



United States Department of Agriculture

# Fish Creek Rim Research Natural Area: Guidebook Supplement 50

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Forest  
Service

Pacific Northwest  
Research Station

General Technical Report  
PNW-GTR-946

September  
2016

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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 that began in 1972.

Cover photo: Fish Creek Rim Research Natural Area, where sagebrush and bunchgrass predominate on shallow, rocky soils, and western juniper, mountain mahogany, mountain big sagebrush, and bitterbrush occupy deeper soils and moister microsites. Photo by Reid Schuller.

## Abstract

**Schuller, Reid; Grinter, Ian. 2016.** Fish Creek Rim Research Natural Area: guidebook supplement 50. Gen. Tech. Rep. PNW-GTR-946. 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 3531-ha (8,725-ac) Fish Creek Rim Research Natural Area located within the Northern Basin and Range ecoregion and managed by the Bureau of Land Management, Lakeview District (USDI BLM 2003).

Keywords: Research natural area, area of critical environmental concern, Basin and Range, Northern Great Basin, mountain mahogany, *Cercocarpus ledifolius*, mountain big sagebrush, *Artemisia tridentata*, bitterbrush, *Purshia tridentata*, Idaho fescue, *Festuca idahoensis*, *Artemisia arbuscula*, low sagebrush, Sandberg bluegrass, *Poa secunda*, *Ceanothus velutinus*, snowbrush, *Prunus emarginata*, bitter cherry, sage grouse, *Centrocercus urophasianus*, vegetation monitoring.

## Preface

The research natural area (RNA) described in this supplement<sup>1</sup> is administered by the Lakeview District, Bureau of Land Management (BLM), U.S. Department of the Interior.

Fish Creek Rim RNA is part of a federal system<sup>2</sup> of natural areas established for research and educational purposes.<sup>3</sup> 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* (Franklin et al. 1988). This report is a supplement to the guidebook.

Each RNA is a site where elements<sup>4</sup> are protected or managed for scientific purposes and natural processes are allowed to dominate. The objectives for establishing RNA's 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.
- Provide onsite and extension educational activities.

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<sup>1</sup> Supplement No. 43 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.

<sup>2</sup> 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. Taken from Wilson, T.M.; Schuller, R.; Holmes, R.; Pavola, C.; Fimbel, R.A.; McCain, C.N.; Gamon, J.G.; Speaks, P.; Seevers, J.I.; DeMeo, T.E.; Gibbons, S. 2009. Interagency strategy for the Pacific Northwest Natural Areas Network. Gen. Tech. Rep. PNW-GTR-798. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 33 p.

<sup>3</sup> See Wilson et al. (2009) for a more complete discussion of rationale for establishment of research natural areas.

<sup>4</sup> 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.

- 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. Research projects, educational visits, and collection of specimens from the RNA all require prior approval. There may be limitations on research or educational activities.

A scientist or educator wishing to use the RNA is obligated to:

- Obtain permission from the appropriate administering agency before using the area (see footnote 2). Those wishing to visit or use Fish Creek Rim RNA for scientific or educational purposes should contact the Lakeview BLM District Manager in advance and provide information about research or educational objectives, sampling procedures, and other prospective activities.
- 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 that 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 that potential collaborations may be fostered and conflicts avoided.
- Maintain records of research activities and research results to benefit the land management agency, 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.

## **Contents**

- 1 Introduction**
- 1 Access and Accommodations**
- 3 Environment**
- 5 Vegetation**
- 14 Fauna**
- 14 Research History**
- 14 Maps**
- 15 Acknowledgments**
- 15 English Equivalent**s
- 16 References**
- 18 Appendix 1: Plants**
- 22 Appendix 2: Amphibians, Reptiles, Birds, and Mammals  
Expected to Use Fish Creek Rim Research Natural Area**

## Introduction

The 3531-ha (8,725-ac) Fish Creek Rim Research Natural Area (RNA) occupies the upper elevations of Lynch's Rim, and the escarpment that faces east toward Warner Valley in Lake County, Oregon. The RNA was established in 2003 because the area supported high-quality examples of four vegetation communities representative of the Northern Basin and Range ecoregion identified for inclusion into a regionwide natural areas system by the Oregon Natural Areas plan (ONHAC 2010; PNNAN 2014; USDI BLM 2000, 2001, 2003; Vander Schaaf 1992):

- Big sagebrush–bitterbrush/Idaho fescue (*Artemisia tridentata*–*Purshia tridentata*/*Festuca idahoensis*).<sup>1</sup>
- Snowbrush and bitter cherry (*Ceanothus velutinus* and *Prunus emarginata*) shrub complex.<sup>2</sup>
- Low sagebrush/Idaho fescue (*Artemisia arbuscula*/*Festuca idahoensis*).
- Mountain mahogany/mountain big sagebrush (*Cercocarpus ledifolius*/*Artemisia tridentata* ssp. *vaseyana*) community with bitterbrush (*Purshia tridentata*).

## Access and Accommodations

From Lakeview, Oregon, proceed 6.4 km (4 mi) north on U.S. Highway 395 to the intersection with Oregon Highway 140. Turn right (east) onto Highway 140 and continue approximately 25.8 km (16 mi) to the “Plush Cutoff Road” (County Road 3-13; paved). Turn left (north) toward Plush and continue for 19.2 km (11.9 mi) to an intersection with Bureau of Land Management (BLM) Road 7105-00 (primitive dirt road). Turn right (southeast) and proceed 7.9 km (4.9 mi) to the northwestern boundary of the RNA. At this point, the road gradually deteriorates into a four-wheel-drive track that can be navigated with vehicles with high clearances. Designated open-access routes provide seasonal access to most of the RNA (fig. 1). However, no off-road or cross-country motorized travel is allowed within the RNA. Permission to use the area for research purposes should be obtained from the BLM, Lakeview District office in Lakeview, Oregon, prior to visiting the site. Maps and additional directions to the area are available at this office. Lodging is available in Lakeview, Oregon.

<sup>1</sup> A list of scientific and common names for vascular plants known to occur within the RNA appears in appendix 1.

<sup>2</sup> This shrub complex occurs as a minor vegetation type throughout the RNA. It has not been mapped separately but occupies small areas within the western juniper woodlands, the mountain big sagebrush-bitterbrush/Idaho fescue plant community, and the mountain mahogany-mountain big sagebrush-bitterbrush plant community.

