

Black Canyon Research Natural Area Guidebook Supplement 52

Reid Schuller and Sarah Canham



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Authors

Reid Schuller is a plant ecologist, Western Stewardship Science Institute, 62615 Stenkamp Road, Bend, OR 97701; **Sarah Canham** is a botanist, U.S. Department of the Interior, Bureau of Land Management, Prineville District, Prineville, OR 97754.

The Pacific Northwest Research Station is publishing this guidebook as part of a continuing series of guidebooks on federal research natural areas begun in 1972.

Cover: Facing north through Black Canyon toward the northeast boundary of Black Canyon Research Natural Area, Oregon. Foreground vegetation is typical of the big sagebrush/bluebunch wheatgrass–Idaho fescue plant association. All photographs in this report are by Sarah Canham.

Abstract

Schuller, Reid; Canham, Sarah. 2019. Black Canyon Research Natural Area: guidebook supplement 52. Gen. Tech. Rep. PNW-GTR-969. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 25 p.

This guidebook describes major biological and physical attributes of the 2686-ha (6,637-ac) Black Canyon Research Natural Area (RNA), Wheeler County, Oregon. The RNA contains high-quality examples of native plant associations' representative of the foothills of the Blue Mountains ecoregion.

Keywords: Research natural area, area of critical environmental concern, big sagebrush/Thurber's needlegrass (*Artemisia tridentata* ssp. *tridentata*/*Achnatherum thurberianum*) plant community, big sagebrush/bluebunch wheatgrass (*Artemisia tridentata* ssp. *tridentata*/*Pseudoroegneria spicata*) plant community, western juniper/big sagebrush/bluebunch wheatgrass (*Juniperus occidentalis*/*Artemisia tridentata* ssp. *tridentata*/*Pseudoroegneria spicata*) plant community, big sagebrush/Idaho fescue (*Artemisia tridentata* ssp. *tridentata*/*Festuca idahoensis*) plant community, western juniper/big sagebrush/Idaho fescue (*Juniperus occidentalis*/*Artemisia tridentata* ssp. *tridentata*/*Festuca idahoensis*) plant community, western juniper/big sagebrush–antelope bitterbrush/bluebunch wheatgrass–Idaho fescue (*Juniperus occidentalis*/*Artemisia tridentata* ssp. *tridentata*–*Purshia tridentata*/*Pseudoroegneria spicata*–*Festuca idahoensis*) plant community, arrowleaf thelypody (*Thelypodium eucosmum*), threatened plant species population.

Preface

The research natural area (RNA) described in this supplement¹ is administered by the Prineville District, Bureau of Land Management (BLM), U.S. Department of the Interior.

Black Canyon RNA is part of a federal system² of natural areas established for research and educational purposes.³ Of the 211 federal RNAs established in Oregon and Washington, 45 are described in *Federal Research Natural Areas in Oregon and Washington: a Guidebook for Scientists and Educators* (see footnote 1). This report is a supplement to the guidebook.

Each RNA is a site where elements⁴ are protected or managed for scientific purposes and natural processes are allowed to dominate. The objectives for establishing RNAs are to:

- Maintain a wide spectrum of high-quality areas that represent the major forms of variability found in forest, shrubland, grassland, alpine, and natural situations that have scientific interest and importance that, in combination, form a national network of ecological areas for research, education, and maintenance of biological diversity.
- Preserve and maintain genetic diversity, including threatened, endangered, and sensitive species.
- Protect against human-caused environmental disruptions.
- Serve as reference areas for the study of natural ecological processes, including disturbance.

¹ Supplement No. 53 to Franklin, J.F.; Hall, F.C.; Dyrness, C.T.; Maser, C. 1972. Federal research natural areas in Oregon and Washington: a guidebook for scientists and educators. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 498 p.

² Six federal agencies cooperate in this program in the Pacific Northwest: U.S. Department of the Interior Bureau of Land Management, Fish and Wildlife Service, and National Park Service; U.S. Department of Agriculture Forest Service; U.S. Department of Energy; and U.S. Department of Defense. In addition, the federal agencies cooperate with state agencies and private organizations in Oregon and Washington in the Pacific Northwest Interagency Natural Area Committee.

³ See Wilson et al. (2009) for a more complete discussion of rationale for establishment of RNAs.

⁴ Elements are the basic units to be represented in a natural area system. An element may be an ecosystem, community, habitat, or organism. Taken from Dyrness, C.T.; Franklin, J.F.; Maser, C.; Cook, S.A.; Hall, J.D.; Faxon, G. 1975. Research natural area needs in the Pacific Northwest: a contribution to land-use planning. Gen. Tech. Rep. PNW-38. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 231 p.

- Provide onsite and extension educational activities.
- Serve as baseline areas for measuring long-term ecological changes.
- Serve as control areas for comparing results from manipulative research.
- Monitor effects of resource management techniques and practices.

The guiding principle in managing RNAs is to maintain natural ecological processes or conditions for which the site is designated. Activities that impair scientific or educational values are not permitted within RNAs. Management practices necessary to maintain or restore ecosystems may be allowed.

Federal RNAs provide a unique system of publicly owned and protected examples of relatively unmodified ecosystems where scientists can conduct research with minimal interference and reasonable assurance that investments in long-term studies will not be lost to logging, land development, or similar activities. Scientists and educators wishing to visit or use Black Canyon RNA for scientific or educational purposes should contact the Prineville BLM district office in advance and provide information about objectives, sampling procedures, and other prospective activities. Research projects, educational visits, and collection of specimens from the RNA require prior approval. There may be limitations on research or educational activities.

A person wishing to use the RNA is obligated to:

- Obtain permission from the appropriate administering agency before using the area (see footnote 2)
- Abide by the administering agency's regulations governing use, including specific limitations on the type of research, sampling methods, and other procedures.
- Inform the administering agency on progress of the research, published results, and disposition of collected materials.

The purpose of this approval process is to:

- Ensure the ecological integrity and scientific and educational values of the RNA are not compromised.
- Provide information to scientists about other research occurring on the RNA so potential collaborations may be fostered and conflicts avoided.
- Maintain records of research activities and research results to benefit the BLM, other agencies, and future researchers.

Appropriate uses of RNAs are determined by the administering agency. Destructive analysis of vegetation is generally not allowed, nor are studies requiring extensive substrate modification such as extensive soil excavation. Collection of plant and animal specimens is generally restricted to voucher specimens or approved research activities. Under no circumstances may collecting significantly reduce species populations. Collecting must also be carried out in accordance with all other federal and state agency regulations.

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Introduction

The U.S. Department of the Interior Bureau of Land Management (BLM) established the 2686-ha (6,637-ac) Black Canyon Research Natural Area (RNA) because it supports high-quality, representative examples of native plant communities and sensitive plant species occurring at low elevations within the Blue Mountain ecoregion (ONAP 2015, USDI BLM 2015), including:

- Big sagebrush/Thurber's needlegrass (*Artemisia tridentata* ssp. *tridentata*/*Achnatherum thurberianum*) plant community.
- Big sagebrush/bluebunch wheatgrass (*Artemisia tridentata* ssp. *tridentata*/*Pseudoroegneria spicata*) plant community.
- Big sagebrush/Idaho fescue (*Artemisia tridentata* ssp. *tridentata*/*Festuca idahoensis*) plant community.
- Western juniper/big sagebrush/bluebunch wheatgrass (*Juniperus occidentalis*/*Artemisia tridentata* ssp. *tridentata*/*Pseudoroegneria spicata*) plant community.
- Western juniper/big sagebrush/Idaho fescue (*Juniperus occidentalis*/*Artemisia tridentata* ssp. *tridentata*/*Festuca idahoensis*) plant community.
- Western juniper/big sagebrush–antelope bitterbrush/bluebunch wheatgrass-Idaho fescue (*Juniperus occidentalis*/*Artemisia tridentata* ssp. *tridentata*-*Purshia tridentata*/*Pseudoroegneria*-*Festuca idahoensis*) plant community.
- Arrowleaf thelypody (*Thelypodium eucosmum*) sensitive plant species population.

