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Forest Creeks Research Natural Area

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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 Photo: Forest Creeks Research Natural Area.

All photos were taken by the authors.

Abstract

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This guidebook describes Forest Creeks Research Natural Area, a 164-ha (405-ac) area comprising two geographically distinct canyons and associated drainages. The two units have been established as examples of first- to third-order streams originating within a ponderosa pine (*Pinus ponderosa*) zone. The two riparian areas also represent examples of the mountain alder-redosier dogwood (*Alnus incana-Cornus sericea* ssp. *sericea*), and the redosier dogwood-mockorange (*Cornus sericea* ssp. *sericea-Philadelphus lewisii*) plant associations.

Keywords: Research natural area, first- to third-order stream, mountain alder-redosier dogwood plant association, *Alnus incana-Cornus sericea* ssp. *sericea* plant association, redosier dogwood-mockorange plant association, *Cornus sericea* ssp. *sericea-Philadelphus lewisii* plant association, riparian vegetation, area of critical environmental concern.

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.

Scientists and educators wishing to visit or use the RNA for scientific or educational purposes should contact the Prineville BLM field office manager in advance and provide information about research or educational objectives, sampling procedures, and other prospective activities. Research projects, educational visits, and collection of specimens from the RNA all require prior approval. There may be limitations on research or educational activities.

Forest Creeks RNA is part of a federal system of such tracts established for research and educational purposes. Each RNA is a site where natural features are protected or managed for scientific purposes and natural processes are allowed to dominate. Their main purposes are to provide:

- Baseline areas against which effects of human activities can be measured or compared.
- Sites for study of natural processes in undisturbed ecosystems.
- Gene pool preserves for all types of organisms, especially rare and endangered types.

The federal system is outlined in *A Directory of the Research Natural Areas on Federal Lands of the United States of America*.²

Of the 183 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). Supplements to the guidebook such as this publication constitute additions to this document.

The guiding principle in management of RNAs is to prevent unnatural encroachments or activities that directly or indirectly modify ecological processes or conditions. Logging and uncontrolled grazing are not allowed, for example, nor is public use that might impair scientific or educational values. Management practices necessary to maintain or restore ecosystems may be allowed (Wilson et al. 2009).

¹ Supplement No. 39 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 Federal Committee on Ecological Reserves. 1977. A directory of the research natural areas on federal lands of the United States of America. Washington, DC: U.S. Department of Agriculture, Forest Service. [Irregular pagination].

Federal RNAs provide a unique system of publicly owned and protected examples of undisturbed 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. In return, a scientist wishing to use an RNA is obligated to:

- Obtain permission from the appropriate administering agency before using the area.³
- 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 these limitations is to:

- Ensure that the scientific and educational values of the tract are not impaired.
- Accumulate a documented body of knowledge and information about the tract.
- Avoid conflict between studies and activities.

Research must be essentially nondestructive; destructive analysis of vegetation is generally not allowed, nor are studies requiring extensive modification of the forest floor or extensive excavation of soil. Collection of plant and animal specimens is generally restricted to the minimum necessary to provide voucher specimens and other research needs. Under no circumstances may collecting significantly reduce populations of species. Collecting must also be carried out in accordance with agency regulations. Within these broad guidelines, appropriate uses of RNAs are determined by the administering agency.

Research natural areas are available for short- or long-term scientific study, research, and education and serve as a baseline against which human impacts on natural ecosystems can be measured.

³ 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.

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Introduction

The paper is one of a series describing research natural areas in Oregon and Washington (see Franklin et al. 1972). Forest Creeks Research Natural Area (RNA) is a 164-ha (405-ac)¹ area comprising two stream reaches within Fox Canyon and Rough Canyon, in Crook County, Oregon. Both drainages are tributaries to the North Fork Crooked River. These two units were established as a research natural area and as an area of critical environmental concern in 1989 with publication of the Brothers/LaPine Resource Management Plan Record of Decision (USDI BLM 1989). This designation was reaffirmed in the 2005 Upper Deschutes Resource Management Plan (USDI BLM 2005).

The area was established to serve as an example of first- to third-order streams originating in a ponderosa pine (*Pinus ponderosa*) zone (see app. 1 for species names), and also to represent an example of the mountain alder-redosier dogwood (*Alnus incana*-*Cornus sericea* ssp. *sericea*), and the redosier dogwood-mockorange (*Cornus sericea* ssp. *sericea*-*Philadelphus lewisii*) riparian plant associations. The RNA is located in the extreme southern portion of the Blue Mountains Ecological Province in central Oregon (ONHP 2003).

Access and Accommodations

From downtown Prineville, Oregon, proceed east on U.S. Highway 26 to intersection with Combs Flat Road (State Route 380) (fig. 1). Turn south and proceed on paved road (not marked with highway signs after leaving Prineville) for 55.4 km (34.4 mi). Turn left (north) onto Teaters Road (gravel/dirt) and reset trip odometer to 0. Proceed for 7.2 km (4.5 mi) and turn left at fork in the road. Continue for 2.3 km (1.4 mi) (9.5 km/5.9 mi on odometer) and take the right fork (do not take road 4235 to the left) and proceed to 10.6 km (6.6 mi) on odometer over cattle guard and take a right turn. Continue to 12.4 km (7.7 mi) on odometer, and take the right fork (do not go uphill). At this point, there is a Bureau of Land Management (BLM) gate that is locked from December 1 to May 1 each year. Continue through the gate to 13.2 km (8.2 mi) on odometer, and take the left fork (do not go downhill at this point). Cross cattle guards at 14.0 km (8.7 mi), 15.4 km (9.6 mi), and 23.7 km (14.7 mi). At 25.7 km (16.0 mi), stop and park vehicle. The Rough Canyon unit of the RNA is located south of the parking area in S30 T15S R22E (fig. 2).

¹ These data are on file at the Prineville District office of the Bureau of Land Management, and at the USDA Forest Service, Pacific Northwest Research Station, Corvallis, Oregon.

To reach the Fox Canyon unit of the RNA, continue from the Rough Canyon parking area on the same road to 31.9 km (19.8 mi). Take the right fork, and continue to 33.3 km (20.7 mi) on the odometer. Park vehicle next to road, and walk 100 m (328 ft) northeast to the rim of Fox Canyon RNA located in NW¼ NW¼ S30 T15S R22E (fig. 2).

Permission to access the RNA for research or educational purposes is required prior to visiting the area. Inquiries should be directed to the Prineville District office, Bureau of Land Management in Prineville, Oregon. Road conditions and access can vary greatly with rain and snow conditions. Check with the Prineville District office prior to attempting access into the area. Lodging is available in Prineville, Oregon.