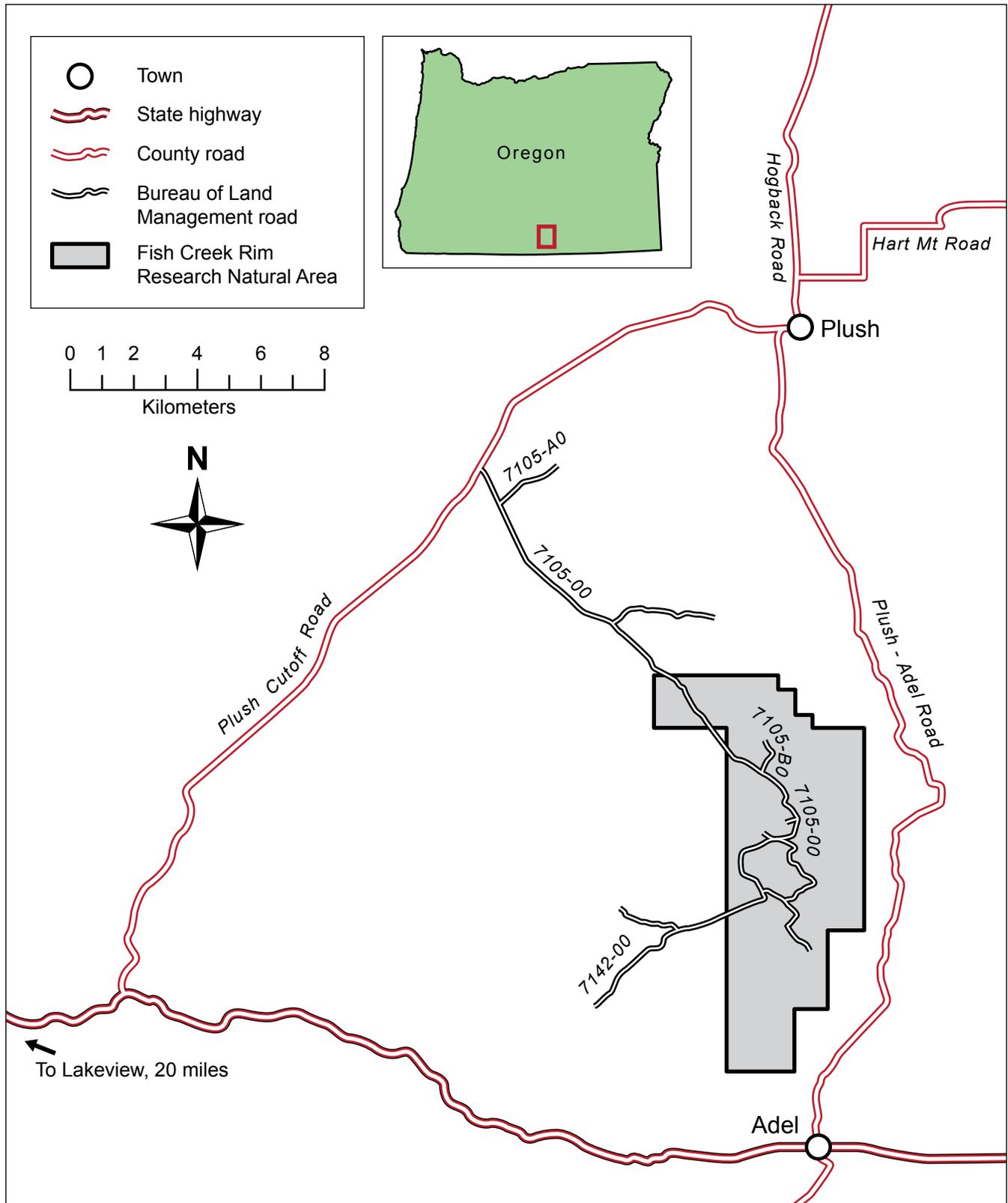


Figure 1—Fish Creek Rim Research Natural Area location and access. BLM = Bureau of Land Management.

## **Environment**

The RNA occupies a transitional region between the Basin and Range and Columbia Plateau physiographic provinces. The Basin and Range physiographic province extends from Lake County southward into northern Nevada and northeastern California. It is characterized by basins that have closed or partially closed drainages separated by north- to south-trending fault-block ranges and escarpments that have been tilted (Conrad et al. 1988, Franklin and Dyrness 1988, USDA NRCS 2014).

Extensive flood basalts and associated air-fall tuffs and sedimentary rocks of Miocene age underlie most of the region. At least three separate periods of volcanism are recorded. The oldest deposits consist of a sequence of nearly flat-lying andesite flows about 23 million years before the present. An overlying sequence of basalt flows about 229 m (750 ft) thick correlates with the Steens Basalt about 15 million years in age. The youngest volcanic rocks in the study area comprise a sequence of basalt flows and flow breccia that underlies the broad plateau at the top of Lynch's Rim (Conrad et al. 1988).

The steeply inclined eastern escarpment drops 739 m (2,425 ft) to the floor of Warner Valley over a horizontal distance of 3.2 km (2 mi). In contrast, gently inclined slopes tilting westward predominate over the majority of the RNA. Numerous intermittent stream channels have incised northwest-oriented shallow ravines, which carry snowmelt and rainfall during spring and summer months. Elevations within Fish Creek Rim RNA range from 1380 m (4,528 ft) along the eastern boundary to 2103 m (6,900 ft) along the summit ridge in the south-central part of the RNA (fig. 2). Soil series present are predominantly classified as Carryback, Deseed, Erakatak, and Old Camp. Soils are residuum and colluvium derived from welded tuff and basalt (Kienzle 1999; USDA NRCS 1999, 2014).

Climate is characterized by cold winters and hot summers with features of both maritime and continental climates. Temperatures are milder than in the Great Plains as the Rocky Mountains buffer this region from the full effects of continental air masses. Cyclonic storms still affect the area, although reduced precipitation results from the rain shadow effect of the Cascade Mountains (Franklin and Dyrness 1988). Temperature and precipitation data collected at nearby Hart Mountain (WRCC 2014) are summarized in table 1. Summers are dry, and the July through September period receives only 12 percent of the average annual total precipitation of 294 mm (11.58 in) (WRCC 2014). Upper elevations within the RNA receive a higher proportion of winter precipitation as snowfall.

