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High Peak/Moon Creek Research Natural Area

Guidebook Supplement 30

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Abstract

Schuller, Reid. 2006. High Peak/Moon Creek Research Natural Area: guidebook supplement 30. Gen. Tech. Rep. PNW-GTR-673. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 25 p.

This guidebook describes the High Peak/Moon Creek Research Natural Area, a 617.5-ha (1,526-ac) tract of coniferous forest containing stands dominated by 100- to 150-year-old Douglas-fir, a small old-growth (500+ years) Douglas-fir stand, and riparian vegetation within the western hemlock zone of the Coast Range in western Oregon.

Keywords: Research natural area, fire-initiated Douglas-fir forest, old-growth forest, Oregon Coast Range.

Preface

The research natural area (RNA) described in this supplement[1] is administered by the Bureau of Land Management (BLM), U.S. Department of the Interior. The BLM/Salem District office has RNA program administrative responsibility, and the Tillamook Resource Area has on-the-ground management responsibility for the RNA. Scientists and educators wishing to visit or use the RNA for scientific or educational purposes should contact the Tillamook Resource Area, Area of Critical Environmental Concern Coordinator 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.

High Peak/Moon Creek RNA is part of a federal system of such tracts established for research and educational purposes. Each RNA constitutes 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 96 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 the system.

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

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[1] Supplement No. 30 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].

is public use that might impair scientific or educational values. Management practices necessary to maintain or restore ecosystems may be allowed.

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 should be restricted to the minimum necessary to provide voucher specimens and other research needs. Under no circumstances may collecting significantly reduce populations of species. Collecting also must be carried out in accordance with agency regulations. Within these broad guidelines, appropriate uses of RNAs are determined by the administering agency.

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[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.

Contents

Introduction

The High Peak/Moon Creek Research Natural Area (RNA) is a 617.5-ha (1,526-ac) tract of coniferous forest containing stands of 100- to 150-year-old Douglas-fir (*Pseudotsuga menziesii*), (See app. 1 for a complete list of scientific and common names of plant species), a small, old-growth (500+ years) Douglas-fir dominated stand, and riparian vegetation within the western hemlock zone of the northern Oregon Coast Range (Franklin and Dyrness 1973, USDI BLM 1996).

High Peak/Moon Creek RNA supports a representative cross section of forest associations that span low to mid elevations in the northern Oregon Coast Range. The majority of the area is dominated by stands that have developed following wildfires in the late 19th century. Overstory tree ages, for the most part, are within the 100- to 150-year-old age class. Douglas-fir is the dominant overstory species throughout the RNA.

A small stand of over 500-year-old Douglas-fir with a western hemlock (*Tsuga heterophylla*) subcanopy and regeneration layer occurs within the northwestern portion of the tract. Riparian vegetation at lower elevations within the RNA is dominated by red alder (*Alnus rubra*), and bigleaf maple (*Acer macrophyllum*). Western redcedar (*Thuja plicata*) occupies mesic sites slightly elevated from riparian areas along with Douglas-fir and western hemlock.

The High Peak/Moon Creek RNA was established in 1983 as a research natural area and an Area of Critical Environmental Concern (ACEC). The RNA is administered by the Salem District of the Bureau of Land Management (BLM) and managed by the Tillamook Resource Area, BLM.

Access and Accommodations

High Peak/Moon Creek RNA is located approximately 11 air miles south-southeast of Tillamook, Oregon, in Tillamook County. The site occupies all or portions of T. 2 S, R. 8 W sec. 32, 33; and T. 3 S, R. 8 W, sec. 3, 4, 5, 8, and 9, Willamette Meridian.

The site may be accessed from the west by using county and BLM roads (fig. 1). Approximately 11 mi. (17.7 km) south of Tillamook, turn east off of U.S. Highway 101 onto East Beaver Creek Road. Proceed east for 7.7 mi (12.4 km), then turn right and cross a bridge. Proceed uphill on the main road to the “Y” intersection 0.9 mi from the bridge. Take the left fork (3-8-6) at the “Y” and proceed another 1.9 mi to a landing (dead end) and park your vehicle. This route provides access to the central parts of the RNA in sec. 5, T. 3 S, R. 8 W. Before attempting

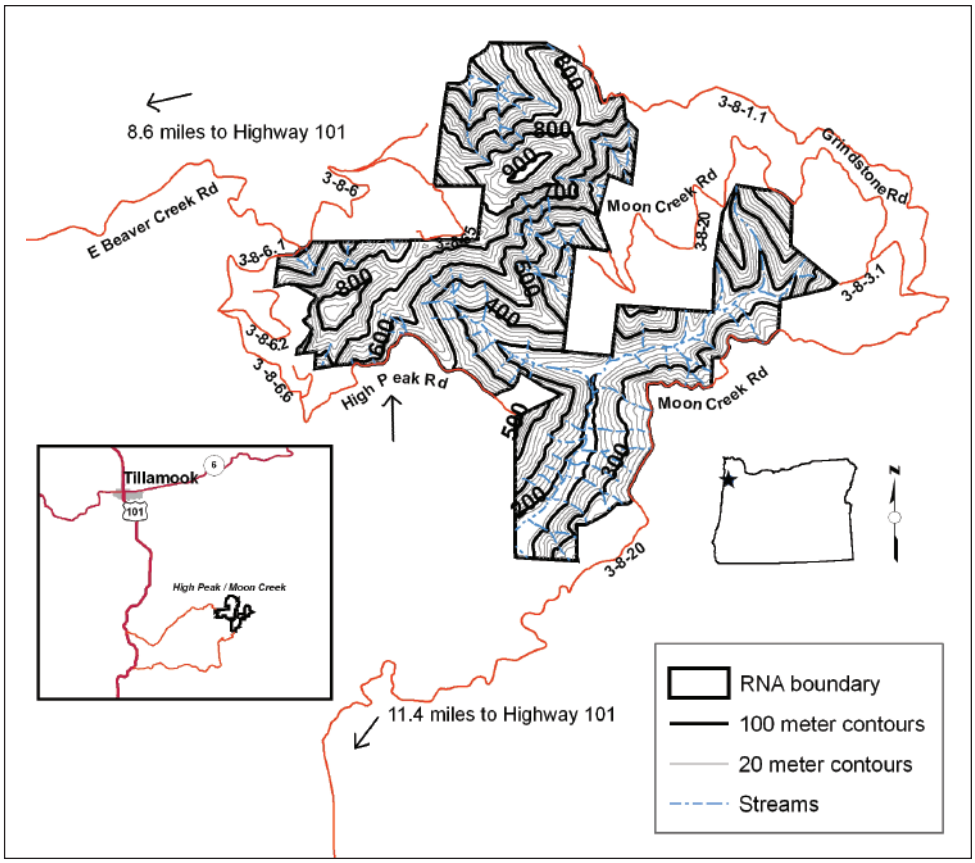

Figure 1—High Peak/Moon Creek Research Natural Area (RNA) boundary and access.

to access the site, contact the BLM Tillamook Resource Area office in Tillamook to obtain permission to use the RNA and for current road and traffic information.