Environment

Elevations in the Rough Canyon unit range from 1201 m (3,940 ft) along the drainage channel in the southeast portion of the tract to 1372 m (4,500 ft) along the north-northwest boundary. Upper elevation slopes are gentle to moderate but drop more steeply into Rough Canyon along lower slope segments. Steep slopes are

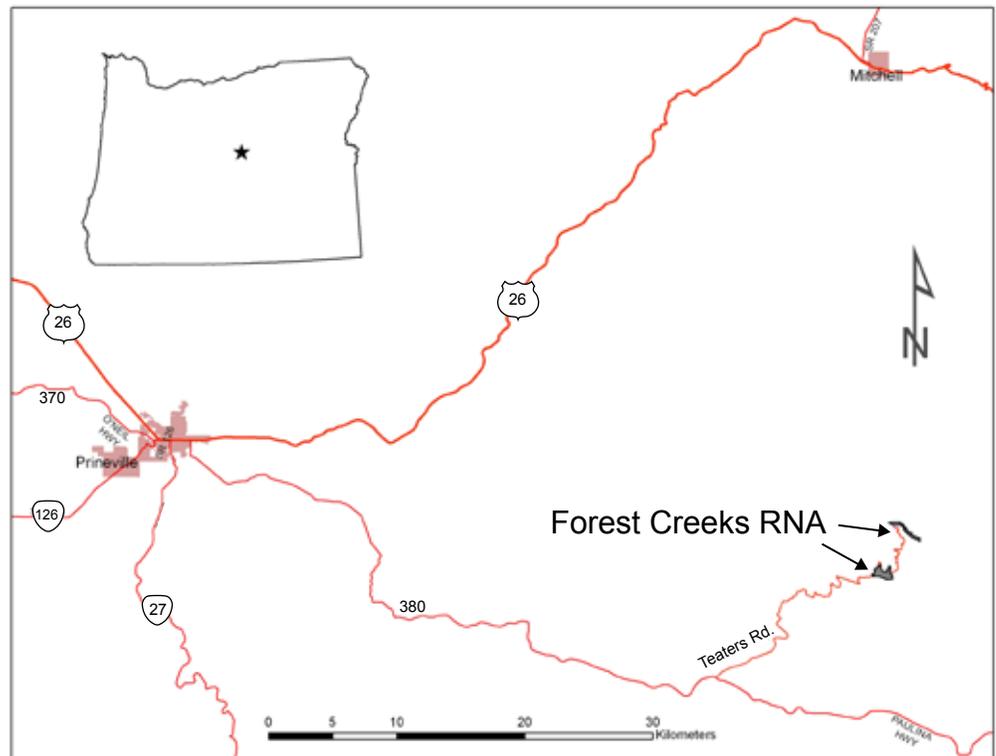


Figure 1—Forest Creeks Research Natural Area location and access.

typically composed of basalt talus. The Fox Canyon unit ranges from 1274 m (4,180 ft) elevation in the drainage bottom along the east boundary of the tract to 1372 m (4,500 ft) in the northwestern part of the tract. Side-slope steepness and length are similar to those in the Rough Canyon unit (fig 2).

Slopes are oriented northwest-southeast, and streamflow is generally to the southeast in both units. Both drainage basins are dissected into gently sloping

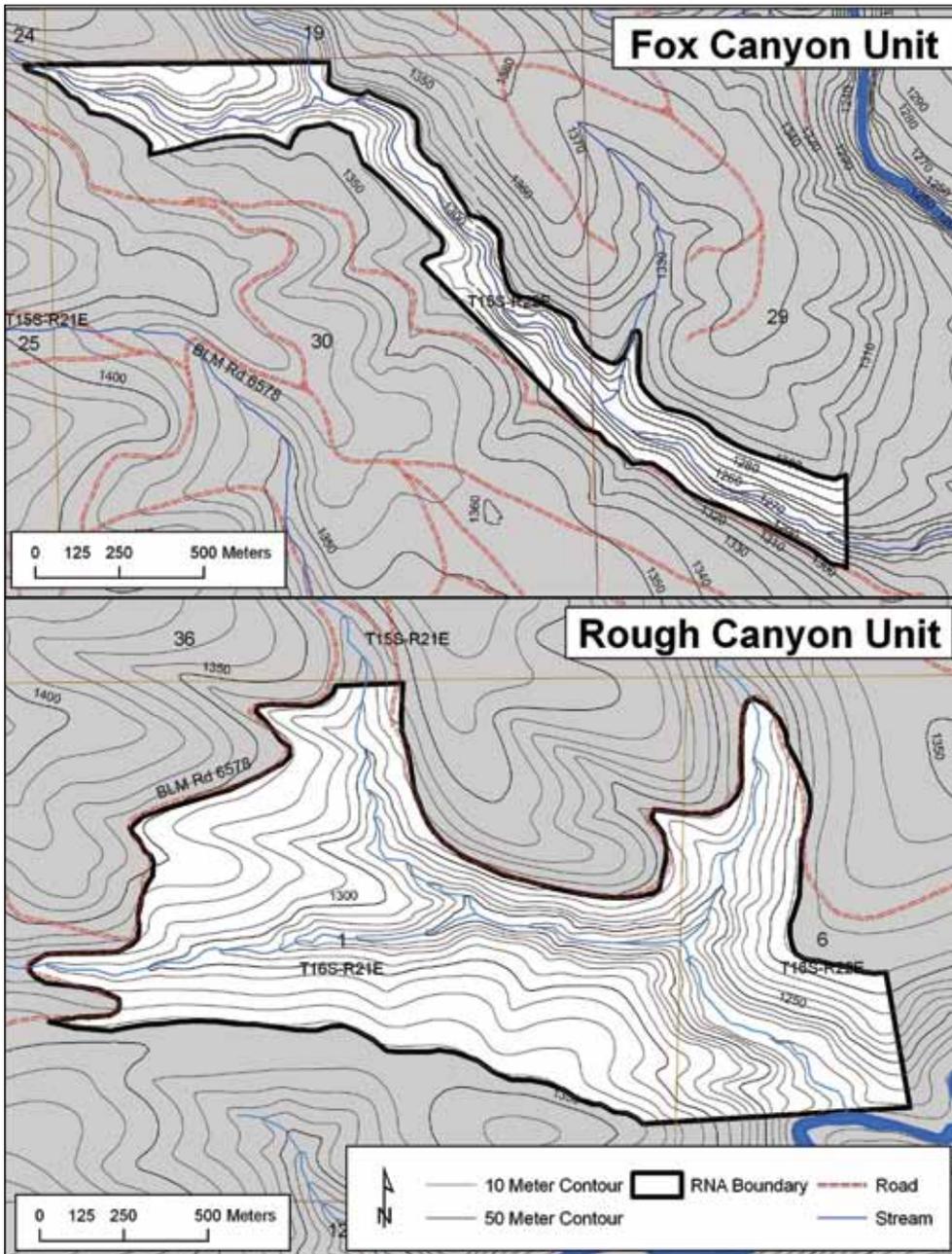


Figure 2—Forest Creeks Research Natural Area topography and boundary.

plateaus. Canyon sides are typically steep, short headwalls, with moderate to long talus slopes leading into the intermittent streams within Fox Canyon and Rough Canyon. Approximately 0.8 km (0.5 mi) of each creekbed is seasonally dry each year. Water surfaces at bedrock in some reaches, and numerous pools form each year in bedrock depressions and temporarily impounded areas (fig. 3) (USDI BLM 2009).

