

Ecoregions of the Pacific Northwest

(Idaho, Oregon, Washington)

Ecoregions are areas where ecosystems (and the type, quality, and quantity of environmental resources) are generally similar. They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. These Level III and IV ecoregions, compiled at a scale of 1:250,000, revise and subdivide an earlier, smaller-scale national ecoregion map (Omernik, 1987). The ecoregions were identified by analyzing the spatial patterns and the composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity (Omernik, 1987, 1995). These phenomena include geology, landforms, soils, vegetation, climate, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another regardless of the hierarchical level. An ecoregion framework is critical for structuring and implementing ecosystem management strategies across federal agencies, state agencies, and nongovernment organizations that are responsible for different types of resources within the same geographic areas (McMahon and others, 2001; Omernik and Griffith, 2014).

A Roman numeral hierarchical scheme has been adopted for different levels of ecological regions. Level I is the most general level, dividing North America into 15 ecological regions. Level II divides the continent into 30 regions (Commission for Environmental Cooperation, 1997, 2006). At level III, the continent contains 183 ecological regions of which 105 occur in the continental United States (United States Environmental Protection Agency [U.S. EPA], 2013; Wiken and others, 2011).

The Level III and IV ecoregions of the Pacific Northwest were mapped in state-level projects in Idaho (McGrath and others, 2001), Oregon (Thorson and others, 2003) and Washington (Clarke and Bryce, 1997; Pater and others, 1998). These projects were conducted primarily by the U.S. EPA National Health and Environmental Effects Research Laboratory (Corvallis, Oregon) in collaboration with U.S. EPA Region 10, state resource management agencies, and other federal agencies, such as the U.S. Department of Agriculture

(USDA)—Natural Resources Conservation Service, USDA—Forest Service, U.S. Geological Survey, and the Bureau of Land Management. The mapping was associated with an interagency effort to develop a common framework of ecological regions (McMahon and others, 2001). Although there are differences in the conceptual approaches and mapping methodologies used by the different federal agencies for developing their own regional frameworks, these collaborative ecoregion projects were a step toward attaining consensus and consistency in ecoregion frameworks for the entire nation.

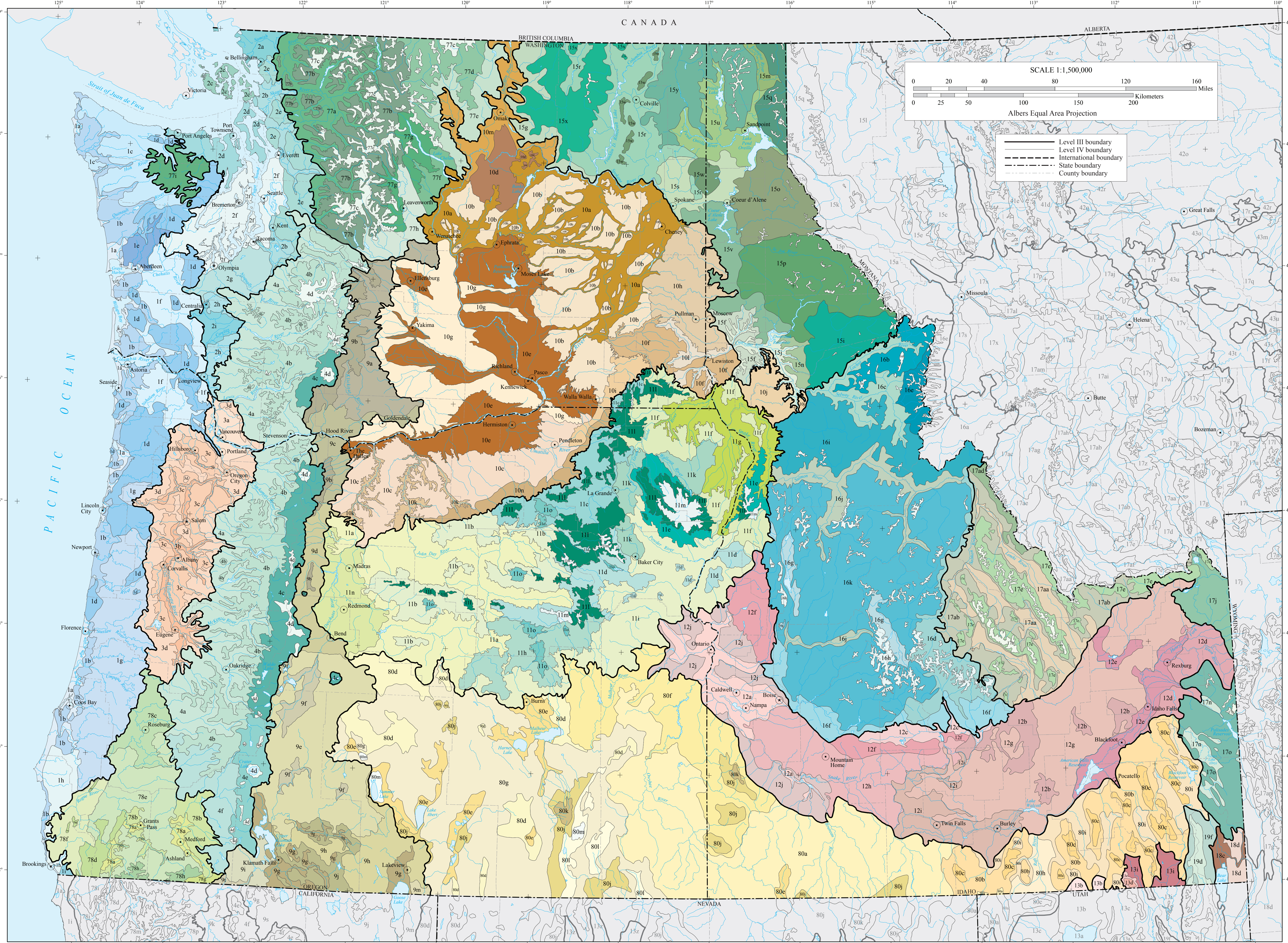
Explanations of the methods used to define these ecoregions are given in Omernik (1995, 2004) and Omernik and Griffith (2014). Additional maps, publications, and GIS data for U.S. and North American ecoregions can be obtained at www.epa.gov/eco-research/ecoregions.

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Scale 1:1,500,000
 0 20 40 80 120 160
 Kilometers Miles
 Albers Equal Area Projection

Legend:
 Level III boundary
 Level IV boundary
 International boundary
 State boundary
 County boundary



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|--|---|--|--|---|---|
| <p>1 Coast Range</p> <ul style="list-style-type: none"> 1a Coastal Lowlands 1b Coastal Uplands 1c Low Olympics 1d Volcanics 1e Outwash 1f Willapa Hills 1g Mid-Coastal Sedimentary 1h Southern Oregon Coastal Mountains 1i Northern Franciscan Redwood Forest <p>2 Puget Lowland</p> <ul style="list-style-type: none"> 2a Fraser Lowland 2b Eastern Puget Riverine Lowlands 2c San Juan Islands 2d Olympic Rainshadow 2e Eastern Puget Uplands 2f Central Puget Lowland 2g Southern Puget Prairies 2h Cowlitz/Chehalis Foothills 2i Cowlitz/Newaukum Prairie Floodplains <p>3 Willamette Valley</p> <ul style="list-style-type: none"> 3a Portland/Vancouver Basin 3b Willamette River and Tributaries Gallery Forest 3c Prairie Terraces 3d Valley Foothills <p>4 Cascades</p> <ul style="list-style-type: none"> 4a Western Cascades Lowlands and Valleys 4b Western Cascades Montane Highlands 4c Cascade Crest Montane Forest 4d Cascades Subalpine/Alpine 4e High Southern Cascades Montane Forest 4f Low Southern Cascades Mixed Conifer Forest | <p>9 Eastern Cascades Slopes and Foothills</p> <ul style="list-style-type: none"> 9a Yakima Plateau and Slopes 9b Grand Fir Mixed Forest 9c Oak/Conifer Foothills 9d Ponderosa Pine/Bitterbrush Woodland 9e Pumice Plateau 9f Pumice Plateau Basins 9g Klamath/Goose Lake Basins 9h Fremont Pine/Fir Forest 9i Southern Cascades Slope 9j Klamath Juniper Woodland/Devils Garden 9m Warner Mountains 9t Old Cascades <p>10 Columbia Plateau</p> <ul style="list-style-type: none"> 10a Channeled Scablands 10b Loess Islands 10c Umatilla Plateau 10d Okanogan Drift Hills 10e Pleistocene Lake Basins 10f Dissected Loess Uplands 10g Yakima Folds 10h Palouse Hills 10i Deep Loess Foothills 10j Nez Perce Prairie 10k Deschutes/John Day Canyons 10l Lower Snake and Clearwater Canyons 10m Okanogan Valley 10n Umatilla Dissected Uplands | <p>11 Blue Mountains</p> <ul style="list-style-type: none"> 11a John Day/Clarno Uplands 11b John Day/Clarno Highlands 11c Maritime-Influenced Zone 11d Melange 11e Willows/Seven Devils Mountains 11f Canyons and Dissected Highlands 11g Canyons and Dissected Uplands 11h Continental Zone Highlands 11i Continental Zone Foothills 11k Blue Mountain Basins 11l Mesic Forest Zone 11m Subalpine Zone 11n Deschutes River Valley 11o Cold Basins <p>12 Snake River Plain</p> <ul style="list-style-type: none"> 12a Treasure Valley 12b Lava Fields 12c Camas Prairie 12d Dissected Plateaus and Teton Basin 12e Upper Snake River Plain 12f Semiarid Foothills 12g Eastern Snake River Basalt Plains 12h Mountain Home Uplands 12i Magic Valley 12j Unwooded Alkaline Foothills | <p>13 Central Basin and Range</p> <ul style="list-style-type: none"> 13a Shadscale-Dominated Saline Basins 13c Sagebrush Basins and Slopes 13d Woodland- and Shrub-Covered Low Mountains 13i Malad and Cache Valleys <p>15 Northern Rockies</p> <ul style="list-style-type: none"> 15f Grassy Potlatch Ridges 15g Western Okanogan Semiarid Foothills 15h High Northern Rockies 15i Clearwater Mountains and Breaks 15j Lower Clearwater Canyons 15m Kootenai Valley 15n Weippe Prairie 15p St. Joe Schist-Gneiss Zone 15q Purcell-Cabinet-North Bitterroot Mountains 15r Okanogan-Colville Xeric Valleys and Foothills 15s Spokane Valley Outwash Plains 15u Inland Maritime Foothills and Valleys 15v Northern Idaho Hills and Low Relief Mountains 15w Western Selkirk Maritime Forest 15x Okanogan Highland Dry Forest 15y Selkirk Mountains | <p>16 Idaho Batholith</p> <ul style="list-style-type: none"> 16b Lochsa Uplands 16c Lochsa-Selway-Clearwater Canyons 16d Dry, Partly Wooded Mountains 16e Glaciated Bitterroot Mountains and Canyons 16f Foothill Shrublands-Grasslands 16g High Glacial Drift-Filled Valleys 16h High Idaho Batholith 16i South Clearwater Forested Mountains 16j Hot Dry Canyons 16k Southern Forested Mountains <p>17 Middle Rockies</p> <ul style="list-style-type: none"> 17e Barren Mountains 17h Alpine Zone 17i West Yellowstone Plateau 17j Gneiss-Schistose Forested Mountains 17n High Elevation Valleys 17o Partly Forested Mountains 17a Dry Intermontane Sagebrush Valleys 17b Dry Gneiss-Schistose-Volcanic Hills 17d Western Beaverhead Mountains <p>18 Wyoming Basin</p> <ul style="list-style-type: none"> 18c Sub-Irrigated High Valleys 18d Foothill Shrublands and Low Mountains <p>19 Wasatch and Uinta Mountains</p> <ul style="list-style-type: none"> 19d Wasatch Montane Zone 19f Semiarid Foothills | <p>77 North Cascades</p> <ul style="list-style-type: none"> 77a North Cascades Lowland Forests 77b North Cascades Highland Forests 77c North Cascades Subalpine/Alpine 77d Pasayten/Sawtooth Highlands 77e Okanogan Pine/Fir Hills 77f Clegham Tephra Hills 77g Wenatchee/Chelan Highlands 77h Chawaukum Hills and Lowlands 77i High Olympics <p>78 Klamath Mountains</p> <ul style="list-style-type: none"> 78a Rogue/Illinois/Scott Valleys 78b Oak Savanna Foothills 78c Umpqua Interior Foothills 78d Serpentine Siskiyou 78e Inland Siskiyou 78f Coastal Siskiyou 78g Klamath River Ridges 78h Border High-Siskiyou <p>80 Northern Basin and Range</p> <ul style="list-style-type: none"> 80a Dissected High Lava Plateau 80b Semiarid Hills and Low Mountains 80c High Elevation Forests and Shrublands 80d Pluvial Lake Basins 80e High Desert Wetlands 80f Owyhee Uplands and Canyons 80g High Lava Plateaus 80h Saltbush-Dominated Valleys 80i Sagebrush Steppe Valleys 80j Semiarid Uplands 80k Partly Forested Mountains 80l Salt Shrub Valleys 80m Barren Playas |
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Ecoregions of Western Washington and Oregon