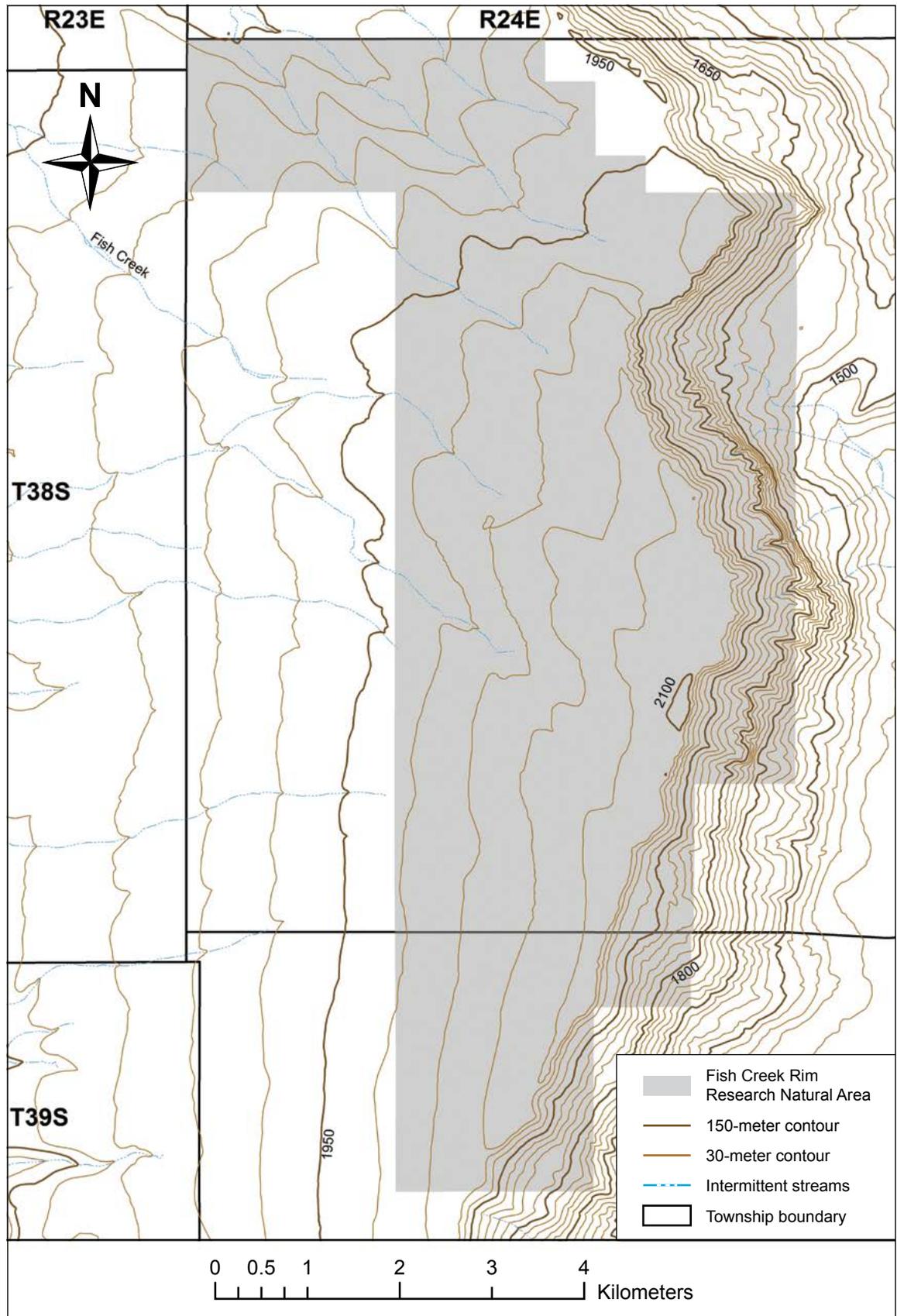


Figure 2—Fish Creek Rim Research Natural Area boundary, topography, and riparian areas.

**Table 1—Temperature<sup>a</sup> and precipitation estimates, 5/1/1939 to 3/31/2013, for Fish Creek Rim Research Natural Area (RNA), Oregon.**

Average minimum January temperature	-7.6 °C (18.4 °F)
Average maximum January temperature	3.9 °C (39.0 °F)
Average minimum July temperature	6.7 °C (44.0 °F)
Average maximum July temperature	27.4 °C (81.4 °F)
Average annual precipitation <sup>1</sup>	294.1 mm (11.58 in)
Average July–September precipitation	36.6 mm (1.44 in)
Average annual snow fall	1252.2 mm (49.3 in)
Average January snow depth	25.4 mm (1 in)

<sup>a</sup> Temperature and precipitation data taken from Hart Mountain Refuge, Oregon, located 40 km (25 mi) northeast of the RNA (WRCC 2014).

## Vegetation

The RNA supports associations of big sagebrush–bitterbrush/Idaho fescue (*Artemisia tridentata*–*Purshia tridentata*/*Festuca idahoensis*); snowbrush and bitter cherry (*Ceanothus velutinus* and *Prunus emarginata*) shrub complex; low sagebrush/Idaho fescue (*Artemisia arbuscula*/*Festuca idahoensis*); and mountain mahogany/mountain big sagebrush (*Cercocarpus ledifolius*/*Artemisia tridentata* ssp. *vaseyana*) community with bitterbrush (*Purshia tridentata*). Plant community distribution within the RNA is shown in figure 3. In addition to relatively homogeneous communities, much of the vegetation within the RNA occupies ecotones or forms tight vegetation mosaics. Figures 4, 5, and 6 illustrate typical vegetation structure and composition within the big sagebrush–bitterbrush/Idaho fescue plant association (fig. 4) along the ecotone between the big sagebrush–bitterbrush/Idaho fescue plant association and the mountain mahogany communities (fig. 5), as well as within the low sagebrush/Idaho fescue plant association (fig. 6). In many areas within the RNA, however, the plant community types intermingle, or form vegetation mosaics. The upper plateau and rimrock areas, in particular, reflect this variation in stands codominated by mountain mahogany, where mountain big sagebrush, bitterbrush, bitter cherry, and snowbrush all may codominate (USDI BLM 2014). Table 2 shows shrub, herb, and grass composition across a mountain mahogany and mountain big sagebrush-bitterbrush ecotone (Schuller and Grinter 2014).

Plant composition and structure within the low sagebrush/Idaho fescue plant association appears in table 3. Low sagebrush is the principal shrub. Minor amounts of *Nestotus stenophyllus* (narrowleaf mock goldenweed) occur scattered in some areas. Conspicuous grasses include Idaho fescue, Sandberg bluegrass, and squirrel-tail (*Elymus elymoides*). Vegetation transects within the low sagebrush community

