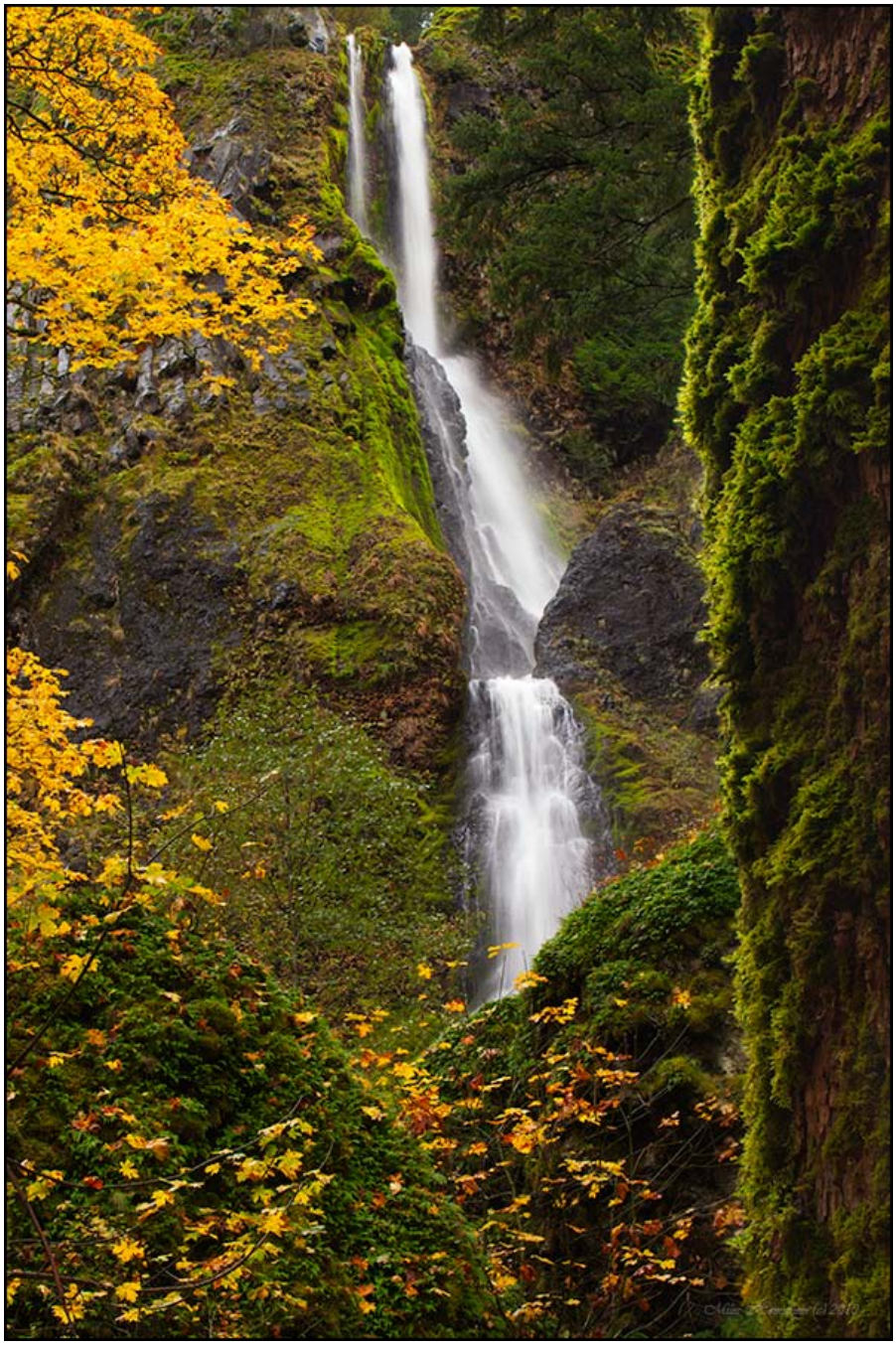
Oregon Natural Areas Plan



2010

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This is the first Oregon Natural Areas Plan
It is based on the Oregon Natural Heritage Plan, first published in 1981 and revised in 1988, 1993, 1998 and 2003 by the Natural Heritage Advisory Council and by the staff of the Oregon Biodiversity Information Center:

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CHAPTER 1. INTRODUCTION

The rich diversity of ecosystems and native plants and animals is one of Oregon's most distinctive and valued qualities. Our state contains rain forests, dry forests, oak woodlands, alpine meadows, prairies, deserts, marshes, estuaries, dunes, rocky headlands, lakes and streams. There are a number of reasons it is so diverse. First are the extremes of climate, with rainfall ranging from over 200 inches a year along Oregon's north coast, to less than 7 inches a year in the Alvord Desert, and temperatures from the very mild banana belt along the coast near the California border to the extremes of the high alpine areas of the Wallowa Mountains. Secondly, Oregon is diverse geographically and geologically, having ancient serpentine landscapes in the Siskiyou Mountains and recent volcanics in the Cascades and the deepest gorge in North America at Hells Canyon. Lastly, Oregon is a floristic crossroads, with arctic boreal species finding their southern limit, Rocky Mountain species common in northeastern Oregon, Great Basin species in southeastern Oregon, and California coastal and Sierra species in the southwest, all mixing with native northwestern taxa to create a wide array of habitats.

Natural Areas

Natural Areas protect the highest quality native ecosystems and rare plant and animal species. Valued for teaching and scientific research, Natural Areas provide a relatively undisturbed setting in which to study native ecosystems and species. Research projects on Natural Areas can provide important answers to statewide land management questions. Native forests, grasslands, tide pools, bogs, and sagebrush communities are protected on Natural Areas in Oregon, as are many of Oregon's rarest plants and animals.

The Oregon Natural Areas Program History

The Oregon Natural Areas Program in its present form was established by the 1979 Legislature in the Natural Heritage Act (ORS 273.561-.591 [SB 448]), to among other things reinvigorate the natural areas program in Oregon. This legislation was built upon a tradition of natural area inventory and conservation in Oregon. In 1973, the Legislature passed the first natural areas law, the Natural Area Preserves Act, which was the first attempt to engage the state in natural areas conservation. In 1975, scientific professionals and conservationists led by Jerry Franklin of the U.S. Forest Service's PNW Research Station developed the first *Research Natural Area Needs in the Pacific Northwest*. This 1975 publication served to guide the establishment of federal natural areas in Oregon until the publication of the first Oregon Natural Heritage Plan in 1981.

After 1979, the Oregon Natural Heritage Information Center (now the Oregon Biodiversity Information Center) staff, along with the Natural Heritage Advisory Council, guided the establishment of natural areas in Oregon with very limited state resources. For the first 14 years of the program, all of the work to establish natural areas was done cooperatively with the Interagency Research Natural Areas committee, an Oregon – Washington partnership staffed by the PNW Research Station, and the natural areas program grew and flourished on federal lands. During this time, no natural areas were established on any state lands in Oregon. After 1993, the Oregon Parks and Recreation Department (OPRD) became the first and only state agency to establish new natural areas. OPRD has since established 10 state park natural areas, and is continually evaluating and acquiring new sites.

The 25-year review of the Oregon Natural Heritage Act and Natural Heritage Program affirmed that natural areas continue to provide important places for public education and baseline research and that it remains important for Oregon to maintain a natural areas program. The review also suggested that the Oregon Parks and Recreation Department is now the best agency to manage the Oregon natural areas program. A description of the program, goals and responsibilities are outlined in this plan.

Goals of the Natural Areas Program

There are three primary goals and three additional principles directing the activities of the Natural Areas Program. The goals are to:

1. Create a discrete and limited system of natural areas representing the full range of Oregon's natural heritage resources. These areas are to be used for scientific research, education and nature interpretation.

2. Establish a process and means for public and private sector voluntary cooperation in the development of a system of natural areas.

3. Provide advice to managers of natural areas on the management and use of such areas and provide information concerning the conservation of natural heritage resources and special species to the state, federal and local agencies that manage lands within Oregon.

The program’s activities are based on the following principles:

1. The Program shall be complementary to and consistent with the Research Natural Area program as implemented on federal lands.

2. All conservation shall be voluntary on the part of the landowner or public land manager. The Program is advisory to those parties.

3. Wherever feasible, a resource shall be protected on public lands allocated primarily to special non-commodity uses, including state and federal parks, natural areas, preserves and wilderness areas, and other areas set aside for conservation purposes.

Natural Areas Plan

The Natural Areas Plan guides the Natural Areas Program's selection of priority areas for establishment as natural areas. As a first step, the Plan defines the full range of components of Oregon's natural heritage -- the terrestrial, marine, wetland, and aquatic ecosystems that define Oregon's living landscape. Unique geologic formations are included because of their special scientific and educational interest.

In addition to these Natural Resources, the Plan lists special species, including vascular plants, non-vascular plants, vertebrates, and invertebrate animals that need attention in order to survive as components of Oregon's natural heritage.

The Plan also establishes criteria for the selection of natural areas suitable for: 1) inclusion on the Oregon Register of Natural Heritage Resources, 2) dedication as a Natural Area, 3) designation as a Research Natural Area, and 4) inclusion in another designated public or private reserve.

Since so many lands in Oregon have natural values and potential importance for conservation, criteria are needed for selection of a limited number of areas containing the highest natural values. The Plan provides landowners and public land managers with tools to voluntarily designate and protect priority areas. Guidelines for the management of these conservation areas should be consistent with those developed for the research natural area program on federal lands.

There is no requirement to update the Oregon Natural Areas Plan. However, it is anticipated that the plan will be updated every ten years to include new scientific concepts related to natural areas, and to evaluate the effectiveness of the program.

Interagency Strategy for the Pacific Northwest Natural Areas Network

In 2009, the Interagency Research Natural Areas committee published a strategic plan for the Natural Areas Program in Oregon and Washington (Wilson et al. 2009). This document outlines a clear vision which the Oregon Natural Areas Program and the Heritage Advisory Council have adopted. Much of this document is incorporated directly into this 2010 Oregon Natural Areas Plan, including the vision statements identified in each of the strategy chapters.

Key Terms and Definitions

The following terms and definitions are used throughout this Plan:

Aquatic and Wetland Ecosystems -- Distinct freshwater aquatic environments, equivalent to "Aquatic Types" as used in the Oregon Natural Heritage Act, and Wetlands and Deepwater habitats, as defined by the U.S. Fish and Wildlife Service (Cowardin et al. 1979). This category includes wetlands, streams, rivers and lakes. Marine and Estuarine aquatic ecosystems are treated separately.

Biodiversity -- The full range of variety and variability within and among living organisms and the ecological complexes in which they occur. The concept of biodiversity encompasses ecosystem processes, species diversity and genetic variation.

Ecoregion -- A geographic area with characteristic features such as climate, geology, geomorphology, soils, ecosystem processes, and natural assemblages of plants and animals.

Ecosystem -- An assemblage of integrated organisms plus the local environment supporting them. Ecosystems generally have consistent dominant species, food chains, and nutrient flows. Ecosystems in the Natural Areas Plan can vary in size from local plant communities, such as a twenty acre silver sagebrush flat, to a 20,000 acre wetland complex.

Elements -- The basic units of Oregon's ecological and geological heritage. Elements are generally either plant communities, ecosystems or geological formations listed in the Plan as Natural Heritage Resources, or special species.

Geologic Formations -- The rocks and sediments deposited in distinct environments (formations) or the landforms formed by distinct biological, chemical, and/or physical processes (features). These features or formations have been grouped into elements that indicate when they were formed or deposited.

Invasive Species -- Also referred to as exotic species, these are plants or animals occurring in Oregon as a result of introduction or unnatural range expansion. These are species that disrupt natural ecosystem processes and did not occur in Oregon before the arrival of European culture.

Native Species -- Any species known to occur in Oregon before the arrival of European culture or which has moved into Oregon through natural range extension.

Natural Area -- A natural area is an area of land managed for scientific research and education, containing important biological or physical attributes. In Oregon, these are lands that are established by an agency or organization for conservation or education.

Natural Heritage Resources -- The Terrestrial Ecosystems, Aquatic and Wetland Ecosystems, Special Species and Geological Formations included in the Natural Areas Plan.

Oregon Register of Natural Heritage Resources -- A registry maintained by the Natural Areas Program of significant natural areas, voluntarily managed in ways that protect one or more natural heritage resources.

Plant Community -- A general term for an assemblage of plants which grow together at a site, which often show an association or affinity to each other or to a particular set of environmental conditions. A plant community type is a set of plant communities with similar structure and floristic composition.

Representation -- The inclusion of an element in a natural area identified according to the guidelines of the Plan. The central goal of the Heritage Program is to assure that each element is adequately represented, but without unnecessary duplication.

Research Natural Area (RNA) – Natural areas established by federal agencies under the plan of the Pacific Northwest Research Natural Area Committee. The Oregon Natural Areas Program is, in effect, the state counterpart of the federal program.

Special Species -- Animal and plant species considered to be of conservation interest because of their rarity or vulnerability to extirpation or extinction, or because they are under-represented in the statewide system of protected natural areas.

Terrestrial Ecosystem -- The name given to an assemblage of land-based species in a given locale, possessing some degree of interrelationship, generally reflected in consistency in dominant species and environment. This term is roughly equivalent to the term "Plant Community Type" as used in the Natural Heritage Act or “Plant Association” as defined in the National Vegetation Classification System. It more accurately reflects the interest in all components of the ecological system rather than merely the dominant plant species.

CHAPTER 2. DESIGNING A NATURAL AREA NETWORK

Vision

A network of natural areas is designed to include the full diversity of ecosystems, species and geologic features in Oregon, which complements other natural areas in the Pacific Northwest, while recognizing that each site is a dynamic ecosystem that will change over time.

Element Approach

Oregon's natural diversity consists of thousands of plants and animals interacting with each other and with their physical environment. To come up with a way to identify and describe this diversity, natural area scientists have identified the elements of diversity (Figure 1).

At the broadest level, an element can be a plant association or an ecosystem, such as a Douglas-fir/swordfern forest, an Idaho fescue dominated prairie, or a sphagnum bog. If a comprehensive list of all species which occur in the complete list Oregon's plant associations were compiled, the list would contain most of Oregon's native species.

However, some individual species (such as the Willamette Valley daisy or the pygmy rabbit) are rare or occur only locally. Because these species may not be protected using the ecosystem approach alone, the Natural Areas Program identifies them as special species and classifies them as elements in their own right. An element, therefore, as used in this Plan, is commonly a plant association or an ecological system, but may also be a rare species or a geologic formation. The goal of the natural areas plan is to insure examples of all elements native to Oregon are included in at least one natural area.

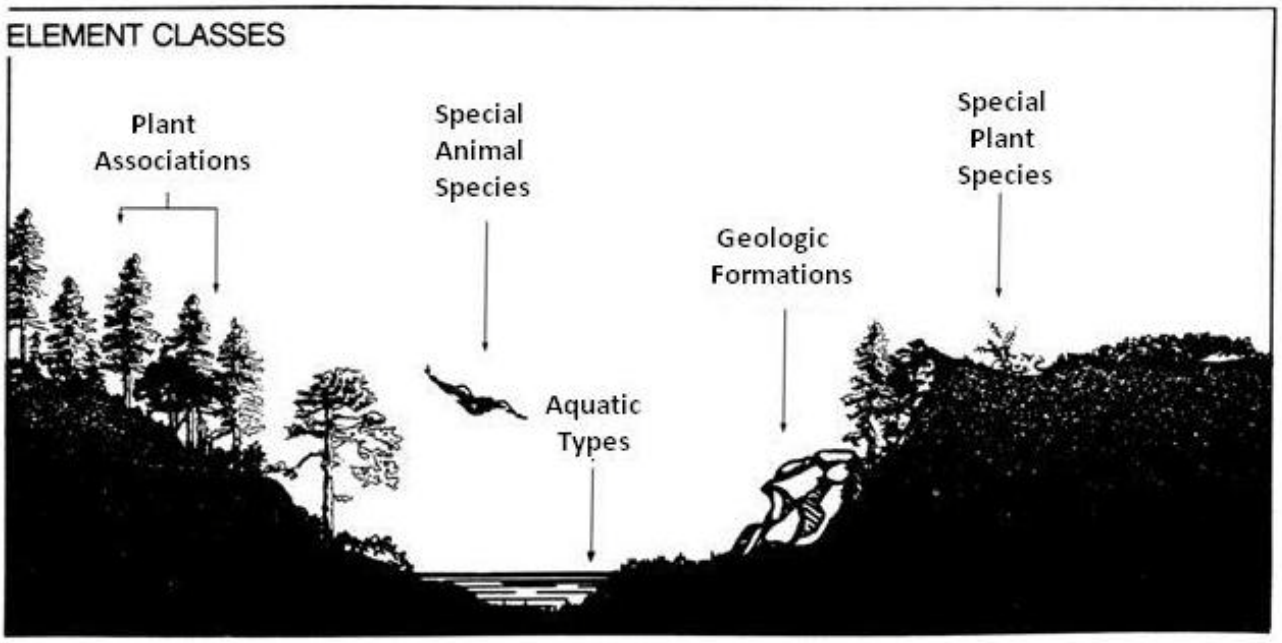

Figure 1. Diagram of Element Types Used in the Natural Areas Plan

Ecoregional Approach

Ecoregions are geographic areas with similar features, such as climate, vegetation, geology, geomorphology, soils, and ecosystem processes. Ecoregions generally have characteristic natural communities as well as typical plant and animal species. The State of Oregon has adopted the ecoregional concept as a way to evaluate environmental health, having used them in the *State of the Environment Report* (2000) and in the Oregon Department of Fish and Wildlife's *Conservation Strategy* (2009), and the Oregon Watershed Enhancement Board uses them to identify conservation acquisition priorities. The Natural Areas Plan uses ecoregions to define the different types of natural areas needed for research and education.

Currently, the state and the Natural Areas Program recognize eight terrestrial ecoregions in Oregon, based on the map developed by the Environmental Protection Agency Research Lab in Corvallis (Thorson *et al.* 2003). The EPA map includes a small part of a ninth ecoregion in Oregon, the Snake River Plains. This has been combined with the Basin and Range Ecoregion for this Plan, since the area found in Oregon is so small. A new Marine – Estuarine region covering the coast and bays has been developed for this plan as well. Figure 2 shows a map of the nine ecoregions used in the plan. A brief description of each ecoregion's ecology, biology and uses is included at the beginning of each ecoregion chapter.

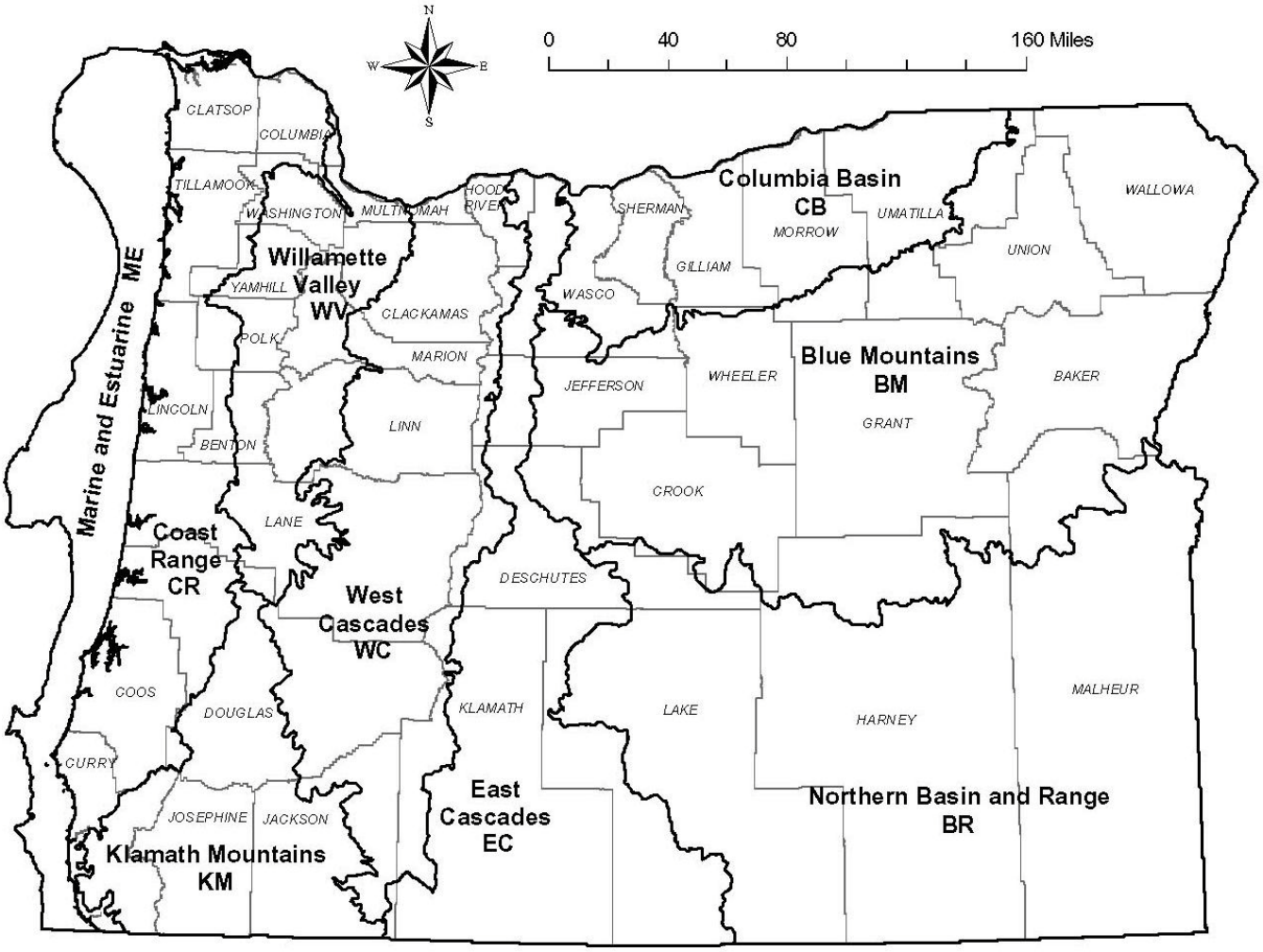

Figure 2. Ecoregions of Oregon used in the Natural Areas Plan

Ecological Elements and Plant Associations

The ecological units in the Natural Areas Plan are plant associations based on the National Vegetation Classification System (NVCS - Jennings et al. 2008). The Oregon Biodiversity Information Center was one of many programs that helped develop this classification, which is now posted at the NatureServe Explorer web site (http://natureserve.org/explorer). This defines a plant association as "*a vegetation classification unit defined on the basis of a characteristic range of species composition, diagnostic species occurrence, habitat conditions, and physiognomy*." The Oregon Biodiversity Information Center maintains a comprehensive list of plant associations known from Oregon, available online at http://orbic.pdx.edu/documents/pclist_2004.pdf. Descriptions of most of these associations are also available on NatureServe Explorer.

Unfortunately, only terrestrial, wetland, and riparian vegetation types are included in the NVCS. For aquatic ecosystem types, estuarine types and marine types, no classification has been officially adopted for the United States. As a result, the Natural Areas Plan has selected the classification that is best developed and most widely accepted in Oregon. In 2010, a final draft of marine and estuarine classification was proposed by the National Oceanic and Atmospheric Administration (NOAA) and NatureServe, currently available for review at http://www.csc.noaa.gov/benthic/cmecs/CMECS_doc.pdf. State agencies are attempting to implement this in Oregon, and we have used this as the basis for some of the types in our new Marine-Estuarine Ecoregion.

For simplicity, all ecological elements, including terrestrial, aquatic and marine types, will be referred to as plant associations throughout the remainder of this plan. This does not alter the fact that only wetland, terrestrial and riparian vegetation types have defined plant associations to date.

Oregon's Natural Areas Plan seeks to identify a "discrete and limited system" of natural areas that will represent the full range of Oregon's natural diversity. The core of the Natural Areas Plan is the list of ecological communities or plant associations that have significant occurrences within each Ecoregion, included in Part 2 of the plan. These are identified to ensure that the full range of biological diversity in each Ecoregion is represented in the network of natural areas. When Oregon's interagency system of natural areas includes at least one good example of each plant association in a protected area, then the primary goal of the Natural Areas Plan will have been achieved. As this goal is approached, agencies can work to ensure there are places where baselines or controls to study management actions can be established and where all of Oregon's ecosystems and species can be studied or visited.

Common plant associations often are important in more than one Ecoregion, and they are listed in the Plan in each of these Ecoregions. For example, "Ponderosa pine/snowberry forest" is found in the Blue Mountains, East Cascades, and Northern Basin and Range Ecoregions. This is because some plant associations are wide-ranging, and can vary regionally in ecosystem function, species composition and land management practices. While the dominant species are quite similar, plant associations from different Ecoregions often vary significantly in their complement of associated species.

Identifying Plant Associations for Defining Natural Area Needs

Oregon's plant associations or ecosystem elements are included in the Natural Areas Plan when:

1. They have been defined in the literature or proposed by scientists or managers, and are determined to represent a significant part of Oregon's natural heritage.

2. They represent unique or local ecosystems which make a significant contribution to biodiversity within the Ecoregion.

Because plant associations typically occur in clusters, several can often be found in a mosaic together. As a result, the number of natural areas needed to protect ecological resources is significantly smaller than the number of plant associations in an Ecoregion. As resources become rarer, it becomes more difficult to find such clusters.

Various scientific references were consulted to develop the resource lists in the plan. All major sources are included in the bibliography, which is based on an updated comprehensive collection of scientific literature maintained at the Oregon Biodiversity Information Center. In addition, experts from the region's universities and natural resource agencies as well as knowledgeable individuals were consulted.

Assigning Priorities to Plant Associations in the Plan

Plant Associations are ranked in the Ecoregion ecological element lists in order of priority as high (H), medium (M) or low (L). The primary factor in determining priorities for ecological communities is the risk that plant community may disappear.

The primary characteristics to assess this risk are: 1) **rarity** of known, high quality occurrences of the element; 2) **threat** to the occurrences of the type; 3) the **ecological fragility** or sensitivity to natural or artificial disturbances; and 4) the **adequacy and viability of protected occurrences**.

The Oregon Biodiversity Information Center uses these same criteria to rank all terrestrial and any defined aquatic plant associations, as well as all native species found in the state. The ranking system is used by Natural Heritage Programs across the U.S. and is maintained by NatureServe. The system ranks elements on both a global and state basis.

The global system uses a scale of G1 to G5, using the four criteria listed above. G1 ranked elements are critically imperiled, while elements ranked G5 are demonstrably secure. Plant associations and native species are also ranked based on their status within Oregon, using the same numbering system. State ranks range from S1 to S5, with S1 including types critically imperiled in Oregon and S5 applied to demonstrably secure Oregon elements.

The priority ranking for plant associations in the Natural Areas Plan is determined by its NatureServe / Natural Heritage rank. The priority values are assigned as follows:

High Priority	=	G1, G2 or S1 ranked types
Moderate	=	G3, S2 or G4S3 ranked types
Low	=	Ranks lower than above

Currently plant associations are only ranked at the state and the global level, which means that the status of an element in an Ecoregion has not been evaluated. Therefore the state and global ranking for a plant association has been applied to all the Ecoregions in which it occurs.

Inventory

To build the desired natural areas network, it is essential to identify the diversity of ecosystems in each ecoregion, and to find examples that are in good enough condition to represent these natural systems. Major partners in Oregon's Natural Areas Program, the Forest Service, BLM, Oregon Biodiversity Information Center, The Nature Conservancy, Oregon Parks and Recreation Department, continue to work to identify the best potential examples of unrepresented ecosystem types across the state. Recent comprehensive inventories have occurred on the Deschutes and Ochoco National Forests, which allowed for important updates to this plan. However, much inventory work remains to identify the sites needed to create a comprehensive network of natural areas in Oregon.

Determining if a Natural Area Adequately Represents a Plant Association

To achieve the goal of a statewide system of natural areas protecting the full range of Oregon's diversity, areas must be identified with examples of each identified plant association that are of sufficient size and quality to allow for study and education. Three basic criteria are used to decide if a plant association is adequately or only partially conserved at a natural area in which it is found.

1. The Management Intent - Sites are adequately protected if the existing management plan or agency management direction identifies the long-term survival of the plant association at the site as a goal, along with provisions for the site to be protected from human impacts.

2. Quality - A determination should be made that the occurrence of the plant association is large enough and of sufficient quality for research and educational uses.

3. Size or Area – Sometimes, plant associations or species have become so rare that only small occurrences exist at a proposed natural area. In these cases, having partial representation at two or more sites can provide researchers better opportunities for studying these rare elements.

Terrestrial Ecosystem Types

Terrestrial ecosystem types are the most frequently found plant associations. They are organized in the Ecoregion lists by zone, with the zones generally representing the dominant plant species in the canopy. These forest zones were modified from the *Yellow Book* (Dyrness et al. 1975) which defined the first list of natural area needs for the Pacific Northwest. Adjacent zones containing only a few ecological communities have been combined in certain Ecoregions to simplify the plan.

Aquatic and Wetland Ecosystem Types

There are three types of aquatic or wetland ecosystems that occur in Oregon which are described in this plan:

1. Lacustrine types, which include lakes and ponds;
2. Palustrine types, which include wetlands and bogs; and
3. Riverine types, which include rivers and streams.

The wetland and aquatic ecological communities for these ecosystem types were originally developed at the Aquatic Classification Workshop held in Newport on August 15, 1980. This Workshop used the *Yellow Book* (Dyrness et al. 1975) as a basis for

the Freshwater classification, and the *Oregon Marine and Estuarine Habitat Classification Systems* (Starr 1979) for the Marine and Estuarine classification. Since then, the lists have been periodically updated or modified.

Lacustrine resources are defined as lakes larger than 20 acres (8 hectares) and greater than 6.6 feet (2 meters) at their deepest point. Vegetation growing in aquatic beds such as floating mats and lakeshore marshes are considered lacustrine types. All other wetland vegetation is considered palustrine. The Portland State University Center for Lakes and Reservoirs has the best database of lakes and aquatic weeds and is working to develop an on-line version of the *Atlas of Oregon Lakes* (Johnson 1985).

Palustrine resources are freshwater or alkaline wetlands dominated by emergent trees, shrubs, grasses, sedges, forbs, mosses or liverworts. The Oregon Department of State Lands manages the state wetland program to conserve these resources. They are lakes, ponds and springs smaller than 20 acres (8 hectares) and less than 6.6 feet (2 meters) at their deepest point, as well as intermittent lakes, ponds, springs and playas of these dimensions, but excludes aquatic beds. Riparian areas associated with the immediate margins of rivers and streams are included here. Wetlands have been a major focus of classification and inventory in Oregon. Freshwater wetland ecological communities have been updated from early editions of the plan to conform to the U.S. Fish and Wildlife Service's Classification of Wetlands and Deepwater Habitats of the United States (Cowardin *et al*. 1979), which is now a standard for wetland classification in the United States.

Riverine resources represent aquatic types associated with rivers and streams. In the 1981-1993 editions of the plan, riverine resources were identified as a third freshwater aquatic category. However, since there are no standard classifications available to adequately define riverine types, they are no longer included in the Ecoregional lists. While riverine resources are a critical component of Oregon's natural heritage, the inventory and classification information does not exist to identify these elements or to compile a comprehensive list of aquatic ecosystem types. It is hoped that new research by natural resource agencies, non-governmental organizations or universities will lead to a comprehensive classification and map of riverine systems in Oregon.

Marine and Estuarine Ecosystem Types

All marine and estuarine ecological elements are compiled in the new Marine and Estuarine Ecoregion. The classification employed is described in detail in this chapter.

Marine resources include tidal and subtidal habitats with little or no freshwater dilution. In previous plans, they extended offshore from beaches, headlands and the outer limits of estuaries to the edge of the State of Oregon’s management area, which is three nautical miles seaward of the coastal baseline. In the current plan, the marine area has been extended to the edge of the continental shelf (Figure 2).

Development of policy for management and designation of reserves is overseen by the Ocean Policy Advisory Council (OPAC), and its *State of Oregon Territorial Sea Plan* (1994). The state and OPAC continue to work to establish marine reserves. Previous plans recognized the designations in the *Territorial Sea Plan* as adequately protecting the elements of biodiversity present in the sites, but this plan includes other designations as well.

Estuarine resources are tidal and subtidal waters with occasional to regular freshwater dilution. They extend from the outer limits of open to temporarily enclosed embayments to a point upstream where the effects of ocean-derived salts are negligible. Estuarine resources are well catalogued in the *Oregon Estuary Plan*

Book, developed cooperatively by the Oregon Department of Fish and Wildlife and the Oregon Department of Land Conservation and Development (ODLCD 1987).

Ecosystem Process Ecological Elements

In developing the 1998 Natural Heritage Plan update, the council and natural area scientists identified ecosystem elements to represent major ecological processes, such as fire, wind, floods, insects and pathogens. The council felt that inclusion of landscape or ecosystem process elements within a network of protected areas was of equal importance to protecting a range of vegetation communities based on current vegetation conditions, especially in cases where natural disturbances often maintain or impact ecological conditions. The importance of including landscape level processes is further supported by recent work in landscape ecology.

In both the 1998 and 2003 Natural Heritage Plans, a series of fire ecosystem process elements were described, and included as an important conservation component within the natural areas network. Unfortunately, attempts to establish ecosystem process elements for Research Natural Areas on federal lands were unsuccessful, largely because it became embroiled in a policy debate concerning the role of fire and fire management within natural forests on public lands. It is now apparent that no Ecosystem Process elements will be established in the Pacific Northwest. As a result, these elements and the methodology supporting them have been removed from this plan. The descriptions of ecosystem elements from each Ecoregion in the 2003 Natural Heritage Plan will be published in a separate document, *Ecosystem Process Natural Areas Needs from Oregon* (2011), along with this plan.

Geologic Formations or Features

Oregon's geological heritage, which consists of rocks, sediments, and associated features, includes a wonderful geological diversity that illustrates well the richness of Oregon's natural heritage. For example, there are Jurassic shales with finely ornamented ammonites in the Blue Mountain and Klamath Mountain Ecoregions; spectacular Tertiary flood basalts that extend across the 300 mile-width of Oregon from the Columbia Basin Ecoregion to the Marine and Estuarine Ecoregion; explosive, volcanic deposits and features, such as Crater Lake of the Cascades Ecoregion; as well as the Quaternary deposits and features such as the striking, glacial erratics transported from the Rocky Mountains by icebergs during ice-age floods and deposited in the Willamette Valley.

The rocks, sediments, and features of this geological heritage formed in distinct environments or the surface features were sculpted by distinct biological, chemical, and physical processes. These rocks, sediments and features can be defined as geological elements. The geological elements are grouped largely into geological formations and features. Formations represent rocks found in the standard intervals of geologic time that are usually on the order of millions to tens of millions of years. In the Plan these intervals extend from the Devonian (the time interval from about 410 to 355 million years ago) that includes the oldest rocks yet found in Oregon, through the Quaternary, which includes the present time. Features, on the other hand, represent deposits or geomorphic forms whose character has developed over the past two million years (the Holocene time interval) and may be undergoing change today, such as Netarts spit.

These geological elements are similar to the ecological heritage elements in that for the most part, they consist of distinctive assemblages.

They are dissimilar from the ecological heritage elements in that they are organized by time interval, rather than the type of element. Furthermore, even though there are similar time intervals among the different ecoregions, the geological setting and processes that formed the elements (deposits of rock and sediment) of the intervals were usually different. For example, in one ecoregion Tertiary rocks may have formed on land whereas in another ecoregion, the Tertiary rocks may have formed in the sea. As a result, the geological elements are both distinct and characteristic of the different ecoregions.

This 2010 plan is similar to the 2003 plan that represented a major revision developed by the Oregon Department of Geology and Mineral Industries, in cooperation with other university and governmental geologists. However, with the addition of the new Marine and Estuarine Ecoregion a new set of geological elements were defined for the Marine and Estuarine Ecoregion and several geological elements were moved from the 2003 Coast Range Ecoregion to the new Marine and Estuarine Ecoregion.

There are two main principles for including geological features and formations in the following element list of Geologic Types:

1. Certain elements, for instance fragile volcanic features and paleontological sites, are vulnerable to destruction and can be protected by effective natural area management. Paleontological elements will be included in future editions of the plan.

2. Other geological elements are a prominent component of our natural heritage and should be recognized for their educational and interpretive values. This could be accomplished through recognition of the finest features on the State Register of Natural Resources.

The Natural Areas Program functions to both formally recognize the geological elements and to help protect them through natural area conservation. As is the case with other elements, priorities for protecting an element are based on the presence of a potential or actual threat to the formation or feature, and the rarity and/or significance of the formation or feature. As is the case with the ecological elements, types are included in a list for an Ecoregion if its occurrences are endemic to, representative of, or important in the ecoregion.

"Protection" of a geological element is interpreted more liberally than for biologic communities and species. In many cases a geologic element may not have to be included in a formally designated natural area for it to be considered protected. For instance, in many areas designated for recreation, such as Wild and Scenic Rivers, Wilderness Areas or Parks, geological values are an important factor in their management. However, some geological elements, such as fossil locales or ash flows, can be quite sensitive to disturbance. In these areas, designations designed to protect the element(s) present is desired.

Assigning Priorities to Geological Elements

Geological elements are ranked in the Natural Heritage Resource lists as high (H), medium (M) or low (L) priority. The factors used for assessing geologic elements are somewhat different than the ecological types. The primary factors include the: 1) **rarity** of known, high quality occurrences of the geologic element; 2) **threat** to the occurrences of the type; and 3) **fragility** or sensitivity to natural or artificial disturbances.

Special Species

The primary goal of the natural areas program is to ensure that one example of each plant community, geologic formation and species is included in the statewide network of natural areas. The program assumes that all of the common species are likely to be found at least once in the network of natural areas, but that rare or at-risk species may not. Therefore, the program seeks to include examples of rare and at-risk species, or “special species” either on the register or within a natural area if possible.

The Natural Areas Program works with the Oregon Biodiversity Information Center of the Institute for Natural Resources, as well as the Oregon Department of Fish and Wildlife and the Oregon Department of Agriculture, to develop a comprehensive list of special species that need to be included in the Natural Areas Plan. The species included in lists were selected using the most current information available on the distribution and abundance of plant and animal species native to Oregon. The list of taxa in the plan should assist public and private land managers and planners in determining which species are of special concern within their given management jurisdictions. They are also intended for use by amateur and professional botanists and zoologists to help focus their efforts on those taxa most in need of attention.

Species, like ecological and geological elements, are listed within the ecoregions where they occur, and in the protected areas that support them. Only those taxa which are considered to be threatened or endangered in Oregon or throughout their range have been included.

Special Species List Designations

List 1 contains taxa that are threatened with extinction or presumed to be extinct throughout their entire range.

List 2 contains taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon. These are often peripheral or disjunct species which are of concern when considering species diversity within Oregon's borders. They can be very significant when protecting the genetic diversity of a taxon. Extreme rarity is viewed as a significant threat and as such very rare Oregon taxa are all on this list.

The Oregon Biodiversity Information Center tracks all occurrences in Oregon for any species included on List 1 and List 2, and has a fairly comprehensive database of their locations. The Biodiversity Information Center also maintains two other lists of at-risk species: List 3 and List 4. List 3 is the “Review List”, which includes taxa that could be threatened or endangered, but whose status is currently unclear. List 4 is the “Watch List” of taxa that are rare but apparently stable, or those that are declining but remain too abundant currently to be considered threatened. Taxa on Lists 3 and 4 have not been included in the Natural Areas Plan because they are at lower risk, and because their distributions may not be understood well enough to include them. The comprehensive list of these taxa and the most up-to-date information on their distributions can be found in the most recent edition of *The Rare, Threatened and Endangered Species of Oregon* (ORBIC 2010), available at http://orbic.pdx.edu/rte-species.html.

CHAPTER 3. NATURAL AREA CONSERVATION

Vision

Federal agencies, state agencies, local governments and conservation organizations working together to designate a network of natural areas representing the full diversity of ecosystems in Oregon.

Oregon's natural areas are conserved when landowners or land managers choose to establish a natural area on lands they own or manage. Natural areas can also be permanently protected if a conservation group, state or federal agency buys private land to conserve it. More commonly, it occurs when a state or federal agency designates a site as a natural area in an agency plan. The federal and state agencies rely on different mechanisms, depending on the laws and rules that guide their actions. Descriptions of the agency designations and natural area programs are included in this chapter. In addition this chapter discusses different mechanisms for establishing Natural Areas and outlines various public and private land management designations which together create the statewide system of natural areas.

Natural areas can be conserved voluntarily on private lands, either on a short term basis by an interested landowner, or through a conservation agreement or easement, which has a set time span. Efforts to make it easier for landowners to conserve habitats on their lands and to provide incentives for landowners to restore habitats on private lands have been increasing and are an important focus for the conservation efforts outlined in the Oregon Conservation Strategy. A comprehensive list of incentives for voluntary protection of private lands was produced for the 2003 legislature as part of a legislative workgroup, and is available at: http://www.defenders.org/programs_and_policy/habitat_conservation/private_lands/landowner_incentives/index.php. While these are important for conservation overall, since the first Natural Areas law was passed in Oregon in 1974, voluntary conservation by private landowners has not been an effective method for establishing natural areas.

In Oregon, the majority of natural areas have been established by the Bureau of Land Management and the U.S. Forest Service on federal lands. So, the primary partner in establishing and managing natural areas is the Pacific Northwest Interagency Research Natural Area Committee which works with the federal agencies to establish federal Research Natural Areas (RNAs) on public lands. The Interagency RNA Committee works cooperatively with the Natural Area programs in Oregon and Washington to implement the states' natural area plans.

The process for establishing natural areas is different for the federal, state and private lands in Oregon, and these are described below. Regardless of the owner, for a site to be designated as a natural area in the state, three steps need to be taken:

1. Search databases and literature at the Oregon Biodiversity Information Center, university libraries, herbaria and other information sources, and contact experts in the scientific and professional community to determine if the site contains species or plant associations needing representation.

2. Visit the site to evaluate the size and quality of the elements present.

3. Make a recommendation to the appropriate oversight group that the area be designated.

Oregon State Agency Natural Area Establishment and Designation

Dedication is the primary mechanism for natural area protection on state lands. The Natural Areas Act states that the Transportation Commission, the Fish and Wildlife Commission, the Board of Forestry, the Board of Higher Education, and the State Land Board "…shall, with the advice and assistance of the Council, establish procedures for the dedication of natural areas on land, the title of which is held by the State of Oregon, and which is under that agency's management and control." These established or dedicated sites would be called State Natural Areas.

State agencies can choose to conserve a natural area or dedicate it based on internal staff recommendations, or they can proceed from a recommendation from the Natural Heritage Advisory Council or the Biodiversity Information Center. The Council has adopted model dedication procedures, which are included as Appendix 1 to assist natural resource state agencies in establishing natural areas on their lands. Agencies may wish to further refine these guidelines.

In addition to dedication of state lands, state agencies can either receive gifts of private property or acquire private property to be managed as Natural Areas. The Natural Areas Act clearly states that whenever feasible, areas selected for protection "shall be located on lands which have been allocated primarily to special non-commodity uses." When the State Parks Commission or another state agency acquires property to protect significant natural heritage values, the Natural Area Program Staff can assist in the development or review of a management plan for the area.

Only properties that have elements included in this natural areas plan and are suitable for dedication would be accepted as state natural areas. The expansion of the state system of Natural Areas to include all of the unrepresented elements that occur primarily on state lands is a long-term goal of the Natural Areas program. The dedication of state lands, the donation of properties, and acquisition of privately owned lands may be necessary to meet this goal.

While natural areas that are dedicated on state lands are assumed to be permanently protected, there are procedures that allow for the Natural Area designation to be removed, or "terminated". In order to terminate a dedication according to the currently established rules, the agency must first hold a public hearing. There must be adequate public notice and a finding from the hearing that either: (1) there is an "imperative or unavoidable necessity;" or (2) the dedication of the site is no longer needed according to the guidelines of the Natural Areas Plan. Reasons to remove dedication might be that the natural area elements or plant associations that were the basis for designation are no longer present, or another larger or better quality site has been found which better represents the elements and compelling reasons exist to no longer manage the lesser site as a natural area. To date, no state dedicated natural areas have been terminated.

Federal Agency Natural Area Establishment and Designation

Federal agencies have different protocols for establishing natural areas (Research Natural Areas or RNAs) on their lands. Generally federal agencies identify areas which contain unrepresented plant associations or other elements identified in the Oregon Natural Area Plan. These areas are evaluated by staff, boundaries are proposed, alternatives are examined, and a site and site boundaries are selected through the agency's planning process.

The U.S. Forest Service requires each RNA to be part of formal Forest Management Plans, either through plan revisions or amendments to existing plans. In addition, Establishment Records are created for each RNA. These

records include the justification for establishment, legal boundary descriptions, maps, distinguishing ecological features, environmental analyses, and management issues and guidelines. RNAs become officially established once an Establishment Record is completed and signed by the Region 6 Regional Forester with concurrence by the U.S. Forest Service Pacific Northwest Research Station Director, on behalf of the Chief of the U.S. Forest Service and Secretary of Agriculture.

In Oregon, the Bureau of Land Management (BLM) generally establishes RNAs during updates to their resource management plans (RMPs). The RNA is established when the RMP is approved by the Oregon/Washington BLM State Office. The National Park Service and the U.S. Fish and Wildlife Service follow similar protocols to establish RNAs on their lands.

Natural Area Protection on Private Lands in Oregon

Private individuals or organizations may voluntarily designate all or part of their property as a natural area. Until 2009, to do so the property needed to be first included on the Oregon Register of Natural Heritage Resources; this is no longer a requirement. The register is an official list of areas that contain significant natural heritage resources and/or special species. To include a site on the register, the Natural Heritage Advisory Council and the State Land Board must determine that an area is predominantly natural, or has an example of a plant association or species needing conservation.

For the Council to proceed with the site inclusion on the register, the Council needs the written consent of the owner. A private site can be removed from the register if the Council receives a letter from the property owner indicating they no longer wish it registered or if the elements for which it was registered are no longer present at the site. The Council has developed a summary form for all sites nominated for registry (Appendix 1). After the Council reviews the data, it may then recommend the site for inclusion on the register. The State Land Board will then act on this recommendation.

As of June 30, 2010, the Register of Natural Heritage Resources included 93 sites found on both state and private lands. State agencies may choose to register sites, if they would like recognition of the elements presents, and plan to conserve them. The list of all sites on the register is found in Appendix 2. More information on these sites is available from the Biodiversity Information Center.

If a private landowner of a site on the Registry wishes to pursue dedication, the process follows the same outline for state agency dedications. If a private parcel dedication was approved by the Council and executed with the State Land Board, an Instrument of Dedication is provided to the landowner. The Council will assure that this Instrument of Dedication shall be recorded in the office of the clerk of the county in which the property exists. This Instrument may be highly variable in nature.

Private landowners may terminate the dedication at any time in accordance with the procedures outlined in the dedication agreement. Since participation in Natural Areas conservation is entirely voluntary for the private landowner, incentives for the dedication of lands have been established. Landowners who dedicate their property as a Natural Area can apply for and obtain property tax exemptions. If tax exemptions are obtained, back taxes become due if a dedication is terminated. However, aside from conservation organizations which acquire natural areas as part of their mission, no private landowners have yet chosen to dedicate their private property.

Natural Area Designations Included in the Plan

Designations are how most public and some private landowners determine how their lands will be managed. This section outlines the management designations, the level of protection they provide, and the consistency of their management objectives with the goals of Oregon's Natural Areas Program.

There are agencies and organizations not included in the following list that play a role in the identification and protection of natural areas even though they do not themselves manage lands. The Oregon Watershed Enhancement Board provides funding for watershed groups, as well as for easements and acquisitions, both of which can lead to important protections for species and habitats. Federal agencies such as the U.S. Natural Resources Conservation Service, and their local Soil and Water Conservation Districts have an interest in conservation issues and maintain close contact with the agricultural community. Together, these agencies have a very important role to play in conserving nature in Oregon.

In evaluating the level of protection that various agency management designations provide, this plan has adopted criteria from a national effort to develop a protected areas database, called the PAD-US. The project recognizes three main areas which describe how well sites or designations work at protecting diversity. These standard definitions represent the most comprehensive criteria developed to date.

1. **Management Intent:** The goal or objective of the designation as it relates to the conservation of biodiversity is compatible if not identical with those for managing natural areas. Most sites are designated as 1- conservation focus, 2 conservation compatible, 3 - conservation neutral, and 4 - unknown.-

2. **Permanence:** The length of time the designation is in place. These include permanent, long-term, temporary, and unknown.

3. **Effective Management Potential:** The ability of the land management entity to implement the intent of the designation. These have to do with agencies having the governance structure, the planning framework, and the resources to manage the property to conserve elements defined in their intent. This was created to address “paper parks” from Central and South America, but can be applied to some private, state and even federal natural areas. This criteria has not been applied in this plan, but will completed in the protected areas database by 2011.

State Agency Designations

State Natural Area (SNA)

Purpose: (1) To protect examples of terrestrial and aquatic ecosystems; (2) to serve as gene pool reserves; (3) to serve as benchmarks against which the influences of human activities may be compared; and (4) to provide outdoor laboratories for research and education.

Administering Agencies: Department of State Lands, State Parks and Recreation Department, Department of Forestry, Department of Fish and Wildlife, Military Department and Conservation Organizations.

Management Intent: Natural Area focused

Permanence: Permanent. While state natural areas can be terminated, none have been and they are not likely to be.

Comments: Ten sites have been dedicated on state lands to date and several others are currently under consideration.

National Estuarine Research Reserve (NERR)

Purpose: The NERR System is a network of protected areas established for long-term research, education and stewardship. This partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states protects more than one million acres of estuarine land and water, which provides essential habitat for wildlife, offers educational opportunities for students, teachers and the public, and serves as living laboratories for scientists.

Administering Agency: State Land Board via Department of State Lands, supported by NOAA.

Management Intent: Natural Area focused

Permanence: Permanent

Comments: Variable, portions designated as registered or dedicated natural areas are adequately protected, others are not.

Marine Garden (MG)

Purpose: To provide intertidal areas for enjoyment of or learning about intertidal resources. Marine life in these areas will be protected by prohibiting the taking of shellfish and other marine invertebrates.

Administrative Structure: Marine Gardens are a management designation for rocky shores listed in Rocky Shore Management Strategy of the Oregon Territorial Sea Plan. The Oregon Fish and Wildlife Commission designates Marine Garden sites through regulation. The Department of Fish and Wildlife administers regulations for marine invertebrates, shellfish and finfish pursuant to designation. The most current ODFW designations are described in the 2011 Sport Fishing Regulations document (ODFW, 2010). Oregon Parks and Recreation Department (OPRD) could adopt complementary regulations to protect marine algae for rocky intertidal areas within the Ocean Shore State Recreation Area.

Designation: Secure for seven sites: Otter Rock, Haystack Rock, Cape Perpetua, Yaquina Head, Cape Kiwanda, Yachats, and Harris Beach.

Protection: Fair, not because of regulations but rather from on-site educational and interpretive programs by State Parks or local volunteer organizations that promote stewardship and educate about the regulations. Clear rules are needed to prohibit taking of intertidal marine algae.

Marine Habitat Refuge (HR)

Purpose: To ensure that various representative areas of marine life in Oregon's rocky shores will be managed to protect natural habitat values and to maintain viable populations of marine plants and animals.

Administrative Structure: Marine Habitat Refuges are a management designation for rocky shores listed in Rocky Shore Management Strategy of the Oregon Territorial Sea Plan. The Oregon Fish and Wildlife Commission designates Marine Habitat Refuge sites through regulation of collecting or harvesting marine animal life. The Department of Fish and Wildlife administers regulations pursuant to designation. Oregon Parks and Recreation Department could adopt complementary regulations to protect marine algae for rocky intertidal areas within state park boundaries.

Designation: Secure for Whale Cove.

Protection: Variable, uncertain, due to lack of access control or on-site monitoring for compliance with regulations by either ODFW or OPRD.

Marine Priority Rock and Reef (PRR)

Purpose: To designate offshore rocks, islands, or reefs determined to need study or management action.

Administrative Structure: Ocean Policy Advisory Council of the Ocean Program of the Department of Land Conservation and Development (OPAC).

Management Intent: Natural Areas focused

Permanence: Permanent

Comments: These are inherently protected, there is no management category designated for these sites. However, fishing and collection can occur in these sites under existing laws.

Marine Research Reserve (RR)

Purpose: To protect and manage areas suitable or being used for scientific study or research including baseline study, monitoring, or applied research.

Administrative Structure: Marine Research Reserves are a management designation for rocky shores listed in Rocky Shore Management Strategy of the Oregon Territorial Sea Plan. The Oregon Fish and Wildlife Commission has designated some Marine Research Reserve sites (subtidal and intertidal) through regulation of collecting or harvesting marine animal life. The Department of Fish and Wildlife administers regulations pursuant to designation. Oregon Parks and Recreation Department could adopt complementary regulations to protect intertidal algae within the Ocean Shore State Recreation Area.

Designation: Secure for Boiler Bay Research Reserve, Pirate Cove Research Reserve, Neptune State Park Research Reserve, Gregory Point Subtidal Research Reserve, Cape Arago Research Reserve, Brookings Research Reserve.

Protection: Variable, uncertain, due to lack of access control or on-site monitoring for compliance with regulations by either ODFW or OPRD.

Marine Reserve (MR)

Purpose: To protect areas of Oregon's seas or adjacent rocky intertidal areas from all extractive activities except as necessary for monitoring and research

Administrative Structure: Marine Reserve sites are recommended by the Ocean Policy Advisory Council, approved by the state legislature, and designated by state agencies, including Oregon Department of Fish and Wildlife.

Management Intent: Likely Natural Area compatible; takes an ecosystem approach to conserving marine resources, but still in development.

Designation: Pilot reserves have been established for Red Fish Rocks and Otter Rock.

Permanence: Objectives are to provide lasting protection, but as this is a new designation these details are yet to be worked out

Scenic Waterway (SW)

Purpose: To provide examples of wild and scenic rivers.

Administering Agency: State Parks and Recreation Department and the Department of Water Resources.

Management Intent: Natural Area compatible, but variable, depending on landowner actions, commitment and land management goals.

Permanence: Short term only on private lands; the designation is permanent, but no protection implied on state lands.

Comments: State, federal, municipal, county or private landowners may register lands upon approval of the Natural Heritage Advisory Council. A few areas have been registered to date.

Federal Agency Designations

Area of Critical Environmental Concern (ACEC)

Purpose: An area within the Bureau of Land Management (BLM) public lands where special management attention is required to protect and to prevent irreparable damage to important historic, cultural or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards.

Administering Agency: USDI Bureau of Land Management

Management Intent: Natural Area focused, in general. A few culturally focused ACECs might be characterized as Natural Area compatible.

Permanence: Variable. Previously, this was thought to be a permanent designation. In 2007 the BLM proposed eliminating all forested ACECs in Western Oregon in the recent Western Oregon Plan Revision (WOPR). Though the WOPR was rejected in 2009, future amendments may also change the protection of these designated areas.

Comments: Not all ecosystems and species contained within ACECs are considered adequately protected in this Plan. However, if an individual site has a management plan which protects natural area values, they can be evaluated separately under this designation. BLM RNA's represent a subcategory of an ACEC.

National Natural Landmark (NNL)

Purpose: To encourage the preservation of areas that illustrate the ecological and geological character of the United States, to enhance the educational and scientific values of the areas thus preserved, to strengthen cultural appreciation of natural history, and to foster a wider interest and concern in the conservation of the Natural Landmarks Program's natural heritage.

Administering Structure: USDI National Park Service is responsible for the NNL designation, although the management is dependent on the individual private or public land owner/manager.

Management Intent: Natural Area focused.

Permanence: Temporary. There is no long-term protection for any NNL, although publicly owned sites with this designation are likely to remain protected, given the potential recognition they receive.

Comments: Designation of a National Landmark carries with it no binding restrictions on management or use of the site. It is the equivalent of a national registry program, national recognition of the importance of the site.

National Parks (NP) and National Park Service National Monuments (NM)

Purpose: To preserve the outstanding natural, historical and recreational resources of the United States.

Administering Agency: USDI National Park Service

Management Intent: Natural Area focused.

Permanence: Permanent.

Comments: By and large, all elements within National Parks are considered adequately protected unless they are in an area developed for recreation.

U.S. Forest Service and Bureau of Land Management National Monuments (NM)

Purpose: To preserve the outstanding natural, historical and recreational resources of the US.

Administering Agency: USDI Bureau of Land Management and USDA Forest Service

Management Intent: Variable – either natural area focused or natural area compatible.