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. Ecoregions are directly applicable to the immediate needs of state agencies, including the development of biological criteria and water quality standards, and the establishment of management goals for nonpoint-source pollution. They are also relevant to integrated ecosystem management, an ultimate goal of most federal and state resource management agencies.

The approach used to compile this map is based on the premise that ecological regions can be identified through the analysis of the patterns and the composition of biotic and abiotic phenomena that reflect differences in ecosystem quality and integrity (Wiken, 1986; Omernik, 1987, 1995). These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another regardless of the hierarchical level. A Roman numeral hierarchical scheme has been adopted for different levels of ecological regions. Level I is the coarsest level, dividing North America into 15 ecological regions, with level II dividing the continent into 51 regions. At level III, the continental United States contains 98 regions (United States Environmental Protection Agency [USEPA], 1996). Level IV is a further subdivision of level III ecoregions. Explanations of the methods used to define the USEPA's ecoregions are given in Omernik (1995), Griffith and others (1994), and Gallant and others (1989).

This level III and IV ecoregion map was compiled at a scale of 1:250,000; it depicts revisions and subdivisions of earlier level III ecoregions that were originally compiled at a smaller scale (USEPA, 1996; Omernik, 1987). This poster is the product of a collaborative effort primarily between the USEPA Region X, the USEPA National Health and Environmental Effects Research Laboratory (Corvallis, Oregon), the Oregon Natural Heritage Program, the United States Department of Agriculture - Forest Service (USFS), the United States Department of Agriculture - Natural Resources Conservation Service (NRCS) (formerly the Soil Conservation Service), the United States Department of the Interior - Geological Survey (USGS) - Earth Resources Observation Systems (EROS) Data Center, the Washington State Department of Natural Resources (Washington DNR), and the Washington State Department of Ecology.

This project is associated with an interagency effort to develop a common framework of ecological regions. Reaching that objective requires recognition of the differences in the conceptual approaches and mapping methodologies that have been used to develop the most commonly used existing ecoregion-type frameworks, including those developed by the USFS (Bailey and others, 1994), the USEPA (Omernik, 1987, 1995), and the NRCS (United States Department of Agriculture - Soil Conservation Service, 1981). As each of these frameworks is further developed, the differences between them are becoming less. Regional collaborative projects such as this one in Washington and Oregon, where agreement can be reached among multiple resource management agencies, is a step in the direction of attaining commonality and consistency in ecoregion frameworks for the entire nation.

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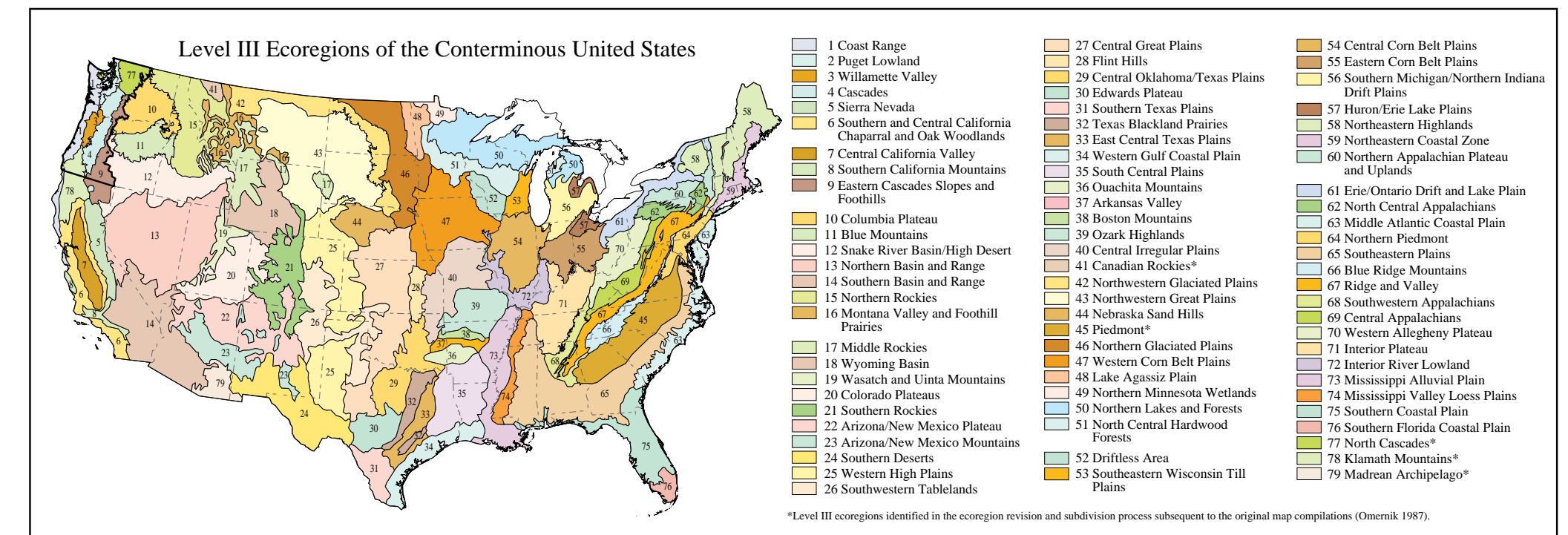
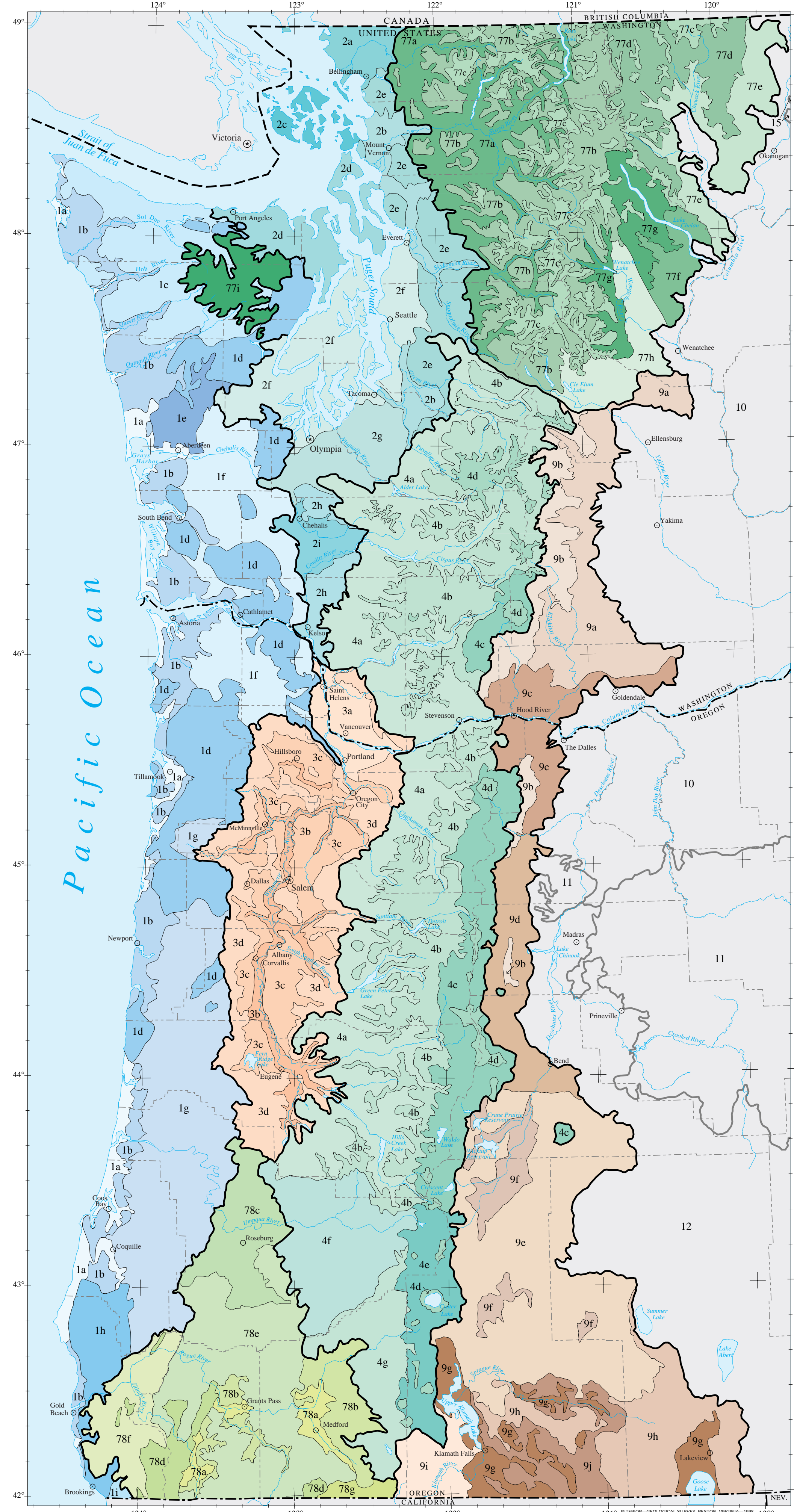
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WASHINGTON STATE DEPARTMENT OF Natural Resources