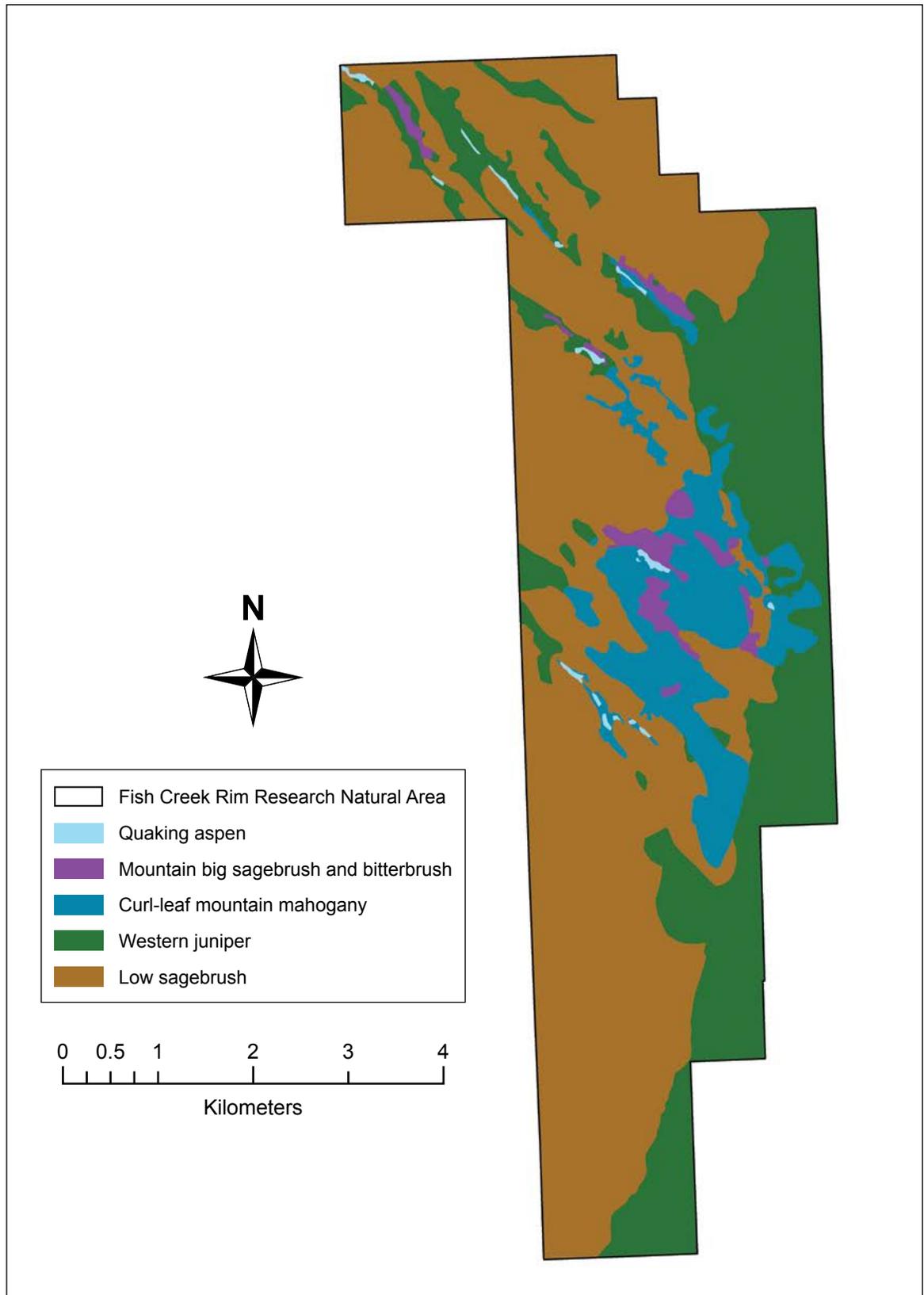


Figure 3—Fish Creek Rim Research Natural Area vegetation map.



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Figure 4—Mountain big sagebrush and bitterbrush dominate shrub layer in the foreground. An ecotone grades into a mountain mahogany thicket in the background. Western juniper and quaking aspen occur sporadically within the ecotone.



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Figure 5—A close-up of ecotone between mountain big sagebrush and bitterbrush and mountain mahogany vegetation communities.



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Figure 6—Low sagebrush and Idaho fescue dominate shallow soils with exposed rock on tableland. Sandberg bluegrass is a codominant, although it is less conspicuous.

revealed a diverse mix of native bunchgrasses with the dominant bunchgrass differing from Idaho fescue in some areas to Sandberg bluegrass in others (Schuller and Grinter 2014). Showy herbaceous species include serrate balsamroot (*Balsamorhiza serrata*), spiny phlox (*Phlox hoodii*), largehead clover (*Trifolium macrocephalum*), and nineleaf biscuitroot (*Lomatium triternatum*).

Western juniper (*Juniperus occidentalis*) occurs throughout the RNA. It occupies the entire range of environments within the RNA. It occurs as dense stands within ravines and along the eastern escarpment, in open woodlands or scattered tree groups throughout the area, or as individual trees within the low sagebrush plant communities. Understory vegetation varies from sparse beneath closed juniper canopies to more vigorous and moderately species-rich in more open areas.

Small groves of white fir (*Abies concolor*) are scattered at higher elevations and in mesic microhabitats at mid-elevations within the RNA. White fir is generally uncommon on BLM-administered lands in the northern Great Basin. This is uncommon in the Great Basin, and is usually restricted to high elevations and moist microhabitats. Ice-age relict stands of white fir are also present on Hart Mountain about 8 km (5 mi) to the east of the RNA (USDI BLM 2014). In mesic settings where soil is moist, quaking aspen (*Populus tremuloides*) sometimes codominates (fig. 7).

Table 2—Plant association, shrub and forb frequency and cover within three permanent transects in Fish Creek Rim Research Natural Area, Oregon

Scientific name	Code <sup>a,b</sup>	Plant association					
		CELE3 - PUTR2 - ARTRV			Transect 589		
		Transect 587	Transect 588	Transect 588	Transect 588	Transect 589	Transect 589
-----Percent-----							
Shrubs:							
<i>Cercodarpus ledifolius</i>	CELE3	56	44	62	59	24	18
<i>Purshia tridentata</i>	PUTR2	32	13	36	13	46	24
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	ARTRV	40	14	22	7	14	5
<i>Linanthus pungens</i>	LIPU1	4	1	2	+	10	3
<i>Chrysothamnus viscidiflorus</i>	CHVI8	4	+	2	+		
<i>Prunus virginiana</i> var. <i>melanocarpa</i>	PRVIM	6	1				
Herbs, grasses, and subshrubs:							
<i>Festuca idahoensis</i>	FEID	53	8	65	19	24	6
<i>Elymus elymoides</i>	ELEL5	12	+	12	+	41	4
<i>Poa secunda</i>	POSE	29	6	47	3	82	6
<i>Antennaria rosea</i>	ANRO2	12	4	24	2	12	1
<i>Crepis</i> sp.	CREPI	29	2	12	1		
<i>Collinsia parviflora</i>	COPA3	18	+	24	+	41	1
<i>Achillea millefolium</i>	ACMI2	6	+	6	+	6	+
<i>Lupinus argenteus</i>	LUAR3	12	1				
<i>Antennaria dimorpha</i>	ANDI2	12	1				
<i>Melica stricta</i>	MEST	12	+				

Table 2—Plant association, shrub and forb frequency and cover within three permanent transects in Fish Creek Rim Research Natural Area, Oregon (continued)

Scientific name	Code <sup>a,b</sup>	Plant association					
		Transect 587		Transect 588		Transect 589	
		Transect 587	Transect 587	Transect 588	Transect 588	Transect 589	Transect 589
<i>Viola</i> sp.	VIOLA	6	+				
<i>Packera cana</i>	PACAI5			29	1	6	1
<i>Lomatium nevadense</i>	LONE			12	+	6	+
<i>Microsteris gracilis</i>	MIGR			6	+		
<i>Trifolium gymnocarpon</i>	TRGY			6	+		
<i>Calochortus macrocarpus</i>	CAMA5			6	+		
<i>Stellaria longipes</i>	STLO2					18	1
<i>Nothocalais troximoides</i>	NOTR2					18	+
<i>Hieracium scouleri</i>	HISC2					6	+
<i>Poa pratensis</i>	POPR					6	+

----- Percent -----

<sup>a</sup> 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 (e.g., *Abies concolor* is shortened to ABCO). In a few instances, a number is added to the four digit acronym in order to avoid duplication and confusion with taxa having the same unnumbered acronym (e.g., "PUTR2" for *Purshia tridentata*). Plant associations are generally defined by the dominant or characteristic species which occupies, or has the biological potential to occupy, the uppermost vegetation layer. In forested plant associations, this is the tree layer. In shrub-dominated areas with no or few trees, the shrub layer is used. Additional names are used for understory layers when they contain dominant, characteristic, or diagnostic species (e.g., white fir-Shasta red fir/pipsissewa—Columbian windflower (*Abies concolor*—*Abies magnifica* var. *shastensis* / *Chimaphila umbellata* ssp. *occidentalis*—*Anemone deltoidea*). Life form layers are separated by a "/". Codominants within a layer are separated by a "c".