Bedrock is composed of early to middle Miocene Picture Gorge basalt flows of aphyric and plagioclase porphyritic flood basalt (Swanson 1969, Walker and MacLeod 1991). Soils within the two units have been provisionally mapped and are composed of two main soil series: the Madeline series and the Lorella series. Two-thirds of the RNA is Lorella–Rock Complex series. A typical pedon is primarily Lorella very stony loam. The taxonomic class is clayey-skeletal, smectitic, mesic Lithic Argixerolls. The soil surface is covered with 20 percent cobbles and 30 percent pebbles. The following is a generalized profile for Lorella very stony loam (USDA NRCS 2009):

A1–0 to 5 cm	(0 to 2 in)	Very dark grayish brown (10YR 3/2) very stoney loam
A2–5 to 13 cm	(2 to 5 in)	Very dark grayish brown (10YR 3/2) very gravelly loam
BA–13 to 25 cm	(5 to 10 in)	Dark brown (10YR 4/4) very cobbly clay loam
Bt–25 to 48 cm	(10 to 19 in)	Dark yellowish brown (10YR 4/4) very cobbly clay
R–48 cm	(19 in)	Dark brown (10YR 4/3) fractured volcanic tuff



Figure 3—Pools and falls along Fox Canyon Creek in late July, 2008.

Climate

The RNA is situated in the Blue Mountains along the boundary of the Northern Great Basin ecoregion, and the Blue Mountains ecoregion (Franklin and Dyrness 1988, ONHP 2003), and consequently exhibits climatic features of both. Summers are dry with warm days and moderate to cool nights. Frost occurs rarely during the summer but may occur anytime between October and June (Western Regional Climate Center 2009).

The weather station nearest to the RNA is PAULINA, OREGON (356500). Data collected from this station from 1961 to 2005 are summarized in table 1. Average annual precipitation of 286 mm (11.3 in) is probably a low estimate for the RNA given its location in the Blue Mountains. Twenty-five percent of annual precipitation occurs during the 3-month growing period from May through July. Snowfall may occur from October through April. Average annual snowfall is 566 mm (22.3 in). Average snow depth accumulations of 25 mm (1 in) occur from December through January (Western Regional Climate Center 2009).

Vegetation

The RNA has biologic and geologic characteristics of both the Blue Mountains and Northern Great Basin ecoregions. A high percentage of the RNA flora occurs throughout central and south-central Oregon (app. 1).

Initial interest in establishing Forest Creeks RNA was because of its general hydrologic and geomorphic representation of first- and third-order streams originating within ponderosa pine forest. Subsequent refinement of vegetation-based wetland and riparian classifications led to more detailed classification and search for riparian, lacustrine, and palustrine plant associations (Crowe et al. 2004, Crowe and Clausnitzer 1997, Johnson 2004, Kovalchik 1987, Kovalchik and Clausnitzer 2004,

Table 1—Temperature and precipitation summary, Paulina, Oregon (356500)

Average minimum January temperature	-8.0 °C (17.6 °F)
Average maximum January temperature	3.8 °C (38.9 °F)
Average minimum July temperature	6.3 °C (43.4 °F)
Average maximum July temperature	30.4 °C (86.7 °F)
Average annual precipitation	286 mm (11.27 in)
Average July-September precipitation	42 mm (1.67 in)
Average annual snowfall	566 mm (22.3 in)

Period of record: 12/20/1961 to 5/31/2005.

Wells 2006) listed in the Oregon Natural Heritage Plan (ONHP 2003). As a result, the RNA was also found suitable to represent two specific plant associations:

1. Mountain alder–redosier dogwood (*Alnus incana*-*Cornus sericea* ssp. *sericea*) riparian association; and
2. Redosier dogwood–mockorange (*Cornus sericea* ssp. *sericea*-*Philadelphus lewisii*) riparian association (Crowe et al. 2004).

Vegetation in both the Rough Canyon and the Fox Canyon Creek drainages is highly variable. Roughly half of the stream reaches within Rough Canyon and Fox Canyon Creek are dominated by a tall shrub layer surrounding the channel comprising mountain alder, redosier dogwood, mockorange, water birch (*Betula occidentalis*), bitter cherry (*Prunus emarginata*), chokecherry (*P. virginiana* var. *melanocarpa*), and willow (*Salix* sp.) (fig. 4). These shrubs are also found in other mesic habitats throughout the RNA. Common herbaceous species include beaked sedge (*Carex utriculata*), smallwing sedge (*C. microptera*), fowl mannagrass (*Glyceria striata*), and Baltic rush (*Juncus arcticus* var. *littoralis*). A number of terrestrial vascular plants also add plant diversity to the RNA, including low sagebrush (*Artemisia arbuscula*), rigid sagebrush (*A. rigida*), sulphur-flower buckwheat (*Eriogonum umbellatum*), rock onion (*Allium macrum*), arrowleaf balsamroot (*Balsamorhiza sagittata*) (fig. 5), and the colorful wallflower phoenicaulis (*Phoenicaulis cheiranthoides*) (USDI BLM 1985).



Figure 4—Tall shrubs along Fox Canyon Creek including mountain alder (*Alnus incana*), bittercherry (*Prunus emarginata*), dogwood (*Cornus sericea* ssp. *sericea*), mockorange (*Philadelphus lewisii*), and water birch (*Betula occidentalis*).

Although limited in size, many other terrestrial habitats and vegetation types that occur outside of the riparian zone contribute to a species-rich flora (app. 1) within the RNA. The most prominent of these are western juniper woodlands (Johnson and Swanson 2005), and the ponderosa pine/Idaho fescue (*Pinus ponderosa*/*Festuca idahoensis*) forest association (Johnson and Clausnitzer 1992). Appendix 1 lists scientific and common names of plant species known to occur within the RNA.

Fauna

Reptiles, amphibians, birds, and mammals known or expected to occur within the RNA are listed in appendix 2. These lists have been derived from both field observation and published literature (Csuti et al. 1997).