OREGON NATURAL HERITAGE PROGRAM

U.S. ENVIRONMENTAL PROTECTION AGENCY

U.S. GEOLOGICAL SURVEY

U.S. DEPARTMENT OF AGRICULTURE - NATURAL RESOURCES CONSERVATION SERVICE

U.S. DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY



Much of the Coast Range (1) has been altered by intensive forest management.

1. Coast Range

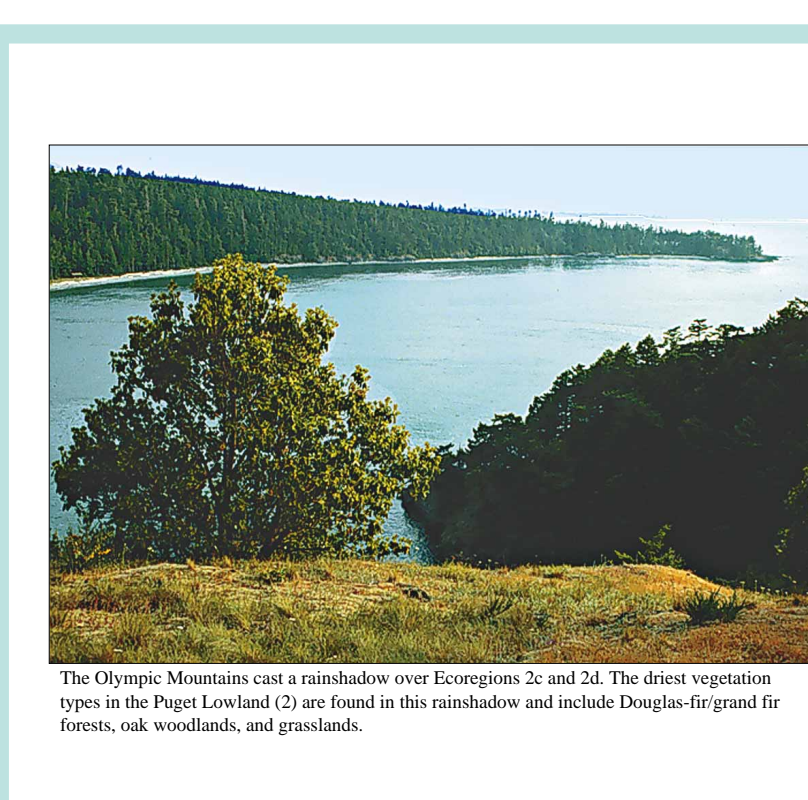
Highly productive, rain-drenched coniferous forests cover the low mountains of the Coast Range. Sitka spruce forests originally dominated the fog-shrouded coast, while a mosaic of western red cedar, western hemlock, and seral Douglas-fir blanketed inland areas. Today Douglas-fir plantations are prevalent on the intensively logged and managed landscape.

1a The **Coastal Lowlands** ecoregion encompasses estuarine marshes, freshwater lakes, black-water streams, marine terraces, and sand dunes. Elevations range from sea level to 300 feet. Channelization and diking have converted many of its wetlands into dry pastures; associated stream quality degradation has occurred.

1b The **Coastal Uplands** ecoregion extends to an elevation of about 500 feet. The climate of Ecoregion 1b is marine-influenced with an extended winter rainy season, enough fog during the summer dry season to reduce vegetation stress, and a lack of seasonal temperature extremes. The ecoregion roughly corresponds with the historic distribution of Sitka spruce. The extent of the original forest has been greatly reduced by logging.

1c The **Low Olympics** ecoregion contains foothills and mountains and rises to an elevation of approximately 4000 feet. Copious precipitation (up to 200 inches/year) supports a lush, epiphytic-rich rainforest of western hemlock, western red cedar, and Douglas-fir. Much of the region is in the third rotation of logging. However, a portion of the region lies within the Olympic National Park and contains ancient forests.

1d The **Volcanics** ecoregion varies in elevation from 1000 to 4000 feet and is disjoint. Columnar and pillow basalts outcrop over. Its mountains may have been offshore seamounts displaced by continental sediments about 200 million years ago. The basaltic shield preserves relatively stable summer stream flows that still support spring chinook salmon and summer steelhead. Its forests are intensively managed.



The Olympic Mountains east a rainshadow over Ecoregions 2c and 2d. The direct vegetation types in the Puget Lowland (2) are forest in this rainshadow and include Douglas-fir grand fir forest, oak woodlands, and grasslands.

2. Puget Lowland

This broad rolling lowland is characterized by a mild maritime climate and flanks the intricately cut coastline of Puget Sound. It occupies a continental glacial trough and has many islands, peninsulas, and bays. Coniferous forest originally grew on the ecoregion's ground moraines, outwash plains, floodplains, and terraces. The distribution of forest species is affected by the rainshadow from the Olympic Mountains.

2a The **Fraser Lowland** ecoregion is composed of glacial drift plains, terraces, and some floodplains. Undulating terrain, a mild, wet climate, and productive pastures are characteristic. This ecoregion has the highest dairy farm concentration in Washington.

2b The **Eastern Puget Riverine Lowlands** ecoregion is composed of floodplains and terraces. Western red cedar forest, western hemlock forest, and both riverine and wetland habitat were common before the 1960s century. Subsequently, many of the wetlands were drained. Pastures, cropland, forests, and urban centers now dominate the landscape.

2c The **glacial-scoured San Juan Islands** ecoregion is underlain by sedimentary rock. Well-drained, shallow soils are typical. It is in the rainshadow of the Olympic Mountains. The direct vegetation types in the Puget Lowland (2) grow here and include Douglas-fir-grand fir forest, oak woodlands, and grasslands.

2d The **Olympic Rainshadow** ecoregion receives, on the average, only 10 to 40 inches of precipitation each year depending on location. Streams on the rain plains have low discharge, and their drainage pattern is often dendritic or interfluvial. Its many soils tend to retain moisture better than the soils of the San Juan Islands (2c) and support pastureland, cropland, and woodland.

2e The **Eastern Puget Upland** ecoregion is made up of rolling moraines and foothills and is a zone of transition. Both Puget Lowland and Cascadian vegetation associations occur with the latter most common in areas of greater elevation and precipitation. The relief and precipitation of Ecoregion 2e tend to be high for the Puget Lowland (2), but low compared to the Cascades (4) or the North Cascades (77).



The agricultural patchwork of the Willamette Valley (3).

3. Willamette Valley

Rolling prairie, deciduous-coniferous forests, and extensive wetlands characterized the pre-settlement landscape of this broad, lowland valley. Ecoregion 3 is distinguished from the adjacent Coast Range (1) and Cascades (4) by lower precipitation, less relief, and a different mosaic of vegetation. Landforms consist of terraces and floodplains, interlaced and surrounded by rolling hills. Productive soils and a temperate climate make it one of the most important agricultural areas in Oregon.

3a The **Portland/Vancouver Basin** ecoregion is composed of undulating terraces and floodplains with numerous wetlands, Oregon ash, and Douglas-fir occurred elsewhere in the fault block basin. Today, Ecoregion 3a is dominated by urban and suburban development, pastures, and meadows. Weather here is often affected by cold or warm easterly winds that blow through the Columbia River Gorge.