There are no developed trails within the site. Cross country foot travel is difficult because of steep slopes, and heavy shrub cover in some areas. A choice of nearby lodging accommodations is available in Tillamook, Oregon.

Environment

The High Peak/Moon Creek RNA ranges in elevation from 165 to 908 m (540 to 2,980 ft). Moon Creek is a first- and second-order watershed containing headwaters and much of the upper reaches within the site boundary. A small portion of the headwaters of Beaver Creek are also included where it flows northwest off a portion of the ridge connecting High Peak to Grindstone Mountain (see fig. 1). The entire area is within the Nestucca River Watershed.

The geologic setting of the RNA owes its origin to the Tillamook Volcanics of the upper middle Eocene. Composing a major part of the Tillamook Highlands, the

Tillamook Volcanics are a largely basaltic subaerial flow sequence forming the rugged topography of the area today. These flows consist of high titanium tholeiitic to alkaic subaerial basalt and lesser dacite and rhyolite resting on a submarine apron of pillow basalt and breccia and basalt lapilli tuff (Wells et al. 1995).

Terrain is rugged with deeply incised drainages. Slopes are typically steep and comprise a 360º range of aspects. Landslides are prevalent in the surrounding landscape as well as within the RNA boundary (see "Disturbance History" section).

Soils in the RNA have provisionally been mapped as of 2005 (Fillmore and Shipman, n.d.). Sixty percent of the area is provisionally mapped as Klistan-Harslow-Hemcross complex, 60 to 90 percent slopes. Collectively, these series are classified as deep to very deep, well drained, and occur from 61 to 671 m (200 to 2,200 ft) elevation on summits, benches, and sideslopes of mountains. Parent material is colluvium from basalt or tuff. Their taxonomic class is Medial-skeletal, ferrihydritic, mesic Alic Hapludands. Another 20 percent of the area is provisionally mapped as Caterl-Laderly-Murtip complex, 60 to 90 percent slopes. As a complex, these soils are moderately to very deep, well drained, and occur above 549 m (1,800 ft) elevation on summits, benches,and sideslopes of high mountains. Parent material is colluvium and residuum from basalt or tuff. Their taxonomic class is Medial to medial-skeletal, ferrihydritic, frigid Alic Hapludands. A variety of other soil mapping units and series make up the remaining 20 percent of the RNA (Fillmore and Shipman, n.d.).

Soils that formed in colluvium derived from igneous materials associated with geologic rock units such as Tillamook Volcanics commonly have low bulk density, high liquid limit, low plasticity, and high cation exchange capacity (Fillmore and Shipman, n.d.).

Climate

A majority of the High Peak/Moon Creek RNA lies within the wet, mild climate typical of the *Tsuga heterophylla* Zone (Franklin and Dyrness 1973). The climate is strongly maritime, owing to its proximity to the Pacific Ocean. Summers are usually dry and warm with the June-August period receiving about 5 percent of the total annual precipitation. Winters are typically cool and wet. The majority of precipitation occurs during the November-March period; mostly in the form of rain below 549 m (1,800 ft) elevation. High winter precipitation results in extensive leaching of bases and in low base saturation. Above 549 m (1,800 ft), snow may cover the area with average monthly snow depth in excess of 51 mm (2 in) occurring from November through April. Average monthly maximum snow depth of 254

mm (10 in) occurs in January. In summer, the soils at the higher elevations dry out for brief periods (Fillmore and Shipman, n.d.).

Meteorological data from the nearest climatic station of comparable elevation and distance from the Pacific Ocean are taken from Laurel Mountain. These data were collected from 1978 to 2005. The Laurel Mountain station is located on the mountain summit at 1094 m (3,589 ft) elevation, approximately 46 km (28.6 miles) south-southeast of the RNA (Western Regional Climate Center 2006).

Average Minimum January Temperature	-0.8° C (30.5° F)
Average Maximum January Temperature	4.4° C (40° F)
Average Minimum July Temperature	9.3° C (48.7° F)
Average Maximum July Temperature	18.7° C (65.6° F)
Average Annual Precipitation	3100 mm (122.03 in)
Average June-August Precipitation	160 mm (6.30 in)
Average Annual Snowfall	2982 mm (117.4 in)

Vegetation

The entire RNA lies within the *Tsuga heterophylla* Zone described by Franklin and Dyrness (1973). Forest plant associations of the northern Oregon Coast Range have been classified and described by Hemstrom and Logan (1986) and more recently by McCain and Diaz (2002).

The High Peak/Moon Creek RNA is characterized by mature coniferous forest stands. Figure 2 illustrates the age-class distribution of forest communities within the RNA. Stands in the 80- to 160-year-old age class predominate. Less than 5 percent of the RNA currently supports forested stands <80 years of age. One area on the eastern RNA boundary owes its recent origin to recovery from the historic Tillamook Burns of 1933-51. Sites mapped as “nonforested” represent a composite of rock outcroppings, talus, and riparian areas. Collectively they occupy less than 5 percent of the RNA (USDI BLM 1994).

The 100- to 150-year-old coniferous forest is well represented.

Tree age data were collected from three tall trees within each of four permanent plots established within the RNA in 2005. Tree cores indicate that the 100- to 150-year-old age class is well represented within the plots, and, based on tree heights and diameters, this age class is prevalent throughout the large majority of the site. Diameters at core height ranged between 44 and 113 cm (17 and 44 in). Tree ages ranged from 90 years old in the smallest diameter tree to 146 years old in the largest diameter tree. The median diameter and age for the group (n = 12) were 84 cm (33 in) and 125 years old, respectively.