Access and Accommodations

From the BLM office in Prineville, Oregon, drive east on Highway 26 east toward Mitchell, Oregon, 72.9 km (45.3 mi). Turn left onto Highway 207 North (Service Creek Road) for 15.7 km (9.7 mi) to Girds Creek Road. Turn left onto Girds Creek Road (also known as South Twickenham Road) and continue for 6.8 km (4.2 mi) to a small turnout on the east side of the road. From here, the northeastern boundary of the RNA occurs immediately across the paved road to the west (fig. 1).

Permission to use the area for research purposes must be obtained from the BLM Prineville District office in Prineville, Oregon. Maps and additional information about the area are available at this office. Lodging is available in Prineville, Oregon. Limited lodging is also available in Mitchell, Oregon.

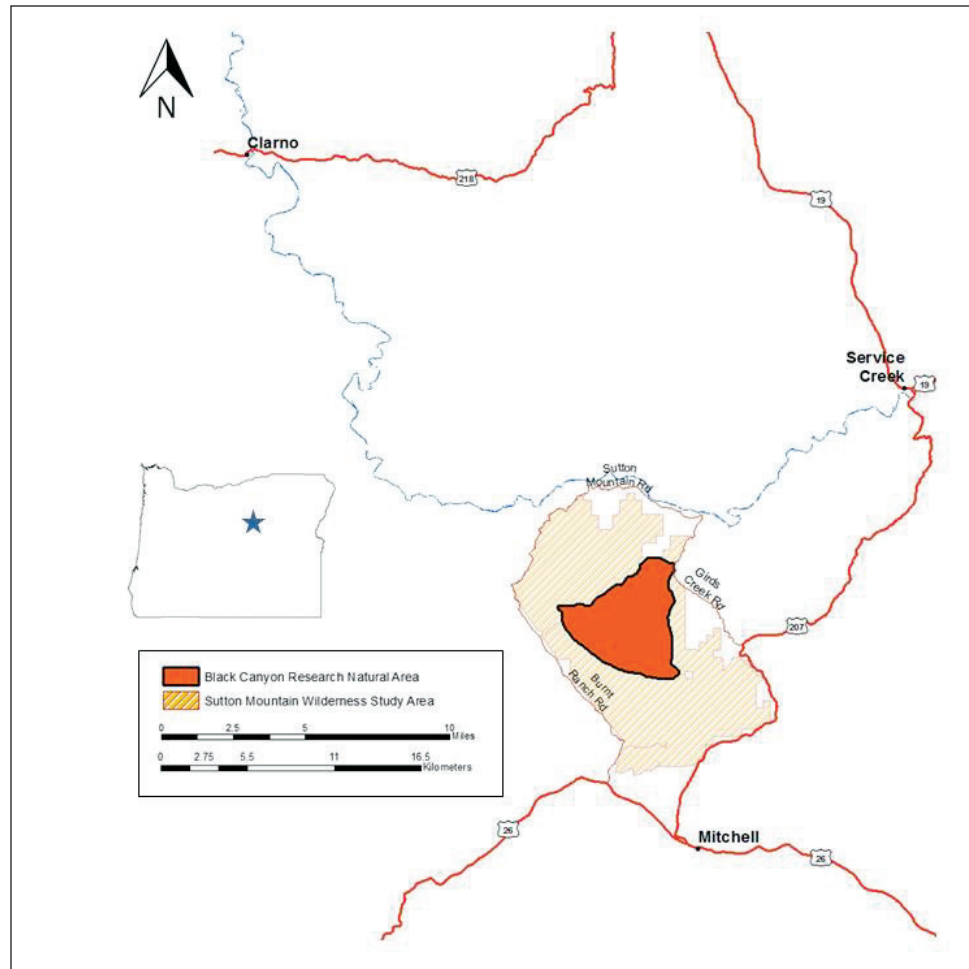


Figure 1—Black Canyon Research Natural Area access and location.

Environment

The RNA occurs within the Blue Mountains of central Oregon in a transitional region between the Blue Mountain ecoregion and the Northern Great Basin ecoregion (Franklin and Dyrness 1988, ONAP 2015, USDI BLM 2015).

Elevations range between 623 m (2,043 ft) at the northern RNA boundary adjacent to Girds Creek in Black Canyon and 1370 m (4,493 ft) at the summit of Sutton Mountain in the southeast portion of the RNA (fig. 2). An intermittent stream flows in a northeasterly direction off of Sutton Mountain to the northeastern boundary of the RNA.

Significant geologic formations in the Sutton Mountain area include the Clarno Formation, John Day Formation, and the Columbia River Basalt Group. The Clarno Formation underlies the John Day Formation and is of late Eocene to early

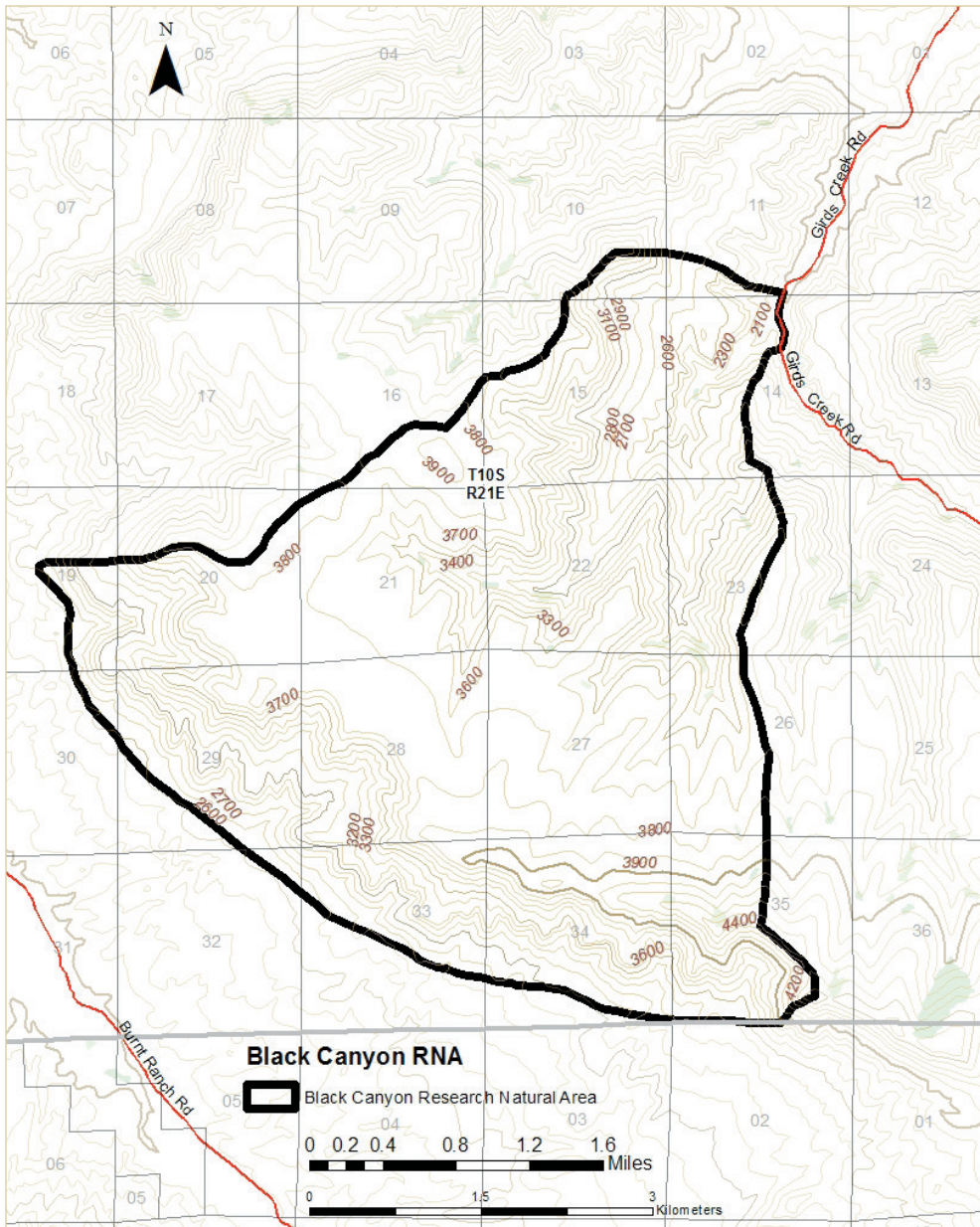


Figure 2—Black Canyon Research Natural Area (RNA) topography and boundary.