Disturbance History

Summer storms and lightning are common in the Blue Mountains. There is scattered evidence of past lightning ignitions in small areas of the RNA (USDI BLM 2009). However, the extensive rock outcrops and sparsely vegetated talus slopes (fig. 6) limit spread of fire from adjacent uplands. The historical role of fire has not been examined in this area.



Figure 5—Arrowleaf balsamroot (*Balsamorhiza sagittata*) in flower.



Figure 6—Steep, sparsely vegetated canyon wall of Rough Canyon may provide a fuelbreak in some wildfire events.

The role of anthropogenic disturbance owing to grazing by domestic livestock appears to have played only a minor role within the RNA. The very sparse abundance of invasive species within the riparian zone suggests that the rocky and often steep terrain may have inhibited livestock movement.

Maps

Maps applicable to Forest Creeks RNA: Topographic—Committee Creek, Oregon 7.5 minute; 1:24,000 scale, 1992; Brothers/LaPine Planning Area—East Half, 1:100,000, 1998.

Acknowledgments

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English Equivalents

1 hectare (ha) = 2.47 acres (ac)

1 kilometer (km) = 0.62 mile (mi)

1 meter (m) = 3.28 feet (ft)

1 centimeter (cm) = 0.394 inch (in)

1 millimeter (mm) = 0.0394 inch

Degrees Celsius (°C) = 0.56(degrees Fahrenheit – 32)

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Appendix 1: Vascular Plants and Ferns^{1 2}

Scientific name	Common name
Coniferous trees:	
<i>Juniperus occidentalis</i> Hook.	Western juniper
<i>Pinus ponderosa</i> Laws. var. <i>ponderosa</i>	Ponderosa pine
<i>Pseudotsuga menziesii</i> (Mirbel) Franco	Douglas-fir
Tall shrubs 2 to 8 m (6.6 to 26.2 ft) tall:	
<i>Alnus incana</i> (L.) Moench	Mountain alder
<i>Amelanchier alnifolia</i> (Nutt.) Nutt. ex M. Roem. var. <i>cusickii</i> (Fern.) C.L. Hitchc.	Saskatoon serviceberry
<i>Betula occidentalis</i> Hook.	Water birch
<i>Cercocarpus ledifolius</i> Nutt.	Curl-leaf mountain mahogany
<i>Cornus sericea</i> L. ssp. <i>sericea</i>	Redosier dogwood
<i>Philadelphus lewisii</i> Pursh	Mockorange
<i>Prunus emarginata</i> (Dougl. ex Hook.) D. Dietr.	Bitter cherry
<i>Prunus virginiana</i> L. var. <i>melanocarpa</i> (A. Nels.) Sarg.	Black chokecherry
<i>Salix</i> sp.	Willow
<i>Sambucus nigra</i> L. ssp. <i>cerulea</i> (Raf.) R. Bolli	Blue elderberry
Medium shrubs 0.5 to 2 m (1.6 to 6.6 ft) tall:	
<i>Artemisia arbuscula</i> Nutt.	Low sagebrush
<i>Artemisia rigida</i> (Nutt.) Gray	Rigid sagebrush
<i>Artemisia tridentata</i> Nutt.	Big sagebrush
<i>Berberis repens</i> Lindl.	Creeping barberry
<i>Chrysothamnus viscidiflorus</i> (Hook.) Nutt.	Yellow rabbitbrush
<i>Ericameria nauseosa</i> (Pallas ex Pursh) Nesom & Baird	Gray rabbitbrush
<i>Purshia tridentata</i> (Pursh) DC.	Antelope bitterbrush
<i>Ribes aureum</i> Pursh	Golden currant
<i>Ribes cereum</i> Dougl.	Wax currant
<i>Rosa gymnocarpa</i> Nutt.	Dwarf rose
<i>Rosa woodsii</i> Lindl.	Woods' rose
<i>Symphoricarpos albus</i> (L.) S.F. Blake	Common snowberry
<i>Symphoricarpos hesperius</i> G.N. Jones	Trailing snowberry
<i>Symphoricarpos oreophilus</i> Gray	Mountain snowberry
Low shrubs <0.5 m tall:	
<i>Ericameria resinosa</i> Nutt.	Columbian goldenbush
<i>Eriogonum sphaerocephalum</i> Dougl. ex Benth.	Rock buckwheat
Herbs:	
<i>Achillea millefolium</i> L.	Common yarrow
<i>Agastache urticifolia</i> (Benth.) Kunze	Nettleleaf giant hyssop
<i>Agoseris glauca</i> (Pursh) Raf.	Pale agoseris
<i>Allium acuminatum</i> Hook.	Tapertip onion
<i>Allium macrum</i> S. Wats.	Rock onion
<i>Allium parvum</i> Kellogg	Small onion
<i>Alyssum alyssoides</i> (L.) L.	Pale madwort
<i>Amsinckia menziesii</i> (Lehm.) A. Nels. & J.F. Macbr.	Menzies' fiddleneck
<i>Antennaria dimorpha</i> (Nutt.) T. & G.	Low pussytoes
<i>Antennaria luzuloides</i> T. & G.	Rush pussytoes