Permanence: Permanent.

Comments: Recreation, and occasionally livestock use occur in BLM or USFS National Monuments. As a result, Research Natural Areas will likely be proposed to protect important plant associations present in them.

National Wildlife Refuges (NWR)

Purpose: To provide, preserve, restore, and manage a national network of lands and waters sufficient in size, diversity and location to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife and wild lands is enhanced and made available.

Administering Agency: USDI Fish and Wildlife Service

Management Intent: Variable. Some refuges, and parts of other refuges, are Natural Area focused. Others are Natural Area compatible, and still others are not compatible, with areas farmed or altered to support specific wildlife species.

Permanence: Permanent.

Comments: Establishment of Research Natural Areas with specific management plans within Refuges is considered adequate protection for elements in this plan. There are large areas in wildlife refuges such as Hart Mountain NWR, where the management plan restricts disturbances enough to support long-term research and education. These areas could also support Natural Area conservation.

Outstanding Natural Areas (ONA)

Purpose: An area of unusual natural characteristics where management of recreation activities is necessary to preserve those characteristics.

Administering Agency: USDI Bureau of Land Management

Management Intent: Natural Area compatible

Permanence: Long-term. These are established in local Resource Management Plans, and can be changed, but they rarely have been.

Comments: These are all designated as ACECs as well as ONAs. The designation in the list of ecosystem elements could read ONA/ACEC for these sites.

Research Natural Areas (RNA)

Purpose: (1) To preserve examples of all significant natural ecosystems for comparison with those influenced by man; (2) to provide educational and research areas for ecological and environmental studies; and (3) to preserve gene pools of typical and endangered plants and animals.

Administering Agencies: DOD Army Corps of Engineers, USDA Forest Service, USDI National Park Service, USDI Bureau of Land Management, USDI Fish and Wildlife Service, US Department of Energy.

Management Intent: Natural Area focused.

Permanence: Permanent.

Comments: Federal agencies have different protocols for establishing natural areas (research natural areas or RNAs) on their lands. The Forest Service, U.S. Department of Agriculture requires every RNA to be part of formal Forest Management Plans, either through plan revisions or amendments to existing plans. In addition, an Establishment Record is created for each RNA. These records include the justification for establishment, legal boundary descriptions, maps, distinguishing ecological features, environmental analyses, and management issues and guidelines. RNAs become officially established once an Establishment Record is completed and signed by the Region 6 Regional Forester with

concurrence by the Pacific Northwest Research Station Director, on behalf of the Chief of the Forest Service and Secretary of Agriculture.

In Oregon, the BLM generally establishes RNAs during updates to their resource management plans (RMPs). Sites are identified as containing plant associations or other elements identified in the Natural Areas Plan. These areas are evaluated by staff, boundaries are proposed, alternatives are examined, and a recommended alternative is selected. The RNA is established when the RMP is approved by the Oregon / Washington BLM State Office. The National Park Service and the U.S. Fish and Wildlife Service follow similar protocols to establish RNAs on their lands.

Special Interest Areas (SIA)

Purpose: To protect, and where appropriate, foster public use and enjoyment of areas with scenic, historical, geological, botanical, zoological, paleontological or other special characteristics. To classify areas that possess unusual recreational and scientific values so that these values are available for public study, use or enjoyment.

Administering Agency: USDA Forest Service.

Management Intent: Natural Area focused.

Permanence: Long-term, to potentially permanent. These are established in a Forest Plan, but can be changed in a forest plan update. The existing plans were to be updated each decade, but have been in place for 25 years.

Comments: These areas are managed for recreational use substantially in their natural condition, which may result in variable protection of natural heritage elements. For example, salvage logging may be allowed in SIAs in certain instances. As a result, SIAs are not always considered optimal designations for a natural area.

Wild and Scenic Rivers (WSR)

Purpose: To protect the river's aesthetic, scenic, historic, archaeological and scientific features.

Administering Agencies: Several agencies, especially the U.S. Department of the Interior

Management Intent: Natural Area compatible.

Permanence: Permanent

Comments: Management plans result in varying degrees of protection of elements, based on the special attributes of the area. Salvage logging and grazing are not necessarily excluded from sites with this designation.

Wilderness Areas (WA)

Purpose: Wilderness Areas are devoted to the public purposes of recreational, scenic, scientific, educational, conservation and historical use.

Administering Agencies: USDA Forest Service, USDI Bureau of Land Management

Management Intent: Natural Area compatible or occasionally focused.

Permanence: Permanent

Comments: Certain activities which are not compatible with natural area management are permitted in Wilderness Areas, such as heavy recreational use, domestic livestock grazing, or mining. For this reason, the Natural Areas Program and the Research Natural Area Committee continue to try to designate Research Natural Areas within established Wilderness Areas.

Wilderness Study Areas (WSAs) are areas under study for inclusion in the wilderness system. These are usually managed in ways equivalent to Wilderness Areas. In Oregon, grazing and mining rarely occur in Wilderness Areas, so these areas are sometimes used to protect an ecosystem or species element in the plan.

Local Designations

Metro Natural Areas
Purpose: To protect and enhance habitat for fish, wildlife and water quality. The natural areas emphasize protection of natural area lands now in urban areas or in areas where development is likely to occur.

Administering Agency: Metro Regional Government, City of Portland, other Metro local governments

Management Intent: Natural Area focused.

Permanence: Permanent

Comments: These are generally in urban settings, which while adequately protected, are often influenced by the significant human disturbances surrounding them. As a result, these urban natural areas are rarely used to protect plant associations or species in the plan.

International Designations

Biosphere Reserves
Purpose: To conserve for present and future use the diversity and integrity of biotic communities of plants and animals within natural ecosystems, and to safeguard the genetic diversity of species on which their continuing evolution depends.

Administering Agency: UNESCO, United Nations

Management Intent: Natural Area focused.

Permanence: Permanent

Private Organizations

The Nature Conservancy Preserves (TNC)
Purpose: (1) To protect examples of high priority terrestrial and aquatic ecosystems, and rare plant and animal species; (2) to serve as gene pool reserves; (3) to serve as benchmarks against which the influences of human activities in similar, disturbed ecosystems may be compared; and (4) to provide outdoor laboratories for scientific research and education.

Administering Agency: The Nature Conservancy

Management Intent: Natural Area focused.

Permanence: Permanent

Comments: These areas are privately owned equivalents of Research Natural Areas or State Natural Areas.

The Wetland Conservancy Preserves (TWC)
Purpose: (1) To protect examples of high priority wetlands and aquatic ecosystems.

Administering Agency: The Wetlands Conservancy

Management Intent: Natural Area focused.

Permanence: Permanent

Comments: These areas are privately owned equivalents of Research Natural Areas or State Natural Areas.

CHAPTER 4. MANAGEMENT AND STEWARDSHIP

Vision

An adaptive, intentional, and science-based approach to management results in a natural areas network that is resilient to threats and environmental changes that will take place over time.

Management Goals and Objectives

The ecosystems represented in the natural areas network today are the result of cumulative effects of both natural and anthropogenic influences over millennia. They are not "pristine" in the sense that they have never been influenced by humans, yet they do represent some of the best examples of ecosystems whose present conditions have been primarily formed by non-human ("natural") processes. They are also not static, in that these sites will continue to change over time due to both natural and human influences. Scientific knowledge and perceptions of the natural world will also continue to evolve, as will social trends, public needs, and legislative and regulatory direction.

Thus, long-term management strategies will need to be both adaptable and intentional in responding to these ecological and social changes (Carey 2007). This includes forethought as to how these ecosystems should look and function over the long term (e.g., centuries), as well as consideration for the long-term consequences of management actions taken or not taken today. For some sites, this may mean leaving them to develop with little or no human intervention (e.g., old-growth rainforest). For other sites, there is growing recognition that "hands-off" management can have unintended negative consequences (e.g., long-term fire suppression of dry, interior forest) and restoration activities like prescribed fire or thinning may be needed to shift these sites back onto more natural ecological trajectories.

These restoration efforts might best focus on restoring ecological processes, rather than a desired end-state or ecological stage. This is especially important given little precedent for understanding or managing for rapid environmental change (Callicott 2002, Millar 2008).

At times, management will need to react to immediate threats like catastrophic human-induced fire or invasive species. Intentional, proactive planning for how best to respond for each site could help reduce some of the negative consequences and costs associated with making decisions on the spot, or case by case. For example, lack of a well-communicated fire response plan may lead to suppression activities that result in unnecessary damage to soils, vegetation, and aquatic systems. Likewise, lack of an early-detection plan for invasive species may lead to expensive control options that could have otherwise been avoided had the species been detected early.

Management will also need to address a growing number of environmental threats in the region (Gamon 2007). Of these, climate change may be the most pervasive management challenge – even small changes in climate patterns could affect a wide range of ecological interactions and ecosystem processes and result in local extirpations of rare organisms (Joyce et al. 2008, Kappelle et al. 1999, Millar et al. 2007, Noss 2001). There is currently little scientific basis for how best to manage for climate change

and it will be important to understand and ultimately manage for climate change at a hierarchy of spatial and temporal scales, from individual organisms to global ecosystems (Mustin et al. 2007). A number of different strategies may also be required (Millar 2008). Given its ecological depth and distribution, the natural areas network could serve as an important foundation for studying and developing regional or even global approaches to managing for climate change.

Future management strategies will also need to address appropriate uses of natural areas as human populations continue to increase in the region. This includes better understanding of the impacts of human activities on natural areas. A number of concerns have already arisen over off-road vehicle use, horseback riding, livestock grazing, harvesting wildland products like mushrooms and floral greens, hunting, fishing, and camping. Use is especially of concern for sites that have infrastructures such as trailheads, parking lots, or established camp sites that encourage human use. Misuse of sites may, in part, be the result of lack of knowledge or appreciation for the importance of natural areas. Thus, there is potential to reduce human-use impacts through public outreach, education, and greater on-the-ground presence.

Juniper Hills Preserve © Alan D. St. John

CHAPTER 5. MONITORING AND DATA MANAGEMENT

Vision

Monitoring data are ecologically driven, consistently collected to acceptable scientific standards across the network, stored and maintained properly, and form an integral part of a feedback loop for making and evaluating management decisions.

Monitoring Goals and Objectives

Collecting baseline and monitoring data provides a number of useful benefits for the long-term management of natural areas, including: (1) site-specific data for making management decisions, (2) feedback on the effectiveness of mitigation, restoration, and offsite management activities, (3) inventory of the ecological characteristics of a site, (4) quantified assessment of natural and anthropogenic influences over time, (5) data for refining monitoring and management protocols, and (6) information for long-term scientific study of ecosystems and ecological processes.

A number of monitoring and data management issues will need to be resolved to strengthen the current monitoring program. First, ecological monitoring programs have been inconsistently established across the network (e.g., about 20% of federal sites, 50% of state sites, 75% of The Nature Conservancy sites). For those sites that are not monitored, information about the site is often limited to lists of plant and wildlife species expected to occur on these sites rather than actual inventories.

Second, where monitoring data have been collected, problems can range from different protocols being used across sites, divergence of protocols over time, lack of connection between data being collected and site management objectives, and irregular monitoring schedules once initial data has been collected. A long-term monitoring program with shared monitoring goals, diverse but consistent protocols to meet both site-specific and cross-site objectives, and regular monitoring schedules can increase sampling power, strengthen statistical inferences within and across sites, and ultimately provide empirical support for management actions both within and around natural areas.

Third, current monitoring data are primarily focused on vegetation and related composition. Opportunities exist for expanding monitoring programs to (1) capture a fuller gradient of multi-dimensional structural measures that evaluate broader ecological processes, and (2) include a wider range of indicators that can measure ecological health and function over time due to environmental change, including microclimate, assessments of key wildlife communities, nutrient cycling, soils, and carbon flux. This might also include measures that can evaluate changes in ecological processes rather than simply changes in the spatial distribution or abundance of select species or taxonomic groups (e.g., McIntire and Fajardo 2009). It could also include measuring changes to trophic hierarchies over time as we have little knowledge about where environmental change will have the greatest effects, or where it will have the first effects (e.g., at the top or bottom of a food chain; Wagner and Adrian 2009).

Fourth, many of the strategies outlined here will result in increased use of natural areas. The risk in promoting use is that it could affect the

environmental integrity of some sites, especially those that are sensitive to foot traffic, or sites that have established infrastructures that might already promote heavy use (e.g., parking areas, trails). Therefore, some form of monitoring focused on human-use effects may be needed to help preempt any long-term negative consequences that promoting additional use may have for some sites.

Finally, a cursory inquiry into data management strategies across agencies suggest that data for natural areas are not always handled in ways that ensure their long-term protection and use. Many datasets reside in unsecured boxes, have never been entered into an electronic database, or have no associated metadata to provide the necessary context for the data. Long-term data management requires a program that extends beyond the employment of individual administrators, can resurrect historic data, provides access to data to the broader community, reduces time and effort spent searching for data, and allows for data to be used to address broad scale questions (Michener and Brunt 2000)

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Oak savanna sampling in the Willamette Valley (ORBIC staff)

CHAPTER 6. RESEARCH

Vision

The depth of research conducted throughout the natural areas network contributes to the understanding and resolution of important scientific, social and economic issues across a range of spatial and temporal scales.

Research Goals and Objectives

A primary purpose for natural areas is to allow study of ecological processes that can improve our understanding of the natural world. Many of the issues facing conservation, such as climate change and invasive species, will require refinement of ecological theory and better understanding of ecological processes. Research on natural areas may be one of the best ways to gain this knowledge, especially given that they represent some of the most intact ecosystems left on the landscape.

A number of important research findings have been based on data collected from natural areas in the past, including studies of old-growth forest that helped lead to the Northwest Forest Plan, the set of documents that has guided management activities on federal lands since 1994 (USDA and USDI 1994). However, many natural areas have received little research attention (Greene et al. 1986). Reasons for lack of use are varied, including relative remoteness of sites from other research sites or centers of research, lack of site replication, some sites representing ecosystems not under current scientific scrutiny, and recent establishment for a number of sites. The lack of use has also been the result of unfamiliarity of researchers with the benefits of using natural areas and misconceptions over the types of research allowed on natural areas.

Agencies have also differed in the degree to which they have actively encouraged or promoted research on natural areas. These reasons for lack of use suggest there is opportunity to better promote natural areas for research, both internally (within the home agency or organization) and externally to research clients.

There are a number of characteristics unique to the natural areas that make them attractive as study sites, especially for understanding ecological processes and effects of climate change:

1. They are geographically well-distributed throughout the region, representing almost the entire gradient of natural biophysical environments found in the Pacific Northwest. This includes gradients in soils, moisture, temperature, elevations, latitudes, and other biotic and abiotic conditions;

2. They contain sites representing environmental extremes, including rare ecosystems that might be the most sensitive to change over time;

3. The biological diversity contained within natural areas allows for study at all hierarchical levels, from genes to individual organisms to complete communities and systems;

4. As relatively pristine sites, natural areas can be used as controls for nearby field experiments as well as benchmarks for measuring the efficacy of management activities (Julius and West 2008, Joyce et al. 2008); and

5. Most natural areas are permanently protected, allowing for long-term study. A network strategy for climate change research could include everything from collecting climatological data at remote sensing stations to periodic field surveys of climate-sensitive organisms at permanent sampling plots using standardized protocols.

Natural areas can also be promoted as satellite study sites in association with other major ecological networks and programs, including U.S. Forest Service experimental forests and ranges, wilderness areas, and national scenic rivers, Department of Interior national parks and US Geological Survey Hydrologic Benchmark Network program, United Nations Biosphere Reserves, the Long-Term Ecological Research (LTER) Network, the National Ecological Observatory Network (NEON), Long-Term Ecosystem Productivity forestry research network, and the National Atmospheric Deposition and National Acid Precipitation Assessment Programs.

As with management and monitoring, research use of natural areas can be enhanced through dedicated funding, either as a regular component of annual agency budgets, or through funding of special projects. For example, seed grants to graduate students could help promote collaborative research with academic institutions. Increased support for research can also be generated by better communication of research studies and their results. This includes better documentation for past and ongoing research projects, encouraging cradle-to-grave research projects to ensure that results are published, and communicating results in different ways to meet the needs of diverse audiences that have an interest in resource management.

Finally, using natural areas to build stronger ties between research and management can help strengthen the importance and relevance of research on natural areas. For example, a number of restoration projects, including woody fuels reduction, prescribed fire, and invasive species control are being proposed for natural areas. However, there is little information available on the site-specific efficacy of these tools, including how they might affect future ecological processes. Close coordination between research and management in designing studies that evaluate these restoration efforts could provide important feedback that results in better management in and around natural areas, and greater appreciation for the importance of research on these sites.

Lower Table Rock vernal pool by John Christy

CHAPTER 7. EDUCATION AND COMMUNICATION

Vision

Education and communication activities connect people with nature, promote understanding of ecology and conservation, increase volunteerism, and strengthen agency and public support for the natural areas network.

Education and Communication Goals and Objectives

Part of a strong interagency network includes effective education, communication and outreach programs. Regional natural areas have been available as outdoor educational laboratories since their inception. Overall use of natural areas as sites for educational activities, however, has been relatively low.

Most natural area educational programs to date have focused on educating college-level and higher students, professional societies, and special-interest groups. There is opportunity to expand the scope of educational activities to include a focus on younger (e.g. K-12) students. Recent social trends in the United States suggest that youth may no longer be getting sufficient exposure to the outdoors and encounters with nature can help reduce aggression, calm anxiety, and develop a healthy sense of self and place (Pilz et al. 2006). A number of agencies have recently added youth education as a top emphasis area (e.g. Kimbell 2009). Engaging youth can also help promote a future adult population that is environmentally literate and appreciates the importance of natural areas and wildlands (USFS 2009b).

Opportunities also exist for expanding the scope of disciplines associated with the use of natural areas beyond traditional science-based fields. For example, individuals from the arts and humanities are increasingly using wildlands as settings for their nature writing, painting, or other forms of artistic expression (Sitka Center for Art and Ecology 2009). Fostering such use on natural areas can help build a constituency that appreciates and supports natural areas.

Support can also be fostered within local communities near natural areas by developing volunteer and citizen science programs to assist with research, monitoring, site surveillance, restoration projects, and community outreach (Lowman et al. 2009, Yung 2007). Many of the strategic actions presented here can be supported, in part, through the use of volunteers. Volunteers are not free in terms of the amount of staff time needed for recruitment, training and oversight. However, the benefits of incorporating their efforts can often outweigh these costs and offers an alternative to accomplishing tasks, especially when budgets are limited. A number of partners, supporters, and target groups could be considered.

There is also need for increasing the understanding and appreciation of natural areas within the agencies that manage them. There are still a number of misconceptions about natural areas—for example, that natural areas are small, unique pieces of land set aside solely to protect an unusual ecosystem. In part, these misconceptions have arisen because information about natural areas is often site-specific (establishment of a single site, result from a single study). These misperceptions also result when the importance of natural areas is not being effectively translated from the field

(where most natural area information is generated) in ways that resonate with upper-level management. Therefore, strategic actions include those that can frame information in ways that show network-level strength and that can be directly tied to the support of agency missions. These could include:

1. Cost-savings associated with managing natural areas as a network across sites and agencies;

2. Important findings from natural areas that increased knowledge for making sound management decisions;

3. The strength of connections with other agencies, partners and organizations that resulted from participating in the natural areas network;

4. Increased public support of management activities as a result of natural areas management or research;

5. The importance of natural areas for providing high-quality sites for research; and

6. The broad biodiversity and conservation goals met by the natural area network

Green cottonwood riparian woodland at Cottonwood Creek RNA in the Pueblo Mountains by E. Crowe

CHAPTER 8. ECOREGIONAL LISTS AND DEFINITIONS

Introduction

The lists of natural heritage elements found in the nine Oregon ecoregions describe the diversity of the different ecoregions, and show how successful Oregon has been at assuring these elements are represented in natural areas. Figure 2 on page 6 identifies the nine Ecoregions used in this plan as well as the nine ecoregional chapters that follow. More information on the ecology or geology of these regions and more detailed maps are available in the Oregon Ecoregions EPA poster (Thorson et al. 2003). The Marine – Estuarine Ecoregion is new, and represents the only one for which the council developed the boundary, which roughly follows the continental shelf.

Status Summary

The lists of natural heritage elements found in the nine Oregon ecoregions describe the natural areas available for research, the ecosystems and species in each Ecoregion, and the types of places that need to be set aside for natural areas. They describe the diversity of the different ecoregions, and show how successful Oregon has been at assuring these elements are represented in natural areas.

These lists have been significantly updated for this edition of the plan. The Council hopes that agencies and the public will use these lists in making decisions related to conservation. The Council, the Oregon Biodiversity Center Staff, and the Pacific Northwest Research Natural Area Committee also hope to continue getting feedback to improve the accuracy of the information included in these lists.

For each update of the Plan, the council presents a report to the State Land Board outlining changes in the plan, and a comparison of the number of ecosystem and geologic types listed. The differences in protection for ecosystem types between the 1998, 2003 and 2010 plans are illustrated in Table 1. The main difference is that the number of ecosystem types decreased in 2003 with the elimination of the aquatic ecosystem types, and again in 2010 due to the elimination of ecosystem process elements. The reduction of protected ecosystem elements from 2003 to 2010 all occur due to the former Coast Range, Marine and Estuarine types being moved and reclassified into two separate ecoregions. Stream and river ecosystem elements will be added back when a system to classify them is developed.

Plan	Types	Protected	Unfilled
1998	804	252	617
2003	750	416	334
Change 98-03	-54	+164	-283
2010	722	400	322
Change 03-10	-28	-16	-12

Table 1. Ecosystem types 1998-2010.

Figure 3 shows the number of established natural areas included in each of the Natural Heritage Plans and the current Natural Areas Plan. The number of established areas increased rapidly in the 1980s and early 1990s when initial efforts to identify and dedicate sites in the National Forest Plans and BLM Resource Management Plans took effect. The rate of new natural area designations has declined since 2003.

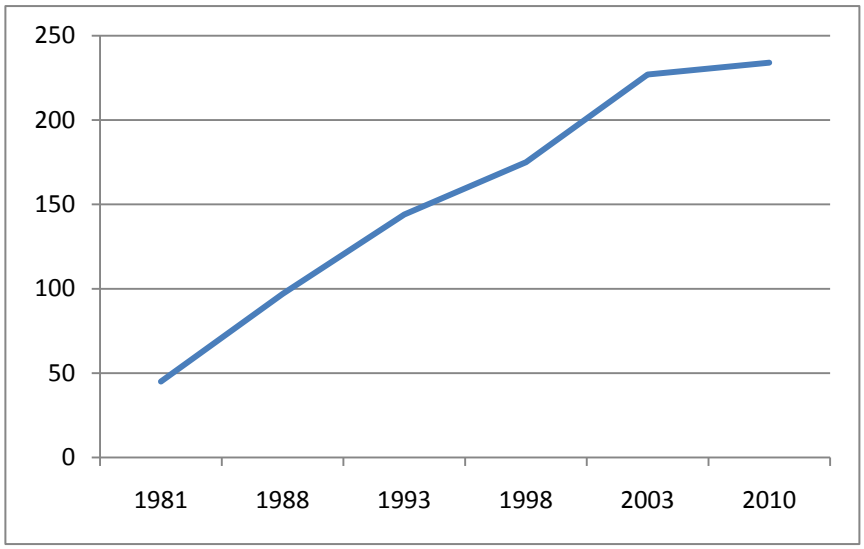

Figure 3. Numbers of Established Natural Areas in Oregon

Overall, the percentage of unrepresented (or unfilled) types has remained the same at 44.5%, with the declines due to the loss of some western Oregon Areas of Environmental Concern counteracting the newly designated natural areas. Significant work remains to fill these types. The majority of unfilled ecosystem types are the riparian forests, woodlands and wetlands from eastern Oregon, and low elevation conifer forests in western Oregon. These types are the most difficult to find suitable examples for natural area designation because they have become fairly rare. Figure 4 shows how well ecosystem elements, geologic elements and species are protected within each of the ecoregions in this 2010 edition of the plan.

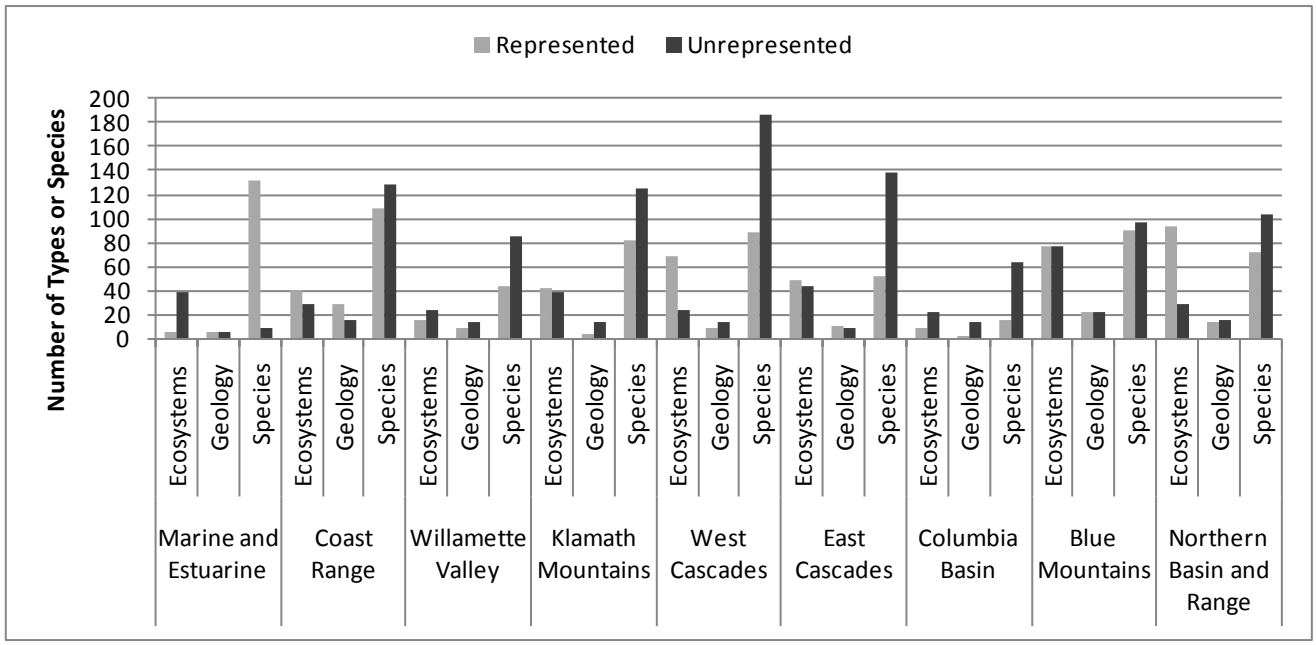

Figure 4. Numbers of Protected and Unprotected Types by Ecoregion

Using Natural Heritage Resource Lists

The Natural Heritage Act specifies that: "In selecting conservation areas, the inclusion of natural heritage resources, and especially those that are not adequately protected elsewhere, shall be given primary consideration". It is hoped that all state and federal agencies and the Interagency Research Natural Area Committee will continue to use these lists to guide in their selection of potential Research Natural Areas.

The next nine chapters in the plan include brief ecoregional descriptions followed by the lists of ecosystem elements. The descriptions are only included to provide the general ecological and social context of each ecoregion. Chapters include the ecosystem types first, with the terrestrial types organized by vegetation zone, followed by the wetland types. The Oregon Biodiversity Information Center and NatureServe are continuing to work on updating the aquatic and marine classifications and these are likely to continue to be modified in future editions of the plan.

Ecosystem types are then followed by the list of geology formations and features, which were revised in 2003, and are little changed since then. Within each ecoregion, the geology elements are organized by the standard intervals of geological time, from the oldest (Devonian, about 320 million years ago) to the newest (the Quaternary, including the present).

Finally, the ecoregional chapters contain the list of special species elements. The special species are organized by major taxonomic group, with the invertebrates listed first, followed by the vertebrates broken up by class, then the vascular plants, the nonvascular plants, and lastly the lichens and fungi. Species are listed alphabetically by scientific name within each group.

The complete list of established natural areas in Oregon is included with a map in Chapter 11, as are the total list of sites names included in the plan. The Oregon Biodiversity Information Center also maintains a GIS cover showing all the conservation lands in Oregon. This Land Management and Stewardship coverage is available at the Oregon Geospatial Data Clearinghouse, and is also included in the Protected Areas Database of the United States (PAD-US), available from the U.S.G.S. on the National Map.

How the Lists are Organized

Different TEXT COLOR IN GRAY and BLACK are used in all of the lists of ecological, geological and species elements to distinguish elements that are already protected from those needing designations. Those that are unrepresented are highlighted in black. Ecosystem elements in gray are those with designations and management that adequately protects them in the ecoregion. This is not necessarily the case for species elements. Determining if a species is viable at these sites is more difficult. As a result, listing in the plan in black only means the species is currently known to be represented at the natural area(s) listed.

The lists for each of the ecoregions are organized as a series of tables for the different element types (ecological, geological, and species). Each table has four columns. The column headings and definitions are listed below.

Agency – The agency or agencies managing lands most likely to contain examples of this type. These agencies should be working to find and designate an example of this ecosystem or geologic type or

species in this ecoregion. Current agency lists are maintained on file at the Oregon Biodiversity Information Center.

Priority – Priorities for elements listed were determined using principles detailed in Part 1 of the plan. These priorities are subject to continual update as elements become rarer, more threatened, or more secure. Current priorities, determined by the Natural Heritage Advisory Council, are maintained at the Oregon Biodiversity Information Center. Determination of adequacy of representation within a proposed area is made by the Natural Heritage Advisory Council, in cooperation with the Federal Research Natural Area Committee. Due to continual status updates, elements added to the "adequately represented" category will be maintained at the Oregon Biodiversity Information Center.

Ecosystem Type Name – These names are intended to be succinct descriptors for discrete, but often difficult-to-describe, components of the resource spectrum. As such, the name should be considered only a flag. Detailed descriptions of all elements are available at the Oregon Biodiversity Information Center. Most terrestrial and wetland ecosystem elements are plant communities. Detailed descriptions of the terrestrial and wetland plant community elements, called Community Characterization Abstracts, are being prepared, starting with the rarest types. Abstracts include information on the species present, soil, geomorphology, range and distribution of the communities, as well as references in the scientific literature relating to them. These materials are maintained on file at the Oregon Biodiversity Information Center.

Present Representation – This column contains names of established, proposed and recommended natural areas that contain examples of the ecosystem type. Specific formatting and codes are used in this column. These include:

< = The element is present at this protected site, but only in small patches which provide only partial representation of the ecosystem type. If < is not present, the area is assumed to adequately represent the element. In this plan, these have only been used for ecosystem elements, not for geologic elements or species.

ITALICS = Areas listed in italics have been recommended by agency ecologists or Heritage staff as having excellent examples of the type, but have no formal designations.

Elements that have been lost or extirpated in the ecoregions are labeled as such. Those known or suspected to be gone are differentiated as “Probably extirpated”, “Extirpated” or “Extinct”. For those elements considered extirpated or extinct, no agency is designated to seek representation. However, if an example of any of these extirpated types was to be located, it would immediately become a high priority for protection. Sites recommended are those high quality sites currently known. Any site meeting the quality and size criteria for the element would be suitable for designation.

The lists will be updated with each revision of the Oregon Natural Heritage Plan, at five-year intervals. A list of all established natural areas and a map are included in Chapter 11. The current status of all elements and natural areas will be maintained on file at the Oregon Biodiversity Information Center.

Table 2. Codes and abbreviations used in the Natural Heritage Resource lists

Priority for Ecological and Geologic Elements	Code
High	H
Moderate	M
Low	L
Unknown	U
Protected adequately at the listed site or sites	*
Adequately protected at the listed site or sites once final designation is completed	+
Only partially protected due to designation, size, or quality at this site	<
Priority for Species	
Species threatened or endangered throughout their range (ORBIC List 1)	1
Species threatened or endangered in Oregon, but more common elsewhere (List 2)	2
Species presumed extirpated throughout its range	1-X
Species presumed extirpated in Oregon, but persists elsewhere	2-x
Marine special species selected by the Natural Heritage Advisory Council	S
Species included because of their federal or state Endangered Species Act status	ESA
Species protected under the Marine Mammals Protection Act	MMPA
Potential Acting Agency	
Private Lands	PVT
Oregon Department of Forestry	ODF
Oregon Department of Transportation	DOT
Oregon Department of State Lands	DSL
Oregon Department of Fish and Wildlife	OFW
Oregon Parks and Recreation Department	PRD
Ocean Policy Advisory Council	OPAC
Army Corps of Engineers	ACE
Bureau of Land Management	BLM
Department of Defense	DOD
National Park Service	NPS
U.S. Fish & Wildlife Service	FWS
U.S. Forest Service	FS
Present Representation (Terrestrial)	
Area of Critical Environmental Concern (BLM designation only)	ACEC
Federal Research Natural Area (Federal Agencies)	RNA
State Natural Area (formerly Natural Heritage Conservation Area)	SNA
Proposed designation (for the three agency designations above)	P....
National Monument (Federal Agencies)	NM
National Recreation Area	NRA
National Wildlife Refuge (U.S. Fish and Wildlife Service)	NWR
The Nature Conservancy Preserve	TNC
Wilderness Area (Federal Agencies)	WA
Wilderness Study Area (Federal Agencies, primarily BLM)	WSA
Wild and Scenic River (Federal Agencies)	WSR

Present Representation (Terrestrial continued)

Wildlife Management Area	WMA
Special Interest Area	SIA

Present Representation (Marine and Estuarine)

Marine Garden	MG
Priority Rock and Reef	PRR
Research Reserve	RR
Marine Reserve	MR
Marine Habitat Refuge	HR
National Estuarine Research Reserve	NERR

Other

Sites recommended as best example of type (site name in italics)	*Italics*

Tufted puffin by Roy Lowe

CHAPTER 9. MARINE AND ESTUARINE ECOREGION

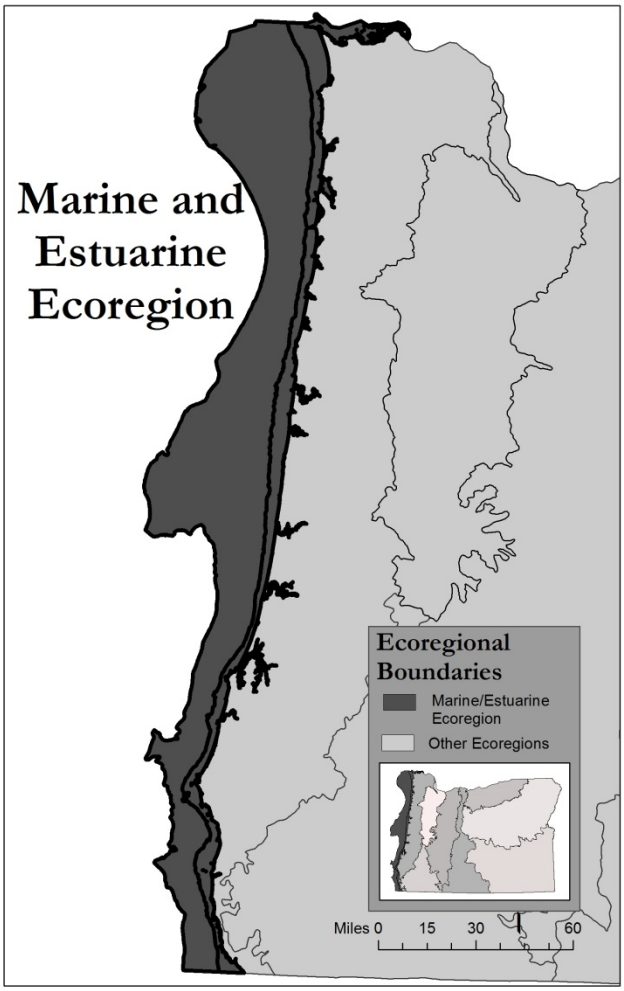

Figure 5. Map of the Oregon Marine and Estuarine Ecoregion.

The Marine and Estuarine Ecoregion includes all of Oregon's intertidal, marine and estuarine ecosystem and geologic resources, as well as all the marine and estuarine species. The classification of marine and estuarine types is a first approximation to implement a new national ecological classification created by the National Oceanic and Atmospheric Administration (NOAA) and NatureServe, based on the online Version III draft (FGDC 2010).

Protected examples of these resources are currently not well represented in Oregon's system of natural areas, and this is the first plan in which this Ecoregion is separated from the Coast Range. The publication of the *Territorial Sea Plan* (Oregon Ocean Policy Advisory Council, 1994) and current work to establish marine reserves in Oregon has created an excellent opportunity to better protect Oregon's marine and intertidal resources. Designations such as Marine Reserves, Marine Protected Areas, Marine Gardens, Habitat Refuge, Research Reserve, Seabird Protection Areas, Marine Shore, and Priority Rock and Reef have been applied to many of Oregon's most significant biological and ecological marine resources.

In this plan, we have made an effort to match existing natural area needs to these designations. However, more inventories are needed to define the ecological resources of the Oregon Estuarine and Marine ecoregion and to establish the designations necessary to ensure that they will be available for research and education. Because this is the first attempt to define natural area needs for the marine and estuarine areas in Oregon, and because the state is working hard to establish a set of marine reserves, this chapter can only represent a first iteration, which we anticipate changing significantly in the future. The council and the Oregon Biodiversity Information Center would appreciate comments, ideas for updates, and any information that might help improve the lists that follow.

In establishing our Geologic types, we also worked to match existing geologic maps to newly defined geological natural area needs. However, more detailed mapping is needed to comprehensively define the geologic resources of the Marine and Estuarine Ecoregion, particularly the subtidal/offshore area where only the broadest types have been mapped. Progress is being made in this area, and once this is done, there will be a solid basis for identifying and protecting the resources.

Figure 6 shows the numbers of ecosystem and geologic types represented and not represented in the network of established natural areas in this ecoregion. It also shows the special species representation.

The selection of special species also represented a challenge in this Ecoregion, since these species are not tracked or monitored in the same way the terrestrial species are in the other Ecoregions.

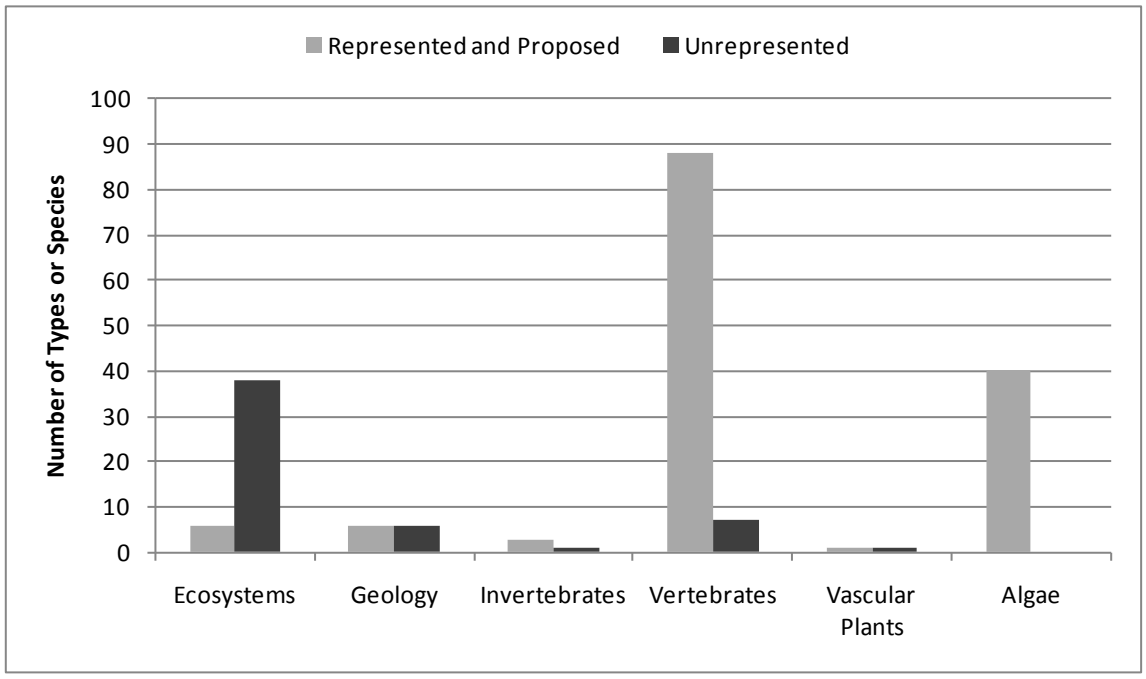

Figure 6. Represented and Unrepresented Ecosystem Elements and Species for the Marine and Estuarine Ecoregion.

MARINE AND ESTUARINE ECOSYSTEM ELEMENTS (ME)

Agency	Priority		Ecosystem Name	Present Representation
			Marine	
DSL	U	1.	Subtidal, high-relief rock bottom with *Nereocystis* kelp bed with little or no algal sub-canopy.	*Orford Reef RR* *Cape Foulweather*
	+	2.	Subtidal, high-relief rock bottom with Macrocystis kelp bed with little or no algal sub-canopy.	Cape Arago PMR Simpson Reef PRR/HR
	*	3.	Subtidal, high-relief rock bottom with dense algal sub-canopy under kelp bed.	Redfish Rocks MR
DSL, PRD	U	4.	Subtidal, high-relief, unvegetated rock bottom.	
	*	5.	Subtidal, low-relief rock bottom with Nereocystis kelp bed and possibly Macrocystis kelp bed.	Pirate Cove RR
DSL, PRD	U	6.	Subtidal, low-relief rock bottom with dense algal sub-canopy under kelp.	*Nellies Cover HR*
	*	7.	Subtidal, low-relief, unvegetated rock bottom.	Pirate Cove RR
	*	8.	Subtidal, high-energy sandy bottom.	Netarts Sand Spit SNA
DSL, PRD	U	9.	Subtidal low-energy sandy bottom.	
DSL	U	10.	Subtidal mud bottom.	
	*	11.	Subtidal gravel bottom.	Orford Reef PRR
	*	12.	Subtidal hard bottoms with reef building animals.	Norton Gulch (Gregory Point RR)
DSL	U	13.	Subtidal, aphotic zone with boulder or bedrock.	
DSL	U	14.	Subtidal, aphotic zone with shale or shingle.	
DSL	U	15.	Subtidal, aphotic zone sandy bottom.	
	*	16.	Intertidal, exposed bedrock, mussel beds.	Yachats MG Boiler Bay RR
	+	17.	Intertidal, exposed bedrock, algal dominated.	North Cove - Cape Arago RR Cape Arago PMR
	*	18.	Intertidal, exposed bedrock, mussel beds.	Yachats MG Boiler Bay RR
	*	19.	Intertidal, exposed bedrock, surfgrass beds.	Otter Crest MG Boiler Bay RR
DSL, PRD	U	20.	Intertidal, exposed bedrock, surge channels.	
DSL, PRD	U	21.	Intertidal, exposed bedrock/boulders subject to sand scour and periodic sand inundation.	*Ecola Point* *Seal Rock*
DSL, PRD	U	22.	Intertidal, exposed boulder field, algal dominated.	*Cape Lookout*

Agency	Priority		Ecosystem Name	Present Representation
	*	23.	Intertidal, exposed boulder field, not algal dominated.	Redfish Rocks MR
DSL, PRD	U	24.	Intertidal, semi-protected, bedrock, surfgrass beds.	
DSL, PRD	U	25.	Intertidal, semi-protected, bedrock, bedrock shelf.	*Chetco Cove*
	+	26.	Intertidal, semi-protected, boulder field.	Cape Arago PMR
DSL, PRD	U	27.	Intertidal sandy/gravelly beach.	
	*	28.	Intertidal, low exposure sandy beach.	Netarts Sand Spit SNA
DSL, PRD	U	29.	Intertidal, high exposure sandy beach.	
DSL, PRD	U	30.	Highly erosive seacliffs.	Cape Kiwanda MG *Seal Rock*
	*	31.	Erosion resistant seacliffs, with caves if possible.	Cascade Head PMR Cape Lookout SNA
DSL, FWS	U	32.	Offshore rocks, awash at high tide.	*Rogue Reef* *Simpson Reef*
DSL, FWS	U	33.	Offshore rocks, not awash at high tide, with soil and vegetation.	*Goat Island* Three Arch Rocks NWR
DSL, FWS	U	34.	Offshore rocks, not awash, unvegetated.	*Pillar Rock (Cape Meares)*
			Estuarine	
DSL	U	35.	Unvegetated, fine sediment (mud to sand) in subtidal zone.	
DSL	U	36.	Eelgrass beds, on fine (mud to sand) unconsolidated substrata in subtidal zone.	
	+	37.	Unvegetated muds in intertidal zone, including *Abarenicola* in lower or middle estuary.	South Slough PSNA
	+	38.	Unvegetated muddy sands in intertidal zone, including *Mya arenia* in upper estuary.	South Slough PSNA
DSL	U	39.	Unvegetated sands in intertidal zone, including *Callinassa californionis* in lower or middle estuary.	
DSL	U	40.	Intertidal, lower estuary, vegetated and unvegetated rocky surfaces, including macroalgal beds (*Enteromorpha, Ulva, Fucus, Polysiphonia,* and *Sargassum*).	
	+	41.	Intertidal, lower estuary, vegetated fine, unconsolidated substrata, including eelgrass beds and macroalgal mats (*Enteromorpha, Ulva, Vaucheria,* and *Gracilaria*).	South Slough PSNA
	*	42.	Low elevation/high salinity intertidal marsh on sand (dominants including Lyngby sedge, saltgrass, glasswort, three-square bulrush, seacoast bulrush and arrow grass).	Netarts Sand Spit SNA

Agency	Priority	Ecosystem Name	Present Representation
	*	43. Low elevation/high salinity intertidal marsh on silt (dominants including Lyngby sedge, saltgrass, glasswort, three-square bulrush, seacoast bulrush and arrow grass).	Cox Island (TNC) Bull Island SNA Smith Island SNA
	*	44. High elevation/low salinity intertidal salt marsh (dominants including Douglas aster, Lyngby sedge, tufted hairgrass and silverweed).	South Slough PSNA Davis Slough SNA Smith Island SNA

MARINE AND ESTUARINE GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
		Holocene	
*	1.	Estuary	South Slough PSNA
*	2.	Estuarine Island	Lewis and Clark NWR
*	3.	Sea Arch	Oregon Islands NWR
*	4.	Sea Cave	Cascade Head (TNC) Cape Lookout SNA
*	5.	Sea Stack	Harris Beach State Park Oregon Islands NWR
+	6.	Rock Reefs	Orford Reef Siletz Reef
*	7.	Nearshore	
*	8.	Shelf	
*	9.	Slope	
*	10.	Channel	
*	11.	Ridge	
+	12.	Gully	
*	13.	Canyon Wall	
+	12.	Canyon Floor	

MARINE AND ESTUARINE SPECIAL SPECIES (ME)

	Scientific Name	Common Name	List	Present Representation	Agency
	Invertebrates				
1	*Algamorda newcombiana*	Newcomb's littorine snail	1		DSL
2	*Haliotis kamtschatkana*	Pinto abalone	S		
3	*Littorina subrotunda*	Newcomb's littorine snail	2	North Spit ACEC	BLM
4	*Saldula villosa*	Hairy shore bug	2		
	Fish				
5	*Acipenser medirostris*	Green sturgeon	ESA		
6	*Acipenser transmontanus*	White sturgeon	S		
7	*Cetorhinus maximus*	Basking shark	S		
8	*Eopsetta jordani*	Petrale sole	S		
9	*Hemilepidotus hemilepidotus*	Red Irish lord	S		
10	*Lampetra ayresii*	River lamprey	S		
11	*Lampetra tridentata*	Pacific lamprey	S		
12	*Oncorhynchus clarkii pop. 1*	Coastal cutthroat trout (Oregon Coast ESU)	S		
13	*Oncorhynchus clarkii pop. 2*	Coastal cutthroat trout (Southwestern Washington/Columbia River ESU)	1		
14	*Oncorhynchus clarkii pop. 4*	Coastal cutthroat trout (Upper Willamette River ESU)	S		
15	*Oncorhynchus clarkii pop. 5*	Coastal cutthroat trout (Southern Oregon/California Coasts ESU)	S		
16	*Oncorhynchus keta pop. 3*	Chum salmon (Columbia River ESU)	1		
17	*Oncorhynchus keta pop. 4*	Chum salmon (Pacific Coast ESU)	2		
18	*Oncorhynchus kisutch pop. 1*	Coho salmon (Lower Columbia River ESU)	1		
19	*Oncorhynchus kisutch pop. 2*	Coho salmon (Southern Oregon/Northern California Coasts ESU)	1	Grassy Knob Wilderness Area	FWS
20	*Oncorhynchus kisutch pop. 3*	Coho salmon (Oregon coast ESU)	1	South Slough NERR, Cascade Head (TNC), Jewell Meadows WMA, Sunset Bay State Park	TNC, OFW, PRD
21	*Oncorhynchus mykiss pop. 13*	Steelhead (Snake River Basin ESU)	1		
22	*Oncorhynchus mykiss pop. 24*	Steelhead (Klamath Mountains Province ESU, summer run)	2		

MARINE AND ESTUARINE SPECIAL SPECIES (ME)

	Scientific Name	Common Name	List	Present Representation	Agency
23	*Oncorhynchus mykiss pop. 25*	Steelhead (Klamath Mountains Province ESU, winter run)	2		
24	*Oncorhynchus mykiss pop. 26*	Steelhead (Lower Columbia River ESU, summer run)	1		
25	*Oncorhynchus mykiss pop. 27*	Steelhead (Lower Columbia River ESU, winter run)	1		
26	*Oncorhynchus mykiss pop. 28*	Steelhead (Middle Columbia River ESU, summer run)	1		
27	*Oncorhynchus mykiss pop. 29*	Steelhead (Middle Columbia River ESU, winter run)	1		
28	*Oncorhynchus mykiss pop. 30*	Steelhead (Oregon Coast ESU, summer run)	1		
29	*Oncorhynchus mykiss pop. 31*	Steelhead (Oregon coast winter run)	1	South Slough NERR, Cascade Head (TNC), Jewell Meadows WMA	TNC, OFW
30	*Oncorhynchus mykiss pop. 33*	Steelhead (Upper Willamette River ESU, winter run)	1		
31	*Oncorhynchus mykiss pop. 35*	Steelhead (Southwest Washington ESU, winter run)	2		
32	*Oncorhynchus mykiss pop. 41*	Steelhead (Upper Klamath Lake ESU, summer run)	1-ex		
33	*Oncorhynchus nerka pop. 1*	Sockeye salmon (Snake River ESU)	1-ex		
34	*Oncorhynchus tshawytscha pop. 12*	Chinook salmon (Upper Columbia River ESU, spring run)	1		
35	*Oncorhynchus tshawytscha pop. 18*	Chinook salmon (Deschutes River ESU, summer/fall run)	1		
36	*Oncorhynchus tshawytscha pop. 19*	Chinook salmon (Middle Columbia River ESU, spring run)	S		
37	*Oncorhynchus tshawytscha pop. 2*	Chinook salmon (Snake River ESU, fall run)	1		
38	*Oncorhynchus tshawytscha pop. 20*	Chinook salmon (Middle Columbia River ESU, fall run)	S		
39	*Oncorhynchus tshawytscha pop. 21*	Chinook salmon (Lower Columbia River ESU, spring run)	1		
40	*Oncorhynchus tshawytscha pop. 22*	Chinook salmon (Lower Columbia River ESU, fall run)	1		

MARINE AND ESTUARINE SPECIAL SPECIES (ME)

	Scientific Name	Common Name	List	Present Representation	Agency
41	*Oncorhynchus tshawytscha pop. 23*	Chinook salmon (Upper Willamette River ESU, spring run)	1		
42	*Oncorhynchus tshawytscha pop. 25*	Chinook salmon (Southern Oregon/Northern California Coast ESU, spring run)	S		
43	*Oncorhynchus tshawytscha pop. 26*	Chinook salmon (Southern Oregon/Northern California Coast ESU, fall run)	2		
44	*Oncorhynchus tshawytscha pop. 27*	Chinook salmon (Oregon Coast ESU, spring run)	S		
45	*Oncorhynchus tshawytscha pop. 8*	Chinook salmon (Snake River ESU, spring/summer run)	1		
46	*Platichthys stellatus*	Starry flounder	S		
47	*Raja binoculata*	Big skate	S		
48	*Raja rhina*	Longnose skate	S		
49	*Scorpaenichthys marmoratus*	Cabezon	S		
50	*Sebastes alutus*	Pacific Ocean perch	S		
51	*Sebastes caurinus*	Copper rockfish	S		
52	*Sebastes crameri*	Darkblotch rockfish	S		
53	*Sebastes entomelas*	Widow rockfish	S		
54	*Sebastes flavidus*	Yellowtail rockfish	S		
55	*Sebastes levis*	Cowcod	S		
56	*Sebastes maliger*	Quillback rockfish	S		
57	*Sebastes melanops*	Black rockfish	S		
58	*Sebastes mystinus*	blue rockfish	S		
59	*Sebastes nebulosus*	China rockfish	S		
60	*Sebastes paucispinis*	Boccacio	S		
61	*Sebastes pinniger*	Canary rockfish	S		
62	*Sebastes ruberrimus*	Yelloweye rockfish	S		
63	*Squalus acanthias*	Spiny dogfish	S		
64	*Thaleichthys pacificus*	Eulachon	2		
	Reptiles				
65	*Caretta caretta*	Loggerhead sea turtle	2		
66	*Chelonia mydas*	Green sea turtle	2		
67	*Dermochelys coriacea*	Leatherback turtle	2		
68	*Lepidochelys olivacea*	Pacific ridley sea turtle	2		
	Birds				
69	*Brachyamphus marmoratus*	Marbled murrelet	2	Peavine Ridge	FS, BLM
70	*Oceanodroma furcata*	Fork-tailed storm-petrel	2	Oregon Islands NWR	FWS

MARINE AND ESTUARINE SPECIAL SPECIES (ME)

	Scientific Name	Common Name	List	Present Representation	Agency
71	*Pelecanus occidentalis californicus*	California brown pelican	2	Oregon Islands NWR, William P. Keady PSNA	FWS
	Mammals				
72	*Balaenoptera acutorostrata*	Minke whale	MMPA		
73	*Balaenoptera borealis*	Sei whale	2		
74	*Balaenoptera musculus*	Blue whale	2		
75	*Balaenoptera physalus*	Fin whale	2		
76	*Berardius bairdii*	Baird's beaked whale	MMPA		
77	*Callorhinus ursinus*	Northern fur seal	MMPA		
78	*Enhydra lutris*	Sea otter	2		
79	*Eschrichtius robustus*	Gray whale	ESA		
80	*Eubalaena japonica*	North Pacific right whale	2		
81	*Eumetopias jubatus*	Northern sea lion	2	Oregon Islands NWR, Cape Arago State Park, Ecola State Park, Cascade Head Preserve	FWS, PRD, TNC
82	*Globicephala macrorhynchus*	Short-finned pilot whale	MMPA		
83	*Histriophoca fasciata*	Ribbon seal	MMPA		
84	*Kogia breviceps*	Pygmy sperm whale	MMPA		
85	*Lissodelphis borealis*	Northern right whale dolphin	MMPA		
86	*Megaptera novaeangliae*	Humpback whale	2		
87	*Mesoplodon carlhubbsi*	Hubbs' beaked whale	MMPA		
88	*Mesoplodon stejnegeri*	Stejneger's beaked whale	MMPA		
89	*Mirounga angustirostris*	Northern elephant seal	MMPA		
90	*Orcinus orca*	Killer whale	ESA		
91	*Phoca vitulina*	Harbor seal	MMPA		
92	*Phocoena phocoena*	Harbor porpoise	MMPA		
93	*Physeter macrocephalus*	Sperm whale	2		
94	*Pseudorca crassidens*	False killer whale	MMPA		
95	*Zalophus californianus*	California sea lion	MMPA		
96	*Ziphius cavirostris*	Cuvier's beaked whale	MMPA		
	Vascular Plants				
97	*Cordylanthus maritimus ssp palustris*	Salt-marsh bird's-beak	1	Oregon Dunes NRA, Cape Lookout State Park	ACE, DSL, PRD
98	*Phyllospadix serrulatus*	Serrulate surf-grass	S		
	Algae				
99	*Ahnfeltiopsis leptophylla*	Red marine alga	S		DSL
100	*Alaria nana*	Brown marine alga	S		DSL
101	*Arthrocardia silvae*	Red marine alga	S		DSL

MARINE AND ESTUARINE SPECIAL SPECIES (ME)

	Scientific Name	Common Name	List	Present Representation	Agency
102	*Coilodesme bulligera*	Brown marine alga	S		DSL
103	*Cryptonemia borealis*	Red marine alga	S		DSL
104	*Cryptopleura peltata*	Red marine alga	S		DSL
105	*Desmarestia foliacea*	Brown marine alga	S		DSL
106	*Dictyosiphon foeniculaceus*	Brown marine alga	S		DSL
107	*Dictyota binghamiae*	Brown marine alga	S		DSL
108	*Erythroglossum californicum*	Red marine alga	S		DSL
109	*Farlowia compressa*	Red marine alga	S		DSL
110	*Farlowia conferta*	Red marine alga	S		DSL
111	*Gloiocladia laciniata*	Red marine alga	S		DSL
112	*Heterosiphonia densiuscula*	Red marine alga	S		DSL
113	*Hollenbergia nigricans*	Red marine alga	S		DSL
114	*Hollenbergia subulata*	Red marine alga	S		DSL
115	*Hymenena smithii*	Red marine alga	S		DSL
116	*Laminaria ephemera*	Brown marine alga	S		DSL
117	*Laminaria longipes*	Brown marine alga	S		DSL
118	*Loranthophycus californicus*	Red marine alga	S		DSL
119	*Macrocystis integrifolia*	Brown marine alga	S		DSL
120	*Mazzaella californica*	Red marine alga	S		DSL
121	*Microcladia coulteri*	Red marine alga	S		DSL
122	*Neogastroclonium subarticulatum*	Red marine alga	S		DSL
123	*Nitophyllum dotyi*	Red marine alga	S		DSL
124	*Pikea pinnata*	Red marine alga	S		DSL
125	*Porphyra torta*	Red marine alga	S		DSL
126	*Porphyropsis coccinea*	Red marine alga	S		DSL
127	*Prasiola linearis*	Green marine alga	S		DSL
128	*Pterocladiella caloglossoides*	Red marine alga	S		DSL
129	*Pylaiella unilateralis*	Brown marine alga	S		DSL
130	*Saundersella simplex*	Brown marine alga	S		DSL
131	*Schimmelmannia plumosa*	Red marine alga	S		DSL
132	*Scinaia confusa*	Red marine alga	S		DSL
133	*Scytosiphon gracilis*	Brown marine alga	S		DSL
134	*Scytothamnus fasciculatus*	Brown marine alga	S		DSL
135	*Sparlingia pertusa*	Red marine alga	S		DSL
136	*Sphacelaria plumigera*	Brown marine alga	S		DSL
137	*Ulvaria obscura* var. *blytii*	Green marine alga	S		DSL

CHAPTER 10. COAST RANGE ECOREGION

The Coast Range Ecoregion includes the entire Oregon coastline and the northern and central Oregon Coast Range Mountains, and extends north through the state of Washington to southwestern British Columbia on Vancouver Island, and south almost to Mendocino, California. Elevations in the Oregon Coast Range Ecoregion range from sea level to 4,000 feet, and the marine climate creates the most moderate and wettest habitats in the state. Average annual rainfall of 60 to 180 inches supports spectacular stands of temperate rainforests. Vegetation is characterized by forests of Sitka spruce, western hemlock, Douglas fir, red alder, redwood and tanoak.