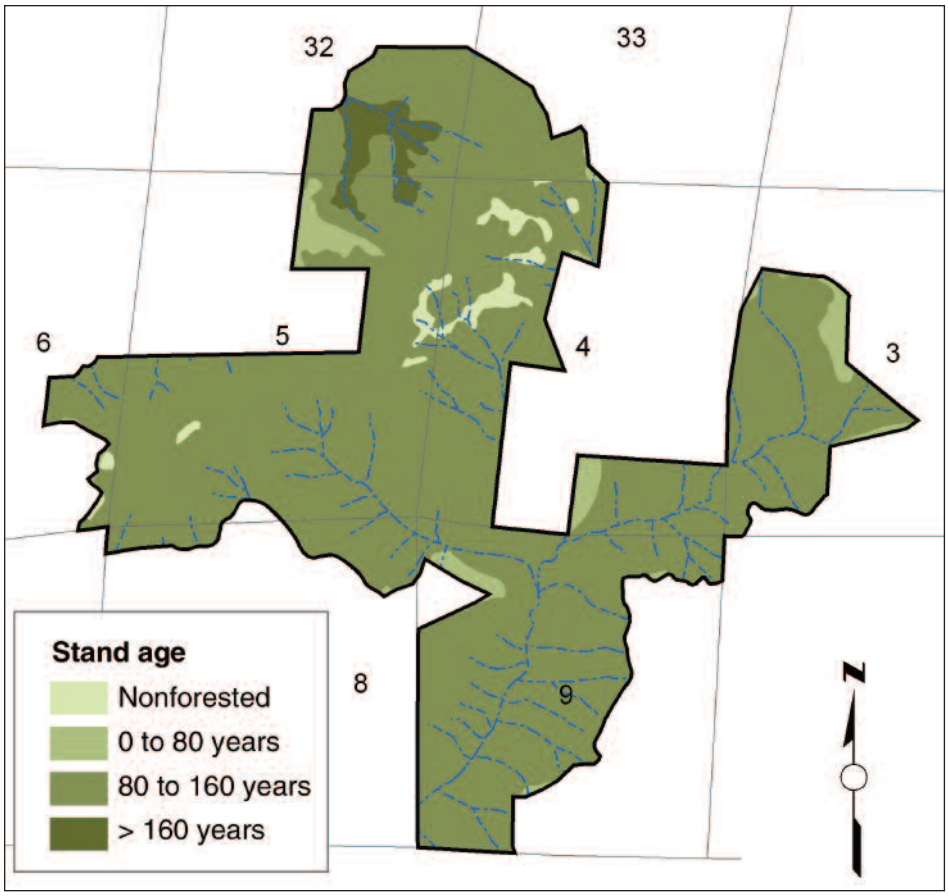

Figure 2—Stand age class distribution in High Peak/Moon Creek Area of Critical Environmental Concern/Research Natural Area.

Shrub and herb vegetation varies with elevation, aspect, slope, and soil conditions. Appendix 1 lists vascular plants by scientific and common names and is arranged by life form. The list includes species known to occur within the RNA as well as species expected to occur within the area based on potential habitats, elevation, aspect, soils, and climate. Species are also included if they have been identified elsewhere within the Nestucca River watershed in comparable habitats (USDI BLM 1994).

Douglas-fir is the most common and widespread overstory tree throughout the site. Western hemlock is also a widespread tree, occupying the regeneration layer or the subcanopy. Other conifers such as western redcedar and Sitka spruce (*Picea sitchensis*) are present in a few areas. Red alder and bigleaf maple are locally abundant adjacent to riparian areas and along road edges and other recently disturbed areas.

Typical tall shrubs include vine maple (*Acer circinatum*), cascara (*Rhamnus purshiana*), serviceberry (*Amelanchier alnifolia*), and red elderberry (*Sambucus racemosa* var. *arborescens*). The 0.5- to 2-m-tall, medium shrub layer includes red huckleberry (*Vaccinium parvifolium*), blue huckleberry (*V. ovalifolium*), salmonberry (*Rubus spectabilis*), thimbleberry (*R. parviflorus*), salal (*Gaultheria shallon*), and various species of currant (*Ribes* spp.). Low Oregongrape (*Berberis nervosa*) is widespread and abundant in the low shrub layer throughout the area.

Common understory herbaceous species include redwood sorrel (*Oxalis oregana*), candyflower (*Claytonia sibirica*), starry false Solomonseal (*Maianthemum stellatum*), false lily-of-the-valley (*M. dilatatum*), and Hooker's fairybells (*Prosartes hookeri*). A variety of ferns are also a conspicuous component of the herb layer: western swordfern (*Polystichum munitum*), ladyfern (*Athyrium filix-femina*), and deerfern (*Blechnum spicant*).

Tables 1 and 2 summarize the physical features, plant association, and understory composition and frequency of four permanent plots established in 2005. Plots 747, 748, and 750 represent examples of the western hemlock/Oregon oxalis (*Tsuga heterophylla/Oxalis oregana*-Northwest Oregon Coast) plant association as defined by McCain and Diaz (2002). This plant association occurs throughout the Coast Range on moist, shaded sites. Stands are located on flat to steep slopes on a variety of slope positions. This association ranges from 67 to 689 m (200 to 2,260 ft) elevation on a variety of aspects. Soil depth averages 127 cm (50 in) with 94 cm (37 in) of effective rooting depth. The shrub layer is sparse with tall shrubs averaging 22 percent cover and low shrubs averaging only 4 percent cover (McCain and Diaz 2002). Figure 3 illustrates understory conditions with this plant association. In the Oregon Coast Range, this association occurs along the more mesic parts of the precipitation gradient and falls in an intermediate position along the temperature gradient compared to other associations within the Tsuga heterophylla Zone (McCain and Diaz 2002).

Plot 749 exemplifies the western hemlock/western swordfern (*Tsuga heterophylla/Polystichum munitum*-Northwest Oregon Coast) plant association (McCain and Diaz 2002). This plant association occurs on productive sites throughout the Coast Range, especially in the south. Stands occupy flat to steep slopes on all slope positions and aspects. Elevations range from 67 to 689 m (200 to 2,260 ft). Soils are well drained but receive continuous subsurface moisture. They are usually deep and rich in organic matter. This association has the sparsest shrub layer in the western hemlock series, with tall shrubs averaging 12 percent cover and low shrubs

Table 1—Physical features of four permanent plots in the High Peak/Moon Creek Research Natural Area

	Plot number			
	747	**748**	**749**	**750**
Physical features:				
Elevation (m)	713	649	530	518
Aspect (°)	340	170	200	80
Slope grade (%)/(°)	49/26	40/22	60/31	51/27
Landform	Upper 1/3 slope	Upper 1/3 slope	Upper 1/3 slope	Upper 1/3 slope

Table 2—Plant association, understory coverage, and frequency of four permanent plots in the High Peak/Moon Creek Research Natural Area