Oligocene age. It has an aggregate thickness of several thousand feet and contains a variety of volcanic and related terrestrial rocks, including mafic lava flows, coarse unsorted breccias, mudflows, tuffaceous sediments, and silicic domes (USDI BLM 1995).

The John Day formation is of Oligocene to early Miocene age. It is widely known for its abundant, well-preserved plant and vertebrate animal fossils.

Approximately 914 m (3,000 ft) of varicolored siltstones, claystones, and vitric tuffs make up most of the formation (USDI BLM 1995).

The Columbia River Basalt Group averages 610 to 914 m (2,000 to 3,000 ft) in thickness. It is the youngest of the three major formations and overlies the John Day and Clarno Formations. It forms the walls that overlook Bridge and Girds Creeks, and the John Day River. The group is composed primarily of continental flood basalts of Miocene age. They are generally dense, black, and fine grained with subordinate tuffaceous sediments (USDI BLM 1995).

Twenty percent of the soils have been intensively mapped along the eastern and southern margins of the RNA (USDA NRCS 2017b). The general distribution of soil types is based on limited field reconnaissance within the RNA.¹ The general soil pattern is dominated by Waterbury Series soils occupying 30 percent of the RNA and occurring within the north and northeast portions of the RNA. The Waterbury Series consists of shallow, well-drained soils that formed in material weathered mainly from basalt and tuff. Waterbury soils are on plateaus, benches, and shoulders of hills. The taxonomic class of Waterbury soils is clayey-skeletal, smectitic, mesic Lithic Argixerolls (USDA NRCS 2017b).

A Tub-Simas-Curant soil complex occurs within the southern and western portions of the remaining 70 percent of the RNA. The Tub Series consists of deep and very deep, well-drained soils that formed in old sediments of volcanic origin. Tub soils are on hilly uplands and have slopes of 1 to 70 percent. The taxonomic class of Tub soils is fine, smectitic, mesic Vertic Argixerolls (USDA NRCS 2017b).

Climate

Climate is characterized by long, cool, moist winters and short, warm, and dry summers with features of both maritime and continental climates. Temperatures are modified by proximity to the Pacific Ocean and are generally milder than in the Continental climates of the Rocky Mountains and Great Plains. Cyclonic storms still affect the area: thunderstorms often occur in the late spring and summer months and can be very intense (Franklin and Dyrness 1988, USDI BLM 1995, WRCC 2016). Temperature and precipitation data collected at the Mitchell 27 SW Ochoco climate station (WRCC 2016) are summarized in table 1. Precipitation occurs mainly during the winter and early spring. Intense, localized thunderstorms occur in late spring and throughout the summer (USDI BLM 1995). The July

¹ Supplement No. 53 to Franklin, J.F.; Hall, F.C.; Dyrness, C.T.; Maser, C. 1972. Federal research natural areas in Oregon and Washington: a guidebook for scientists and educators. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 498 p.

Table 1—Temperature and precipitation summary

Average minimum January temperature	-9.1 °C (15.7 °F)
Average maximum January temperature	1.7 °C (35.0 °F)
Average minimum July temperature	15.3 °C (41.5 °F)
Average maximum July temperature	27.8 °C (81.8 °F)
Average annual precipitation	443 mm (17.44 in)
Average July–September precipitation	54 mm (2.14 in)

through September time period receives only 12 percent of the average annual total precipitation of 343 mm (13.5 in) (WRCC 2016). Upper elevations on Sutton Mountain receive greater annual precipitation amounts than lower elevations within the RNA, with a higher proportion of winter precipitation falling as snow than in adjacent lowlands.

Vegetation

Vegetation within the RNA is characterized by big sagebrush (*Artemisia tridentata*)-dominated shrub steppe mixed with western juniper (*Juniperus occidentalis*) woodlands. Curl-leaf mountain mahogany (*Cercocarpus ledifolius*) occurs sporadically throughout the RNA as a codominant within western juniper woodlands, and as the sole overstory species in big sagebrush plant associations. Large ponderosa pine (*Pinus ponderosa*) individuals are scattered throughout the RNA. Wildfires of varying size have recently reduced the woody vegetation (see the “Disturbance History” section below), resulting in grass-dominated stands with antelope bitterbrush (*Purshia tridentata*) and occasional big sagebrush scattered throughout (Schuller and Canham 2016). Bluebunch wheatgrass (*Pseudoroegneria spicata*) is widespread and common throughout the RNA. Idaho fescue (*Festuca idahoensis*) codominates north-facing slopes. Thurber’s needlegrass (*Achnatherum thurberianum*) codominates with bluebunch wheatgrass on shallow and droughty soils (USDI BLM 2017).

Figure 3 shows the distribution of the major plant associations present in the area. The *Juniperus occidentalis*/*Cercocarpus ledifolius*–*Purshia tridentata*/*Pseudoroegneria spicata* plant association (Johnson and Swanson 2005) is the most extensive association within the RNA (fig. 4), occupying 1080 ha (2,667 ac) or 40 percent of the area (USDI BLM 2017). Understory shrub, herb, and grass frequency and cover within this association are summarized in table 2. Bluebunch wheatgrass predominates on warmer drier sites, and codominates with Idaho fescue on slightly more mesic sites, especially on north-facing slope exposures. Perennial herbs such

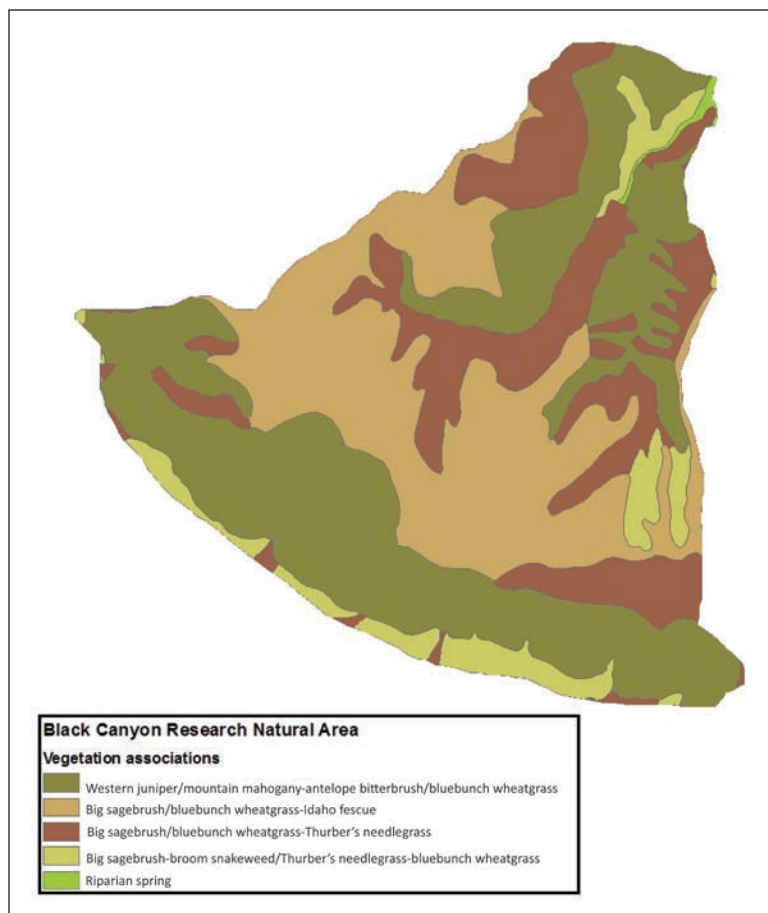


Figure 3—Black Canyon Research Natural Area vegetation associations.