Scientific name	Common name
<i>Antennaria microphylla</i> Rydb.	Littleleaf pussytoes
<i>Aquilegia formosa</i> Fisch. ex DC.	Western columbine
<i>Arabis holboellii</i> Hornem. var. <i>pinetorum</i> (Tidestr.) Rollins	Holboell's rockcress
<i>Arabis puberula</i> Nutt.	Silver rockcress
<i>Arabis sparsiflora</i> Nutt.	Sicklepod rockcress
<i>Arnica cordifolia</i> Hook.	Heartleaf arnica
<i>Arnica sororia</i> Greene	Twin arnica
<i>Artemisia ludoviciana</i> Nutt.	White sagebrush
<i>Balsamorhiza sagittata</i> (Pursh) Nutt.	Arrowleaf balsamroot
<i>Balsamorhiza serrata</i> Nels. & Macbr.	Serrate balsamroot
<i>Barbarea vulgaris</i> Ait.	Garden yellowrocket
<i>Calochortus macrocarpus</i> Dougl.	Sagebrush mariposa lily
<i>Castilleja applegatei</i> Fernald	Wavyleaf Indian paintbrush
<i>Castilleja tenuis</i> (Heller) Chuang & Heckard	Hairy Indian paintbrush
<i>Cerastium nutans</i> Raf.	Nodding chickweed
<i>Chaenactis douglasii</i> (Hook.) Hook. & Arn.	Douglas' dusty maiden
<i>Chamaesyce glyptosperma</i> (Engelm.) Small	Ribseed sandmat
<i>Chamerion angustifolium</i> (L.) Holub var. <i>canescens</i> (Mosquin) Hoch	Fireweed
<i>Cirsium arvense</i> (L.) Scop.	Canada thistle
<i>Cirsium vulgare</i> (Savi) Ten.	Bull thistle
<i>Clarkia gracilis</i> (Piper) A. Nels. & J.F. Macbr.	Slender clarkia
<i>Clarkia pulchella</i> Pursh	Pinkfairies
<i>Claytonia perfoliata</i> Donn ex Willd.	Miner's lettuce
<i>Clematis hirsutissima</i> Pursh	Hairy clematis
<i>Clematis ligusticifolia</i> Nutt.	Western white clematis
<i>Collinsia parviflora</i> Dougl. ex Lindl.	Maiden blue-eyed Mary
<i>Collomia grandiflora</i> Dougl. ex Lindl.	Grand collomia
<i>Conium maculatum</i> L.	Poison hemlock
<i>Crepis acuminata</i> Nutt.	Tapertip hawksbeard
<i>Crepis intermedia</i> Gray	Limestone hawksbeard
<i>Cryptantha ambigua</i> (Gray) Greene	Basin cryptantha
<i>Cryptantha torreyana</i> (Gray) Greene	Torrey's cryptantha
<i>Delphinium nuttallianum</i> Pritz. ex Walp.	Twolobe larkspur
<i>Dodecatheon conjugens</i> Greene	Bonneville shootingstar
<i>Draba verna</i> L.	Spring draba
<i>Epilobium brachycarpum</i> C. Presl	Tall annual willowherb
<i>Epilobium glaberrimum</i> Barbey	Glaucous willowherb
<i>Equisetum arvense</i> L.	Field horsetail
<i>Erigeron bloomeri</i> Gray	Scabland fleabane
<i>Erigeron divergens</i> T. & G.	Spreading fleabane
<i>Erigeron linearis</i> (Hook.) Piper	Desert yellow fleabane
<i>Eriogonum compositum</i> Dougl. ex Benth.	Arrowleaf buckwheat
<i>Eriogonum heracleoides</i> Nutt.	Parsnipflower buckwheat
<i>Eriogonum microthecum</i> Nutt.	Slender buckwheat
<i>Eriogonum sphaerocephalum</i> Dougl. ex Benth.	Rock buckwheat
<i>Eriogonum strictum</i> Benth.	Blue Mountain buckwheat
<i>Eriogonum umbellatum</i> Torr.	Sulphur-flower buckwheat
<i>Eurybia radulina</i> (Gray) Nesom	Roughleaf aster
<i>Fragaria vesca</i> L.	Woodland strawberry
<i>Fritillaria atropurpurea</i> Nutt.	Spotted fritillary

Scientific name	Common name
<i>Fritillaria pudica</i> (Pursh) Spreng.	Yellow fritillary
<i>Galium aparine</i> L.	Stickywilly
<i>Galium boreale</i> L.	Northern bedstraw
<i>Galium triflorum</i> Michx.	Fragrant bedstraw
<i>Galium watsonii</i> (Gray) Heller	Watson's bedstraw
<i>Gayophytum diffusum</i> T. & G.	Spreading groundsmoke
<i>Gayophytum humile</i> Juss.	Dwarf groundsmoke
<i>Geum triflorum</i> Pursh var. <i>ciliatum</i> (Pursh) Fassett	Old man's whiskers
<i>Hackelia micrantha</i> (Eastw.) J.L. Gentry	Jessica sticktight
<i>Hemizonella minima</i> (Gray) Gray	Opposite-leaved tarweed
<i>Heracleum lanatum</i> Michx.	Common cowparsnip
<i>Heterocodon rariflorum</i> Nutt.	Rareflower heterocodon
<i>Heuchera cylindrica</i> Dougl. ex Hook.	Roundleaf alumroot
<i>Hieracium albiflorum</i> Hook.	White hawkweed
<i>Hieracium scouleri</i> Hook. var. <i>albertinum</i> (Farr) G.W. Douglas & G.A. Allen	Scouler's woolyweed
<i>Holosteum umbellatum</i> L.	Jagged chickweed
<i>Hydrophyllum capitatum</i> Dougl. ex Benth.	Ballhead waterleaf
<i>Hypericum perforatum</i> L.	Common St. Johnswort
<i>Hypericum scouleri</i> Hook.	Scouler's St. Johnswort
<i>Idahoia scapigera</i> (Hook.) Nels. & Macbr.	Oldstem idahoia
<i>Iliamna rivularis</i> (Dougl. ex Hook.) Greene	Streambank wild hollyhock
<i>Lactuca serriola</i> L.	Prickly lettuce
<i>Lagophylla ramosissima</i> Nutt.	Branched lagophylla
<i>Lathyrus nevadensis</i> S. Wats.	Sierra pea
<i>Lewisia rediviva</i> Pursh	Bitter root
<i>Linum perenne</i> L.	Blue flax
<i>Lithophragma glabrum</i> Nutt.	Bulbous woodland-star
<i>Lithophragma parviflorum</i> (Hook.) Nutt. ex T. & G.	Smallflower woodland-star
<i>Lithospermum ruderales</i> Dougl. ex Lehm.	Western stoneseed
<i>Lomatium bicolor</i> (S. Wats.) Coult. & Rose var. <i>leptocarpum</i> (T. & G.) Schlessm.	Wasatch desertparsley
<i>Lomatium cous</i> (S. Wats.) Coult. & Rose	Cous biscuitroot
<i>Lomatium dissectum</i> (Nutt.) Mathias & Constance var. <i>dissectum</i>	Fernleaf biscuitroot
<i>Lomatium grayi</i> (Coult. & Rose) Coult. & Rose	Gray's biscuitroot
<i>Lomatium hendersonii</i> (Coult. & Rose) Coult. & Rose	Henderson's biscuitroot
<i>Lomatium macrocarpum</i> (Nutt. ex T. & G.) Coult. & Rose	Bigseed biscuitroot
<i>Lomatium nudicaule</i> (Pursh) Coult. & Rose	Barestem biscuitroot
<i>Lomatium piperi</i> Coult. & Rose	Indian biscuitroot
<i>Lomatium triternatum</i> (Pursh) Coult. & Rose	Nineleaf biscuitroot
<i>Lomatium vaginatum</i> Coult. & Rose	Broadsheath desertparsley
<i>Lupinus caudatus</i> Kellogg	Tailcup lupine
<i>Madia exigua</i> (Sm.) Gray	Small tarweed
<i>Madia gracilis</i> (Sm.) Keck & J. Clausen ex Applegate	Grassy tarweed
<i>Maianthemum racemosum</i> (L.) Link	Feathery false lily of the valley
<i>Maianthemum stellatum</i> (L.) Link	Starry false lily of the valley
<i>Mentha arvensis</i> L.	Wild mint