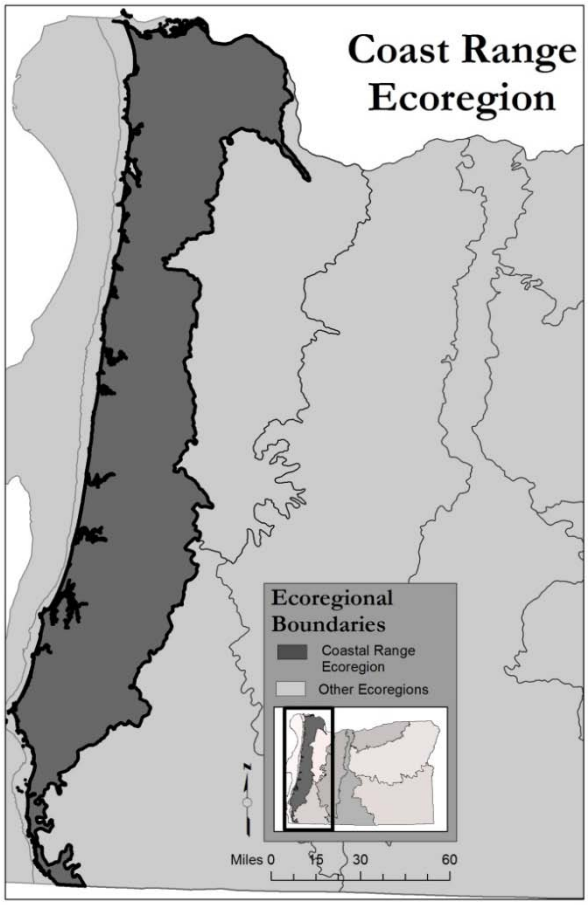

Figure 7. Map of Coast Range Ecoregion.

The Oregon coast has other unique ecological features. Sand deposits from coastal streams and rivers (primarily the Umpqua and Columbia Rivers) have created major coastal dune systems, the largest located at the Oregon Dunes National Recreation Area. In the north coast, steep headlands and cliffs are separated by stretches of flat coastal plain and large estuaries. The south coast includes the warmest areas, with rugged headlands and very mild winters, supporting local endemic species such as the coast redwood and Port Orford cedar.

Almost 40% of the region is in public ownership, primarily in National Forest and State Forest lands. Population is dispersed in many small towns, most located within a few miles of the ocean.

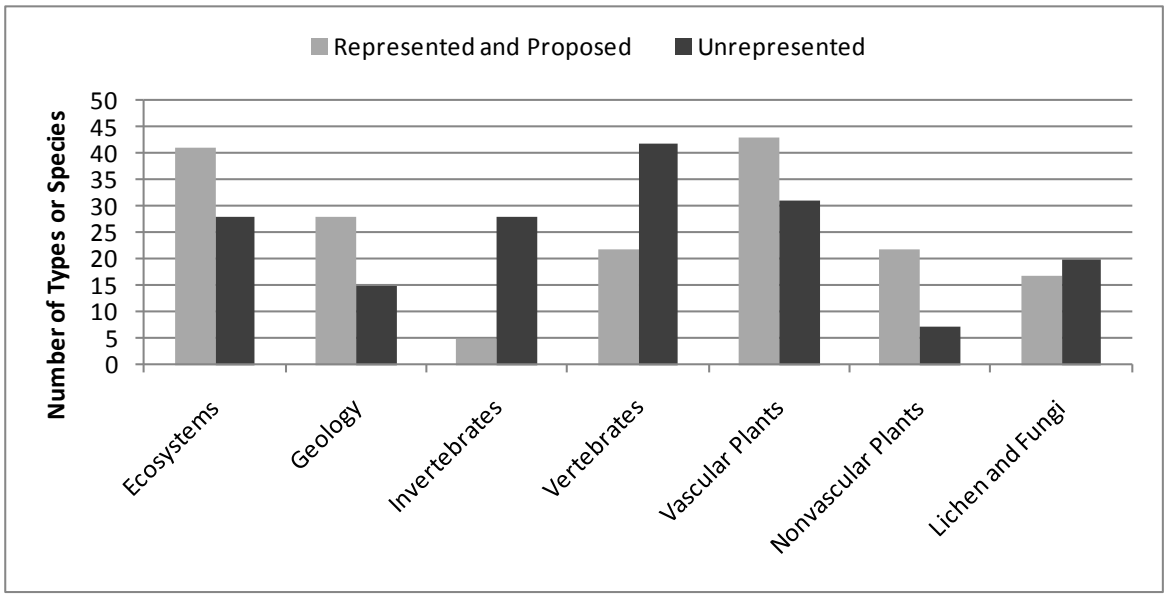

Figure 8. Coast Range Represented and Unrepresented Elements and Species.

Agency	Priority		Ecosystem Element Name	Present Representation
			Sitka Spruce	
	*	1.	Sitka spruce/salal.	Cape Meares RNA/SNA Cape Lookout PSNA
	*	2.	Sitka spruce/swordfern.	Neskowin Crest RNA Cape Lookout PSNA
FS	H	3.	Sitka spruce/oxalis, with devils club if possible.	*Drift Creek WA*
	*	4.	Sitka spruce/salmonberry.	Cummins Creek RNA Reneke Creek RNA
FS	H	5.	Sitka spruce/fool's huckleberry-red huckleberry.	*Neskowin Crest RNA*
	*	6.	Grand fir-Sitka spruce forest.	Nesika Beach (TNC)
FS	H	7.	Sitka spruce-Port Orford cedar forest on sand.	*S. Horsefall Campground*
FS, BLM, PVT	H.	8.	Sitka spruce-western hemlock-Port Orford cedar forest on coastal terrace.	*Coos County Forest*
			Redwood	
	*	9.	Redwood-Douglas fir forest with evergreen shrubs (tanoak, rhododendron, and evergreen huckleberry).	Wheeler Creek RNA
FS	H	10.	Redwood/swordfern and tanoak-Douglas fir/evergreen shrub forests.	*Peavine Ridge* *Winchuck Slope SNA*
			Port Orford Cedar	
	*	11.	Douglas fir-western hemlock-Port Orford cedar forest with wet shrubs and forbs.	Port Orford Cedar RNA Coquille River Falls RNA
	*	12.	Port Orford cedar-Douglas fir-western hemlock forest with dry shrubs and forbs.	Port Orford Cedar RNA Coquille River Falls RNA
FS, BLM	H.	13.	Port Orford cedar forest types on ultramafic soils.	Hunter Creek Bog RNA
			Western Hemlock	
	*	14.	Western hemlock/swordfern.	Cummins Creek RNA High Peak-Moon Creek RNA
	*	15.	Western hemlock/oxalis.	Cherry Creek RNA
FS, BLM	H	16.	Western hemlock/rhododendron/swordfern and western hemlock/rhododendron-salal communities.	
	*	17.	Western hemlock/rhododendron-Oregon grape.	Cherry Creek RNA
FS, BLM	M	18.	Western hemlock/devils club with or without grand fir.	*Bunker Hill*

Agency	Priority		Ecosystem Element Name	Present Representation
	*	19.	Western hemlock/vine maple with salmonberry and swordfern.	Flynn Creek RNA
FS	H	20.	Western hemlock/salmonberry, with salal or California hazel if possible.	
	*	21.	Western hemlock/evergreen huckleberry.	Cherry Creek RNA
	*	22.	Western hemlock/vine maple-salal.	High Peak-Moon Creek RNA
FS, BLM	H	23.	Western hemlock/salal.	
FS, BLM	H	24.	Western hemlock/Oregon grape, with salal if possible.	
FS, BLM	M	25.	Douglas fir/oceanspray-salal.	
	*	26.	Noble fir-western hemlock forest.	Grass Mountain RNA Saddle Mountain SNA
	*	27.	Pacific silver fir-western hemlock forest.	Saddleback Mountain RNA Onion Peak Conservation Easement
			Coastal Dunes	
	*	28.	Coastal dune mosaic with tree islands and early successional stages.	Tenmile Creek RNA
FS	H	29.	Native stabilized dune grassland with red fescue and dune wildrye.	*Tenmile Creek RNA* *Tenmile closure area*
	*	30.	Native unstabilized dune grassland with dune bluegrass and seaside lupine.	Sand Lake RNA
ACE	H	31.	Unstabilized foredunes with dune bluegrass and American beachgrass.	*West Sand Island*
PVT, BLM PRD	H	32.	Oceanfront herb-dominated dunes with cammisonia, knotweed and silvery phacelia.	*Ophir Dunes PSNA* *Sunset Bay PSNA*
FS, PRD	H	33.	Douglas fir/Rhododendron-evergreen huckleberry mature dune forest.	*Umpqua Lighthouse SP*
			Shore Pine Forests and Woodlands	
FS	L	34.	Sitka spruce-shore pine/evergreen huckleberry community.	Tenmile Creek RNA Umpqua Lighthouse State Park
FS	H	35.	Shore pine/manzanita communities.	*Eel Creek*
FS, BLM, PRD	M	36.	Shorepine/salal-evergreen huckleberry forest.	*Blacklock Point PSNA* *Cape Blanco SNA*
	*	37.	Pygmy shorepine forest on Blacklock soil.	Blacklock Point PSNA

Agency	Priority		Ecosystem Element Name	Present Representation
			Grasslands and Shrublands	
	*	38.	Coastal headland grassland and herbaceous complex with red fescue dominant.	Cascade Head (TNC) Neskowin Crest RNA
FWS, PVT PRD	*	39.	Coastal headland or oceanfront grassland with California oatgrass, red fescue, and Roemer's fescue.	*Cape Blanco SNA* *Crook Point*
	*	40.	Coastal headland shrublands with salal, coastal sage or evergreen huckleberry.	Cape Lookout PSNA Cascade Head (TNC)
	*	41.	Oceanfront shrublands with crowberry and western azalea.	Blacklock Point PSNA Cape Blanco SNA
	*	42.	Grass bald on Coast Range mountain.	Grass Mountain RNA Saddle Mountain SNA
	*	43.	Rock garden on Coast Range mountain.	Onion Peak Conservation Easement Saddle Mountain SNA
			Lacustrine	
	*	44.	Dune-blocked lake with aquatic beds and marshy shore, surrounded by unconsolidated sands.	New River RNA
PRD, PVT, FS, BLM	H	45.	Dune or slump-blocked lake with aquatic beds and marshy shore, surrounded by sedimentary or igneous formations.	
			Palustrine	
FS	U	46.	Pond in active sand dune area.	
PRD, FS	U	47.	Pond in stabilized sand dune area.	
	*	48.	Pond at mid to high elevation, including slump ponds.	Wassen Creek RNA
	*	49.	Sparsely-vegetated deflation plain marsh, with Nevada rush, sickle-leaved rush and springbank clover.	Tenmile Creek RNA
	*	50.	Deflation plain marsh, dominants including slough sedge and silverweed.	Tenmile Creek RNA
	+	51.	Freshwater tidal marsh on lower Columbia River, with streams and mud flats (including Lyngby sedge, hardstem bulrush and narrow-leaved cattail.	Russian Island PRNA
	*	52.	Slough sedge-Sitka sedge fen.	Gearhart Bog (TNC)
	*	53.	Mid to high elevation sedge fen, sphagnum bog and beaver marsh.	Lost Prairie RNA
	*	54.	Labrador tea/sphagnum mire on organic soils, without Darlingtonia, including associations with shore pine and western red cedar.	Gearhart Bog (TNC) Woahink Bog Preserve (TWC)

COAST RANGE ECOLOGICAL ELEMENTS

Agency	Priority		Ecosystem Element Name	Present Representation
FS, PVT BLM	M	55.	Labrador tea/sphagnum mire on organic soils, with Darlingtonia, including associations with shore pine and western red cedar.	Woahink Bog Preserve (TWC)
	*	56.	Labrador tea/sphagnum mire on floating lake-fill mat.	Nestucca Bay NWR (FWS), Woahink Bog Preserve (TWC)
PVT	H	57.	Labrador tea-sweet gale heath.	
	+	58.	Bog blueberry/tufted hairgrass brush prairie.	Blacklock Point PSNA
PVT, PRD	H	59.	Willow-crabapple/slough sedge swamp with spiraea.	Sutton Lake Preserve (TNC)
FS, PRD	H	60.	Shore pine/slough sedge seasonal swamp.	Heceta Dunes ACEC
		61.	Cottonwood/willow-creek dogwood tideland swamp.	Tenasillahe RNA
	*	62.	Sitka spruce/creek dogwood and willow/creek dogwood tideland swamps.	Blind Slough Swamp (TNC)
PRD, FS, PVT	H	63.	Sitka spruce/skunk cabbage swamp (non-tidal).	Nestucca Bay NWR (FWS)
	*	64.	Western red cedar-western hemlock/skunk cabbage.	Upper Rock Creek RNA
	*	65.	Low elevation pond with aquatic beds and marshy shore.	Port Orford Cedar RNA
	*	66.	Oregon myrtle/evergreen shrub riparian forest.	N. Fk. Chetco River ACEC
PRD, PVT	H	67.	Shallow lake on ancient deflation plain, with aquatic beds and marshy shore, surrounded by dunes.	
	*	68.	Pacific reedgrass fen.	Cape Blanco SNA
	*	69.	Oregon ash-red alder swamp.	Port Orford Cedar RNA

COAST RANGE GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
		Holocene	
	*	1. Baymouth Spit	Netarts Spit SNA
	*	2. Beach Ridges	Fort Stevens State Park
	H	3. Buried Forest	*Neskowin Beach*
	*	4. Dune Sheet	Oregon Dunes NRA Tenmile RNA
	+	5. Dune-dammed Lake	Lake Marie - Umpqua Lighthouse State Park PSNA
	M	6. Landslide	*Newport* *Jumpoff Joe*
	M	7. Landslide-dammed Lake	*Lost Lake*
	M	8. Liquefaction Dike	*Marsh Island*
	*	9. Ring Dike, Sill	Ecola State Park
	*	10. Sea Cliff	Cape Kiwanda State Park Cape Blanco SNA
	+	11. Tsunami Deposits	Netarts Bay Cape Lookout – Netarts Spit SNA
		12. Wave-Cut Terrace	Sunset Bay State Park
		Pleistocene	
	*	13. Cape Blanco Terrace	Cape Blanco SNA Cape Arago State Park
	*	14. Whisky Run Terrace	Cape Arago State Park
	*	15. Pioneer Terrace	Cape Arago State Park
	*	16. Seven Devils Terrace	Cape Arago State Park
	*	17. Metcalf Terrace	Cape Arago State Park
	L	18. Port Orford Formation	*Port Orford*
		Miocene	
	*	19. Cape Foulweather Basalt	Depot Bay State Park
	*	20. Sandstone Of Whale Cove	Depot Bay State Park
	*	21. Depot Bay Basalt	Depot Bay State Park
	*	22. Astoria Formation	Cape Kiwanda State Park

COAST RANGE GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
	L	23. Nye Mudstone	*Newport*
	*	24. Empire Formation	Cape Blanco SNA South Slough SNA
		Oligocene	
	L	25. Scappoose Formation	*Manning*
	L	26. Yaquina Formation	*Depot Bay*
		Oligocene and Eocene	
	L	27. Pittsburgh Bluff Formation	*Buxton*
	L	28. Alsea Formation	*Waldport*
		Eocene	
	L	29. Keasey Formation	*Buxton*
	L	30. Cowlitz Formation	*Vernonia*
	*	31. Basalt of Yachats	Sea Lion Point Heceta Head ACEC
	L	32. Nestucca Formation	*Toledo*
	*	33. Tunnel Point Sandstone	Cape Arago State Park
	*	34. Bastendorff Shale	Cape Arago State Park Shore Acres State Park
	*	35. Coaledo Formation	Sunset Bay State Park Shore Acres State Park
	L	36. Bateman Formation	*Elkton*
	L	37. Elkton Formation	*Elkton*
		Cretaceous	
	*	38. Hunters Cove Siltstone	Cape Sebastian State Park
	*	39. Cape Sebastian Siltstone	Cape Sebastian State Park
	*	40. Hunters Cove Siltstone Formation	Cape Sebastian State Park
	*	41. Rocky Point Formation	Port Orford State Park
	*	42. Humbug Mountain Conglomerate	Humbug Mountain State Park
	*	**Jurassic**	
	*	43. Otter Point Formation	Cape Blanco State Park Otter Point State Park

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
	Invertebrates				
1	*Algamorda newcombiana*	Newcomb's littorine snail	1		
2	*Anodonta californiensis*	California floater (mussel)	2	Lewis & Clark NWR	FWS
3	*Anodonta nuttalliana*	Winged floater (mussel)	2		
4	*Anodonta wahlametensis*	Willamette floater (mussel)	1		
5	*Callophrys johnsoni*	Johnson's hairstreak (butterfly)	1		
6	*Callophrys polios maritima*	Hoary elfin (butterfly)	1		
7	*Capnia kersti*	A stonefly	1		
8	*Cicindela hirticollis siuslawensis*	Siuslaw sand tiger beetle	1		
9	*Deroceras hesperium*	Evening fieldslug	1		
10	*Driloleirus macelfreshi*	Oregon giant earthworm	1		
11	*Gliabates oregonius*	Salamander slug	1		
12	*Hochbergellus hirsutus*	Sisters hesperian (snail)	1		
13	*Juga sp. 3*	Brown juga (snail)	1		
14	*Lanx subrotunda*	Rotund lanx (snail)	1		
15	*Lygus oregonae*	Oregon plant bug	1		
16	*Monadenia fidelis beryllica*	Green sideband (snail)	1		
17	*Namamyia plutonis*	A caddisfly	2		
18	*Physella columbiana*	Rotund physa (snail)	1		
19	*Plebejus saepiolus littoralis*	Insular blue (butterfly)	1	*Rock creek – Big Creek*	
20	*Polites mardon*	Mardon skipper (butterfly)	1		
21	*Pomatiopsis binneyi*	Robust walker (snail)	1	*Redwood Creek*	
22	*Pomatiopsis californica*	Pacific walker (snail)	1		
23	*Pomatiopsis chacei*	Marsh walker (snail)	1		
24	*Pristiloma johnsoni*	Broadwhorl tightcoil (snail)	2		
25	*Pristiloma pilsbryi*	Crowned tightcoil (snail)	1		
26	*Prophysaon vanattae pop. 1*	Spotted tail-dropper (slug)	1		
27	*Pterostichus rothi*	Roth's blind ground beetle	1	Grass Mountain RNA, Marys Peak ACEC	BLM
28	*Rhyacophila haddocki*	Haddock's rhyacophilan caddisfly	1	Marys Peak ACEC, *Parker Creek headquarters*	BLM
29	*Saldula villosa*	Hairy shore bug	2		
30	*Speyeria zerene bremnerii*	Valley silverspot (butterfly)	2-x	Marys Peak ACEC	BLM
31	*Speyeria zerene hippolyta*	Oregon silverspot (butterfly)	1	Cascade Head Preserve, *Rock Creek – Big Creek, Mount Hebo*	
32	*Teratocoris paludum*	Pale plant bug	2		
33	*Vorticifex neritoides*	Nerite ramshorn (snail)	1		
	Fish				
34	*Oncorhynchus clarkii pop. 2*	Coastal cutthroat trout (Southwestern Washington/Columbia River ESU)	1		
35	*Oncorhynchus keta pop. 3*	Chum salmon (Columbia River ESU)	1		
36	*Oncorhynchus keta pop. 4*	Chum salmon (Pacific Coast ESU)	2		

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
37	*Oncorhynchus kisutch pop. 1*	Coho salmon (Lower Columbia River ESU)	1		
38	*Oncorhynchus kisutch pop. 2*	Coho salmon (Southern Oregon/Northern California Coasts ESU)	1	Grassy Knob Wilderness Area, Wild Rogue Wilderness Area	FS
39	*Oncorhynchus kisutch pop. 3*	Coho salmon (Oregon Coast ESU)	1	South Slough NERR, Cascade Head Preserve, Jewell Meadows WMA	TNC, OFW
40	*Oncorhynchus mykiss pop. 13*	Steelhead (Snake River Basin ESU)	1		
41	*Oncorhynchus mykiss pop. 24*	Steelhead (Klamath Mountains Province ESU, summer run)	2		
42	*Oncorhynchus mykiss pop. 25*	Steelhead (Klamath Mountains Province ESU, winter run)	2		
43	*Oncorhynchus mykiss pop. 26*	Steelhead (Lower Columbia River ESU, summer run)	1		
44	*Oncorhynchus mykiss pop. 27*	Steelhead (Lower Columbia River ESU, winter run)	1		
45	*Oncorhynchus mykiss pop. 28*	Steelhead (Middle Columbia River ESU, summer run)	1		
46	*Oncorhynchus mykiss pop. 29*	Steelhead (Middle Columbia River ESU, winter run)	1		
47	*Oncorhynchus mykiss pop. 30*	Steelhead (Oregon Coast ESU, summer run)	1		
48	*Oncorhynchus mykiss pop. 31*	Steelhead (Oregon Coast ESU, winter run)	1	South Slough NERR, Cascade Head Preserve, Jewell Meadows WMA	TNC, OFW
49	*Oncorhynchus mykiss pop. 33*	Steelhead (Upper Willamette River ESU, winter run)	1		
50	*Oncorhynchus mykiss pop. 35*	Steelhead (Southwest Washington ESU, winter run)	2		
51	*Oncorhynchus tshawytscha pop. 2*	Chinook salmon (Snake River ESU, fall run)	1		
52	*Oncorhynchus tshawytscha pop. 21*	Chinook salmon (Lower Columbia River ESU, spring run)	1		
53	*Oncorhynchus tshawytscha pop. 22*	Chinook salmon (Lower Columbia River ESU, fall run)	1		
54	*Oncorhynchus tshawytscha pop. 23*	Chinook salmon (Upper Willamette River ESU, spring run)	1		
55	*Oncorhynchus tshawytscha pop. 26*	Chinook salmon (Southern Oregon/Northern California Coast ESU, fall run)	2		
56	*Oncorhynchus tshawytscha pop. 8*	Chinook salmon (Snake River ESU, spring/summer run)	1		
57	*Oregonichthys kalawatseti*	Umpqua chub	1		

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
58	*Rhinichthys cataractae ssp. 1*	Millicoma dace	1	*South Fork Coos River*, West Fork Millicoma River	ODF
	Amphibians				
59	*Batrachoseps attenuatus*	California slender salamander	2	Wheeler Creek RNA, Winchick Slope SNA	FWS
60	*Dicamptodon copei*	Cope's giant salamander	2	Saddle Mountain NA	PRD
61	*Rana boylii*	Foothill yellow-legged frog	2	Alfred A. Loeb State Park, Coquille River Falls RNA, Grassy Knob WA	PRD, FS
	Reptiles				
62	*Actinemys marmorata marmorata*	Northern Pacific pond turtle	2	New River RNA, Oregon Dunes National Recreation Area, William M. Tugman State Park	FS, PRD, BLM
	Birds				
63	*Brachyramphus marmoratus*	Marbled murrelet	2	Elk River State Scenic Waterway, *Peavine Ridge*	
64	*Branta canadensis occidentalis*	Dusky Canada goose	1		
65	*Branta hutchinsii leucopareia*	Aleutian Canada goose	2	Cape Lookout State Park, Nestucca Bay NWR, Oregon Islands NWR, Netarts Spit SNA	PRD, FWS
66	*Bucephala albeola*	Bufflehead	2		
67	*Cerorhinca monocerata*	Rhinoceros auklet	2		
68	*Charadrius alexandrinus nivosus*	Western snowy plover	2	Bandon NA, Cape Blanco State Park, New River RNA, Oregon Dunes National Recreation Area	PRD, BLM, FS
69	*Cygnus buccinator*	Trumpeter swan	2		
70	*Elanus leucurus*	White-tailed kite	2		
71	*Eremophila alpestris strigata*	Streaked horned lark	1		
72	*Falco peregrinus anatum*	American peregrine falcon	2	Cape Blanco State Park, Cape Lookout State Park, Oregon Islands NWR, Oswald West State Park, Cape Meares RNA/SNA	PRD, FWS
73	*Fratercula cirrhata*	Tufted puffin	2		
74	*Gymnogyps californianus*	California condor	1-x		

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
75	*Haliaeetus leucocephalus*	Bald Eagle	ESA	Tenasillahe RNA, Neskowin Crest RNA, Cape Meares SNA/RNA	
76	*Histrionicus histrionicus*	Harlequin duck	2		
77	*Melanerpes lewis*	Lewis's woodpecker	2		
78	*Oceanodroma furcata*	Fork-tailed storm-petrel	2	Oregon Islands NWR	FWS
79	*Pelecanus occidentalis californicus*	California brown pelican	2	Oregon Islands NWR, William P. Keady State Wayside	FWS
80	*Podiceps auritus*	Horned grebe	2		
81	*Podiceps grisegena*	Red-necked grebe	2		
82	*Pooecetes gramineus affinis*	Oregon vesper sparrow	2		
83	*Progne subis*	Purple martin	2	East Sand Island, Lewis And Clark NWR, Oregon Dunes National Recreation Area	FWS, FS
84	*Ptychoramphus aleuticus*	Cassin's auklet	2		
85	*Strix occidentalis caurina*	Northern spotted owl	1	Wheeler Creek RNA, Cherry Creek RNA, Little Sink RNA	BLM
	Mammals				
86	*Antrozous pallidus*	Pallid bat	2		
87	*Canis lupus*	Gray wolf	2		
88	*Corynorhinus townsendii*	Townsend's big-eared bat	2	Ecola State Park, Samuel H. Boardman State Scenic Corridor	PRD
89	*Enhydra lutris*	Sea otter	2-x		
90	*Eumetopias jubatus*	Northern sea lion	2	Cape Arago State Park, Cascade Head Preserve, Ecola State Park, Oregon Islands NWR	PRD, TNC
91	*Gulo gulo*	Wolverine	2		
92	*Martes pennanti*	Fisher	2	Grassy Knob WA	FS
93	*Myotis thysanodes*	Fringed myotis	2	Drift Creek WA, Lewis and Clark NHP	NPS
94	*Odocoileus virginianus leucurus*	Columbian white-tailed deer	1	Lewis and Clark NWR	FWS
95	*Thomomys bottae detumidus*	Pistol River pocket gopher	1		
96	*Thomomys mazama helleri*	Gold Beach pocket gopher	1		
97	*Ursus arctos horribilis*	Grizzly bear	2-x		
	Vascular Plants				

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
98	*Abronia umbellata ssp. breviflora*	Pink sandverbena	1	Otter Point SNA, *Port Orford*	PRD
99	*Adiantum jordanii*	California maiden-hair	2		
100	*Anemone oregana var. felix*	Bog anemone	2	Fanno Meadows Tnc Managed Area, Lost Forest/Sand Dunes/Fossil Lake ACEC/RNA	TNC, BLM
101	*Arctostaphylos hispidula*	Gasquet manzanita	2	Pistol River State Scenic Viewpoint	
102	*Artemisia pycnocephala*	Coastal sagewort	2	Bandon NA, Oregon Islands NWR, Tenmile Creek RNA	BLM, FWS
103	*Atriplex gmelinii var. gmelinii*	Gmelin's saltbush	2		
104	*Baccharis douglasii*	Marsh baccharis	2		
105	*Bensoniella oregana*	Bensonia	1		
106	*Brodiaea terrestris*	Dwarf brodiaea	2	Cape Arago State Park, New River RNA, Port Orford Heads State Park	PRD, BLM
107	*Cardamine pattersonii*	Saddle Mt. bittercress	1	Onion Peak Conservation Easement, Saddle Mountain SNA	TNC
108	*Carex brevicaulis*	Short-stemmed sedge	2	Lewis And Clark National Historical Park, New River RNA, Samuel H. Boardman State Scenic Corridor	NPS, BLM
109	*Carex gynodynama*	Hairy sedge	2		
110	*Carex livida*	Pale sedge	2		
111	*Carex macrocephala*	Bighead sedge	2		
112	*Carex macrochaeta*	Alaska long-awned sedge	2	Saddle Mountain NA	PRD
113	*Carex pluriflora*	Many flowered sedge	2	Gearhart Bog	TNC
114	*Castilleja chambersii*	Chambers' paintbrush	1	Onion Peak Conservation Easement, *Sugarloaf Mountain*	TNC
115	*Castilleja mendocinensis*	Mendocino coast paintbrush	1	Otter Point SNA	PRD
116	*Ceratophyllum echinatum*	Prickly hornwort	2-x		
117	*Cicendia quadrangularis*	Timwort	2	New River RNA	BLM
118	*Cimicifuga elata var. elata*	Tall bugbane	1		
119	*Clintonia andrewsiana*	Andrew's bead-lily	2-x		
120	*Cochlearia officinalis*	Spoonwort	2		
121	*Cordylanthus maritimus ssp. palustris*	Pt. Reyes bird's-beak	1	South Slough PSNA, Netarts Spit SNA	PRD
122	*Cryptantha leiocarpa*	Seaside cryptantha	2		
123	*Cryptantha milo-bakeri*	Milo Baker's cryptantha	2		
124	*Delphinium oreganum*	Willamette Valley larkspur	1		
125	*Delphinium pavonaceum*	Peacock larkspur	1		

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
126	*Dodecatheon austrofrigidum*	Frigid shootingstar	1	Onion Peak Conservation Easement, Saddle Mountain SNA	TNC, PRD
127	*Ericameria arborescens*	Golden fleece	2		
128	*Erigeron peregrinus var. peregrinus*	Wandering daisy	2	Onion Peak Conservation Easement, Saddle Mountain SNA	PRD
129	*Eriophorum chamissonis*	Russet cotton-grass	2	L. Presley & Vera C. Gill State Natural Site, New River RNA	BLM
130	*Erysimum menziesii ssp. concinnum*	Pacific wallflower	2	Humbug Mountain State Park	PRD
131	*Erythronium elegans*	Coast Range fawn-lily	1	Fanno Meadows Preserve, Lost Prairie RNA	TNC, BLM
132	*Filipendula occidentalis*	Queen-of-the-forest	1	Onion Peak Conservation Easement, Saddle Mountain SNA	TNC, PRD
133	*Fritillaria camschatcensis*	Indian rice	2	Lost Prairie RNA	BLM
134	*Geum triflorum var. campanulatum*	Western red avens	2	Saddle Mountain NA	PRD
135	*Gilia millefoliata*	Seaside gilia	1	Sunset Bay PSNA, Crissey Field PSNA	
136	*Hydrocotyle verticillata*	Whorled marsh pennywort	2	Oregon Dunes National Recreation Area, William M. Tugman State Park	FS, PRD
137	*Iliamna latibracteata*	California globe-mallow	2	*Panther Creek*	
138	*Lasthenia ornduffii*	Large-flowered goldfields	1	Cape Blanco SNA, Otter Point SNA	PRD
139	*Lathyrus holochlorus*	Thin-leaved peavine	1		
140	*Lewisia columbiana var. rupicola*	Rosy lewisia	2	Onion Peak Conservation Easement, Saddle Mountain NA, Onion Peak SNA	PRD
141	*Lilium kelloggii*	Kellogg's lily	2	*Peavine Ridge*	
142	*Lilium occidentale*	Western lily	1	Bastendorff Bog Preserve, Blacklock Point SNA	TNC, PRD
143	*Limonium californicum*	Western marsh-rosemary	2		
144	*Lycopodiella inundata*	Northern bog clubmoss	2	Jessie M. Honeyman Memorial State Park, Oregon Dunes National Recreation Area	PRD, FS

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
145	*Microseris bigelovii*	Coast microseris	2	Cape Blanco State Park, Oregon Islands NWR, Port Orford Heads State Park	PRD, FWS
146	*Monardella purpurea*	Siskiyou monardella	2	*Rocky Peak*	
147	*Oenothera wolfii*	Wolf's evening-primrose	1	Humbug Mt. PSNA, Otter Point SNA, Cape Blanco SNA	PRD
148	*Ophioglossum pusillum*	Adder's-tongue	2	Jessie M. Honeyman Memorial State Park, Oregon Dunes National Recreation Area	PRD, FS
149	*Packera flettii*	Flett's groundsel	2	Onion Peak Conservation Easement	
150	*Pellaea andromedifolia*	Coffee fern	2		
151	*Phacelia argentea*	Silvery phacelia	1	New River RNA, Crissey Field PSNA	BLM
152	*Phacelia malvifolia*	Mallow-leaved phacelia	2-x		
153	*Plantago macrocarpa*	North pacific plantain	2	Smelt Sands State Recreation Site, Yachats Ocean Road State Natural Site	PRD
154	*Poa unilateralis*	San Francisco bluegrass	2	Cascade Head Preserve, Oregon Islands NWR	TNC, FWS
155	*Polystichum californicum*	California sword-fern	2		
156	*Rhynchospora alba*	White beakrush	2		
157	*Rhynchospora capitellata*	Brownish beakrush	2	Harris Beach State Recreation Area	PRD
158	*Ribes divaricatum var. pubiflorum*	Straggly gooseberry	2		
159	*Romanzoffia thompsonii*	Thompson mistmaiden	1		
160	*Saxifraga hitchcockiana*	Saddle Mt. saxifrage	1	Onion Peak Conservation Easement, Saddle Mountain SNA	TNC, PRD
161	*Schoenoplectus subterminalis*	Water clubrush	2	Jessie M. Honeyman Memorial State Park, New River RNA, Oregon Dunes National Recreation Area	PRD, BLM, FS
162	*Sidalcea hendersonii*	Henderson's sidalcea	1	Cox Island Preserve	TNC
163	*Sidalcea hirtipes*	Bristly-stemmed sidalcea	1	Neskowin Crest RNA, Cascade Head Preserve, Saddle Mountain SNA	BLM, TNC
164	*Sidalcea malachroides*	Maple-leaved sidalcea	1-x		

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
165	*Sidalcea malviflora ssp. patula*	Coast checker bloom	1	Port Orford State Wayside, Hunter Creek Bog RNA	BLM
166	*Sidalcea nelsoniana*	Nelson's sidalcea	1	Walker Flat ACEC, Nestucca River State Scenic Waterway	
167	*Silene douglasii var. oraria*	Cascade Head catchfly	1	Cascade Head Preserve, Cape Lookout State Park SNA	TNC, PRD
168	*Stellaria humifusa*	Creeping starwort	2	Oregon Dunes National Recreation Area	FS
169	*Triteleia laxa*	Ithuriel's spear	2		
170	*Utricularia gibba*	Humped bladderwort	2	Jessie M. Honeyman Memorial State Park, Oregon Dunes National Recreation Area	PRD, FS
171	*Utricularia minor*	Lesser bladderwort	2		
	Nonvascular Plants				
172	*Anastrophyllum minutum*	Liverwort	2		
173	*Barbilophozia barbata*	Liverwort	2		
174	*Blepharostoma arachnoideum*	Liverwort	2		
175	*Calypogeia sphagnicola*	Liverwort	2	Darlingtonia State Natural Site, New River RNA	PRD
176	*Campylopus schmidii*	Moss	2	Heceta Sand Dunes ACEC/Ona, Oregon Dunes National Recreation Area, Sutton Creek Recreation Area	BLM, FS, PRD
177	*Cephaloziella spinigera*	Liverwort	2	Woahink Bog Preserve	TWC
178	*Encalypta brevicolla*	Moss	2	Saddle Mountain SNA	PRD
179	*Encalypta brevipes*	Moss	2	Saddle Mountain NA	PRD
180	*Haplomitrium hookeri*	Liverwort	2	Oregon Dunes National Recreation Area	FS
181	*Herbertus aduncus*	Liverwort	2	Saddle Mountain NA	PRD
182	*Herbertus dicranus*	Liverwort	2	Saddle Mountain NA	PRD
183	*Iwatsukiella leucotricha*	Moss	2	Saddle Mountain NA Onion Peak Conservation Easement	PRD, TNC
184	*Kurzia makinoana*	Liverwort	2	New River RNA	BLM
185	*Limbella fryei*	Moss	1	Sutton Lake Preserve	TNC

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
186	*Lophozia laxa*	Liverwort	2	Woahink Bog Preserve Sand Lake Recreation Area	TWC, PRD
187	*Metzgeria violacea*	Liverwort	2	Cummins Creek RNA, Flynn Creek RNA, Oswald West State Park, South Slough NERR	FS, PRD
188	*Orthodontium gracile*	Moss	2		
189	*Orthodontium pellucens*	Moss	2		
190	*Plagiochila semidecurrens* var. *alaskana*	Liverwort	2	Saddle Mountain NA	PRD
191	*Pohlia sphagnicola*	Moss	2	Nestucca Bay NWR, Woahink Bog Preserve	FWS, TWC
				Gearhart Bog	TNC
192	*Polytrichum strictum*	Hummock haircap moss	2	Gearhart Bog	TNC
193	*Radula brunnea*	Liverwort	2	Saddle Mountain NA	PRD
194	*Rhytidium rugosum*	Moss	2	Saddle Mountain NA	PRD
195	*Schistostega pennata*	Moss	2	Valley Of The Giants Ona-ACEC	BLM
196	*Tayloria serrata*	Moss	2		
197	*Tetraphis geniculata*	Moss	2	Valley Of The Giants Ona-ACEC	BLM
198	*Tetraplodon mnioides*	Moss	2	Lost Prairie RNA, Rickreall Ridge ACEC	BLM
199	*Triquetrella californica*	Moss	1		
200	*Tritomaria quinquedentata*	Liverwort	2	Saddle Mountain NA	PRD
	Fungi				
201	*Albatrellus avellaneus*	Fungus	1		
202	*Arcangeliella camphorata*	Fungus	1		
203	*Boletus pulcherrimus*	Fungus	1		
204	*Bridgeoporus nobilissimus*	Giant polypore fungus	1		
205	*Bryoria spiralifera*	Lichen	2	North Spit ACEC, Oregon Dunes National Recreation Area, Umpqua Lighthouse State Park	
206	*Bryoria subcana*	Lichen	2	Little Grass Mountain Ona-ACEC, Oregon Dunes National Recreation Area, Saddle Mountain NA	FS, PRD
207	*Chamonixia caespitosa*	Fungus	2	Cape Perpetua Scenic Area, Mary's Peak Ona-ACEC, Saddle Bag Mountain RNA	FS, BLM

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
208	*Cladidium bolanderi*	Lichen	2	Harris Beach State Recreation Area	PRD
209	*Cortinarius sp. 1*	Fungus	2		
210	*Cystangium idahoensis*	Fungus	1		
211	*Erioderma sorediatum*	Lichen	2	Eel Creek Botanical Area, Heceta Sand Dunes ACEC/Ona, Oregon Dunes National Recreation Area, Umpqua Lighthouse State Park	BLM. FS, PRD
212	*Heterodermia japonica*	Lichen	2		
213	*Heterodermia leucomela*	Lichen	2	Cape Blanco State Park, Samuel H. Boardman State Scenic Corridor	PRD
214	*Heterodermia sitchensis*	Lichen	2	Oregon Dunes National Recreation Area	FS
215	*Hypogymnia pulverata*	Lichen	2		
216	*Hypogymnia subphysodes*	Lichen	2		
217	*Hypotrachyna revoluta*	Lichen	2	Cape Arago State Park, Cape Lookout State Park, Shore Acres State Park, Sunset Bay State Park	PRD
218	*Leioderma sorediatum*	Lichen	2	Heceta Sand Dunes ACEC/ONA, Oregon Dunes National Recreation Area, Sutton Creek Recreation Area	BLM, FS
219	*Leptogium cyanescens*	Lichen	2		
220	*Leptonia occidentalis var. occidentalis*	Fungus	1-X		
221	*Lobaria linita*	Lichen	2		
222	*Niebla cephalota*	Lichen	2	North Spit ACEC, Oregon Dunes National Recreation Area	BLM, FS
223	*Pannaria rubiginosa*	Lichen	2	Heceta Sand Dunes ACEC/ONA, Oregon Dunes National Recreation Area	FS, BLM
224	*Phaeocollybia californica*	Fungus	1		
225	*Phaeocollybia gregaria*	Fungus	1		
226	*Phaeocollybia oregonensis*	Fungus	1		
227	*Pilophorus nigricaulis*	Lichen	2	Onion Peak SNA, Onion Peak Conservation Easement	DSL, TNC

COAST RANGE SPECIAL SPECIES

	Scientific Name	Common Name	List	Representation	Agency
228	*Pseudocyphellaria mallota*	Lichen	2		
229	*Pseudorhizina californica*	Fungus	2	Oregon Dunes National Recreation Area	FS
230	*Ramalina pollinaria*	Lichen	2	Ecola State Park, New River RNA, North Spit ACEC, Samuel H. Boardman State Scenic Corridor	PRD, BLM
231	*Ramaria rubella var. blanda*	Fungus	2	Oregon Dunes National Recreation Area	FS
232	*Rhizopogon clavitisporus*	Fungus	2		
233	*Rhizopogon exiguus*	Fungus	2		
234	*Sticta arctica*	Lichen	2	Saddle Mountain NA	PRD
235	*Teloschistes flavicans*	Lichen	2	Cape Lookout State Park, Harris Beach State Recreation Area	PRD, BLM, FS
236	*Thaxterogaster pavelekii*	Fungus	1		
237	*Usnea nidulans*	Lichen	2		

CHAPTER 11. WILLAMETTE VALLEY ECOREGION

The Willamette Valley Ecoregion is located between the Coast Range and the Western Cascades in northwestern Oregon and includes Oregon's largest river valley. From Oregon it extends north to include the Vancouver, Washington bottomlands. The valley is characterized by broad, alluvial flats and low basalt hills. Soils include deep alluvial silts from river deposits and dense heavy clays from pluvial deposits in the valley bottom's numerous oxbow lakes and ponds.

The abundant rainfall and fertile soils make the valley Oregon's most important agricultural region. This has been the case since the first settlers began arriving via the Oregon trail. As a result, the Willamette Valley is Oregon's most developed area. The Willamette Valley is home to most Oregonians, with more than 70% of the state's population, the majority of its industry, and almost half of its farmland.

When the first European settlers came to Oregon, the valley was a mosaic of gallery riparian forests and wetlands, open white oak savannas and prairie, with valley margins of oak, ponderosa pine and Douglas fir woodlands. Native Americans maintained the prairies, oak savannas and woodlands by regularly burning most of the valley. With settlement, the prairies have been largely farmed and the open oak savannas and oak-conifer woodlands have been logged or become closed canopy forests due to fire suppression.

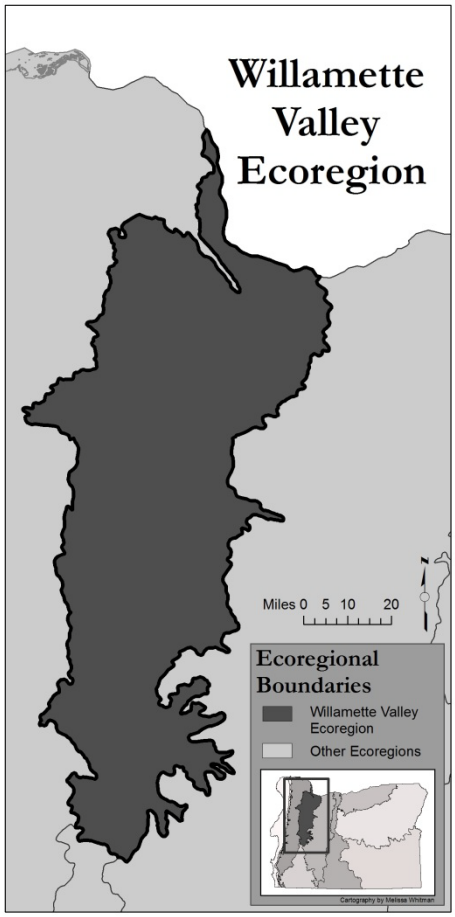

Figure 9. Willamette Valley Map.

The Willamette Valley's location on the Pacific Flyway makes it an important area for migrating and wintering waterfowl. Geese and shorebirds benefit from flooded agricultural lands, and the Willamette River and its many tributaries support salmon and steelhead runs, mostly of hatchery origin due to the large number of dams in the system. The valley's few remaining fragments of native prairie support many special plant species and endemic invertebrates, while the remaining wetlands provide habitat to the Oregon chub, the western pond turtle and many other sensitive animal species.

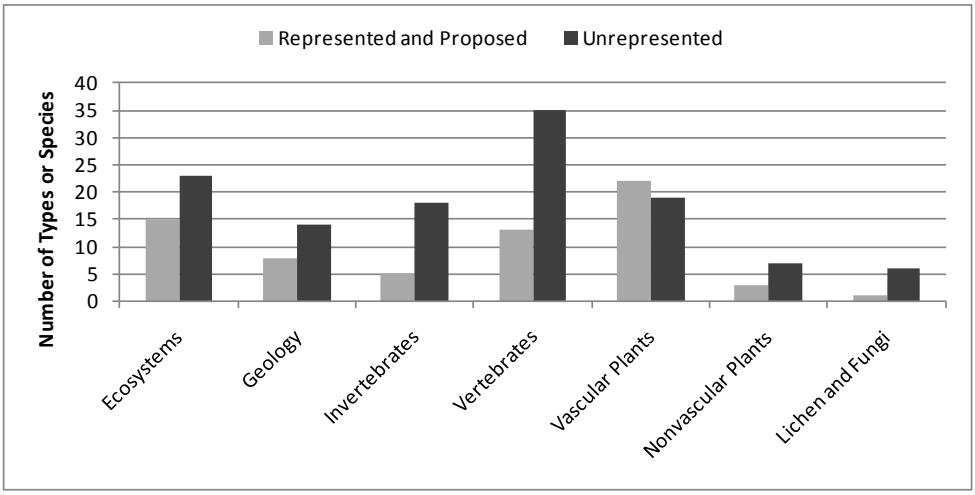

Figure 10. Willamette Valley Represented and Unrepresented Types.

