timothy
! <i>Phleum pratense</i> L.	timothy
<i>Piptatherum exiguum</i> (Thurb.) Dorn	little ricegrass
<i>Poa abbreviata</i> R. Br. ssp. <i>pattersonii</i> (Vasey) A. Löve & D. Löve & Kapoor	Patterson's bluegrass
<i>Poa alpina</i> L.	alpine bluegrass
<i>Poa arctica</i> R. Br. ssp. <i>grayana</i> (Vasey) A. Löve & D. Löve & Kapoor	arctic bluegrass
<i>Poa arida</i> Vasey	plains bluegrass
<i>Poa cusickii</i> Vasey ssp. <i>epilis</i> (Scribn.) W.A. Weber	Cusick's bluegrass
<i>Poa fendleriana</i> (Steud.) Vasey	muttongrass
<i>Poa glauca</i> Vahl ssp. <i>rupicola</i> (Nash ex Rydb.) W.A. Weber	timberline bluegrass
<i>Poa leptocoma</i> Trin.	marsh bluegrass
<i>Poa nemoralis</i> L. ssp. <i>interior</i> (Rydb.) W.A. Weber	inland bluegrass
<i>Poa palustris</i> L.	fowl bluegrass
! <i>Poa pratensis</i> L.	Kentucky bluegrass
! <i>Poa pratensis</i> L.	Kentucky bluegrass
<i>Poa reflexa</i> Vasey & Scribn. ex Vasey	nodding bluegrass
<i>Poa secunda</i> J. Presl	Sandberg bluegrass

## Appendix 1 (continued).

<b>PLANTS Accepted Scientific Name with Author</b>	<b>PLANTS Common Name</b>
<i>Poa wheeleri</i> Vasey	Wheeler's bluegrass
<i>Psathyrostachys juncea</i> (Fisch.) Nevski	Russian wildrye
<i>Pseudoroegneria spicata</i> (Pursh) A. Löve	bluebunch wheatgrass
<i>Pseudoroegneria spicata</i> (Pursh) A. Löve ssp. <i>spicata</i>	bluebunch wheatgrass
<i>Schoenoplectus acutus</i> (Muhl. ex Bigelow) A. Löve & D. Löve var. <i>occidentalis</i> (S. Watson) S.G. Sm.	tule
<i>Schoenoplectus tabernaemontani</i> (C.C. Gmel.) Palla	softstem bulrush
<i>Thinopyrum intermedium</i> (Host) Barkworth & D.R. Dewey	intermediate wheatgrass
<i>Trichophorum pumilum</i> (Vahl) Schinz & Thell.	Rolland's bulrush
<i>Trisetum spicatum</i> (L.) K. Richt.	spike trisetum
<i>Trisetum wolfii</i> Vasey	Wolf's trisetum
<i>xPseudelymus saxicola</i> (Scribn. & J.G. Sm.) Barkworth & D.R. Dewey ([ <i>Elymus elymoides</i> x <i>Pseudoroegneria spicata</i> ])	foxtail wheatgrass
<b>Ferns</b>	
<i>Botrychium ascendens</i> W.H. Wagner	trianglelobe moonwort
<i>Botrychium simplex</i> E. Hitchc.	little grapefern
<i>Botrychium virginianum</i> (L.) Sw.	rattlesnake fern
<i>Cystopteris fragilis</i> (L.) Bernh.	brittle bladderfern
<i>Equisetum arvense</i> L.	field horsetail
<i>Equisetum fluviatile</i> L.	water horsetail
<i>Equisetum hyemale</i> L. var. <i>affine</i> (Engelm.) A.A. Eaton	scouringrush horsetail
<i>Equisetum laevigatum</i> A. Braun	smooth horsetail
<i>Equisetum variegatum</i> Schleich. ex F. Weber & D. Mohr	variegated scouringrush
<i>Lycopodium annotinum</i> L.	stiff clubmoss
<i>Selaginella densa</i> Rydb.	lesser spikemoss
<b>Mosses</b>	
<i>Sphagnum angustifolium</i> (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.