

FOREST HEALTH ISSUES AND RESOURCES OF THE BLUE MOUNTAINS

by

Raymond G. Jaindl,¹ Research Associate, Rangeland Resources,
Oregon State University, Corvallis, OR

Thomas M. Quigley,² Manager,
Blue Mountains Natural Resources Institute, La Grande, OR

Richy Harrod, Botanist, Wenatchee National Forest, Wenatchee, WA

THE DILEMMA

The Oregon territory: Land of unlimited resources; gold in every stream; soil deep, rich and more productive than anywhere else on earth; timber as tall as mountains waiting to be harvested; grass for livestock forage up to a horse's belly; fish and wildlife in abundant supply; Come to the Oregon territory and make your fortune. (Johanson and Gates 1967).

The times were tough, resources were plentiful, and laws were designed for private use and exploitation. This Oregon presented an opportunity thousands wanted. Getting your piece of the American dream, for the most part, meant obtaining a patch of earth and making your living from it. This resulted in the most productive valley soils being plowed and converted to farmland. It also resulted in much of the non-arable foothill lands being plowed and eventually abandoned, opening the areas to weed invasion and loss of native species. The easily accessible timber tracts, for the most part dominated by old growth, were harvested with little concern for the next crop of trees. Minerals were there for the taking. Land was dredged or mined and turned upside down into non-productive or polluted piles putting an ecological system in disarray. Surviving meant using; for ranchers that meant heavy stocking rates and long seasons of use. The rangelands paid a high price. Wildlife and fish were also believed to be unlimited and there for the taking, resulting in decimation or extermination of much of our wildlife. During this period of exploitation, a decline in many of the resources, which were believed to be unlimited, was initiated. The results were not to be fully felt during that period.

The institutions of that day, public and private, encouraged, financed, and facilitated the use and development of the natural resources. Social values were reflected in the laws and practices of the time. Looking back on those times and judging by today's knowledge and social values one tends to be harsh on the early pioneers. The fact is that the pioneers were operating mostly within the law but with limited understanding and cruel realities for survival.

Much of the first half of this century can be viewed as a period of extractive enterprises. Resources were extracted, whether as minerals, forage, timber, or other products, with a poor understanding of sustainable production for the long

term. Social demands, including world wars, and devastating floods and fires, again placed pressure on natural resources. Landscape patterns and cycles were disrupted through construction of dams for electricity, irrigation, and flood control; through control of forest fires (whether catastrophic or less intense under-burnings); and through land development for agriculture and urban growth.

The knowledge of long-term impacts and interactions were not really a factor in the socio-political processes. The true heroes of the day were the strong, brave, and daring who tackled nature's challenges to harvest resources. The demands of the time and the systems created to meet these demands were supported by social and political institutions.

The sum of all of these factors is a system--the land, people and economy--in turmoil. Today, forests are dying because of disease and insect infestations at epidemic levels. Rangelands, considered by many to be in the best condition in this century, are still plagued by noxious weeds and invaded by sagebrush (*Artemisia tridentata* Nutt.), rabbitbrush (*Chrysothamnus* spp. Nutt.) and western juniper (*Juniperus occidentalis* Hook.). Riparian areas are being managed to provide habitat for wildlife and fish, but at the same time they are experiencing high tree mortality and threat of catastrophic wildfire. Heavy demands are placed on agricultural lands while management options seem to be declining. Individuals and communities that have developed a dependency on natural resources are finding their livelihood threatened as the controls and alternative demands for the natural resources increase. Urban areas are growing and demanding more of the resources, whether it be water, clean air, or recreational opportunities.

During the past fifty years, human populations have shifted from rural to urban areas, resulting in shifts in attitudes and values of the majority of the United States. Available time and interest in becoming more aware, concerned, and involved in preventing loss and pollution of natural resources on a national basis have dramatically increased. This concern and involvement has resulted in new laws or changes in policies on land use. Most land managers, both public and private, have incorporated these laws, policy changes, and increased awareness into their work. Sustainable timber production practices have been developed

¹ Raymond G. Jaindl is now Rangeland Resource Specialist, Oregon Department of Agriculture, Salem, OR.

² Thomas M. Quigley is now Science Team Leader for the Eastside Ecosystem Management Project, Walla Walla, WA.

or are now developing. Improved range management systems are being employed to eliminate overgrazing. Alternative agricultural practices such as no-till farming have been introduced to minimize loss of topsoil.

The Blue Mountains of Northeast Oregon and Southeast Washington (fig. 1.1) were part of the Oregon Territory and were subject to much of the use described above. Today the people of the Blue Mountain region are embracing the philosophy of sustainability through wise use. They are concerned about sustaining the resources and their lives in this region and are incorporating new technology and strategies to reach this goal. However, despite all of these adaptations and changes, there continues to be a deterioration of the systems and conflicts among groups interested in the management and sustainability of the resources.

For thousands of years prior to the arrival of Europeans onto this continent, wildfires in the Blue Mountains were frequent and widespread (see Chapter 7). Dominance of slow-growing but hardy ponderosa pine, well-adapted to low-intensity fires, sparse rainfall, drought, and insects, was the result of periodic underburns. Then in the early

decades of this century, programs of fire suppression were initiated along with the logging of ponderosa pine (*Pinus ponderosa* Dougl.). This resulted in the development of forests with high densities of Douglas-fir (*Pseudotsuga menziesii* (Mirbel) Franco) and grand fir (*Abies grandis* (Dougl.) Forbes) in many areas of the Blue Mountains. Initially this was desirable because of the increased productivity provided by these species, but after decades of observation land managers have now realized that these tree species are not as desirable as originally expected. Their high susceptibility to drought and insect infestation limits their ability to grow to their full potential.