	Plant Association							
	TSHE/OXOR[a] [b] (plot 747)		**TSHE/OXOR (plot 748)**		**TSHE/POMU (plot 749)**		**TSHE/OXOR (plot 750)**	
Species	**Cover**	**Frequency**	**Cover**	**Frequency**	**Cover**	**Frequency**	**Cover**	**Frequency**
	Percent							
Shrub cover[c]								
Berberis nervosa[d]					1			
Vaccinium parvifolium					1			
Rosa gymnocarpa					tr[e]			
Herb cover and frequency[c]								
Oxalis oregana[d]	56	100	41	96	11	79	69	96
Polystichum munitum	3	7	19	61	57	79	16	39
Claytonia sibirica	5	68	1	7			6	34
Coptis laciniata	1	11						
Athyrium filix-femina	3	7						
Maianthemum stellatum	tr	4			1	11		
Maianthemum dilatatum	tr	7	tr	4				
Listera cordata	tr	4						
Viola glabella	tr	4						
Anemone deltoidea			tr	4				
Prosartes hookeri					1	4	1	7
Trisetum cernuum					tr	4	tr	14
Trillium ovatum					1	4		
Trientalis latifolia					tr	4		
Pteridium aquilinum					tr	4		
Hesperostipa comata							1	14
Mimulus guttatus							tr	4
Blechnum spicant							tr	4
Galium triflorum							tr	4

[a] TSHE-*Tsuga heterophylla*, OXOR-Oxalis oregana, POMU-*Polystichum munitum.*

[b] Plant association names all have a suffix, NWO Coast, which differentiates them from plant associations having similar names that occur in the Oregon Cascades sensu McCain and Diaz (2002).

[c] Cover is expressed as percentage of foliar cover; frequency is expressed as percentage of relative frequency. Zero values are not included.

[d] See appendix 1 for a listing of scientific names matched with their common name equivalent.

[e] tr = trace (<0.5 percent foliar cover).

Figure 3—Western hemlock/Oregon oxalis (*Tsuga heterophylla/Oxalis oregana*-Northwest Oregon Coast) plant association with mature Douglas-fir overstory mixed with western hemlock in the subcanopy and reproduction size classes. Oregon oxalis is abundant and western swordfern is scattered throughout the herbaceous groundcover. Taken from plot 750 (see TSHE/OXOR in table 2).

averaging 6 percent cover. Herbaceous cover is dominated by western swordfern. The western hemlock/western swordfern plant association occurs in an intermediate position along the precipitation gradient and on the warmer end of the temperature gradient (McCain and Diaz 2002). Figure 4 shows an example of the understory conditions of this plant association.

One old-growth Douglas-fir stand contrasts with the younger stands typical of the RNA.

One small stand of old-growth Douglas-fir (500+ years old) and western hemlock contrasts with the younger, fire-initiated stands typical of the RNA. Old-growth stands are increasingly uncommon in the northern Oregon Coast Range owing primarily to widespread timber harvesting over the past century and to large-scale wildfires. The Moon Creek old-growth stand is the last remaining stand in an area extending from 16 km (10 mi) south of Mount Hebo to the north end of the old Tillamook Burn. Less than 1 percent of the Nestucca River watershed is forested by stands in excess of 130 years. Scarcity of late-seral-stage habitat is the major

Figure 4—Western hemlock/western swordfern (*Tsuga heterophylla/Polystichum munitum*-Northwest Oregon Coast) plant association supports large Douglas-fir with western hemlock reproduction in the subcanopy. Western swordfern is the dominant species in the ground layer, and Oregon oxalis is present in minor amounts along with western trillium (*Trillium ovatum*) and starry false Solomonseal (*Maianthemum stellatum*). Taken from plot 749 (see TSHE/POMU in table 2).

factor contributing to declining population viability of many species of wildlife and plants (USDI BLM 1994). The few remaining stands of old growth and contiguous late-seral-stage habitat are important today for habitat-dependent species with low mobility or small home ranges. They are also important to scientists, educators, and land managers as research areas and as unique outdoor educational laboratories that can inform us about the long-term history of the land and provide perspective on future landscape management options.

Gray (2005) characterized the structure and composition of the Moon Creek old-growth stand in order to provide information on potential desired future conditions for younger forests in late-successional reserves (USDA and USDI 1994). Table 3 summarizes vegetation understory conditions based upon a 1-ha (2.47-ac) plot design used for Continuous Vegetation Survey by the BLM in western Oregon.

Table 3—Understory composition of a 500-year old Douglas-fir/western hemlock stand within the High Peak/Moon Creek Research Natural Area

	Cover	Frequency
	Percent	
Shrubs:		
Acer circinatum	12	100
Berberis nervosa	4	67
Menziesia ferruginea	tr	33
Rhamnus purshiana	1	33
Ribes sp.	tr	33
Rosa gymnocarpa	1	33
Rubus parviflorus	tr	33
Rubus spectabilis	1	67
Rubus ursinus	tr	33
Vaccinium parvifolium	1	100
Herbs:		
Anaphalis margaritacea	tr	33
Asarum caudatum	tr	33
Campanula scouleri	tr	33
Claytonia sibirica	tr	33
Dicentra formosa	tr	33
Digitalis purpurea	tr	33
Galium triflorum	1	67
Hieracium albiflorum	tr	33
Maianthemum dilatutum	tr	33
Maianthemum stellatum	tr	33
Marah oreganus	tr	33
Mimulus dentatus	tr	33
Moneses uniflora	tr	33
Mycelis muralis	tr	33
Oxalis oregana	28	100
Prosartes hookeri	tr	33
Senecio jacobaea	1	33
Stachys mexicana	tr	67
Streptopus amplexifolius	tr	33
Tiarella trifoliata	1	67
Trientalis latifolia	tr	67
Trillium ovatum	tr	67
Viola sempervirens	1	33
Ferns:		
Adiantum pedatum	1	100
Blechnum spicant	2	67
Polypodium glycyrrhiza	tr	33
Polystichum munitum	40	100

Sources: Gray 2005, USDI BLM 1997.

Comparison between the old-growth stand sampled by Gray (2005) with four 0.1-ha (0.25-ac) plots established in 2005 in the 100- to 150-year age class is limited by the lack of randomization and the variation in plot size and sampling protocol. However, some general patterns merit comment. Examination of tables 2 and 3 suggests that percentages of cover and frequency are higher for shrubs in the old-growth plot than in the 100- to 150-year-old stands. Shrub species richness (number of species) is also higher in the old-growth plot. Understory herbaceous species richness is also slightly higher in the old-growth plot. It is unclear if these differences are a result of stand age, disturbance history, or differences in habitat and plant association characteristics.

Some differences exist between mature and old-growth Douglas-fir stands.