Figure 4—An example of the western juniper/mountain mahogany–antelope bitterbrush/bluebunch wheatgrass plant association.

Table 2—Plant association, understory coverage, and frequency of eight permanent plots in the Black Canyon Research Natural Area

Code ^b	Plant association ^a > Plot # >	ARTR/PSSP6		ARTR/FEID		ARTR/PSSP6		ARTR/PSSP6	
		478	478	479	479	480	480	481	481
		Cover ^c	Frequency ^c	Cover	Frequency	Cover	Frequency	Cover	Frequency
Shrubs:									
CELE3	<i>Cercocarpus ledifolius</i>	2	+	—	—	—	—	—	—
ARTRT	<i>Artemisia tridentata</i>	—	—	—	—	—	—	18	27
Forbs:									
PSSP6	<i>Pseudoroegneria spicata</i>	75	23	75	20	79	13	75	13
BRTE	<i>Bromus tectorum</i>	82	8	29	+	64	4	71	9
POSE	<i>Poa secunda</i>	39	1	29	2	25	1	7	+
ACMI2	<i>Achillea millefolium</i>	4	+	7	+	18	1	—	—
ASFI	<i>Astragalus filipes</i>	—	—	4	+	—	—	—	—
BRHO2	<i>Bromus hordeaceus</i>	—	—	7	+	—	—	—	—
CAXA	<i>Castilleja xanthotricha</i>	—	—	4	+	—	—	—	—
CREPI	<i>Crepis</i> sp.	—	—	7	+	—	—	—	—
CYFR2	<i>Cystopteris fragilis</i>	—	—	—	—	—	—	14	+
DRVE2	<i>Draba verna</i>	68	+	4	+	25	+	4	+
EPILO	<i>Epilobium brachycarpum</i>	11	+	7	+	—	—	—	—
ERFI2	<i>Erigeron filifolius</i>	—	—	11	+	—	—	4	2
EROV	<i>Eriogonum ovalifolium</i>	11	+	—	—	7	+	—	—
FEID	<i>Festuca idahoensis</i>	—	—	75	27	—	—	—	—
HOUM	<i>Holosteum umbellatum</i>	39	+	46	+	14	+	36	1
LUPIN	<i>Lupinus</i> sp.	7	1	11	1	7	+	—	—
MIGR	<i>Microsteris gracilis</i>	43	+	—	—	—	—	—	—

Table 2—Plant association, understory coverage, and frequency of eight permanent plots in the Black Canyon Research Natural Area (continued)

Code ^b	Species name	Plant association ^a >		ARTR/PSSP6		ARTR/FEID		ARTR/PSSP6		ARTR/PSSP6	
		Plot # >		478		479		480		481	
		Cover ^c	Frequency ^c	Cover ^c	Frequency ^c	Cover ^c	Frequency ^c	Cover ^c	Frequency ^c	Cover ^c	Frequency ^c
PEDE4	<i>Pentstemon deustus</i> var. <i>variabilis</i>	—	—	—	—	—	—	—	—	11	+
PLMA4	<i>Plantago macrocarpa</i>	4	+	—	—	—	—	—	—	—	—
SCAN3	<i>Scutellaria angustifolia</i>	—	—	—	—	—	—	—	—	29	2
TRDU2	<i>Tragopogon dubius</i>	—	—	—	—	4	+	7	+	—	—
VUMI	<i>Vulpia microstachys</i>	—	—	—	—	4	+	—	—	—	—

+ = <0.5 percent cover and is converted to 0.2 percent cover in estimating cover values.

^a Plant associations are named based on a combination of the dominant life form plus the characteristic or dominant plant species in the various plant layers (trees, shrubs, and herbs). Plant association acronyms are a shorthand form for communicating the plant association name. Each acronym is made up of the first two letters of the genus name of the dominant or characteristic species within a layer, and combined with the first two letters of the specific epithet of the species. Life form layers are separated by a slash (/) Codominants within a layer are separated by a dash (-).

^b ACTH = *Achnatherum thurberiana*, ARTR = *Artemisia tridentata*, CELE3 = *Cercocarpus ledifolius*, FEID = *Festuca idahoensis*, GUSA = *Gutierrezia sarothrae*, JUOC = *Juniperus occidentalis*, PSSP = *Pseudoroegneria spicata*, PUTR = *Purshia tridentata*.

^c Frequency is expressed as percentage of relative frequency. Vegetation cover is expressed as percentage of foliar cover. + = trace (<0.5 percent foliar cover), — = not recorded. Zero values are not included.

^d See appendix 1 for a listing of scientific and common names.

as lupine (*Lupinus* sp.), threadleaf fleabane (*Erigeron filifolius*), common yarrow (*Achillea millefolium*), and narrowleaf skullcap (*Scutellaria angustifolia*) are present in minor amounts. Native, annual herbs and grasses include slender phlox (*Microsteris gracilis*), tall annual willowherb (*Epilobium brachycarpum*), and small fescue (*Vulpia microstachys*). Introduced, nonnative herbs and grasses are conspicuous throughout the understory. These include cheatgrass (*Bromus tectorum*), spring draba (*Draba verna*), jagged chickweed (*Holosteum umbellatum*), and smooth brome (*Bromus hordaceus*) (Schuller and Canham 2016).

The second most abundant plant association in Black Canyon RNA is the *Artemisia tridentata*/*Pseudoroegneria spicata*–*Festuca idahoensis* (big sagebrush/bluebunch wheatgrass-Idaho fescue) plant association (fig. 5). It occupies 823 ha (2,033 ac) or approximately 30 percent of the RNA. The *Artemisia tridentata*/*Pseudoroegneria spicata*–*Achnatherum thurberiana* plant association occupies a variety of shallow, rocky soil types that collectively account for 582 ha (1,438 ac) or 22 percent of the RNA. Two additional vegetation communities occupy relatively small amounts of land within the RNA, but are of ecological significance: (1) the *Artemisia tridentata*–*Gutierrezia sarothrae*/*Achnatherum thurberianum*–*Pseudoroegneria spicata* (big sagebrush-broom snakeweed/Thurber’s needlegrass-bluebunch wheatgrass), which is distinguished by the high abundance of Thurber’s needlegrass relative to other native bunchgrasses in the area; and (2) a small riparian area, which is both an important area for wildlife, and supports a moderate number of plant species not present elsewhere within the RNA (Schuller and Canham 2016).

Numerous showy herbaceous species occur throughout the RNA, including Clearwater cryptantha (*Cryptantha intermedia*) (fig. 6). The RNA also supports a population of the Oregon state sensitive plant species: arrow-leaf thelypody (*Thelypodium eucosmum*) (USDA FS and USDI BLM 2015).

Fauna

Amphibians, reptiles, birds, and mammals known or expected to occur within the RNA are listed in appendix 2. These lists have been derived from published literature (Csuti et al. 1997), using species distribution, life history characteristics, and availability of habitat within the RNA as criteria for inclusion on the list.

Research History

Sutton Mountain is the site of some of the earliest paleontological exploration in the state of Oregon. In the mid- to late-1860s, Dr. Thomas Condon recovered specimens that aided in interpreting the evolution of the horse. In 1899, researchers from the University of California, Berkeley, surveyed and collected vertebrate fossils in the



Figure 5—Representative vegetation within the big sagebrush/bluebunch wheatgrass—Thurber’s needlegrass plant association within Black Canyon Research Natural Area.



Figure 6—Clearwater cryptantha (*Cryptantha intermedia*) is a conspicuous herbaceous species within Black Canyon Research Natural Area.

area. Current research on Sutton Mountain indicates that fossil localities on the mountain provide important information concerning the Haystack Member of the John Day Formation (USDI BLM 1995).

Long-term vegetation monitoring plots were established in 2016 (Schuller and Canham 2016). Four plots were established to characterize vegetation structure and composition of representative stands of *Artemisia tridentata*/*Festuca idahoensis* (big sagebrush/Idaho fescue); and *Artemisia tridentata*/*Pseudoroegneria spicata* (big sagebrush/bluebunch wheatgrass).