<sup>b</sup> CELE3—*Cercocarpus ledifolius*, PUTR2—*Purshia tridentata*, ARTRV—*Artemisia tridentata* ssp. *vaseyana*, + = trace (<0.5 percent foliar cover), - = not recorded.

<sup>c</sup> Frequency is expressed as percentage of relative frequency (e.g., rooted occurrence of a species in 3 of 20 microplots is expressed as 15 percent), cover is expressed as percentage estimate of foliar cover as observed from a vertical projection. Zero values are not included.

Table 3—Plant association, understory percent frequency and cover within six permanent transects in Fish Creek Rim Research Natural Area, Oregon

Scientific name	Code	Plant association					
		ARAR8 / POSE	ARAR8 / FEID-POSE	ARAR8 / POSE	ARAR8 / FEID-POSE	ARAR8 / FEID-POSE	ARAR8 / FEID-POSE
		Transect 590	Transect 591	Transect 592	Transect 593	Transect 594	Transect 595
----- Percent frequency / Percent cover -----							
Shrubs:							
<i>Purshia tridentata</i>	PUTR2						4 / 3
<i>Artemisia arbuscula</i> ssp. <i>arbuscula</i>	ARAR8	28 / 9	64 / 21	12 / 3	44 / 13	40 / 9	52 / 16
<i>Nestotus stenophyllus</i>	NEST5	18 / 1		50 / 7		10 / 1	12 / 2
<i>Eriogonum microthecum</i> var. <i>laxiflorum</i>	ERMIL2			8 / 1			
Herbs, grasses, and sedges:							
<i>Festuca idahoensis</i>	FEID	18 / 1	53 / 10		65 / 14	29 / 2	47 / 5
<i>Elymus elymoides</i>	ELEL5	24 / 1	29 / 1	35 / 1	18 / 1	24 / 1	29 / 1
<i>Poa secunda</i>	POSE	65 / 7	88 / 9	100 / 13	100 / 7	82 / 10	94 / 8
<i>Danthonia unispicata</i>	DAUN	6 / 1		6 / +	6 / 1		6 / +
<i>Phlox hoodii</i>	PHHO	24 / 1	35 / 2	12 / +	35 / 3	18 / 1	35 / 1
<i>Lomatium triternatum</i>	LOTR2	59 / 3	71 / 2	47 / 2	6 / +	6 / +	6 / +
<i>Balsamorhiza serrata</i>	BASE2	29 / 1	41 / 1	18 / 2			6 / 1
<i>Trifolium macrocephalum</i>	TRMA3	29 / 2	6 / +	65 / 3		12 / +	
<i>Trifolium</i> sp.	TRIFO	47 / 10	41 / 7	6 / 1			
<i>Antennaria dimorpha</i>	ANDI2	18 / +		18 / 2		6 / +	
<i>Nothocalais troximoides</i>	NOTR2	6 / +	18 / +			6 / +	

Table 3—Plant association, understory percent frequency and cover within six permanent transects in Fish Creek Rim Research Natural Area, Oregon (continued)

Scientific name	Code	Plant association					
		ARAR8 / POSE	ARAR8 / FEID-POSE	ARAR8 / POSE	ARAR8 / FEID-POSE	ARAR8 / FEID-POSE	ARAR8 / FEID-POSE
		Transect 590	Transect 591	Transect 592	Transect 593	Transect 594	Transect 595
<i>Collinsia parviflora</i>	COPA3	6 / +			18 / +		
<i>Packera cana</i>	PACA15	12 / +					
<i>Lithophragma glabrum</i>	LIGL2	6 / +				6 / +	
<i>Allium platycaule</i>	ALPL2	6 / +					
<i>Phoenicautis cheiranthoides</i>	PHCH		6 / 1				
<i>Koeleria macrantha</i>	KOMA		6 / +			6 / +	6 / +
<i>Eremogone congesta</i>	ERCO24		12 / 1			12 / +	
<i>Castilleja pilosa</i>	CAPI3		12 / 1			6 / +	
<i>Antennaria rosea</i>	ANRO2					12 / +	
<i>Erigeron bloomeri</i>	ERBL					6 / +	6 / +
<i>Carex rossii</i>	CARO5					6 / +	
<i>Leptosiphon harknessii</i>	LEHA11						6 / +
<i>Agoseris heterophylla</i>	AGHE2						6 / +
<i>Bromus hordeoides</i>	BRHO2						6 / +
<i>Lomatium nevadense</i>	LONE						6 / +
<i>Microsteris gracilis</i>	MIGR						6 / +
<i>Gayophytum</i> sp.	GAYOP						6 / +
<i>Draba verna</i>	DRVE2						6 / +



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Figure 7—A white fir stand within Fish Creek Rim Research Natural Area. White fir is reproducing in the ground layer. Quaking aspen and western juniper also are present in the tree layer.

## Fauna

Bighorn sheep (*Ovis canadensis*) have been observed in the area, and extensive habitat is available within the RNA along the eastern escarpment. This rimrock area also provides habitat for birds of prey nesting. Sage grouse (*Centrocercus urophasianus*) is documented to occur within the area and habitat occurs in and around the RNA (USDI BLM 2014). The shrublands on the western slope provide browse and cover for mule deer (*Odocoileus hemionus* ssp. *hemionus*), pronghorn (*Antilocapra americana*), and elk (*Cervus elaphus*).

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

Long-term vegetation monitoring transects were established in 2014 (Schuller and Grinter 2014). Three transects were laid out along the ecotone between stands of mountain mahogany and the big sagebrush–bitterbrush/Idaho fescue plant community. Six transects were established within the low sagebrush/bunchgrass vegetation mosaic, where Idaho fescue and Sandberg bluegrass (*Poa secunda*) alternate as stand dominants.

Conrad et al. (1988) evaluated 4827 ha (11,929 ac) of Fish Creek Rim Wilderness Study Area for known and potential mineral resources. The large majority of the RNA is within this boundary.

## Maps

Maps applicable to Fish Creek Rim RNA: Topographic—Priday Reservoir, 7.5 minute; 1:24,000 scale, 1967 (photo revised 1980); BLM Lakeview Resource Area—Southeast Quarter recreation map, 1:126720 (1/2 inch = 1 mile), 1996.

## Acknowledgments

The following people merit recognition for their contributions. Phil D’Amo, Lakeview District geologist, and Steven Flock, Vale District geologist, provided helpful comments on the geology and general environment. John Owens, Lakeview District wildlife biologist, reviewed and improved the list of animals in appendix 2. We also thank the three manuscript reviewers: Todd Wilson, wildlife biologist and research natural area coordinator, U.S. Forest Service, Pacific Northwest Research Station; Grace Haskins, invasive species coordinator, Lakeview District, BLM; and Paul Whitman, planning and environmental coordinator, Lakeview District, BLM.

Photographs and figures are provided by the authors. The project is funded through the BLM Oregon State Office, and is administratively supported by the USDA Forest Service, Pacific Northwest Research Station.