3b In the **Willamette River and Tributaries Gallery Forest** ecoregion, meandering, low-gradient channels and oxbow lakes are incised into broad floodplains. Deciduous riparian forests that once grew on its fertile, alluvial soils have been largely replaced by agriculture and rural residential, suburban, and urban

4. Cascades

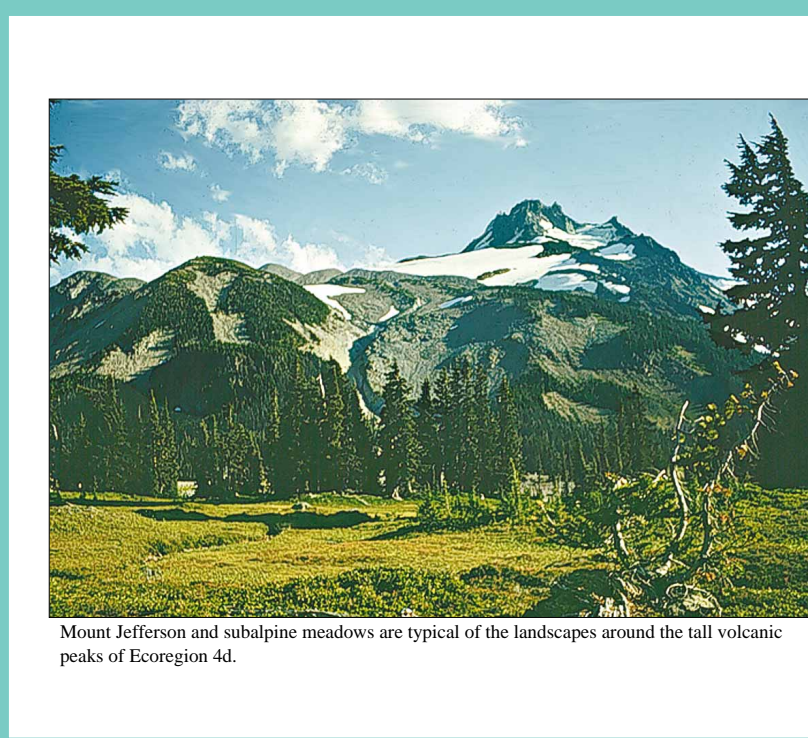
This mountainous ecoregion underlain by Cenozoic volcanics has been affected by alpine glaciation. It is characterized by steep ridges and river valleys in the west, a high plateau in the east, and both active and dormant volcanoes. Elevations range upwards to 14410 feet. Its moist, temperate climate supports an extensive and highly productive coniferous forest. Subalpine meadows occur at high elevations.

4a The **Western Cascades Lowlands and Valleys** ecoregion is characterized by a network of steep ridges and narrow valleys. Elevations are generally less than 3200 feet and are the lowest in Ecoregion 4. The wet, mild climate promotes lush forests that are dominated by Douglas-fir and western hemlock. It is one of the most important timber producing areas in the Northwest.

4b The **Western Cascades Montane Highlands** ecoregion is composed of steep, glaciated mountains that have been dissected by high-gradient streams. It has lower temperatures than Ecoregion 4a and is characterized by a deep annual snow pack. Soils are of the frigid and cryic temperature regimes and support forests dominated by Pacific silver fir, western hemlock, mountain hemlock, Douglas-fir, and noble fir.

4c The **Cascade Crest Montane Forest** ecoregion consists of an undulating plateau punctuated by volcanic buttes and cones that reach a maximum elevation of about 6500 feet. It is Pleistocene and Pliocene volcanics were glaciated leaving numerous lakes in their wake. The ecoregion is extensively forested with mountain hemlock and Pacific silver fir.

4d The **Cascades Subalpine/Alpine** ecoregion is an area of high, glaciated, volcanic peaks that rise above subalpine meadows. Elevations range from 5000 to 12000 feet. Active glaciation occurs on the highest volcanoes and decreases from north to south. The winters are very cold and the growing season is extremely short.



Mount Jefferson and subalpine meadows are typical of the landscapes around the tall volcanic peaks of Ecoregion 4d.

9. Eastern Cascades Slopes and Foothills

Ecoregion 9 is in the rainshadow of the Cascade Mountains. Its climate exhibits greater temperature extremes and less precipitation than ecoregions to the west. Open forests of ponderosa pine and some lodgepole pine distinguish this region from the higher ecoregions to the west where hemlock and fir forests are predominant. The vegetation is adapted to the prevailing dry, continental climate and is highly susceptible to wildfire. Volcanic cones and buttes are common in much of the region.

9a The **unglaciated Yakima Plateau and Slopes** ecoregion is characterized by plateaus, buttes, and canyons, a dry continental climate, and open woodlands dominated by ponderosa pine. Fire is an integral part of its ecosystem.

9b The **Grand Fir Mixed Forest** ecoregion is mostly outside the limit of maritime climatic influence. It is characterized by high, glaciated plateaus and mountains, frigid soils, and a snow-dominated, continental climate. The vegetation is a mix of grand fir, Douglas-fir, and ponderosa pine.

9c The **Oak/Conifer Eastern Cascades Columbia Foothills** ecoregion is more diverse than any other within the Eastern Cascades Slopes and Foothills (9). Soil, climate, and landforms are all highly variable and contribute to a mosaic of vegetation types that includes grasslands, oak woodlands, Douglas-fir/ponderosa pine forests, and western hemlock/Douglas-fir forests. Maritime weather systems sometime enter Ecoregion 9c via the Columbia River Gorge and moderate its otherwise continental climate.

9d The **Ponderosa Pine/Bitterbrush Woodland** ecoregion has a terrain dominated by undulating volcanic plateaus and canyons. Its well-drained, frigid soils are often derived from ash and support nearly homogeneous stands of ponderosa pine, bitterbrush grasses at the lower elevations. Stands of lodgepole pines are largely absent in contrast to the Pumice Plateau Forest (9e) to the south.

9e The **Pumice Plateau Forest** ecoregion is a high volcanic plateau that is thickly covered by Mt. Mazama ash and pumice. Its residual soils are somewhat excessively drained. Spring-fed creeks, marshes, and a few lakes occur. Forests of ponderosa pine are common on slopes; colder deposits and firs are dominated by their network forests in a trellis pattern.

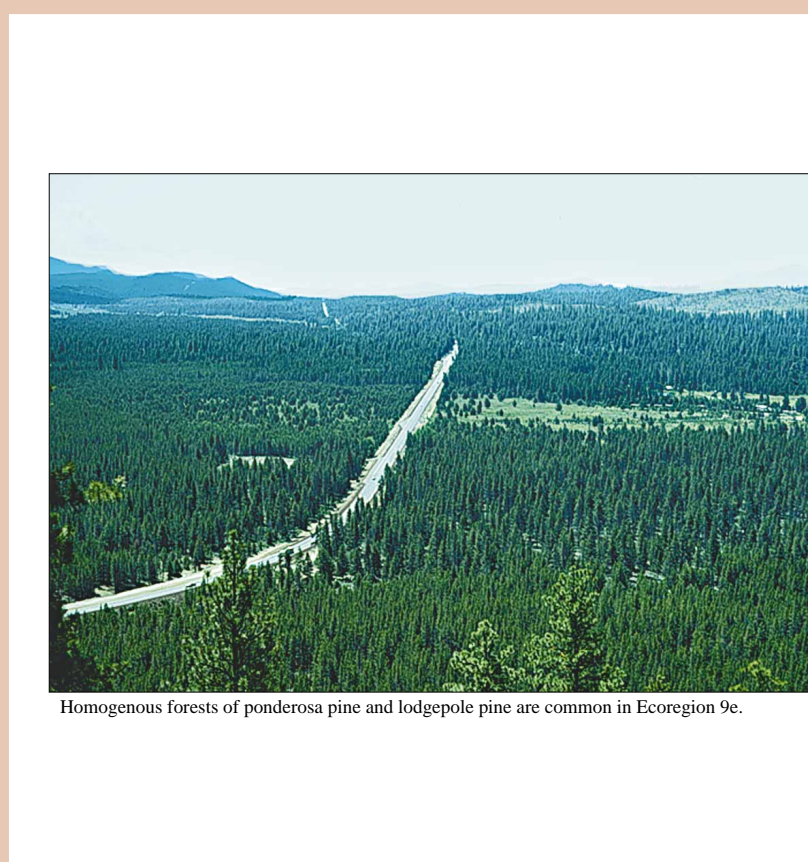
9f The **Cold Wet Pumice Plateau Basins** ecoregion includes Sycan Marsh, Klamath Marsh, and La Pine Basin. All three areas function as cold air catch-basins during the winter and have lower minimum temperatures than Ecoregion 9e. Its marshes and forested wetlands are commonly 4500 to 5000 feet in elevation and are important habitat for migratory waterfowl. The La Pine Basin is underlain by thick lacustrine deposits that exhibit high ground water levels during the spring snow melt.

9g The **Klamath/Goose Lake Warm Wet Basins** ecoregion is drier than elsewhere in Ecoregion 9, yet it contains floodplains, terraces, and a pluvial lake basin. Its silt, sedge, and cattail wetlands have largely been drained for agriculture. Sagebrush and bunchgrasses occur in upland areas.

9h The terrain of the **Fremont Pine/Fir Forest** ecoregion is composed of mountains and high plateaus. Its continental climate and diverse terrain support a range of vegetation types. Ponderosa pine woodlands are common at lower elevations while white fir is more prevalent in higher areas.

9i The **Southern Cascades Slope** ecoregion is a transitional zone between the Cascades (4) and the drier Eastern Cascades Slopes and Foothills (9). Forests of ponderosa pine blanketed the ecoregion's landscape white fir, Shasta red fir, and Douglas-fir grow at higher elevations. Much of Ecoregion 9i typically receives more precipitation than Ecoregions 9a, c, d, e, f, g, and j.

9j The terrain of the **Klamath Juniper/Ponderosa Pine Woodland** ecoregion consists of undulating hills, escarpments, and plateaus. Mean annual precipitation ranges from 12 to 20 inches per year. Reservoirs dot the landscape and are important to lowland irrigation. The natural vegetation was mostly juniper in the south and a mix of ponderosa pine and juniper in the north; today, a mosaic of pastures and woodland occurs.



Homogeneous forests of ponderosa pine and lodgepole pine are common in Ecoregion 9e.

77. North Cascades

The terrain of Ecoregion 77 is composed of high, rugged mountains. It contains the greatest concentration of active alpine glaciers in the conterminous United States and has a variety of climatic zones. A dry continental climate occurs in the east and mild, maritime, rainforest conditions are found in the west. It is underlain by sedimentary and metamorphic rock in contrast to the adjoining Cascades (4) which are composed of volcanics.

77a The **North Cascades Lowland Forests** ecoregion is composed of low mountains, broad glaciated valleys, and glacial-fed rivers that receive, on average, 60 to 90 inches of precipitation per year. Extensive, productive rainforests have developed under the mild maritime climate and are dominated by western hemlock, Douglas-fir, and western red cedar. Pastures occur in the valleys.