Disturbance History

Lightning-ignited wildfires have been a frequent part of the Sutton Mountain landscape in recent years. Table 3 summarizes recent fire history within the RNA and shows the year and size of burned area occurring within the RNA since 1999 (USDI BLM 2017). Six wildfires have been recorded for the 1999 to 2017 period. Four fires have been less than 2 ha (5 ac) in size. Two fires have burned more extensively within the RNA. In 2001, a 243-ha (600-ac) fire burned at upper elevations on Sutton Mountain. In 2001, a 54-ha (133-ac) fire also burned within the RNA.

Historical Land Use

Livestock grazing has been the predominant land use in and around the RNA since 1865. Sutton Mountain, located in the southwest portion of the RNA was named after Al Sutton, an early stockman who first moved to Wheeler County in 1865 (McArthur 1952). From that time until the early 1900s, sheep grazing was the primary grazing enterprise in Wheeler County. By 1900, approximately 12,000 sheep were grazing on lands surrounding the town of Twickenham, located just 3 km (2 mi) northeast of the RNA (Fussner 1975).

The first General Land Office survey completed within the RNA and surrounding township in 1881 described the area as “generally mountainous, broken and

Table 3—Fire history within the Black Canyon Research Natural Area, 1999–2012

Name of wildfire	Year of burn	Burn size
234	2012	2 ha (5 ac)
235	2012	0.04 ha (0.1 ac)
322	2011	243 ha (600 ac)
Sutton	2003	0.04 ha (0.1 ac)
719	2001	54 ha (134 ac)
Rim	1999	0.9 ha (2 ac)

rocky” with “good agricultural land” in creek valleys. The cadastral survey map from this time also indicates two homesteads within the RNA: “E. Bailey’s House” and the “Robinson House” (USDI BLM 1881 to present). Both homes were located in the uplands, suggesting they were used for grazing and not agricultural purposes.

There were many failed and few successful attempts to homestead the RNA and surrounding area from 1900 to 1919, at which point stock raising homestead entries began to dominate land claims in and around the RNA until 1931. Oil and gas leases dominated land claims after that period (USDI BLM 1881 to present).

Maps

Maps applicable to Black Canyon RNA: Topographic—Sutton Mountain, 7.5 minute; 1:24,000 scale, 1987 (provisional edition); BLM Sutton Mountain and Pat’s Cabin Wilderness Study Area map, 2011.

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U.S. Equivalents

When you know:	Multiply by:	To find:
Millimeters (mm)	0.0394	Inches
Centimeters (cm)	0.394	Inches
Meters (m)	3.28	Feet
Kilometers (km)	0.62	Miles
Hectares (ha)	2.471	Acres
Square meters (m ²)	10.76	Square feet
Degrees Fahrenheit (°F)	(°F – 32)/1.8	Degrees Celsius (°C)

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Appendix 1: Plants ^{a b}

Scientific name	Common name
Trees:	
<i>Cercocarpus ledifolius</i> Nutt. ex Torr. & A. Gray var. <i>ledifolius</i> ^c	Curl-leaf mountain mahogany
<i>Juniperus occidentalis</i> Hook.	Western juniper
<i>Pinus ponderosa</i> Dougl. ex C. Lawson var. <i>ponderosa</i>	Ponderosa pine
Tall shrubs >2 m (6.6 ft) tall:	
<i>Amelanchier alnifolia</i> (Nutt.) Nutt. ex M. Roem.	Saskatoon serviceberry
<i>Betula occidentalis</i> Hook.	Water birch
<i>Celtis reticulata</i> Torr.	Netleaf hackberry
<i>Cornus sericea</i> L.	Redosier dogwood
<i>Holodiscus microphyllus</i> Rydb. var. <i>glabrescens</i> (Greenm.) F.A. Ley	Oceanspray
<i>Philadelphus lewisii</i> Pursh	Lewis' mock orange
<i>Prunus virginiana</i> L. var. <i>melanocarpa</i> (A. Nelson) Sarg.	Black chokecherry
<i>Salix amygdaloides</i> Andersson	Peachleaf willow
<i>Salix</i> sp.	Willow
Medium shrubs 0.5 to 2 m (1.6 to 6.6 ft) tall:	
<i>Artemisia tridentata</i> Nutt.	Big sagebrush
<i>Artemisia tridentata</i> Nutt. ssp. <i>wyomingensis</i> Beetle & Young	Wyoming big sagebrush
<i>Atriplex confertifolia</i> (Torr. & Frém.) S. Watson	Shadscale saltbush
<i>Chrysothamnus humilis</i> Greene	Truckee rabbitbrush
<i>Chrysothamnus viscidiflorus</i> (Hook.) Nutt.	Yellow rabbitbrush
<i>Ericameria nauseosa</i> (Pall. ex Pursh) G.L. Nesom & G.I. Baird	Rubber rabbitbrush
<i>Grayia spinosa</i> (Hook.) Moq.	Spiny hopsage
<i>Gutierrezia sarothrae</i> (Pursh) Britton & Rusby	Broom snakeweed
<i>Linanthus pungens</i> (Torr.) J.M. Porter & L.A. Johnson	Granite prickly phlox
<i>Purshia tridentata</i> (Pursh) DC.	Antelope bitterbrush
<i>Ribes cereum</i> Douglas var. <i>cereum</i>	Wax currant
<i>Ribes lacustre</i> (Pers.) Poir.	Prickly currant
<i>Rosa woodsii</i> Lindl. var. <i>ultramontana</i> (S. Watson) Jeps.	Woods' rose
<i>Sarcobatus vermiculatus</i> (Hook.) Torr.	Greasewood
<i>Salvia dorrii</i> (Kellogg) Abrams var. <i>incana</i> (Benth.) Strachan	Purple sage
<i>Tetradymia canescens</i> DC.	Spineless horsebrush
Low shrubs <0.5 m (1.6 ft) tall:	
<i>Brickellia oblongifolia</i> Nutt. var. <i>oblongifolia</i>	Mojave brickellbush
<i>Ericameria resinosa</i> Nutt.	Columbian goldenbush

Scientific name	Common name
<i>Toxicodendron rydbergii</i> (Small ex Rydb.) Greene	Western poison ivy
Ferns:	
<i>Cystopteris fragilis</i> (L.) Bernh.	Brittle bladderfern
Forbs:	
<i>Achillea millefolium</i> L.	Common yarrow
<i>Agoseris heterophylla</i> (Nutt.) Greene	Annual agoseris
<i>Allium tolmiei</i> Baker	Tolmie's onion
<i>Alyssum alyssoides</i> (L.) L.	Pale madwort
<i>Amsinckia lycopoides</i> Lehm.	Tarweed fiddleneck
<i>Amsinckia tessellata</i> A. Gray	Bristly fiddleneck
<i>Antennaria</i> sp.	Pussytoes
<i>Antennaria dimorpha</i> (Nutt.) Torr. & A. Gray	Low pussytoes
<i>Antennaria pulvinata</i> Greene	Rosy pussytoes
<i>Aquilegia formosa</i> Fisch. ex DC.	Western columbine
<i>Arabis eschscholtziana</i> Andr.	Eschscholtz's hairy rockcress
<i>Arceuthobium campylopodum</i> Engelm.	Western dwarf mistletoe
<i>Asclepias speciosa</i> Torr.	Showy milkweed
<i>Astragalus diaphanus</i> Douglas ex Hook. var. <i>diaphanus</i>	Transparent milkvetch
<i>Astragalus filipes</i> Torr. ex A. Gray	Basalt milkvetch
<i>Astragalus lentiginosus</i> Douglas var. <i>chartaceus</i> M.E. Jones	Broadleaf milkvetch
<i>Astragalus purshii</i> Douglas ex Hook.	Woollypod milkvetch
<i>Boechera</i> sp.	Rockcress
<i>Boechera pauciflora</i> (Nutt.) Windham & Al-Shehbaz	Hairystem rockcress
<i>Boechera pendulocarpa</i> (A. Nelson) Windham & Al-Shehbaz	Dropseed rockcress
<i>Calochortus macrocarpus</i> Douglas	Sagebrush mariposa lily
<i>Castilleja tenuis</i> (A. Heller) T.I. Chuang & Heckard	Hairy Indian paintbrush
<i>Castilleja xanthotricha</i> Pennell	Yellowhair Indian paintbrush
<i>Centaurea stoebe</i> L. ssp. <i>Micranthos</i> (Gugler) Hayek	Spotted knapweed
<i>Ceratocephala testiculata</i> (Crantz) Roth	Curveseed butterwort
<i>Chaenactis douglasii</i> (Hook.) Hook. & Arn.	Douglas' dustymaiden
<i>Chaenactis nevii</i> A. Gray	John Day's pincushion
<i>Chenopodium fremontii</i> S. Watson	Fremont's goosefoot
<i>Cirsium arvense</i> (L.) Scop.	Canada thistle
<i>Claytonia perfoliata</i> Donn ex Willd.	Miner's lettuce
<i>Clematis ligusticifolia</i> Nutt.	Western white clematis
<i>Collinsia parviflora</i> Douglas ex Lindl.	Maiden blue-eyed Mary
<i>Collomia grandiflora</i> Douglas ex Lindl.	Grand collomia