This fir-dominated forest has resulted in massive insect and disease infestations as a result of drought, overstocking, and selective harvest practices. "Over the last twenty years, the forests in the Blue Mountains have been subjected to increasing damage by fire, insects, and diseases. Approximately 3.2 million acres of National Forests, lands managed by other federal and state agencies, and private lands have been affected" (Caraher et al. 1992) (fig. 1.2 & 1.3).

On the rangelands of the Blue Mountains, change con-

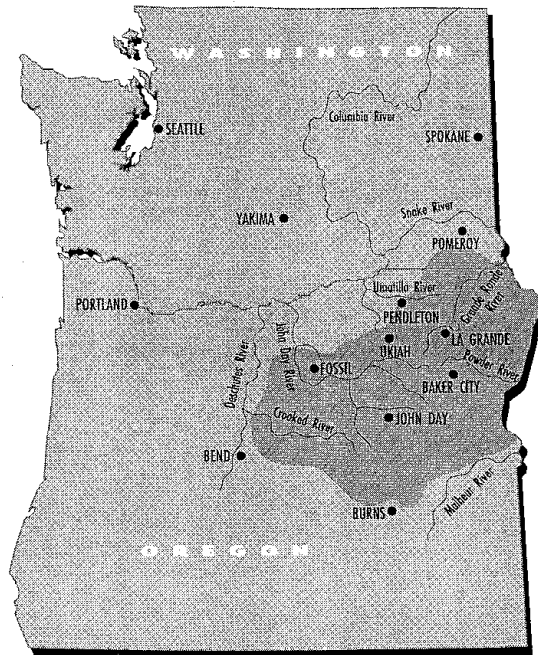


Figure 1.1 -- The Blue Mountain physiographic province (from Thomas 1979)

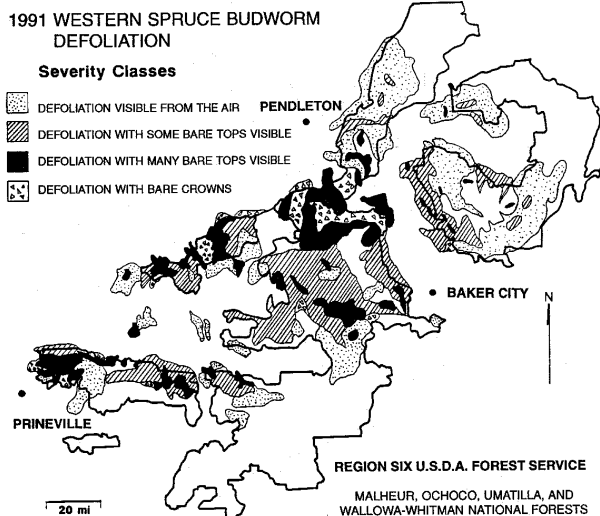


Figure 1.2 -- Areas affected by the western spruce budworm on the Malheur, Ochoco, Umatilla, and Wallowa-Whitman National Forests as detected by the 1991 aerial survey (from Tanaka et al. 1995).

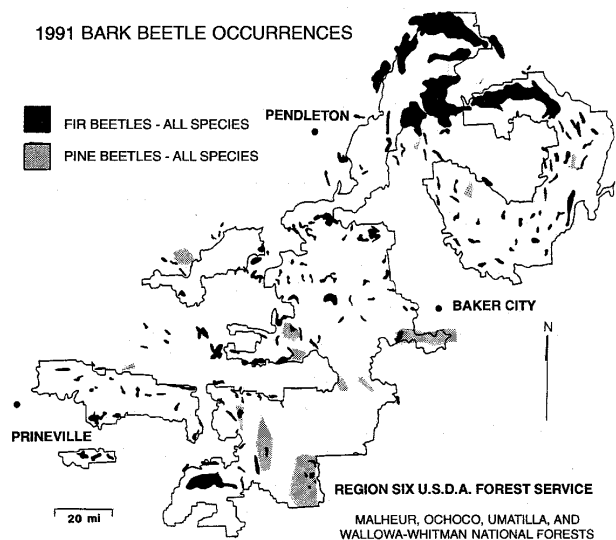


Figure 1.3 -- Areas affected by bark beetles on the Malheur, Ochoco, Umatilla, and Wallowa-Whitman National Forests as detected by the 1991 aerial survey (from Tanaka et al. 1995).

tinues despite adaptation of new strategies and technologies. Undesirable, non-native grasses continue to dominate in many areas. Juniper is spreading into grasslands. Noxious weeds are invading both grasslands and forests. Riparian area improvement is limited. These factors, combined with reduced productivity and diversity on grasslands and forests, threaten native vegetation and its potential use by livestock and native wildlife. The resulting reduced productivity and diversity of rangelands heavily impacts the natural resource-dependent communities in the region.

This is the thrust of the dilemma. As never before, livestock, timber, farming, and tourism industries, as well as outdoor-recreation and quality-of-life proponents, appear to be in competition in their need for sustainable yields of natural resources. These regional issues are further complicated by national issues involving old-growth preservation (Chapter 5), biodiversity (Chapter 5), and rural development (Chapter 3).

As a result of increased public concern about our inability to address these issues, the Blue Mountains Natural Resources Institute (BMNRI) was formed in 1990. The BMNRI seeks to bring together a broad spectrum of people involved in natural resource issues in the Blue Mountains. The Institute's purpose is to facilitate the application of scientific research to meet the challenges of multiple-use across a diverse landscape with diverse ownerships (U.S. Department of Agriculture 1991).

The Institute's charter was signed on May 11, 1991. The Institute was chartered for ten years. At its inception, 30 organizations joined the Institute as partners and agreed to help achieve its purpose. Today, the Institute has 80 partners, including federal and state natural resource agencies, county and tribal governments, educational institutions, natural resource industries, business, labor, and environmental groups.