WILLAMETTE VALLEY ECOLOGICAL ELEMENTS

Agency	Priority	Ecosystem Element Name	Present Representation
		Conifer Forests	
	*	1. Douglas fir/salal/swordfern and Douglas fir/Oregon grape forest.	Fox Hollow RNA Camas Swale RNA
	*	2. Douglas fir/poison oak forest.	The Butte RNA Fox Hollow RNA Forest Peak RNA
	*	3. Douglas fir-western hemlock/Oregon grape and salal forests, with grand fir if possible.	Mohawk RNA Wilhoit Springs RNA
BLM	H	4. Ponderosa pine-Douglas fir/California fescue woodland.	*Fox Hollow RNA* *Ponderosa Pine PACEC*
	*	5. Douglas fir-grand fir/vine maple-salal.	Little Sink RNA
BLM, FS	M	6. Western red cedar-western hemlock/hazel forest on alluvial terrace and slopes.	*Sandy River (TNC) & ACEC*
		Mixed Hardwood-Conifer Forests	
	*	7. Douglas fir-bigleaf maple forest with some grand fir if possible.	Forest Peak RNA The Butte RNA Mohawk RNA
BLM	M	8. Madrone-Douglas fir-oak woodlands with poison oak and snowberry.	*McCully Mountain* *Fishermen's Bend Campground*
BLM, PVT	H	9. Oregon white oak-Douglas fir/snowberry woodland.	*McCully Mountain*
BLM	H	10. Ponderosa pine-Douglas fir-California black oak woodland.	*Ponderosa Pine PACEC* *Fox Hollow RNA*
		Hardwood Forests	
PVT, BLM FWS	H	11. Oregon white oak/grass savanna.	The Butte RNA Wren Prairie (TNC) *Basket Slough NWR*
	*	12. Oregon white oak/poison oak-snowberry/blue wildrye woodland.	Pigeon Butte RNA Maple Knoll RNA *Basket Slough NWR*
BLM, PVT County	H	13. Oregon white oak-madrone/poison oak/bunchgrass woodland.	*Bald Hill Park* *Mt. Pisgah*
		Prairies	
PVT, BLM	H	14. Roemer fescue valley grassland.	*Wren Prairie (TNC)* *Kingston (TNC)* *Basket Slough NWR* *Dorena Prairie*

Agency	Priority	Ecosystem Element Name	Present Representation
	*	15. Lemmon's needlegrass-moss bald.	*Forest Peak RNA* Rattlesnake Butte (TNC)
		Riparian Woodlands	
BLM, PRD PVT, FWS	H	16. Oregon ash-bigleaf maple-Oregon white oak riparian forest.	*Willamette Floodplain RNA* *Mission Bottom*
PVT, PRD	M	17. White alder bottomland riparian forest.	
		Lacustrine	
PRD, PVT, FWS	H	18. Oxbow lake on Willamette River, with aquatic beds and marshy shore.	*Mission Bottom*
PRD, DSL, PVT, OFW	H	19. Shallow backwater lake on major river floodplain, with associated marsh and mudflats.	*Burlington Bottoms* *Sauvie Island*
		Palustrine	
	*	20. Slump pond at margin of valley, with aquatic beds and marshy shore.	Little Sink RNA
PVT	U	21. Low elevation vernal pool.	Possibly Extirpated
PRD, FWS	U	22. Cold spring.	
OFW, PVT	M	23. Tidal marsh on major river, with associated mud flats (including spikerush, bulrush, burreed and wapato).	*Rooster Rock* *Scappose Bay*
PRD, PVT	M	24. Wapato marsh (including cutgrass, knotgrass and nodding beggars tick).	*Beggars Tick Marsh* *Sauvie Island*
	*	25. Slough sedge-one sided sedge marsh.	Fern Ridge RNA Willamette Floodplain RNA
	*	26. Tufted hairgrass valley bottomland prairie, with vernal pools and brush prairie (including Nootka rose, Douglas spiraea and dwarf blueberry).	Willamette Floodplain RNA Willow Creek (TNC) Fern Ridge RNA
	*	27. Tufted hairgrass-California oatgrass bottomland prairie.	Fern Ridge RNA Willow Creek (TNC)
	*	28. Nootka rose/water parsley shrub swamp.	Jackson-Frazier Wetland
PVT	H	29. Geyer willow-Hooker willow shrub swamp.	*Killin Wetland* (Metro)
	*	30. Hooker willow-Sitka willow shrub swamp.	Camassia (TNC) *Beggars Tick Marsh*
PVT, OFW	M	31. Pacific willow shrub swamp.	*Luckiamute-Little Luckiamute* *Scappose Bay, Sauvie Island WMA*
	*	32. Oregon ash/slough sedge woodland with snowberry.	Willamette Floodplain RNA
FWS, OFW	M	33. Oregon ash/Pacific willow woodland.	*Luckiamute River*

WILLAMETTE VALLEY ECOLOGICAL ELEMENTS

Agency	Priority	Ecosystem Element Name	Present Representation
PRD	M	34. Riparian area dominated by river and Pacific willow.	
	+	35. Riparian area dominated by Oregon ash, black cottonwood and creek dogwood.	Gary, Flagg and Chatham Islands PSNA
PVT, PRD	H	36. Riparian area dominated by Oregon ash, black cottonwood and snowberry.	*Multnomah Channel (Sauvie Island)* *Mission Bottom* *Santiam Bar*
PVT	H	37. Western red cedar-western hemlock/skunk cabbage swamp.	Possibly extirpated
OFW, PVT, Metro	H	38. Columbia sedge marsh.	Smith and Bybee Lakes (Metro)<

WILLAMETTE VALLEY GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
		Holocene	
	M	1. Meandering Stream	*Tualatin River*
	*	2. River Terraces	Sandy River (TNC)/ACEC Oxbow Park (Metro)
	H	3. Talus Caves In Boring Lava Rock Fall	*Carver Caves*
		Pleistocene	
	*	4. Glacial Erratic	Erratic Rock State Wayside
PVT	L	5. Portland Hills Silt	*Forest Park*
PVT	L	6. Willamette Silt	*River Bend*
PVT	L	7. Cataclysmic Flood Bedforms	*Irvington Bar*
	*	8. Cataclysmic Flood Scours	Rock Island State Greenway Site
		Pleistocene and Pliocene	
	*	9. Boring Lava	Rocky Butte State Park
	*	10. Boring Volcano	Mt. Scott Park
	*	11. Springwater Terrace Gravel	Milo McIver State Park Eagle Creek Park
		Pliocene and Miocene	
	*	12. Troutdale Formation	Oxbow Park Milo McIver Park State
	*	13. Sandy River Mudstone	Oxbow Park Milo McIver State Park
		Miocene	
PVT	L	14. Molalla Formation	*Molalla*
PVT	L	15. Wanapum Basalt	*Oregon City*
PVT	L	16. Grand Ronde Basalt	*Oregon City*
		Oligocene	
	L	17. Scotts Mills Formation	*Drake Crossing*
		Eocene	
	L	18. Little Butte Volcanics	*Mollala*
	L	19. Eugene Formation	*Spores Point*

WILLAMETTE VALLEY GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
	L	20. Fisher Formation	*Eugene*
	L	21. Spencer Formation	*Eugene*
	L	22. Yamhill Formation	*McMinnville*

WILLAMETTE VALLEY SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
	Invertebrates				
1	*Acetropis americana*	American grass bug	1	William Finley NWR	FWS
2	*Anodonta californiensis*	California floater (mussel)	2	Sauvie Island WMA	FWS
3	*Anodonta nuttalliana*	Winged floater	2		
4	*Anodonta wahlametensis*	Willamette floater (mussel)	1		
5	*Callophrys johnsoni*	Johnson's hairstreak (butterfly)	1		
6	*Chloealtis aspasma*	Siskiyou short-horned grasshopper	1		
7	*Colligyrus sp. 4*	Columbia duskysnail	1		
8	*Cryptomastix devia*	Puget oregonian (snail)	1		
9	*Deroceras hesperium*	Evening fieldslug	1		
10	*Driloleirus macelfreshi*	Oregon giant earthworm	1		
11	*Euphydryas editha taylori*	Taylor's checkerspot (butterfly)	1	Wren Prairie Preserve	TNC
12	*Fisherola nuttalli*	Shortface lanx (=Giant Columbia River limpet)	1		
13	*Fluminicola fuscus*	Columbia pebblesnail or spire snail	1		
14	*Gonidea angulata*	Western ridged mussel	2	Little Rock Island TNC Managed Area, Sauvie Island WMA	FWS, TNC
15	*Juga hemphilli hemphilli*	Barren juga (snail)	1		
16	*Juga sp. 3*	Brown juga (snail)	1		
17	*Physella columbiana*	Rotund physa (snail)	1		
18	*Plebejus icarioides fenderi*	Fender's blue (butterfly)	1	Willow Creek Preserve, Wren Prairie Preserve, Backett Slough NWR	TNC, FWS
19	*Pristiloma pilsbryi*	Crowned tightcoil (snail)	1		
20	*Speyeria callippe ssp. 1*	Willamette callippe fritillary (butterfly)	1-x		
21	*Speyeria zerene bremnerii*	Valley silverspot (butterfly)	2-x		
22	*Vespericola sp. 2*	Bald hesperian (snail)	1		
23	*Vorticifex neritoides*	Nerite ramshorn (snail)	1		
	Fish				
24	*Oncorhynchus clarkii pop. 2*	Coastal cutthroat trout (Southwestern Washington/Columbia River ESU)	1		
25	*Oncorhynchus keta pop. 3*	Chum salmon (Columbia River ESU)	1		
26	*Oncorhynchus kisutch pop. 1*	Coho salmon (Lower Columbia River ESU)	1		
27	*Oncorhynchus kisutch pop. 3*	Coho salmon (Oregon Coast ESU)	1		
28	*Oncorhynchus mykiss pop. 13*	Steelhead (Snake River Basin ESU)	1		
29	*Oncorhynchus mykiss pop. 26*	Steelhead (Lower Columbia River ESU, summer run)	1		
30	*Oncorhynchus mykiss pop. 27*	Steelhead (Lower Columbia River ESU, winter run)	1		

WILLAMETTE VALLEY SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
31	*Oncorhynchus mykiss pop. 28*	Steelhead (Middle Columbia River ESU, summer run)	1		
32	*Oncorhynchus mykiss pop. 29*	Steelhead (Middle Columbia River ESU, winter run)	1		
33	*Oncorhynchus mykiss pop. 30*	Steelhead (Oregon Coast ESU, summer run)	1		
34	*Oncorhynchus mykiss pop. 31*	Steelhead (Oregon Coast ESU, winter run)	1		
35	*Oncorhynchus mykiss pop. 33*	Steelhead (Upper Willamette River ESU, winter run)	1		
36	*Oncorhynchus mykiss pop. 35*	Steelhead (Southwest Washington ESU, winter run)	2		
37	*Oncorhynchus tshawytscha pop. 2*	Chinook salmon (Snake River ESU, fall run)	1		
38	*Oncorhynchus tshawytscha pop. 21*	Chinook salmon (Lower Columbia River ESU, spring run)	1		
39	*Oncorhynchus tshawytscha pop. 22*	Chinook salmon (Lower Columbia River ESU, fall run)	1		
40	*Oncorhynchus tshawytscha pop. 23*	Chinook salmon (Upper Willamette River ESU, spring run)	1		
41	*Oncorhynchus tshawytscha pop. 8*	Chinook salmon (Snake River ESU, spring/summer run)	1		
42	*Oregonichthys crameri*	Oregon chub	1	William Finley NWR, Elijah Bristow State Park	FWS, PRD
43	*Salvelinus confluentus pop. 2*	Bull trout (Columbia River population)	1		
	Amphibians				
44	*Rana boylii*	Foothill yellow-legged frog	2		
45	*Rana pretiosa*	Oregon spotted frog	1	William Finley NWR	FWS
	Reptiles				
46	*Actinemys marmorata marmorata*	Northern Pacific pond turtle	2	Ankeny NWR, Elijah Bristow State Park, William Finley NWR, Willow Creek Preserve	FWS, PRD, TNC
47	*Chrysemys picta*	Painted turtle	2	Ankeny NWR, Champoeg State Heritage Area, Fern Ridge WMA, Sauvie Island WMA, William Finley NWR	FWS, PRD
	Birds				
48	*Agelaius tricolor*	Tricolored blackbird	2		
49	*Ammodramus savannarum*	Grasshopper sparrow	2	Baskett Slough NWR	FS
50	*Branta canadensis occidentalis*	Dusky Canada goose	1		

WILLAMETTE VALLEY SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
51	*Branta hutchinsii leucopareia*	Aleutian Canada goose	2	Ankeny NWR, Baskett Slough NWR, Sauvie Island WMA, William Finley NWR	FWS
52	*Bucephala albeola*	Bufflehead	2		
53	*Coccyzus americanus*	Yellow-billed cuckoo	2-x		
54	*Cygnus buccinator*	Trumpeter swan	2		
55	*Elanus leucurus*	White-tailed kite	2		
56	*Eremophila alpestris strigata*	Streaked horned lark	1	Baskett Slough NWR	FWS
57	*Falco peregrinus anatum*	American peregrine falcon	2		
58	*Gymnogyps californianus*	California condor	1-x		
59	*Haliaeetus leucocephalus*	Bald eagle	ESA	Sauvie Island WMA, Mollala River State Park, Backett Slough NWR	
60	*Melanerpes lewis*	Lewis's woodpecker	2	Sauvie Island WMA	
61	*Podiceps auritus*	Horned grebe	2		
62	*Pooecetes gramineus affinis*	Oregon vesper sparrow	2	Baskett Slough NWR	FS
63	*Progne subis*	Purple martin	2	Fern Ridge WMA, Sauvie Island WMA, Willamette River Greenway	
64	*Strix occidentalis caurina*	Northern spotted owl	1		
	Mammals				
65	*Antrozous pallidus*	Pallid bat	2		
66	*Canis lupus*	Gray wolf	2		
67	*Corynorhinus townsendii*	Townsend's big-eared bat	2	Milo McIver State Park	PRD
68	*Lynx canadensis*	Canada lynx	2		
69	*Myotis thysanodes*	Fringed myotis	2	*Carver Caves*	
70	*Odocoileus virginianus leucurus*	Columbian white-tailed deer	1	Burlington Bottoms	BPA
71	*Ursus arctos horribilis*	Grizzly bear	2-x		
	Vascular Plants				
72	*Agrostis howellii*	Howell's bentgrass	1		
73	*Carex comosa*	Bristly sedge	2		
74	*Carex gynodynama*	Hairy sedge	2		
75	*Carex retrorsa*	Retrorse sedge	2	Sauvie Island WMA	OFW
76	*Castilleja levisecta*	Golden paintbrush	1-x		
77	*Cicendia quadrangularis*	Timwort	2	Willow Creek Preserve, Long Tom ACEC	TNC, BLM
78	*Cimicifuga elata var. elata*	Tall bugbane	1	The Butte RNA	BLM
79	*Cyperus acuminatus*	Short-pointed cyperus	2	Fern Ridge Wildlife Area	OFW
80	*Cyperus lupulinus ssp. lupulinus*	A cyperus	2		

WILLAMETTE VALLEY SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
81	*Delphinium leucophaeum*	White rock larkspur	1	Camassia Natural Area, Little Rock Island, Champoeg State Heritage Park	TNC, PRD
82	*Delphinium nuttallii*	Nuttall's larkspur	2		
83	*Delphinium oreganum*	Willamette Valley larkspur	1	North Santiam State Recreation Area	PRD
84	*Delphinium pavonaceum*	Peacock larkspur	1	Willamette Floodplain RNA, William Finley NWR	BLM, FWS
85	*Erigeron decumbens*	Willamette Valley daisy	1	Fern Ridge RNA, William Finley NWR, Baskett Slough NWR	BLM, FWS
86	*Eucephalus vialis*	Wayside aster	1	Camas Swale RNA, Camas Swale ACEC, Willow Creek Preserve	TNC, BLM
87	*Heliotropium curassavicum*	Salt heliotrope	2		
88	*Horkelia congesta ssp. congesta*	Shaggy horkelia	1	Fern Ridge RNA, Long Tom ACEC, Willow Creek Preserve	BLM, TNC
89	*Howellia aquatilis*	Howellia	1	William Finley NWR	FWS
90	*Hydrocotyle verticillata*	Whorled marsh pennywort	2		
91	*Iris tenax var. gormanii*	Gorman's iris	1		
92	*Lathyrus holochlorus*	Thin-leaved peavine	1	William Finley NWR, Ankeny NWR	FWS
93	*Lipocarpha micrantha*	Small-flowered lipocarpha	2-x		
94	*Lomatium bradshawii*	Bradshaw's lomatium	1	Fern Ridge RNA, Long Tom ACEC, Willamette Floodplain RNA	BLM
95	*Lupinus sulphureus ssp. kincaidii*	Kincaid's lupine	1	Cogswell-Foster (TNC), Baskett Slough NWR, William Finley NWR	TNC, FWS
96	*Mimulus tricolor*	Three-colored monkeyflower	2	Ankeny NWR, Cogswell-Foster Preserve, Willamette River Greenway, William Finley NWR	TNC
97	*Navarretia willamettensis*	Willamette navarretia	1		
98	*Pellaea andromedifolia*	Coffee fern	2		
99	*Polystichum californicum*	California sword-fern	2		
100	*Pyrrocoma racemosa var. racemosa*	Racemose pyrrocoma	2	Fern Ridge RNA	ACE
101	*Romanzoffia thompsonii*	Thompson mistmaiden	1		
102	*Rorippa columbiae*	Columbia cress	1		
103	*Rotala ramosior*	Toothcup	2		
104	*Scirpus pendulus*	Drooping bulrush	2		
105	*Sedella pumila*	Sierra mock-stonecrop	2-x		

WILLAMETTE VALLEY SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
106	*Sericocarpus rigidus*	White-topped aster	1	Fern Ridge RNA, Kingston Prairie Preserve	BLM, TNC
107	*Sidalcea nelsoniana*	Nelson's sidalcea	1	Willamette Prairie RNA, Wren Prairie (TNC), William Finley NWR	BLM, TNC, FWS
108	*Sisyrinchium hitchcockii*	Hitchcock's blue-eyed grass	1	Willow Creek Preserve	TNC
109	*Sullivantia oregana*	Oregon sullivantia	1	Crown Point, Rooster Rock State Park	PRD
110	*Utricularia gibba*	Humped bladderwort	2		
111	*Wolffia borealis*	Dotted water-meal	2	Little Sink RNA	BLM
112	*Wolffia columbiana*	Columbia water-meal	2	Smith and Bybee Lakes, Willamette Park Corvallis	
	Nonvascular Plants				
113	*Bruchia flexuosa*	Moss	2	Willow Creek Preserve	TNC
114	*Ephemerum crassinervium*	Moss	2		
115	*Ephemerum serratum*	Moss	2	Willow Creek Preserve	TNC
116	*Fissidens fontanus*	Moss	2-x		
117	*Micromitrium synoicum*	Moss	2		
118	*Physcomitrella patens*	Moss	2	Sauvie Island WMA, William Finley NWR	OFW, FWS
119	*Porella bolanderi*	Liverwort	2		
120	*Preissia quadrata*	Liverwort	2		
121	*Sphaerocarpos hians*	Liverwort	1	Avery Park	City
122	*Tayloria serrata*	Moss	2		
	Fungi				
123	*Boletus pulcherrimus*	Fungus	1		
124	*Calicium adspersum*	Lichen	2	Little Sink RNA	BLM
125	*Leptonia occidentalis var. occidentalis*	Fungus	1-X		
126	*Phaeocollybia gregaria*	Fungus	1		
127	*Pseudorhizina californica*	Fungus	2		
128	*Rhizopogon subradicatus*	Fungus	2-x		
129	*Urnula craterium*	Fungus	2-x		

CHAPTER 12. KLAMATH MOUNTAINS ECOREGION

The Klamath Mountains Ecoregion covers most of southwestern Oregon and northwestern California and includes the Siskiyou Mountains, California's Marble Mountains and Trinity Alps and the interior valleys and foothills between these mountain ranges. Oregon elevations are from 100 to over 7,500 feet. The ecoregion also has major climatic extremes. Far western portions receive more than 100 inches of rain per year, with relatively mild temperatures year-round. The southern interior valleys are much drier, with locations receiving less than 20 inches of rain per year and summer high temperatures averaging more than 90° F.

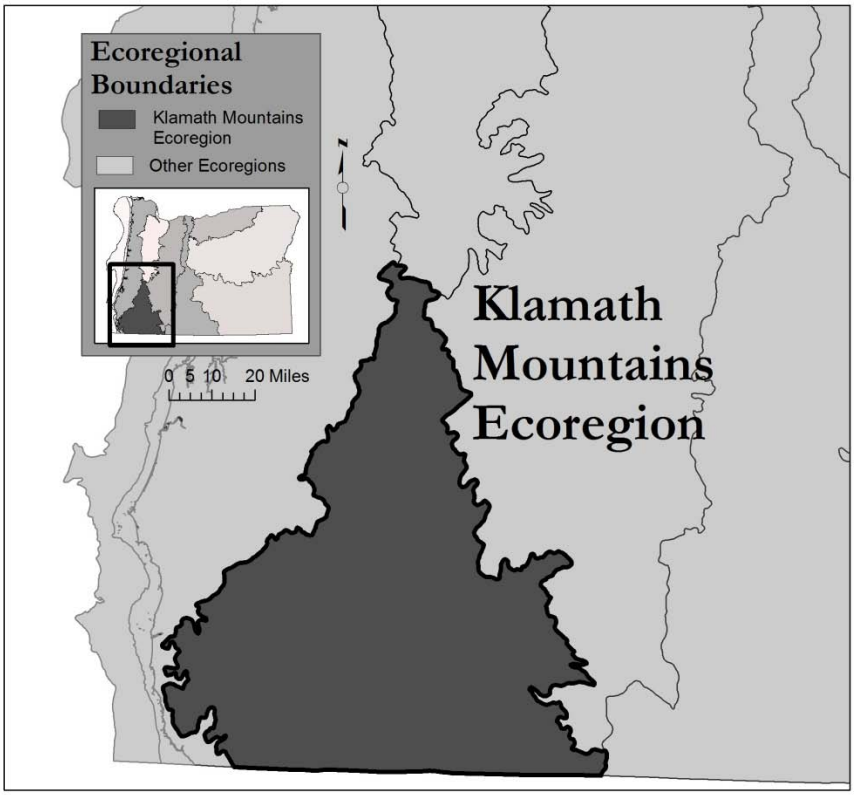

Figure 11. Klamath Mountains Ecoregion map.

The ecoregion has the oldest landscapes in Oregon, representing the only large area of the state not shaped primarily by volcanism. It also is by far the most geologically diverse region, having large areas of metamorphic and sedimentary rocks such as serpentine, limestone and gabbro, as well as granite and basalt. Topography ranges from steep, dissected mountains and canyons to gentle foothills and flat valley bottoms.

The combination of exceptional climatic, geologic, and topographic diversity supports the most diverse habitats in Oregon. In addition, the Klamath Mountain Ecoregion is a floristic crossroads, including elements of the Sierra Nevada Mountains, Sacramento Valley and Coast Range Mountains of Claifornia; the Cascade Mountains of Oregon and Washington; and the Great Basin to the east. Its geologic age, stable climate, and unusual geology result in the ecoregion being a major center of species endemism for vascular plants. Of the 4,000 native plant species or subspecies occurring in Oregon, about half are found in this ecoregion, with about a quarter of these known only here. The region is also known for its diversity of conifers, with 30 different species. In Oregon, the West Cascades has the second largest number of conifer species, with 18 species.

Prior to European settlement, the landscape was dominated by Douglas fir forests, oak woodlands and ponderosa pine woodlands. There were native grasslands and chaparral on the valley bottoms, and diverse conifer and mixed hardwood forests. All of the natural habitats have changed since fire suppression became effective in the early twentieth century. The region has a high frequency of dry, summer lightning storms, leading to natural fire frequency of less than 40 years for most of the region, and closer to 20 years in the valleys and eastern portions of the region. Over 50 years of fire suppression have dramatically altered the ecology of the forests, savannas and shrublands in this region.

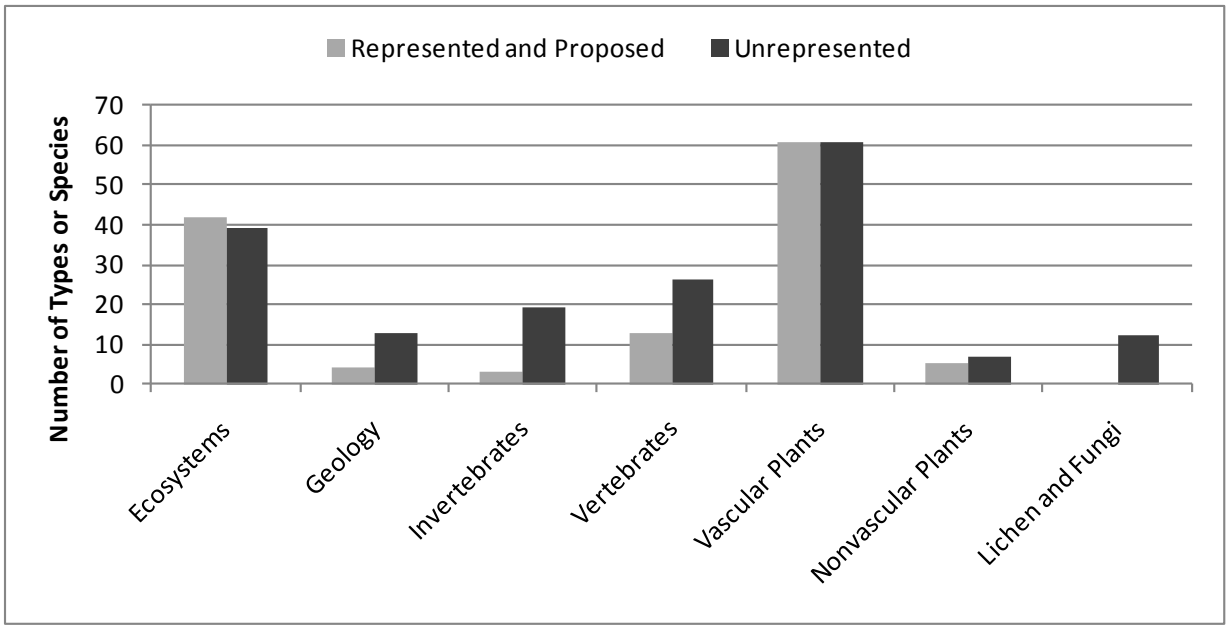

Figure 12. Represented and Unrepresented Ecosystem Elements and Species for the Klamath Mountains Ecoregion.

KLAMATH MOUNTAINS ECOLOGICAL ELEMENTS

Agency	Priority	Ecosystem Element Name	Present Representation
		Oregon White Oak	
	*	1. Oregon white oak savanna or open woodland with forbs or grasses.	Round Top Butte (TNC)/RNA Fawn Butte PRNA Bushnell-Irwin Rockes ACEC Whetstone Savanna (TNC)
PVT, ACE, BLM	M	2. Oregon white oak-Douglas fir-madrone/poison oak woodland.	Bushnell-Irwin Rocks ACEC Fawn Butte PRNA
		Port Orford Cedar	
FS, BLM	H	3. Port Orford cedar/huckleberry oak/beargrass on ultramafic soils.	
	*	4. Port Orford cedar-white fir/Oregon grape and Port Orford cedar-tanoak/salal communities.	Pipe Fork RNA
	*	5. Port Orford cedar-western hemlock with leucothe and swordfern.	North Fork Silver Creek RNA
	*	6. Port Orford cedar/hairy honeysuckle/fescue on ultramafic soils.	Lemmingsworth Gulch RNA Cedar Log Flat RNA
FS, BLM	H	7. Port Orford cedar maritime types with evergreen huckleberry/swordfern or rhododendron-salal.	
		Ponderosa Pine	
	*	8. Ponderosa pine-Douglas fir moist forest.	Ashland RNA
	*	9. Ponderosa pine-white oak woodland.	Roundtop Butte RNA-(TNC) French Flat RNA Fawn Butte PRNA
PVT, BLM	H	10. Ponderosa pine-black oak woodland.	Lower Table Rock (TNC)
BLM	H	11. Western juniper-Oregon white oak-Ponderosa pine/buckbrush/bunchgrass savanna.	Siskiyou Pass PACEC
		Douglas Fir	
	+	12. Douglas fir serpentine woodland.	Eight Dollar Mtn ACEC/PSNA Lemmingsworth Gulch RNA
FS, BLM	M	13. Douglas fir/pinemat manzanita.	
FS	M	14. Douglas fir/vine maple/dwarf Oregon grape.	
FS, BLM	*	15. Douglas fir forest with salal and/or swordfern.	
	*	16. Douglas fir/canyon live oak woodland with poison oak and dwarf Oregon grape if possible.	Bear Gulch RNA Hoover Gulch RNA
FS, BLM	H	17. Douglas fir-California black oak/poison oak.	French Flat RNA

Agency	Priority	Ecosystem Element Name	Present Representation
	*	18. Douglas fir-Ponderosa pine forest with poison oak, hairy snowberry or Piper's Oregon grape understory.	North Myrtle Creek RNA Oregon Gulch RNA
FS, BLM	L	19. Douglas fir-white fir forest at high elevation.	
FS, BLM	H	20. Douglas fir/oceanspray or dry shrub community.	
		Western Hemlock	
FS	M	21. Western hemlock-white fir forest with dwarf Oregon grape and vine maple.	
FS, BLM	H	22. Western hemlock/salal/swordfern and western hemlock/vine maple-salal with western red cedar.	
FS, BLM	M	23. Western hemlock-tanoak/Pacific rhododendron, western hemlock-incense cedar/salal and western hemlock/salal-dwarf Oregon grape assocations.	*Bobby Creek RNA*
FS, BLM	M	24. Western hemlock/Pacific rhododendron associations.	*Bobby Creek RNA*
FS, BLM	M	25. Western hemlock coastal communities with California laurel, evergreen huckleberry, swordfern, and salmonberry if possible.	
		Tan Oak	
FS, BLM	M	26. Tanoak on ultramafics with shrub understory.	Lemmingsworth Gulch RNA
	*	27. Tanoak - Douglas fir dry site forest with canyon live oak, dwarf Oregon grape and poison oak if possible.	Hoover Gulch RNA Lemmingsworth Gulch RNA
	*	28. Moist tanoak forests (tanoak-bigleaf maple-canyon live oak/swordfern, tanoak-Port Orford cedar/ salal, and tanoak/evergreen huckleberry-rhododendron-salal).	Bobby Creek RNA
FS, BLM	H	29. Tanoak-western hemlock/evergreen huckleberry forest with swordfern if possible.	
		30. Tanoak-Douglas fir moist forest with evergreen huckleberry, salal and dwarf Oregon grape.	Bobby Creek RNA
FS	H	31. Tanoak on ultramafics with sugar pine and golden chinkapin.	
FS	L	32. Tanoak with white fir and Sadler's oak at a cool site.	
		White Fir	
FS, BLM	M	33. White fir/pinemat manzanita on shallow soil.	
FS	L	34. White fir-tanoak/prince's pine forest.	
	*	35. White fir at high elevations (white fir-red fir/Sadler oak or vanilla leaf or prince's-pine-threeleaf anemone and whitefir/beargrass associations).	Grayback Glades RNA

Agency	Priority	Ecosystem Element Name	Present Representation
	*	36. White fir/dwarf Oregon grape moderately dry site forest with twinflower and vanilla leaf if possible.	North Fork Silver Creek RNA North Myrtle Creek RNA
FS, BLM	M	37. White fir, moderately dry site forest with baldhip rose, hairy snowberry and starflower if possible.	*Oregon Gulch RNA*
	*	38. White fir moist site forest with rhododendron, Dwarf Oregon grape, Sadler oak, salal, and twinflower, often with western hemlock.	Holton Creek RNA
FS, BLM	M	39. White fir/huckleberry oak on ultramafics.	
	*	40. White fir with Brewer spruce and Alaska yellow cedar if possible.	Brewer Spruce RNA Oliver Mathews PRNA
		Red Fir	
	+	41. Red fir-mountain hemlock/pinemat manzanita/prince's pine forest.	Oliver Mathews PRNA
	+	42. Red fir-white fir/baldhip rose/one-sided pyrola.	Oliver Mathews PRNA
FS	L	43. Red fir-white fir/Sadler oak/one-sided pyrola.	
FS	M	44. Red fir-white fir/Sadler oak/prince's pine.	
FS	M	45. Red fir/mountain sweetroot.	
		Mountain Hemlock	
	+	46. Mountain hemlock/herb association.	Oliver Mathews PRNA
FS, BLM	L	47. Mountain hemlock-red fir/dwarf bramble/one-sided pyrola.	
		Serpentine Pine	
	*	48. Knobcone pine forest.	Lemmingsworth Gulch RNA Hunter Creek Bog RNA
	*	49. Jeffrey pine grassland savanna.	Beatty Creek RNA Cedar Log Flat RNA
PVT, BLM	M	50. Jeffrey pine with incense cedar and dry shrubs.	
FS, BLM DSL	M	51. Jeffrey pine/huckleberry oak-pinemat manzanita forest with box-leaved silk-tassel if possible.	*Eight Dollar Mtn PSNA/ACEC*
	+	52. Western white pine/beargrass.	Lemmingsworth Gulch RNA Red Mountain PRNA
	+	53. Western white pine/huckleberry oak/beargrass with tanoak and Jeffrey pine if possible.	Lemmingsworth Gulch RNA Red Mountain PRNA

KLAMATH MOUNTAINS ECOLOGICAL ELEMENTS

Agency	Priority	Ecosystem Element Name	Present Representation
		Chaparral	
PVT, BLM	H	54. Manzanita-wedgeleaf ceanothus/bunchgrass chaparral.	
	*	55. Sticky manzanita-gray manzanita serpentine chaparral.	Rough & Ready Creek ACEC/(TNC)
PVT, BLM FS	M	56. Live oak/Fremont silk-tassel-birchleaf mountain mahogany/bunchgrass.	
	*	57. Birchleaf mountain mahogany-ceanothus-rosaceous mixed chaparral.	Scotch Creek RNA
		Grasslands	
	+	58. Baker cypress woodland.	Oliver Mathews PRNA
	*	59. Bluebunch wheatgrass-California oatgrass-Lemmon's needlegrass slopes.	Round Top Butte (TNC)/RNA
PVT, BLM	H	60. Idaho fescue-junegrass-Lemmon's needlegrass non-serpentine grassland.	
	*	61. Coastal oak-conifer woodland and meadow mosaic.	North Fork Hunter Creek ACEC
		Lacustrine	
FS, BLM	U	62. Dune or slump-blocked lake with aquatic beds and marshy shore.	
	*	63. Valley floor vernal pools on hardpan.	Table Rocks RNA Agate Desert (TNC)
	*	64. Vernal pools on basaltic andesite.	Table Rocks RNA Poverty Flat ACEC
	*	65. Lower to upper montane lake with aquatic beds and marshy shore, on serpentine or peridotite.	Red Mountain PRNA
		Palustrine	
	*	66. Douglas fir-bigleaf maple forest.	North Myrtle Creek RNA
FS, BLM	M	67. Riparian hardwoods with ash and black cottonwood.	
PVT, BLM	H	68. Alluvial terrace with ash, Oregon white oak and Ponderosa pine.	
	*	69. High elevation alder glade.	Grayback Glades RNA
	*	70. Riparian hardwood forest along a major river (with alder, bigleaf maple and myrtle).	North Fork Chetco River RNA Myrtle Island RNA
	*	71. Mid to high elevation pond with aquatic beds and marshy shore.	Brewer Spruce RNA

KLAMATH MOUNTAINS ECOLOGICAL ELEMENTS

Agency	Priority	Ecosystem Element Name	Present Representation
	+	72. Mid to high elevation vernal ponds and large cold springs.	Oliver Mathews PRNA
FS	L	73. Tufted hairgrass-sedge wetland.	
	*	74. Tufted hairgrass-California oatgrass bottomland seasonally flooded prairie.	Round Top Butte RNA/(TNC) French Flat RNA
	*	75. Mire on floating lake-fill mat.	Sharon Lake Fen (TNC)
FS, NPS	U	76. Hillslope wetland with willow and saussurea.	*Oregon Caves NM*
FS	U	77. Montane fen and wet mountain meadow complex.	
	*	78. Darlingtonia fen on serpentine-peridotite, with western azalea and camas along margins.	Lemmingsworth Gulch RNA Woodcock Bog RNA
	*	79. Darlingtonia fen on serpentine-peridotite, with Port Orford cedar.	Hunter Creek Bog RNA
FS	M	80. Riparian on serpentine-peridotite, with Port Orford cedar, western azalea and darlingtonia.	*Kalmiopsis WA*
	*	81. California laurel riparian forest.	North Fork Chetco River RNA

KLAMATH MOUNTAINS GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
		Quaternary	
	*	1. Limestone Caves	Oregon Caves NM
	*	2. River Gorge	Mule Creek Canyon Rogue WSR
		Eocene	
PVT	L	3. Tyee Formation	*Reston*
PVT	L	4. Camas Valley Formation	*Reston*
PVT	L	5. White Tail Ridge Formation	*Reston*
PVT	L	6. Tenmile Formation	*Reston*
PVT	L	7. Bushnell Rock Formation	*Reston*
		Eocene and Paleocene	
PVT	L	8. Siletz River Volcanics	*Reston*
		Cretaceous	
	*	9. Days Creek Formation	Eight Dollar Mountain SIA/ACEC
		Cretaceous and Jurassic	
BLM, FS	M	10. Riddle Formation	*Days Creek*
PVT	L	11. Dothan Formation	*Winston*
		Jurassic	
FS	M	12. Colebrooke Schist	
FS	L	13. Coast Range Ophiolite	*Riddle*
BLM, FS	M	14. Galice Formation	*Galice*
	*	15. Rogue Formation	Rogue River WSR (by Glendale)
BLM, FS	M	16. Josephine Ophiolite	*Cave Junction*
		Jurassic and Triassic	
	L	17. May Creek Schist	*Evans Creek*

KLAMATH MOUNTAINS SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
	Invertebrates				
1	*Bombus franklini*	Franklin's bumblebee	1		
2	*Branchinecta lynchi*	Vernal pool fairy shrimp	1	Lower Table Rock ACEC, Table Rocks RNA, Whetstone Savanna Preserve	BLM, TNC
3	*Callophrys johnsoni*	Johnson's hairstreak (butterfly)	1		
4	*Chloealtis aspasma*	Siskiyou short-horned grasshopper	1		
5	*Fluminicola sp. 19*	Keene Creek pebblesnail	1		
6	*Helminthoglypta hertleini*	Oregon shoulderband (snail)	1		
7	*Juga sp. 2*	Blue Mountains juga (snail)	1		
8	*Juga sp. 3*	Brown juga (snail)	1		
9	*Lanx alta*	Highcap lanx (snail)	1		
10	*Lanx subrotunda*	Rotund lanx (snail)	1		
11	*Monadenia chaceana*	Chace sideband (snail)	1		
12	*Monadenia fidelis beryllica*	Green sideband (snail)	1		
13	*Monadenia fidelis celeuthia*	Traveling sideband (snail)	1		
14	*Polites mardon*	Mardon skipper (butterfly)	1		
15	*Pomatiopsis binneyi*	Robust walker (snail)	1		
16	*Pomatiopsis chacei*	Marsh walker (snail)	1		
17	*Prophysaon sp. 1*	Klamath tail-dropper (slug)	1		
18	*Speyeria coronis coronis*	Coronis fritillary (butterfly)	2	Rough & Ready Flat SIA	TNC
19	*Stygobromus oregonensis*	Oregon Cave amphipod	1	Oregon Caves National Monument	NPS
20	*Vespericola sierranus*	Siskiyou hesperian (snail)	1		
21	*Vespericola sp. 1*	Oak Springs hesperian (snail)	1		
22	*Vespericola sp. 2*	Bald hesperian (snail)	1		
	Fish				
23	*Catostomus rimiculus pop. 1*	Jenny Creek sucker	1		
24	*Oncorhynchus kisutch pop. 2*	Coho salmon (Southern Oregon/Northern California Coasts ESU)	1		
25	*Oncorhynchus kisutch pop. 3*	Coho salmon (Oregon Coast ESU)	1		
26	*Oncorhynchus mykiss pop. 24*	Steelhead (Klamath Mountains Province ESU, summer run)	2		
27	*Oncorhynchus mykiss pop. 25*	Steelhead (Klamath Mountains Province ESU, winter run)	2		
28	*Oncorhynchus mykiss pop. 30*	Steelhead (Oregon Coast ESU, summer run)	1		
29	*Oncorhynchus mykiss pop. 31*	Steelhead (Oregon Coast ESU, winter run)	1		
30	*Oncorhynchus tshawytscha pop. 26*	Chinook salmon (Southern Oregon/Northern California Coast ESU, fall run)	2		
31	*Oregonichthys kalawatseti*	Umpqua chub	1		

KLAMATH MOUNTAINS SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
	Amphibians				
32	*Aneides flavipunctatus*	Black salamander	2	Ashland RNA	FS
33	*Batrachoseps attenuatus*	California slender salamander	2	Sourgame SIA, Wheeler Creek RNA	FS, BLM
34	*Plethodon stormi*	Siskiyou Mountains salamander	1		
35	*Rana boylii*	Foothill yellow-legged frog	2	Illinois River State Scenic Waterway, Kalmiopsis WA, Rough & Ready Creek Preserve, Rogue River Wild & Scenic River	PRD, FS, TNC
36	*Rana pipiens*	Northern leopard frog	2		
	Reptiles				
37	*Actinemys marmorata marmorata*	Northern Pacific pond turtle	2	Kalmiopsis WA, Lost Lake RNA, Rogue River State Scenic Waterway, Denman WMA	FS, BLM
	Birds				
38	*Agelaius tricolor*	Tricolored blackbird	2	Denman WMA	
39	*Ammodramus savannarum*	Grasshopper sparrow	2		
40	*Brachyramphus marmoratus*	Marbled murrelet	2	*Peavine Ridge*	
41	*Branta hutchinsii leucopareia*	Aleutian Canada goose	2		
42	*Bucephala albeola*	Bufflehead	2		
43	*Elanus leucurus*	White-tailed kite	2		
44	*Eremophila alpestris strigata*	Streaked horned lark	1		
45	*Falco peregrinus anatum*	American peregrine falcon	2	Kalmiopsis WA, Rogue River State Scenic Waterway	FS
46	*Fratercula cirrhata*	Tufted puffin	2		
47	*Gymnogyps californianus*	California condor	1-x		
48	*Haliaeetus leucocephalus*	Bald eagle	ESA	Wild Rogue WA	FS
49	*Melanerpes lewis*	Lewis's woodpecker	2	Denman WMA, Lower Table Rock Preserve, Touvelle State Recreation Site	TNC, PRD
50	*Picoides albolarvatus*	White-headed woodpecker	2		
51	*Pooecetes gramineus affinis*	Oregon vesper sparrow	2		
52	*Progne subis*	Purple martin	2		
53	*Strix occidentalis caurina*	Northern spotted owl	1	Bear Gulch ACEC, Bear Gulch RNA	BLM
	Mammals				
54	*Antrozous pallidus*	Pallid bat	2		
55	*Canis lupus*	Gray wolf	2		

KLAMATH MOUNTAINS SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
56	*Corynorhinus townsendii*	Townsend's big-eared bat	2	Kalmiopsis WA, Oregon Caves National Monument, Rogue River State Scenic Waterway	NPS, FS
57	*Lynx canadensis*	Canada lynx	2		
58	*Martes pennanti*	Fisher	2	Eight Dollar Mt SIA	
59	*Myotis thysanodes*	Fringed myotis	2	Oregon Caves National Monument	NPS
60	*Odocoileus virginianus leucurus*	Columbian white-tailed deer	1	North Bank Habitat Area	BLM
61	*Ursus arctos horribilis*	Grizzly bear	2-x		
	Vascular Plants				
62	*Adiantum jordanii*	California maiden-hair	2		
63	*Agrostis hendersonii*	Henderson's bentgrass	1-x		
64	*Allium peninsulare*	Peninsular onion	2	Cascade-Siskiyou National Monument	BLM
65	*Androsace elongata ssp. acuta*	Long-stemmed androsace	2-x		
66	*Arabis koehleri var. koehleri*	Koehler's rockcress	1		
67	*Arabis macdonaldiana*	Red Mountain rockcress	1	Kalmiopsis Wilderness Area, Rough & Ready Flat SIA	FS
68	*Arabis modesta*	Rogue Canyon rockcress	2	Rogue River State Scenic Waterway	BLM
69	*Arctostaphylos hispidula*	Gasquet manzanita	2	Green Knob SIA, Kalmiopsis WA, North Fork Hunter Creek ACEC	FS, BLM
70	*Astragalus californicus*	California milk-vetch	2	Cascade-Siskiyou National Monument, Scotch Creek RNA	BLM
71	*Astragalus gambelianus*	Gambel milk-vetch	2	Cascade-Siskiyou National Monument, Scotch Creek RNA	BLM
72	*Balsamorhiza hookeri var. lanata*	Woolly balsamroot	1		
73	*Bensoniella oregana*	Bensonia	1	Bear Camp SIA	FS
74	*Botrychium crenulatum*	Crenulate grape-fern	1		
75	*Bulbostylis capillaris*	Densetuft hairsedge	2-x		
76	*Callitriche marginata*	Winged water-starwort	2	Table Rocks RNA	BLM
77	*Calochortus coxii*	Cox's mariposa-lily	1		
78	*Calochortus greenei*	Greene's mariposa-lily	1	Cascade Siskiyou National Monument	NPS
79	*Calochortus howellii*	Howell's mariposa-lily	1	Woodcock Bog RNA, Eight Dollar Mountain ACEC, Oregon Mountain SIA	BLM, FS
80	*Calochortus indecorus*	Sexton Mt. mariposa-lily	1-X		

KLAMATH MOUNTAINS SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
81	*Calochortus nitidus*	Broad-fruit mariposa-lily	2		
82	*Calochortus nudus*	Shasta star-tulip	2		
83	*Calochortus persistens*	Siskiyou mariposa lily	1		
84	*Calochortus umpquaensis*	Umpqua mariposa-lily	1	Eight Dollar Mountain SIA/ACEC, Rough & Ready Creek SIA, Rough & Ready Preserve	BLM, FS, TNC
85	*Camassia howellii*	Howell's camassia	1		
86	*Camissonia graciliflora*	Slender-flowered evening-primrose	2	Cascade-Siskiyou National Monument, Oregon Gulch RNA, Pilot Rock ACEC, Soda Mountain WSA	BLM
87	*Carex comosa*	Bristly sedge	2		
88	*Carex gynodynama*	Hairy sedge	2	North Bank ACEC	BLM
89	*Carex klamathensis*	Klamath sedge	1		
90	*Carex nervina*	Sierra nerved sedge	2		
91	*Carex scabriuscula*	Siskiyou sedge	2	Kalmiopsis WA, Red Buttes WA	
92	*Castilleja schizotricha*	Split-hair paintbrush	2	Red Mountain RNA	
93	*Cheilanthes intertexta*	Coastal lipfern	2	Cascade-Siskiyou National Monument, Oregon Gulch RNA, Scotch Creek RNA, Soda Mountain WSA	BLM
94	*Chlorogalum angustifolium*	Narrow-leaved amole	2		
95	*Cicendia quadrangularis*	Timwort	2		
96	*Cimicifuga elata var. elata*	Tall bugbane	1		
97	*Cryptantha milo-bakeri*	Milo Baker's cryptantha	2		
98	*Cupressus bakeri*	Baker's cypress	2	Grayback Mt SIA, Miller Lake SIA	
99	*Cyperus acuminatus*	Short-pointed cyperus	2		
100	*Cypripedium fasciculatum*	Clustered lady's-slipper	2	Cascade-Siskiyou National Monument, Kalmiopsis WA, Scotch Creek RNA	BLM
101	*Delphinium nudicaule*	Red larkspur	2	Cascade-Siskiyou National Monument, Rogue River Wild & Scenic River	BLM
102	*Dicentra pauciflora*	Few-flowered bleedingheart	2	Hinkle Lake SIA	USDA
103	*Draba howellii*	Howell's whitlow-grass	2	Big Craggies SIA, Brewer Spruce RNA, Hinkle Lake SIA, Oliver Mathews RNA	BLM, USDA
104	*Epilobium oreganum*	Oregon willow-herb	1	Cedar Log Flat RNA, Woodcock Bog RNA, Oregon Mountain SIA	BLM, FS

KLAMATH MOUNTAINS SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
105	*Epilobium siskiyouense*	Siskiyou willow-herb	1	Observaton Peak, Dutchman Peak SIA	FS
106	*Ericameria arborescens*	Golden fleece	2		
107	*Erigeron cervinus*	Siskiyou daisy	2	Babyfoot Lake Botanical Interest Area, Grayback Mt SIA, Kalmiopsis WA, Red Flat SIA	FS
108	*Erigeron petrophilus*	Cliff daisy	2	Oliver Mathews RNA, Agate Desert Preserve	BLM, TNC
109	*Eriogonum lobbii*	Lobb's buckwheat	2	Big Craggies SIA	
110	*Erodium macrophyllum*	Large-leaved filaree	2-x		
111	*Erythronium howellii*	Howell's adder's-tongue	1	Eight Dollar Mountain SIA	FS
112	*Eschscholzia caespitosa*	Gold poppy	2		
113	*Eucephalus vialis*	Wayside aster	1		
114	*Frasera umpquaensis*	Umpqua swertia	1	Bear Camp SIA	FS
115	*Fritillaria gentneri*	Gentner's fritillaria	1	Cascades Siskiyou National Monument	NPS
116	*Fritillaria purdyi*	Purdy's fritillaria	2		
117	*Gentiana plurisetosa*	Bristly gentian	1	Grayback Mountain SIA	FS
118	*Gentiana setigera*	Waldo gentian	1	Lemmingsworth Gulch RNA, Woodcock Bog RNA	BLM
119	*Hackelia bella*	Beautiful stickseed	2		
120	*Hastingsia bracteosa var. atropurpurea*	Purple flowered rush-lily	1	Rough & Ready Flat SIA, Woodcock Bog RNA	BLM, FS
121	*Hastingsia bracteosa var. bracteosa*	Large-flowered rush-lily	1	Eight Dollar Mountain ACEC, Rough & Ready Flat SIA/ACEC	BLM, FS
122	*Hieracium horridum*	Shaggy hawkweed	2		
123	*Horkelia congesta ssp. congesta*	Shaggy horkelia	1		
124	*Horkelia hendersonii*	Henderson's horkelia	1		
125	*Horkelia tridentata ssp. tridentata*	Three-toothed horkelia	2		
126	*Iliamna latibracteata*	California globe-mallow	2		
127	*Keckiella lemmonii*	Bush beardtongue	2		
128	*Lewisia leeana*	Lee's lewisia	2	Grayback Mt SIA	
129	*Lilium kelloggii*	Kellogg's lily	2		
130	*Limnanthes floccosa ssp. bellingeriana*	Bellinger's meadow-foam	1	Roxyanne Peak Park	CITY OF MEDFORD
131	*Limnanthes floccosa ssp. grandiflora*	Big-flowered wooly meadow-foam	1	Agate Desert Preserve, Whetstone Savanna Preserve	TNC
132	*Limnanthes floccosa ssp. pumila*	Dwarf wooly meadow-foam	1	Table Rocks RNA, Lower Table Rock Preserve	BLM, TNC

KLAMATH MOUNTAINS SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
133	*Limnanthes gracilis ssp. gracilis*	Slender meadow-foam	1	Illinois River Forks State Park	PRD
134	*Lomatium cookii*	Agate Desert lomatium	1	Woodcock Bog RNA, Agate Desert Preserve, Whetstone Savanna Preserve	BLM, TNC
135	*Lomatium engelmannii*	Engelmann's desert-parsley	2	Chrome Ridge SIA	FS
136	*Lotus stipularis*	Stipuled trefoil	2		
137	*Lupinus lepidus var. ashlandensis*	Mt. Ashland lupine	1	*Mt. Ashland*	
138	*Lupinus sulphureus ssp. kincaidii*	Kincaid's lupine	1		
139	*Lupinus tracyi*	Tracy's lupine	2	Babyfoot Lake Botanical Interest Area, Kalmiopsis WA	FS
140	*Meconella oregana*	White meconella	1		
141	*Microseris douglasii ssp. douglasii*	Douglas' microseris	2-x		
142	*Mimulus bolanderi*	Bolander's monkeyflower	2		
143	*Mimulus congdonii*	Congdon's monkeyflower	2		
144	*Monardella purpurea*	Siskiyou monardella	2	Kalmiopsis WA, Lemmingsworth Gulch RNA, Rough & Ready Flat SIA, Rogue River Wild & Scenic River	
145	*Nemacladus capillaris*	Slender nemacladus	2	Cascade-Siskiyou National Monument, Oregon Gulch RNA	BLM
146	*Pellaea andromedifolia*	Coffee fern	2		
147	*Pellaea mucronata ssp. mucronata*	Bird's-foot fern	2		
148	*Perideridia erythrorhiza*	Red-root yampah	1	Eight Dollar Mountain SIA	FS
149	*Phacelia leonis*	Siskiyou phacelia	1		
150	*Pilularia americana*	American pillwort	2	Agate Desert Preserve	TNC
151	*Plagiobothrys austiniae*	Austin's plagiobothrys	2		
152	*Plagiobothrys figuratus ssp. corallicarpus*	Coral seeded allocarya	1	Whetstone Savanna Preserve	BLM
153	*Plagiobothrys greenei*	Greene's popcorn flower	2	Table Rocks RNA	BLM
154	*Plagiobothrys hirtus*	Rough popcorn flower	1	Popcorn Swale Preserve	BLM
155	*Plagiobothrys lamprocarpus*	Shiny-fruited popcorn flower	1-X		
156	*Poa rhizomata*	Timber bluegrass	2	Cascade-Siskiyou National Monument	BLM
157	*Rafinesquia californica*	California chicory	2	Cascade-Siskiyou National Monument, Scotch Creek RNA	BLM
158	*Ranunculus austrooreganus*	Southern Oregon buttercup	1	Whetstone Savanna Preserve, Upper Table Rock ACEC	BLM

KLAMATH MOUNTAINS SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
159	*Rhamnus ilicifolia*	Redberry	2	Cascade-Siskiyou National Monument	BLM
160	*Ribes divaricatum var. pubiflorum*	Straggly gooseberry	2		
161	*Romanzoffia thompsonii*	Thompson mistmaiden	1		
162	*Saxifragopsis fragarioides*	Strawberry saxifrage	2	Kalmiopsis WA	
163	*Schoenoplectus subterminalis*	Water clubrush	2	Kalmiopsis WA	FS
164	*Scirpus pendulus*	Drooping bulrush	2	Illinois River State Scenic Waterway, Rogue River Wild & Scenic River	FS, BLM
165	*Scoliopus bigelovii*	California fetid adder's-tongue	2		
166	*Sedum moranii*	Rogue River stonecrop	1	Rogue River WSR	BLM, FS
167	*Sidalcea hickmanii ssp. 1*	Hickman's southern Oregon sidalcea	1		
168	*Sidalcea malachroides*	Maple-leaved sidalcea	1-x		
169	*Sidalcea malviflora ssp. patula*	Coast checker bloom	1		
170	*Silene hookeri ssp. bolanderi*	Bolander's catchfly	2		
171	*Sisyrinchium hitchcockii*	Hitchcock's blue-eyed grass	1		
172	*Solanum parishii*	Parish's horse-nettle	2	Cascade-Siskiyou National Monument, Hinkle Lake SIA	BLM, USDA
173	*Sophora leachiana*	Western necklace	1	York Creek SIA, Kalmiopsis WA	FS
174	*Streptanthus glandulosus*	Common jewel flower	2		
175	*Streptanthus howellii*	Howell's streptanthus	1	Lemmingsworth Gulch RNA, Rough & Ready Flat SIA/(TNC), Kalmiopsis WA	BLM, TNC, FS
176	*Tauschia howellii*	Howell's tauschia	1		
177	*Trillium kurabayashii*	Giant purple trillium	2		
178	*Triteleia ixioides ssp. anilina*	Sierra brodiaea	2-x		
179	*Triteleia laxa*	Ithuriel's spear	2		
180	*Utricularia minor*	Lesser bladderwort	2		
181	*Viola primulifolia ssp. occidentalis*	Western bog violet	1	Lemmingsworth Gulch RNA, Woodcock Bog RNA, Eight Dollar Mountain ACEC	BLM
182	*Wolffia columbiana*	Columbia water-meal	2		
183	*Zigadenus fontanus*	Small-flowered death camas	2	Ashland RNA	BLM
	Nonvascular Plants				
184	*Anastrophyllum minutum*	Liverwort	2		
185	*Andreaea schofieldiana*	Moss	2	Cascade-Siskiyou National Monument	BLM

KLAMATH MOUNTAINS SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
186	*Bryum calobryoides*	Moss	2	Oregon Caves National Monument	NPS
187	*Cryptomitrium tenerum*	Liverwort	2	Rogue River Wild & Scenic River	
188	*Encalypta brevipes*	Moss	2		
189	*Entosthodon fascicularis*	Moss	2		
190	*Ephemerum crassinervium*	Moss	2		
191	*Meesia uliginosa*	Moss	2	Cascade-Siskiyou National Monument	BLM
192	*Phymatoceros bulbiculosus*	Hornwort	2		
193	*Porella bolanderi*	Liverwort	2	Bushnell-Irwin Rocks ACEC/RNA, Cascade-Siskiyou National Monument	BLM
194	*Tayloria serrata*	Moss	2		
195	*Tortula mucronifolia*	Moss	2		
	Fungi				
196	*Arcangeliella camphorata*	Fungus	1		
197	*Bryoria subcana*	Lichen	2		
198	*Dermocybe humboldtensis*	Fungus	1		
199	*Gastroboletus vividus*	Fungus	1		
200	*Phaeocollybia californica*	Fungus	1		
201	*Psathyrella quercicola*	Fungus	1-X		
202	*Ramaria spinulosa var. diminutiva*	Fungus	1		
203	*Rhizopogon chamaleontinus*	Fungus	2		
204	*Rhizopogon clavitisporus*	Fungus	2		
205	*Rhizopogon ellipsosporus*	Fungus	2		
206	*Rhizopogon exiguus*	Fungus	2		
207	*Urnula craterium*	Fungus	2-x		

CHAPTER 13. WEST CASCADES ECOREGION

The West Cascades Ecoregion extends from southern British Columbia south almost to the California border. This mountainous, heavily forested ecoregion is bounded on the west by the farms and woodlands of the Willamette Valley or the drier forests and valleys of the Klamath Mountains. To the east, it spills over the crest of the Cascade Mountains to the drier pine forests of the East Cascades.

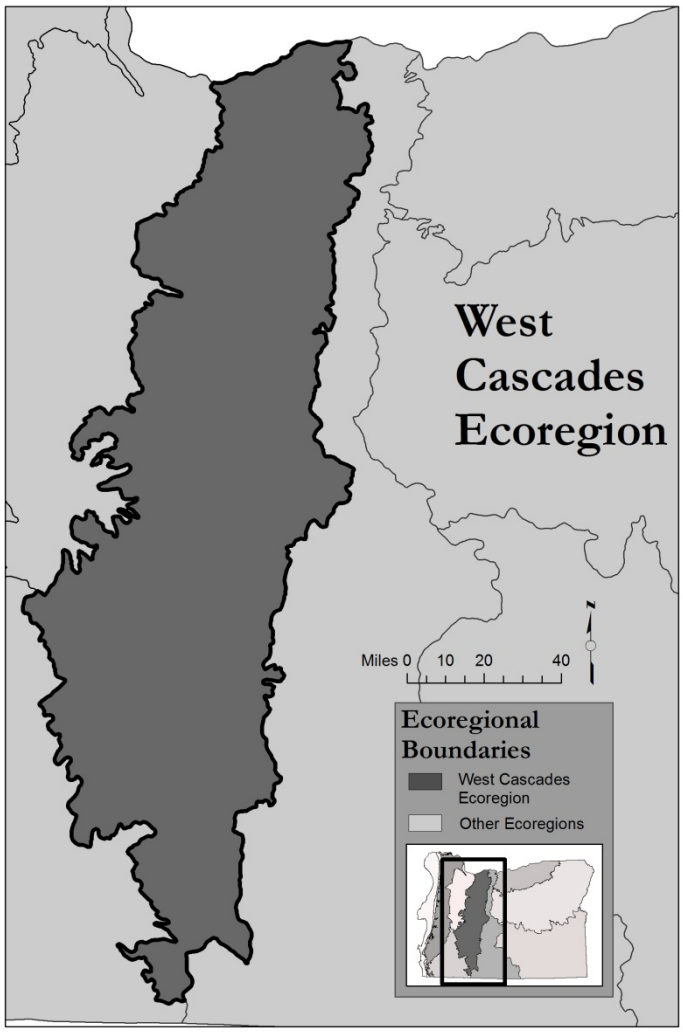

Figure 13. West Cascades Ecoregion Map.

The crest of the Cascade Range is dominated by a series of volcanic peaks. In Oregon, Mount Hood is the highest at 11,240 feet, but a dozen others top 8,000 feet. The western slopes of the range feature long ridges with steep sides and wide, glaciated valleys. Most of the rivers draining the northern two-thirds of the ecoregion flow into the Willamette Valley and then to the Columbia River system; the southern third drains to the Pacific Ocean through the Umpqua and Rogue River systems. The climate varies with elevation and, to a lesser extent, latitude. Higher elevations receive heavy winter snows. The drier southern half has a fire regime similar to the Klamath Mountains, with frequent lightning-caused fires. In the north, the natural fire regime historically has had less frequent but more severe fires.

The ecoregion is almost entirely forested. Douglas fir-western hemlock forests dominate large areas up to elevations of about 3,300 feet. However, most of the previously-harvested forests of the lowlands and lower slopes now support mixed conifer-deciduous forests, with young Douglas fir and western hemlock forests found in a mosaic with hardwood species such as bigleaf maple and red alder. Silver fir-mountain hemlock forests occur at mid-elevations. Silver fir is common between 2,600 and 4,200 feet. Mountain hemlock is most common between 3,200 and 6,000 feet. In the higher areas, mountain hemlock or occasionally Alaska yellow cedar, subalpine fir, or whitebark pine woodlands open into alpine parklands with patches of forest interspersed with shrub and meadow communities. Alpine areas feature a variety of habitats ranging from dwarf shrubs, grasses and forbs to wetlands and barren expanses of rocks and ice.

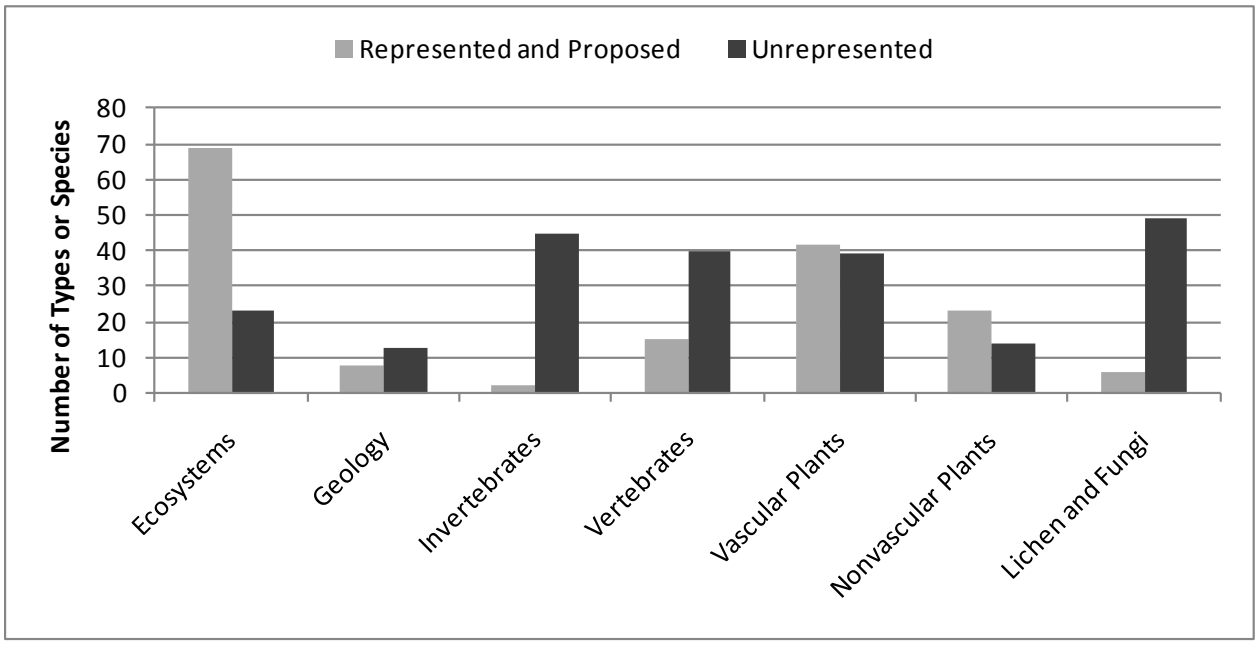

Figure 14. Represented and Unrepresented Ecosystem Elements and Species for the West Cascades Ecoregion.