Scientific name	Common name
<i>Collomia linearis</i> Nutt.	Tiny trumpet
<i>Crepis atriobarba</i> A. Heller	Slender hawksbeard
<i>Cryptantha ambigua</i> (A. Gray) Greene	Basin cryptantha
<i>Cryptantha intermedia</i> (A. Gray) Greene	Clearwater cryptantha
<i>Cryptantha torreyana</i> (A. Gray) Greene	Torrey's cryptantha
<i>Dalea ornata</i> (Douglas ex Hook.) Eaton & Wright	Blue Mountain prairie clover
<i>Daucus carota</i> L.	Queen Anne's lace
<i>Delphinium nuttallianum</i> Pritz. ex Walp.	Twolobe larkspur
<i>Descurainia pinnata</i> (Walter) Britton	Western tansymustard
<i>Dieteria canescens</i> (Pursh) Nutt.	Hoary tansyaster
<i>Diplacus cusickii</i> (Greene) G.L. Nesom	Cusick's monkeyflower
<i>Diplacus nanus</i> (Hook. & Arn.) G.L. Nesom	Dwarf purple monkeyflower
<i>Dipsacus fullonum</i> L.	Fuller's teasel
<i>Dodecatheon pulchellum</i> (Raf.) Merr.	Darkthroat shootingstar
<i>Draba verna</i> L.	Spring draba
<i>Epilobium brachycarpum</i> C. Presl	Tall annual willowherb
<i>Equisetum arvense</i> L.	Field horsetail
<i>Equisetum laevigatum</i> A. Braun	Smooth horsetail
<i>Eriastrum wilcoxii</i> (A. Nelson) H. Mason	Wilcox's woollystar
<i>Erigeron chrysopsidis</i> A. Gray	Dwarf yellow fleabane
<i>Erigeron filifolius</i> (Hook.) Nutt.	Threadleaf fleabane
<i>Erigeron linearis</i> (Hook.) Piper	Desert yellow fleabane
<i>Erigeron pumilus</i> Nutt. var. <i>intermedius</i> Cronquist	Shaggy fleabane
<i>Erigeron speciosus</i> (Lindl.) DC.	Aspen fleabane
<i>Eriogonum compositum</i> Douglas ex Benth	Arrowleaf buckwheat
<i>Eriogonum microtheca</i> Nutt. var. <i>laxiflorum</i> Hook.	Slender buckwheat
<i>Eriogonum strictum</i> Benth. var. <i>proliferum</i> (Torr. & A. Gray) C.L. Hitchc.	Blue Mountain buckwheat
<i>Eriogonum umbellatum</i> Torr.	Sulphur-flower buckwheat
<i>Eriogonum vimineum</i> Douglas ex. Benth.	Wickerstem buckwheat
<i>Eriophyllum lanatum</i> (Pursh) J. Forbes	Common woolly sunflower
<i>Erodium cicutarium</i> (L.) L'Hér. Ex Aiton	Redstem stork's bill
<i>Erysimum repandum</i> L.	Spreading wallflower
<i>Erythranthe guttata</i> (Fisch. ex DC.) G.L. Nesom	Seep monkeyflower
<i>Fritillaria atropurpurea</i> Nutt.	Spotted fritillary
<i>Galium aparine</i> L.	Stickywilly
<i>Gayophytum ramosissimum</i> Torr. & A. Gray	Pinyon groundsmoke

Scientific name	Common name
<i>Gilia sinuata</i> Douglas ex Benth	Rosy gilia
<i>Heracleum maximum</i> W. Bartram	Common cowparsnip
<i>Hesperolinon micranthum</i> (A. Gray) Small	Smallflower dwarf-flax
<i>Heterotheca villosa</i> (Pursh) Shinnery var. <i>villosa</i>	Hairy false goldenaster
<i>Heuchera cylindrica</i> Douglas	Roundleaf alumroot
<i>Holosteum umbellatum</i> L.	Jagged chickweed
<i>Hymenopappus filifolius</i> Hook.	Fineleaf hymenopappus
<i>Layia glandulosa</i> (Hook.) Hook. & Arn.	Whitedaisy tidytips
<i>Lewisia rediviva</i> Pursh	Bitter root
<i>Linaria dalmatica</i> (L.) Mill.	Dalmatian toadflax
<i>Lithophragma parviflorum</i> (Hook.) Nutt. ex Torr. & A. Gray	Smallflower woodland-star
<i>Lithospermum ruderales</i> Douglas ex Lehm.	Western stoneseed
<i>Lomatium papilioniferum</i> J.A. Alexander & W. Whaley	Gray's biscuitroot
<i>Lomatium triternatum</i> (Pursh) J.M. Coulter & Rose	Nineleaf biscuitroot
<i>Lupinus lepidus</i> Douglas ex Lindl. var. <i>aridus</i> (Lindl.) Jeps.	Desert lupine
<i>Malus</i> sp.	Apple
<i>Melilotus officinalis</i> (L.) Pall.	Sweetclover
<i>Mentzelia albicaulis</i> (Douglas ex Hook.) Douglas ex Torr. & A. Gray	Whitestem blazingstar
<i>Mentzelia laevicaulis</i> (Douglas ex Hook.) Torr. & A. Gray var. <i>laevicaulis</i>	Smoothstem blazingstar
<i>Microseris nutans</i> (Hook.) Sch. Bip.	Nodding microseris
<i>Microsteris gracilis</i> (Hook.) Greene	Slender phlox
<i>Montia parviflora</i> (Moench ex DC.) Greene	Streambank springbeauty
<i>Nasturtium officinale</i> W.T. Aiton	Watercress
<i>Nothocalais troximoides</i> (A. Gray) Greene	Sagebrush false dandelion
<i>Opuntia fragilis</i> (Nutt.) Haw.	Brittle pricklypear
<i>Orobanchefasciculata</i> Nutt.	Clustered broomrape
<i>Penstemon deustus</i> Douglas ex Lindl. var. <i>variabilis</i> (Sukhsd.) Cronquist	Scabland penstemon
<i>Penstemon eriantherus</i> Pursh var. <i>argillosus</i> M.E. Jones	Fuzzytongue penstemon
<i>Phacelia hastata</i> Douglas ex Lehm. var. <i>hastata</i>	Silverleaf phacelia
<i>Phacelia linearis</i> (Pursh) Holz.	Threadleaf phacelia
<i>Phlox longifolia</i> Nutt.	Longleaf phlox
<i>Plagiobothrys tenellus</i> (Nutt.) A. Gray	Pacific popcornflower
<i>Plectritis macrocera</i> Torr. & A. Gray	Longhorn plectritis
<i>Potentilla</i> sp.	Cinquefoil
<i>Potentilla gracilis</i> Douglas ex Hook.	Slender cinquefoil
<i>Pyrrocoma hirta</i> (A. Gray) Greene	Tacky goldenweed