The BMNRI seeks to promote sound resource management and economically healthy communities through research, technology development, and demonstration. The Institute also facilitates communication and cooperation among the various constituencies concerned about the Blue Mountains. In its work, the Institute emphasizes landscape-level perspectives in dealing with Blue Mountain natural resource issues.

DESCRIPTION OF THE BLUE MOUNTAIN REGION

The Blue Mountain Region in its broadest sense includes the hilly and mountainous land of northeastern Oregon and southeastern Washington. It extends from the Snake River Canyon in the east to near Prineville, Oregon, in the west and from near Pomeroy, Washington, in the north almost to Burns in the south (Dart and Johnson 1981). This includes an area approximately 320 km (200 miles) both north to south and east to west and encompasses approximately 7.7 million ha (19 million acres). Mountain ranges in this region include the Strawberry, Greenhorn, Elkhorn, Aldrich, and Maury Ranges, and the Ochoco,

Blue, and Wallowa Mountains (Thomas 1979, Franklin and Dryness 1988, Johnson and Clausnitzer 1992).

The Blue Mountains are a distinct physiographic region with their own climate and topography. Within the Blue Mountains are three broad physiographic zones (Caraher et al. 1992) (fig. 1.4).

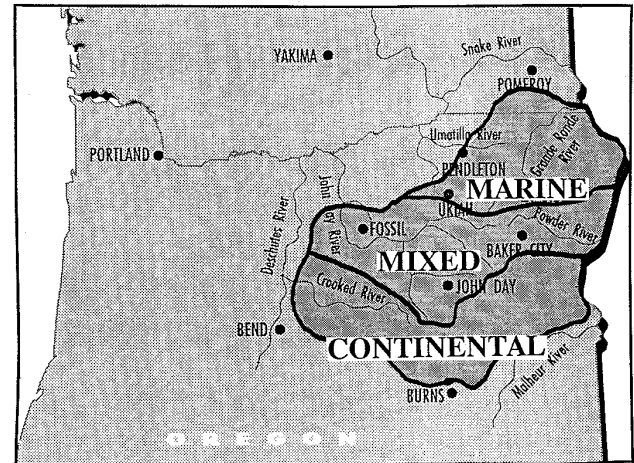


Figure 1.4 -- Physiographic zones of the Blue Mountains (from Caraher et al. 1992).

- ◆ The Marine Zone, roughly the northern third of the Blue Mountains, is characterized by a relatively cool, moist climate, and wide variations in topography.
- ◆ The Mixed Zone, roughly the central portion of the Blue Mountains, has a climate that is between the moist, cool influence of the north, and the drier, warmer climate found in the south.
- ◆ The Continental zone, in the southern portion of the Blue Mountains, is the driest of the three zones (Caraher et al. 1992).

The region can be divided into 21 river basins (table 1.1, page 4) with each river basin a collection of smaller watersheds varying from 0.2 to 0.8 million hectares (0.5 to 2 million acres).

Climate

The mountain ranges, rolling hills, and deep canyons of the Blue Mountains influence the local climatic conditions. However, the climate of the region is greatly influenced by the Cascade Range, which divides Oregon and Washington into east and west sides. This range intercepts storm fronts originating from the Pacific Ocean, causing the bulk of the moisture to fall to the west and creating a rainshadow to the east of its crest. As a result, the Blue Mountain area east of the Cascade Range is very different from western Oregon and Washington, which have temperate and moist maritime climates. The climate of the Blue Mountains is divided into Temperate Continental with a cool summer phase, Temperate Oceanic, and Mixed Continental-Oceanic (Caraher et al. 1992). In the Blue Mountain region, sparse rainfall, greater temperature differences, and large year-to-year climate vari-

RIVER BASIN	HECTARE	ACRES ¹
Marine Zone		
Imnaha	219,044	547,610
Lower Grande Ronde	393,736	984,340
Upper Grande Ronde	420,036	1,050,090
Lower Snake	130,824	327,060
Tucannon River	377,236	943,090
Umatilla	646,904	1,617,260
Wallowa	239,948	599,870
Walla Walla	452,864	1,132,160
Willow	198,024	495,060
Mixed Zone		
Brownlee Reservoir	163,432	408,580
Lower John Day	808,748	2,021,870
Upper John Day	547,152	1,367,880
Middle Fork John Day	201,072	502,680
North Fork John Day	469,604	1,174,010
Powder	442,428	1,106,070
Continental		
Burnt	279,724	699,310
Harney-Malheur Lakes	366,516	916,290
Upper Malheur	622,176	1,555,440
Silvies	336,004	840,010
Willow	223,984	559,960
Crooked	766,000	1,915,000

Table 1.1 -- River basins of the Blue Mountains by physiographic zone.

¹Provided by U.S.D.A. Forest Service, Region 6, Geometrics Group, Gis Unit, except Crooked River Basin estimate which was determined by

ability have created ecosystems very different from those in the western areas of the two states.

The mean temperature of the Temperate Continental climate in the warmest months is 22°C (72°F), and is -10°C (14°F) or less in the three coldest months (Johnson and Clausnitzer 1992, Caraher et al. 1992). The area can be generally characterized by low precipitation, low relative humidity, high evaporation, abundant sunshine, and varying temperature and precipitation (Johnson and Clausnitzer 1992, Caraher et al. 1992). Average annual precipitation ranges from 25 to 250 cm (10 to 100 inches) (Taylor and Bartlett 1993) (fig. 1.5). Higher elevations have higher precipitation, in the form of snow, and colder temperatures. Thunderstorms often develop in the region over high topography during warm weather but seldom contribute significantly to the annual precipitation. Yearly precipitation often varies considerably from the mean (Franklin and Dyrness 1988, U.S. Department of Agriculture 1991).