## English Equivalents

<b>When you know:</b>	<b>Multiply by:</b>	<b>To find:</b>
Millimeter (mm)	0.0394	Inch
Centimeter (cm)	0.394	Inch (in)
Meter (m)	3.28	Feet (ft)
Kilometer (km)	0.62	Mile (mi)
Square meter (m <sup>2</sup> )	10.76	Square feet (ft <sup>2</sup> )
Hectare (ha)	2.47	Acres (ac)
Degrees Fahrenheit	(°F – 32)/1.8	Degrees Celsius (°C)

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## Appendix 1: Plants<sup>a b</sup>

Scientific name	Common name
Coniferous trees:	
<i>Abies concolor</i> (Gord. & Glend.) Lindl. ex Hildebr.	White fir
<i>Juniperus occidentalis</i> Hook.	Western juniper
<i>Pinus ponderosa</i> Laws. & C. Laws.	Ponderosa pine
Deciduous trees:	
<i>Populus tremuloides</i> Michx.	Quaking aspen
Tall shrubs 2 to 8 m (6.6 to 26.2 ft) tall:	
<i>Cercocarpus ledifolius</i> Nutt. var. <i>ledifolius</i>	Curl-leaf mountain mahogany
<i>Peraphyllum ramosissimum</i> Nutt.	Wild crab apple
<i>Prunus emarginata</i> (Dougl. ex Hook.) D. Dietr.	Bitter cherry
<i>Prunus virginiana</i> L. var. <i>melanocarpa</i> (Nels.) Sarg.	Black chokecherry
Medium shrubs 0.5 to 2 m (1.6 to 6.6 ft) tall:	
<i>Artemisia tridentata</i> Nutt. ssp. <i>vaseyana</i> (Rydb.) Beetle	Mountain big sagebrush
<i>Artemisia tridentata</i> Nutt. ssp. <i>wyomingensis</i> Beetle & Young	Wyoming big sagebrush
<i>Ceanothus velutinus</i> Dougl. ex Hook.	Snowbrush ceanothus
<i>Chrysothamnus viscidiflorus</i> (Hook.) Nutt.	Yellow rabbitbrush
<i>Ericameria nauseosa</i> (Pallas ex Pursh) Nesom & Baird	Gray rabbitbrush
<i>Eriogonum microthecum</i> Nutt. var. <i>laxiflorum</i> Hook.	Slender buckwheat
<i>Grayia spinosa</i> (Hook.) Moq.	Spiny hopsage
<i>Holodiscus dumosus</i> (Nutt. ex Hook.) A. Heller	Rockspirea
<i>Linanthus pungens</i> (Torr.) J.M. Porter & L.A. Johnson	Granite prickly phlox
<i>Purshia tridentata</i> (Pursh) DC.	Bitterbrush
<i>Ribes aureum</i> Pursh	Golden currant
<i>Ribes cereum</i> Dougl.	Wax currant
<i>Rosa woodsii</i> Lindl.	Woods' rose
<i>Symphoricarpos oreophilus</i> A. Gray	Mountain snowberry
Low shrubs <0.5 m tall:	
<i>Artemisia arbuscula</i> Nutt. ssp. <i>arbuscula</i>	Low sagebrush
<i>Nestotus stenophyllus</i> (A. Gray) R.P. Roberts, Urbatsch & Neubig	Narrowleaf mock goldenweed
<i>Phlox hoodii</i> Richardson	Spiny phlox
Herbs:	
<i>Achillea millefolium</i> L.	Common yarrow
<i>Agoseris glauca</i> (Pursh) Raf.	Pale agoseris
<i>Agoseris heterophylla</i> (Nutt.) Greene	Annual agoseris
<i>Alisma triviale</i> Pursh	Northern water plantain
<i>Allium platycaule</i> S. Watson	Broadstemmed onion
<i>Antennaria dimorpha</i> (Nutt.) T. & G.	Low pussytoes

Scientific name	Common name
<i>Antennaria rosea</i> Greene	Rosy pussytoes
<i>Arnica sororia</i> Greene	Twin arnica
<i>Astragalus filipes</i> Torr. ex A. Gray	Basalt milkvetch
<i>Astragalus malacus</i> A. Gray	Shaggy milkvetch
<i>Astragalus purshii</i> Dougl. ex Hook.	Woollypod milkvetch
<i>Balsamorhiza sagittata</i> (Pursh) Nutt.	Arrowleaf balsamroot
<i>Balsamorhiza serrata</i> A. Nelson & J.F. Macbr.	Serrate balsamroot
<i>Calochortus macrocarpus</i> Dougl.	Sagebrush mariposa lily
<i>Castilleja chromosa</i> A. Nels.	Desert paintbrush
<i>Castilleja pilosa</i> (S. Watson) Rydb.	Parrothead Indian paintbrush
<i>Chenopodium</i> L.	Goosefoot
<i>Cirsium vulgare</i> (Savi) Ten.	Bull thistle
<i>Collinsia parviflora</i> Lindl.	Maiden blue eyed Mary
<i>Collomia grandiflora</i> Dougl. ex Lindl.	Grand collomia
<i>Crepis acuminata</i> Nutt.	Tapertip hawksbeard
<i>Crepis occidentalis</i> Nutt.	Largeflower hawksbeard
<i>Crepis</i> L.	Hawksbeard
<i>Cystopteris fragilis</i> (L.) Bernh.	Brittle bladderfern
<i>Descurainia incana</i> (Bernh. ex Fisch. & C.A. Mey.) Dorn	Mountain tansymustard
<i>Descurainia pinnata</i> (Walt.) Britt.	Western tansymustard
<i>Dodecatheon</i> L.	Shootingstar
<i>Draba verna</i> L.	Spring draba
<i>Epilobium brachycarpum</i> C. Presl	Tall annual willowherb
<i>Eremogone aculeata</i> S. Watson.	Prickly sandwort
<i>Eremogone congesta</i> (Nutt.) Ikonn.	Ballhead sandwort
<i>Erigeron bloomeri</i> A. Gray	Scabland fleabane
<i>Erigeron foliosus</i> Nutt.	Leafy fleabane
<i>Erigeron linearis</i> (Hook.) Piper	Desert yellow fleabane
<i>Eriogonum umbellatum</i> Torr.	Sulphur-flower buckwheat
<i>Eriophyllum lanatum</i> (Pursh) Forbes	Common woolly sunflower
<i>Erysimum repandum</i> L.	Spreading wallflower
<i>Fritillaria atropurpurea</i> Nutt.	Spotted fritillary
<i>Galium aparine</i> L.	Stickywilly
<i>Gayophytum</i> A. Juss.	Groundsmoke
<i>Geum triflorum</i> Pursh	Old man's whiskers
<i>Hackelia cusickii</i> (Piper) Brand	Cusick's stickseed
<i>Hesperochiron californicus</i> (Benth.) S. Watson	California hesperochiron
<i>Hieracium scouleri</i> Hook.	Scouler's woollyweed
<i>Horkelia fusca</i> Lindl.	Pinewoods horkelia
<i>Hydrophyllum capitatum</i> Dougl. ex Benth.	Ballhead waterleaf
<i>Ionactis alpina</i> (Nutt.) Greene	Lava aster