77b The landscape of the **North Cascades Highland Forests** ecoregion consists of steep, glaciated ridges, high-gradient streams, and tarns. Colder climatic conditions, deeper snow pack, and Pacific silver fir/mountain hemlock forests distinguish it from Ecoregion 77a.

77c The **North Cascades Subalpine/Alpine** ecoregion is characterized by high mountain peaks, bare rock, glaciers, many tarns, plentiful precipitation, and sediment-laden glacial meltwater streams. Subalpine meadows occur around the taller peaks; their flora and fauna is adapted to the prevailing subarctic climate.

77d The **Passayten/Sawtooth Highlands** has colder winter temperatures than elsewhere in Ecoregion 77 and has experienced both continental and alpine glaciation. Its landscape of high ridges, plateaus, and trough valleys is dominated by subalpine fir. In addition, lodgepole pine grows in the northeast. Douglas-fir is found at lower elevations, and many wetlands occur. Mean precipitation is from 25 to 65 inches per year and varies according to elevation and slope aspect; it is less than that received by Ecoregions 77a, b, c, and d, which occur to the west.

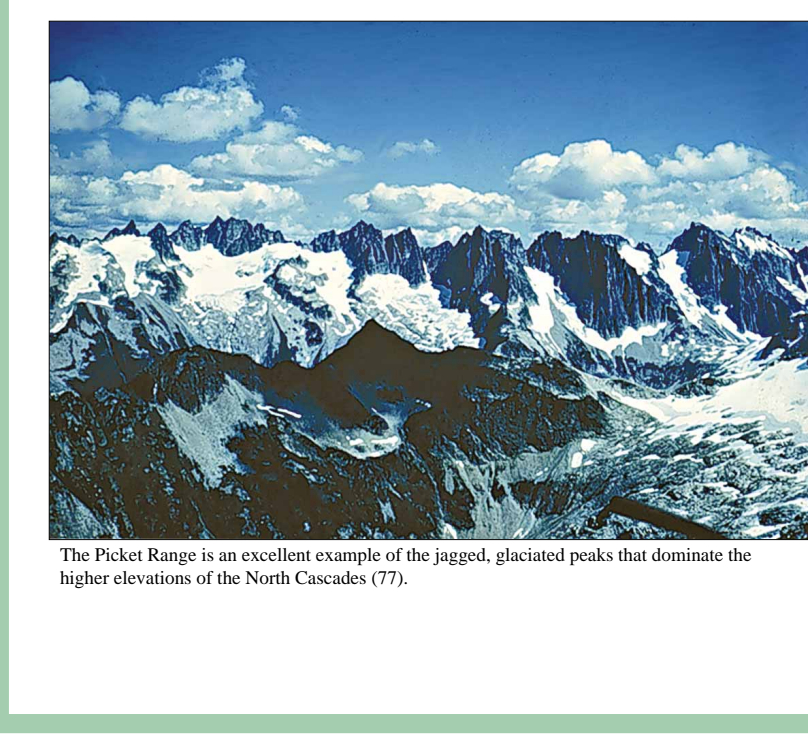
77e The glaciated **Okanagan Pine/Fir Hills** ecoregion has rounded mountains and broad, U-shaped valleys. Elevations are lower and slope angles are gentler than further west in the jagged, mountainous areas of the North Cascades (77). Precipitation ranges from 10 to 35 inches per year, falling mostly as snow. It is lower than elsewhere in Ecoregion 77 and droughty conditions prevail. Precipitation and temperature both vary according to elevation, microtopography, and slope aspect and affect the distribution of vegetation. Ponderosa pine grows in lower, drier areas and Douglas-fir is found at higher elevations. Bluebunch wheatgrass is common in the understory of the south and Idaho fescue grass in the north.

77f The steep, glaciated **Chelan Tephra Hills** ecoregion is dominated by deep deposits of coarse, volcanic silt that contribute to the character of this dry, east-side region. Elevations range from 1200 to 3700 feet. Ponderosa pine grows in lower areas, Douglas-fir occurs in the mid-elevations, and subalpine fir is found above 5000 feet in elevation.

77g The glaciated **Wenatchee/Chelan Highlands** ecoregion is characterized by mountains and ridges, tarns, U-shaped valleys, and dissected high-gradient streams. Leeward climatic conditions prevail. Douglas-fir, grand fir, and subalpine fir are common; lodgepole pine and Engelmann spruce also occur. Average precipitation ranges from only 15 to about 40 inches per year.

77h The **Chiwaukum Hills and Lowlands** are composed of feldspathic sandstone and are unlike neighboring ecoregions which are underlain by metamorphic and igneous rock. Its low mountains, hills, and cuestas can be highly erodible and unstable. Streams have high sediment yields and run in V-shaped cuts over the dissected, mountainous landscape.

77i The **High Olympics** ecoregion contains steep, glaciated mountains that reach an elevation of 9000 feet. It is characterized by rock outcrops, tarns, persistent snow pack, alpine glaciers, and high-gradient, glacial-fed streams. Its vegetation includes subalpine mountain hemlock and Pacific silver fir forests as well as alpine meadows. Subalpine fir occurs on the eric soils of northeastern rainshadow areas.



The Picket Range is an excellent example of the jagged, glaciated peaks that dominate the higher elevations of the North Cascades (77).

78. Klamath Mountains

The ecoregion is physically and biologically diverse. Highly dissected, folded mountains, foothills, terraces, and floodplains occur and are underlain by igneous, sedimentary, and some metamorphic rock. The mild, subhumid climate of Ecoregion 78 is characterized by a lengthy summer drought. It supports a vegetal mix of northern Californian and Pacific Northwest conifers.

78a The **Rogue/Hillocks Valley** ecoregion consists of foothills and terraces that have a local relief of 100 to 6000 feet. It is characterized by hot, dry summers and a native vegetation of Oregon white oak, madrone, California black oak, ponderosa pine, and grasslands. Today, a mix of orchards, cropland, pastureland, oak woodland, pine woodland, and rural residential development occurs. Vegetation and land use are more similar to those of northern California's inland valleys than to those of the Willamette Valley (3).

78b The **Siskiyou Foothills** are affected by a Mediterranean climate that is similar to Ecoregion 78a. The driest area occurs east of Medford and is dominated by oak woodlands, ponderosa pine, and Douglas-fir. The wetter foothills adjacent to the Illinois Valley support Douglas-fir, madrone, and incense cedar.

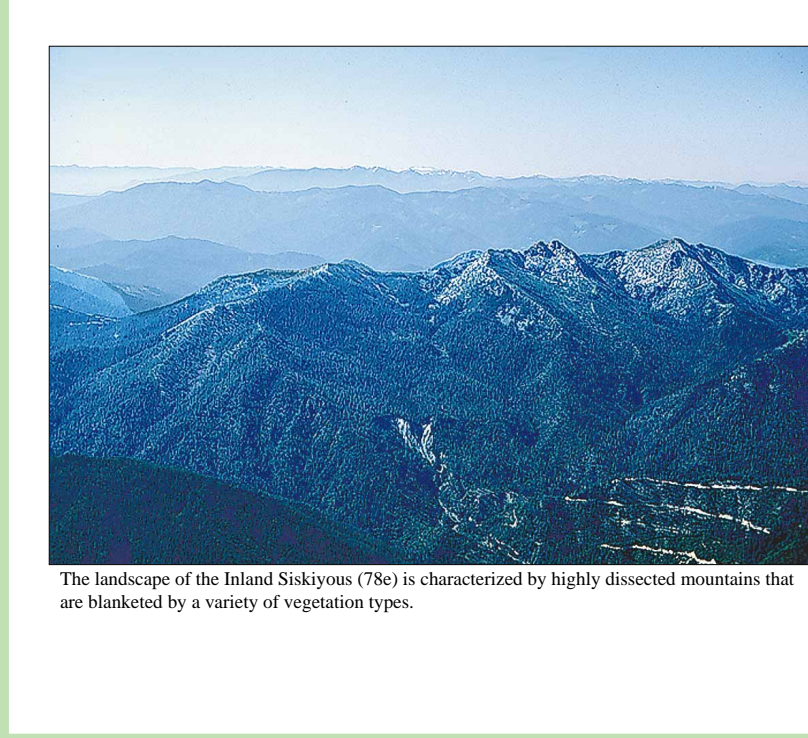
78c The **Umpqua Interior Foothills** ecoregion is an intermingling of narrow valleys, terraces, and foothills. It contrasts with the terrain of the more mountainous Inland Siskiyou (78a). A mix of oak woodlands, Douglas-fir, ponderosa pine, and madrone intermingles with pastureland, vineyards, orchards, and row crops. The vegetation and land use are similar to those of Ecoregions 78a and 78b. Summers are hot and dry, although the climate is transitional to both the Willamette and Rogue valleys; it is most similar to the Rogue Valley.

78d The mountainous **Serpenine Siskiyou** ecoregion is highly dissected and is underlain by Jurassic sedimentary. Rare rudersity species and sparse woodlands grow on its unique soils. Mining and associated water quality problems occur.