In the northern and northwestern Blue Mountains, a Temperate Oceanic climate occurs as a result of the break in the Cascade Range by the Columbia River gorge (Johnson

and Clausnitzer 1992, Caraher et al. 1992). This climate is characterized by more cloudiness and precipitation, higher relative humidity, and more stable temperatures during the winter months than is the Temperate Continental climate. The Oceanic Climate is favorable to grasslands and ninebark (*Physocarpus malvaceus* (Greene) Kuntze) shrubland in the foothills and ridgetops, while the continental climate in the southern part of the range is favorable for sagebrush and western juniper (Johnson and Clausnitzer 1992).

The Oceanic and Continental climates mix in the central Blue Mountains along the westward flowing North and Middle Forks of the John Day River (Caraher et al. 1992). Thus, there is a diversity of climate in the Blue Mountains.

Geology and Soils

Geology of the Blue Mountain region is the result of two different geologic events. Sections of the region were once part of the Pacific Ocean floor or volcanic islands created during the Devonian to Late Jurassic, 135 to 405 million years ago (mya) (Brooks 1979). These rocks were added to the outer edge of the continent between the Late Triassic (180-230 mya) and Late Jurassic (135-180 mya) (Brooks 1979). Other sections are the result of sedimentation and volcanic activity. These events deposited sedimentary and volcanic material on dry land or in freshwater lakes on top of the older oceanic rocks during the Cenozoic era (beginning 70 mya) (Brooks 1979, Franklin and Dyrness 1988).

Generally, the area west of John Day, Oregon, consists of formations of limestone, mudstone, and sandstone from the Carboniferous period (280-345 mya) during the Paleozoic era. Carboniferous rocks can be found near the Crooked River (Franklin and Dyrness 1988, Johnson and Clausnitzer 1992). Conglomerate, sandstone, siltstone, shale, and limestone rocks formed in the Triassic and Jurassic periods can be found near Paulina, Oregon. This strata has an aggregate thickness of about 15,000 m (Brooks 1979). Miocene (13-25 mya) Columbia River basalt occupies large areas in the western Blue Mountains (Franklin

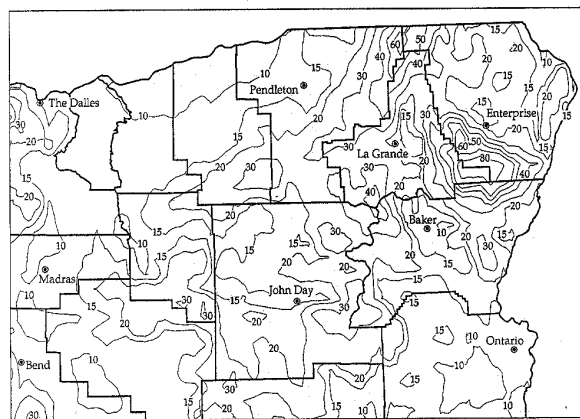


Figure 1.5 -- Map of mean annual precipitation (inches) for northeast Oregon averaged from records collected between 1961 and 1990 (developed by Oregon Climate Service 1994).

and Dyrness 1988) some of which may be more than 600 meters thick (Johnson and Clausnitzer 1992).

The eastern portion of the Blue Mountains are geologically variable. Permian (230-280 mya) formations of schist, limestone, slate, argillite, tuff, and chert are widespread near Sumpter and Baker, Oregon (Brooks 1979, Franklin and Dyrness 1988). The intrusive form of granite is also present in the Elkhorns, in the Wallowa Mountains, and along the John Day River. The range that occurs between Pendleton and La Grande is composed of Columbia River basalt, leading to the assumption that the uplift of the Blue Mountains occurred after the deposition of these lavas during the Miocene (Franklin and Dyrness 1988). Basins are covered with alluvial deposits of sand and gravel eroded by glaciers during the Pleistocene, 2-3 mya (Franklin and Dyrness 1988, Johnson and Clausnitzer 1992).

Volcanic ash from Glacier Peak (12,000 years ago) and Mt. Mazama (6,000 years ago) once covered the Blue Mountains. This ash was then redeposited by wind and water on broad ridgetops and north-facing slopes (Franklin and Dyrness 1988, Johnson and Clausnitzer 1992). Loess, a wind-deposited soil from the Washington central basin, occurs in the northern Blue Mountains and supports Palouse grasslands. However, basalt and andesite are the most common geologic materials available for soil formation in the Blue Mountains (Johnson and Clausnitzer 1992).

Soils range from thin, rocky, low-productivity ridgetop scablands to deep ash accumulations on very productive sites. In general, soil productivity is related to the ash and loess content (Johnson and Clausnitzer 1992). Thus, most soils can be placed in one of the following categories:

- ◆ Residual - derived in place from predominately bed-rock or colluvial rock materials.
- ◆ Ash-Loess - derived from deposited and accumulated ash and/or loess over older buried soil material.
- ◆ Mixed - derived from colluvium, ash, and/or loess mixed well in surface layers over older buried soil material (Johnson and Simon 1987).

The geologic parent material contributes to soil characteristics that are important in determining plant species distribution and defining limits of plant community distribution (Johnson and Clausnitzer 1992).

Vegetation

Johnson and Simon (1987) and Johnson and Clausnitzer (1992) classified the forest and grasslands of the Wallowa, Blue, and Ochoco Mountains into "series," which are aggregates of plant associations dominated by the same species at climax. The series is named after the dominant climax species. These dominants tend to occupy environmental zones within a climatic gradient of moisture and temperature, which are associated with elevation, aspect, slope, and substrate. The distribution of tree species from dry and warm to moist and cool along a mountain slope can be generalized for the Blue Mountains as in figure 1.6. Western juniper occurs at the lower limits and whitebark pine (*Pinus albicaulis* Engelm.) at upper limits of tree growth.