The most prominent differences between the old-growth stand and the 100- to 150-year-old stands are tree size, density, and reproduction patterns. The old-growth stand supported 18 live Douglas-fir with diameters at breast height (d.b.h.) ranging between 155 and 255 cm (61 and 100 in). In the 100- to 150-year-old plots, live Douglas-fir were considerably smaller and ranged from 35 to 115 cm (14- to 45-in) d.b.h. Douglas-fir reproduction in the 5- to 25-cm (2- to 10-in) diameter classes was absent in both the 100- to 150-year-old stands and in the old-growth stands. Reproduction in the smaller diameter classes was almost entirely western hemlock in both stands. However, reproduction in the 5- to 25-cm (2- to 10-in) diameter classes was about three times as much in the old-growth stand (possibly a result of nurse-log reproduction on downed trees). The overstory trees in the 100- to 150-year-old stands were all Douglas-fir, these being roughly half the diameter of the Douglas-fir overstory trees in the old-growth stand. Western hemlock dominance in the subcanopy of the old-growth stand is reflected in the moderate representation of individuals in the 65- to 155-cm (26- to 61-in) diameter class (Gray 2005). Western hemlock was present, but only as a minor component of the mid-canopy and subcanopy in the 100- to 150-year-old stands in the 65- to 85-cm (26- to 33-in) d.b.h. diameter classes.

Fauna

Reptiles, amphibians, freshwater and anadromous fish, birds, and mammals known or expected to occur within the RNA are listed in appendix 2. These lists have been compiled from a combination of field observations and published literature. Taken together, they represent an informed approximation (best approximation using multiple sources) of species expected to occur within or use the RNA for portions of their life cycles (Csuti et al. 1997, USDI BLM 1994).

Disturbance History

The Oregon Coast Range is characterized by a pattern of large-scale, infrequent stand-replacement fires typical of cool moist climates where lightning is uncommon. Many of theses fires are larger than 8094 ha (20,000 ac) and occur between 150 and 300 years (Agee 1990). During long periods of drought (measured in years), lightning storms couple with high winds to create the potential for high-intensity fire events. This can lead to extensive stand-destroying crown fires (Agee 1993). Large fires such as the 1933 Tillamook Fire are clearly part of the recent historical record. Almost all coniferous forests within the *Tsuga heterophylla* Zone (such as that in the northern Oregon Coast Range) are first- or multigeneration stands originating from fire. In the absence of stand-destroying fire over hundreds of years, Douglas-fir will eventually die out and western hemlock will play an increasingly important role, especially in more mesic sites (Agee 1993).

Although the Oregon coast and Coast Range can receive storm winds exceeding 161 km per hour (100 mph), there is no evidence that large-scale windthrow has occurred within the RNA. Similarly, there is no evidence of catastrophic damage within the RNA resulting from insects or disease.

A combination of Tillamook Volcanics bedrock, steep slopes, shallow soils, weak rock, and high rainfall combine to produce extensive debris slides and flows within the Moon Creek subwatershed, expecially in its upper reaches. A 1988-89 inventory of Moon Creek subwatershed identified 170 active debris slides and debris flows. Eighty-five percent of these have been attributed to roads and timber harvest activities (USDI BLM 1994).

Research History

Monitoring studies were conducted to assess distribution, habitat, population status, and trend for Oregon fetid adder's-tongue (*Scoliopus hallii*) (Scofield 1979-1984). Similar studies were conducted for withered bluegrass (*Poa marcida*) as part of a statewide geographic assessment of the species status (Scofield 1987-1991). Although results were inconclusive, generally both species were determined to be more abundant within their respective ranges in Oregon than previously known.

In 1997 and 1998, Gray (2005) established a plot in the old-growth stand within the RNA to characterize old-growth conditions (see discussion in "Vegetation" section of this report and table 3).

Four permanent vegetation plots were established in 2005 to characterize and monitor change in forest composition and structure within the 100- to 150-year-old age class, the most common and widespread age class within the RNA (the project summarized, in part, in table 3.) Data are on file at the Salem District office of the BLM.

Maps and Aerial Photography

Maps—applicable to High Peak/Moon Creek RNA: Topographic—Blaine 7.5 minute 1:24,000 scale; BLM Salem District Westside Recreation Map 1:10,560 1996. **Aerial Photography**—2003 color 1:12,000.

English Equivalents

1 hectare (ha) = 2.47 acres (ac)
1 kilometer (km) = 0.62 miles (mi)
1 meter (m) = 3.28 feet (ft)
1 centimeter (cm) = 0.394 inch (in)
1 millimeter (mm) = 0.0394 inch (in)
°Celsius (°C) = 1.8 x °C + 32 °Fahrenheit (°F)

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Appendix 1: Plants[1,2]

Scientific name	Common name
Coniferous trees:	
Picea sitchensis (Bong.) Carr.	Sitka spruce
Pseudotsuga menziesii (Mirbel) Franco	Douglas-fir
Taxus brevifolia Nutt.	Western yew
Thuja plicata Donn.	Western redcedar
Tsuga heterophylla (Raf.) Sarg.	Western hemlock
Deciduous trees >8 m (26.3 ft) tall:	
Acer macrophyllum Pursh	Bigleaf maple
Alnus rubra Bong.	Red alder
Prunus emarginata (Dougl.) Walp.	Bitter cherry
Tall shrubs 2-8 m (6.6-26.3 ft) tall:	
Acer circinatum Pursh	Vine maple
Amelanchier alnifolia Nutt.	Serviceberry
Aruncus sylvester Kostel.	Goatsbeard
Corylus cornuta L. var. californica (DC.) Sharp	Hazelnut
Holodiscus discolor (Pursh) Maxim.	Oceanspray
Malus fusca Schneid.	Pacific crab apple
Oemleria cerasiformis Torr. & Gray ex Hook. & Arn.	Indian plum
Rhamnus purshiana DC.	Cascara
Salix sp.	Willow
Sambucus racemosa L. var. *arborescens* (Torr. & Gray) Gray	Red elderberry
Medium shrubs 0.5-2 m (1.6-6.6 ft) tall:	
Gaultheria shallon Pursh	Salal
Menziesia ferruginea Smith	False huckleberry
Oplopanax horridus (Smith) Miq.	Devilsclub
Ribes bracteosum Dougl. ex Hook.	Stink currant
Ribes lacustre (Pers.) Poir.	Black gooseberry, prickly currant
Ribes sanguineum Pursh	Red-flowering currant
Rosa gymnocarpa Nutt.	Baldhip rose
Rubus parviflorus Nutt.	Thimbleberry
Rubus spectabilis Pursh	Salmonberry
Spiraea douglasii Hook.	Hardhack, Douglas spirea
Symphoricarpos albus (L.) Blake	Snowberry
Vaccinium ovalifolium Smith	Blue huckleberry
Vaccinium parvifolium Smith	Red huckleberry
Low shrubs <0.5 m (1.6 ft) tall:	
Arctostaphylos uva-ursi (L.) Spreng.	Kinnikinnick, common bearberry

[1] Compiled by: Kurt Heckeroth, Jaye Rhodes, and Reid Schuller.

[2] Nomenclature for vascular plants, ferns, and fern-allies follows the Oregon Flora Project Web site (2006), and North American Flora Web site (2006).