Agency	Priority	Ecosystem Element Name	Present Representation
		Western Hemlock	
	*	1. Western hemlock/oceanspray.	Tater Hill RNA Limpy Rock RNA
	*	2. Western hemlock/salal/twinflower with white-flowered hawkweed and common prince's pine if possible.	Hagan RNA
	*	3. Western hemlock/salal-Oregon grape.	Hagan RNA
	*	4. Western hemlock/rhododendron-salal.	Bagby RNA
	*	5. Western hemlock/rhododendron-Alaska huckleberry.	Middle Santiam RNA
FS	M	6. Western hemlock/Alaska huckleberry-salal.	*Menagerie WA*
	*	7. Western hemlock/rhododendron/twinflower with beargrass if possible.	Bull Run RNA
	*	8. Western hemlock/dwarf Oregon grape/swordfern.	Middle Santiam RNA
	*	9. Western hemlock/dwarf Oregon grape/oxalis.	Middle Santiam RNA
FS	H	10. Western hemlock/dwarf Oregon grape/vanilla leaf.	*Menagerie WA*
	*	11. Western hemlock/dwarf Oregon grape/twinflower.	Hagan RNA
FS	M	12. Western hemlock/salal.	*Columbia WA*
FS	H	13. Western hemlock/vanilla leaf.	
	*	14. Western hemlock/oxalis.	Middle Santiam RNA
	*	15. Western hemlock/devil's club.	Carolyn's Crown - Shafer Creek RNA Columbia WA
FS, BLM PRD	H	16. River terrace forest with Douglas fir, western red cedar, western hemlock and associated hardwoods.	Middle Santiam R. Terrace ACEC
	*	17. Old growth western red cedar types.	Carolyn's Crown – Shafer Creek RNA
		Pacific Silver Fir	
FS	L	18. Silver fir/dwarf Oregon grape.	
	+	19. Silver fir/rhododendron/beargrass.	Big Bend Mountain WMA Carolyn's Crown – Shafer Creek RNA
	*	20. Silver fir/rhododendron-dwarf Oregon grape.	Big Bend Mountain WMA Bull Run RNA
FS	M	21. Silver fir forest with big huckleberry and dwarf bramble.	
	+	22. Silver fir/big huckleberry/beadlily.	Salmon-Huckleberry WA Big Bend Mountain WMA

Agency	Priority	Ecosystem Element Name	Present Representation
	*	23. Silver fir/big huckleberry/beargrass.	Big Bend Mountain WMA Bull Run RNA
	*	24. Silver fir/vine maple.	Upper Elk Meadows RNA
	*	25. Silver fir/Alaska huckleberry/bunchberry with rhododendron if possible.	Big Bend Mountain WMA Wildcat Mountain RNA Carolyn's Crown – Shafer Creek RNA
	*	26. Silver fir/Oregon oxalis.	Carolyn's Crown – Shafer Creek RNA
	*	27. Silver fir/coolwort foamflower and silver fir/vine maple/coolwort foamflower communities.	Wildcat Mountain RNA
	*	28. Silver fir/Cascades azalea with fool's huckleberry if possible.	Mount Hood WA
	*	29. Silver fir/Devil's club.	Big Bend Mountain WMA Bull Run RNA
FS	M	30. Silver fir-white fir/starry Solomon seal with dwarf Oregon grape if possible.	
	+	31. Douglas fir-canyon live oak forest.	Bear Gulch RNA
		Douglas Fir	
	*	32. Douglas fir-Oregon white oak/poison oak woodland with associated meadows.	Squaw Flat RNA
FS, BLM	M	33. Douglas fir/poison oak woodland.	
	*	34. Douglas fir/salal/swordfern forest.	Red Ponds RNA
	*	35. Douglas fir/oceanspray-dwarf Oregon grape.	Rigdon Point RNA
	*	36. Douglas fir/oceanspray/whipplevine with incense cedar if possible.	Limpy Rock RNA
FS	H	37. Douglas fir-ponderosa pine-incense cedar/California fescue forest.	
	*	38. Douglas fir-ponderosa pine-sugar pine/evergreen shrub forest.	Abbott Creek RNA
		White Fir and Red Fir	
FS, BLM	M	39. White fir-Douglas fir/Piper's Oregon grape.	
	*	40. White fir-incense cedar/dwarf Oregon grape forest.	Abbott Creek RNA
FS, BLM	M	41. White fir/big huckleberry with twinflower and vanilla leaf if possible.	
FS, BLM	M	42. White fir/vine maple/vanilla leaf with snow bramble if possible.	

Agency	Priority	Ecosystem Element Name	Present Representation
FS, BLM	M	43. White fir/dwarf Oregon grape-salal.	
	L	44. White fir-red fir/prince's pine.	
FS	M	45. White fir-Douglas fir forest with dwarf Oregon grape and threeleaf anemone and with western serviceberry and Douglas maple if possible.	
	*	46. Ponderosa pine/greenleaf manzanita-bitterbrush.	Desert Creek RNA
	*	47. Shasta red fir/big huckleberry.	Wickiup Springs PRNA Cougar Butte RNA
FS	H	48. Red fir-Alaska yellow cedar forest.	*Sky Lakes WA*
	*	49. Mountain meadow-white fir forest mosaic with blue wildrye and Umpqua swertia.	Cougar Butte RNA
		Mountain Hemlock	
	8	50. Mountain hemlock/big huckleberry.	Gold Lake Bog RNA Waldo WA
	*	51. Mountain hemlock/rhododendron.	Three Sisters WA Waldo Lake WA
	+	52. Mountain hemlock/grouse huckleberry and mountain hemlock/woodrush forests.	Torrey-Charlton RNA Three Sisters WA
		Subalpine and Alpine Communities	
	*	53. Subalpine bitterbrush steppe with long stolon sedge and needlegrass.	Desert Creek RNA
	*	54. Engelmann spruce-subalpine fir forest.	Gold Lake Bog RNA
	*	55. Alaska yellow cedar forest mosaic.	Three Creeks RNA
	*	56. Lodgepole pine/Brewer's sedge forest.	Pumice Desert RNA
	*	57. Whitebark pine in the high Cascades.	Llao Rock RNA
	*	58. Subalpine meadow mosaic in the high Cascades.	Three Sisters WA Mt. Jefferson WA Rogue-Umpqua Divide WA
	*	59. Subalpine pumice and ash fields.	Pumice Desert RNA
	*	60. Alpine needlegrass in the high Cascades.	Sky Lakes WA Mountain Lakes WA
	*	61. Alpine mosaic (above treeline with a variety of meadows, rocky areas, and aspects).	Three Sisters WA Mount Jefferson WA Mount Thielsen WA

Agency	Priority	Ecosystem Element Name	Present Representation
		Special Types	
	*	62. Lava flow with representative vegetation (range from mid to high elevations).	McKenzie Pass RNA
FS	U	63. Recent lahar (mudflow) with successional forest communities including lodgepole pine/pinemat manzanita.	
FS	L	64. Lodgepole pine/sedge communities on glacial outwash.	
	+	65. Blue wildrye or red fescue grass bald communities.	Horse Rock Ridge RNA Grassy Mountain PACEC
	+	66. Chaparral communities dominated by chinquapin and manzanita.	Old Baldy RNA
		Lacustrine	
	*	67. Mid-montane lake with aquatic beds and marshy shore, surrounded by mixed conifer forest.	Lost Lake RNA
		68. Mid to upper montane lake with aquatic beds and marshy shore.	Waldo Lake WA Mt. Jefferson WA Mount Washington WA Diamond Lake WA
	+	69. Subalpine lake.	Big Bend Mtn. RNA Crabtree Lake ONA/ACEC
	*	70. Alpine lake.	Three Sisters WA
	*	71. Ultraoligotrophic montane lake.	Waldo Lake WA, Crater Lake National Park
		Palustrine	
	*	72. Low elevation pond, with aquatic beds and marshy shore.	Red Ponds RNA
	*	73. Upper montane to subalpine pond, with aquatic beds and marshy shore.	Gold Lake Bog RNA Torrey-Charlton RNA Many Lakes RNA
	*	74. Alpine pond.	Three Sisters WA
	+	75. Montane vernal pond.	Big Bend Mtn. PRNA Torrey-Charlton RNA
PVT, FS	U	76. Flowing and pooled hot springs.	
	*	77. Flowing and pooled cold springs.	Big Bend Mtn. PRNA Bull Run RNA

Agency	Priority	Ecosystem Element Name	Present Representation
	*	78. Vernal seepage slopes on low to mid elevation rocky bald communities, with monkeyflower, saxifrage and moss.	Horse Rock Ridge RNA Grassy Mountain ACEC
FS	H	79. Sphagnum mire on floating lake fill mat.	
	+	80. Sitka sedge fen.	Big Bend Mtn. PRNA
	*	81. Subalpine sedge fen, dominated by black and Holm sedge.	Three Sisters WA Mount Jefferson WA
	*	82. Few flowered spikerush/brown moss fen, with lodgepole pine.	Gold Lake Bog RNA Many Lakes RNA
	*	83. Bog laurel shrub swamp.	Torrey-Charlton RNA Sphagnum Bog RNA
	*	84. Forb flush on seepage slope (including marsh marigold, shooting-star, bistort, arrowleaf groundsel and false hellebore).	Upper Elk Meadows RNA Three Sisters WA Mt. Jefferson WA
	*	85. Geyer willow shrub swamp.	Gold Lake Bog RNA
	*	86. Sitka alder/devils club swamp on seepy talus slopes or avalanche tracks.	Three Sisters WA Mt. Jefferson WA
	*	87. Sitka alder/lady fern swamp.	Upper Elk Meadows RNA Olallie Ridge RNA
	*	88. Bog birch shrub swamp.	Gold Lake Bog RNA Many Lakes RNA
	+	89. Mountain alder/sedge on organic soils.	Sphagnum Bog RNA Many Lakes RNA
	*	90. Bog blueberry shrubswamp, with Engelmann spruce, lodgepole pine, and tufted hairgrass.	Gold Lake Bog RNA Many Lakes RNA
FS, BLM	H	91. Western red cedar-western hemlock/skunk cabbage swamp.	
FS	L	92. Alaska yellow cedar/devils club swamp.	

WEST CASCADES GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority		Formation or Feature Name	Present Representation
			Holocene	
	*	1.	Columbia River Gorge	Columbia River Gorge National Scenic Area
	*	2.	Multnomah Falls	Columbia River Gorge National Scenic Area
PRD	H	3.	Sand dunes in western Columbia River Gorge	Rooster Rock State Park
	*	4.	Bridge of the Gods Landslide	Columbia River Gorge National Scenic Area
	*	5.	Bagby Hot Springs	Bagby RNA
			Pleistocene and Holocene	
	*	6.	Eliot Glacier	Mt. Hood WA
FS	M	7.	Old Maid Lahar	*Sandy River*
	M	8.	Cascades Stratovolcanoes Cone: Mt. McLoughlin	*Mt. McLoughlin*
	*	9.	Cascades Stratovolcanoes Eroded cone: Three-Fingered Jack	Mt. Washington WA
	*	10.	Cascades Stratovolcanoes Caldera: Crater Lake	Crater Lake National Park
			Pliocene and Miocene	
FS	L	11.	Outerson volcanics	*Outerson Mountain*
FS	L	12.	Rhododendron Formation	*Rhododendron*
			Miocene	
	*	13.	Eagle Creek Formation	Eagle Creek Columbia River Gorge National Scenic Area
FS	L	14.	Sardine Formation	*Sardine Mountain*
			Miocene and Oligocene	
FS, PVT	L	15.	Breitenbush Formation	*Cleator Bend* *Breitenbush River*
			Oligocene and Eocene	
FS	L	16.	Heppsie Andesite	*Heppsie Mountain*
FS	L	17.	Wasson Formation	*Lake Creek*
FS	L	18.	Roxy Formation	*Ashland*

WEST CASCADES GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
FS	L	19. Tuff of Bond Creek	*Diamond Rock*
		Eocene	
FS	L	20. Colestin Formation	*Colostin*
		Cretaceous	
FS	L	21. Hornbrook Formation	*Jacksonville*

WEST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
	Invertebrates				
1	*Agonum belleri*	Beller's ground beetle	2		
2	*Allomyia scotti*	Scott's apatanian caddisfly	1		
3	*Anodonta californiensis*	California floater (mussel)	2		
4	*Anodonta nuttalliana*	Winged floater	2		
5	*Anodonta wahlametensis*	Willamette floater (mussel)	1		
6	*Callophrys johnsoni*	Johnson's hairstreak (butterfly)	1		
7	*Chloealtis aspasma*	Siskiyou short-horned grasshopper	1		
8	*Colligyrus sp. 4*	Columbia duskysnail	1		
9	*Cryptomastix devia*	Puget oregonian (snail)	1		
10	*Cryptomastix hendersoni*	Columbia Gorge oregonian (snail)	1		
11	*Deroceras hesperium*	Evening fieldslug	1		
12	*Farula constricta*	A caddisfly	1		
13	*Fluminicola sp. 15*	Tiger lily pebblesnail	1		
14	*Fluminicola sp. 19*	Keene Creek pebblesnail	1		
15	*Fluminicola sp. 21*	Pinhead pebblesnail	1		
16	*Fluminicola sp. 4*	Fall Creek pebblesnail	1		
17	*Fluminicola sp. 7*	Lake of the Woods pebblesnail	1		
18	*Gliabates oregonius*	Salamander slug	1		
19	*Gonidea angulata*	Western ridged mussel	2		
20	*Helminthoglypta hertleini*	Oregon shoulderband (snail)	1		
21	*Juga hemphilli dallesensis*	Dalles juga (snail)	1		
22	*Juga hemphilli hemphilli*	Barren juga (snail)	1		
23	*Juga sp. 1*	Basalt juga (snail)	1		
24	*Juga sp. 3*	Brown juga (snail)	1		
25	*Juga sp. 7*	Three-band juga (snail)	1		
26	*Lanx subrotunda*	Rotund lanx (snail)	1		
27	*Monadenia chaceana*	Chace sideband (snail)	1		
28	*Monadenia fidelis celeuthia*	Traveling sideband (snail)	1		
29	*Monadenia fidelis columbiana*	Columbia sideband (snail)	1		
30	*Monadenia fidelis minor*	Oregon snail (Dalles sideband)	1		
31	*Namamyia plutonis*	A caddisfly	2		
32	*Neothremma andersoni*	Columbia Gorge caddisfly	1		
33	*Physella columbiana*	Rotund physa (snail)	1		
34	*Plebejus podarce*	Gray blue (butterfly)	2		
35	*Polites mardon*	Mardon skipper (butterfly)	1		
36	*Pristiloma arcticum crateris*	Crater Lake tightcoil (snail)	1	Crater Lake National Park	NPS
37	*Pristiloma johnsoni*	Broadwhorl tightcoil (snail)	2		
38	*Prophysaon sp. 1*	Klamath tail-dropper (slug)	1		
39	*Prophysaon vanattae pop. 1*	Spotted tail-dropper (slug)	1		
40	*Rhyacophila chandleri*	A caddisfly	2		
41	*Rhyacophila leechi*	A caddisfly	2		
42	*Sixeonotus sp. 1*	A plant bug	2		
43	*Speyeria coronis coronis*	Coronis fritillary (butterfly)	2		
44	*Vanduzeeina borealis californica*	California shield-backed bug	2		

	Scientific Name	Common Name	List	Present Representation	Agency
45	*Vespericola sierranus*	Siskiyou hesperian (snail)	1		
46	*Vorticifex neritoides*	Nerite ramshorn (snail)	1		
47	*Zapada wahkeena*	Wahkeena Falls flightless stonefly	1	Columbia River Gorge National Scenic Area	FS
	Fish				
48	*Catostomus rimiculus pop. 1*	Jenny Creek sucker	1		
49	*Lampetra minima*	Miller Lake lamprey	1		
50	*Oncorhynchus clarkii pop. 2*	Coastal cutthroat trout (Southwestern Washington/Columbia River ESU)	1		
51	*Oncorhynchus keta pop. 3*	Chum salmon (Columbia River ESU)	1		
52	*Oncorhynchus kisutch pop. 1*	Coho salmon (Lower Columbia River ESU)	1	Salmon-Huckleberry Wilderness Area	FS
53	*Oncorhynchus kisutch pop. 2*	Coho salmon (Southern Oregon/Northern California Coasts ESU)	1		
54	*Oncorhynchus kisutch pop. 3*	Coho salmon (Oregon Coast ESU)	1		
55	*Oncorhynchus mykiss pop. 13*	Steelhead (Snake River Basin ESU)	1		
56	*Oncorhynchus mykiss pop. 24*	Steelhead (Klamath Mountains Province ESU, summer run)	2		
57	*Oncorhynchus mykiss pop. 25*	Steelhead (Klamath Mountains Province ESU, winter run)	2		
58	*Oncorhynchus mykiss pop. 26*	Steelhead (Lower Columbia River ESU, summer run)	1		
59	*Oncorhynchus mykiss pop. 27*	Steelhead (Lower Columbia River ESU, winter run)	1		
60	*Oncorhynchus mykiss pop. 28*	Steelhead (Middle Columbia River ESU, summer run)	1		
61	*Oncorhynchus mykiss pop. 29*	Steelhead (Middle Columbia River ESU, winter run)	1		
62	*Oncorhynchus mykiss pop. 30*	Steelhead (Oregon Coast ESU, summer run)	1		
63	*Oncorhynchus mykiss pop. 31*	Steelhead (Oregon Coast ESU, winter run)	1		
64	*Oncorhynchus mykiss pop. 33*	Steelhead (Upper Willamette River ESU, winter run)	1		
65	*Oncorhynchus tshawytscha pop. 2*	Chinook salmon (Snake River ESU, fall run)	1		
66	*Oncorhynchus tshawytscha pop. 21*	Chinook salmon (Lower Columbia River ESU, spring run)	1		
67	*Oncorhynchus tshawytscha pop. 22*	Chinook salmon (Lower Columbia River ESU, fall run)	1		
68	*Oncorhynchus tshawytscha pop. 23*	Chinook salmon (Upper Willamette River ESU, spring run)	1		

WEST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
69	*Oncorhynchus tshawytscha pop. 26*	Chinook salmon (Southern Oregon/Northern California Coast ESU, fall run)	2		
70	*Oncorhynchus tshawytscha pop. 8*	Chinook salmon (Snake River ESU, spring/summer run)	1		
71	*Oregonichthys crameri*	Oregon chub	1		
72	*Oregonichthys kalawatseti*	Umpqua chub	1		
73	*Salvelinus confluentus pop. 1*	Bull trout (Klamath River population)	1		
74	*Salvelinus confluentus pop. 2*	Bull trout (Columbia River population)	1		
	Amphibians				
75	*Dicamptodon copei*	Cope's giant salamander	2	Columbia Gorge National Scenic Area	FS
76	*Plethodon larselli*	Larch Mountain salamander	2	Columbia Gorge National Scenic Area, Seneca Fouts Memorial NA, Starvation Creek State Park	FS, PRD
77	*Rana boylii*	Foothill yellow-legged frog	2	North Umpqua Wild & Scenic River	FS
78	*Rana pretiosa*	Oregon spotted frog	1	Gold Lake Bog RNA, Many Lakes RNA, Sky Lakes WA	BLM, FS
	Reptiles				
79	*Actinemys marmorata marmorata*	Northern Pacific pond turtle	2		
80	*Chrysemys picta*	Painted turtle	2		
	Birds				
81	*Bucephala albeola*	Bufflehead	2		
82	*Coccyzus americanus*	Yellow-billed cuckoo	2-x		
83	*Cypseloides niger*	Black swift	2	Starvation Creek State Park, Three Sisters WA	PRD, FS
84	*Falco peregrinus anatum*	American peregrine falcon	2	Columbia Gorge National Scenic Area , Crater Lake National Park, Starvation Creek State Park, Three Sisters WA	FS, PRD, NPS
85	*Haliaeetus leucocephalus*	Bald eagle	ESA	Mt. Jefferson WA	
86	*Gymnogyps californianus*	California condor	1-x		
87	*Histrionicus histrionicus*	Harlequin duck	2	Boulder Creek WA, Three Sisters WA	FS
88	*Melanerpes lewis*	Lewis's woodpecker	2		
89	*Picoides albolarvatus*	White-headed woodpecker	2		

WEST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
90	*Podiceps auritus*	Horned grebe	2		
91	*Podiceps grisegena*	Red-necked grebe	2		
92	*Progne subis*	Purple martin	2	Columbia Gorge National Scenic Area	
93	*Seiurus noveboracensis*	Northern waterthrush	2		
94	*Strix occidentalis caurina*	Northern spotted owl	1	Limpy Rock RNA, Rigdon Point RNA, Wildcat Mountain RNA	BLM
	Mammals				
95	*Antrozous pallidus*	Pallid bat	2		
96	*Canis lupus*	Gray wolf	2	Clackamas River State Scenic Waterway, Mckenzie River State Scenic Waterway, Umpqua River State Scenic Waterway	
97	*Corynorhinus townsendii*	Townsend's big-eared bat	2	Clackamas River State Scenic Waterway, Mt Washington WA, North Umpqua Wild & Scenic River, Silver Falls State Park	PRD FS
98	*Gulo gulo*	Wolverine	2	Mt. Jefferson WA, Mt. Thielson WA, Mt. Washington WA	
99	*Lynx canadensis*	Canada lynx	2		
100	*Martes pennanti*	Fisher	2	Cougar Butte RNA, Crater Lake National Park, Diamond Peak WA, East Kiger Plateau RNA, Three Sisters WA	NPS, FS
101	*Myotis thysanodes*	Fringed myotis	2		
102	*Ursus arctos horribilis*	Grizzly bear	2-x		
	Vascular Plants				
103	*Agoseris elata*	Tall agoseris	2	Mt Hood WA	FS
104	*Agrostis howellii*	Howell's bentgrass	1	Wahkeena Falls, Elowah Falls	FS
105	*Anemone oregana var. felix*	Bog anemone	2		
106	*Arabis hastatula*	Hells Canyon rockcress	1	Wildcat Mountain RNA	BLM
107	*Arabis sparsiflora var. atrorubens*	Sickle-pod rockcress	2	Columbia Gorge National Scenic Area	FS
108	*Arabis suffrutescens var. horizontalis*	Crater Lake rockcress	1	Sky Lakes WA, Crater Lake National Park	FS, NPS

WEST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
109	*Arnica viscosa*	Shasta arnica	2	Crater Lake National Park, Mt Thielsen WA, Three Sisters WA	NPS, FS
110	*Artemisia campestris var. wormskioldii*	Northern wormwood	1-x		
111	*Asplenium septentrionale*	Grass-fern	2		
112	*Botrychium crenulatum*	Crenulate grape-fern	1		
113	*Botrychium montanum*	Mountain grape-fern	2		
114	*Botrychium pumicola*	Pumice grape-fern	1	Crater Lake National Park, Three Sisters WA, Paulina Peak NM	NPS, FS
115	*Calamagrostis breweri*	Brewer reedgrass	2	Mt Hood WA, Mt Jefferson WA	FS
116	*Calochortus monophyllus*	One-leaved calochortus	2		
117	*Calochortus umpquaensis*	Umpqua mariposa-lily	1	Ace Williams Mountain ACEC	BLM
118	*Carex atrosquama*	Blackened sedge	2		
119	*Carex capitata*	Capitate sedge	2		
120	*Carex crawfordii*	Crawford's sedge	2	Crater Lake National Park	NPS
121	*Carex diandra*	Lesser panicled sedge	2	Three Sisters WA	FS
122	*Carex lasiocarpa var. americana*	Slender sedge	2		
123	*Carex livida*	Pale sedge	2	Big Bend PRNA, Three Sisters WA	FS
124	*Carex macrochaeta*	Alaska long-awned sedge	2	Columbia Gorge National Scenic Area	FS
125	*Carex nardina*	Spikenard sedge	2		
126	*Carex scirpoidea ssp. stenochlaena*	Alaskan single-spiked sedge	2		
127	*Carex vernacula*	Native sedge	2		
128	*Castilleja thompsonii*	Thompson's paintbrush	2		
129	*Cheilanthes covillei*	Coville's lipfern	2		
130	*Cimicifuga elata var. elata*	Tall bugbane	1	Three Sisters WA	FS
131	*Collomia mazama*	Mt. Mazama collomia	1	Sphagnum Bog RNA, Sky Lakes WA	BLM, FS
132	*Coptis trifolia*	Three-leaf goldthread	2	*Crater Creek*	
133	*Corydalis aquae-gelidae*	Cold-water corydalis	1	Clackamas River State Scenic River	FS
134	*Cupressus bakeri*	Baker's cypress	2	Oliver Mathews RNA, Miller Lake SIA	BLM
135	*Cypripedium fasciculatum*	Clustered lady's-slipper	2	Cascade-Siskiyou National Monument, Umpqua River State Scenic Waterway	BLM
136	*Delphinium nuttallii*	Nuttall's larkspur	2	Abbott Creek RNA	FS
137	*Delphinium oreganum*	Willamette Valley larkspur	1		
138	*Delphinium pavonaceum*	Peacock larkspur	1		

WEST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
139	*Erigeron howellii*	Howell's daisy	1	Columbia Gorge WA	FS
140	*Erigeron oreganus*	Oregon daisy	1	Oneonta Gorge SIA	FS
141	*Eucephalus gormanii*	Gorman's aster	1	Bull-of-the-Woods WA, Mt. Jefferson WA, Table Rock WA	FS
142	*Eucephalus vialis*	Wayside aster	1		
143	*Frasera umpquaensis*	Umpqua swertia	1	Rogue-Umpqua WA, Upper Elk Meadows ACEC/RNA	FS, BLM
144	*Fritillaria camschatcensis*	Indian rice	2	*West of Mt. Talapus*	
145	*Fritillaria gentneri*	Gentner's fritillaria	1	*Gray Creek, Dog Creek*	
146	*Gentiana newberryi*	Newberry's gentian	2	Mt Washington WA, Sky Lakes WA, Three Sisters WA	FS
147	*Hackelia bella*	Beautiful stickseed	2		
148	*Hieracium horridum*	Shaggy hawkweed	2	Crater Lake National Park	NPS
149	*Horkelia congesta ssp. congesta*	Shaggy horkelia	1		
150	*Iliamna latibracteata*	California globe-mallow	2		
151	*Kalmiopsis fragrans*	North Umpqua kalmiopsis	1	Limpy Rock RNA	BLM
152	*Lathyrus holochlorus*	Thin-leaved peavine	1		
153	*Lewisia columbiana var. columbiana*	Columbia lewisia	2	Columbia Gorge National Scenic Area	FS
154	*Limnanthes floccosa ssp. bellingeriana*	Bellinger's meadow-foam	1	Poverty Flat Preserve, *Pinehurst*	TNC
155	*Limnanthes gracilis ssp. gracilis*	Slender meadow-foam	1		
156	*Lupinus sulphureus ssp. kincaidii*	Kincaid's lupine	1		
157	*Luzula arcuata ssp. unalaschcensis*	Alaska curved woodrush	2	*Lost Lake*	
158	*Lycopodiella inundata*	Northern bog clubmoss	2	Big Bend WMA, Diamond Peak WA, Multorpor Fen, Three Sisters WA	FS
159	*Lycopodium complanatum*	Ground cedar	2	Mt Hood WA	FS
160	*Nemacladus capillaris*	Slender nemacladus	2	Cascade-Siskiyou National Monument, *Pinehurst*	BLM
161	*Ophioglossum pusillum*	Adder's-tongue	2		
162	*Penstemon barrettiae*	Barrett's penstemon	1	Bonneville Dam	BPA
163	*Phlox hendersonii*	Henderson phlox	2	Mt Hood WA	FS
164	*Plagiobothrys figuratus ssp. corallicarpus*	Coral seeded allocarya	1	*Pinehurst*	
165	*Poa rhizomata*	Timber bluegrass	2		
166	*Polystichum californicum*	California sword-fern	2		
167	*Potentilla villosa*	Villous cinquefoil	2	Mt Hood WA	FS
168	*Rhynchospora alba*	White beakrush	2		

WEST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
169	*Ribes divaricatum var. pubiflorum*	Straggly gooseberry	2		
170	*Romanzoffia thompsonii*	Thompson mistmaiden	1	Iron Mountain SIA, Rogue-Umpqua WA	FS
171	*Rorippa columbiae*	Columbia cress	1		
172	*Scheuchzeria palustris ssp. americana*	Scheuchzeria	2	Diamond Peak WA, Gold Lake Bog RNA, Many Lakes RNA, Three Sisters WA	
173	*Schoenoplectus subterminalis*	Water clubrush	2		
174	*Scirpus pendulus*	Drooping bulrush	2	Horse Rock Ridge RNA	
175	*Sisyrinchium sarmentosum*	Pale blue-eyed grass	1	*Crater Lake (Mt. Hood)*	
176	*Solanum parishii*	Parish's horse-nettle	2		
177	*Streptopus streptopoides*	Kruhsea	2	Big Bend PRNA	
178	*Suksdorfia violacea*	Violet suksdorfia	2	Columbia Gorge National Scenic Area , Seneca Fouts Memorial NA, Viento State Park	PRD
179	*Sullivantia oregana*	Oregon sullivantia	1	Table Rock WA	FS
180	*Tauschia stricklandii*	Strickland's tauschia	2	*Moffett Creek – Bull Run Watershed*	
181	*Utricularia minor*	Lesser bladderwort	2	Crater Lake National Park, Diamond Peak WA, Gold Lake Bog RNA, Sharon Lake Fen Preserve, Sphagnum Bog RNA, Three Sisters WA, Many Lakes RNA	BLM, NPS, FWS FS
182	*Utricularia ochroleuca*	Northern bladderwort	2	Gold Lake Bog RNA, Waldo Lake WA	
183	*Wolffia columbiana*	Columbia water-meal	2	Red Ponds RNA	BLM
	Nonvascular Plants				
184	*Anastrophyllum minutum*	Liverwort	2	Mt Hood WA	FS
185	*Andreaea schofieldiana*	Moss	2		
186	*Anthelia julacea*	Liverwort	2		
187	*Barbilophozia lycopodioides*	Liverwort	2	Mt Jefferson WA	
188	*Blepharostoma arachnoideum*	Liverwort	2		
189	*Brachydontium olympicum*	Moss	2		
190	*Bryum calobryoides*	Moss	2	Olallie Ridge RNA	
191	*Calypogeia sphagnicola*	Liverwort	2	Gold Lake Bog RNA, Salmon-Huckleberry WA, White Rock Fen ACEC	BLM
192	*Chiloscyphus gemmiparus*	Liverwort	1	Three Sisters WA	FS
193	*Codriophorus depressus*	Moss	2		

WEST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
194	*Conostomum tetragonum*	Moss	2	Mt Hood WA	FS
195	*Entosthodon fascicularis*	Moss	2	Horse Rock Ridge ACEC	BLM
196	*Gymnomitrion concinnatum*	Liverwort	2	Columbia Gorge National Scenic Area , Mt Hood WA	FS
197	*Haplomitrium hookeri*	Liverwort	2	Three Sisters WA	FS
198	*Harpanthus flotovianus*	Liverwort	2	Three Sisters WA	FS
199	*Helodium blandowii*	Moss	2	Crater Lake National Park, Many Lakes RNA, Sphagnum Bog RNA	NPS, FS
200	*Herbertus aduncus*	Liverwort	2	Columbia Gorge National Scenic Area , Guy W. Talbot State Park, Latourell Falls State Park, Oneonta Gorge SIA	FS, PRD
201	*Jamesoniella autumnalis var. heterostipa*	Liverwort	1	Waldo Lake WA	FS
202	*Jungermannia polaris*	Liverwort	2		
203	*Lophozia laxa*	Liverwort	2		
204	*Marsupella emarginata var. aquatica*	Liverwort	2	North Fork Of The Middle Fork Of The Willamette River State Scenic Waterway, Waldo WA	FS
205	*Marsupella sparsifolia*	Liverwort	2		
206	*Nardia japonica*	Liverwort	2	Mt Hood WA	FS
207	*Polytrichastrum sexangulare var. vulcanicum*	Moss	2	Mt Hood WA	FS
208	*Porella bolanderi*	Liverwort	2		
209	*Porella vernicosa var. fauriei*	Liverwort	2-x	Columbia Gorge National Scenic Area	FS
210	*Pseudocalliergon trifarium*	Moss	2		
211	*Scapania gymnostomophila*	Liverwort	2	John B. Yeon State Scenic Corridor	
212	*Scapania obscura*	Liverwort	2	Three Sisters WA	FS
213	*Schistostega pennata*	Moss	2	Crater Lake National Park	NPS
214	*Schofieldia monticola*	Liverwort	2	Three Sisters WA	FS
215	*Tayloria serrata*	Moss	2		
216	*Tetraphis geniculata*	Moss	2	Salmon-Huckleberry WA	FS
217	*Tetraplodon mnioides*	Moss	2		
218	*Tomentypnum nitens*	Moss	2	Crater Lake National Park, Many Lakes RNA	NPS, FS
219	*Trematodon asanoi*	Moss	2		

	Scientific Name	Common Name	List	Present Representation	Agency
220	*Tritomaria exsectiformis*	Liverwort	2		
	Fungi				
221	*Alpova alexsmithii*	Fungus	1		
222	*Boletus pulcherrimus*	Fungus	1		
223	*Bridgeoporus nobilissimus*	Giant polypore fungus	1	Three Sisters WA, Menagerie WA	FS
224	*Bryoglossum gracile*	Fungus	2		
225	*Bryoria spiralifera*	Lichen	2		
226	*Bryoria subcana*	Lichen	2		
227	*Choiromyces venosus*	Fungus	2	Mohawk ACEC/RNA	BLM
228	*Chroogomphus loculatus*	Fungus	1		
229	*Cortinarius sp. 1*	Fungus	2		
230	*Cystangium idahoensis*	Fungus	1		
231	*Destuntzia rubra*	Fungus	1-x		
232	*Gastroboletus imbellus*	Fungus	1-X		
233	*Gastroboletus vividus*	Fungus	1		
234	*Gymnomyces fragrans*	Fungus	1		
235	*Gymnomyces nondistincta*	Fungus	1		
236	*Helvella crassitunicata*	Fungus	2	Mt Hood WA, Mt Washington WA	FS
237	*Hygrophorus caeruleus*	Fungus	2		
238	*Hypotrachyna revoluta*	Lichen	2		
239	*Leptogium cyanescens*	Lichen	2		
240	*Leptonia rosea var. marginata*	Fungus	2-x		
241	*Leptonia subeuchroa*	Fungus	2-x		
242	*Lobaria linita*	Lichen	2		
243	*Lyophyllum acutipes*	Fungus	1-X		
244	*Lyophyllum chamaeleon*	Fungus	1-X		
245	*Lyophyllum conoideospermum*	Fungus	1-X		
246	*Lyophyllum furfurellum*	Fungus	1-X		
247	*Lyophyllum gracile*	Fungus	2-x		
248	*Lyophyllum lubricum*	Fungus	1-X		
249	*Lyophyllum pallidum*	Fungus	1-X		
250	*Lyophyllum solidipes*	Fungus	1-X		
251	*Macowanites mollis*	Fungus	1		
252	*Microcalicium arenarium*	Lichen	2	Guy W. Talbot State Park	PRD
253	*Mythicomyces corneipes*	Fungus	2		
254	*Octaviania macrospora*	Fungus	1-X		

WEST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
255	*Phaeocollybia californica*	Fungus	1		
256	*Phaeocollybia oregonensis*	Fungus	1		
257	*Pilophorus nigricaulis*	Lichen	2		
258	*Psathyrella gruberi*	Fungus	1-X		
259	*Psathyrella oregonensis*	Fungus	1-X		
260	*Psathyrella subcaespitosa*	Fungus	1-X		
261	*Psathyrella wapinitaensis*	Fungus	2-x		
262	*Pseudocyphellaria mallota*	Lichen	2		
263	*Pseudorhizina californica*	Fungus	2		
264	*Ramalina pollinaria*	Lichen	2		
265	*Ramaria amyloidea*	Fungus	2		
266	*Rhizopogon brunneifibrillosus*	Fungus	2-x		
267	*Rhizopogon clavitisporus*	Fungus	2		
268	*Rhizopogon ellipsosporus*	Fungus	2		
269	*Rhizopogon inquinatus*	Fungus	2		
269	*Rhizopogon masoniae*	Fungus	1-X		
270	*Rhizopogon quercicola*	Fungus	2-x		
271	*Stagnicola perplexa*	Fungus	2		
272	*Stereocaulon spathuliferum*	Lichen	2	Carolyn's Crown – Shafer Creek RNA	
273	*Tholurna dissimilis*	Lichen	2	Mt Hood WA	FS
274	*Tricholomopsis fulvescens*	Fungus	2-x		

CHAPTER 14. EAST CASCADES ECOREGION

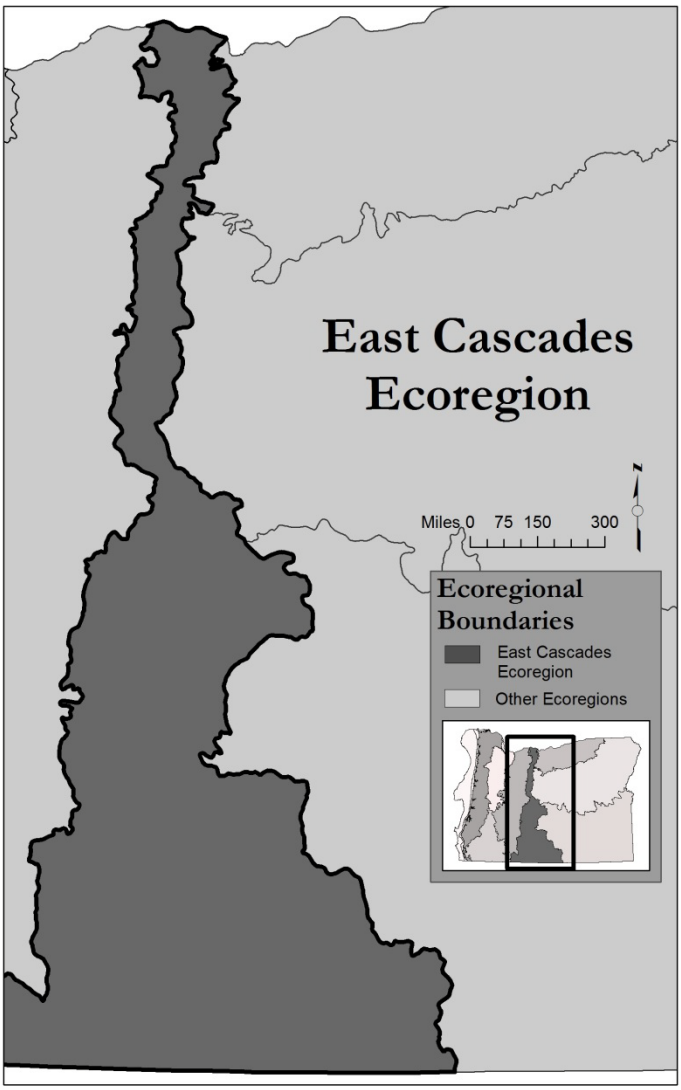

Figure 15. East Cascades Ecoregion Map.

The East Cascades Ecoregion is a transition zone that extends from below the crest of the Cascade Range east to where the ponderosa pine zone meets the sagebrush-juniper steppe. The ecoregion also extends north into Washington and south into California. In Oregon, the ecoregion is variable, including extensive lodgepole forests on deep Mazama ash, the montane and foothill Ponderosa pine forests, Klamath Basin lakes and wetlands, and diverse montane forests.

The eastern slopes of the Cascades are drier than the Western Slopes, with annual rainfall ranging from 14-26 inches per year. It is less steep and cut by fewer streams than the west. The northern two-thirds of the East Cascades are drained by the Deschutes River system, which includes a series of large lakes and reservoirs near its headwaters. The southern third is drained by the Klamath River, which flows south and west into California. The Klamath Basin, which extends into the Modoc Plateau in California, is a broad, relatively flat mid-elevation valley that historically supported a vast expanse of lakes and marshes. Oregon's largest lake, Upper Klamath Lake, is the biggest remnant of this wetland system. Most of the basin's wetlands have been drained and converted to agriculture.

The mountains on the northern and eastern edges of the Klamath Basin lack a generally accepted name, but include a series of peaks and ridges extending from Paulina Peak near Bend southward through the headwaters of the Williamson, Sprague and Chewaucan rivers to the Warner Mountains east of Lakeview. These mountains are generally forested, but the valleys and flats between them include large marshes, irrigated meadows and pastures, and arid juniper and sagebrush steppes. These habitats are a critical part of the Pacific flyway, supporting vast number of shorebirds and waterfowl, the densest wintering concentration of bald eagles in the world, and many other wildlife species.

Also of ecological significance is the ecological zone found at the northern end of this region in Oregon, where the Columbia River Gorge contains a wealth of diversity. This Columbia Gorge transition zone, the extensive Ponderosa pine forests and woodlands, and the vast wetlands of the Klamath and upper Deschutes basin characterize this region.

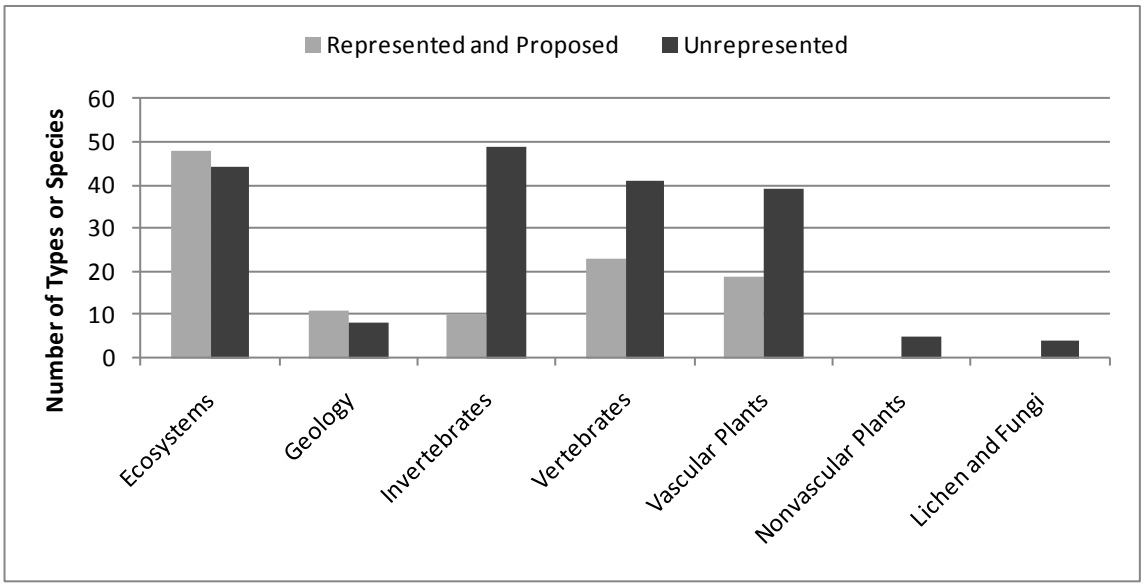

Figure 16. East Cascades Represented and Unrepresented Elements and Species.

EAST CASCADES ECOLOGICAL ELEMENTS

Agency	Priority	Ecosystem Element Name	Present Representation
		Western Juniper	
	*	1. Western juniper/big sagebrush/Idaho fescue.	Goodlow Mountain RNA Silver Lake Exclosure RNA
FS, BLM	H	2. Western juniper/big sagebrush/bluebunch wheatgrass.	
	*	3. Western juniper/big sagebrush-bitterbrush/Idaho fescue-western needlegrass.	Peck's Milkvetch ACEC
	*	4. Western juniper/bitterbrush/bluebunch wheatgrass-Thurber's needlegrass.	Wildhaven (TNC)
	*	5. Western juniper/low sagebrush/Idaho fescue and bluebunch wheatgrass communities.	Vee Pasture RNA
		Ponderosa Pine	
	*	6. Ponderosa pine-western juniper/bitterbrush/ Idaho fescue.	Silver Lake Exclosure RNA
	*	7. Ponderosa pine/bitterbrush/western needlegrass and long-stolon sedge communities.	Pringle Falls RNA Bluejay RNA
	*	8. Ponderosa pine/bitterbrush/Idaho fescue.	Metolius RNA
	*	9. Ponderosa pine/snowbrush-bitterbrush.	Goodlow Mountain RNA
	*	10. Ponderosa pine/greenleaf manzanita-bitterbrush.	Metolius RNA Goodlow Mountain RNA
FS	H	11. Ponderosa pine/big sagebrush-bitterbrush.	*Silver Lake Exclosure RNA*
FS	H	12. Ponderosa pine/big sagebrush/bunchgrass.	*Silver Lake Exclosure RNA*
FS	H	13. Ponderosa pine/mounain big sagebrush/bunchgrass.	*Silver Lake Exclosure RNA*
		Lodgepole Pine	
	*	14. Lodgepole pine/bitterbrush/western needlegrass.	Cannon Well RNA Pringle Falls RNA
	*	15. Lodgepole pine/bitterbrush/long-stolon sedge	Cannon Well RNA Bluejay RNA
	*	16. Lodgepole pine/bitterbrush/Idaho fescue.	Pringle Falls RNA
FS	M	17. Lodgepole pine/bitterbrush-squawcurrent.	
	*	18. Lodgepole pine/grouse huckleberry.	Cherry Basin RNA Cache Mountain RNA
FS	M	19. Lodgepole pine/big sagebrush.	
FS, PRD	M	20. Lodgepole pine/snowberry/blue wildrye and sedge at moist site.	

Agency	Priority	Ecosystem Element Name	Present Representation
FS	M	21. Lodgepole pine/long-stolon sedge.	
FS	M	22. Lodgepole pine/western needlegrass.	
	*	23. Lodgepole pine/kinnikinnik.	Cultus River PRNA Bluejay RNA
	*	24. Lodgepole pine/beargrass.	Cache Mountain RNA
	+	25. Whitebark pine-lodgepole pine forest.	Augur Creek RNA
		Grand Fir	
	+	26. Englemann spruce bottomland with ponderosa and lodgepole pine.	Cultus River PRNA
	*	27. Grand fir-Englemann spruce/starry solomon seal.	Gumjuwac-Tolo RNA
	*	28. Grand fir/skunkleaf polemonium.	Gumjuwac-Tolo RNA
FS	H	29. Grand fir/vanilla leaf.	
FS, PRD	M	30. Grand fir/elk sedge.	
FS, PRD	M	31. Grand fir/snowberry, if possible with ridgetops containing oceanspray and other dry shrubs.	
		Mixed Conifer	
	+	32. Ponderosa pine-white fir/snowberry.	Augur Creek RNA
	*	33. Ponderosa pine-white fir/green manzanita/western needlegrass.	Goodlow Mountain RNA Pringle Falls RNA
	+	34. Ponderosa pine-white fir/snowbrush.	Augur Creek RNA
FS	H	35. Ponderosa pine-white fir/snowbrush-greenleaf manzanita.	
FS	H	36. Ponderosa pine-white fir/chinkquapin forest, with snowbrush and boxwood if possible.	
FS	H	37. White fir/snowbrush-squawcarpet ceanothus with kinnikinnik if possible.	
	*	38. White fir-Douglas fir/snowbrush.	Cherry Basin RNA
	*	39. White fir-Douglas fir/snowberry.	Cherry Basin RNA
FS	H	40. Douglas fir-Pacific silver fir forest.	
	*	41. White fir-Pacific silver fir/snowberry.	Cache Mountain RNA
	*	42. White fir-red fir/long-stolon sedge forest with chinkapin if possible.	Cherry Basin RNA

Agency	Priority	Ecosystem Element Name	Present Representation
	*	43. Red fir-mountain hemlock/pinemat manzanita with mountain hemlock/grouseberry if possible.	Cherry Basin RNA
		Grasslands and Shrubland Steppe	
	*	44. Bluebunch wheatgrass-Sandberg bluegrass.	Mill Creek RNA
	*	45. Idaho fescue-hawkweed.	McCall Preserve at Rowena (TNC)
	*	46. Big sagebrush-bitterbrush/Idaho fescue-western needlegrass.	Peck's Milkvetch ACEC
FS, BLM	L	47. Mountain big sagebrush/bunchgrass.	
	*	48. Low sagebrush vegetation complex, with Idaho fescue, bluegrass, and bluebunch wheatgrass.	Vee Pasture RNA
PVT	H	49. Bitterbrush steppe with bluebunch wheatgrass and Idaho fescue.	
PVT, BLM	H	50. Big sagebrush, greasewood or meadow (Nevada bluegrass or basin wildrye).	
		Special Types	
	*	51. Oregon white oak/bitterbrush/bluebunch wheatgrass.	Mill Creek RNA
FS	H	52. Ponderosa pine-Oregon white oak woodland.	
PVT, BLM	M	53. Oak-Pine woodland, with California black oak.	
FS	M	54. Douglas fir-grand fir/Oregon grape.	
FS	L	55. Dry site Douglas fir with vine maple, Douglas maple, and oceanspray.	
PVT, BLM FS	M	56. Oregon white oak canyon riparian with bittercherry, serviceberry or red-osier dogwood.	
	+	57. Entire undisturbed cinder cone at mid-elevations with ponderosa pine-lodgepole pine climax.	Wechee Butte PRNA
	*	58. Entire undisturbed forested cinder cone, in white fir zone; pre-Mazama.	Moskt Butte RNA
	+	59. Entire forested cinder cone, in white fir zone; post-Mazama.	Katsuk Butte PRNA
	*	60. Entire undisturbed cinder cone in mountain hemlock zone.	Moskt Butte RNA
		Lacustrine and Riverine	
	*	61. Mid-montane lake, with aquatic beds and marshy shore.	Cache Mountain RNA

Agency	Priority	Ecosystem Element Name	Present Representation
	*	62. Upper montane lake, with aquatic beds and marshy shore.	Cherry Basin RNA
	+	63. Flowing and pooled cold springs.	Cultus River PRNA
PVT, FS	U	64. Flowing and pooled hot springs.	
PVT, FS	U	65. Mare's egg springs.	
		Palustrine	
	*	66. Vernal pond at mid to high elevation	Sycan Marsh (TNC)
	*	67. Subalpine pond.	Cherry Basin RNA
	*	68. Bulrush-pondlily marsh with aquatic beds.	Sycan Marsh (TNC)
	*	69. Few flowered spikerush/brown moss fen, with lodgepole pine.	Sycan Marsh (TNC)
	*	70. Forb flush on seepage slope (including shooting-star, bistort, arrowleaf groundsel and false hellebore).	Sycan Marsh (TNC)
FWS, FS BLM	M	71. Beaked sedge marsh.	
FS	M	72. Wooly sedge marsh.	*Big Marsh*
	*	73. Creeping spikerush meadow.	Sycan Marsh (TNC)
	*	74. Cusick or Nevada bluegrass meadow.	Sycan Marsh (TNC) Bluejay RNA
	*	75. Tufted hairgrass meadow, with lodgepole pine and sedge at margin.	Sycan Marsh (TNC)
FS	M	76. Undergreen willow-mountain willow shrub swamp.	
FS	M	77. Booth willow-Geyer willow shrub swamp.	
	*	78. Bog blueberry shrub-swamp, with lodgepole pine and tufted hairgrass.	Sycan Marsh (TNC)
PVT, BLM	M	79. Silver sagebrush/Nebraska sedge-Cusick bluegrass playa.	Sycan Marsh (TNC)
FS, BLM	H	80. Riparian dominated by white alder.	
PVT, BLM	H	81. Mountain alder-creek dogwood riparian.	
FS	H	82. Black cottonwood/mountain alder riparian.	
FS	H	83. Mountain alder-Douglas spiraea riparian.	
FS	H	84. Mountain alder-snowberry riparian.	