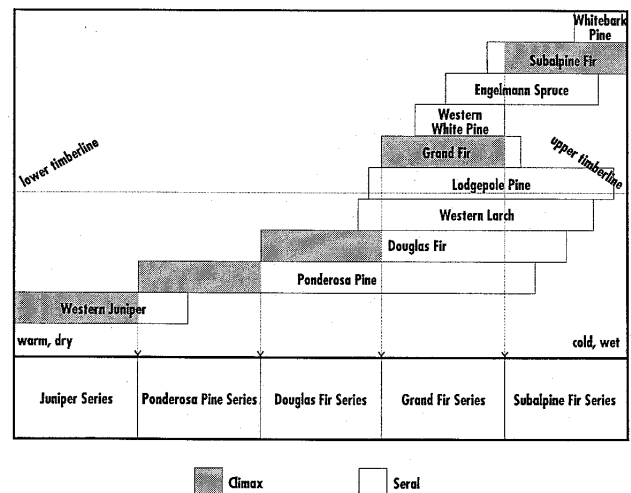


Figure 1.6 -- Tree species distribution in the Blue Mountains from warm and dry cool and moist along an elevational gradient (from Johnson and

Landscapes dominated by grasslands or shrublands can be found below the juniper zone, and alpine meadows dominated by sedge or fescue communities occur above the subalpine fir series (Hall 1973, Johnson and Clausnitzer 1992). However, this generalized pattern is altered by soils and microclimate (as influenced by topography) creating a mosaic of different series within a zone. This results in an inherently diverse landscape with patches of forest intermingled with grass- or shrublands.

The dominant tree species in classifications by Hall (1973), Cole (1982), and Johnson and Clausnitzer (1992) include ponderosa pine, Douglas-fir, grand fir, lodgepole pine (*Pinus contorta* Dougl.), and subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.). A number of shrubs, graminoids (grass-like plants), and forbs are variously associated with the conifers to form the forest plant associations. Woodlands at lower elevations in the southern portion of the Blue Mountains contain western juniper, which is largely associated with Idaho fescue (*Festuca idahoensis* Elmer) or bitterbrush (*Purshia tridentata* (Pursh) DC). Shrublands are dominated mostly by mountain big sagebrush (*Artemisia tridentata* vaseyana (Pursh) DC), scabland sagebrush (*A. rigida* (Nutt.) Gray), mountain-mahogany (*Cercocarpus ledifolius* Nutt.) or ninebark. Dominant in the understory of shrublands, or forming grasslands in the absence of shrubs, are bluebunch wheatgrass (*Agropyron spicatum* (Pursh) Scribn. & Smith), Idaho fescue, green fescue (*Festuca viridula* Vasey) or Sandberg's bluegrass (*Poa secunda* Presl).

Fauna

Because of the varied natural environment of the Blue Mountain region, there exists a great diversity of wildlife species (Dart and Johnson 1981). Thomas (1979) refers to a total of 378 species of wildlife that occur in the Blue Mountains. This includes 10 species of amphibians, 16 species of reptiles, 263 species of birds, and 89 species of mammals. Larger mammals include white-tailed deer

(*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), Rocky Mountain elk (*Cervus elaphus*), pronghorn (*Antilocarpa americana*), bighorn sheep (*Ovis canadensis*), black bear (*Ursus americanus*) and mountain lion (*Felis concolor*). While settlement and excessive hunting did result in decreased numbers of most of the larger mammals by the early 1900s, subsequent regulation and management has resulted in a significant increase in populations of all of the larger mammals but the bighorn sheep. While the larger mammals and game birds generally historically received the most attention because of their "game" status, the importance of many of the other species is now being noted due to their status as threatened or endangered species and because of increased interest in maintaining resource diversity.

LAND USE

Politically, the Blue Mountain region includes all or portions of Baker, Crook, Grant, Harney, Malheur, Morrow, Umatilla, Union, Wallowa, and Wheeler counties in Oregon, and Asotin, Columbia, Garfield, and Walla Walla counties in Washington (fig. 1.7). Over 40% of the land is federally owned with 17% of

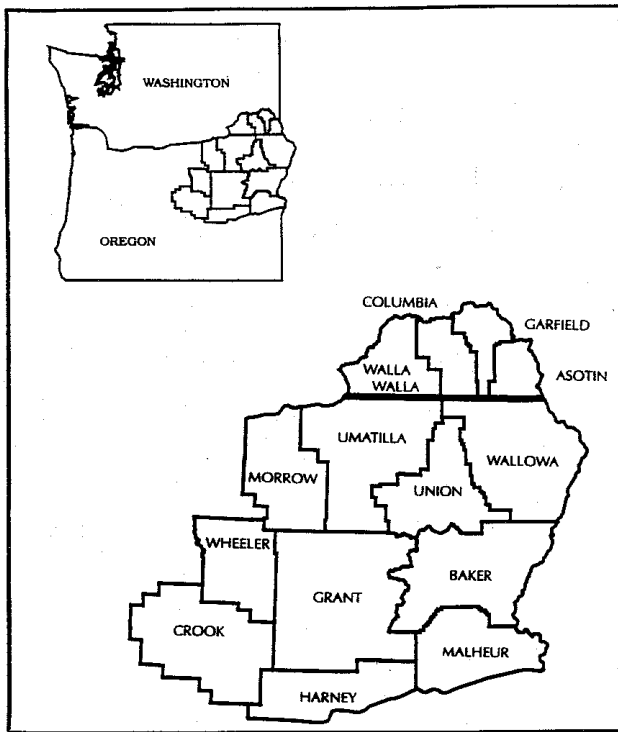


Figure 1.7 -- Area and counties composing the Blue Mountains Natural Resources Institute.

that designated for recreation or wilderness management (U.S. Department of Agriculture 1991). National Forests in the Blue Mountain region are the Umatilla, Wallowa-Whitman, Ochoco, and Malheur National Forests. Other federal and state agencies involved in land management in this region include the Bureau of Land Management, Oregon Department of Fish and Wildlife, Oregon Department of Forestry, U. S. Department of Defense,

U.S. Department Indian Affairs, and the Corps of Engineers.