Scientific name	Common name
<i>Mentzelia albicaulis</i> (Dougl. ex Hook.) Dougl. ex T. & G.	Whitestem blazingstar
<i>Mimulus guttatus</i> DC.	Seep monkeyflower
<i>Mimulus nanus</i> Hook. & Arn.	Dwarf purple monkeyflower
<i>Monardella odoratissima</i> Benth.	Mountain monardella
<i>Montia linearis</i> (Dougl. ex Hook.) Greene	Narrowleaf minerslettuce
<i>Nasturtium microphyllum</i> Boenn. ex Rchb.	Onerow yellowcress
<i>Nothocalais troximoides</i> (Gray) Greene	Sagebrush false dandelion
<i>Olsynium douglasii</i> (A. Dietr.) Bickn. var. <i>inflatum</i> (Suks.) Cholewa & D. Henderson	Douglas' grasswidow
<i>Orobanche uniflora</i> L.	Oneflowered broomrape
<i>Packera cana</i> (Hook.) Weber & Löve	Woolly groundsel
<i>Penstemon gairdneri</i> Hook.	Gairdner's beardtongue
<i>Penstemon glandulosus</i> Dougl.	Stickystem penstemon
<i>Penstemon laetus</i> Gray	Mountain blue penstemon
<i>Penstemon richardsonii</i> Dougl. ex Lindl.	Cutleaf beardtongue
<i>Perideridia gairdneri</i> (Hook. & Arn.) Mathias	Gardner's yampah
<i>Phacelia hastata</i> Dougl. ex Lehm.	Silverleaf phacelia
<i>Phacelia heterophylla</i> Pursh	Varileaf phacelia
<i>Phacelia linearis</i> (Pursh) Holz.	Threadleaf phacelia
<i>Phlox gracilis</i> (Hook.) Greene	Slender phlox
<i>Phoenicaulis cheiranthoides</i> Nutt.	Wallflower phoenicaulis
<i>Plantago major</i> L.	Common plantain
<i>Plectritis macrocera</i> T. & G.	Longhorn plectritis
<i>Polemonium pulcherrimum</i> Hook.	Jacob's ladder
<i>Polygonum douglasii</i> Greene	Douglas' knotweed
<i>Potentilla arguta</i> Pursh	Tall cinquefoil
<i>Potentilla gracilis</i> Dougl. ex Hook.	Slender cinquefoil
<i>Pterospora andromedea</i> Nutt.	Woodland pinedrops
<i>Ranunculus glaberrimus</i> Hook.	Sagebrush buttercup
<i>Ranunculus uncinatus</i> D. Don ex G. Don	Woodland buttercup
<i>Rumex acetosella</i> L.	Common sheep sorrel
<i>Rumex crispus</i> L.	Curly dock
<i>Saxifraga</i> sp.	Saxifrage
<i>Scrophularia lanceolata</i> Pursh	Lanceleaf figwort
<i>Scutellaria angustifolia</i> Pursh	Narrowleaf scullcap
<i>Sedum stenopetalum</i> Pursh	Wormleaf stonecrop
<i>Senecio integerrimus</i> Nutt. var. <i>exaltatus</i> (Nutt.) Cronq.	Columbia ragwort
<i>Senecio serra</i> Hook.	Tall ragwort
<i>Sidalcea oregana</i> (Nutt. ex T. & G.) Gray	Oregon checkermallow
<i>Taraxacum officinale</i> G.H. Weber ex Wiggins	Common dandelion
<i>Thalictrum occidentale</i> Gray	Western meadow-rue
<i>Toxicoscordion venenosum</i> (S. Wats.) Rydb.	Meadow deathcamas
<i>Tragopogon dubius</i> Scop.	Yellow salsify
<i>Trifolium dubium</i> Sibthorp	Suckling clover
<i>Trifolium macrocephalum</i> (Pursh) Poir.	Largehead clover
<i>Triteleia hyacinthina</i> (Lindl.) Greene	White brodiaea
<i>Urtica dioica</i> L. ssp. <i>gracilis</i> (Ait.) Seland.	Stinging nettle
<i>Verbascum thapsus</i> L.	Common mullein
<i>Viola vallicola</i> A. Nels. var. <i>vallicola</i>	Sagebrush violet

Scientific name	Common name
Grasses, sedges, and rushes:	
<i>Achnatherum hendersonii</i> (Vasey) Barkworth	Henderson's needlegrass
<i>Achnatherum lemmonii</i> (Vasey) Barkworth	Lemmon's needlegrass
<i>Achnatherum occidentale</i> (Thurb.) Barkworth	Western needlegrass
<i>Agropyron cristatum</i> (L.) Gaertn.	Crested wheatgrass
<i>Agrostis scabra</i> Willd.	Rough bentgrass
<i>Bromus briziformis</i> Fisch. & C.A. Mey.	Rattlesnake brome
<i>Bromus hordeaceus</i> L.	Soft brome
<i>Bromus inermis</i> Leyss.	Smooth brome
<i>Bromus japonicus</i> Thunb.	Japanese brome
<i>Bromus tectorum</i> L.	Cheatgrass
<i>Calamagrostis rubescens</i> Buckl.	Pinegrass
<i>Carex lenticularis</i> Michx. var. <i>lipocarpa</i> (Holm) L.A. Standl.	Kellogg's Sedge
<i>Carex leptopoda</i> Mack.	Taperfruit shortscale sedge
<i>Carex microptera</i> Mack.	Smallwing sedge
<i>Carex rossii</i> Boott	Ross' sedge
<i>Carex utriculata</i> Boott	Beaked sedge
<i>Dactylis glomerata</i> L.	Orchardgrass
<i>Danthonia unispicata</i> (Thurb.) Munro ex Vasey	One-spike oatgrass
<i>Elymus elymoides</i> (Raf.) Swezey	Bottlebrush squirreltail
<i>Festuca idahoensis</i> Elmer	Idaho fescue
<i>Glyceria striata</i> (Lam.) A.S. Hitchc.	Fowl mannagrass
<i>Hordeum brachyantherum</i> Nevski ssp. <i>brachyantherum</i>	Meadow barley
<i>Hordeum jubatum</i> L.	Foxtail barley
<i>Juncus arcticus</i> Willd. var. <i>balticus</i> (Willd.) Trautv.	Mountain rush
<i>Koeleria macrantha</i> (Ledeb.) J.A. Schultes	Prairie junegrass
<i>Leymus cinereus</i> (Scribn. & Merr.) A. Löve	Basin wildrye
<i>Phalaris arundinacea</i> L.	Reed canarygrass
<i>Phleum pratense</i> L.	Timothy
<i>Poa bulbosa</i> L.	Bulbous bluegrass
<i>Poa pratensis</i> L.	Kentucky bluegrass
<i>Poa secunda</i> J. Presl	Sandberg bluegrass
<i>Poa</i> sp.	Bluegrass
<i>Pseudoroegneria spicata</i> (Pursh) A. Löve	Bluebunch wheatgrass
<i>Scirpus microcarpus</i> J. Presl & C. Presl	Panicled bulrush
<i>Vulpia bromoides</i> (L.) S.F. Gray	Brome fescue
Ferns:	
<i>Cryptogramma</i> sp.	Rockbrake
<i>Cystopteris fragilis</i> (L.) Bernh.	Brittle bladderfern

¹ Compiled from numerous sources.