Agency	Priority	Ecosystem Element Name	Present Representation
PVT, FS	M	85. Geyer willow-Lemmon willow riparian.	
FS	H	86. Booth willow-mountain willow riparian.	
PVT, FS	M	87. Booth willow-Lemmon willow riparian.	
PVT, BLM	M	88. Pacific willow-coyote willow riparian.	
FS	M	89. Geyer willow and Lemmon willow riparian.	
FS	H	90. Black cottonwood/widefruit sedge riparian.	
FS	M	91. Engelmann spruce/widefruit sedge swamp.	
FS	M	92. Lodgepole pine-quaking aspen/Douglas spiraea woodland.	*Bluejay RNA*

EAST CASCADES GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
		Holocene	
	M	1. Active Fault Plane	*Modoc Point*
	*	2. Ash-Dammed Marsh	Klamath Marsh NWR
FS	H	3. Metolius Springs	*Metolius Headwater Springs*
	*	4. Mazama Ash	Collier State Park
	*	5. Mima Mounds	Mayer State Park McCall Preserve at Rowena (TNC)
		Pleistocene	
FS, PVT	M	6. Shevlin Park Tuff	*Bend*
	*	7. Tumalo Ash-Flow Tuff	Bull Flat ACEC
BLM, FS	M	8. Bend Air-Fall Pumice	*Bend*
FS	M	9. Desert Spring Tuff	
		Pleistocene and Pliocene	
	*	10. Lava Butte Cinder Cone	Lave Butte SIA
	*	11. Newberry Shield Volcano	Newberry Crater NM
	*	12. Newberry Crater	Newberry Crater NM
	*	13. Newberry Lava Caves And Tubes	Newberry Crater NM
	H	14. Lava-Dammed Lake	*Sparks Lake*
	*	15. Hole-In-The-Ground Maar	Fort Rock State Park
		Pliocene and Miocene	
FS	L	16. Yonna Formation	*Merrill*
	*	17. Deschutes Formation	Cove Palisades State Park
		Miocene	
	*	18. Simtustus Formation	Cove Palisades State Park
FS	L	19. Palagonitic Tuff	*Devil's Garden*

EAST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
	Invertebrates				
1	*Anodonta californiensis*	California floater (mussel)	2		
2	*Anodonta nuttalliana*	Winged floater (mussel)	2		
3	*Anodonta wahlametensis*	Willamette floater (mussel)	1		
4	*Callophrys johnsoni*	Johnson's hairstreak (butterfly)	1		
5	*Cicindela columbica*	Columbia River tiger beetle	1-x		
6	*Colligyrus sp. 4*	Columbia duskysnail	1		
7	*Colligyrus sp. 5*	Klamath duskysnail	1	*Williamson River*	
8	*Colligyrus sp. 7*	Mare's egg duskysnail	1	Kimball State Park	ORPD
9	*Colligyrus sp. 8*	Nodose duskysnail	1	*Ouxy Spring*	
10	*Cryptomastix devia*	Puget oregonian (snail)	1		
11	*Cryptomastix hendersoni*	Columbia Gorge oregonian (snail)	1		
12	*Deroceras hesperium*	Evening fieldslug	1	Sycan Marsh	TNC
13	*Fluminicola modoci*	Modoc pebblesnail	1		
14	*Fluminicola sp. 10*	Metolius pebblesnail	1		
15	*Fluminicola sp. 11*	Nerite pebblesnail	1		
16	*Fluminicola sp. 12*	Odessa pebblesnail	1		
17	*Fluminicola sp. 13*	Ouxy Spring pebblesnail	1	*Ouxy Spring*	
18	*Fluminicola sp. 14*	Tall pebblesnail	1	*Harriman Spring*	
19	*Fluminicola sp. 15*	Tiger lily pebblesnail	1		
20	*Fluminicola sp. 16*	Toothed pebblesnail	1	*Schoolhouse Meadow*	
21	*Fluminicola sp. 18*	Wood River pebblesnail	1	Kimball State Park, Klamath State Fish Hatchery	PRD, OFW
22	*Fluminicola sp. 19*	Keene Creek pebblesnail	1	*Blue Jay Spring Run*	
23	*Fluminicola sp. 2*	Casebeer pebblesnail	1		
24	*Fluminicola sp. 20*	Crooked Creek pebblesnail	1	Kimball State Park	PRD
25	*Fluminicola sp. 3*	Diminutive pebblesnail	1		
26	*Fluminicola sp. 4*	Fall Creek pebblesnail	1	*Schoolhouse Meadow*	
27	*Fluminicola sp. 5*	Klamath pebblesnail	1	Upper Klamath NWR	FWS
28	*Fluminicola sp. 6*	Klamath Rim pebblesnail	1		
29	*Fluminicola sp. 7*	Lake of the Woods pebblesnail	1		
30	*Fluminicola sp. 8*	Lost River pebblesnail	1		
31	*Fluminicola turbiniformis*	Turban pebblesnail	1		
32	*Gliabates oregonius*	Salamander slug	1		
33	*Gonidea angulata*	Western ridged mussel	2	Collier Memorial State Park	PRD
34	*Helisoma newberryi newberryi*	Great Basin ramshorn (snail)	1		
35	*Juga acutifilosa*	Scalloped juga (snail)	1	*Schoolhouse Meadow*	
36	*Juga hemphilli dallesensis*	Dalles juga (snail)	1		
37	*Juga hemphilli ssp. 1*	Indian Ford juga (snail)	1		
38	*Juga sp. 1*	Basalt juga (snail)	1		
39	*Juga sp. 2*	Blue Mountains juga (snail)	1		
40	*Juga sp. 7*	Three-band juga (snail)	1		
41	*Lanx alta*	Highcap lanx (snail)	1	Collier State Park	PRD
42	*Lanx klamathensis*	Scale lanx (snail)	1		

	Scientific Name	Common Name	List	Present Representation	Agency
43	*Monadenia chaceana*	Chace sideband (snail)	1		
44	*Monadenia fidelis minor*	Oregon snail (Dalles sideband)	1		
45	*Monadenia fidelis ssp. 11*	Modoc Rim sideband (snail)	1		
46	*Philotiella leona*	Leona's little blue (butterfly)	1		
47	*Pisidium sp. 1*	Modoc peaclam	1	Upper Klamath NWR	FWS
48	*Pisidium ultramontanum*	Montane peaclam	1		
49	*Plebejus podarce*	Gray blue (butterfly)	2		
50	*Pristiloma arcticum crateris*	Crater Lake tightcoil (snail)	1		
51	*Prophysaon sp. 1*	Klamath tail-dropper (slug)	1		
52	*Pyrgulopsis archimedis*	Archimedis springsnail	1	Upper Klamath NWR	FWS
53	*Pyrgulopsis sp. 7*	Lost River springsnail	1		
54	*Pyrgulopsis sp. 9*	Klamath Lake springsnail	1		
55	*Vespericola sierranus*	Siskiyou hesperian (snail)	1		
56	*Vorticifex effusa dalli*	Dall's ramshorn (snail)	1	*Upper Klamath Lake*	
57	*Vorticifex effusa diagonalis*	Lined ramshorn (snail)	1	Collier State Park, Klamath State Fish Hatchery	PRD, OFW
58	*Vorticifex klamathensis klamathensis*	Klamath ramshorn (snail)	1		
59	*Vorticifex klamathensis sinitsini*	Sinitsin ramshorn (snail)	1		
	Fish				
60	*Catostomus microps*	Modoc sucker	1		
61	*Catostomus occidentalis lacusanserinus*	Goose Lake sucker	1		
62	*Catostomus rimiculus pop. 1*	Jenny Creek sucker	1		
63	*Chasmistes brevirostris*	Shortnose sucker	1	Williamson River Delta (TNC)	TNC
64	*Cottus pitensis*	Pit sculpin	2		
65	*Deltistes luxatus*	Lost River sucker	1	Williamson River Delta, Upper Klamath NWR	TNC, FWS
66	*Gila bicolor oregonensis*	Oregon Lakes tui chub	1		
67	*Gila bicolor thalassina*	Goose Lake tui chub	1		
68	*Lampetra minima*	Miller Lake lamprey	1	*Miller Lake*	
69	*Lampetra tridentata ssp. 1*	Goose Lake lamprey	1		
70	*Lavinia symmetricus mitrulus*	Pit roach	2		
71	*Oncorhynchus clarkii pop. 2*	Coastal cutthroat trout (Southwestern Washington/Columbia River ESU)	1		
72	*Oncorhynchus kisutch pop. 1*	Coho salmon (Lower Columbia River ESU)	1		
73	*Oncorhynchus mykiss pop. 13*	Steelhead (Snake River Basin ESU)	1		
74	*Oncorhynchus mykiss pop. 2*	Jenny Creek redband trout	1		
75	*Oncorhynchus mykiss pop. 26*	Steelhead (Lower Columbia River ESU, summer run)	1		

EAST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
76	*Oncorhynchus mykiss pop. 27*	Steelhead (Lower Columbia River ESU, winter run)	1		
77	*Oncorhynchus mykiss pop. 28*	Steelhead (Middle Columbia River ESU, summer run)	1		
78	*Oncorhynchus mykiss pop. 29*	Steelhead (Middle Columbia River ESU, winter run)	1		
79	*Oncorhynchus mykiss pop. 4*	Warner Valley redband trout	1		
80	*Oncorhynchus mykiss pop. 6*	Goose Lake redband trout	1		
81	*Oncorhynchus tshawytscha pop. 2*	Chinook salmon (Snake River ESU, fall run)	1		
82	*Oncorhynchus tshawytscha pop. 21*	Chinook salmon (Lower Columbia River ESU, spring run)	1		
83	*Oncorhynchus tshawytscha pop. 22*	Chinook salmon (Lower Columbia River ESU, fall run)	1		
84	*Oncorhynchus tshawytscha pop. 8*	Chinook salmon (Snake River ESU, spring/summer run)	1		
85	*Salvelinus confluentus pop. 1*	Bull trout (Klamath River population)	1	Sycan Marsh Preserve, Gearhart Mountain WA, Crater Lake National Park	TNC, FS, NPS
86	*Salvelinus confluentus pop. 2*	Bull trout (Columbia River population)	1		
	Amphibians				
87	*Rana pipiens*	Northern leopard frog	2		
88	*Rana pretiosa*	Oregon spotted frog	1		
89	*Taricha granulosa mazamae*	Crater Lake newt	1	Crater Lake National Park	NPS
	Reptiles				
90	*Actinemys marmorata marmorata*	Northern Pacific pond turtle	2	Klamath River State Scenic Waterway, Klamath WMA	BLM
	Birds				
91	*Agelaius tricolor*	Tricolored blackbird	2	Klamath WMA, Lower Klamath NWR	
92	*Anser albifrons elgasi*	Tule goose	1		
93	*Bartramia longicauda*	Upland sandpiper	2	Sycan Marsh Preserve	TNC
94	*Bucephala albeola*	Bufflehead	2	Crane Prairie WMA	FS
95	*Centrocercus urophasianus*	Greater sage-grouse	2		
96	*Charadrius alexandrinus nivosus*	Western snowy plover	2	Lower Klamath NWR	
97	*Coccyzus americanus*	Yellow-billed cuckoo	2-x		
98	*Coturnicops noveboracensis*	Yellow rail	2	Klamath Marsh NWR, Sycan Marsh Preserve	FWS TNC
99	*Cygnus buccinator*	Trumpeter swan	2		
100	*Egretta thula*	Snowy egret	2	Upper Klamath NWR	FS

EAST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
101	*Falco columbarius*	Merlin	2-x		
102	*Falco peregrinus anatum*	American peregrine falcon	2	Seneca Fouts State Natural Area, Starvation Creek State Park	PRD
103	*Haliaeetus leucocephalus*	Bald eagle	ESA	Mountain Lakes WA, Bear Valley NWR, Upper Klamath NWR	FS, FWS
104	*Histrionicus histrionicus*	Harlequin duck	2		
105	*Melanerpes lewis*	Lewis's woodpecker	2	Klamath River State Scenic Waterway, Upper Klamath NWR, White River WMA	
106	*Pelecanus erythrorhynchos*	American white pelican	2	Upper Klamath NWR	FS
107	*Picoides albolarvatus*	White-headed woodpecker	2		
108	*Podiceps auritus*	Horned grebe	2	Sycan Marsh Preserve	TNC
109	*Podiceps grisegena*	Red-necked grebe	2	Klamath Marsh NWR, Upper Klamath NWR	FWS FS
110	*Seiurus noveboracensis*	Northern waterthrush	2		
111	*Strix occidentalis caurina*	Northern spotted owl	1	Badger Creek WA, Mt. Jefferson WA, Crater Lake National Park	FS, NPS
112	*Tympanuchus phasianellus columbianus*	Columbian sharp-tailed grouse	2		
	Mammals				
113	*Antrozous pallidus*	Pallid bat	2	Memaloose State Park	PRD
114	*Brachylagus idahoensis*	Pygmy rabbit	2	Slide Mt SIA	FS
115	*Canis lupus*	Gray wolf	2	Crane Prairie WMA, Sycan Marsh Preserve	TNC
116	*Corynorhinus townsendii*	Townsend's big-eared bat	2	Columbia Gorge National Scenic Area, Lava River Caves State Park, Metolius River State Scenic Waterway	PRD, FS
117	*Gulo gulo*	Wolverine	2		
118	*Lynx canadensis*	Canada lynx	2		
119	*Martes pennanti*	Fisher	2	Deschutes River State Scenic Waterway, Oregon Cascades Recreation Area, Three Sisters WA	FS
120	*Myotis thysanodes*	Fringed myotis	2		
121	*Ovis canadensis nelsoni*	Desert bighorn sheep	2-x		

EAST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
122	*Ursus arctos horribilis*	Grizzly bear	2-x		
123	*Vulpes macrotis*	Kit fox	2		
	Vascular Pllants				
124	*Agoseris elata*	Tall agoseris	2	Metolius River State Scenic Waterway, Mt Hood WA	FS
125	*Arabis sparsiflora var. atrorubens*	Sickle-pod rockcress	2	Mill Creek RNA	FS
126	*Artemisia arbuscula ssp. longicaulis*	Lahontan sagebrush	2		
127	*Astragalus applegatei*	Applegate's milk-vetch	1	Ewauna Flat Preserve, Klamath WMA	TNC, FWS
128	*Astragalus hoodianus*	Hood River milk-vetch	2	Columbia Gorge National Scenic Area, Mayer State Park, Tom Mccall Preserve At Rowena	PRD, TNC
129	*Astragalus lemmonii*	Lemmon's milk-vetch	1-x		
130	*Astragalus peckii*	Peck's milk-vetch	1		
131	*Atriplex gmelinii var. gmelinii*	Gmelin's saltbush	2		
132	*Botrychium montanum*	Mountain grape-fern	2	Badger Creek WA	
133	*Botrychium pumicola*	Pumice grape-fern	1	Three Sisters WA, Newberry Craters NM	FS, NPS
134	*Callitriche fassettii*	The Dalles water-starwort	1		
135	*Calochortus greenei*	Greene's mariposa-lily	1		
136	*Calochortus monophyllus*	One-leaved calochortus	2		
137	*Carex capitata*	Capitate sedge	2	Sycan Marsh Preserve	TNC
138	*Carex davyi*	Dry-spike sedge	2		
139	*Carex diandra*	Lesser panicled sedge	2		
140	*Carex duriuscula*	Involute-leaved sedge	2-x	Sycan Marsh Preserve	TNC
141	*Carex lasiocarpa var. americana*	Slender sedge	2		
142	*Carex vernacula*	Native sedge	2	*Drakes Peak*	
143	*Castilleja chlorotica*	Green-tinged paintbrush	1	Gearhart Mountain WA	FS
144	*Castilleja thompsonii*	Thompson's paintbrush	2		
145	*Cicuta bulbifera*	Bulb-bearing water-hemlock	2-x	Upper Klamath NWR	
146	*Delphinium nuttallii*	Nuttall's larkspur	2		
147	*Eleocharis bolanderi*	Bolander's spikerush	2		
148	*Erigeron oreganus*	Oregon daisy	1		
149	*Eriogonum prociduum*	Prostrate buckwheat	1		
150	*Eriogonum umbellatum var. glaberrimum*	Green buckwheat	1		
151	*Galium serpenticum ssp. warnerense*	Warner Mountain bedstraw	1	*Drakes Peak*	
152	*Gentiana newberryi*	Newberry's gentian	2		

EAST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
153	*Heliotropium curassavicum*	Salt heliotrope	2		
154	*Ivesia shockleyi*	Shockley's ivesia	2	*Drakes Peak*	
155	*Limnanthes floccosa ssp. bellingeriana*	Bellinger's meadow-foam	1		
156	*Lipocarpha aristulata*	Aristulate lipocarpha	2		
157	*Lobelia dortmanna*	Water lobelia	2	Metolius River State Scenic Waterway	
158	*Lomatium suksdorfii*	Suksdorf's lomatium	1		
159	*Lomatium watsonii*	Watson's desert-parsley	2		
160	*Lycopodiella inundata*	Northern bog clubmoss	2		
161	*Meconella oregana*	White meconella	1	Tom McCall Preserve, Koberg Beach State Park, Mayer State Park	TNC, PRD
162	*Melica stricta*	Nodding melic	2		
163	*Mimulus evanescens*	Disappearing monkeyflower	1	*Drews Reservoir*	
164	*Mimulus tricolor*	Three-colored monkeyflower	2	Sycan Marsh Preserve	TNC
165	*Penstemon barrettiae*	Barrett's penstemon	1	Koberg Beach State Park	PRD
166	*Penstemon glaucinus*	Blue-leaved penstemon	1	Yainax Butte ACEC, Deadhorse Rim-Whitebark Pine RNA, Slide Mountain SIA	BLM, FS
167	*Penstemon peckii*	Peck's penstemon	1	Metolius River (TNC)	TNC
168	*Perideridia erythrorhiza*	Red-root yampah	1		
169	*Phacelia inundata*	Playa phacelia	1		
170	*Pilularia americana*	American pillwort	2		
171	*Plagiobothrys salsus*	Desert allocarya	2		
172	*Pleuropogon oregonus*	Oregon semaphore grass	1	Mud Creek Managed Area (TNC)	TNC
173	*Potamogeton fibrillosus*	Fibrous pondweed	2-x		
174	*Ranunculus triternatus*	Dalles Mt. buttercup	1		
175	*Rorippa columbiae*	Columbia cress	1		
176	*Rotala ramosior*	Toothcup	2		
177	*Salix laevigata*	Polished willow	2-x		
178	*Scheuchzeria palustris ssp. americana*	Scheuchzeria	2		
179	*Suksdorfia violacea*	Violet suksdorfia	2	Columbia Gorge National Scenic Area , Mayer State Park, Memaloose State Park	PRD
180	*Thelypodium brachycarpum*	Short-podded thelypody	2	Klamath WMA, Lower Klamath NWR	
181	*Thelypodium howellii ssp. howellii*	Howell's thelypody	2		

EAST CASCADES SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
	Nonvascular Plants				
182	*Cephaloziella spinigera*	Liverwort	2		
183	*Pseudocalliergon trifarium*	Moss	2		
184	*Schistidium cinclidodonteum*	Moss	2		
185	*Splachnum ampullaceum*	Moss	2	*Buck Lake Fen*	
186	*Tomentypnum nitens*	Moss	2		
	Fungi				
187	*Boletus pulcherrimus*	Fungus	1		
188	*Lyophyllum piceum*	Fungus	1-X		
189	*Pseudorhizina californica*	Fungus	2		
190	*Rhizopogon oswaldii*	Fungus	2-x		

CHAPTER 15. COLUMBIA BASIN ECOREGION

The Oregon portion of the Columbia Basin Ecoregion is sometimes referred to as the Umatilla Plateau. It extends from the eastern slopes of the Cascades Mountains south and east from the Columbia River to the Blue Mountains. The region continues northward throughout most of eastern Washington, including a small portion of west central Idaho. The region includes the Columbia Basin proper, and the Palouse, which is recognized by many geographers as a separate region.

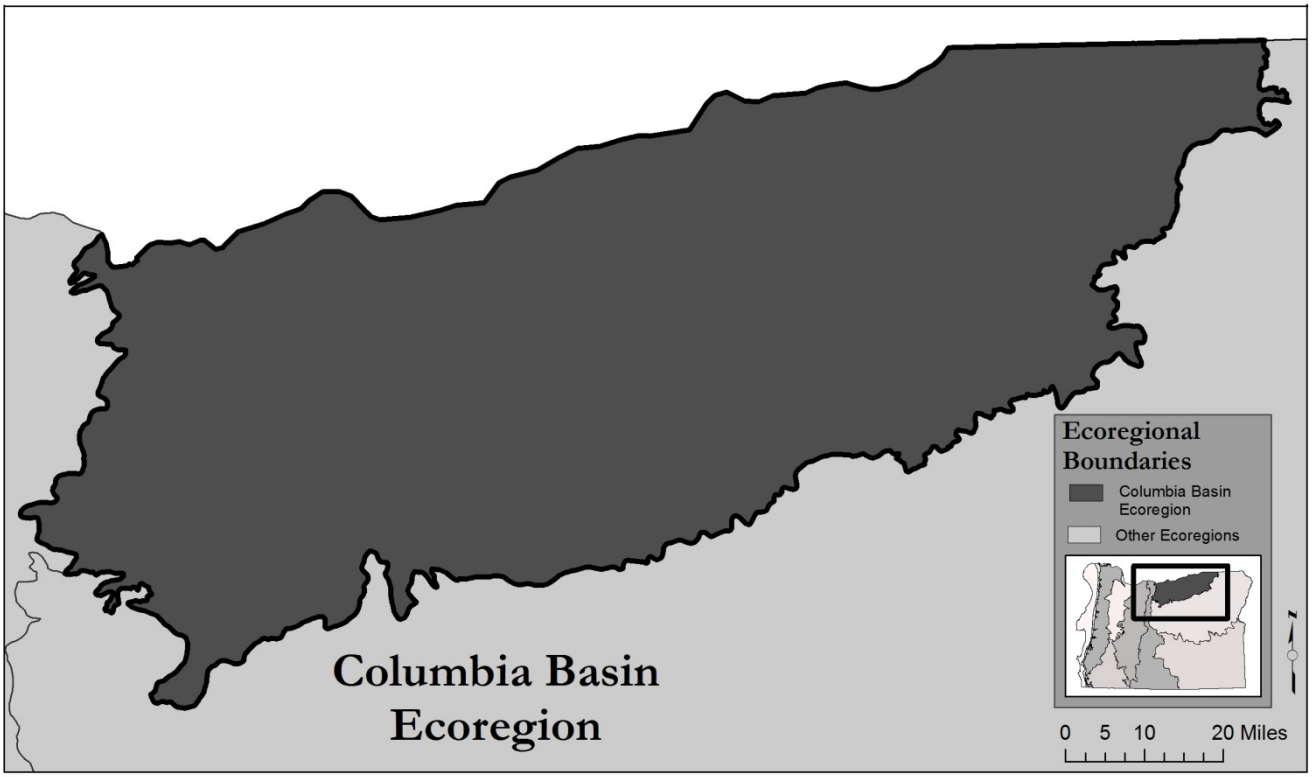

Figure 17. Columbia Basin Ecoregion Map.

The Columbia River, with its historic floods and large deposits of loess (wind-borne silt and sand) from the end of the last ice age, has greatly influenced the region. Most of the Oregon portion of the ecoregion is a lava plateau broken by basalt canyons carved out by the Deschutes, John Day, and Umatilla Rivers and other streams that flow into the Columbia. The climate is arid, with cold winters and hot summers. Most of the ecoregion receives less than 15 inches of precipitation per year (some areas as little as eight inches), much of that in the form of snow.

The majority of the ecoregion's natural vegetation is native bunchgrass prairie, often called Palouse prairie because of the deep, loess soils and plentiful grass. The majority of the ecoregion in Washington was originally sagebrush steppe. Sandy deposits along the Columbia River support open dunes, bitterbrush and steppe and western juniper. A few species of ground-squirrel and plants (milkvetch species among others) adapted to these habitats. The rivers are characterized by riparian vegetation, with black cottonwood, willows, chokecherry and aspen dominating riverbanks. Less common are riparian areas dominated by black hawthorn and white alder.

Early travelers along the Oregon trail found vast natural grasslands broken by brushy draws and tree- and rimrock-bordered streams with numerous springs. Because of the deep productive soils, mild climate (due to low elevations) and the presence of adequate water (either from wells or from the Columbia, Snake and Umatilla rivers), much of this region provided model farmland. The Columbia Basin Ecoregion is second only to the Willamette Valley in the percentage of landscape converted to non-native habitats and human uses. Protected areas and public lands are very limited in this region, with the only vegetation types that have not declined dramatically being found on lands that cannot be farmed: the steep canyon grasslands and scablands.

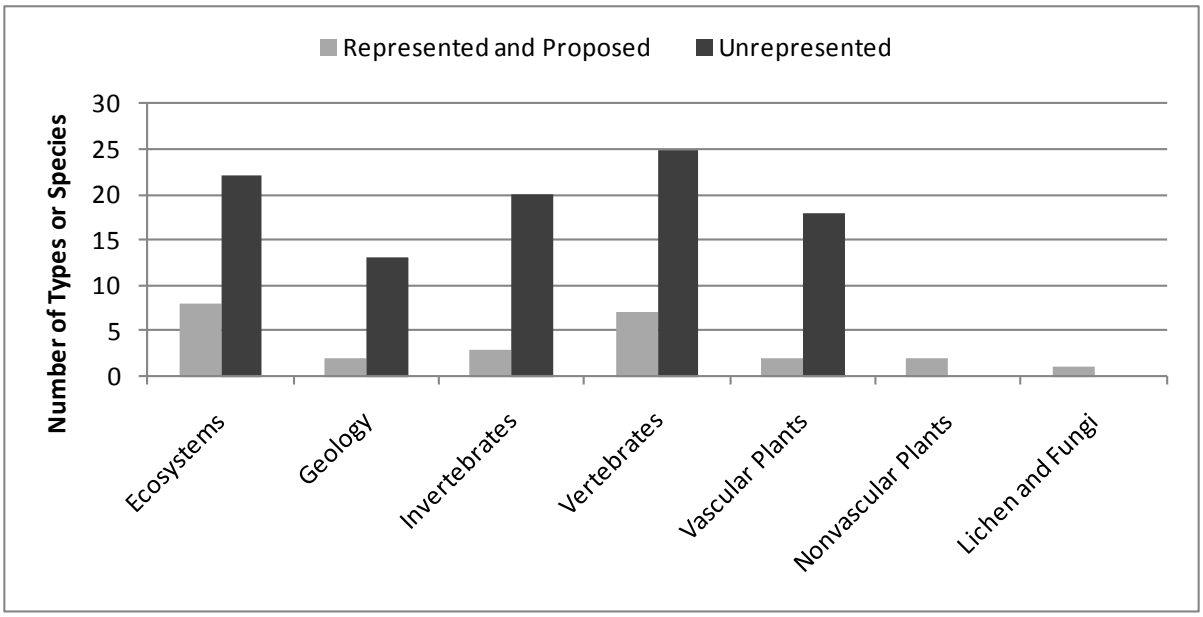

Figure 18. Columbia Basin Represented and Unrepresented Elements and Species.

Agency	Priority	Ecosystem Element Name	Present Representation
		Ponderosa Pine and Western Juniper	
FS, BLM	H	1. Ponderosa pine/hawthorn grassland mosaic.	
	+	2. Western juniper/big sagebrush/bunchgrass.	Boardman PRNA addition Boardman Grasslands (TNC)
		Shrub Steppe	
PVT, BLM	H	3. Big sagebrush/Idaho fescue.	Possibly extirpated
PVT, BLM	H	4. Big sagebrush/needle-and-thread.	*Lindsay Prairie (TNC)*
	*	5. Big sagebrush/bluebunch wheatgrass-Sandberg bluegrass.	Boardman RNA
	*	6. Rigid sagebrush/Sandberg bluegrass.	Lawrence Grassland (TNC)
	+	7. Bitterbrush/needle-and-thread.	Boardman Grasslands (TNC)
PVT, FWS	H	8. Big sagebrush-bitterbrush/bunchgrass.	
FS, BLM	M	9. Black hawthorn, snowberry, rose shrubland mosaic.	
		Grasslands	
	*	10. Sandy grasslands (Needle-and-thread-Sandberg bluegrass, downy wheatgrass-needle-and-thread).	Boardman RNA Boardman Grasslands (TNC)
	*	11. Bluebunch wheatgrass-Needle-and-thread-Sandberg bluegrass palouse.	Boardman RNA Lindsay Prairie (TNC)
PVT, BLM	H	12. Idaho fescue-bluebunch wheatgrass.	
PVT	H	13. Idaho fescue-junegrass.	
PVT, BLM	L	14. Sandberg bluegrass-serrate balsamroot scabland.	
PVT, BLM	L	15. Buckwheat-Sandberg bluegrass scabland.	
PVT, BLM	H	16. Bunchgrass mounds/grassland scabland complex.	
	*	17. Bunchgrass mounds/rigid sagebrush scabland complex.	Lawrence Grassland (TNC)
PVT, BLM	M	18. Great Basin wildrye.	Possibly extripated
		Special Types	
PVT, FWS ACE	U	19. Unstabilized sand dune communities along the Columbia River.	*Umatilla National Wildlife Refuge*
	*	20. Unstabilized, inland sand dune series, from active unvegetated dunes through partially stabilized dunes (with bitterbrush, big sagebrush, rabbitbrush, and Indian ricegrass).	Boardman RNA

Agency	Priority	Ecosystem Element Name	Present Representation
		Lacustrine	
PVT, BLM	U	21. Permanent Pond.	
		Palustrine	
PVT, BLM	H	22. Bare playas with annual forbs and grasses including mousetail and annual foxtail.	
PVT, BLM	H	23. Greasewood flats with Great Basin wildrye.	
PVT, OFW BLM	H	24. Riparian dominated by peachleaf willow, coyote willow, or Pacific willow.	
PVT, BLM	H	25. Riparian dominated by white alder.	
BLM	H	26. Riparian dominated by black hawthorn.	
BLM	H	27. Riparian dominated by western birch, with quaking aspen if possible.	
BLM, PVT	M	28. Black cottonwood/creek dogwood or rose riparian.	
BLM, PVT	M	29. Black cottonwood/snowberry riparian.	
PVT	M	30. Black cottonwood/black hawthorn riparian.	

COLUMBIA BASIN GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
		Holocene	
ACE, BLM	H	1. Eolian Dunes	Boardman Grasslands (TNC) *Boardman Naval Training Center*
PVT	H	2. Mima Mounds	*Eight Mile Mounds*
		Pleistocene	
	H	3. Flood Bar	*Umatilla Weapons Depot*
	*	4. Flood Scour	Hat Rock State Park
ACE, BLM	H	5. Bar and Crescentric Dunes	*Petersburg*
PVT	M	6. Scabland Topography	*Blalock*
	M	7. Rhythmites (Missoula floods)	*Arlington*
BLM, PVT	M	8. Mt. St. Helens Tephra	*Arlington*
		Pliocene and Miocene	
PVT	L	9. Chenoweth Formation	*Chenoweth Creek*
BLM, FS	L	10. Tygh Valley Formation	*Tygh Valley*
PVT	M	11. Alkali Canyon Formation	*Alkali Canyon*
PVT	L	12. McKay Formation	*McKay Reservoir*
		Miocene	
	*	13. Saddle Mountains Basalt	Hat Rock State Park
PVT	L	14. Wanapum Basalt Formation	*Umatilla River/Pendleton*
BLM, FS	L	15. Grande Ronde Basalt Formation	*Umatilla River/Pendleton*

COLUMBIA BASIN SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
	Invertebrates				
1	*Anodonta californiensis*	California floater (mussel)	2	Deschutes Wild & Scenic River	BLM
2	*Cicindela columbica*	Columbia River tiger beetle	1-x		
3	*Colligyrus sp. 4*	Columbia duskysnail	1		
4	*Cryptomastix hendersoni*	Columbia Gorge oregonian (snail)	1		
5	*Fisherola nuttalli*	Shortface lanx (=Giant Columbia River limpet)	1	*Columbia River*	
6	*Fluminicola fuscus*	Columbia pebblesnail or spire snail	1		
7	*Fluminicola sp. 17*	Tuscan pebblesnail	1		
8	*Gonidea angulata*	Western ridged mussel	2		
9	*Juga bulbosa*	Bulb juga (snail)	1	*Columbia River*, Deschutes Wild and Scenic River	
10	*Juga hemphilli dallesensis*	Dalles juga (snail)	1		
11	*Juga hemphilli maupinensis*	Purple-lipped juga (snail)	1	Deschutes Wild and Scenic River	
12	*Juga newberryi*	A Freshwater Snail	1		
13	*Juga sp. 1*	Basalt juga (snail)	1		
14	*Juga sp. 4*	Opal Springs (Crooked River) juga (snail)	1		
15	*Juga sp. 6*	Purple juga (snail)	1		
16	*Juga sp. 7*	Three-band juga (snail)	1		
17	*Monadenia fidelis minor*	Oregon snail (Dalles sideband)	1	*Columbia River*	
18	*Monadenia fidelis ssp. 1*	Deschutes sideband (snail)	1		
19	*Oreohelix variabilis*	Dalles mountainsnail	1	*Columbia River*	
20	*Oreohelix variabilis ssp. 1*	Deschutes mountainsnail	1		
21	*Pyrgulopsis robusta*	Jackson Lake springsnail	2		
22	*Vespericola depressa*	Columbia Gorge hesperian (snail)	1		
23	*Vespericola sp. 1*	Oak Springs hesperian (snail)	1		
	Fish				
24	*Oncorhynchus clarkii pop. 2*	Coastal cutthroat trout (Southwestern Washington/Columbia River ESU)	1		
25	*Oncorhynchus kisutch pop. 1*	Coho salmon (Lower Columbia River ESU)	1		
26	*Oncorhynchus mykiss pop. 13*	Steelhead (Snake River Basin ESU)	1		
27	*Oncorhynchus mykiss pop. 28*	Steelhead (Middle Columbia River ESU, summer run)	1	Deschutes Wild and Scenic River, John Day Wild and Scenic River	
28	*Oncorhynchus mykiss pop. 29*	Steelhead (Middle Columbia River ESU, winter run)	1		

COLUMBIA BASIN SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
29	*Oncorhynchus tshawytscha pop. 18*	Chinook salmon (Deschutes River ESU, summer/fall run)	1		
30	*Oncorhynchus tshawytscha pop. 2*	Chinook salmon (Snake River ESU, fall run)	1		
31	*Oncorhynchus tshawytscha pop. 8*	Chinook salmon (Snake River ESU, spring/summer run)	1		
32	*Salvelinus confluentus pop. 2*	Bull trout (Columbia River population)	1	Deschutes Wild and Scenic River	
	Amphibians				
33	*Bufo woodhousii*	Woodhouse's toad	2		
34	*Rana luteiventris*	Columbia spotted frog	2		
35	*Rana pipiens*	Northern leopard frog	2		
	Reptiles				
36	*Chrysemys picta*	Painted turtle	2	Columbia Gorge National Scenic Area, Irrigon WMA, Umatilla NWR	PVT
	Birds				
37	*Agelaius tricolor*	Tricolored blackbird	2	Umatilla NWR	FWS
38	*Ammodramus savannarum*	Grasshopper sparrow	2	Boardman RNA/TNC Preserve	
39	*Bucephala albeola*	Bufflehead	2		
40	*Centrocercus urophasianus*	Greater sage-grouse	2		
41	*Falco columbarius*	Merlin	2-x		
42	*Falco peregrinus anatum*	American peregrine falcon	2		
43	*Melanerpes lewis*	Lewis's woodpecker	2	Tygh Valley State Wayside, White River WMA	
44	*Podiceps auritus*	Horned grebe	2		
45	*Tympanuchus phasianellus columbianus*	Columbian sharp-tailed grouse	2		
	Mammals				
46	*Antrozous pallidus*	Pallid bat	2		
47	*Brachylagus idahoensis*	Pygmy rabbit	2		
48	*Canis lupus*	Gray wolf	2		
49	*Corynorhinus townsendii*	Townsend's big-eared bat	2		
50	*Euderma maculatum*	Spotted bat	2		
51	*Gulo gulo*	Wolverine	2		
52	*Lynx canadensis*	Canada lynx	2		
53	*Ovis canadensis nelsoni*	Desert bighorn sheep	2-x		
54	*Spermophilus washingtoni*	Washington ground squirrel	1	Boardman RNA, Boardman Grasslands (TNC)	
55	*Ursus arctos horribilis*	Grizzly bear	2-x		

COLUMBIA BASIN SPECIAL SPECIES

	Scientific Name	Common Name	List	Present Representation	Agency
	Vascular Plants				
56	*Achnatherum hendersonii*	Henderson ricegrass	1	Lawrence Grasslands (TNC)	TNC
57	*Allium robinsonii*	Robinson's onion	2-x		
58	*Artemisia campestris var. wormskioldii*	Northern wormwood	1-x		
59	*Astragalus collinus var. laurentii*	Laurence's milk-vetch	1		
60	*Astragalus geyeri var. geyeri*	Geyer's milk-vetch	2		
61	*Astragalus hoodianus*	Hood River milk-vetch	2	Columbia Gorge National Scenic Area	PVT
62	*Astragalus tyghensis*	Tygh Valley milk-vetch	1		
63	*Balsamorhiza rosea*	Rosy balsamroot	2		
64	*Callitriche fassettii*	The Dalles water-starwort	1		
65	*Callitriche marginata*	Winged water-starwort	2		
66	*Camissonia pygmaea*	Dwarf evening-primrose	1		
67	*Carex retrorsa*	Retrorse sedge	2		
68	*Coryphantha vivipara var. vivipara*	Cushion coryphantha	2		
69	*Cryptantha leucophaea*	Gray cryptantha	2-x		
70	*Heliotropium curassavicum*	Salt heliotrope	2		
71	*Lipocarpha aristulata*	Aristulate lipocarpha	2		
72	*Lomatium watsonii*	Watson's desert-parsley	2		
73	*Mimulus evanescens*	Disappearing monkeyflower	1		
74	*Myosurus sessilis*	Sessile mousetail	1	*Shutler Playas*	
75	*Phemeranthus spinescens*	Spiny flame-flower	2		
	Nonvascular Plants				
76	*Aloina bifrons*	Moss	2	Boardman RNA/TNC Preserve, Hat Rock State Park	PRD
77	*Bryoerythrophyllum columbianum*	Moss	2	Boardman RNA/TNC Preserve, Lawrence Memorial Preserve	PRD
	Fungi				
78	*Texosporium sancti-jacobi*	Woven-spored lichen	2	Boardman RNA/TNC Preserve, Lawrence Memorial Preserve	NPS

CHAPTER 16. BLUE MOUNTAINS ECOREGION

The Blue Mountains Ecoregion occupies nearly all of northeastern Oregon and extends into small portions of southern Washington and western Idaho. It encompasses three major mountain ranges: the Ochoco, Blue and Wallowa mountains. It also includes the High Lava Plains, an ecoregion recognized in past versions of this plan, which occupies most of the non-forested lands at the western edge of the region.

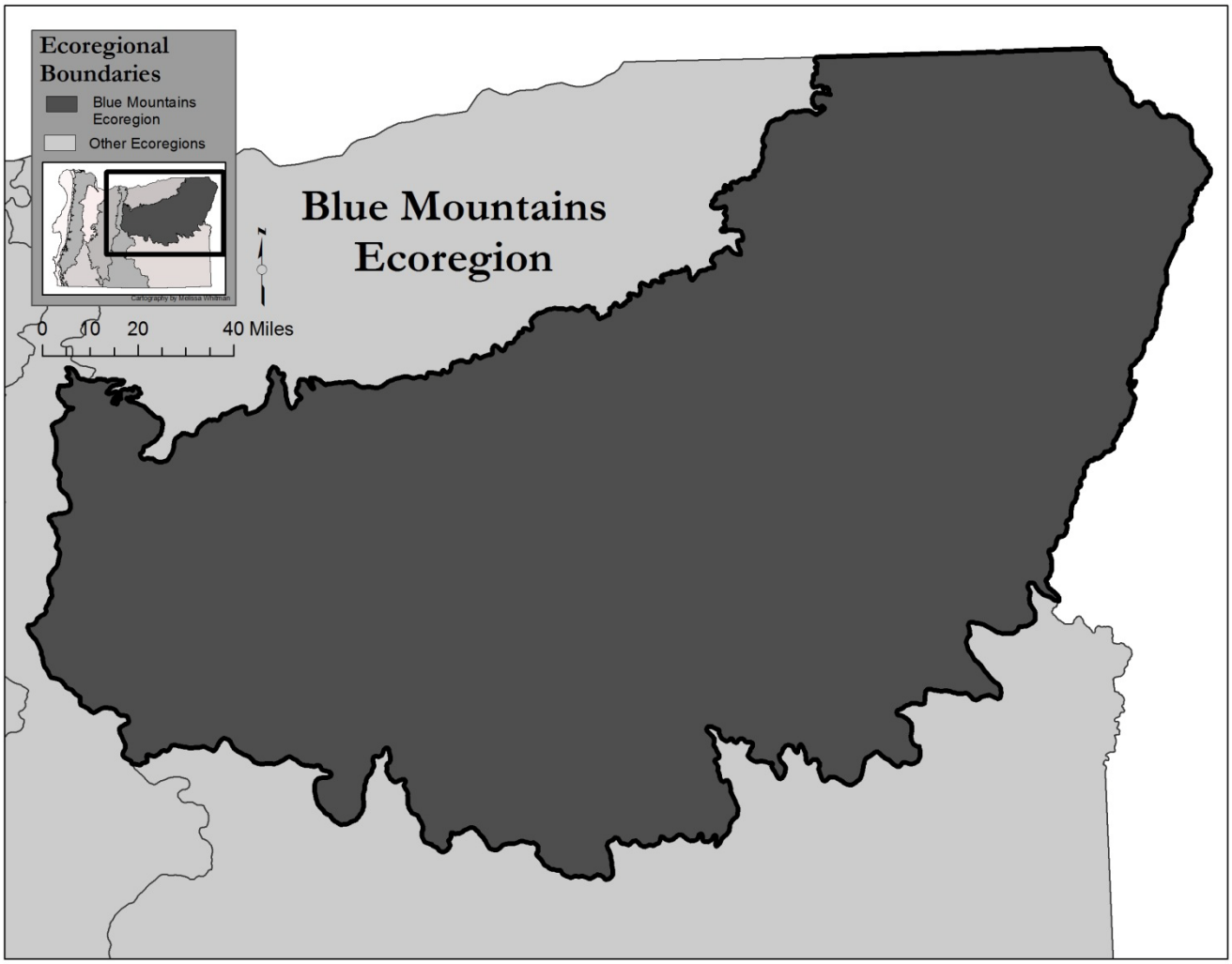

Figure 19. Blue Mountains Ecoregion Map.

Landscapes include deep, rocky-walled canyons, glacially cut gorges, dissected plateaus, broad alluvial river valleys, and numerous mountain lakes, forests and meadows. Due to sharp elevational differences, the climate varies over broad temperature and precipitation ranges. Overall, the ecoregion is characterized by short, dry summers and long, cold winters.

The flora is intermediate between the east Cascades and the western Rocky Mountains of Idaho and Montana. Species composition changes with elevation and longitude. Western juniper dominates the western portion of the region, sagebrush and grassland steppes dominate the entire eastern length of the region, ponderosa pine woodlands are characteristic at mid-elevations and mixed coniferous forests

dominate at higher altitudes. Extensive grasslands occur in and north of the Wallowa Mountains, while sagebrush steppe is prevalent in the southeastern and southwestern parts of the region.

Before European settlement, Ponderosa pine savannas, basin big sagebrush steppe, native grasslands and riparian woodlands were widespread in this region. Today, many bottomland habitats have been replaced by irrigated alfalfa, juniper has expanded into many former shrub-steppe vegetation types, and ponderosa pine savannas have been cut or are being invaded by Douglas fir and grand fir.

The diversity in elevation, soils and climate yields diverse habitats and many endemic plant species. The Wallowa Mountains alone have more than 10 plants species found nowhere else. Bighorn sheep, elk and large mammal populations here are among the largest in the state. The variety in habitats, including low, mid and high elevation grasslands, shrublands and forests results in this ecoregion having more habitat diversity than all but the Klamath Mountains Ecoregion. As a result, there are a correspondingly high number of ecosystem Elements which follow.

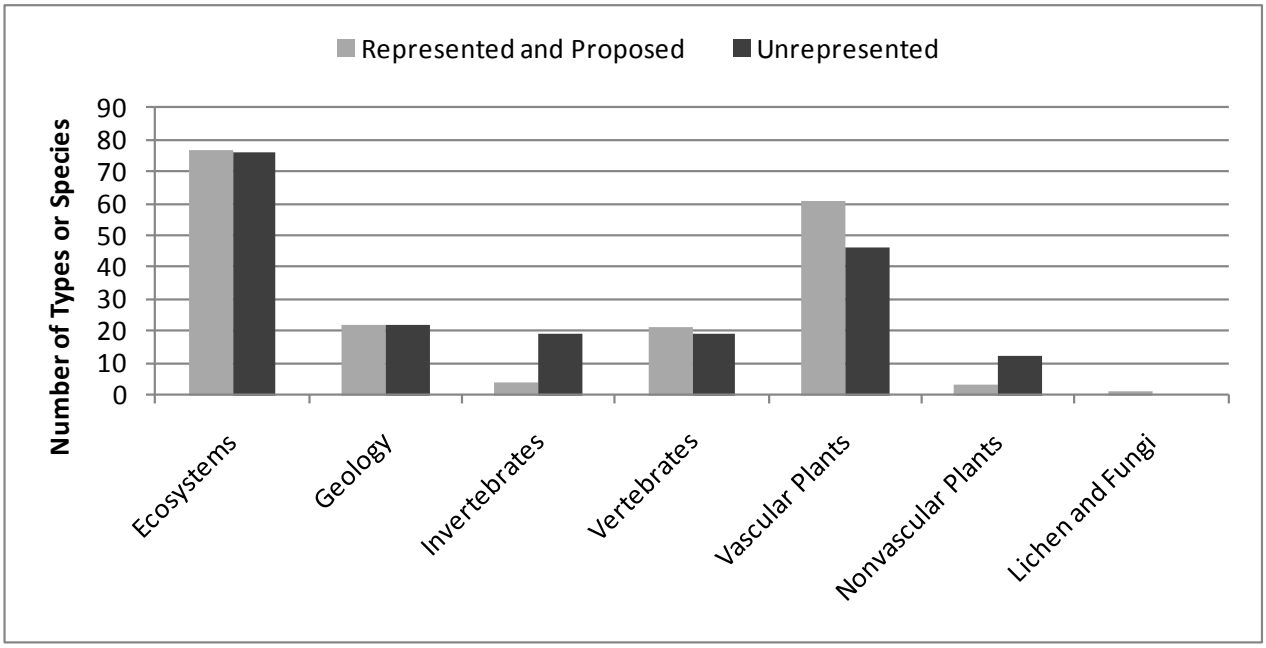

Figure 20. Blue Mountains Ecoregion Represented and Unrepresented Elements and Species.

Agency	Priority	Ecosystem Element Name	Present Representation
		Western Juniper	
	+	1. Western juniper/low sagebrush/bunchgrass.	Shaketable PRNA
FS, BLM	L	2. Western juniper/stiff sagebrush.	*Magpie Table*
FS, BLM	M	3. Western juniper/mountain shrub (bitterbrush, mountain snowberry, serviceberry or squawapple).	*Magpie Table*
	*	4. Western juniper/mountain mahogany.	Baldy Mountain PRNA Canyon Creek RNA
	*	5. Western juniper/big sagebrush/threadleaf sedge.	Horse Ridge RNA
	*	6. Western juniper/big sagebrush/bluebunch wheatgrass.	Sheep Rock RNA Powell Butte RNA The Island RNA
	*	7. Western juniper/big sagebrush/Idaho fescue.	Haystack Butte PRNA Powell Butte RNA Benjamin RNA
	*	8. Western juniper/big sagebrush-bitterbrush/bluebunch wheatgrass & Idaho fescue vegetation.	The Island RNA Dry Mountain RNA
	*	9. Western juniper/big sagebrush-bitterbrush/needle-and-thread.	Badlands ACEC
	*	10. Western juniper/bluebunch wheatgrass.	Sheep Rock RNA Powell Butte RNA
	*	11. Western juniper/Thurber needlegrass on ash.	Sheep Rock RNA *Crooked River Ash Beds*
FS, BLM	H	12. Western juniper/Idaho fescue.	
		Ponderosa Pine	
FS, BLM	M	13. Ponderosa pine-western juniper/big sagebrush-bitterbrush vegetation mosaic.	
FS, PVT	H	14. Ponderosa pine/bluebunch wheatgrass.	
FS	H	15. Ponderosa pine/Idaho fescue.	*Garrett Basin*
	+	16. Ponderosa pine/pinegrass with elk sedge if possible.	Dugout Creek RNA
	+	17. Ponderosa pine/bitterbrush/Ross sedge with elk sedge if possible.	Silver Creek RNA
FS	M	18. Ponderosa pine/mountain snowberry.	*Soldier Creek*
	*	19. Ponderosa pine/mountain mahogany communities with elk sedge & bunchgrasses if possible.	Dry Mountain RNA Stinger Creek PRNA
FS	H	20. Ponderosa pine/common snowberry floodplain.	

Agency	Priority	Ecosystem Element Name	Present Representation
		Douglas Fir	
	*	21. Douglas fir/pinegrass.	Canyon Creek RNA Ochoco Divide RNA Stinger Creek PRNA
	+	22. Douglas fir/elk sedge.	Government Draw PRNA
FS	M	23. Douglas fir/common snowberry, including riparian type if possible.	*Mill Creek*
FS	M	24. Douglas fir/mountain snowberry.	Eagle Cap WA
	+	25. Douglas fir/mallow ninebark.	Pleasant Valley PRNA *Moore Flat*
FS	M	26. Douglas fir/Rocky Mountain maple-mallow ninebark bottomland.	
FS	M	27. Douglas fir/oceanspray.	
		Grand Fir	
		28. Grand fir/beadlily.	
FS	H	29. Grand fir/swordfern-wild ginger with grand fir/oakfern if possible.	*Mill Creek*
FS	M	30. Grand fir/ladyfern.	
	+	31. Grand fir/twinflower forest.	Elk Flats-Wenaha PRNA
	+	32. Grand fir/pinegrass forest.	Dugout Creek RNA Canyon Creek RNA
	*	33. Grand fir/Columbia brome forest.	Ochoco Divide RNA
	+	34. Grand fir/big huckleberry forest.	Duck Lake PRNA Elk Flats-Wenaha PRNA
FS	L	35. Grand fir/grouse huckleberry	
		36. Grand fir/birchleaf spiraea.	Canyon Creek RNA
	+	37. Grand fir/Pacific yew communities.	Elk Flats-Wenaha PRNA
		38. Grand fir/common snowberry with grand fir/douglas maple if possible.	Wenaha-Tucannon WA
		39. Grand fir/ninebark with grand fir/douglas maple if possible.	Wenaha-Tucannon WA

Agency	Priority	Ecosystem Element Name	Present Representation
		Subalpine Fir	
	+	40. Subalpine fir/big huckleberry forest.	Point Prominence PRNA
	*	41. Subalpine fir/grouse huckleberry.	Indian Creek RNA
FS	L	42. Subalpine fir/elk sedge.	
		43. Subalpine fir-Engelmann spruce/beadlily.	Eagle Cap WA
FS	L	44. Subalpine fir-Engelmann spruce/Labrador tea/mixed sedge.	*N. Minam Meadows*
		45. Subalpine fir/arrowleaf groundsel or Engelmann spruce/arrowleaf groundsel.	Eagle Cap WA
FS	M	46. Subalpine fir/ladyfern or Engelmann spruce/ladyfern.	
FS	M	47. Subalpine fir/bog blueberry/Holms sedge wetland.	*Elkhorn Mountains*
		48. Subalpine fir/Labrador tea/Holms sedge.	Eagle Cap WA
FS	M	49. Subalpine fir-whitebark pine.	*Strawberry Mountain*
	*	50. Mountain hemlock/grouse huckleberry forest.	Indian Creek RNA
FS	M	51. Limber pine forest or woodland.	*Slickrock Creek*
		Grassland Communitites	
	+	52. Buckwheat-Sandberg bluegrass complex.	Pleasant Valley PRNA
	+	53. Buckwheat-bluebunch wheatgrass complex.	Lake Fork PRNA
	*	54. Bluebunch wheatgrass-Idaho fescue-silky lupine.	Zumwalt Prairie TNC
	+	55. Bluebunch wheatgrass-Idaho fescue-arrowleaf balsamroot.	Basin Creek PRNA Horsepasture Ridge PRNA
	*	56. Bluebunch wheatgrass-Sandberg bluegrass, Balsamroot canyon grassland.	Sheep Rock RNA
	+	57. Biscuit scabland grasslands.	Vance Knoll RNA
	*	58. Sandberg bluegrass-onespike oatgrass.	Vance Knoll RNA Clear Lake Ridge (TNC)
	+	59. Snake River grassland canyon mosaic including: sand dropseed, red threeawn, Sandberg bluegrass, prickly pear cactus and bluebunch wheatgrass if possible.	Pleasant Valley PRNA
	*	60. Idaho fescue-junegrass high elevation and ridgetop communities.	Clear Lake Ridge (TNC)
	+	61. Low elevation, Idaho fescue-junegrass.	Basin Creek PRNA

Agency	Priority	Ecosystem Element Name	Present Representation
		Shrubland Communities	
	*	62. Big sagebrush/Idaho fescue.	Silver Creek RNA Sheep Rock RNA
	*	63. Big sagebrush/bluebunch wheatgrass.	Dry Mountain RNA Sheep Rock RNA
DSL, BLM	H	64. Big sagebrush/needle-and-thread community.	
PRD, BLM	H	65. Big sagebrush/needlegrass community.	
DSl, BLM	H	66. Big sagebrush/Thurber needlegrass community.	
	+	67. Low sagebrush/Idaho fescue.	Shaketable PRNA
	*	68. Low sagebrush/bluebunch wheatgrass.	Sutton Mountain WA
BLM, FS	L	69. Low sagebrush/Sandberg bluegrass.	
	+	70. Rigid sagebrush/Sandberg bluegrass scabland.	Kelly Creek Butte PRNA Government Draw PRNA Shaketable PRNA
	+	71. Netleaf hackberry/bunchgrass canyon shrubland with mockorange-poison ivy terraces or toeslopes.	Pleasant Valley PRNA
	+	72. Mountain big sagebrush/Idaho fescue.	Vinegar Hill PRNA
FS	M	73. Mountain big sagebrush/Cusick's bluegrass, with bluegrass openings if possible.	
	+	74. Smooth sumac/bluebunch wheatgrass.	Bobs Creek PRNA
	+	75. Bitterbrush/bunchgrass.	Shaketable PRNA
	+	76. Mountain mahogany/bunchgrass.	Pleasant Valley PRNA Dry Mountain RNA
PVT, BLM	H	77. Valley marginor bottomland shrubland/grassland with big sagebrush, threetip sagebrush, and bunchgrasses.	
PVT, BLM	L	78. Bitterbrush biscuit scabland.	*Warm Springs*
		Subalpine Meadow	
	+	79. High elevation Idaho fescue grasslands.	Baldy Mountain PRNA
FS	M	80. Green fescue-spurred lupine with Parry rush and Hood sedge if possible.	*Standley* *Tenderfoot Basin*
	+	81. Red mountain-heather communities.	Razz Lake Cirque PRNA
	+	82. Alpine vegetation mosaic, including fellfields, heaths, and tundra.	Mt. Joseph PRNA Eagle Cap WA

Agency	Priority	Ecosystem Element Name	Present Representation
	+	83. Alpine sedge communities.	Dixie Butte PRNA
		Special Types	
FS, BLM	L	84. Rocky Mountain juniper shrubland.	*Hurricane Creek*
	*	85. Lodgepole pine/grouse huckleberry/pinegrass.	Indian Creek RNA
	+	86. Lodgepole pine/big huckleberry.	Elk Flats-Wenaha PRNA
FS	M	87. Lodgepole pine montane valley wetland with aquatic sedge, bluejoint reedgrass and tufted hairgrass if possible.	
FS	M	88. Lodgepole pine-quaking aspen/Douglas spiraea/forb.	
	+	89. Serpentine vegetation types.	Baldy Mountain PRNA
FS	M	90. Maidenhair fern cobble/boulder bank.	
	*	91. Annual forb communities on exposed ash beds.	Painted Hills NM
		Lacustrine	
BLM	U	92. Low-elevation alkaline lake or pond.	
PVT, BLM	U	93. Freshwater lake with aquatic beds and marshy shore.	
	+	94. Mid to high elevation lake, with aquatic beds and marshy shore.	Razz Lake PRNA
	+	95. Mid elevation pond, with aquatic beds and marshy shore.	Elk Flats-Wenaha PRNA
PVT, BLM	U	96. Vernal pond on loess or alluvium.	
Pvt, BLM	U	97. Pond with aquatic beds and marshy shore.	
PVT, OFW	M	98. Low elevation vernal pond with saltgrass and cordgrass.	*Ladd Marsh*
	+	99. Subalpine pond, with aquatic beds and marshy shore including pondweeds and water lily if possible.	Craig Mountain Lake PRNA
	*	100. Mid to high elevation vernal pond.	Indian Creek RNA
	+	101. Alpine pond with quillworts if possible.	Razz Lake PRNA
		Palustrine	
	+	102. Alpine laurel/black sedge and black sedge communities at high elevation.	Craig Mountain Lake PRNA
PVT, BLM FS	M	103. Vernal seepage slopes on tabular basalt, with Cusick camas and California oatgrass.	*Hells Canyon WA*
FS	M	104. Shrubby cinquefoil/tufted hairgrass.	

Agency	Priority	Ecosystem Element Name	Present Representation
	*	105. Seeps on avalanche slopes, with bluebells and nettle.	Eagle Cap WA
	*	106. Sitka alder with ladyfern, and mesic forbs if possible.	Eagle Cap WA
PVT, OFW	U	107. Hot springs.	
	+	108. Bulrush-cattail marsh, with aquatic beds.	Ladd Marsh WMA
	*	109. Forb flush on seepage slope (including marsh marigold, cowparsnip, shooting-star, bistort, tall larkspur, arrowleaf groundsel and false hellebore).	Eagle Cap WA
	+	110. Subalpine sphagnum mire, with floating mat and buckbean.	Duck Lake PRNA
	I	111. Subalpine sedge fen, with black and Holm sedge.	Eagle Cap WA
PVT, FS	M	112. Small-fruit bullrush wetland.	
PVT, FS	M	113. Nebraska sedge meadow.	
PVT, FS	H	114. Cusick bluegrass meadow.	
FS	M	115. Devil's club/mixed forb seeps.	*Sheep Creek*
	+	116. Tufted hairgrass meadow.	Cougar Meadow PRNA Elk Flats PRNA
PVT, FS	M	117. Geyer willow shrub swamp.	
FS	M	118. Undergreen willow-mountain willow shrub swamp on organic soils.	
FS	M	119. Booth willow-Geyer willow shrub swamp on organic soils.	
	*	120. Prairie sage levee.	Eagle Cap WA
PVT, BLM OFW	H	121. Alkali playa and wetlands, including creeping wildrye, spikerush, Baltic rush, Nevada bulrush, alkali bluegrass and Lemmon alkaligrass.	
PVT, BLM	M	122. Sedge and rush fen, with grass meadows.	
PVT, BLM OFW	L	123. Bulrush-cattail marsh with aquatic beds.	
PVT, BLM	H	124. Great Basin wildrye bottomland.	
PVT, BLM	M	125. Silver sagebrush/bunchgrass playa.	
PVT, BLM	M	126. Greasewood/saltgrass with greasewood/basin wildrye if possible.	