Scientific name	Common name
<i>Rumex crispus</i> L.	Curly dock
<i>Salsola tragus</i> L.	Prickly Russian thistle
<i>Scutellaria angustifolia</i> Pursh	Narrowleaf skullcap
<i>Senecio integerrimus</i> Nutt. var. <i>exaltatus</i> (Nutt.) Cronquist	Columbia ragwort
<i>Sisymbrium altissimum</i> L.	Tall tumbled mustard
<i>Solidago missouriensis</i> Nutt.	Missouri goldenrod
<i>Taraxacum officinale</i> Weber ex F.H. Wigg.	Common dandelion
<i>Thelypodium eucosmum</i> B.L. Rob.	Arrow-leaf thelypod
<i>Toxicoscordion paniculatum</i> (Nutt.) Rydb.	Foothill deathcamas
<i>Toxicoscordion venenosum</i> (S. Watson) Rydb.	Meadow deathcamas
<i>Tragopogon dubius</i> Scop.	Yellow salsify
<i>Tribulus terrestris</i> L.	Puncturevine
<i>Typha latifolia</i> L.	Broadleaf cattail
<i>Urtica dioica</i> L. <i>holosericea</i> (Nutt.) Thorne	Stinging nettle
<i>Verbascum thapsus</i> L.	Common mullein
<i>Veronica anagallis-aquatica</i> L.	Water speedwell
Grasses, rushes, and sedges:	
<i>Achnatherum hymenoides</i> (Roem. & Schult.) Barkworth	Indian ricegrass
<i>Achnatherum occidentale</i> (Thurb.) Barkworth	Western needlegrass
<i>Achnatherum thurberianum</i> (Piper) Barkworth	Thurber's needlegrass
<i>Agropyron cristatum</i> (L.) Gaertn.	Crested wheatgrass
<i>Bromus briziformis</i> Fisch. & C.A. Mey.	Rattlesnake brome
<i>Bromus hordeaceus</i> L.	Soft brome
<i>Bromus tectorum</i> L.	Cheatgrass
<i>Carex amplifolia</i> Boott	Bigleaf sedge
<i>Carex aurea</i> Nutt.	Golden sedge
<i>Carex hystericina</i> Muhl. ex Willd.	Bottlebrush sedge
<i>Carex microptera</i> Mack.	Smallwing sedge
<i>Carex nebrascensis</i> Dewey	Nebraska sedge
<i>Carex nudata</i> W. Boott	Naked sedge
<i>Elymus elymoides</i> (Raf.) Swezey	Bottlebrush squirreltail
<i>Festuca idahoensis</i> Elmer	Idaho fescue
<i>Hesperostipa comata</i> (Trin. & Rupr.) Barkworth ssp. <i>comata</i>	Needle and thread
<i>Juncus dudleyi</i> Wiegand	Dudley's rush
<i>Juncus nevadensis</i> S. Watson var. <i>nevadensis</i>	Sierra rush
<i>Koeleria macrantha</i> (Ledeb.) Schult.	Prairie junegrass
<i>Leymus cinereus</i> (Scribn. & Merr.) Á. Löve	Basin wildrye
<i>Pascopyrum smithii</i> (Rydb.) Barkworth & D. R. Dewey	Western wheatgrass

Scientific name	Common name
<i>Poa bulbosa</i> L.	Bulbous bluegrass
<i>Poa cusickii</i> Vasey ssp. <i>cusickii</i>	Cusick's bluegrass
<i>Poa pratensis</i> L.	Kentucky bluegrass
<i>Poa secunda</i> J. Presl ssp. <i>juncifolia</i> (Scribn.) Soreng	Big bluegrass
<i>Poa secunda</i> J. Presl ssp. <i>secunda</i>	Sandberg bluegrass
<i>Pseudoroegneria spicata</i> (Pursh) Á. Löve	Bluebunch wheatgrass
<i>Schoenoplectus americanus</i> (Pers.) Volkart ex Schinz & R. Keller	Chairmaker's bulrush
<i>Sporobolus cryptandrus</i> (Torr.) A. Gray	Sand dropseed
<i>Taeniatherum caput-medusae</i> (L.) Nevski	Medusahead
<i>Thinopyrum intermedium</i> (Host) Barkworth & D. R. Dewey	Intermediate wheatgrass
<i>Vulpia microstachys</i> (Nutt.) Munro ex Benth.	Small fescue

^a Nomenclature for vascular plants, ferns, and fern-allies follows Oregon vascular plant checklist: <http://www.oregonflora.org/checklist.php>. Version 1.6 (Jaster et al. (2017). Common names are taken from the USDA PLANTS Database. <http://www.plants.gov> (USDA NRCS 2017a).

^b Compiled from field surveys (Schuller et al. 2016, USDI BLM 2008).

^c *Cercocarpus ledifolius* occurs in both tree form and shrub form within the research natural area.

Appendix 2: Amphibians, Reptiles, Birds, and Mammals^{a b}

Family	Scientific name	Common name
Amphibians:		
Bufonidae	<i>Bufo boreas</i>	Western toad
Hylidae	<i>Pseudacris regilla</i>	Pacific chorus frog
Pleobatidae	<i>Scaphiopus intermontanus</i>	Great Basin spadefoot
Reptiles:		
Anguidae	<i>Elgaria multicarinata</i>	Southern alligator lizard
Boidae	<i>Charina bottae</i>	Rubber boa
Colubridae	<i>Coluber constrictor</i>	Racer
	<i>Hypsiglena torquata</i>	Night snake
	<i>Masticophis taeniatus</i>	Striped whipsnake
	<i>Pituophis melanoleucus</i>	Gopher snake
	<i>Thamnophis elegans</i>	Western terrestrial garter snake
	<i>Thamnophis sirtalis</i>	Common garter snake
	<i>Phrynosoma douglasii</i>	Short-horned lizard
Iguanidae	<i>Sceloporus graciosus</i>	Sagebrush lizard
	<i>Sceloporus occidentalis</i>	Western fence lizard
	<i>Uta stansburiana</i>	Side-blotched lizard
	<i>Eumeces skiltonianus</i>	Western skink
Teiidae	<i>Cnemidophorus velox</i>	Plateau striped whiptail
Viperidae	<i>Crotalus viridis</i>	Western rattlesnake
Birds:		
Accipitridae	<i>Accipiter cooperii</i>	Cooper's hawk
	<i>Accipiter gentilis</i>	Northern goshawk
	<i>Accipiter striatus</i>	Sharp-shinned hawk
	<i>Aquila chrysaetos</i>	Golden eagle
	<i>Buteo jamaicensis</i>	Red-tailed hawk
	<i>Circus cyaneus</i>	Northern harrier
	<i>Haliaeetus leucocephalus</i>	Bald eagle
	<i>Pandion haliaetus</i>	Osprey
Cathartidae	<i>Cathartes aura</i>	Turkey vulture
Falconidae	<i>Falco mexicanus</i>	Prairie falcon
	<i>Falco peregrinus</i>	Peregrine falcon
	<i>Falco sparverius</i>	American kestrel