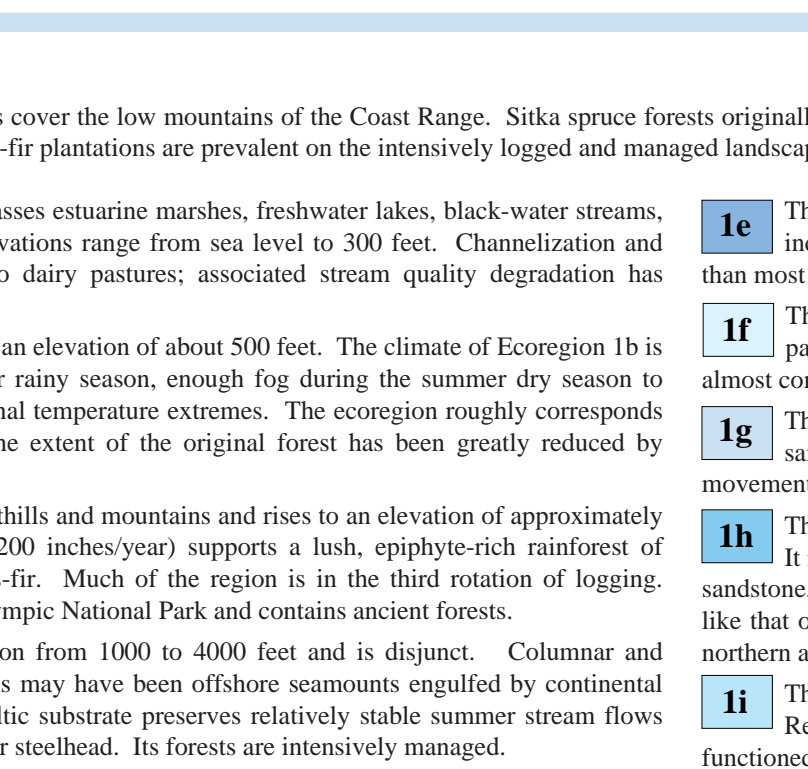
78e The **Inland Siskiyou** ecoregion is mountainous. Granite and sedimentary rock underlie the ecoregion and distinguish it from the volcanic mountains of the Cascades (4). Greater fire frequency, less annual precipitation, longer summer droughts, and a lack of north differentials from the Coastal Siskiyou (78b).

78f The **Coastal Siskiyou** ecoregion has a wetter and a milder maritime climate than elsewhere in the Klamath Mountains (78). Productive forests composed of tanoak, Douglas-fir, and some Port Orford cedar cover the dissected, mountainous landscape.

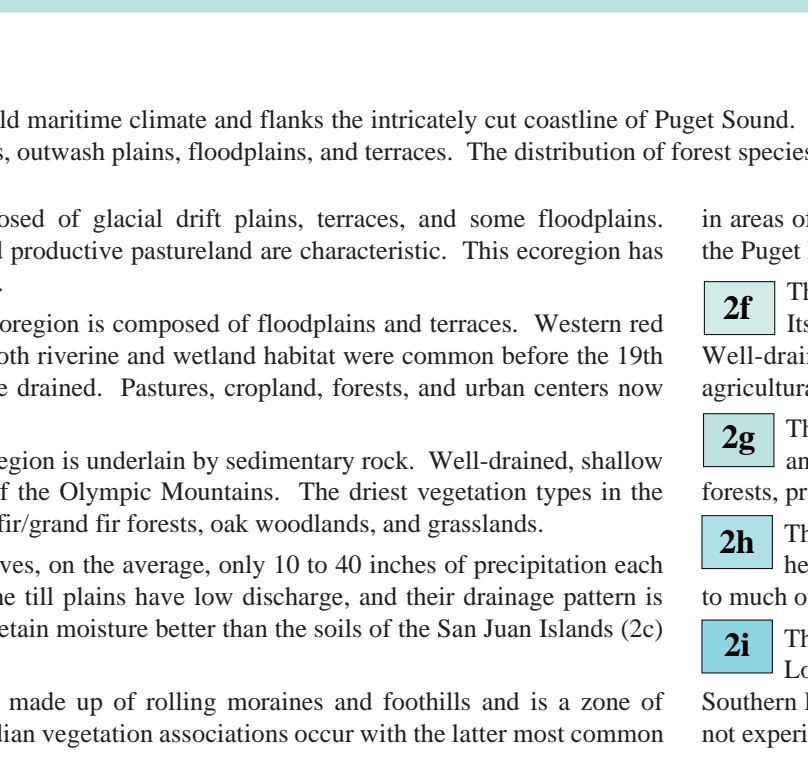
78g The **Klamath River Ridges** ecoregion has a dry, continental climate and receives, on average, 25 to 35 inches of rain annually. Low elevation and south-facing sites have a more drought resistant vegetation than elsewhere in the Klamath Mountains (78) such as juniper, chaparral, and ponderosa pine. Higher areas and north-facing slopes are covered by Douglas-fir, white fir, and Shasta red fir. Ecoregion 78g has less precipitation, more sunny days, and a greater number of cold, clear nights than the Inland Siskiyou (78c).



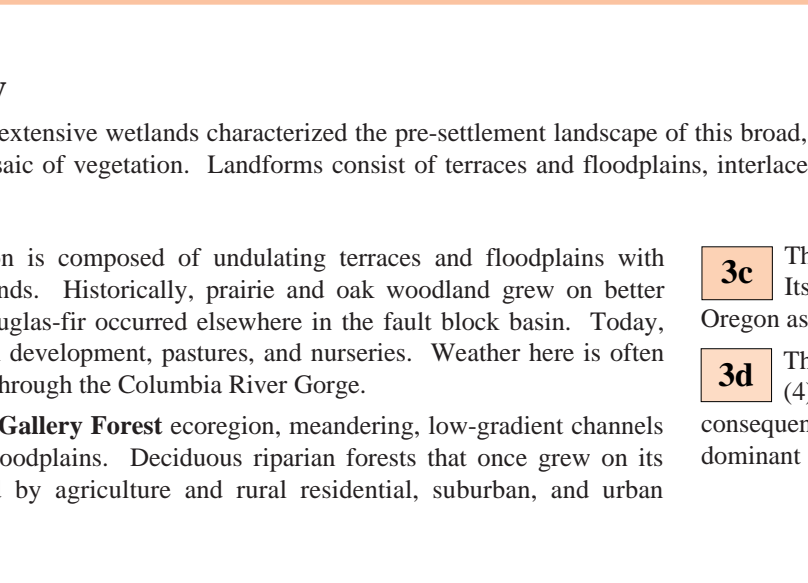
The landscape of the Inland Siskiyou (78c) is characterized by highly dissected mountains that are underlain by a variety of vegetation types.



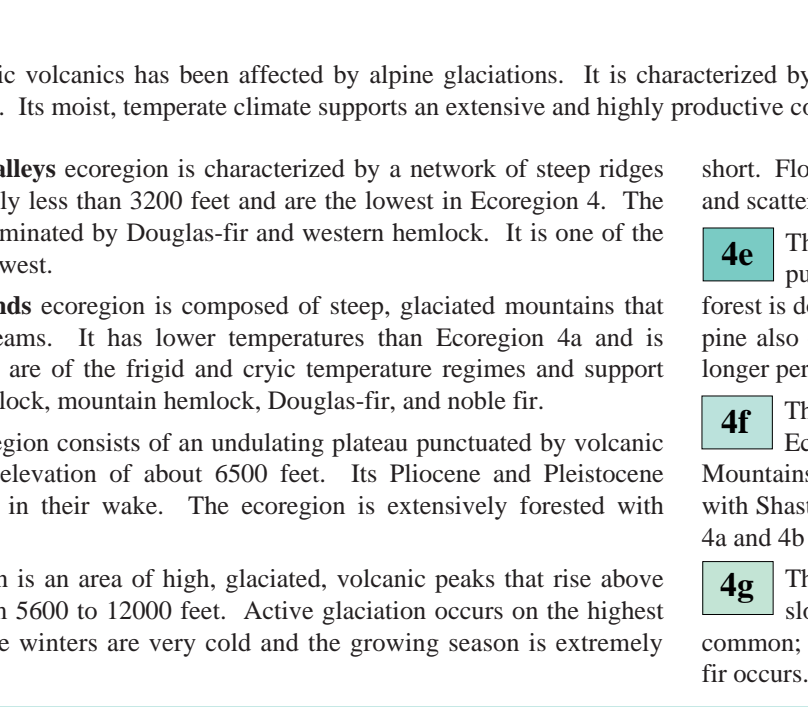
The Grand Lowlands (1a) are noted for their fish patterns. Photo: Farming in common.



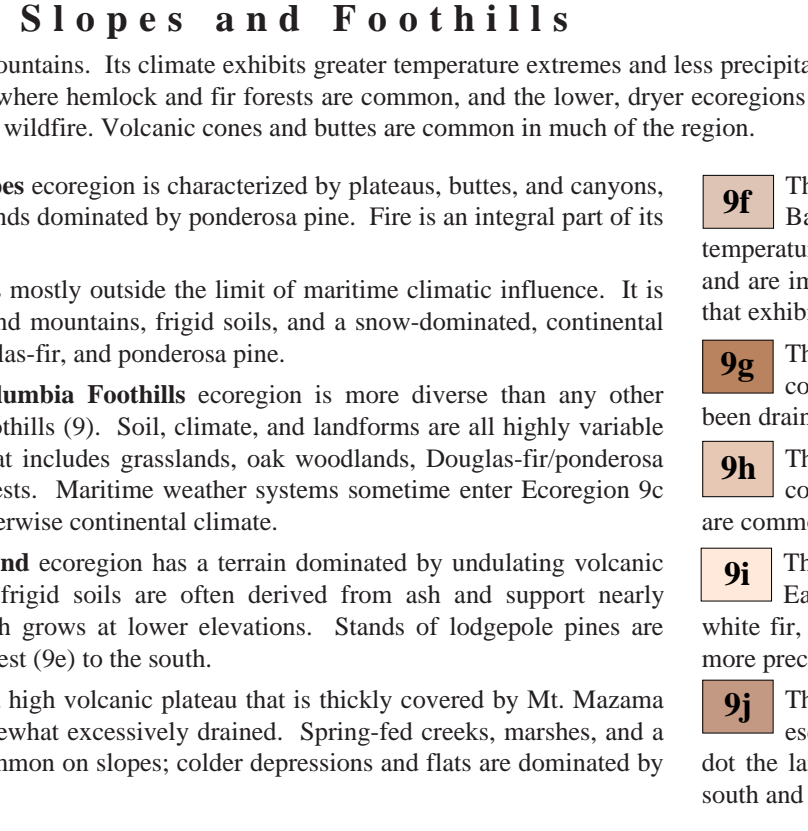
Chinook and cotton are a common sight during their spawning season in the high quality coastal rivers of Ecoregion 1.