Each of these agencies are chartered by different regulations and mandates. The Bureau of Land Management has a custodial mandate with certain trust land responsibilities similar to state trust land. The Forest Service's legal responsibility focuses on management of all natural resources for perpetual use by the American public. Currently, almost 20% of the Forest Service annual budget is dedicated to State and Private programs, which focus on resource planning, management, and protection of non-Federal lands (Cushing 1992).

Land in this region is used for timber production, livestock production, outdoor recreation (fishing, hunting, wildlife viewing, hiking, camping), mining (not a major land use currently), and agriculture, and includes areas that need protection because of their cultural significance to native Americans. Of the total land area, approximately 34% is used for timber production, 45% is classified as rangeland, 19% is used for agriculture, and the remaining portion is incorporated and unincorporated urban growth areas and right-of-ways. The valley or basin areas are small, but it is within these areas that most of the population and economic activity of the region are found. These include the Crooked, Grande Ronde, John Day, Powder, Umatilla, Walla Walla, and Wallowa River valleys. These valleys are moderate in elevation and relief with fertile soil providing opportunities for irrigated agriculture in favored locations. Agriculture includes intensive production of irrigated hay, grain, seed crops, vegetables, and fruit, and dry farming of small grains on the non-irrigated slopes. Baker City, Enterprise, John Day, La Grande, Prineville, and Walla Walla are principal cities located in those valleys. They serve as agricultural, wood processing, and marketing centers (Dart and Johnson 1981).

Based on total acreage, the largest resource uses in the Blue Mountain area are timber- and rangeland-related activities. Because of the diversity of forest types, a wide array of forest products are obtained from the Blue Mountain forest lands including lumber, composites (plywood, particle board, etc.), and biomass for cogeneration of electricity. Based on the value of timber prorated by acre, there is approximately 7,890 million cubic feet of standing timber distributed among National Forests, Bureau of Land Management, State, and private landowners (65, 3, 1, and 31% of the total, respectively).

In many areas of the West, forest management had included harvest rates that were above sustainable levels because of the philosophy that old-growth timber is not at a high productivity stage in the growth cycle. It was believed that through fire control, harvesting, and reforestation, forests could be brought into a more productive phase of the growth cycle (Miller 1988). As our understanding of the plant communities increased, and as society's demands from our natural resources changed, the role of the forests have shifted from tree farms to multifaceted environmental resources for supplying many products, including oxygen, water, and more diverse landscapes.

Rangelands also provide diverse landscapes. The role of Blue Mountain rangeland has changed over the last century. One hundred years ago rangelands were recognized primarily for their livestock forage production capabilities. Today, while we continue to recognize the varied capacity of rangelands for livestock forage production, we also recognize their role in watershed maintenance, biodiversity, and wildlife habitat.

Economic Aspects

Population densities for the counties in the Blue Mountain area are substantially less than that for the states in which they are found. Based on a report by the U. S. Bureau of the Census (1988) (table 1.2), population densities for counties in the Blue Mountains range from 0.4 to 7.3 people per sq km (1 to 19 people per sq mi) and from 1.5 to 14.6 people per sq km (4 to 38 people per sq mi) compared to 10.0 and 25.8 people per sq km (28 and 67 people per sq mi) for the states of Oregon and Washington, respectively. Resource-related employment for the Blue Mountain area of Oregon and Washington, i.e. logging and wood products, agriculture, recreation, and federal and state resource agencies, accounts for about 26,500 jobs. This is about 24% of all employment in the region. Only one percent of the resource-related employment is in recreation though the area experiences approximately 12 million recreational visits a year.

From the gross receipts of product sales from the national forests, 25% is remitted to local governments. These monies are used for maintenance of area roads and schools. Because the local governments employ many area residents, the economic effects of changes in management activities that affect gross receipts need to be considered before any project decisions are made (Gast et al. 1991) especially since percentage of unemployment, (U.S. Bureau of the Census 1988) exceeded the respective state average in all counties

	Area (sq mi)	Population 1986	Population change from 1980 (%)	Civilian Labor Force	Civilian Labor Force Unemployed	Unemployment (%)
Oregon	96,184	2,698,000	2.5	1,347,000	114,000	8.5
Baker	3,072	15,500	-3.7	6,615	892	13.5
Crook	2,984	13,200	0.7	6,555	663	10.1
Grant	4,525	8,400	1.8	4,385	530	12.1
Harney	10,174	7,300	-11.9	4,005	453	11.3
Malheur	9,861	28,300	5.4	12,992	1,314	10.1
Morrow	2,044	8,100	7.6	4,047	551	13.6
Umatilla	3,218	60,200	2.4	31,047	3,663	11.8
Union	2,035	23,700	-0.9	11,183	1,220	10.9
Wallowa	3,150	7,200	-0.6	3,527	378	10.7
Wheeler	1,713	1,500	-3.8	596	71	11.9
Washington	66,511	4,452,000	8.0	2,178,000	179,000	8.2
Asotin	635	17,100	1.8	8,164	684	8.4
Columbia	865	4,200	2.7	2,022	374	18.5
Garfield	706	2,500	-0.4	1,073	107	10.0
Walla Walla	1,261	48,000	1.2	23,516	2,310	9.8

Table 1.2 -- Land and population data by county for the Blue Mountain area (U.S. Bureau of the Census 1988)