Family	Scientific name	Common name
Phasianidae	<i>Alectoris chukar</i>	Chukar
	<i>Callipepla californica</i>	California quail
	<i>Oreortyx pictus</i>	Mountain quail
	<i>Perdix perdix</i>	Gray partridge
Charadriidae	<i>Charadrius vociferous</i>	Killdeer
Columbidae	<i>Columbia livia</i>	Rock dove
	<i>Zenaida macroura</i>	Mourning dove
Tytonidae	<i>Tyto alba</i>	Barn owl
Strigidae	<i>Asio otus</i>	Long-eared owl
	<i>Athene cunicularia</i>	Burrowing owl
	<i>Bubo virginianus</i>	Great-horned owl
	<i>Glaucidium gnoma</i>	Northern pygmy owl
	<i>Otus kennicottii</i>	Western screech-owl
Caprimulgidae	<i>Chordeiles minor</i>	Common nighthawk
Apodidae	<i>Aeronautes saxatalis</i>	White-throated swift
	<i>Chaetura vauxi</i>	Vaux's swift
Trochilidae	<i>Archilochus alexandri</i>	Black-chinned hummingbird
	<i>Stellula calliope</i>	Calliope hummingbird
	<i>Selasphorus rufus</i>	Rufous hummingbird
Picidae	<i>Colaptes auratus</i>	Northern flicker
	<i>Picoides pubescens</i>	Downy woodpecker
	<i>Picoides villosus</i>	Hairy woodpecker
	<i>Sphyrapicus nuchalis</i>	Red-naped sapsucker
Tyrannidae	<i>Contopus sordidulus</i>	Western wood peewee
	<i>Empidonax oberholseri</i>	Dusky flycatcher
	<i>Empidonax wrightii</i>	Gray flycatcher
	<i>Sayornis saya</i>	Say's phoebe
	<i>Myiarchus cinerascens</i>	Ash-throated flycatcher
	<i>Tyrannus verticalis</i>	Western kingbird
Alaudidae	<i>Eremophila alpestris</i>	Horned lark
Hirundinidae	<i>Hirundo pyrrhonota</i>	Cliff swallow
	<i>Hirundo rustica</i>	Barn swallow
	<i>Stelgidopteryx serripennis</i>	Northern rough-winged swallow
	<i>Tachycineta bicolor</i>	Tree swallow
	<i>Tachycineta thalassina</i>	Violet-green swallow
Corvidae	<i>Aphelocoma californica</i>	Western scrub-jay

Family	Scientific name	Common name
	<i>Corvus brachyrhynchos</i>	American crow
	<i>Corvus corax</i>	Common raven
	<i>Cyanocitta stelleri</i>	Steller's jay
	<i>Gymnorhinus cyanocephalus</i>	Pinyon jay
	<i>Nucifraga columbiana</i>	Clark's nutcracker
	<i>Pica pica</i>	Black-billed magpie
Paridae	<i>Parus atricapillus</i>	Black-capped chickadee
	<i>Parus gambeli</i>	Mountain chickadee
Aegithalidae	<i>Psaltriparus minimus</i>	Bushtit
Sittidae	<i>Sitta canadensis</i>	Red-breasted nuthatch
Troglodytidae	<i>Catherpes mexicanus</i>	Canyon wren
	<i>Salpinctes obsoletus</i>	Rock wren
	<i>Troglodytes aedon</i>	House wren
Muscicapidae	<i>Myadestes townsendi</i>	Townsend's solitaire
	<i>Sialia mexicana</i>	Western bluebird
	<i>Sialia currucoides</i>	Mountain bluebird
	<i>Turdus migratorius</i>	American robin
Mimidae	<i>Oreoscoptes montanus</i>	Sage thrasher
Bombycillidae	<i>Bombycilla cedrorum</i>	Cedar waxwing
Laniidae	<i>Lanius ludovicianus</i>	Loggerhead shrike
Sturnidae	<i>Sturnus vulgaris</i>	European starling
Vireonidae	<i>Vireo solitarius</i>	Blue-headed vireo
Emberizidae	<i>Agelaius phoeniceus</i>	Red-winged blackbird
	<i>Chondestes grammacus</i>	Lark sparrow
	<i>Dendroica coronata</i>	Yellow-rumped warbler
	<i>Dendroica nigrescens</i>	Black-throated gray warbler
	<i>Euphagus cyanocephalus</i>	Brewer's blackbird
	<i>Icterus bullockii</i>	Bullock's oriole
	<i>Junco hyemalis</i>	Dark-eyed junco
	<i>Molothrus ater</i>	Brown-headed cowbird
	<i>Passerculus sandwichensis</i>	Savannah sparrow
	<i>Passerella iliaca</i>	Fox sparrow
	<i>Pipilo chlorurus</i>	Green-tailed towhee
	<i>Pipilo maculatus</i>	Spotted towhee
	<i>Pooecetes gramineus</i>	Vesper sparrow
	<i>Spizella breweri</i>	Brewer's sparrow

Family	Scientific name	Common name
Fringillidae	<i>Spizella passerina</i>	Chipping sparrow
	<i>Sturnella neglecta</i>	Western meadowlark
	<i>Zonotrichia leucophrys</i>	White-crowned sparrow
	<i>Carduelis pinus</i>	Pine siskin
	<i>Carduelis psaltria</i>	Lesser goldfinch
	<i>Carduelis tristis</i>	American goldfinch
	<i>Carpodacus cassinii</i>	Cassin's finch
	<i>Carpodacus mexicanus</i>	House finch
Mammals:		
Soricidae	<i>Sorex merriami</i>	Merriam's shrew
	<i>Sorex preblei</i>	Preble's shrew
	<i>Sorex vagrans</i>	Vagrant shrew
Talpidae	<i>Scapanus orarius</i>	Coast mole
Vespertilionidae	<i>Antrozous pallidus</i>	Pallid bat
	<i>Corynorhinus townsendii</i>	Townsend's big-eared bat
	<i>Eptesicus fuscus</i>	Big brown bat
	<i>Lasionycteris noctivagans</i>	Silver-haired bat
	<i>Myotis californicus</i>	California myotis
	<i>Myotis ciliolabrum</i>	Western small-footed myotis
	<i>Myotis evotis</i>	Long-eared myotis
	<i>Myotis lucifugus</i>	Little brown myotis
	<i>Myotis thysanodes</i>	Fringed myotis
	<i>Myotis volans</i>	Long-legged myotis
	<i>Myotis yumanensis</i>	Yuma myotis
Leporidae	<i>Lepus californicus</i>	Black-tailed jackrabbit
	<i>Sylvilagus nuttallii</i>	Mountain cottontail
Sciuridae	<i>Spermophilus beecheyi</i>	California ground squirrel
	<i>Spermophilus beldingi</i>	Belding's ground squirrel
	<i>Spermophilus townsendii</i>	Townsend's ground squirrel
	<i>Tamias townsendii</i>	Townsend's chipmunk
Geomyidae	<i>Thomomys talpoides</i>	Northern pocket gopher
Heteromyidae	<i>Dipodomys ordii</i>	Ord's kangaroo rat
	<i>Perognathus parvus</i>	Great Basin pocket mouse
Muridae	<i>Lemmys curtatus</i>	Sagebrush vole
	<i>Marmota flaviventris</i>	Yellow-bellied marmot
	<i>Microtus longicaudus</i>	Long-tailed vole
	<i>Neotoma cinerea</i>	Bushy-tailed woodrat
	<i>Onychomys leucogaster</i>	Northern grasshopper mouse

Family	Scientific name	Common name
	<i>Peromyscus crinitus</i>	Canyon mouse
	<i>Peromyscus maniculatus</i>	Deer mouse
	<i>Peromyscus truei</i>	Pinyon mouse
Erethizontidae	<i>Erethizon dorsatum</i>	Common porcupine
Canidae	<i>Canis latrans</i>	Coyote
	<i>Vulpes vulpes</i>	Red fox
Procyonidae	<i>Procyon lotor</i>	Common raccoon
Mustelidae	<i>Mephitis mephitis</i>	Striped skunk
	<i>Mustela frenata</i>	Long-tailed weasel
	<i>Spilogale gracilis</i>	Western spotted skunk
	<i>Taxidea taxus</i>	American badger
Felidae	<i>Felis concolor</i>	Mountain lion
	<i>Lynx rufus</i>	Bobcat
Cervidae	<i>Odocoileus hemionus</i>	Mule deer
	<i>Cervus canadensis nelsoni</i>	Rocky Mountain elk

^a Nomenclature taken from Csuti et al. 1997.

^b Compiled from habitat descriptions and distribution maps in Csuti et al. (1997).

Pacific Northwest Research Station

Website	http://www.fs.fed.us/pnw
Telephone	(503) 808-2592
Publication requests	(503) 808-2138
FAX	(503) 808-2130
E-mail	pnw_pnwpubs@fs.fed.us
Mailing address	Publications Distribution Pacific Northwest Research Station P.O. Box 3890 Portland, OR 97208-3890



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