Scientific name	Common name
Berberis nervosa Pursh	Oregongrape
Linnaea borealis L.	Twinflower
Rubus leucodermis Dougl.	Blackcap, whitebark raspberry
Rubus ursinus Cham. & Schlecht.	Native blackberry
Ferns and allies:	
Adiantum pedatum L.	Maidenhair fern
Athyrium filix-femina (L.) Roth.	Ladyfern
Blechnum spicant (L.) Sm.	Deerfern
Dryopteris sp.	Woodfern
Polypodium glycyrrhiza DC. Eat.	Licoricefern
Polystichum munitum (Kaulf.) Presl	Western swordfern
Pteridium aquilinum (L.) Kuhn.	Brackenfern
Selaginella sp.	Clubmoss, spikemoss
Herbs:	
Achlys triphylla (Smith) DC.	Vanilla leaf, deer foot
Actaea rubra (Ait.) Willd.	Baneberry
Adenocaulon bicolor Hook.	Pathfinder, trailplant
Anaphalis margaritacea (L.) Benth.	Pearly everlasting
Anemone deltoidea Hook.	Three-leaved anemone
Aquilegia formosa Fisch.	Red columbine
Asarum caudatum Lindl.	Wild ginger
Campanula scouleri Hook. ex A. DC.	Scouler's harebell
Cephalanthera austinae (A. Gray) Heller	Phantom orchid
Chimaphila menziesii (R. Br. ex D Don) Spreng	Little princes pine
Chimaphila umbellata (L.) Bart.	Princes pine
Chrysosplenium glechomifolium Nutt.	Water carpet
Cirsium arvense (L.) Scop.	Canada thistle
Cirsium vulgare (Savi) Tenore	Bull thistle
Claytonia sibirica (L.) Howell	Candyflower
Clintonia uniflora (Schult.) Kunth	Queen's cup
Coptis asplenifolia Salisb.	Fern-leaved goldthread
Corallorhiza maculata (Raf.) Raf. var. *mertensiana* (Bong.) Cald. & R.L. Taylor	Western coralroot
Corallorhiza maculata (Raf.) Raf. var. *maculata*	Spotted coralroot
Delphinium sp.	Larkspur
Dicentra formosa (Haw.) Walp.	Bleeding heart
Digitalis purpurea L.	Foxglove
Epilobium angustifolium L.	Fireweed
Epilobium ciliatum Raf.	Purple-leaved willowherb
Equisetum arvense L.	Horsetail
Galium kamtschaticum (Steller ex JA) Schultes subsp. *oreganum* Steller	Oregon bedstraw
Galium triflorum Michx.	Sweetscented bedstraw
Goodyera oblongifolia Raf.	Rattlesnake plantain
Heracleum lanatum Michx.	Cow parsnip
Hieracium albiflorum Hook.	White-flowered hawkweed
Hydrophyllum fendleri (Gray) Heller	Fendler's waterleaf

Scientific name	Common name
Hydrophyllum tenuipes Heller	Slender-stem waterleaf
Hypericum perforatum L.	St. John's wort
Hypopitys monotropa Crantz.	Pinesap
Iris tenax Dougl.	Oregon iris
Leucanthemum vulgare Lam.	Oxeye daisy
Lilium columbianum Leichtl. ex Duchart.	Tiger lily
Listera caurina Piper	Northwestern twayblade
Listera cordata (L.) R. Br.	Heart-leaved twayblade
Lupinus sp.	Lupine
Lysichiton americanus Hult. & St. John	Skunk cabbage
Maianthemum dilatatum (Wood.) Nels. & Macbr.	False lily-of-the-valley
Maianthemum stellatum (L.) Link	Starry false Solomonseal
Marah oreganus (T. & G.) Howell	Manroot
Mentha arvensis L.	Field mint
Mimulus dentatus Nutt. ex Benth.	Coastal monkeyflower
Mimulus guttatus DC.	Yellow monkeyflower
Moneses uniflora (L.) Gray	Single delight
Monotropa uniflora L.	White indian pipe
Mycelis muralis (L.)/Dumort.	Wall lettuce
Oenanthe sarmentosa Presl ex DC.	Water parsley
Osmorhiza chilensis H. & A.	Mountain sweet-cicely
Oxalis oregana Nutt.	Redwood sorrel
Phacelia nemoralis Greene ssp. *oregonensis* Heckard	Woodland phacelia
Prosartes hookeri Torr.	Hooker's fairybells
Prosartes smithii (Hooker) Utech Shinwari & Kawano	Smith's fairybells
Prunella vulgaris L.	Self-heal
Pterospora andromedea Nutt.	Pinedrops
Pyrola picta Smith	Wintergreen
Ranunculus repens L.	Buttercup
Ranunculus uncinatus D. Don	Small-flowered buttercup
Rumex acetosella L.	Sheep sorrel, sour weed
Rumex occidentalis Wats.	Western dock
Scoliopus hallii Wats.	Oregon fetid adder's-tongue
Scrophularia californica Cham. & Schlecht.	California figwort
Senecio jacobaea L.	Tansy ragwort
Stachys mexicana Benth.	Mexican hedge-nettle
Streptopus amplexifolius (L.) DC.	Claspleaf twistedstalk
Taraxacum officinale Wiggers	Common dandelion
Tellima grandiflora (Pursh) Dougl.	Fringecup
Tiarella trifoliata L.	Foamflower
Tolmiea menziesii (Pursh) T. & G.	Piggy back plant
Trientalis latifolia Hook.	Starflower
Trifolium dubium Sibth.	Small hop-clover
Trillium ovatum Pursh	Western trillium
Urtica dioica L.	Stinging nettle
Vancouveria hexandra (Hook.) Morr. & Decais.	Inside-out flower