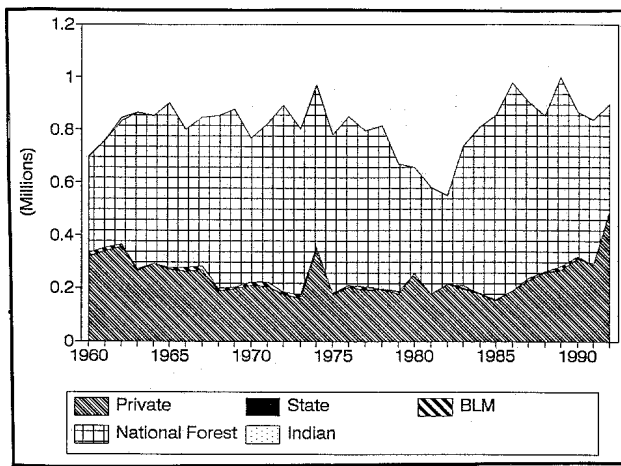


Figure 1.8 -- Summary of timber harvest by ownership between 1960 and 1992 for the Blue Mountains in northeast Oregon and southeast Washington (Department of Forestry, Salem, OR, 1961-1993 annual Oregon timber harvest reports, Washington State Department of Natural Resources, Olympia, WA, 1961 - 1993 Washington timber harvest reports). (Millions of board feet - Scribner log).

of the Blue Mountains in Oregon and Washington (table 1.2).

Based on data from the eight-county region of north-east Oregon and four-county region of southeast Washington, approximately 60% of the timber harvest has been from US Forest Service land with the remaining 40% coming primarily from private land (fig. 1.8). Of these counties, Grant county is the largest supplier of timber (fig. 1.9 and 1.10). Harvest levels, which declined during the early 1980s, rebounded during the late 1980s and generally were similar to, or exceeded, the harvest levels from 1960 to 1980.

SUMMARY

Most residents of the Blue Mountains and many residents of the United States benefit in some measure from the natural resources of the Blue Mountain area. These benefits range from supporting livelihoods to the quality of life we enjoy. In the Blue Mountains our dependence on forest resources is particularly apparent in: the timber industry's reliance on National Forest timber, the domestic uses of water supplied by forest watersheds, the importance of forage provided for livestock, the special relationship Native Americans have to their lands and waters, and the many recreation opportunities the area provides (Gast et al. 1991).

Perturbations to Blue Mountain ecosystems have occurred as a result of natural (fire, drought, extensive insect outbreaks) and human-caused (timber harvesting, livestock grazing, fire, dams, recreation) disturbances, which are resulting in short- and/or long-term effects on the ecological integrity of the sys-

tem and the stability of human societies in the area. For example, man has been successful in excluding fire as a natural ecological force on forest vegetation. As a result, the forests are evolving in directions we did not anticipate. The long-term result of our fire suppression success in combination with other activities has been the creation of a large-scale pest problem and the potential for high-intensity fires (Gast et al. 1991).

Given existing forest conditions in the Blue Mountains, we firmly believe that forest health degradation, and in particular, insect- and disease-caused damage will continue, and perhaps worsen, as time goes on. While the insect situation may temporarily improve as the current insect epidemics collapse, without major changes in stand conditions and modification of management practices over relatively large areas, stands will continue to be periodically subjected to major depredations by insects, because the conditions making them highly susceptible to attack have not changed. Moreover, forest disease problems will continue to worsen little-by-little each year as untreated disease centers expand in size, and are aggravated by management practices that do not fully consider forest health. (Gast et al. 1991)

In the following chapters we bring together our existing

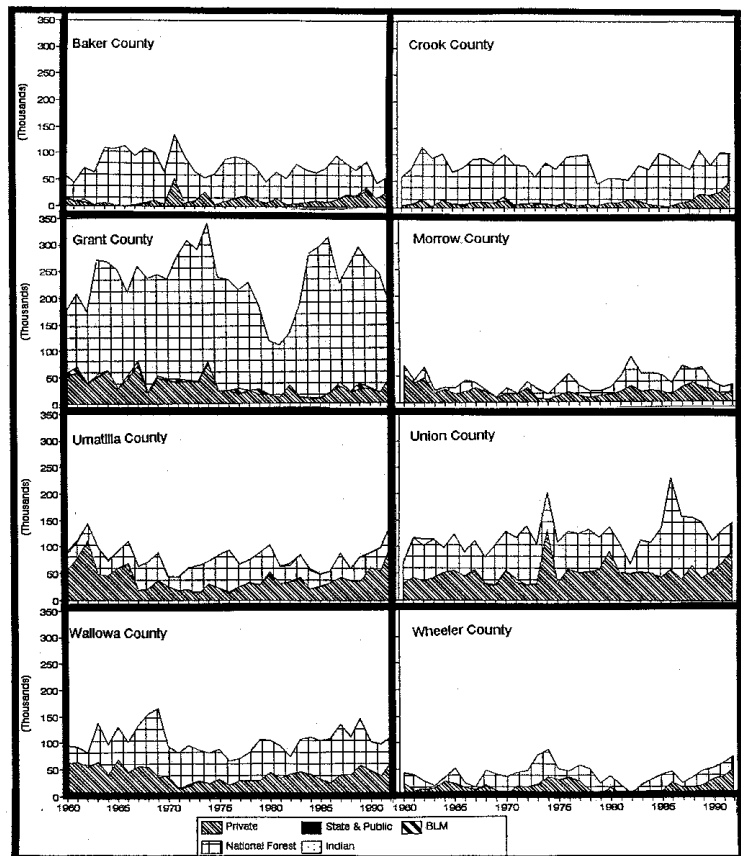


Figure 1.9 -- Summary of timber harvest by ownership between 1960 and 1992 for the eight counties of the Blue Mountains in northeast Oregon (Oregon Department of Forestry, Salem, OR, 1961-1993 annual Oregon timber harvest reports) (Thousands of board feet - Scribner log).