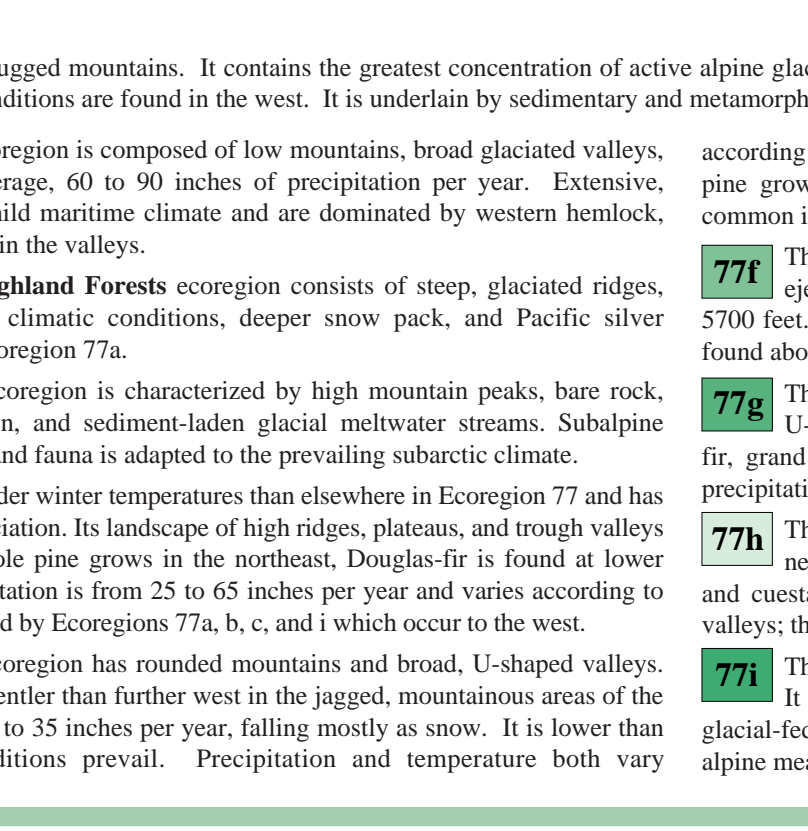
A landscape mosaic of coniferous forest and prairie characterizes the Southern Puget Drainage (2).



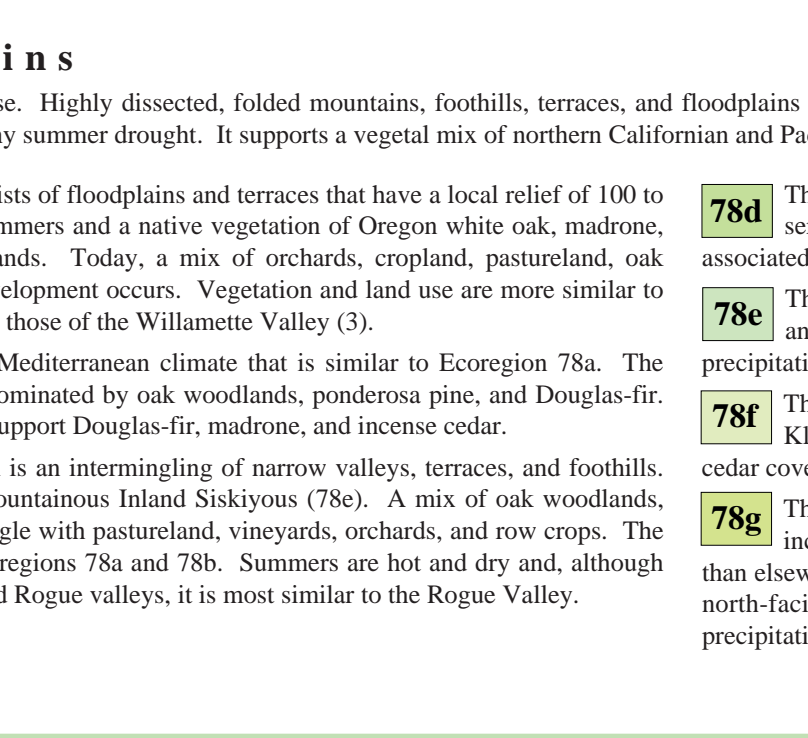
Wetland landscapes and many other herbaceous plants are found within the Puget Lowland (2).



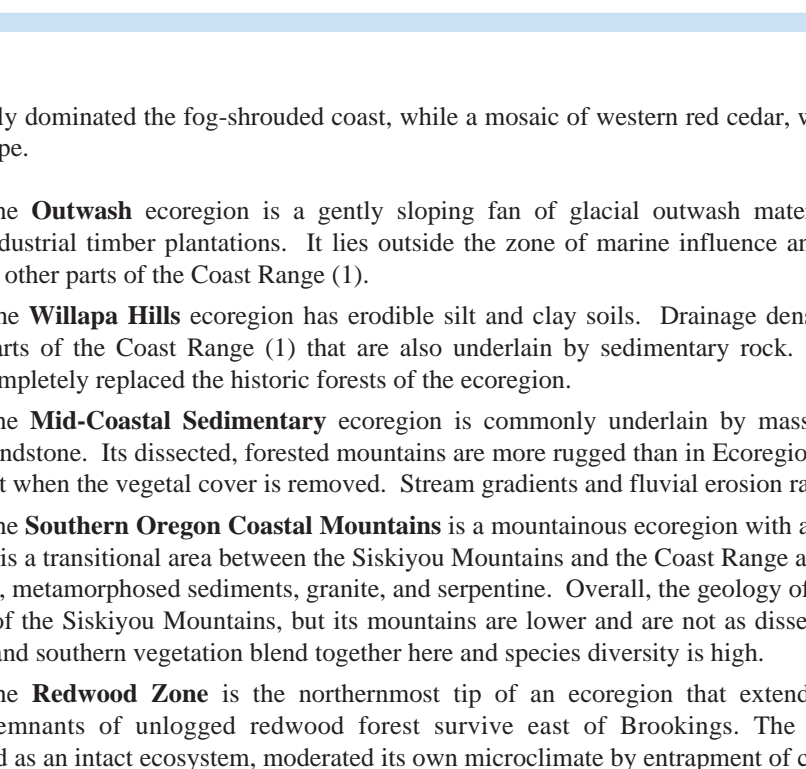
A mosaic of rural residential development, pastureland, woodland (dominated by Oregon white oak and Douglas-fir), and vineyards occur in the Valley Foothills (3d).



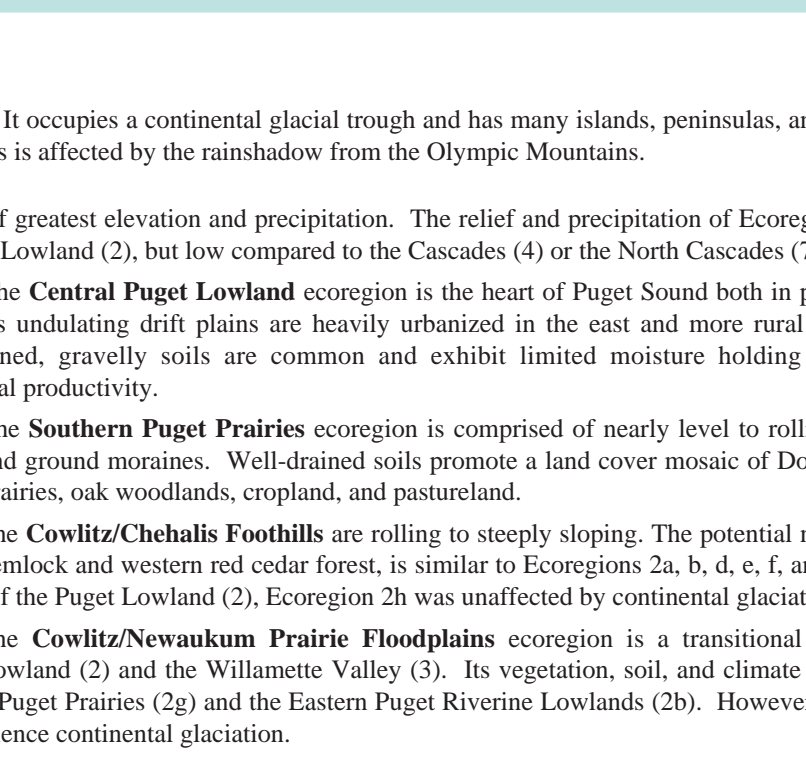
Remnants of old-growth western hemlock and western red cedar forests occur in Ecoregion 4a. Northern spotted owls are found here.



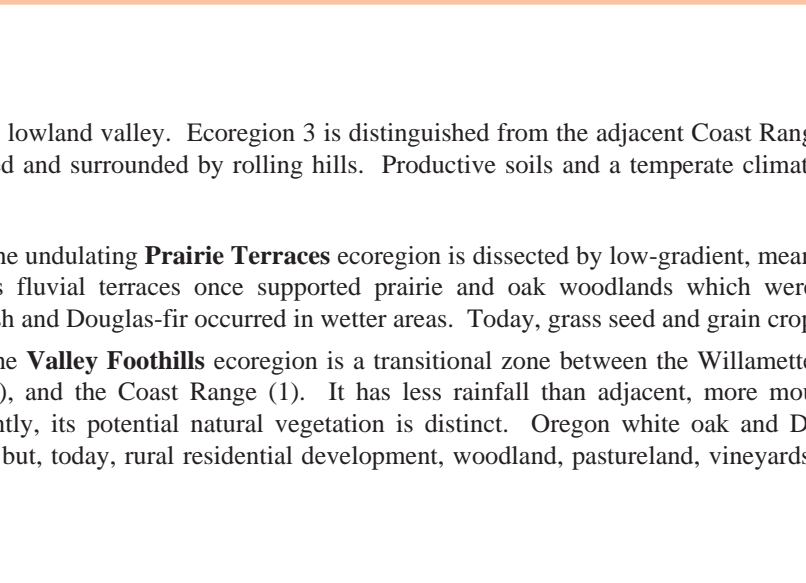
Intensive forestry is a common sight in Ecoregion 4a and 4b.