² Nomenclature for vascular plants, ferns, and fern-allies follows the Flora of North America (1993+) and the Oregon Flora Project Web site (2009).

Appendix 2: Amphibians, Reptiles, Birds, and Mammals^{1 2 3}

Family	Scientific name	Common name	
Amphibians:			
Ambystomatidae	<i>Ambystoma macrodactylum</i>	Long-toed salamander	
Bufo	<i>Bufo boreas</i>	Western toad	
Hylidae	<i>Pseudacris regilla</i>	Pacific chorus frog	
Ranidae	<i>Rana luteiventris</i>	Columbia spotted frog	
Reptiles:			
Iguanidae	<i>Sceloporus occidentalis</i>	Western fence lizard	
Scincidae	<i>Eumeces skiltonianus</i>	Western skink	
Boidae	<i>Charina bottae</i>	Rubber boa	
Colubridae	<i>Thamnophis sirtalis</i>	Common garter snake	
	<i>Pituophis melanoleucus</i>	Gopher snake	
	<i>Coluber constrictor</i>	Racer	
	<i>Thamnophis elegans</i>	Western terrestrial garter snake	
Viperidae	<i>Crotalus viridis</i>	Western rattlesnake	
Birds:			
Cathartidae	<i>Cathartes aura</i>	Turkey vulture	
Accipitridae	<i>Haliaeetus leucocephalus</i>	Bald eagle	
	<i>Accipiter cooperii</i>	Cooper's hawk	
	<i>Buteo regalis</i>	Ferruginous hawk	
	<i>Aquila chrysaetos</i>	Golden eagle	
	<i>Accipiter gentilis</i>	Northern goshawk	
	<i>Accipiter cyaneus</i>	Northern harrier	
	<i>Buteo jamaicensis</i>	Red-tailed hawk	
	<i>Accipiter striatus</i>	Sharp-shinned hawk	
	<i>Buteo swainsonii</i>	Swainson's hawk	
	Falconidae	<i>Falco sparverius</i>	American kestrel
		<i>Falco mexicanus</i>	Prairie falcon
Phasianidae		<i>Alectoris chukar</i>	Chukar
	<i>Bonasa umbellus</i>	Ruffed grouse	
	<i>Meleagris gallopavo</i>	Wild turkey	
Odontophoridae	<i>Callipepla californica</i>	California quail	
	<i>Oreortyx pictus</i>	Mountain quail	
Charadriidae	<i>Charadrius vociferus</i>	Killdeer	
Scolopacidae	<i>Actitis macularia</i>	Spotted sandpiper	
Columbidae	<i>Zenaidura macroura</i>	Mourning dove	
Strigidae	<i>Otus flammeolus</i>	Flammulated owl	
	<i>Bubo virginianus</i>	Great-horned owl	
	<i>Asio otus</i>	Long-eared owl	
	<i>Glaucidium gnoma</i>	Northern pygmy owl	
	<i>Aegolius acadicus</i>	Northern saw-whet owl	
	<i>Otus kennicottii</i>	Western screech-owl	
	Caprimulgidae	<i>Chordeiles minor</i>	Common nighthawk
Apodidae	<i>Chaetura vauxi</i>	Vaux's swift	
Trochilidae	<i>Stellula calliope</i>	Calliope hummingbird	
	<i>Selasphorus rufus</i>	Rufous hummingbird	

Alcedinidae	<i>Ceryle alcyon</i>	Belted kingfisher	
Picidae	<i>Picoides arcticus</i>	Black-backed woodpecker	
	<i>Picoides pubescens</i>	Downy woodpecker	
	<i>Picoides villosus</i>	Hairy woodpecker	
	<i>Colaptes auratus</i>	Northern flicker	
	<i>Dryocopus pileatus</i>	Pileated woodpecker	
	<i>Sphyrapicus nuchalis</i>	Red-naped sapsucker	
	<i>Picoides albolarvatus</i>	White-headed woodpecker	
	Tyrannidae	<i>Myiarchus cinerascens</i>	Ash-throated flycatcher
		<i>Empidonax wrightii</i>	Gray flycatcher
		<i>Empidonax hammondii</i>	Hammond's flycatcher
<i>Contopus borealis</i>		Olive-sided flycatcher	
<i>Sayornis saya</i>		Say's phoebe	
<i>Tyrannus verticalis</i>		Western kingbird	
<i>Contopus sordidulus</i>		Western wood peewee	
<i>Empidonax traillii</i>		Willow flycatcher	
Alaudidae		<i>Eremophila alpestris</i>	Horned lark
		Hirundinidae	<i>Hirundo rustica</i>
<i>Hirundo pyrrhonota</i>	Cliff swallow		
<i>Tachycineta bicolor</i>	Tree swallow		
<i>Tachycineta thalassina</i>	Violet-green swallow		
Corvidae	<i>Corvus brachyrhynchos</i>		American crow
	<i>Nucifraga columbiana</i>		Clark's nutcracker
	<i>Corvus corax</i>		Common raven
	<i>Perisoreus canadensis</i>	Gray jay	
	<i>Cyanocitta stelleri</i>	Steller's jay	
Paridae	<i>Parus gambeli</i>	Mountain chickadee	
Aegithalidae	<i>Psaltriparus minimus</i>	Bushtit	
Sittidae	<i>Sitta pygmaea</i>	Pygmy nuthatch	
	<i>Sitta canadensis</i>	Red-breasted nuthatch	
	<i>Sitta carolinensis</i>	White-breasted nuthatch	
Certhiidae	<i>Certhia americana</i>	Brown creeper	
Troglodytidae	<i>Catherpes mexicanus</i>	Canyon wren	
	<i>Troglodytes aedon</i>	House wren	
	<i>Salpinctes obsoletus</i>	Rock wren	
	<i>Troglodytes troglodytes</i>	Winter wren	
	Cinclidae	<i>Cinclus mexicanus</i>	American dipper
Muscicapidae		<i>Turdus migratorius</i>	American robin
	<i>Catharus guttatus</i>	Hermit thrush	
	<i>Sialia currucoides</i>	Mountain bluebird	
	<i>Regulus calendula</i>	Ruby-crowned kinglet	
	<i>Catharus ustulatus</i>	Swainson's thrush	
	<i>Myadestes townsendi</i>	Townsend's solitaire	
	<i>Catharus fuscescens</i>	Veery	
	<i>Sialia mexicana</i>	Western bluebird	
	Bombycillidae	<i>Bombycilla cedrorum</i>	Cedar waxwing
	Vireonidae	<i>Vireo cassinii</i>	Cassin's vireo
<i>Vireo gilvus</i>		Warbling vireo	
Emberizidae	<i>Pheucticus melanocephalus</i>	Black-headed grosbeak	
	<i>Dendroica nigrescens</i>	Black-throated gray warbler	
	<i>Euphagus cyanocephalus</i>	Brewer's blackbird	
	<i>Spizella breweri</i>	Brewer's sparrow	