Scientific name	Common name
<i>Iris missouriensis</i> Nutt.	Rocky Mountain iris
<i>Iva axillaris</i> Pursh	Povertyweed
<i>Lactuca serriola</i> L.	Prickly lettuce
<i>Leptosiphon harknessii</i> (Curran) J.M. Porter & L.A. Johnson	Harkness' flaxflower
<i>Lithophragma glabrum</i> Nutt.	Bulbless woodland-star
<i>Lithospermum ruderales</i> Dougl. ex Lehm.	Western stoneseed
<i>Lomatium leptocarpum</i> (Torr. & A. Gray) J.M. Coult. & Rose	Wasatch desertparsley
<i>Lomatium macrocarpum</i> (Nutt. ex Torr. & A. Gray) J.M. Coult. & Rose	Bigseed biscuitroot
<i>Lomatium nevadense</i> (S. Watson) Coult. & Rose	Nevada biscuitroot
<i>Lomatium nudicaule</i> (Pursh) J.M. Coult. & Rose	Barestem biscuitroot
<i>Lomatium triternatum</i> (Pursh) Coult. & Rose	Nineleaf biscuitroot
<i>Lupinus argenteus</i> Pursh	Silvery lupine
<i>Mertensia oblongifolia</i> (Nutt.) G. Don	Oblongleaf bluebells
<i>Microsteris gracilis</i> (Hook.) Greene	Slender phlox
<i>Montia linearis</i> (Dougl. ex Hook.) Greene	Narrowleaf minerslettuce
<i>Navarretia intertexta</i> (Benth.) Hook.	Needleleaf navarretia
<i>Navarretia leucocephala</i> Benth.	Whitehead navarretia
<i>Nothocalais troximoides</i> (A. Gray) Greene	Sagebrush false dandelion
<i>Orthocarpus cuspidatus</i> Greene ssp. <i>copelandii</i> (Eastw.) T.I. Chuang & Heckard	Copeland's owl's-clover
<i>Packera cana</i> (Hook.) W.A. Weber & Á. Löve	Woolly groundsel
<i>Pedicularis centranthera</i> A. Gray	Dwarf lousewort
<i>Penstemon deustus</i> Dougl. ex Lindl.	Scabland penstemon
<i>Penstemon humilis</i> Nutt. ex A. Gray	Low beardtongue
<i>Phacelia heterophylla</i> Pursh	Varileaf phacelia
<i>Phoenicaulis cheiranthoides</i> Nutt.	Wallflower phoenicaulis
<i>Plagiobothrys hispidulus</i> (Greene) I.M. Johnst.	Sleeping popcornflower
<i>Potentilla gracilis</i> Dougl. ex Hook.	Slender cinquefoil
<i>Ranunculus aquatilis</i> L.	White water crowfoot
<i>Ranunculus occidentalis</i> Nutt.	Western buttercup
<i>Rumex crispus</i> L.	Curly dock
<i>Scutellaria angustifolia</i> Pursh	Narrowleaf skullcap
<i>Senecio integerrimus</i> Nutt. var. <i>exaltatus</i> (Nutt.) Cronquist	Columbia ragwort
<i>Sidalcea oregana</i> (Nutt. ex Torr. & A. Gray) A. Gray	Oregon checkerbloom
<i>Sisymbrium altissimum</i> L.	Tall tumbledustard
<i>Stellaria longipes</i> Goldie	Longstalk starwort
<i>Taraxia tanacetifolia</i> (Torr. & A. Gray) Piper	Tansyleaf evening primrose
<i>Toxicoscordion venenosum</i> (S. Wats.) Rydb.	Meadow deathcamas
<i>Trifolium gymnocarpon</i> Nutt.	Hollyleaf clover
<i>Trifolium longipes</i> Nutt.	Longstalk clover
<i>Trifolium macrocephalum</i> (Pursh) Poir.	Largehead clover
<i>Trifolium</i> L.	Clover

Scientific name	Common name
<i>Viola beckwithii</i> Torr. & A. Gray	Beckwith's violet
<i>Viola praemorsa</i> Dougl. ex Lindl.	Canary violet
<i>Viola</i> L.	Violet
Grasses, sedges, and rushes:	
<i>Achnatherum thurberianum</i> (Piper) Barkworth	Thurber's needlegrass
<i>Alopecurus aequalis</i> Sobol.	Shortawn foxtail
<i>Alopecurus geniculatus</i> L.	Water foxtail
<i>Bromus carinatus</i> Hook. & Arn.	California brome
<i>Bromus hordeaceus</i> L.	Soft brome
<i>Bromus tectorum</i> L.	Cheatgrass
<i>Carex douglasii</i> Boott	Douglas' sedge
<i>Carex filifolia</i> Nutt.	Threadleaf sedge
<i>Carex petasata</i> Dewey	Liddon sedge
<i>Carex rossii</i> Boott	Ross' sedge
<i>Carex utriculata</i> Boott	Northwest Territory sedge
<i>Carex vallicola</i> Dewey	Valley sedge
<i>Danthonia unispicata</i> (Thurb.) Munro ex Macoun	Onespike danthonia
<i>Deschampsia cespitosa</i> (L.) P. Beauv.	Tufted hairgrass
<i>Deschampsia danthonioides</i> (Trin.) Munro	Annual hairgrass
<i>Eleocharis</i> R. Br.	Spikerush
<i>Elymus elymoides</i> (Raf.) Swezey	Squirreltail
<i>Festuca idahoensis</i> Elmer	Idaho fescue
<i>Hordeum brachyantherum</i> Nevski	Meadow barley
<i>Hordeum jubatum</i> L.	Foxtail barley
<i>Juncus balticus</i> Willd.	Mountain rush
<i>Koeleria macrantha</i> (Ledeb.) Schult.	Prairie Junegrass
<i>Melica stricta</i> Bol.	Rock melicgrass
<i>Poa alpina</i> L.	Alpine bluegrass
<i>Poa bulbosa</i> L.	Bulbous bluegrass
<i>Poa pratensis</i> L.	Kentucky bluegrass
<i>Poa secunda</i> J. Presl	Sandberg bluegrass
<i>Poa secunda</i> J. Presl ssp. <i>juncifolia</i> (Scribn.) Soreng.	Big bluegrass
<i>Pseudoroegneria spicata</i> (Pursh) Á. Löve	Bluebunch wheatgrass

<sup>a</sup> Nomenclature for vascular plants, ferns, and fern-allies follows the *Flora of North America* (1993+) and the Oregon Flora Project website (Cook and Sundberg 2014).

<sup>b</sup> Compiled from field surveys (Schuller and Grinter 2014).