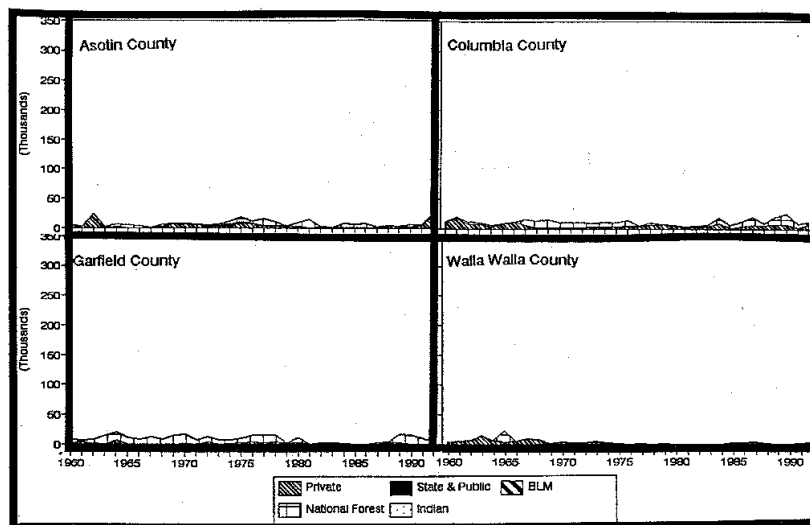


Figure 1.10 -- Summary of timber harvest by ownership and county between 1960 and 1992 for the four counties in the Blue Mountains in southeast Washington (Washington Department of Natural Resources, Olympia, WA, 1961 - 1993 Washington timber harvest reports). (Thousands of board feet - Scribner log).

knowledge of the Blue Mountains and resources, both natural and human, to contribute to solving the conflicts, ambiguities, ecosystem degradation, and societal concerns. These chapters represent a beginning for finding a solution and identifying man's role as part of the Blue Mountain ecosystem.

LITERATURE CITED

- Brooks, H. C. 1979. Plate tectonics and the geologic history of the Blue Mountains. *Oregon Geology*. 41:71-80.
- Caraheer, D. L., J. Henshaw, F. Hall [and others], panel members. 1992. Restoring ecosystems in the Blue Mountains: a report to the regional forester and the forest supervisors of the Blue Mountain forests. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 14 p. with appendices.
- Cole, David N. 1982. Vegetation of two drainages in Eagle Cap Wilderness, Wallowa Mountains, Oregon. Res. Pap. INT-288. U.S. Dept. of Agric., Forest Service, Intermountain Forest and Range Experiment Station. Ogden, UT. 42 p.
- Cushing, Ken. 1992. Rural interface. White Paper Issue No. 24.
- Dart, J.O., and D.M. Johnson. 1981. Oregon: wet, high, and dry. The Hapi Press, Portland. 365 p.
- Franklin, J.F., and C.T. Dryness. 1988. Natural vegetation of Oregon and Washington. Oregon State University Press, Corvallis, Oregon. 452 p.
- Gast, William R., Jr., Donald W. Scott, Craig Schmitt, David Clemens, Steven Howes, Charles G. Johnson, Jr., Robert Mason, and Francis Mohr. 1991. Robert A. Clapp, Jr., ed. Blue Mountains forest health report: new perspectives in forest health. U.S. Department of Agriculture, Forest Service, PNW Region, Malheur, Umatilla and Wallowa-Whitman National Forests.
- Hall, Fred C. 1973. Plant communities of the Blue Mountains in eastern Oregon and south-eastern Washington. R-6 Area Guide 3-1. U.S. Dept. of Agric., Forest Service, PNW Region. Portland, OR. 62 p.
- Johanson, Dorothy O., and Charles M. Gates. 1967. Empire of the Columbia: a history of the Pacific Northwest. Harper and Row Publishers, New York. 654 p.
- Johnson, C.G., Jr., and R.R. Clausnitzer. 1992. Plant associations of the Blue and Ochoco Mountains. R6-ERW-TP-036-92. U.S. Dept. of Agric., Forest Service, Pacific Northwest Region, Portland, OR. 164 p.
- Johnson, C.G., Jr., and S. Simon. 1987. Plant associations of the Wallowa-Snake Province. R6-ECOL-TP-225A-86, U.S. Dept. of Agric., Forest Service, Pacific Northwest Region. 399 p.
- Miller, Patrick, A. 1988. A landscape ecology approach to visual resource management. In: Moss, Michael R., ed. Landscape ecology and management: Proceedings of the first symposium of the Canadian Society for Landscape Ecology and Management; May, 1987; University of Guelph. Polyscience Publications, Montreal. p. 191-202.
- Oregon Department of Forestry. 1961-1993. Annual Oregon timber harvest reports. Oregon Department of Forestry, Forest Resources Planning Division. Salem, OR.
- Taylor, George H., and Alexi Bartlett. 1993. The climate of Oregon. Climate Zone 6 - North Central Area, Climate Zone 7 - South Central Area, and Climate Zone 8 - Northeast Area. Special Reports 918, 919, and 920. Oregon State University Agricultural Experiment Station. Corvallis, OR.
- Tanaka, John A., G. Lynn Starr, and Thomas M. Quigley. 1995. Strategies and recommendations for addressing forest health issues in the Blue Mountains of Oregon and Washington. Gen. Tech. Rep. PNW-GTR-350. U.S. Dept. of Agric., Forest Service, Pacific NW Res. Stn. Portland, OR. 18p.
- Thomas, J.W. 1979. Introduction. In: Thomas, J.W., ed. Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. Agricultural Handbook No. 553. U.S. Dept. of Agric., Forest Service. 511 p.
- U.S. Bureau of the Census. 1988. County and city data book, 1988: A statistical abstract supplement. U.S. Government Printing Office, Washington, D.C., 20402. 797 p. plus appendices.
- U.S. Department of Agriculture. 1991. Blue Mountains Natural Resources Institute charter and program. U.S. Dept. of Agric., Forest Service, Pacific Northwest Region. 10 p.
- Washington State Department of Natural Resources. 1961-1993. Washington timber harvest report. Washington State Department of Natural Resources, Olympia, WA.

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