	<i>Molothrus ater</i>	Brown-headed cowbird
	<i>Icterus bullockii</i>	Bullock's oriole
	<i>Spizella passerina</i>	Chipping sparrow
	<i>Geothlypis trichas</i>	Common yellowthroat
	<i>Junco hyemalis</i>	Dark-eyed junco
	<i>Passerella iliaca</i>	Fox sparrow
	<i>Pipilo chlorurus</i>	Green-tailed towhee
	<i>Chondestes grammacus</i>	Lark sparrow
	<i>Passerina amoena</i>	Lazuli bunting
	<i>Melospiza lincolnii</i>	Lincoln's sparrow
	<i>Oporornis tolmiei</i>	Macgillivray's warbler
	<i>Vermivora ruficapilla</i>	Nashville warbler
	<i>Vermivora celata</i>	Orange-crowned warbler
	<i>Agelaius phoeniceus</i>	Red-winged blackbird
	<i>Passerculus sandwichensis</i>	Savannah sparrow
	<i>Melospiza melodia</i>	Song sparrow
	<i>Pipilo maculatus</i>	Spotted towhee
	<i>Dendroica townsendi</i>	Townsend's warbler
	<i>Piranga ludoviciana</i>	Western tanager
	<i>Wilsonia pusilla</i>	Wilson's warbler
	<i>Dendroica petechia</i>	Yellow warbler
	<i>Icteria virens</i>	Yellow-breasted chat
	<i>Dendroica coronata</i>	Yellow-rumped warbler
Fringillidae	<i>Carduelis tristis</i>	American goldfinch
	<i>Carpodacus cassinii</i>	Cassin's finch
	<i>Coccothraustes vespertinus</i>	Evening grosbeak
	<i>Carpodacus mexicanus</i>	House finch
	<i>Carduelis psaltria</i>	Lesser goldfinch
	<i>Carduelis pinus</i>	Pine siskin
	<i>Loxia curvirostra</i>	Red crossbill
Mammals:		
Soricidae	<i>Sorex merriami</i>	Merriam's shrew
	<i>Sorex vagrans</i>	Vagrant shrew
	<i>Sorex palustris</i>	Water shrew
Vespertilionidae	<i>Eptesicus fuscus</i>	Big brown bat
	<i>Myotis californicus</i>	California myotis
	<i>Lasiurus cinereus</i>	Hoary bat
	<i>Myotis lucifugus</i>	Little brown myotis
	<i>Myotis evotis</i>	Long-eared myotis
	<i>Myotis volans</i>	Long-legged myotis
	<i>Antrozous pallidus</i>	Pallid bat
	<i>Lasionycteris noctivagans</i>	Silver-haired bat
	<i>Myotis ciliolabrum</i>	Western small-footed myotis
	<i>Myotis yumanensis</i>	Yuma myotis
Leporidae	<i>Sylvilagus nuttallii</i>	Mountain cottontail
Sciuridae	<i>Tamiasciurus douglasii</i>	Douglas' squirrel
	<i>Spermophilus lateralis</i>	Golden-mantled ground squirrel
	<i>Tamias minimus</i>	Least chipmunk
	<i>Glaucomys sabrinus</i>	Northern flying squirrel
	<i>Tamias townsendii</i>	Townsend's chipmunk
	<i>Marmota flaviventris</i>	Yellow-bellied marmot

	<i>Tamias amoenus</i>	Yellow-pine chipmunk
Geomyidae	<i>Thomomys talpoides</i>	Northern pocket gopher
Castoridae	<i>Castor canadensis</i>	American beaver
Muridae	<i>Neotoma cinerea</i>	Bushy-tailed woodrat
	<i>Peromyscus crinitus</i>	Canyon mouse
	<i>Peromyscus maniculatus</i>	Deer mouse
	<i>Microtus longicaudus</i>	Long-tailed vole
	<i>Microtus montanus</i>	Montane vole
	<i>Ondatra zibethicus</i>	Muskrat
	<i>Peromyscus truei</i>	Piñon mouse
	<i>Clethrionomys gapperi</i>	Southern red-backed vole
Dipodidae	<i>Zapus princeps</i>	Western jumping mouse
Erethizontidae	<i>Erethizon dorsatum</i>	Common porcupine
Canidae	<i>Canis latrans</i>	Coyote
	<i>Urocyon cinereoargenteus</i>	Gray fox
Ursidae	<i>Ursus americanus</i>	Black bear
Procyonidae	<i>Procyon lotor</i>	Common raccoon
Mustelidae	<i>Taxidea taxus</i>	American badger
	<i>Mustela erminea</i>	Ermine
	<i>Mustela frenata</i>	Long-tailed weasel
	<i>Mustela vison</i>	Mink
	<i>Lutra canadensis</i>	Northern river otter
	<i>Mephitis mephitis</i>	Striped skunk
	<i>Spilogale gracilis</i>	Western spotted skunk
	<i>Gulo gulo</i>	Wolverine
Felidae	<i>Lynx rufus</i>	Bobcat
	<i>Felis concolor</i>	Mountain lion
Cervidae	<i>Odocoileus hemionus</i>	Mule deer
	ssp. <i>hemionus</i>	
Bovidae	<i>Antilocapra americana</i>	Pronghorn

¹ Taken from range maps and habitat descriptions in Csuti et al. 1997.

² Species known or suspected to occur within the area based on species range and habitat characteristics.

³ Species are arranged in taxonomic order by evolutionary relationship, then alphabetically by common name within family.

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