Scientific name	Common name
Viola glabella Nutt.	Stream violet, yellow wood violet
Viola sempervirens Greene	Evergreen violet
Grasses, sedges and rushes:	
Agrostis exarata Trin.	Spike bentgrass
Carex deweyana Schwein.	Dewey's sedge
Elymus glaucus Buckl.	Blue wildrye
Hesperostipa comata (Trin. & Rupr.) Barkworth	Needle-and-thread
Holcus lanatus L.	Velvetgrass
Luzula parviflora (Ehrh.) Desv.	Small-flowered woodrush
Melica subulata (Griseb.) Scribn.	Alaska oniongrass
Poa laxiflora Buckley	Loose-flowered bluegrass
Poa marcida A.S. Hitchc.	Withered bluegrass
Scirpus microcarpus Presl	Small-fruited bulrush
Trisetum cernuum Trin.	Nodding trisetum
Mosses:[3]	
Antitrichia sp.	
Brachythecium asperrimum (Mitt.) Sull.	
Bryum miniatum Lesq.	
Buxbaumia piperi Best	
Claopodium bolanderi Best	
Dichodontium sp.	
Dicranum sp.	
Dicranum tauricum Sapehin.	
Eurhynchium oreganum (Sull.) Jaeg.	
Eurhynchium sp.	
Fontinalis sp.	
Hookeria sp.	
Hylocomium splendens (Hedw.) B.S.G.	
Hypnum spp.	
Isothecium stoloniferum Brid.	
Leucolepis menziesii (Hook.) Steere	
Mnium sp.	
Neckera sp.	
Orthotrichum lyellii Hook. & Tayl.	
Plagiomnium insigne (Mitt.) Koponen	
Plagiothecium undulatum (Hedw.) B.S.G.	
Polytrichum juniperinum Hedw.	
Polytrichum sp.	
Rhacomitrium canescens (Hedw.) Brid.	
Rhizomnium glabrescens (Kindb.) Koponen	
Rhizomnium sp.	
Rhytidiadelphus loreus (Hedw.) Warnst.	
Rhytidiadelphus triquetrus (Hedw.) Warnst.	
Scleropodium sp.	
Tetraphis pellucida Hedw.	
Ulota sp.	

[3] Nomenclature follows Missouri Botanical Garden Web site (2006).

Scientific name	Common name
Liverworts:[3]	
Conocephalum conicum (L.) Dumort.	
Frullania nisquallensis Sull.	
Porella navicularis (Lehm. & Lindenb.) Lindb.	
Scapania bolanderi Austin	
Scapania sp.	
Lichens:[4]	
Alectoria imshaugii Brodo & D. Hawksw.	
Bryoria sp.	
Cetraria orbata (Nyl.) Fink	
Cladonia squamosa Hoffm.	
Cladonia sp.	
Evernia prunastri (L.) Ach.	
Hypogymnia enteromorpha (Ach.) Nyl.	
Hypogymnia imshaugii Krog	
Hypogymnia inactiva (Krog) Ohlsson	
Hypogymnia oceanica Goward	
Hypogymnia physodes (L.) Nyl.	
Hypogymnia tubulosa (Schaerer) Hav.	
Lobaria oregana (Tuck.) Müll. Arg.	
Melanelia sp.	
Menegazzia sp.	
Neofuscelia sp.	
Ochrolechia sp.	
Parmelia hygrophila Goward & Ahti	
Parmelia sulcata Taylor	
Peltigera britannica (Gyelnik) Holt.-Hartw. & Tønsberg	
Peltigera collina (Ach.) Schrader	
Peltigera membranacea (Ach.) Nyl.	
Peltigera neopolydactyla (Gyelnik) Gyelnik	
Peltigera pacifica Vitik.	
Peltigera venosa (L.) Hoffm.	
Pilophorus sp.	
Platismatia glauca (L.) Culb. & C. Culb.	
Platismatia herrei (Imshaug) Culb. & C. Culb.	
Platismatia lacunosa (Ach.) Culb. & C. Culb.	
Platismatia norvegica (Lynge) Culb. & C. Culb.	
Platismatia stenophylla (Tuck.) Culb. & C. Culb.	
Pseudocyphellaria anomala Brodo & Ahti	
Pseudocyphellaria crocata (L.) Vainio	
Ramalina farinacea (L.) Ach.	
Sphaerophorus globosus (Hudson) Vainio	
Sticta fuliginosa (Hoffm.) Ach.	
Sticta sp.	
Usnea filipendula Stirton	
Usnea sp.	

[4] Nomenclature follows Brodo et al. 2001.

Appendix 2: Reptiles, Amphibians, Birds, Fish, and Mammals Expected to Use High Peak/Moon Creek Research Natural Area[1]

Reptiles and Amphibians

Order	Scientific name	Common name
Caudata	*Ambystoma gracile*	Northwest salamander
	Ambystoma macrodactylum	Long-toed salamander
	Aneides ferreus	Clouded salamander
	Dicamptodon tenebrosus	Pacific giant salamander
	Ensatina eschscholtzii	Ensatina
	Plethodon dunni	Dunn's salamander
	Plethodon vehiculum	Western redback salamander
	Rhyacotriton kezeri	Columbia torrent salamander
	Taricha granulosa	Rough-skinned newt
Anura	*Ascaphus truei*	Tailed frog
	Bufo boreas	Western toad
	Pseudacris regilla	Pacific chorus frog
	Rana aurora	Red-legged frog
	Rana catesbeiana	Bullfrog
	Rana pretiosa	Spotted frog
Squamata	*Elgaria coerulea*	Northern alligator lizard
	Charina bottae	Rubber boa
	Coluber constrictor	Racer
	Contia tenuis	Sharptail snake
	Sceloporus occidentalis	Western fence lizard
	Thamnophis elegans	Western terrestrial garter snake
	Thamnophis ordinoides	Northwestern garter snake
	Thamnophis sirtalis	Common garter snake
Testudines	*Clemmys marmorata*	Western pond turtle

Birds[1]

Order	Scientific name	Common name
Falconiformes	*Accipiter cooperii*	Cooper's hawk
	Accipiter striatus	Sharp-shinned hawk
	Buteo jamaicensis	Red-tailed hawk
	Cathartes aura	Turkey vulture
	Falco peregrinus	Peregrine falcon
	Falco sparverius	American kestrel
Galliformes	*Bonasa umbellus*	Ruffed grouse
	Callipepla californica	California quail
	Dendragapus obscurus	Blue grouse
	Fulica americana	American coot
	Meleagris gallopavo	Wild turkey
	Oreortyx pictus	Mountain quail
	Phasianus colchicus	Ring-necked pheasant

[1] Nomenclature taken from Csuti et al. 1997.

Birds (continued)