Agency	Priority	Ecosystem Element Name	Present Representation
		Riparian	
PVT, BLM	H	127. Low elevation riparian dominated by coyote willow, Pacific willow, or arroyo willow.	
FS, BLM	H	128. Red-osier dogwood-mockorange riparian.	
	+	129. Quaking aspen/bluejoint reedgrass forest.	Cougar Meadow PRNA
FS	M	130. Quaking aspen/aquatic sedge wetland woodland.	
FS	M	131. Quaking aspen/wooly sedge woodland with wooly sedge meadows if possible.	
	+	132. Quaking aspen/common snowberry forest.	Elk Flats PRNA
FS	H	133. Mid elevation riparian forest, dominated by birch, mountain alder and mixed conifers.	*S. Fork Walla-Walla R. ACEC* *N. Fork Crooked R. ACEC*
	+	134. Western birch-mixed shrub riparian.	Pleasant Valley PRNA
	*	135. Mountain alder-creek dogwood riparian.	Forest Creeks RNA
FS	M	136. Mountain alder/common horsetail riparian with ladyfern or tall mannagrass if possible.	
PVT, FS	M	137. Quaking aspen/mountain alder-snowberry.	
PVT, FS	M	138. Mountain alder-snowberry riparian.	
	*	139. Mountain alder-black hawthorn riparian.	Keating Riparian RNA
PVT, FS	M	140. Tall willow (Booth, Geyer, Lemmon, Bebb, or Missouri willow)/bladder sedge.	
PVT, FS	M	141. Tall willow willow/aquatic sedge.	
PVT, FS	M	142. Tall willow/wooly sedge.	
FS, BLM	M	143. Missouri willow-coyote willow riparian.	
FS, BLM	M	144. White alder/creek dogwood, snowberry or rose.	
FS, BLM	H	145. White alder/mockorange.	
FS	H	146. White alder-black cottonwood riparian.	
FS	M	147. Black cottonwood/mountain alder-red-osier dogwood.	
PVT, BLM FS	M	148. Black cottonwood/common snowberry.	
PVT, FS	M	149. Black cottonwood/red-osier dogwood.	

Agency	Priority	Ecosystem Element Name	Present Representation
PVT, FS	M	150. Black cottonwood/Pacific willow, with coyote willow if possible.	
	*	151. Black cottonwood/black hawthorn.	Joseph Canyon RNA
PVT, FS	M	152. Black cottonwood/snowberry.	
FS	M	153. Quaking aspen-lodgepole pine/Douglas spiraea forb.	

BLUE MOUNTAINS GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
		Holocene	
BLM	M	1. Landslides	*Hole-in-the-Wall Slide* *Powder and Snake River confluence*
BLM, PVT	M	2. Alder Springs	*Deschutes Canyon* *Deschutes Formation Intersection*
	*	3. Deschutes Canyon	Cove Palisades State Park
	*	4. Hells Canyon Gorge	Hells Canyon NRA – WA
		Pleistocene	
PVT	H	5. Glacial moraines	*Wallowa Lake*
	*	6. Glacial features – Horns, Cirques, Arêtes…	Matterhorn Mountain
	M	7. Entrenched meander	*Grande Ronde River/Perry*
		Miocene	
	*	8. Mascall Formation	Picture Gorge RNA
	*	9. Picture Gorge Basalt	Picture Gorge RNA
	*	10. Grande Ronde Basalt	Hells Canyon WA
	*	11. Imnaha Basalt	Imnaha Canyon - Hells Canyon WA
		Oligocene	
	*	12. John Day Formation	Sheep Rocks Unit - John Day Fossil Bed NM
		Eocene	
	*	13. Clarno Formation	Clarno Unit-John Day Fossil Beds NM
		Cretaceous	
	*	14. Gable Creek Formation	Painted Hills Unit - John Day Fossil Beds NM
	L	15. Hudspeth Shale	*Mitchell*
	L	16. Bernard Formation	*Suplee*
		Jurassic	
	*	17. Coon Hollow Formation	Pittsburg Landing – Hells Canyon NRA
BLM, PVT	L	18. Lonesome Formation	*Suplee*

BLUE MOUNTAINS GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
BLM, PVT	L	19. Trowbridge Formation	*Suplee*
BLM, PVT	L	20. Snowshoe Formation	*Suplee*
BLM, PVT	L	21. Hyde Formation	*Suplee*
BLM, PVT	L	22. Nicely shale	*Suplee*
BLM, PVT	L	23. Suplee Formation	*Suplee*
BLM, PVT	L	24. Robertson Formation	*Suplee*
BLM, PVT	L	25. Weatherby Formation	*Huntington*
FS, PVT	L	26. Keller Creek Shale	*Seneca*
		Jurassic and Triassic	
	L	27. Murder's Creek Graywacke	*Ingle Rock*
	*	28. Hurwal Formation	Hurwal Divide - Eagle Cap WA
		Triassic	
	*	29. Martin Bridge Limestone	Big Bar – Hells Canyon NRA Matterhorn
	*	30. Doyle Creek Formation	Hells Canyon WA Cook Creek SR
	*	31. Wild Sheep Creek Formation	Cottonwood Cr. - Hells Canyon WA
	*	32. Laycock Graywacke	Aldrich Mountain SIA
	*	33. Fields Creek Formation	Aldrich Mountain SIA
	*	34. Vester Formation	Aldrich Mountain SIA
BLM	M	35. Huntington Formation	*Huntington*
		Triassic and Permian	
BLM, FS	L	36. Burnt River schist	*Bridgeport*
	*	37. Canyon Mountain Ophiolite	Strawberry Mountains WA
		Triassic, Permian, and Pennsylvanian	
FS	L	38. Elkhorn Ridge Argillite	*Sumpter*
		Permian	
	*	39. Coyote Butte Limestone	Strawberry Mountains WA

BLUE MOUNTAINS GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
	*	40. Hunsaker Creek Formation	Oxbow (Snake River – Hells Canyon NRA)
	*	41. Windy Ridge Formation	Oxbow (Snake River – Hells Canyon NRA)
		Pennsylvanian	
BLM, FS	M	42. Spotted Ridge Formation	*Suplee*
		Mississippian	
BLM, FS	M	43. Coffee Creek Formation	*Suplee*
		Devonian	
BLM, FS	M	44. Fossiliferous Limestone	*Suplee*

BLUE MOUNTAINS SPECIAL SPECIES

	Species Name	Common Name	List	Present Representation	Agency
	Invertebrates				
1	*Anodonta californiensis*	California floater (mussel)	2	Smith Rock State Park	PRD
2	*Boloria bellona*	Meadow fritillary (butterfly)	2		
3	*Boloria selene*	Silver-bordered fritillary (butterfly)	2		
4	*Callophrys johnsoni*	Johnson's hairstreak (butterfly)	1		
5	*Cicindela columbica*	Columbia River tiger beetle	1-x		
6	*Colligyrus sp. 3*	Blue Mountains duskysnail	1		
7	*Cryptomastix populi*	Poplar oregonian (snail)	1		
8	*Cryptomastix sp. 3*	Disc oregonian (snail)	1		
9	*Fluminicola fuscus*	Columbia pebblesnail or spire snail	1		
10	*Gonidea angulata*	Western ridged mussel	2	Snake WSRr	FS
11	*Juga bulbosa*	Bulb juga (snail)	1	Deschutes River St. Scenic Waterway	
12	*Juga hemphilli maupinensis*	Purple-lipped juga (snail)	1	Deschutes River St. Scenic Waterway	
13	*Juga newberryi*	A Freshwater Snail	1		
14	*Juga sp. 2*	Blue Mountains juga (snail)	1		
15	*Juga sp. 4*	Opal Springs (Crooked River) juga (snail)	1		
16	*Megomphix lutarius*	Umatilla megomphix (snail)	1		
17	*Monadenia fidelis ssp. 1*	Deschutes sideband (snail)	1		
18	*Ochlodes yuma*	Yuma skipper (butterfly)	2	*Imnaha River*	
19	*Ogaridiscus subrupicola*	Southern tightcoil (snail)	1		
20	*Oreohelix sp. 29*	Hells Canyon mountainsnail	1		
21	*Oreohelix strigosa delicata*	Blue mountainsnail	1		
22	*Radiodiscus abietum*	Fir pinwheel (snail)	2		
23	*Taylorconcha insperata*	A freshwater snail	1		
	Fish				
24	*Oncorhynchus clarkii lewisi*	Westslope cutthroat trout	1		
25	*Oncorhynchus mykiss pop. 13*	Steelhead (Snake River ESU)	1		
26	*Oncorhynchus mykiss pop. 28*	Steelhead (Middle Columbia River ESU, summer run)	1		
27	*Oncorhynchus mykiss pop. 29*	Steelhead (Middle Columbia River ESU, winter run)	1		
28	*Oncorhynchus nerka pop. 1*	Sockeye salmon (Snake River ESU)	1-x		
29	*Oncorhynchus tshawytscha pop. 18*	Chinook salmon (Deschutes River ESU, summer/fall run)	1		
30	*Oncorhynchus tshawytscha pop. 2*	Chinook salmon (Snake River ESU, fall run)	1		
31	*Oncorhynchus tshawytscha pop. 8*	Chinook salmon (Snake River ESU, spring/summer run)	1	Eagle Cap WA, Wenaha Tucannon WA	FS
32	*Salvelinus confluentus pop. 2*	Bull trout (Columbia River population)	1	Wenaha Tucannon WA, Eagle Cap WA, North Fork John Day WA	FS

BLUE MOUNTAINS SPECIAL SPECIES

	Species Name	Common Name	List	Present Representation	Agency
	Amphibians				
33	*Ascaphus montanus*	Rocky Mountain tailed frog	2	Eagle Cap WA, Hells Canyon NRA, Wenaha Tucannon WA	FS
34	*Rana luteiventris*	Columbia spotted frog	2	Hells Canyon NRA, Prineville WMA, Strawberry Mountain WA	FS
35	*Rana pipiens*	Northern leopard frog	2		
	Reptiles				
36	*Chrysemys picta*	Painted turtle	2	John Day Fossil Beds NM	NPS
	Birds				
37	*Agelaius tricolor*	Tricolored blackbird	2	John Day Fossil Beds National Monument	NPS
38	*Ammodramus savannarum*	Grasshopper sparrow	2		
39	*Bartramia longicauda*	Upland sandpiper	2	Bridge Creek WMA	OFW
40	*Bucephala albeola*	Bufflehead	2		
41	*Centrocercus urophasianus*	Greater sage-grouse	2		
42	*Coccyzus americanus*	Yellow-billed cuckoo	2-x		
43	*Cygnus buccinator*	Trumpeter swan	2		
44	*Dolichonyx oryzivorus*	Bobolink	2	Ladd Marsh WMA	
45	*Falco peregrinus anatum*	American peregrine falcon	2	Eagle Cap WA, Hells Canyon NRA	FS
46	*Histrionicus histrionicus*	Harlequin duck	2	Eagle Cap WA, Hilgard Junction State Recreation Area	PRD
47	*Leucosticte tephrocotis wallowa*	Wallowa rosy-finch	1		
48	*Melanerpes lewis*	Lewis's woodpecker	2	Grande Ronde River State Scenic Waterway, Hells Canyon WA, Ladd Marsh WMA	FS
49	*Picoides albolarvatus*	White-headed woodpecker	2		
50	*Podiceps auritus*	Horned grebe	2	Clear Lake Ridge Preserve	TNC
51	*Seiurus noveboracensis*	Northern waterthrush	2		
52	*Tympanuchus phasianellus columbianus*	Columbian sharp-tailed grouse	2	Clear Lake Ridge Preserve	BLM
	Mammals				
53	*Antrozous pallidus*	Pallid bat	2	John Day Fossil Beds National Monument	NPS
54	*Brachylagus idahoensis*	Pygmy rabbit	2		
55	*Canis lupus*	Gray wolf	2	Wenaha Tucannon WA	FS

BLUE MOUNTAINS SPECIAL SPECIES

	Species Name	Common Name	List	Present Representation	Agency
56	*Corynorhinus townsendii*	Townsend's big-eared bat	2	Deschutes River State Recreation Area, Hells Canyon NRA, John Day Fossil Beds National Monument	FS, NPS
57	*Euderma maculatum*	Spotted bat	2	Crooked River National Grassland, Hells Canyon NRA, John Day Fossil Beds National Monument	FS, NPS, BLM
58	*Gulo gulo*	Wolverine	2	Hells Canyon WA, Strawberry Mountain WA, North Fork John Day WA	FS
59	*Lynx canadensis*	Canada lynx	2	Eagle Cap WA	FS
60	*Martes pennanti*	Fisher	2	Duck Lake RNA, Eagle Cap WA, Hells Canyon NRA, Indian Creek RNA	FS
61	*Myotis thysanodes*	Fringed myotis	2	Hells Canyon NRA, John Day Fossil Beds National Monument	FS, NPS
62	*Ovis canadensis nelsoni*	Desert bighorn sheep	2-x		
63	*Ursus arctos horribilis*	Grizzly bear	2-x		
	Vascular Plants				
64	*Achnatherum hendersonii*	Henderson ricegrass	1	North Fork Crooked River RNA	
65	*Achnatherum wallowaensis*	Wallowa ricegrass	1	Clear Lake Ridge (TNC)	TNC
66	*Allium dictuon*	Blue Mt. onion	1		
67	*Allium geyeri var. geyeri*	Geyer's onion	2	Hells Canyon NRA	FS
68	*Allium tolmiei var. platyphyllum*	Flat-leaved Tolmie's onion	3	Hells Canyon NRA, Hells Canyon WA	FS
69	*Anemone multifida var. tetonensis*	Cliff anemone	3	Eagle Cap WA	FS
70	*Arabis davidsonii*	Davidson's rockcress	2	Hunt Mountain ACEC	BLM
71	*Arabis hastatula*	Hells Canyon rockcress	1	Hells Canyon WA, Eagle Cap WA	FS
72	*Artemisia arbuscula ssp. longicaulis*	Lahontan sagebrush	2		
73	*Asplenium trichomanes-ramosum*	Green spleenwort	2	Eagle Cap WA	FS
74	*Astragalus diaphanus var. diurnus*	South John Day milk-vetch	1	Phillip W. Schneider Wildlife Area	OFW
75	*Astragalus peckii*	Peck's milk-vetch	1	Bull Flat ACEC, “Innes Market Road” ACEC	BLM
76	*Astragalus tegetarioides*	Bastard kentrophyta	1		
77	*Botrychium ascendens*	Upward-lobed moonwort	1	Eagle Cap WA	FS

BLUE MOUNTAINS SPECIAL SPECIES

	Species Name	Common Name	List	Present Representation	Agency
78	*Botrychium campestre*	Prairie moonwort	2	Eagle Cap WA	FS
79	*Botrychium crenulatum*	Crenulate grape-fern	1	Eagle Cap WA	FS
80	*Botrychium hesperium*	Western moonwort	2		
81	*Botrychium lineare*	Skinny moonwort	1	Eagle Cap WA	FS
82	*Botrychium lunaria*	Moonwort	2	Eagle Cap WA	FS
83	*Botrychium montanum*	Mountain grape-fern	2	Eagle Cap WA	FS
84	*Botrychium paradoxum*	Twin-spike moonwort	1		
85	*Botrychium pedunculosum*	Stalked moonwort	1		
86	*Bupleurum americanum*	Bupleurum	2	Eagle Cap WA	FS
87	*Calochortus longebarbatus var. peckii*	Peck's mariposa-lily	1	North Fork Crooked River RNA, Bridge Creek WA	FS
88	*Calochortus macrocarpus var. maculosus*	Green-band mariposa-lily	1	Wenaha Tucannon WA, Hells Canyon WA	FS
89	*Calyptridium roseum*	Rosy pussypaws	2		
90	*Camissonia pygmaea*	Dwarf evening-primrose	1	John Day River WSR	
91	*Carex atrosquama*	Blackened sedge	2	Eagle Cap WA	FS
92	*Carex capillaris*	Capillary sedge	2	Eagle Cap WA	FS
93	*Carex concinna*	Low northern sedge	2	Eagle Cap WA	FS
94	*Carex cordillerana*	Cordilleran sedge	2	Hells Canyon NRA, Wenaha Tucannon WA	FS
95	*Carex duriuscula*	Involute-leaved sedge	2-x		
96	*Carex gynocrates*	Yellow bog sedge	2		
97	*Carex idahoa*	Idaho sedge	1		
98	*Carex lasiocarpa var. americana*	Slender sedge	2		
99	*Carex media*	Intermediate sedge	2	Eagle Cap WA	FS
100	*Carex nardina*	Spikenard sedge	2	Eagle Cap WA	FS
101	*Carex pelocarpa*	A sedge	2	Eagle Cap WA	FS
102	*Carex retrorsa*	Retrorse sedge	2		
103	*Carex saxatilis*	Russet sedge	2	Eagle Cap WA	FS
104	*Carex subnigricans*	Dark alpine sedge	2	Eagle Cap WA	FS
105	*Carex vernacula*	Native sedge	2	Eagle Cap WA	FS
106	*Castilleja chlorotica*	Green-tinged paintbrush	1		
107	*Castilleja flava var. rustica*	Rustic paintbrush	2		
108	*Castilleja fraterna*	Fraternal paintbrush	1		
109	*Castilleja rubida*	Purple alpine paintbrush	1		
110	*Cheilanthes feei*	Fee's lipfern	2	Hells Canyon NRA	FS
111	*Coryphantha vivipara var. vivipara*	Cushion coryphantha	2		
112	*Cryptogramma stelleri*	Steller's rock-brake	2		
113	*Cymopterus nivalis*	Snowline cymopterus	2	Strawberry Mountain WA	
114	*Cyperus lupulinus ssp. lupulinus*	A cyperus	2	Hells Canyon NRA	FS
115	*Cypripedium fasciculatum*	Clustered lady's-slipper	2		
116	*Elatine brachysperma*	Short-seeded waterwort	2		
117	*Eleocharis bolanderi*	Bolander's spikerush	2		

BLUE MOUNTAINS SPECIAL SPECIES

	Species Name	Common Name	List	Present Representation	Agency
118	*Erigeron disparipilus*	White cushion erigeron	2	Hells Canyon NRA, Wenaha Tucannon WA	FS
119	*Erigeron engelmannii var. davisii*	Engelmann's daisy	2	Hells Canyon NRA	FS
120	*Eriogonum cusickii*	Cusick's eriogonum	1		
121	*Geum rossii var. turbinatum*	Slender-stemmed avens	2	Eagle Cap WA	FS
122	*Heliotropium curassavicum*	Salt heliotrope	2		
123	*Juncus triglumis var. albescens*	Three-flowered rush	2	Eagle Cap WA	FS
124	*Kobresia bellardii*	Bellard's kobresia	2	Eagle Cap WA	FS
125	*Kobresia simpliciuscula*	Simple kobresia	2	Eagle Cap WA	FS
126	*Lipocarpha aristulata*	Aristulate lipocarpha	2		
127	*Listera borealis*	Northern twayblade	2	Eagle Cap WA	FS
128	*Lomatium erythrocarpum*	Red-fruited lomatium	1	*Cougar Saddle*	
129	*Lomatium greenmanii*	Greenman's lomatium	1	Eagle Cap WA	FS
130	*Lomatium ravenii*	Raven's lomatium	2		
131	*Lomatium sp. 2*	Ochoco lomatium	1	*Forest Creeks WSA,* North Fork Crooked River RNA	
132	*Lomatium watsonii*	Watson's desert-parsley	2		
133	*Luina serpentina*	Colonial luina	1	Strawberry Mountain WA	FS
134	*Lupinus lepidus var. cusickii*	Cusick's lupine	1	*Denny Flat*	
135	*Lycopodium complanatum*	Ground cedar	2		
136	*Mimulus evanescens*	Disappearing monkeyflower	1		
137	*Mimulus hymenophyllus*	Membrane-leaved monkeyflower	1	*Horse Creek,* Hells Canyon NRA	FS
138	*Mirabilis macfarlanei*	Macfarlane's four-o'clock	1	Pleasant Valley RNA, Hells Canyon WA	FS
139	*Myosurus sessilis*	Sessile mousetail	1		
140	*Pellaea bridgesii*	Bridges' cliff-brake	2	Eagle Cap WA	FS
141	*Phacelia minutissima*	Least phacelia	1	Hells Canyon NRA	FS
142	*Phemeranthus spinescens*	Spiny flame-flower	2		
143	*Phlox hendersonii*	Henderson phlox	2		
144	*Phlox multiflora*	Many-flowered phlox	2		
145	*Physaria chambersii*	Chambers' bladder-pod	2		
146	*Pilularia americana*	American pillwort	2		
147	*Platanthera obtusata*	Small northern bog-orchid	2	Eagle Cap WA	FS
148	*Pleuropogon oregonus*	Oregon semaphore grass	1	Dry Beaver-Ladd Canyon Cooperative Travel Management Area	
149	*Primula cusickiana*	Wallowa primrose	2	Hells Canyon NRA, Eagle Cap WA	FS
150	*Pyrrocoma radiata*	Snake River goldenweed	1		
151	*Pyrrocoma scaberula*	Rough pyrrocoma	1		
152	*Rafinesquia californica*	California chicory	2		
153	*Rorippa columbiae*	Columbia cress	1		
154	*Rubus bartonianus*	Bartonberry	1		
155	*Salix farriae*	Farr's willow	2	Eagle Cap WA	FS
156	*Salix wolfii*	Wolf's willow	2	Eagle Cap WA	FS

BLUE MOUNTAINS SPECIAL SPECIES

	Species Name	Common Name	List	Present Representation	Agency
157	*Saxifraga adscendens ssp. oregonensis*	Wedge-leaf saxifrage	2	Eagle Cap WA	FS
158	*Senecio porteri*	Porter's butterweed	2-x	Eagle Cap WA	FS
159	*Silene spaldingii*	Spalding's campion	1	Clear Lake Ridge Preserve, Zumwalt Prairie Preserve	TNC
160	*Stanleya confertiflora*	Biennial stanleya	1		
161	*Suksdorfia violacea*	Violet suksdorfia	2	Minam State Recreation Area	PRD
162	*Thalictrum alpinum*	Alpine meadow-rue	2	Eagle Cap WA	FS
163	*Thelypodium eucosmum*	Arrow-leaf thelypody	1	Sutton Mountain WSA	FS
164	*Thelypodium howellii ssp. howellii*	Howell's thelypody	2		
165	*Thelypodium howellii ssp. spectabilis*	Howell's spectacular thelypody	1	*Powder River Easement, Rodeo Grounds Easement*	TNC
166	*Townsendia montana*	Mountain townsendia	2	Eagle Cap WA	FS
167	*Townsendia parryi*	Parry's townsendia	2	Eagle Cap WA	FS
168	*Trifolium douglasii*	Douglas clover	1		
169	*Trollius laxus ssp. albiflorus*	American globeflower	2	Hells Canyon NRA, Hells Canyon WA	FS
170	*Utricularia minor*	Lesser bladderwort	2		
	Nonvascular Plants				
171	*Anastrophyllum minutum*	Liverwort	2		
172	*Anthelia julacea*	Liverwort	2		
173	*Barbilophozia lycopodioides*	Liverwort	2		
174	*Ephemerum serratum*	Moss	2		
175	*Harpanthus flotovianus*	Liverwort	2	North Fork John Day WA	FS
176	*Helodium blandowii*	Moss	2	North Fork John Day WA, Vinegar Hill-Indian Rock Special Interest Area	FS
177	*Jungermannia polaris*	Liverwort	2		
178	*Lophozia gillmanii*	Liverwort	2	North Fork John Day WA	FS
179	*Meesia uliginosa*	Moss	2		
180	*Peltolepis quadrata*	Liverwort	2		
181	*Preissia quadrata*	Liverwort	2		
182	*Ptilidium pulcherrimum*	Liverwort	2		
183	*Schistidium cinclidodonteum*	Moss	2		
184	*Tomentypnum nitens*	Moss	2		
185	*Tortula mucronifolia*	Moss	2		
	Fungi				
186	*Texosporium sancti-jacobi*	Woven-spored lichen	2	Crooked River National Grassland, The Island RNA	BLM

CHAPTER 17. NORTHERN BASIN & RANGE ECOREGION

The Northern Basin and Range Ecoregion includes much of southeastern Oregon's high desert and extends south into Nevada and extreme northeastern California. The ecoregion's name reflects its topography and geology, with numerous flat basins separated by isolated, generally north-south mountain ranges. Many of the mountains are fault blocks, with gradual slopes on one side and precipitous basalt rims on the other. In Oregon, elevations range from 2,500 feet in the lowest parts of the Owyhee and Malheur Rivers to more than 9,700 feet on Steens Mountain. Soils are generally rocky and thin, low in organic matter and high in minerals.

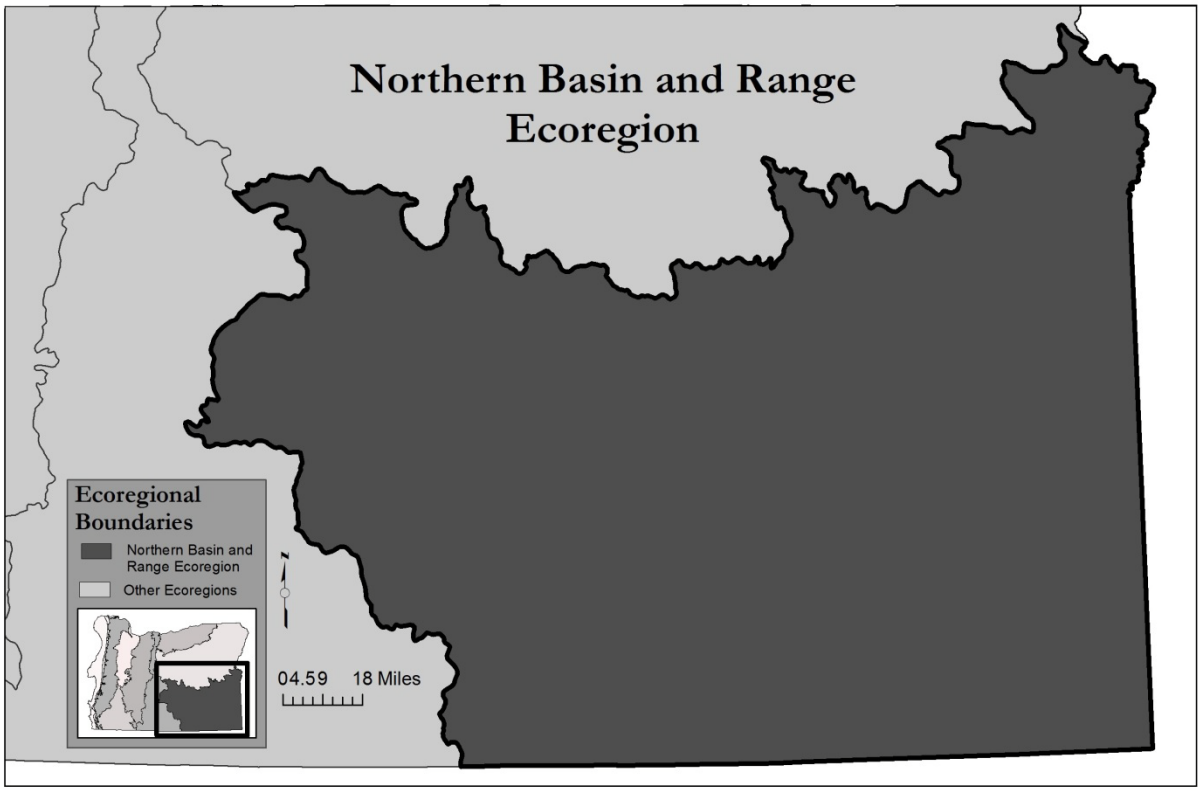

Figure 21. Northern Basin & Range Ecoregion Map.

Another important influence in the ecoregion is the geology, which is mostly of volcanic origin. Over large portions of the landscape, soils have been derived from underlying layers of basalt and rhyolite, or occasionally from sedimentary layers that have been exposed by erosion. Of more interest than these "normal soils" are soils derived from volcanic ash and welded tuffs, which are found in distinct sites such as Leslie Gulch and Succor Creek near the Idaho border, or the extensive young lava flows such as Devil's Garden, Diamond Craters, Jordan Craters or Saddle Butte Lava Field. The climate is arid, with extreme ranges of daily and seasonal temperatures, with areas in the Alvord Desert (Oregon's driest location) receiving as little as 7 inches of rain annually. Runoff from rainfall and mountain snowpack in the basins often flows into flat alkaline playas, forming seasonal shallow lakes and marshes.

Also known as the sagebrush desert or high desert, the Northern Basin and Range Ecoregion contains many diverse habitats. The most significant of these are the extensive sagebrush steppe areas, dominated primarily by Wyoming big sagebrush and low sagebrush, with many small but important

silver sagebrush playas. The Ecoregion contains large, closed, alkaline basins, the largest of which is the Alvord Desert. These contain large areas of salt desert scrub characterized by alkaline flats, with Oregon's only populations of mormon tea, iodine bush, and most of Oregon's winterfat, shadscale and spiny-hopsage alkaline shrublands. The large wildlife refuges, ACECs and Wilderness Areas here support some of the largest populations of pronghorn antelope, white pelicans, sage grouse and waterfowl, and are well known for their wildlife diversity. The refuges and protected areas also contain Oregon's only narrowleaf cottonwood riparian forests, and the majority of the state's alkaline wetlands, mountain mahogany and aspen woodlands.

Also included within this section of the plan is a small inclusion of the Snake River Plain ecoregion. This is a major feature in southern Idaho, which extends into Oregon in northeastern Malheur County. It includes the lower Snake River valley from the county line to where the Snake leaves the state, and includes the lower valley of the Malheur River from Ontario to Harper. The Snake River Plain Ecoregion has similar vegetation as the adjacent Northern Basin and Range Ecoregion, but differs markedly in its terrain. The Snake River Plain is basically a broad river valley with low, adjacent foothills.

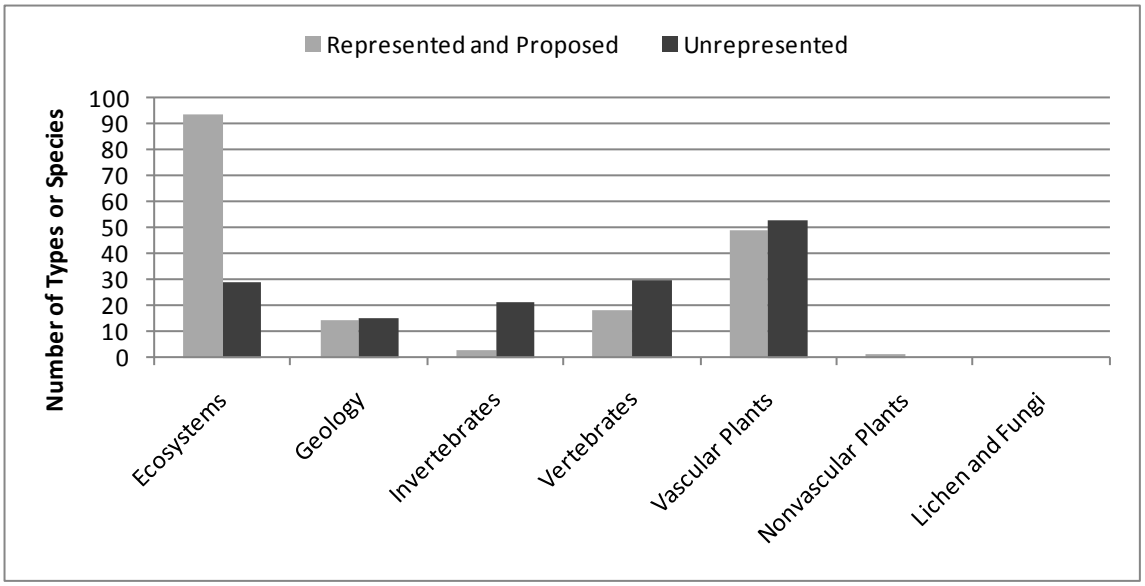

Figure 22. Represented and Unrepresented Ecosystem Elements and Species for the Northern Basin and Range Ecoregion.

Agency	Priority	Ecosystem Element Name	Present Representation
		Ponderosa Pine and Western Juniper	
	*	1. Ponderosa pine/big sagebrush-bitterbrush, isolated stand within steppe.	Lost Forest RNA
	*	2. Ponderosa pine-western juniper/big sagebrush/ needle-and-thread.	Lost Forest RNA
	+	3. Ponderosa pine-western juniper/sagebrush-bitterbrush vegetation mosaic.	Castle Rock PRNA Ott Mountain PRNA Sheep Mountain PRNA
	*	4. Ponderosa pine-western juniper/low sagebrush vegetation mosaic.	Silver Creek RNA
	+	5. Western juniper/big sagebrush/bluebunch wheatgrass.	Connley Hills RNA Stockade Mountain RNA Black Canyon RNA
DSL, BLM	M	6. Western juniper/big sagebrush/Idaho fescue.	
	+	7. Western juniper/big sagebrush-bitterbrush.	Rahilly-Gravelly RNA
	+	8. Western juniper/bluebunch wheatgrass.	Connley Hills RNA
	+	9. Western juniper/Idaho fescue.	Connley Hills RNA Vee Pasture RNA
	*	10. Western juniper/low sagebrush/Idaho fescue.	Poker Jim Ridge RNA
	+	11. Western juniper/big sagebrush-bitterbrush steppe.	Juniper Gulch PRNA
	+	12. Western juniper-mountain mahogany/mountain big sagebrush/bunchgrass.	Ott Mountain PRNA
	*	13. Western juniper/low sagebrush/Sandberg bluegrass.	Poker Jim Ridge RNA
		Big Sagebrush	
	+	14. Wyoming big sagebrush/bluebunch wheatgrass.	Connley Hills RNA Big Alvord Creek RNA Hawk Mountain II PRNA *Tent Creek Headwaters*
	+	15. Wyoming big sagebrush/Idaho fescue.	Hawk Mountain I PRNA Hawk Mountain II PRNA
	*	16. Wyoming big sagebrush/Thurber needlegrass.	North Ridge Bully Creek RNA South Ridge Bully Creek RNA
BLM	H	17. Wyoming big sagebrush/western needlegrass.	
	+	18. Wyoming big sagebrush/needle-and-thread.	Sink Lakes-Guano Creek RNA

Agency	Priority	Ecosystem Element Name	Present Representation
	*	19. Wyoming big sagebrush/needle-and-thread on cinders.	Honeycombs RNA
	*	20. Wyoming big sagebrush/Indian ricegrass.	Long Draw RNA
	+	21. Wyoming big sagebrush/Indian ricegrass and Wyoming big sagebrush/needle and thread mosaic.	South Alkali Sand Hills PRNA
	*	22. Basin big sagebrush/bluebunch wheatgrass.	Jordan Crater RNA
PVT, BLM	H	23. Basin big sagebrush/basin wildrye.	*Three Forks PRNA*
		Mixed Sagebrush and Mountain Big Sagebrush	
	*	24. Big sagebrush-greasewood vegetation.	Stinking Lake RNA Harney Lake RNA
	+	25. Big sagebrush-bitterbrush/Idaho fescue.	Fish Creek Rim RNA
	+	26. Mountain brush (Mountain big sagebrush-bitterbrush-squawapple.	Rahilly-Gravelly RNA
	+	27. Snowbrush and bittercherry shrub complex.	Fish Creek Rim RNA
	+	28. Big sagebrush-bitterbrush/Idaho fescue.	South Bull Canyon RNA
	+	29. Big sagebrush-bitterbrush/Indian ricegrass and big sagebrush/needle and thread mosaic on sandy soils.	Hammond Hill Sand Hills RNA South Alkali Sand Hills PRNA
	+	30. Wyoming big sagebrush-squawapple/bluebunch wheatgrass-Thurber needlegrass.	North Ridge Bully Creek RNA
	+	31. Wyoming big sagebrush-squawapple/Idaho fescue.	South Ridge Bully Creek RNA
	*	32. Mountain big sagebrush/Idaho fescue.	Castle Rock PRNA Spring Mountain RNA East Fork Trout Creek RNA
	*	33. Mountain big sagebrush/needlegrass.	Steens Mountain WA Little Blitzen RNA
	+	34. Mountain big sagebrush/basin wildrye.	Warner Creek PRNA
	+	35. Mountain big sagebrush-mountain snowberry/Idaho fescue.	Spring Mountain RNA
	*	36. Mountain big sagebrush, bitterbrush, mountain snowberry/Thurber needlegrass mosaic.	Little Blitzen RNA Rahilly-Gravelly RNA
	+	37. Big sagebrush-threetip sagebrush/bunchgrass.	North Ridge Bully Creek RNA South Ridge Bully Creek RNA
	+	38. Threetip sagebrush/bluebunch wheatgrass.	North Ridge Bully Creek RNA South Ridge Bully Creek RNA
	+	39. Threetip sagebrush/Idaho fescue.	Jordan Crater RNA

Agency	Priority	Ecosystem Element Name	Present Representation
	+	40. Silver sagebrush/Nevada bluegrass flat or playa.	Lake Ridge RNA Toppin Butte RNA Jordan Crater RNA
		Low and Black Sagebrush	
	+	41. Low sagebrush/bluebunch wheatgrass.	*Poker Jim Ridge RNA* Lake Ridge RNA
	+	42. Low sagebrush/Idaho fescue.	Fish Creek Rim RNA Toppin Butte RNA *Lake Ridge RNA*
BLM, FWS	M	43. Low sagebrush/Thurber needlegrass.	*Desert Lake PRNA* *Sagehen Hills*
	*	44. Low sagebrush/Sandberg bluegrass scabland.	*Sink Lakes-Guano Creek RNA* Stockade Mountain RNA addition Steens Mountain WA
	+	45. Montane low sagebrush/sheep fescue-Idaho fescue mosaic.	Warner Creek PRNA
	+	46. Black sagebrush/bunchgrass community complex.	Foley Lake RNA Mendi Gore Playa RNA
	+	47. Rigid sagebrush/Sandberg bluegrass.	Black Canyon RNA
	+	48. Rigid sagebrush/Bluebunch wheatgrass	
		Desert or Salt Desert Shrub	
		49. Big sagebrush-spiny hopsage salt desert scrub playa.	Harney Lake RNA TumTum Lake RNA
	+	50. Big sagebrush-spiny hopsage-budsage mosaic on ash.	Coal Mine Basin RNA Basin PACEC Dry Creek Gorge PACEC
	*	51. Shadscale-spiny hopsage-green mormon tea salt desert scrub.	Pueblo Foothills RNA
	*	52. Black greasewood-shadscale/bunchgrass playa margin vegetation.	Harney Lake RNA TumTum Lake RNA
	+	53. Shadscale-budsage/bunchgrass salt desert scrub.	Spanish Lake RNA
BLM	M	54. Shadscale/bunchgrass steppe.	*Dry Creek Buttes*
	+	55. Black greasewood flat.	Hammond Hill Sand Hills RNA Crooked Creek SNA
	+	56. Shadscale-big sagebrush mosaic.	Palomino Playa RNA Crooked Creek SNA
	*	57. Winterfat playa.	Mickey Basin RNA Mendi Gore Playa RNA

Agency	Priority	Ecosystem Element Name	Present Representation
	*	58. Sand dune series, from active unvegetated dunes through stabilized (with greasewood, hopsage, Indian ricegrass, and wildrye).	Harney Lake RNA Big Alvord Creek RNA
BLM	H	59. Iodine bush playa.	*McDermitt* *Mann Lake*
		Mountain Mahogany	
	+	60. Mountain mahogany/mountain big sagebrush community with bitterbrush if possible.	Fish Creek Rim RNA Mahogany Ridge RNA
	+	61. Mountain mahogany/mountain big sagebrush-snowberry/bunchgrass.	Dry Creek Bench PRNA Warner Creek PRNA
PVT	H	62. Mountain mahogany/pinegrass.	
	+	63. Mountain mahogany-aspen-cherry snowbank.	Spring Mountain RNA Mahogany Ridge RNA Addition
	*	64. Mountain mahogany/bluebunch wheatgrass canyon.	Rooster Comb RNA
		Special Types	
	+	65. White fir forest.	Hart Canyon PRNA Fir Groves PACEC
	*	66. Aspen/blue wildrye.	Little Blitzen RNA
	*	67. High elevation fescue grassland.	East Kiger Plateau RNA Little Blitzen RNA
	*	68. Alpine upland vegetation including grasslands with alpine oatgrass, sedge and spikerush meadows, and alpine buckwheat.	Little Wildhorse Lake RNA Little Blitzen RNA Steens Mountain WA
DSL, BLM	M	69. Intermittent stream dominated by mock orange, bitterbrush or serviceberry.	*Canyon south. of Namorf*
	*	70. Annual forb communities on exposed ash beds.	Leslie Gulch RNA Honeycombs RNA
		Lacustrine	
	*	71. Low elevation lake with aquatic beds and marshy shore.	Jordan Crater RNA
PVT, BLM	U	72. Faultblock lake.	
	*	73. Low elevation hot lake and associated elevated mineral springs.	Borax Lake (TNC) Micky Hot Springs PACEC
	*	74. Low elevation alkaline lake.	Harney Lake RNA Stinking Lake RNA Tumtum Lake RNA

Agency	Priority	Ecosystem Element Name	Present Representation
	*	75. Mid to high elevation lake.	Little Wildhorse Lake RNA
		Palustrine	
DSL, BLM	U	76. Low elevation alkaline pond with aquatic beds and marshy shore.	
DSL, BLM FWS	U	77. Low elevation freshwater pond with aquatic beds and marshy shore.	
DSL, BLM	U	78. Mid to high elevation pond with aquatic beds and marshy shore.	
	+	79. Low elevation vernal pond.	Sink Lakes-Guano Creek RNA Jordan Crater RNA
	*	80. Mid to high elevation vernal pond.	Little Blitzen RNA
	*	81. Large hot springs.	Borax Lake Preserve (TNC) Mickey Hot Springs PACEC
	*	82. Running hot springs	Three Forks PRNA *Harney Hot Springs*
	*	83. Cold springs.	Little Blitzen RNA
	*	84. Bulrush-cattail marsh, with aquatic beds.	Jordan Crater RNA
	+	85. Burreed marsh.	Crump Lake PSNA
	+	86. Reedgrass marsh.	Crump Lake PSNA *South Warner Basin (TNC)*
PVT, BLM	M	87. Nebraska sedge meadow.	
	*	88. Wet sedge meadow in alpine cirque.	Little Blitzen RNA South Fork Willow Creek RNA Little Wildhorse Creek RNA
	*	89. Alkaline marsh, with sedge, spikerush, rush and bulrush.	Harney Lake RNA Stinking Lake RNA Borax Lake ACEC/(TNC)
	+	90. Silver sagebrush/Great Basin wildrye.	Guano Slough PRNA Sink Lakes-Guano Creek RNA
	*	91. Silver sagebrush/Nevada bluegrass	Foster Flat RNA
PVT, BLM	M	92. Silver sagebrush/mat muhly playa.	
	*	93. Silver sagebrush/Nebraska sedge-Cusick bluegrass playa.	Foster Flat RNA
PVT, BLM	H	94. Spiny saltbush/saltgrass playa.	
	*	95. Bare playa with playa margin communities, including creeping wildrye, Baltic rush, Nevada bulrush, alkali	Harney Lake RNA Big Alvord Creek RNA

Agency	Priority	Ecosystem Element Name	Present Representation
		bluegrass and Lemmon alkaligrass	
	*	96. Playa with greasewood and Great Basin wildrye.	Serrano Point RNA
	*	97. Greasewood/saltgrass playa.	Harney Lake RNA Borax Lake ACEC - TNC Stinking Lake RNA
	*	98. Greasewood/seablite playa.	Tum Tum Lake RNA Stinking Lake RNA
PVT, BLM PRD	H	99. Open basin valley bottom alkaline wetland mosaic, with greasewood/saltgrass and greasewood/Basin wildrye.	*Crooked Creek*
	+	100. Bare playa with Davis' peppergrass if possible.	Palomino Playa RNA Toppin Butte RNA
	+	101. Bare playa with poverty weed.	Spanish Lake RNA
		Riparian	
PVT, BLM	H	102. Missouri willow/golden currant.	
PVT, BLM	H	103. Booth willow-Lemmon willow riparian.	
BLM	H	104. Subalpine willow shrub swamp, with Booth and Drummond willows.	*Fish Creek Meadows*
PVT, BLM	H	105. Lemmon willow-bog blueberry shrub swamp on organic soils.	
	*	106. Lemmon willow, mid elevation riparian.	East Fork Trout Creek RNA
PVT, BLM	H	107. Low elevation riparian community dominated by coyote willow, Pacific willow and arroyo willow.	*Sink Lakes-Guano Creek RNA*
BLM	H	108. Riparian community dominated by arroyo willow, red-osier dogwood and Woods rose.	
	*	109. Riparian dominated by coyote willow and Pacific willow.	Black Canyon RNA Three Forks PRNA
PVT, BLM FS	M	110. Rigid willow/golden currant riparian.	
DSL, BLM	M	111. Geyer willow riparian.	
	+	112. Riparian community dominated by mountain alder and creek dogwood or snowberry.	Little Whitehorse Exclosure RNA
	*	113. Mountain alder-quaking aspen riparian.	Little Blitzen RNA

Agency	Priority	Ecosystem Element Name	Present Representation
	*	114. Riparian community dominated by quaking aspen and Scouler willow.	East Fork Trout Creek RNA
	*	115. Riparian community dominated by black cottonwood and creek dogwood.	Rooster Comb RNA Little Blitzen RNA
	+	116. Riparian community dominated by black cottonwood and coyote willow.	Big Alvord Creek RNA
PVT, BLM	H	117. Black cottonwood/mountain alder riparian.	
PVT, BLM	H	118. Black cottonwood/snowberry riparian.	
	*	119. Narrowleaf cottonwood riparian area.	Pueblo Foothills RNA
	+	120. Aspen/mountain snowberry woodland or forest.	Spring Mountain RNA
BLM	M	121. Dwarf aspen-bittercherry-serviceberry snowbank.	*Spring Mountain RNA*
	+	122. White alder riparian.	Succor Creek PSNA
DSL, BLM	H	123. Bittercherry-coyote willow-rose riparian.	

NORTHERN BASIN AND RANGE GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
		Holocene	
	*	1. Active fault scarp	Abert Rim ACEC
BLM	M	2. Landslides	*Winter Ridge*
	*	3. Eolian dunes	Alvord Dunes ACEC Warner Lakes Dunes
	*	4. Playa Lakes	Alvord Lake - Alvord ACEC
	*	5. Tyfoni Weathering	Leslie Gulch RNA
BLM	L	6. Pinnacles	*Sand Creek*
		Pleistocene	
	*	7. Cinder cones and craters	Diamond Craters Outstanding Natural Area Jordan Craters RNA
	*	8. Desert deposits and features	Big Alvord Creek RNA
	*	9. Glacial valleys	Steens Mountains WA Little Blitzen RNA
	*	10. Lake deposits and features	Fort Rock State Park Harney Lake RNA
BLM, PVT	M	11. Landslides	*Rome*
BLM	H	12. Lava Tube Caves	*Saddle Butte*
	*	13. Lava Field	Jordan Craters RNA Devils Garden ACEC
	*	14. Rhyolite pillars	Leslie Gulch Lower Owyhee Gorge
	*	15. Tuff Ring	Fort Rock State Park
		Pliocene	
BLM	L	16. Glenns Ferry Formation	*Malheur Butte*
BLM	L	17. Harney Formation	*Burns*
		Miocene	
PVT	L	18. Rattlesnake Ash-Flow Tuff	*Burns*
	*	19. Jump Creek Rhyolite	Succor Creek State Park
BLM, PVT	L	20. Wildcat Creek Welded Ash-Flow Tuff	*Skull Springs*

NORTHERN BASIN AND RANGE GEOLOGIC FORMATIONS AND FEATURES

Agency	Priority	Formation or Feature Name	Present Representation
BLM	L	21. Rhyolite and Rhyodacite of Dry Creek	*Skull Springs*
BLM	L	22. Prater Creek Ash-Flow Tuff	*Burns*
BLM	L	23. Devine Canyon Ash-Flow Tuff	*Burns*
BLM	L	24. Littlefield Rhyolite	*Namorf*
BLM, PRD	L	25. Owyhee Basalt	*Owyhee River Canyon*
	*	26. Sucker Creek Formation	Succor Creek State Park
	*	27. Steens Mountain Basalt	Steens Mountain WA
BLM	M	28. Pike Creek Volcanics	Steens Mountain Cooperative Management and Protection Area
BLM	M	29. Alvord Creek Formation	

NORTHERN BASIN AND RANGE SPECIAL SPECIES (BR)

	Scientific Name	Common Name	List	Present Representation	Agency
	Invertebrates				
1	*Amerigoniscus malheurensis*	Malheur isopod	1	*Malheur Cave*	
2	*Anodonta californiensis*	California floater (mussel)	2	Harney Lake RNA, Malheur NWR	FWS
3	*Anodonta nuttalliana*	Winged floater	2		
4	*Anodonta wahlametensis*	Willamette floater (mussel)	1		
5	*Apochthonius malheuri*	Malheur pseudoscorpion	1	*Malheur Cave*	
6	*Colligyrus depressus*	Harney Basin duskysnail	1		
7	*Fluminicola insolitus*	Donner und Blitzen pebblesnail	1		
8	*Fluminicola sp. 9*	Malheur pebblesnail	1		
9	*Fluminicola turbiniformis*	Turban pebblesnail	1		
10	*Gonidea angulata*	Western ridged mussel	2	Lower Owyhee Canyon WSA, Malheur NWR, Owyhee River Canyon WSA	BLM, FS
11	*Helisoma newberryi newberryi*	Great Basin ramshorn (snail)	1		
12	*Kenkia rhynchida*	A flatworm (planarian)	1		
13	*Micracanthia fennica*	Harney Hot Spring shore bug	2		
14	*Ochlodes yuma*	Yuma skipper (butterfly)	2		
15	*Oncopodura mala*	Malheur Cave springtail	1		
16	*Petrophysa sp. 1*	Hotspring physa (snail)	1		
17	*Physa megalochlamys*	Large-mantle physa (snail)	2		
18	*Planorbella oregonensis*	Borax Lake ramshorn (snail)	1	Borax Lake Preserve	TNC
19	*Pyrgulopsis fresti*	Owyhee hot springsnail	1		
20	*Pyrgulopsis intermedia*	Crooked Creek springsnail	1		
21	*Pyrgulopsis owyheensis*	A springsnail	1		
22	*Pyrgulopsis robusta*	Jackson Lake springsnail	2		
23	*Stygobromus hubbsi*	Malheur Cave amphipod	1	*Malheur Cave*	
24	*Taylorconcha insperata*	A freshwater snail	1		
	Fish				
25	*Catostomus tahoensis*	Tahoe sucker	2		
26	*Catostomus warnerensis*	Warner sucker	1		
27	*Gila alvordensis*	Alvord chub	1		
28	*Gila bicolor eurysoma*	Sheldon tui chub	1		
29	*Gila bicolor oregonensis*	Oregon Lakes tui chub	1		
30	*Gila bicolor pop. 1*	Warner Basin tui chub	1		
31	*Gila bicolor ssp. 1*	Hutton tui chub	1		
32	*Gila bicolor ssp. 13*	Summer Basin tui chub	1		
33	*Gila bicolor ssp. 2*	Catlow tui chub	1	Steens Mountain Cooperative Management and Protection Area	BLM, FS, private
34	*Gila boraxobius*	Borax Lake chub	1	Borax Lake Preserve	TNC
35	*Oncorhynchus anaden alvordensis*	Alvord cutthroat trout	1-x		
36	*Oncorhynchus anaden henshawi*	Lahontan cutthroat trout	2	Steens Mountain RNA	BLM

NORTHERN BASIN AND RANGE SPECIAL SPECIES (BR)

	Scientific Name	Common Name	List	Present Representation	Agency
37	*Oncorhynchus mykiss pop. 3*	Catlow Valley redband trout	1		
38	*Oncorhynchus mykiss pop. 4*	Warner Valley redband trout	1		
39	*Rhinichthys osculus ssp. 3*	Foskett Spring speckled dace	1	*Foskett Springs*	
40	*Richardsonius egregius*	Lahontan redside	2		
	Amphibians				
41	*Bufo woodhousii*	Woodhouse's toad	2		
42	*Rana luteiventris*	Columbia spotted frog	2	Malheur NWR, Steens Mountain Cooperative Management And Protection Area	BLM
43	*Rana pipiens*	Northern leopard frog	2		
	Birds				
44	*Ammodramus savannarum*	Grasshopper sparrow	2		
45	*Anser albifrons elgasi*	Tule goose	1		
46	*Bucephala albeola*	Bufflehead	2		
47	*Centrocercus urophasianus*	Greater sage-grouse	2	Hart Mountain National Antelope Refuge, Jordan Craters RNA, Summer Lake WMA	BLM, FWS
48	*Charadrius anadensiss nivosus*	Western snowy plover	2	Borax Lake ACEC, Borax Lake Preserve, Harney Lake RNA, Malheur NWR	BLM, FWS, OFW
49	*Coccyzus americanus*	Yellow-billed cuckoo	2-x		
50	*Cygnus buccinator*	Trumpeter swan	2	Malheur NWR	
51	*Dolichonyx oryzivorus*	Bobolink	2	Malheur NWR	FWS
52	*Egretta thula*	Snowy egret	2	Malheur NWR, Summer Lake WMA	FWS, OFW
53	*Falco columbarius*	Merlin	2-x		
54	*Falco anadensis anatum*	American peregrine falcon	2	Fort Rock NA	PRD
55	*Larus pipixcan*	Franklin’s gull	2	Malheur NWR	FWS
56	*Leucosticte atrata*	Black rosy-finch	2		
57	*Melanerpes lewis*	Lewis’s woodpecker	2		
58	*Pelecanus erythrorhynchos*	American white pelican	2	Harney Lake RNA, Jordan Crater RNA, Malheur NWR, Summer Lake WMA	BLM, OFW, FWS
59	*Podiceps auritus*	Horned grebe	2	Malheur NWR	
60	*Tympanuchus phasianellus columbianus*	Columbian sharp-tailed grouse	2		
	Mammals				
61	*Antrozous pallidus*	Pallid bat	2	Hart Mountain National Antelope Refuge	BLM

NORTHERN BASIN AND RANGE SPECIAL SPECIES (BR)

	Scientific Name	Common Name	List	Present Representation	Agency
62	*Brachylagus idahoensis*	Pygmy rabbit	2	Fort Rock NA, Hart Mountain National Antelope Refuge, Malheur NWR	PRD, FWS
63	*Canis lupus*	Gray wolf	2		
64	*Corynorhinus townsendii*	Townsend's big-eared bat	2	Jordan Crater RNA, Saddle Butte Lava Flow ACEC	
65	*Euderma maculatum*	Spotted bat	2		
66	*Gulo gulo*	Wolverine	2	Little Blitzen RNA, Steens Mountain WA	FS
67	*Lynx canadensis*	Canada lynx	2		
68	*Myotis thysanodes*	Fringed myotis	2		
69	*Ovis anadensis nelsoni*	Desert bighorn sheep	2-x		
70	*Spermophilus elegans nevadensis*	Wyoming ground squirrel	2-x		
71	*Ursus arctos horribilis*	Grizzly bear	2-x		
72	*Vulpes macrotis*	Kit fox	2	Big Alvord Creek RNA, Saddle Butte Lava Flow ACEC	BLM
	Vascular Plants				
73	*Abronia turbinata*	Trans montane abronia	2	Big Alvord Creek RNA, Alvord Desert WSA, East Alvord WSA, Mickey Basin RNA	BLM
74	*Achnatherum speciosum*	Desert needlegrass	2		
75	*Agastache cusickii*	Cusick's giant-hyssop	2	Pueblo Mountains WSA	
76	*Allenrolfea occidentalis*	Iodine bush	2	Malheur NWR, Tum Tum Lake RNA	FWS, BLM
77	*Argemone munita*	Prickly-poppy	2		
78	*Artemisia arbuscula ssp. Longicaulis*	Lahontan sagebrush	2		
79	*Artemisia papposa*	Owyhee sagebrush	2	Upper West Little Owyhee WSA	
80	*Astragalus calycosus*	King's rattleweed	2		
81	*Astragalus cusickii var. sterilis*	Sterile milk-vetch	1		
82	*Astragalus geyeri var. geyeri*	Geyer's milk-vetch	2		
83	*Astragalus mulfordiae*	Mulford's milk-vetch	1	South Alkali ACEC	BLM
84	*Astragalus platytropis*	Broad-keeled milk-vetch	2		
85	*Astragalus tegetarioides*	Bastard kentrophyta	1		
86	*Astragalus tenellus*	Loose flower milk-vetch	2		
87	*Botrychium crenulatum*	Crenulate grape-fern	1	Steens Mountain WA	FS
88	*Botrychium lunaria*	Moonwort	2	Little Blitzen RNA	
89	*Callitriche fassettii*	The Dalles water-starwort	1		
90	*Calyptridium roseum*	Rosy pussypaws	2		
91	*Camissonia pygmaea*	Dwarf evening-primrose	1		
92	*Carex atrosquama*	Blackened sedge	2	Steens Mountain WA	FS
93	*Carex capitata*	Capitate sedge	2	Steens Mountain WA	FS