## Appendix 2: Amphibians, Reptiles, Birds, and Mammals Expected to Use Fish Creek Rim Research Natural Area<sup>a b</sup>

Family	Scientific name	Common name
Amphibians:		
Ambystomatidae	<i>Ambystoma macrodactylum</i>	Long-toed salamander
Pelobatidae	<i>Scaphiopus intermontanus</i>	Great Basin spadefoot
Reptiles:		
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
Iguanidae	<i>Phrynosoma douglasii</i>	Short-horned lizard
	<i>Sceloporus graciosus</i>	Sagebrush lizard
	<i>Sceloporus occidentalis</i>	Western fence lizard
	<i>Uta stansburiana</i>	Side-blotched lizard
Scincidae	<i>Eumeces skiltonianus</i>	Western skink
Viperidae	<i>Crotalus viridis</i>	Western rattlesnake
Birds:		
Accipitridae	<i>Accipiter cooperii</i>	Cooper's hawk
	<i>Accipiter cyaneus</i>	Northern harrier
	<i>Accipiter gentilis</i>	Northern goshawk
	<i>Accipiter striatus</i>	Sharp-shinned hawk
	<i>Aquila chrysaetos</i>	Golden eagle
	<i>Buteo regalis</i>	Ferruginous hawk
	<i>Buteo jamaicensis</i>	Red-tailed hawk
	<i>Buteo swainsoni</i>	Swainson's hawk
	<i>Haliaeetus leucocephalus</i>	Bald eagle
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
Phasianidae	<i>Alectoris chukar</i>	Chukar
	<i>Centrocercus urophasianus</i>	Sage grouse
	<i>Dendragapus obscurus</i>	Blue grouse
Columbidae	<i>Columbia livia</i>	Rock dove
	<i>Zenaida macroura</i>	Mourning dove

Family	Scientific name	Common name
Tytonidae	<i>Tyto alba</i>	Barn owl
Strigidae	<i>Asio otus</i>	Long-eared owl
	<i>Bubo virginianus</i>	Great horned owl
	<i>Otus flammeolus</i>	Flammulated owl
Caprimulgidae	<i>Chordeiles minor</i>	Common nighthawk
	<i>Phalaenoptilus nuttallii</i>	Common poorwill
Apodidae	<i>Aeronautes saxatalis</i>	White-throated swift
	<i>Archilochus alexandri</i>	Black-chinned hummingbird
Picidae	<i>Colaptes auratus</i>	Northern flicker
	<i>Sphyrapicus ruber</i>	Red-breasted sapsucker
Tyrannidae	<i>Contopus sordidulus</i>	Western wood-pewee
	<i>Empidonax oberholseri</i>	Dusky flycatcher
	<i>Empidonax wrightii</i>	Gray flycatcher
	<i>Sayornis saya</i>	Say's phoebe
Hirundinidae	<i>Tachycineta thalassina</i>	Violet-green swallow
Corvidae	<i>Corvus corax</i>	Common raven
	<i>Gymnorhinus cyanocephalus</i>	Pinyon jay
	<i>Nucifraga columbiana</i>	Clark's nutcracker
Paridae	<i>Parus gambeli</i>	Mountain chickadee
Aegithalidae	<i>Psaltriparus minimus</i>	Bushtit
Sittidae	<i>Sitta carolinensis</i>	White-breasted nuthatch
Troglodytidae	<i>Salpinctes obsoletus</i>	Rock wren
	<i>Troglodytes aedon</i>	House wren
Muscicapidae	<i>Catharus ustulatus</i>	Swainson's thrush
	<i>Myadestes townsendi</i>	Townsend's solitaire
	<i>Polioptila caerulea</i>	Blue-gray gnatcatcher
	<i>Sialia mexicana</i>	Western bluebird
Mimidae	<i>Oreoscoptes montanus</i>	Sage thrasher
Bombycillidae	<i>Bombycilla cedrorum</i>	Cedar waxwing
Laniidae	<i>Lanius ludovicianus</i>	Loggerhead shrike
Vireonidae	<i>Vireo solitarius</i>	Blue-headed vireo
Emberizidae	<i>Amphispiza belli</i>	Sage sparrow
	<i>Chondestes grammacus</i>	Lark sparrow
	<i>Dendroica coronata</i>	Yellow-rumped warbler
	<i>Dendroica petechia</i>	Yellow warbler
	<i>Euphagus cyanocephalus</i>	Brewer's blackbird
	<i>Junco hyemalis</i>	Dark-eyed junco

Family	Scientific name	Common name
	<i>Molothrus ater</i>	Brown-headed cowbird
	<i>Oporornis tolmiei</i>	Macgillivray's warbler
	<i>Pipilo chlorurus</i>	Green-tailed towhee
	<i>Pooecetes gramineus</i>	Vesper sparrow
	<i>Spizella breweri</i>	Brewer's sparrow
	<i>Spizella passerina</i>	Chipping sparrow
	<i>Vermivora celata</i>	Orange-crowned warbler
Fringillidae	<i>Carpodacus cassinii</i>	Cassin's finch
	<i>Coccothraustes vespertinus</i>	Evening grosbeak
Mammals:		
Soricidae	<i>Sorex merriami</i>	Merriam's shrew
	<i>Sorex preblei</i>	Preble's shrew
	<i>Sorex trowbridgii</i>	Trowbridge's shrew
Talpidae	<i>Scapanus latimanus</i>	Broad-footed mole
Vespertilionidae	<i>Antrozous pallidus</i>	Pallid bat
	<i>Myotis ciliolabrum</i>	Western small-footed myotis
	<i>Myotis evotis</i>	Long-eared myotis
Ochotonidae	<i>Ochotona princeps</i>	American pika
Leporidae	<i>Lepus townsendii</i>	White-tailed jackrabbit
	<i>Sylvilagus nuttallii</i>	Mountain cottontail
Sciuridae	<i>Glaucomys sabrinus</i>	Northern flying squirrel
	<i>Marmota flaviventris</i>	Yellow-bellied marmot
	<i>Spermophilus beldingi</i>	Belding's ground squirrel
	<i>Spermophilus lateralis</i>	Golden-mantled ground squirrel
	<i>Tamias minimus</i>	Least chipmunk
	<i>Tamias amoenus</i>	Yellow-pine chipmunk
	<i>Tamiasciurus douglasii</i>	Douglas' squirrel
Heteromyidae	<i>Dipodomys ordii</i>	Ord's kangaroo rat
	<i>Perognathus parvus</i>	Great Basin pocket mouse
Muridae	<i>Lemmiscus curtatus</i>	Sagebrush vole
	<i>Microtus longicaudus</i>	Long-tailed vole
	<i>Microtus montanus</i>	Montane vole
	<i>Neotoma lepida</i>	Desert woodrat
	<i>Onychomys leucogaster</i>	Northern grasshopper mouse
Dipodidae	<i>Zapus princeps</i>	Western jumping mouse
Erethizontidae	<i>Erethizon dorsatum</i>	Common porcupine
Canidae	<i>Canis latrans</i>	Coyote

Family	Scientific name	Common name
Mustelidae	<i>Mustela frenata</i>	Long-tailed weasel
	<i>Taxidea taxus</i>	American badger
Felidae	<i>Felis concolor</i>	Mountain lion
	<i>Lynx rufus</i>	Bobcat
Cervidae	<i>Cervus elaphus</i>	Elk
	<i>Odocoileus hemionus</i> ssp. <i>hemionus</i>	Mule deer
Bovidae	<i>Antilocapra americana</i>	Pronghorn
	<i>Ovis canadensis</i>	Bighorn sheep

<sup>a</sup> Nomenclature taken from Csuti et al. 1997. Atlas of Oregon wildlife. Corvallis, OR: Oregon State University Press. 492 p. + map.

<sup>b</sup> Compiled from habitat descriptions and distribution maps in Csuti et al. 1997. Atlas of Oregon wildlife. Corvallis, OR: Oregon State University Press. 492 p. + map.







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