Order	Scientific name	Common name
Charadriiformes	*Brachyramphus marmoratus*	Marbled murrelet
	Charadrius vociferous	Killdeer
Columbiformes	*Columba fasciata*	Band-tailed pigeon
	Zenaida macroura	Mourning dove
Strigiformes	*Aegolius acadicus*	Northern saw-whet owl
	Bubo virginianus	Great-horned owl
	Glaucidium gnoma	Northern pygmy owl
	Otus kennicottii	Western screech-owl
	Strix occidentalis	Spotted owl
	Strix varia	Barred owl
Caprimulgiformes	*Chordeiles minor*	Common nighthawk
Apodiformes	*Chaetura vauxi*	Vaux's swift
	Calypte anna	Anna's hummingbird
	Selasphorus rufus	Rufous hummingbird
Coraciiformes	*Ceryle alcyon*	Belted kingfisher
Piciformes	*Colaptes auratus*	Northern flicker
	Dryocopus pileatus	Pileated woodpecker
	Picoides pubescens	Downy woodpecker
	Picoides villosus	Hairy woodpecker
	Sphyrapicus ruber	Red-breasted sapsucker
Passeriformes	*Agelaius phoeniceus*	Red-winged blackbird
	Bombycilla cedrorum	Cedar waxwing
	Carduelis pinus	Pine siskin
	Carduelis psaltria	Lesser goldfinch
	Carduelis tristis	American goldfinch
	Carpodacus mexicanus	House finch
	Carpodacus purpureus	Purple finch
	Catharus ustulatus	Swainson's thrush
	Certhia americana	Brown creeper
	Chamaea fasciata	Wrentit
	Cinclus mexicanus	American dipper
	Coccothraustes vespertinus	Evening grosbeak
	Contopus borealis	Olive-sided flycatcher
	Contopus sordidulus	Western wood peewee
	Corvus brachyrhynchos	American crow
	Corvus corax	Common raven
	Cyanocitta stelleri	Steller's jay
	Dendroica coronata	Yellow-rumped warbler
	Dendroica nigrescens	Black-throated gray warbler
	Dendroica occidentalis	Hermit warbler
	Dendroica petechia	Yellow warbler
	Empidonax difficilis	Pacific-slope flycatcher
	Empidonax hammondii	Hammond's flycatcher
	Empidonax traillii	Willow flycatcher
	Euphagus cyanocephalus	Brewer's blackbird
	Geothlypis trichas	Common yellowthroat
	Hirundo pyrrhonota	Cliff swallow
	Hirundo rustica	Barn swallow

Birds (continued)

Order	Scientific name	Common name
	Ixoreus naevius	Varied thrush
	Junco hyemalis	Dark-eyed junco
	Loxia curvirostra	Red crossbill
	Melospiza melodia	Song sparrow
	Molothrus ater	Brown-headed cowbird
	Myadestes townsendi	Townsend's solitaire
	Oporornis tolmiei	MacGillivray's warbler
	Parus atricapillus	Black-capped chickadee
	Parus rufescens	Chestnut-backed chickadee
	Perisoreus canadensis	Gray jay
	Pheucticus melanocephalus	Black-headed grosbeak
	Pipilo maculatus	Spotted towhee
	Piranga rubra	Summer tanager
	Progne subis	Purple martin
	Psaltriparus minimus	Bushtit
	Regulus calendula	Ruby-crowned kinglet
	Regulus satrapa	Golden-crowned kinglet
	Sialia mexicana	Western bluebird
	Sitta canadensis	Red-breasted nuthatch
	Sitta carolinensis	White-breasted nuthatch
	Sturnus vulgaris	European starling
	Tachycineta bicolor	Tree swallow
	Tachycineta thalassina	Violet-green swallow
	Thryomanes bewickii	Bewick's wren
	Troglodytes aedon	House wren
	Troglodytes troglodytes	Winter wren
	Turdus migratorius	American robin
	Vermivora celata	Orange-crowned warbler
	Vireo gilvus	Warbling vireo
	Vireo huttoni	Hutton's vireo
	Vireo solitarius	Solitary vireo
	Wilsonia pusilla	Wilson's warbler
	Zonotrichia leucophrys	White-crowned sparrow

Freshwater and anadromous fish found in the Nestucca River watershed[2]

	Scientific name	Common name
	Cottus spp.	Sculpin species
	Lampetra richardsoni	Brook lamprey
	Lampetra tridentatus	Pacific lamprey
	Lampetra ayresi	River lamprey
	*Oncorhynchus clark*i	Cutthroat trout
	Oncorhynchus kisutch	Coho salmon
	Oncorhynchus keta	Chum salmon
	Oncorhynchus mykiss	Steelhead trout
	Oncorhynchus tshawytscha	Chinook salmon
	Rhinichthys sp.	Dace

[2] Adapted from USDI BLM 1994.

Mammals expected to occur within the High Peak/Moon Creek Research Natural Area[3]

Order	Scientific name	Common name
Insectivora	*Neurotrichus gibbsii*	Shrew-mole
	Scapanus townsendii	Townsend's mole
	Scapanus orarius	Coast mole
	Sorex vagrans	Vagrant shrew
	Sorex bairdi	Baird's shrew
	Sorex bendirii	Pacific water shrew
	Sorex trowbridgii	Trowbridge's shrew
Chiroptera	*Corynorhinus townsendii*	Townsend's big-eared bat
	Eptesicus fuscus	Big brown bat
	Lasionycteris noctivagans	Silver-haired bat
	Lasiurus cinereus	Hoary bat
	Myotis californicus	California myotis
	Myotis yumanensis	Yuma myotis
	Myotis lucifugus	Little brown myotis
	Myotis volans	Long-legged myotis
	Myotis thysanodes	Fringed myotis
	Myotis evotis	Long-eared myotis
Lagomorpha	*Lepus americanus*	Snowshoe hare
	Sylvilagus bachmani	Brush rabbit
Rodentia	*Aplodontia rufa*	Mountain beaver
	Castor canadensis	American beaver
	Clethrionomys californicus	Western red-backed vole
	Erethizon dorsatum	Common porcupine
	Glaucomys sabrinus	Northern flying squirrel
	Microtus longicaudus	Long-tailed vole
	Microtus oregoni	Creeping vole
	Microtus townsendii	Townsend' vole
	Myocastor coypus	Nutria
	Neotoma cinerea	Bushy-tailed woodrat
	Ondatra zibethicus	Muskrat
	Peromyscus maniculatus	Deer mouse
	Phenacomys albipes	White-footed vole
	Phenacomys longicaudus	Red tree vole
	Sciurus griseus	Western gray squirrel
	Spermophilus beecheyi	California ground squirrel
	Tamias townsendii	Townsend's chipmunk
	Tamiasciurus douglasii	Douglas' squirrel
	Thomomys mazama	Western pocket gopher
	Zapus trinotatus	Pacific jumping mouse
Carnivora	*Canis latrans*	Coyote
	Felis concolor	Mountain lion
	Lutra canadensis	Northern river otter
	Lynx rufus	Bobcat
	Martes americana	American marten
	Mephitis mephitis	Striped skunk

[3] Nomenclature, distribution and habitat characteristics adapted from Csuti et al. 1997.

Mammals (continued)

Order	Scientific name	Common name
	Mustela erminea	Ermine
	Mustela frenata	Long-tailed weasel
	Mustela vison	Mink
	Odocoileus hemionus	Mule deer
	Procyon lotor	Common raccoon
	Spilogale gracilis	Western spotted skunk
	Urocyon cinereoargenteus	Common gray fox
	Ursus americanus	Black bear
	Vulpes vulpes	Red fox
Artiodactyla	*Cervus elaphus*	Elk