NORTHERN BASIN AND RANGE SPECIAL SPECIES (BR)

	Scientific Name	Common Name	List	Present Representation	Agency
94	*Carex cordillerana*	Cordilleran sedge	2	Steens Mountain WA	BLM
95	*Carex pelocarpa*	A sedge	2	Little Blitzen RNA	
96	*Carex saxatilis*	Russet sedge	2		
97	*Carex scirpoidea ssp. Stenochlaena*	Alaskan single-spiked sedge	2	Steens Mountain WA	FS
98	*Carex subnigricans*	Dark alpine sedge	2	Little Wildhorse Creek RNA	
99	*Carex vernacula*	Native sedge	2	Steens Mountain WA	FS
100	*Caulanthus crassicaulis var. glaber*	Smooth wild cabbage	2		
101	*Caulanthus major var. nevadensis*	Slender wild cabbage	2	*Owyhee Butte*	
102	*Chaenactis xantiana*	Desert pincushion	2	Steens Mountain WA	FS
103	*Chaetadelpha wheeleri*	Wheeler's skeleton-weed	2	Big Alvord Creek RNA	
104	*Collomia renacta*	Barren Valley collomia	1		
105	*Coryphantha vivipara var. vivipara*	Cushion coryphantha	2		
106	*Cymopterus acaulis var. greeleyorum*	Greeley's cymopterus	1		
107	*Cymopterus longipes var. ibapensis*	Ibapah wavewing	2		
108	*Cymopterus nivalis*	Snowline cymopterus	2	Little Blitzen RNA	
109	*Cymopterus purpurascens*	Purple cymopterus	2	Long Draw RNA	
110	*Delphinium bicolor*	Flathead larkspur	2		
111	*Dodecatheon pulchellum var. shoshonense*	Darkthroat shootingstar	2	Crooked Creek NA	PRD
112	*Elatine brachysperma*	Short-seeded waterwort	2	Spaulding WSA	BLM
113	*Eleocharis bolanderi*	Bolander's spikerush	2	Upper West Little Owyhee WSA	BLM
114	*Erigeron latus*	Broad fleabane	2		
115	*Eriogonum brachyanthum*	Short-flowered eriogonum	2		
116	*Eriogonum chrysops*	Golden buckwheat	1	*Skull Springs*	
117	*Eriogonum crosbyae*	Crosby's buckwheat	1		
118	*Eriogonum cusickii*	Cusick's eriogonum	1	*Sagehen*	
119	*Eriogonum hookeri*	Hooker's wild buckwheat	2		
120	*Eriogonum prociduum*	Prostrate buckwheat	1	Hart Mountain National Antelope Refuge	FWS
121	*Eriogonum salicornioides*	Playa buckwheat	2	Crooked Creek NA, Owyhee Breaks WSA, Succor Creek NA	PRD, BLM
122	*Galium serpenticum ssp. Warnerense*	Warner Mountain bedstraw	1		
123	*Gentiana prostrata*	Moss gentian	2	South Fork Willow Creek RNA, Steens Mountain WA	BLM, FS
124	*Gentianella tenella ssp. Tenella*	Slender gentian	2	South Fork Willow Creek RNA	BLM
125	*Gratiola heterosepala*	Boggs Lake hedge-hyssop	1		
126	*Hackelia ophiobia*	Three Forks stickseed	2	North Fork Owyhee WSR	

NORTHERN BASIN AND RANGE SPECIAL SPECIES (BR)

	Scientific Name	Common Name	List	Present Representation	Agency
127	*Heliotropium curassavicum*	Salt heliotrope	2	Lost Forest/Sand Dunes/Fossil Lake ACEC/RNA, Sand Dunes WSA, Tum Tum Lake RNA, Warner Wetlands ACEC	BLM
128	*Hymenoxys lemmonii*	Cooper's goldflower	2		
129	*Ivesia rhypara var. rhypara*	Grimy ivesia	1	Leslie Gulch RNA	BLM
130	*Ivesia rhypara var. shellyi*	Shelly's ivesia	1	*Venator Canyon*	
131	*Ivesia shockleyi*	Shockley's ivesia	2		
132	*Kobresia bellardii*	Bellard's kobresia	2	Steens Mountain WA	FS
133	*Lepidium davisii*	Davis' peppergrass	1	Palomino Playa RNA	BLM
134	*Lomatium foeniculaceum var. fimbriatum*	Fringed desert-parsley	2		
135	*Lomatium ravenii*	Raven's lomatium	2	Alvord Peak ACEC, Steens Mountain WA	BLM
136	*Lomatium roseanum*	Rose's lomatium	1		
137	*Lupinus nevadensis*	Nevada lupine	2	Alvord Peak ACEC, Steens Mountain WA	BLM
138	*Malacothrix sonchoides*	Sow-thistle desert-dandelion	2		
139	*Melica stricta*	Nodding melic	2	Hart Mountain National Antelope Refuge	
140	*Mentzelia mollis*	Smooth mentzelia	1	Coal Mine Basin RNA	BLM
141	*Mentzelia packardiae*	Packard's mentzelia	1	Leslie Gulch RNA	BLM
142	*Mimulus evanescens*	Disappearing monkeyflower	1	*Anderson Crossing*	
143	*Mimulus latidens*	Broad-toothed monkeyflower	2		
144	*Mirabilis laevis var. retrorsa*	Bigelow's four-o'clock	2	Big Alvord Creek RNA, Borax Lake ACEC	BLM
145	*Muhlenbergia minutissima*	Annual dropseed	2	Jordan Crater RNA	BLM
146	*Oxytropis sericea var. sericea*	White locoweed	2		
147	*Phacelia gymnoclada*	Naked-stemmed phacelia	2	Crooked Creek NA, Pueblo Foothills RNA	PRD
148	*Phacelia inundata*	Playa phacelia	1	Warner Potholes ACEC, Silver Lake RNA	BLM
149	*Phacelia lutea var. mackenzieorum*	Mackenzie's phacelia	1	Leslie Gulch RNA	BLM
150	*Phemeranthus spinescens*	Spiny flame-flower	2		
151	*Physaria chambersii*	Chambers' bladder-pod	2		
152	*Pilularia americana*	American pillwort	2	*South of Hampton*	
153	*Plagiobothrys salsus*	Desert allocarya	2	Lake Abert ACEC	BLM
154	*Pleuropogon oregonus*	Oregon semaphore grass	1		
155	*Pogogyne floribunda*	Profuse-flowered pogogyne	1	Foley Lake RNA	
156	*Polyctenium williamsiae*	Williams combleaf	1		

NORTHERN BASIN AND RANGE SPECIAL SPECIES (BR)

	Scientific Name	Common Name	List	Present Representation	Agency
157	*Potamogeton diversifolius*	Rafinesque's pondweed	2	Steens Mountain Cooperative Management And Protection Area	BLM
158	*Potamogeton fibrillosus*	Fibrous pondweed	2-x	Malheur NWR	FWS
159	*Primula cusickiana*	Wallowa primrose	2		
160	*Rafinesquia californica*	California chicory	2		
161	*Rorippa columbiae*	Columbia cress	1	*Malheur Lake Exclosures*	
162	*Rotala ramosior*	Toothcup	2	Diamond Craters ONA-ACEC	BLM
163	*Salix wolfii*	Wolf's willow	2	Steens Mountain WA	FS
164	*Saxifraga adscendens ssp. oregonensis*	Wedge-leaf saxifrage	2	Little Blitzen RNA	
165	*Senecio ertterae*	Ertter's senecio	1	Leslie Gulch RNA	BLM
166	*Sesuvium verrucosum*	Verrucose sea-purslane	2	Hart Mountain National Antelope Refuge, Tum Tum Lake RNA	
167	*Stanleya confertiflora*	Biennial stanleya	1		
168	*Stephanomeria malheurensis*	Malheur wire-lettuce	1	South Narrows ACEC	BLM
169	*Stylocline psilocarphoides*	Malheur stylocline	2-x		
170	*Symphoricarpos longiflorus*	Long-flowered snowberry	2	Hart Mountain National Antelope Refuge, Whitehorse Basin ACEC	
171	*Thelypodium brachycarpum*	Short-podded thelypody	2	Summer Lake WMA	
172	*Thelypodium howellii ssp. howellii*	Howell's thelypody	2		
173	*Trifolium leibergii*	Leiberg's clover	1	*Drewsey*	
174	*Trifolium owyheense*	Owyhee clover	1	Leslie Gulch RNA, Honeycombs RNA	BLM
	Nonvascular Plants				
175	*Tortula mucronifolia*	Moss	2	Steens Mountain WA	FS

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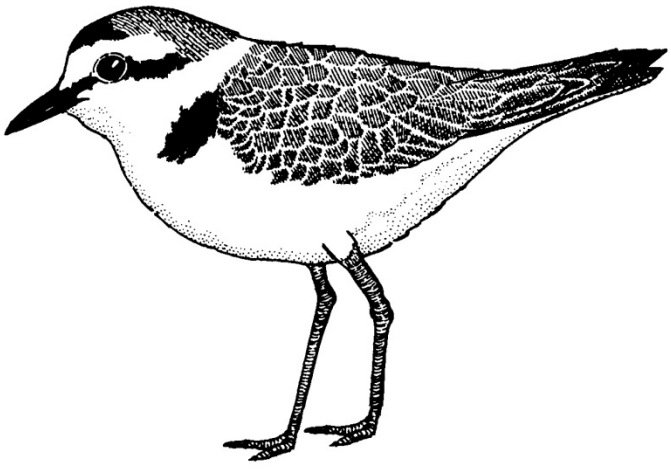

Snowy plover (*Charadrius alexandrinus nivosus*) by Jay Miner

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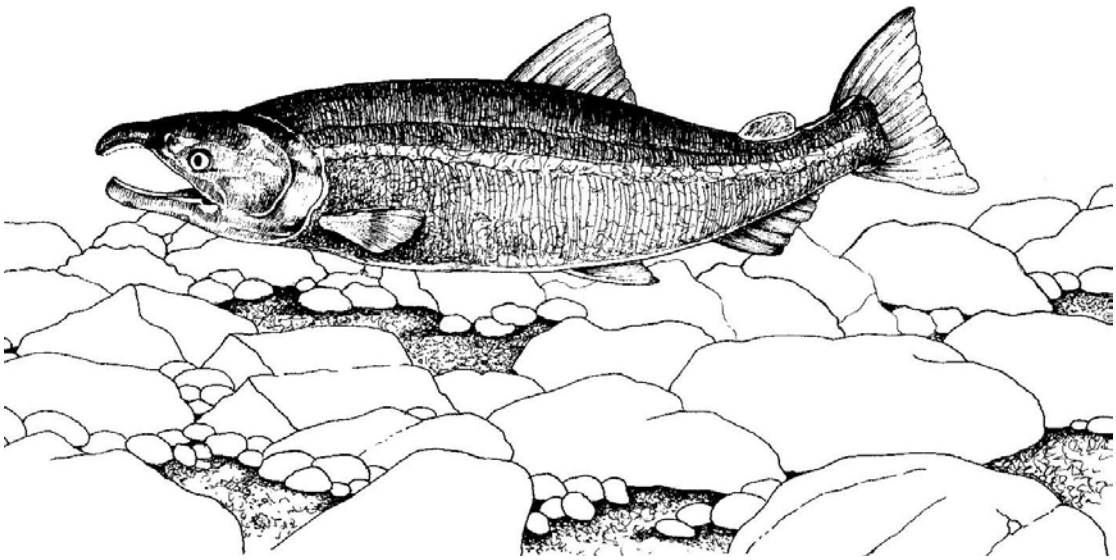

Chinook salmon (*Oncorhynchus tshawytscha*) by Jay Miner

APPENDIX 1. FORMS AND PROCEDURES USED IN THE NATURAL AREA PROGRAM

Comparative Analysis Format for Natural Area Designation

A. Introduction and Methods

B. Abstract of Each Site

1) Site Description - Brief descriptive sentences about the vegetation or elements at the site, its relationship to the landscape, and geomorphology.
2) Elements - List of the target and secondary elements present at the site and brief description as to: (a) size, (b) quantity, (c) quality, and (d) natural variation represented for each.
3) Legal Considerations
   a) Preserve Boundaries - Description of boundaries for entire proposed area.
   b) Tract Ownership Summary - Names and addresses of owners or managers and legal description of property.
   c) Protection Costs - Costs of buying, if privately owned, or taking out of production, if currently used or designated for commodity use. Includes property values (assessed and real, if applicable).
   d) Stewardship Costs - Costs of executing any necessary management recommendations, e.g. fencing, burning, etc. Briefly states management needs.

C. Comparison of Sites

1) Physical Attributes - Size, aspects, soil, scenic qualities, etc.
2) Ecological Attributes - Quality in terms of species composition, absence of invaders, lack of sign of physical disturbance, general vigor, presence of indicator species (for communities), viability (for species).
3) Overall Attributes - Costs and ease of actual protection.
4) Tabular Summary of Ranking Considerations.

Model Dedication Agreement Form for State Natural Areas

The Oregon State Land Board and the [name of agency] hereby agree to the following provisions as they pertain to [name of site] located at [legal description of site location]. By virtue of this agreement, the above-described site is dedicated as a Natural Area as provided for in the Oregon Natural Heritage Act, as amended.

This agreement is entered into for the purpose of promoting natural diversity of native species and ecosystems in Oregon, and specifically to protect the designated area as the primary representative site for the natural element(s) [name of element(s)] as identified in the Oregon Natural Heritage Plan of [date].

This agreement includes as additional instruments of dedication the appended documents as follows:

(a) A statement of management objectives for the site;
(b) The Natural Heritage Registry Summary Form for the site;
(c) Any other documents as needed.

Either party to this agreement may terminate it in accordance with the provisions of the Oregon Natural Heritage Act upon 60 days written notice, including specific reasons for termination.

Approved and signed on [date]. Signatures.

Model Procedures for State Agency Dedication of Natural Areas

Model dedication procedures are included to assist natural resource state agencies in establishing natural areas on their lands. Agencies may wish to further refine these guidelines.

Oregon's Natural Areas Program has rules in force for dedicating and managing such areas (Oregon Administrative Rules 141-50-500 to 141-50-599). The procedures recommended here are designed to keep the process as simple as possible in conformity with these existing rules.

Step 1: Agency Receives Dedication Proposal from the Council

A letter from the council to the agency includes reasons why the site is proposed for dedication, a general description of the site and its boundaries, and management considerations.

Step 2: Agency Evaluates Dedication Proposal

1) Within one month, the agency designates the person responsible for evaluating the proposal and preparing the dedication documents and communicates this information informally or in writing to the council.
2) Using staff or consultants and consulting with the council, the agency evaluates the proposal to determine whether or not it is feasible.
3) The agency takes into account the Natural Area Program rules (referenced above), recognizing that the council is empowered to waive any of its own rules which would prevent dedication of a natural area due to conflict with agency statutes, rules, regulations, or policy.
4) The agency determines within six months after receiving the council proposal whether or not to go forward with dedication procedures for that site, and communicates this decision to the council in writing. The council recognizes that evaluations that depend on seasonal opportunities for study may take longer.

Step 3: Agency and Council Draft Dedication Documents

The agency, in consultation with the council, drafts two dedication documents. One is a dedication agreement specifying the boundaries of the site, the natural heritage values the agreement is designed to protect, and any other considerations as needed.

The other document is a statement of management objectives for the site. This outlines major known threats to the resources in question, as well as the best and most realistic methods of protecting them. It includes activities to be encouraged, allowed or proscribed, and options for management agreements involving outside parties.

Additional documents to accompany the dedication agreement may also on occasion be required to meet the needs of the agency, the council, the State Land Board, or other parties.

Step 4: Public Notice, Hearing, and Agency Approval

The agency, according to its existing rules and procedures for public notice and hearing, publishes notice of intent to dedicate the site and places the matter on the agenda of the regular public meeting of the board or commission which oversees the agency. The meeting or meetings at which the dedication proposal is discussed and approved constitute the required public hearing.

After taking into account any public comment, the board or commission revises the dedication documents as needed and accords them final approval.

Step 5: Dedication by State Land Board

The agency and council together bring the dedication agreement and accompanying documents before a regular State Land Board meeting for approval.

Step 6: Dedication Ceremony

This step is optional, and can include whatever ceremony and activities the agency and the council believe are appropriate.

Summary Form for Sites included in the Register of Natural Heritage Resources

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NATURAL HERITAGE ADVISORY COUNCIL
OREGON REGISTER OF NATURAL HERITAGE RESOURCES
SUMMARY FORM

1. NATURAL AREA NAME:
2. LOCATION:
3. SIZE:
4. REGISTER CATEGORY:
5. PRINCIPAL NATURAL HERITAGE RESOURCES:
6. SPECIAL SPECIES:
7. EVALUATION OF CRITERIA FOR REGISTRATION
    - A. PRIORITY IN PLAN:
    - B. ADEQUATE REPRESENTATION:
    - C. DEGREE OF DISTURBANCE:
    - D. VIABILITY:
    - E. UNIQUE GEOLOGICAL VALUES:
    - F. PRIORITY FOR SPECIAL SPECIES:
    - G. SPECIAL SPECIES PROTECTION CAPABILITY:
    - H. MANAGEABILITY:
8. SPECIAL REMARKS OR COMMENTS:
9. OWNERSHIP:
10. CONSENT OF OWNER (PRIVATE), DATE:
11. DATE OF COUNCIL RECOMMENDATION:
12. DATE OF LAND BOARD APPROVAL:
13. SOURCES OF ADDITIONAL INFORMATION:
14. VALUE OF NATURAL AREA IN LAY TERMS:

APPENDIX 2. OREGON STATE REGISTER OF NATURAL HERITAGE RESOURCES AS OF 30 JUNE 2010

Name (Owner) – Date Registered

Ace Williams Mountain (TNC) - 2/01
Ainsworth (OPRD) - 6/93
Bald Hill (City of Corvallis) - 2/91
Bandon Marsh (TNC) - 12/02
Benson Addition, Multnomah Falls (OPRD) - 11/91
Billy Burr Lake (TNC) - 3/93
Blacklock Point (OPRD) - 6/88
Blind Slough Swamp (TNC) - 6/95
Blowout Ponds (OPRD) - 3/93
Borax Lake (TNC) - 2/94
Bridal Veil Falls (OPRD) - 6/93
Bull Flat (DSL) - 3/90
Camassia (TNC) - 5/03
Cape Blanco (OPRD) - 2/91
Cape Ferrelo (OPRD) - 4/99
Cape Lookout (OPRD) - 6/88
Cape Meares (OPRD) - 6/88
Cape Sebastian (OPRD) - 4/99
Cascade Head (TNC) - dedicated 1985
Clear Lake Ridge (TNC) - 4/89
Coberg Ridge (TNC) – 5/08
Collier State Park (OPRD) - 1/92
Columbia Oaks (Hood River County, OPRD) - 6/93
Conley Lake (ODFW, TNC) - 10/99
Coopey Falls (OPRD) - 6/93
Crissey Field (OPRD) - 4/99
Crooked Creek (OPRD) - 11/91
Crook Point (TNC) -10/98
Crump Lake Preserve (TNC) - 3/93
Crump Lake South (DSL) - 3/90
Davis Slough (DSL) - 4/89
Denman Vernal Pools (ODFW) - 2/94
Eight Dollar Mountain (DSL, TNC) - 6/88
Elowah Falls (OPRD) - 6/93
Flagg Island (ODOT) - 3/93
Gary & Chatham Islands (Multnomah Co) - 1/92
Hart Mountain additions (TNC) - 4/94
Humbug Mountain (OPRD) - 4/99
Illinois River Forks (OPRD) - 2/97
Indian Sands (OPRD) - 2/91
Jackson-Frazier Wetlands (Benton County) - 2/91
Juniper Hills (TNC) - 10/98
Kingston Prairie (TNC) - 2/97
Knappa Slough Island (DSL) - 4/99
Ladd Marsh (ODFW) - 6/88
Latourell Falls (OPRD) - 6/93

Name (Owner) – Date Registered

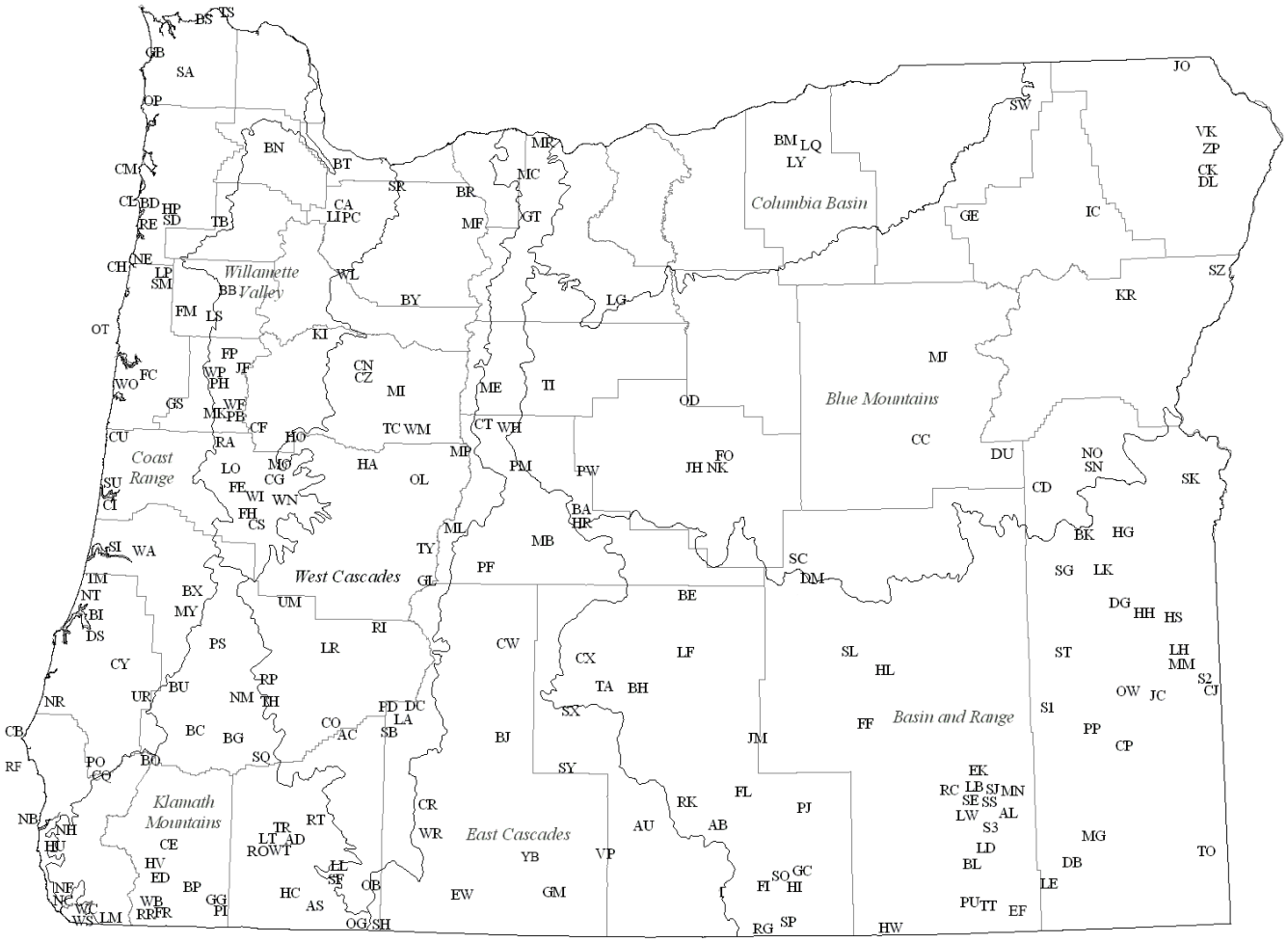
Lindsay Prairie (TNC) - 6/88
Little Rock Island and Shore (OPRD) - 6/88
Logan Valley (TNC) -4/99
Lower Table Rock (TNC) - 5/86
Luckiamute Landing (OPRD) - 3/93
Memaloose (OPRD) - 6/93
Middle Fork John Day - Dunston (TNC) - 3/90
Middle Fork John Day River - Oxbow (TNC) - 4/99
Mill Creek Ridge (TNC) - 11/91
Miller Island (ODFW) - 1/92
Nehalem Bay (OPRD) - 2/91
Nesika Beach (TNC) -10/98
Nestucca Bay (DSL) - 2/94
Netarts Spit (OPRD) - 4/89
North Fork Owyhee River (TNC) – 11/04
Ochoco State Wayside (OPRD) - 3/90
Onion Peak (DSL, ODF, TNC) - 6/88
Ophir Dunes (ODOT) - 6/88
Otter Point (OPRD) – 4/99
Piute Creek (DSL) - 1/92
Pumpkin Ridge (Private - GROWISER) - 6/94
Rattlesnake Butte (TNC) - 5/86
Rooster Rock (OPRD) - 3/90
Rough and Ready Creek (TNC) - 10/94
Rough and Ready State Wayside (OPRD) - 4/89
Round Top Butte (TNC) - 5/86
Rowena Plateau (OPRD, TNC) - 6/93
Saddle Mountain (OPRD) - 4/89
Scappoose Bay (OPRD) -10/99
Simpson Reef – Cape Arago (DSL) - 1/92
Skull & Little Wallace Island (DSL) - 11/91
Smith Island (DSL) - 4/89
Snag Boat Bend (TNC) - 6/99
South Grouse Gap (TNC) - 4/98
South Slough (DSL) - 2/91
Succor Creek (PRD) – 6/88
Squally Point Dunes (OPRD) - 6/93
Starvation Creek (OPRD) - 3/90
Steens Mountain – Ankle Creek (TNC) - 4/01
Steens Summit (DSL) - dedicated 1979
Sycan Marsh (TNC) - 6/88
Tom McCall Preserve at Rowena (TNC) - 5/86
Twin Rocks Bluffs (OPRD) - 4/99
Tygh Valley (OPRD) - 3/91
Umpqua Lighthouse (OPRD) – 5/02
West Sand Island (COE) - 6/88

Whalen Island (OPRD) - 2/01
Whetstone Savanna (TNC) - 6/95
Williamson River Delta (TNC) - 2/97
Willow Creek (TNC) - 4/98
Winchuck Slope (DSL) - dedicated 1979
Woodcock Creek (DSL) - 3/90
Yamhill Oaks (TNC) – 1/09
Zumwalt Prairie (TNC) - 2/01

COE – Corps of Engineers TNC – The Nature Conservancy TWC – The Wetlands Conservancy
ODF – Department of Forestry ODFW – Department of Fish and Wildlife DSL – Department of State Lands
ODOT – Department of Transportation OPRD – Parks and Recreation Department

Ponderosa pine (*Pinus ponderosa*) savanna at Round Top Butte RNA (Jimmy Kagan)

APPENDIX 2A. OREGON'S NATURAL AREAS



Symbol	Name	Ecoregion	Ownership	Area(ha)
BA	Badlands ACEC	BM	BLM	6826
BE	Benjamin RNA	BM	BLM	260
CC	Canyon Creek RNA	BM	USFS	283
CD	Castle Rock ACEC	BM	BLM	9227
CK	Clear Lake Ridge Preserve	BM	TNC	1378
DM	Dry Mountain RNA	BM	BLM/USFS	1737
DU	Dugout Creek RNA	BM	USFS	908
EF	East Fork Trout Creek	BM	BLM	361
FO	Forest Creeks RNA	BM	BLM	165
GE	Gerald S. Strickler RNA	BM	USFS	72
HR	Horse Ridge RNA	BM	BLM	243
IC	Indian Creek RNA	BM	USFS	401
JO	Joseph Canyon RNA	BM	BLM	1359
JH	Juniper Hills Preserve	BM	TNC	7540

Symbol	Name	Ecoregion	Ownership	Area(ha)
KR	Keating Ripariain RNA	BM	BLM	879
MJ	Middle Fork John Day River Preserve	BM	TNC	611
NK	North Fork Crooked River RNA	BM	BLM	2728
NL	North Fork Malheur River ACEC	BM	BLM	732
NO	North Ridge Bully Creek RNA	BM	BLM	913
OD	Ochoco Divide RNA	BM	USFS	777
PM	Pecks Milkvetch ACEC	BM	BLM	17405
PW	Powell Buttes RNA	BM	BLM	211
SZ	Sheep Mountain RNA	BM	BLM	777
SC	Silver Creek (BLM) RNA	BM	BLM	291
SW	South Fork Walla-Walla River RNA	BM	BLM	508
SN	South Ridge Bully Creek RNA	BM	BLM	795
TI	The Island RNA	BM	BLM/USFS	80
VK	Vance Knoll RNA	BM	USFS	78
ZP	Zumwalt Prairie Preserve	BM	TNC	13,342
AB	Abert Lake ACEC	BR	BLM	27605
AL	Big Alvord Creek RNA	BR	BLM	1676
BK	Black Canyon RNA	BR	BLM	1131
BH	Black Hills RNA	BR	BLM	1234
BL	Borax Lake Preserve/ACEC	BR	TNC/BLM	146
CJ	Coal Mine Basin RNA	BR	BLM	306
CX	Connley Hills RNA	BR	BLM	1456
CP	Crooked Creek RNA	BR	BLM	429
DB	Dry Creek Bench RNA	BR	BLM	705
DG	Dry Creek Gorge ACEC	BR	BLM	6638
EK	East Kiger Plateau RNA	BR	BLM	502
FI	Fish Creek Rim RNA	BR	BLM	8725
FL	Foley Lake RNA	BR	BLM	902
FF	Foster Flat RNA	BR	BLM	1097
HH	Hammond Hill Sand Hills RNA	BR	BLM	1502
HL	Harney Lake RNA	BR	FWS	12000
HW	Hawksie-Walksie RNA	BR	BLM	7017
HI	High Lakes ACEC	BR	BLM	15777
HG	Hog Creek Ridge RNA	BR	BLM	364
HS	Honeycombs RNA	BR	BLM	6413
JC	Jordan Craters RNA	BR	BLM	12709
JM	Juniper Mountain RNA	BR	BLM	2564
LK	Lake Ridge RNA	BR	BLM	2227
LH	Leslie Gulch RNA	BR	BLM	4714
LB	Little Blitzen RNA	BR	BLM	1027
LE	Little Whitehorse Creek RNA	BR	BLM	317
LW	Little Wildhorse Lake RNA	BR	BLM	97

Symbol	Name	Ecoregion	Ownership	Area(ha)
LD	Long Draw RNA	BR	BLM	178
LF	Lost Forest RNA	BR	BLM	3628
MM	Mahogany Ridge RNA	BR	BLM	276
MG	Mendi Gore Playa RNA	BR	BLM	1145
MN	Mickey Basin RNA	BR	BLM	227
OW	Owhyee River Below the Dam ACEC	BR	BLM	4548
PP	Palomino Playa RNA	BR	BLM	642
PJ	Poker Jim Ridge RNA	BR	FWS	259
PU	Pueblo Foothills RNA	BR	BLM	1020
RG	Rahilly-Gravelly RNA	BR	BLM	7951
RK	Red Knoll ACEC	BR	BLM	4503
RC	Rooster Comb RNA	BR	BLM	291
S1	Saddle Butte ACEC	BR	BLM	2855
S3	Serrano Point RNA	BR	BLM	678
GU	Sink Lakes-Guano Creek RNA	BR	BLM	4532
SK	South Alkali Sand Hills ACEC	BR	BLM	2247
SG	South Bull Canyon RNA	BR	BLM	552
SJ	South Fork Willow Creek RNA	BR	BLM	92
SO	South Warner Basin Preserve	BR	TNC	250
SP	Spanish Lake RNA	BR	BLM	1902
S2	Spring Mountain RNA	BR	BLM	607
SE	Steens Mountain RNA	BR	BLM	20427
SS	Steens Mountain Summit SNA	BR	DSL	191
SL	Stinking Lake RNA	BR	FWS	626
ST	Stockade Mountain RNA	BR	BLM	715
TA	Table Rock ACEC	BR	BLM	2080
TO	Toppin Butte RNA	BR	BLM	1879
TT	Tum Tum Lake RNA	BR	BLM	616
BM	Boardman RNA	CB	DOD	1923
LG	Lawrence Memorial Grassland Preserve	CB	TNC	150
LQ	Lindsay Prairie Preserve	CB	TNC	141
BS	Blind Slough Swamp Preserve	CR	TNC	274
BD	Bradley Bog Preserve	CR	TNC	19
BX	Brads RNA	CR	BLM	20
BI	Bull Island SNA	CR	DSL	173
CB	Cape Blanco SNA	CR	OPRD	124
CL	Cape Lookout/Netarts Sand Spit SNA	CR	OPRD	221
CM	Cape Meares SNA/RNA	CR	OPRD/FWS	66
CH	Cascade Head Preserve	CR	TNC	109
CY	Cherry Creek RNA	CR	BLM	239
CQ	Coquille River Falls RNA	CR	USFS	202
CI	Cox Island Preserve	CR	TNC	76

Symbol	Name	Ecoregion	Ownership	Area(ha)
CU	Cummins Creek RNA	CR	FS	1943
DS	Davis Slough SNA	CR	DSL	24
FM	Fanno Meadows Preserve	CR	TNC	241
FC	Flynn Creek RNA	CR	USFS	271
GB	Gearhart Bog Preserve and Easement	CR	TNC	208
GS	Grass Mountain RNA	CR	BLM	295
HP	High Peak-Moon Creek RNA	CR	BLM	618
HU	Hunter Creek Bog RNA	CR	BLM	231
LP	Lost Prairie RNA	CR	BLM	23
MY	Myrtle Island RNA	CR	BLM	11
NB	Nesika Beach Preserve	CR	TNC	29
NE	Neskowin Crest RNA	CR	USFS	476
NR	New River RNA	CR	BLM	356
NH	North Fork Hunter Creek ACEC	CR	BLM	770
NT	North Spit ACEC	CR	BLM	290
OP	Onion Peak Conservation Easement	CR	TNC	156
PO	Port Orford Cedar RNA	CR	USFS	454
RE	Reneke Creek RNA	CR	USFS	194
SA	Saddle Mountain SNA	CR	OPRD	669
SM	Saddleback Mountain RNA	CR	BLM	55
SD	Sand Lake RNA	CR	USFS	97
SI	Smith Island SNA	CR	DSL	5
SU	Sutton Lake Preserve	CR	TNC	6
TS	Tenasillahe Island RNA	CR	FWS	75
TM	Tenmile Creek RNA	CR	USFS	482
TB	The Butte RNA	CR	BLM	16
UR	Upper Rock Creek RNA	CR	BLM	186
WA	Wassen Creek RNA	CR	BLM	1393
WS	Winchuck Slope SNA	CR	DSL	78
WO	Woahink Bog	CR	TWC	16
AU	Augur Creek RNA	EC	USFS	888
BJ	Blue Jay RNA	EC	USFS	325
CT	Cache Mountain RNA	EC	USFS	596
CW	Cannon Well RNA	EC	USFS	270
CR	Cherry Creek Basin RNA	EC	USFS	3900
EW	Ewauna Flat Preserve	EC	TNC	4
GM	Goodlow Mountain RNA	EC	USFS	510
GT	Gumjuwac-Tolo RNA	EC	USFS	1440
MR	McCall Preserve at Rowena	EC	TNC	93
ME	Metolius River Preserve/RNA	EC	TNC/USFS	545
MC	Mill Creek Ridge RNA	EC	BLM/USFS	379
MB	Mokst Butte RNA	EC	USFS	506

Symbol	Name	Ecoregion	Ownership	Area(ha)
OB	Old Baldy RNA	EC	BLM	211
PF	Pringle Falls RNA	EC	USFS	545
SH	Scotch Creek RNA	EC	BLM	728
SX	Silver Lake Exclosure RNA	EC	USFS	119
SY	Sycan Marsh Preserve	EC	TNC	12359
VP	Vee Pasture RNA	EC	USFS	300
WH	Wildhaven Preserve	EC	TNC	65
WR	Williamson River Delta Preserve	EC	TNC	2953
YB	Yainax Butte ACEC	EC	BLM	286
AD	Agate Desert Preserve	KM	TNC	20
AS	Ashland RNA	KM	USFS	570
BG	Bear Gulch RNA	KM	BLM	135
BC	Beatty Creek RNA	KM	BLM	294
BO	Bobby Creek RNA	KM	BLM	675
BP	Brewer Spruce RNA	KM	BLM	645
BU	Bushnell-Irwin Rocks RNA	KM	BLM	388
CE	Cedar Log Flat RNA	KM	USFS	166
ED	Eight Dollar Mountain Preserve/RNA	KM	TNC/BLM	518
FR	French Flat RNA	KM	BLM	266
GG	Grayback Glades RNA	KM	BLM	433
HC	Holton Creek RNA	KM	BLM	171
HV	Hoover Gulch RNA	KM	USFS	511
LM	Lemmingsworth Gulch RNA	KM	USFS	495
LL	Lost Lake RNA	KM	BLM	155
LT	Lower Table Rock Preserve	KM	TNC	1125
NC	North Fork Chetco River RNA	KM	BLM	243
NF	North Fork Silver Creek RNA	KM	BLM	499
NM	North Myrtle Creek RNA	KM	BLM	288
OG	Oregon Gulch RNA	KM	BLM	424
PI	Pipe Fork RNA	KM	BLM	214
PS	Popcorn Swale Preserve	KM	TNC	12
RO	Rogue River Plains Conservation Easement	KM	TNC	51
RR	Rough and Ready Creek Preserve/ACEC	KM	TNC/BLM	495
RT	Round Top Butte Preserve/RNA	KM	TNC/BLM	302
SF	Sharon Lake Fen Preserve	KM	TNC	729
SQ	Squaw Flat RNA	KM	USFS	226
TR	Table Rocks RNA	KM	BLM	502
WC	Wheeler Creek RNA	KM	USFS	135
WT	Whetstone Savanna Preserve	KM	TNC	91
WB	Woodcock Bog RNA	KM	BLM	112
RF	Red Fish Rocks MR	ME	OPAC	673
OT	Otter Rock MR	ME	OPAC	259

Symbol	Name	Ecoregion	Ownership	Area(ha)
AC	Abbott Creek RNA	WC	USFS	1077
BY	Bagby RNA	WC	USFS	227
BR	Bull Run RNA	WC	USFS	146
CN	Carolyn’s Crown - Shafer Creek RNA	WC	BLM	798
CO	Cougar Butte RNA	WC	USFS	1047
CZ	Crabtree Lake ONA / ACEC	WC	BLM	389
DC	Desert Creek RNA	WC	NPS	757
GL	Gold Lake Bog RNA	WC	USFS	188
HA	Hagan RNA	WC	USFS	456
HO	Horse Rock Ridge RNA	WC	BLM/TNC	153
LR	Limpy Rock RNA	WC	USFS	760
LA	Llao Rock RNA	WC	NPS	176
ML	Many Lakes RNA	WC	USFS	260
MP	McKenzie Pass RNA	WC	USFS	480
MI	Middle Santiam RNA	WC	USFS	463
MF	Multorpor Fen Preserve	WC	TNC	36
OL	Ollalie Ridge RNA	WC	USFS	291
PD	Pumice Desert RNA	WC	NPS	1236
RP	Red Ponds RNA	WC	BLM	54
RI	Rigdon Point RNA	WC	USFS	185
SB	Sphagnum Bog RNA	WC	NPS	69
TH	Tater Hill RNA	WC	BLM	181
TC	Three Creeks RNA	WC	USFS	280
TY	Torrey-Charlton RNA	WC	USFS	1145
UM	Upper Elk Meadows RNA	WC	BLM	83
WM	Wildcat Mountain RNA	WC	USFS	405
BN	Banks Swamp	WV	Metro	75
BB	Baskett Butte Preserve	WV	TNC	62
BT	Beggars Tick Marsh	WV	Metro	2
CS	Camas Swale RNA	WV	BLM	113
CA	Camassia Preserve	WV	TNC	10
CG	Coburg Ridge Preserve	WV	TNC	516
CF	Cogswell-Foster Preserve	WV	TNC	36
FE	Fern Ridge RNA	WV	ACE	47
FP	Forest Peak RNA	WV	BLM	63
FH	Fox Hollow RNA	WV	BLM	65
JF	Jackson Frazier Wetlands Preserve	WV	Benton Co.	53
KI	Kingston Prairie Preserve	WV	TNC	61
LI	Little Rock Island Preserve	WV	TNC	11
LS	Little Sink RNA	WV	BLM	32
LO	Long Tom ACEC	WV	BLM	3
MK	Maple Knoll RNA	WV	FWS	40

Symbol	Name	Ecoregion	Ownership	Area(ha)
MO	Mohawk RNA	WV	BLM	118
PC	Peach Cove Fen	WV	Metro	10
PH	Philomath Preserve	WV	TNC	53
PB	Pigeon Butte RNA	WV	FWS	28
RA	Rattlesnake Butte Preserve	WV	TNC	20
SR	Sandy River Gorge Preserve/RNA	WV	TNC/BLM	537
WL	Wilhoit Springs RNA	WV	BLM	69
WN	Willamette Confluence	WV	TNC	514
WF	Willamette Floodplain RNA	WV	FWS	210
WI	Willow Creek Preserve	WV	TNC	210
WP	Wren Prairie Preserve	WV	TNC	4

APPENDIX 2B. OTHER DESIGNATED AREAS CONSERVING PLAN ELEMENTS

Name	Ecoregion	Owner
Ace Williams Mountain ACEC	WC	BLM
Alfred A. Loeb State Park	CR	PRD
Ankeny NWR	WV	FWS
Augur Creek PRNA	EC	FS
Babyfoot Lake Botanical Interest Area	KM	FS
Badger Creek WA	EC	FS
Bald Hill Park	WV	County
Baldy Mountain PRNA	BM	FS
Basin Creek PRNA	BM	FS
Baskett Slough NWR	WV	FWS
Big Bend Mountain WMA	WC	FS
Big Craggies SIA	KM	FS
Big Marsh	EC	FS
Big Marsh Headwall	EC	FS
Blacklock Point PSNA	CR	PRD
Bobs Creek PRNA	BM	FS
Boiler Bay PSNA	CR	PRD
Boulder Creek WA	WC	FS
Bridge Creek WMA	BR	FWS
Buford County Park	WV	Lane Co.
Burlington Bottoms	WV	OFW
Bushnell-Irwin Rocks ACEC	KM	BLM
Cape Arago State Park	CR	PRD
Cape Arago/Seven Devils PMR	ME	OPAC
Cape Blanco State Park	CR	PRD
Cape Falcon PMR	ME	OPAC
Cape Kiwanda PSNA	CR	PRD
Cape Lookout State Park	CR	PRD
Cape Perpetua PMR	ME	OPAC
Cape Perpetua PSNA	CR	PRD
Cascade Head PMR	ME	OPAC
Cascade Siskiyou NM	KM	BLM
Champoeg State Heritage Area	WV	PRD
Chrome Ridge SIA	KM	FS
Cold Springs NWR	CB	FWS
Columbia Gorge National Scenic Area	Multiple	Multiple
Columbia WA	WC	FS
Cougar Meadow PRNA	BM	FS

Name	Ecoregion	Owner
Craig Mountain Lake PRNA	BM	FS
Crane Prairie WMA	BM	FS
Crater Lake NP	WC	NPS
Crissey Field PSNA	CR	PRD
Crook Point NWR	CR	FWS
Crook Point/Mack Reef	CR	DSL
Crooked Creek SNA	BR	PRD
Crooked River National Grassland	BM	FS
Crump Lake PSNA	BR	DSL
Cultus River PRNA	EC	FS
Darlingtonia SNA	CR	PRD
Denman WMA	KM	OFW
Deschutes WSR	CB	BLM/State
Diamond Craters ONA-ACEC	BR	BLM
Diamond Peak WA	WV	FS
Dixie Butte PRNA	BM	FS
Drift Creek WA	CR	FS
Dry Creek Bench PRNA	BR	BLM
Dry Creek Buttes	BR	BLM
Duck Lake PRNA	BM	FS
Eagle Cap WA	BM	FS
East Alvord WSA	BR	BLM
East Sand Island	WV	ACE
Ecola State Park	CR	PRD
Eel Creek Botanical Area	CR	FS
Elijah Bristow State Park	WV	PRD
Elk Flats-Wenaha PRNA	BM	FS
Fir Groves PACEC	BR	BLM
Fish Creek Meadows - Steens Mountain WA	BR	BLM
Fort Rock SNA	BR	PRD
Gary, Flagg and Chatham Islands PSNA	WV	METRO
Goat Island PSNA	CR	DSL
Grassy Knob WA	CR	FS
Grassy Mountain ACEC	WC	BLM
Grayback Mountain SIA	KM	FS
Green Knob SIA	KM	FS
Guano Slough PRNA	BR	BLM
Guy W. Talbot State Park	WC	PRD
Harney Hot Springs	BR	BLM/FWS
Harris Beach State Park	CR	PRD
Hart Canyon PRNA	BR	FWS
Hart Mountain National Antelope Refuge	BR	FWS

Name	Ecoregion	Owner
Hat Rock State Park	CB	PRD
Haystack Butte PRNA	BM	BLM
Haystack Rock PSNA	CR	PRD
Heceta Dunes ACEC	CR	BLM
Hells Canyon WA	BM	FS
Hidden Lake-Lulu Lake SIA	WC	FS
Hilgard Junction State Recreation Area	BM	PRD
Hinkle Lake SIA	KM	FS
Horsepasture Ridge PRNA	BM	FS
Humbug Mountain - Lookout Rock PSNA	CR	DSL
Humbug Mountain State Park	CR	PRD
Hunt Mountain ACEC	BM	BLM
Hunter Creek Bog ACEC/SIA	CR	BLM/FS
Hurricane Creek-Eagle Cap WA	BM	FS
Illinois River Forks State Park	KM	PRD
Imnaha WSR	BM	FS
Innes Market Road ACEC	BM	BLM
Irrigon WA	CB	OFW
Jackson-Frazier Wetland	WV	Benton Co.
Jessie M. Honeyman State Park	CR	PRD
John Day Fossil Beds NM	BM	NPS
John Day WSR	CB	BLM
Kalmiopsis WA	KM	FS
Katsuk Butte PRNA	EC	FS
Kelly Creek Butte PRNA	BM	FS
Klamath Marsh NWR	EC	FWS
Klamath WMA	EC	DSL
L. Presley and Vera C. Gill State Park	CR	PRD
Ladd Marsh WMA	BM	OFW
Lake Abert ACEC	BR	BLM
Lake Fork PRNA	BM	FS
Lake Marie - Umpqua Lighthouse State Park PSNA	CR	PRD
Lewis and Clark National Historical Park	CR	NPS
Lewis and Clark NWR	CR	FWS
Lower Klamath NWR	EC	FWS
Lower Owyhee Canyon WSA	BR	BLM
Luckiamute River PSNA	WV	PRD
Malheur Lake Exclosures	BR	FWS
Malheur NWR	BR	FWS
Mayer State Park	EC	PRD
Memaloose State Park	EC	PRD
Menagerie WA	WC	FS

Name	Ecoregion	Owner
Mickey Hot Springs ACEC	BR	BLM
Middle Santiam River Terrace ACEC	WC	BLM
Miller Lake SIA	KM	FS
Minam State Park	BM	PRD
Mountain Lakes WA	WC	FS
Mt. Hood WA	WC	FS
Mt. Jefferson WA	WC	FS
Mt. Joseph PRNA	BM	FS
Mt. Thielsen WA	WC	FS
Mt. Washington WA	WC	FS
N. Fk. Chetco River ACEC	CR	BLM
N. Fork Crooked River ACEC	BM	BLM
Neskowin Marsh-Nestucca Bay NWR	CR	FWS
Nestucca Bay NWR	CR	FWS
Nestucca Spit State Park	CR	PRD
North Cove - Cape Arago PSNA	CR	PRD
North Fork Crooked River WSR	BM	BLM/FS
North Fork John Day WA	BM	FS
North Umpqua WSR	WC	FS
Oliver Mathews PRNA	KM	FS
Ophir Dunes PSNA	CR	DOT
Oregon Caves NM	KM	NPS
Oregon Dunes NRA	CR	FS
Oregon Islands NWR	CR	FWS
Oswald West State Park	CR	PRD
Otter Crest PSNA	CR	PRD
Owyhee Breaks WA	BR	FS
Owyhee River Canyon WA	BR	FS
Painted Hills - John Day Fossel Beds NM	BM	NPS
Philip W. Schneider WMA (Murderers Creek WMA)	BM	OFW
Pistol River State Scenic Viewpoint	CR	PRD
Pleasant Valley PRNA	BM	FS
Point Prominence PRNA	BM	FS
Ponderosa Pine PACEC	WV	BLM
Port Orford Heads State Park	CR	PRD
Poverty Flat ACEC	KM	BLM
Prescott Park	WV	City of Corvallis
Prineville WMA	BM	OFW
Razz Lake PRNA	BM	FS
Red Buttes WA	KM	FS
Red Flat SIA	KM	FS
Red Mountain PRNA	KM	FS

Name	Ecoregion	Owner
Rogue Reef PSNA	CR	DSL
Rogue River WSR	CR	FS
Rogue-Umpqua WA	WC	FS
Rooster Rock PSNA	WV	PRD
Russian Island PRNA	CR	FWS
S. Fork Walla-Walla River ACEC	BM	FS
Sagehen Hills WSA	BR	FWS
Salmon-Huckleberry WA	WC	FS
Sand Dunes WSA	BR	BLM
Sauvie Island WMA	WV	OFW
Seneca Fouts Memorial SNA	WV	PRD
Shaketable PRNA	BM	FS
Sheep Rock RNA	BM	NPS
Shore Acres State Park	CR	PRD
Silver Creek PRNA	BM	FS
Silver Falls State Park	WV	PRD
Simpson Reef PSNA	CR	DSL
Siskiyou Pass ACEC	KM	BLM
Sky Lakes WA	WC	FS
Slickrock Creek - Eagle Cap WA	BM	FS
Slide Mountain SIA	EC	FS
Smelt Sands State Park	CR	PRD
Smith Rock State Park	BM	PRD
Snake WSR	BM	FS
Soda Mountain WSA	KM	BLM
Sourgame SIA	KM	FS
South Slough National Research Reserve	CR	DSL
Spaulding WSA	BR	BLM
Starvation Creek State Park	WC	PRD
Steens Mountain WA	BR	BLM
Stinger Creek PRNA	BM	FS
Strawberry Mountain WA	BM	FS
Succor Creek SNA	BR	PRD
Summer Lake WMA	BR	OFW
Sunset Beach PSNA	CR	PRD
Sutton Mountain WA	BM	BLM
Tenmile closure area	CR	FS
Three Sisters WA	WC	FS
Touvelle State Recreation Site	KM	PRD
Tygh Valley State Wayside	CB	PRD
Umatilla NWR	CB	FWS
Umpqua Lighthouse State Park	CR	PRD

Name	Ecoregion	Owner
Upper Klamath NWR	EC	FWS
Upper West Little Owyhee WSA	BR	BLM
Valley of the Giants ONA-ACEC	CR	BLM
Viento State Park	WC	PRD
Vinegar Hill-Indian Rocks SIA	BM	FS
Waldo Lake WA	WC	FS
Walker Flat ACEC	CR	BLM
Warner Wetlands ACEC	BM	BLM
Wechee Butte PRNA	EC	FS
Wenaha-Tucannon WA	BM	FS
West Sand Island PRNA	CR	ACE
White River WMA	EC	OFW
White Rock Fen ACEC	CR	BLM
Wickiup Springs PRNA	WC	FS
Wild Rogue WA	CR	FS
William Finley NWR	WV	FWS
William M. Tugman State Park	CR	PRD
William P. Keady PSNA	CR	PRD
Yachats PSNA	CR	DSL

APPENDIX 3. HOW NHAC PREVIOUSLY DESCRIBED AND DESIGNATED NATURAL AREAS FOR ECOSYSTEM PROCESS ELEMENTS

Ecosystem Process Ecological Elements

In order to represent biodiversity in a network of protected areas, it is necessary to consider not only the current condition of vegetation communities but also the landscape processes, generally related to disturbance, that either maintain or frequently affect ecosystems. The need for natural areas dealing specifically with landscape ecosystem processes is evident by recent work in landscape ecology.

Key disturbance processes, such as fire, wind, floods, insects and pathogens, are among the most important influences on Oregon's ecosystems. A natural area that allows for the study of dynamic ecological processes over time should also capture pattern or mosaic at broad to fine scales. Establishing these ecological communities will increase the probability that processes can continue spatially and temporally at the natural area, unaffected by manipulative management.

The objective of the process element is to represent landscape disturbance and the concomitant successional processes across a wide range of gradients in environment, vegetation zones or habitats, and disturbance intensities. In order for disturbance processes to be significant enough to merit the creation of an element, two primary criteria must be met. First, the process must occur on a landscape scale, at a minimum impacting entire stands. The second is that the disturbances must occur at a frequency that is shorter than the life cycle of the affected stands. For example, throughout most of eastern Oregon, fires occur with return intervals ranging from 10 to 100 years, which is shorter than the duration of most stands. Volcanism, while occurring widely, rarely occurs at frequent enough intervals.

Generally a process natural area should be big enough to allow landscape flows and related successional processes to occur with minimal influence from adjacent lands. The size will depend on the area's landscape context and the type of disturbance. Typically several thousands of acres are necessary to accommodate major disturbances such as fire and to allow replication of research sites across environmental, vegetational, and disturbance intensity gradients.

When selecting sites, those with minimal previous human impacts to the site are preferable, recognizing regional context (i.e. historical grazing). A preliminary threshold of 10% of the total reserve in previously impacted conditions is proposed. When possible, topographic features should be used to delineate natural area boundaries for process ecological communities. Boundaries should minimize current and future edge influences such as microclimate differences, invasion routes for exotics, impacts of genetic material from nearby plantations, etc. Inclusion of some previously managed areas may be necessary to manage edges as well as to ensure connection to nearby landscape units (wilderness, major ridge or riparian systems, etc.) needed for critical landscape flows.

In this first effort to define process ecological communities, only those that have been clearly defined are included. Wildfire is the process used to model the ecological communities defined in the plan. To date, no fire process natural areas have been established. Once the process of defining and establishing fire process ecological communities is underway by the federal and state agencies, work on other

process ecological communities such as insects and pathogens will begin. As a result, fire is the only process element included in this plan.

Fire process ecological communities are included at the end of the natural area ecological communities for each ecoregion. In some ecoregions such as the Oregon Coast Range, the diversity of vegetation zones and the accompanying fire effects is low, so ecological communities have not been defined. In others, such as the Blue Mountains, the diversity of vegetation zones and fire effects are high, and multiple ecological communities have been defined.

How to Define a Fire Process Element

The steps to define a process element follow.

1) Define the element and objective

Fire is a major process that impacts most of Oregon's natural terrestrial habitats with varying effects among ecoregions. The objective is to include fire effects and successional processes, beginning with the earliest successional stages and including as wide a range of disturbance intensities and environmental gradients as possible.

2) Outline significant process components and landscape criteria.

A. Fire event components consist of fire event types and range of post-fire successional stages present on the landscape. Three fire event types have been defined.

1. Stand replacement (greater than 70% mortality)
2. Partial stand replacement (30-70% mortality)
3. Underburn (less than 30% mortality)

Single or multiple event types may be present in a fire element, depending on the representative fire regime for the ecoregion and vegetation zone.

B. Potential landscape conditions to be considered:

Most desirable	Wildfire with natural regeneration
	some planting
	Wildfire with some salvage
	natural post-fire regeneration
	planting

Least desirable Partial Cut or clear-cut and burn

(to be used in very rare circumstances, or in conjunction with more desirable circumstances)

3) Apply Process Element Components in Ecoregions

Identify ecological communities by appropriate event types and vegetation zones used in the plan. The fire example continues below for two typical ecoregions.

Ecoregion	Vegetation Zone	Fire Event Type
Blue Mountains	Ponderosa Pine	1,2,3
	Douglas Fir	1,2,3
	Grand Fir	1,2,3
	Shrub Steppe	1,2
Basin and Range	Ponderosa Pine	1,2,3
	Big Sagebrush	1,2
	Low Sagebrush	1,2

Only the vegetation zones in which fire is a significant, natural disturbance occurring at a minimum of a stand scale and a regular frequency have been included.

Assigning Priorities to Ecosystem Process Ecological communities

Ecosystem process ecological communities were not assigned priorities in this edition of the plan. It is anticipated that the primary criteria would be the rarity of examples of the ecosystem process.