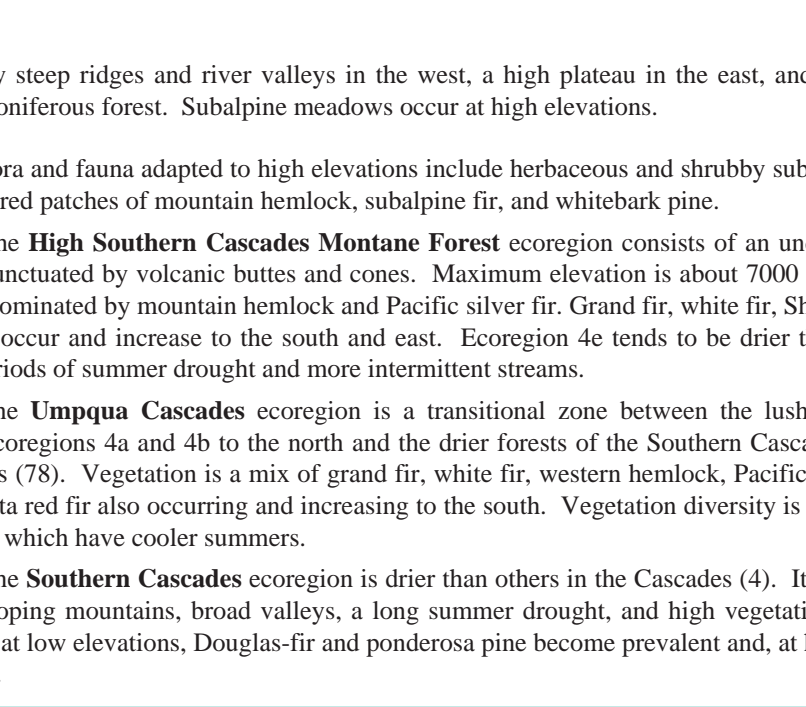
Intensive forestry is a common sight in Ecoregion 4a and 4b.



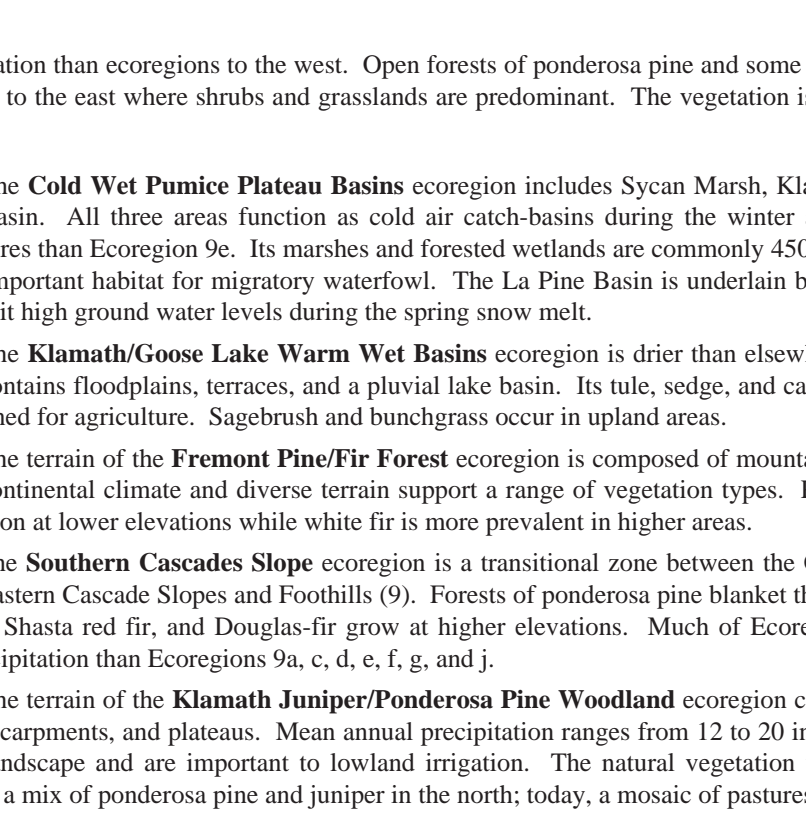
Intensive forestry is a common sight in Ecoregion 4a and 4b.



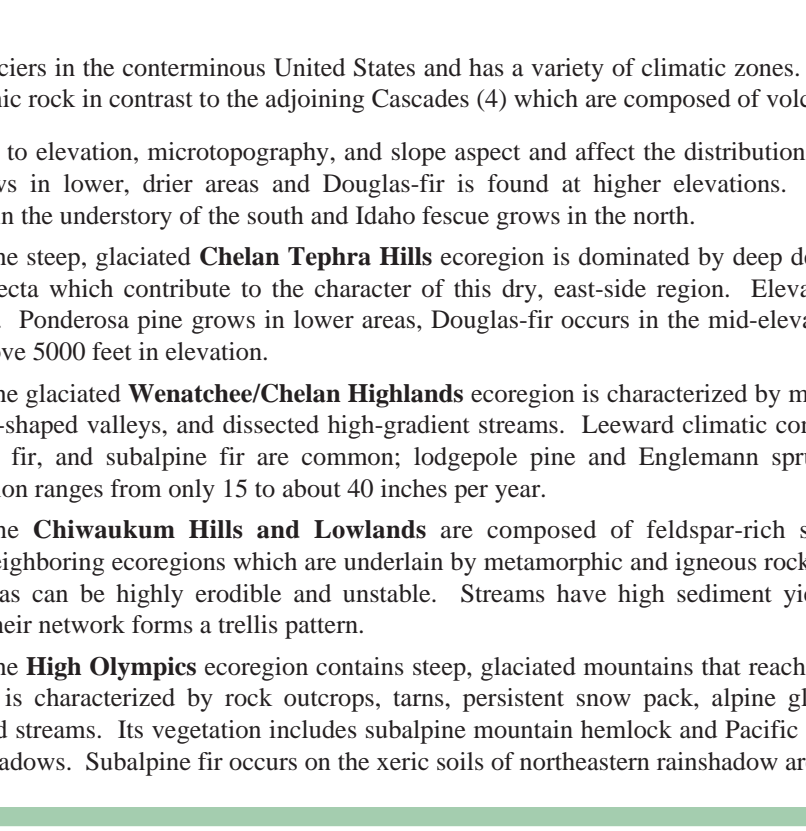
Intensive forestry is a common sight in Ecoregion 4a and 4b.



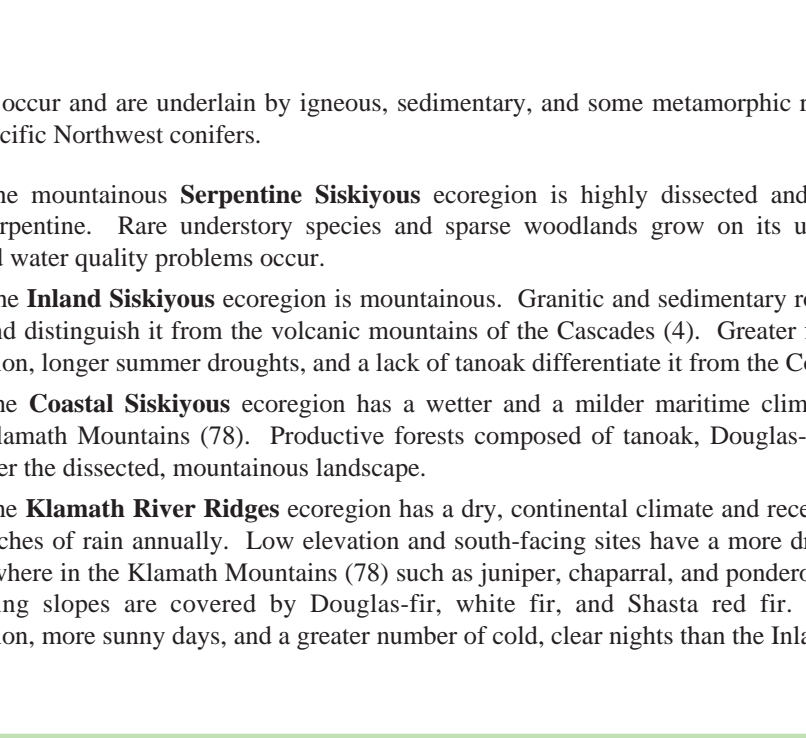
Intensive forestry is a common sight in Ecoregion 4a and 4b.



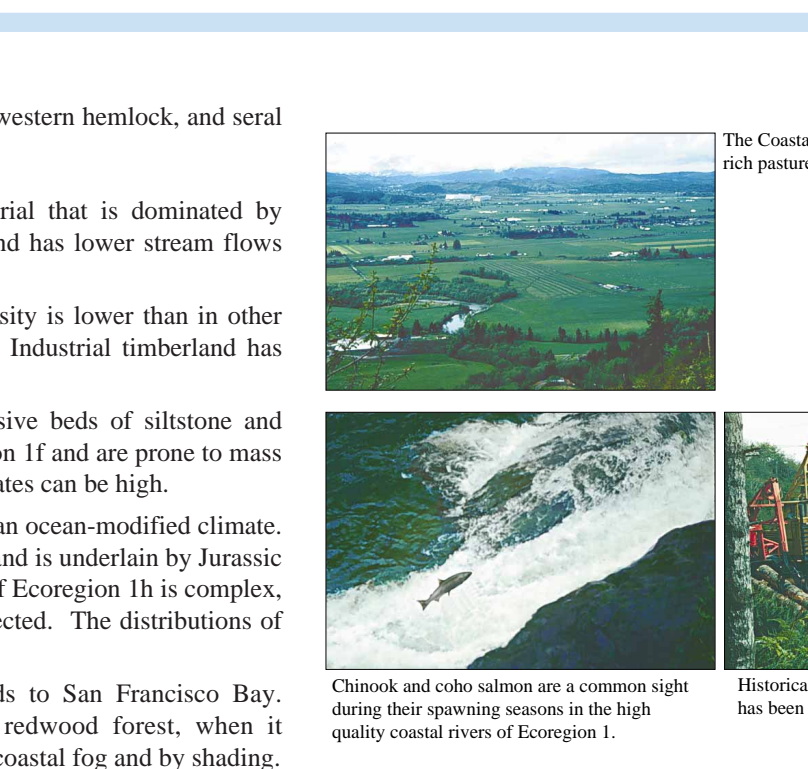
Intensive forestry is a common sight in Ecoregion 4a and 4b.



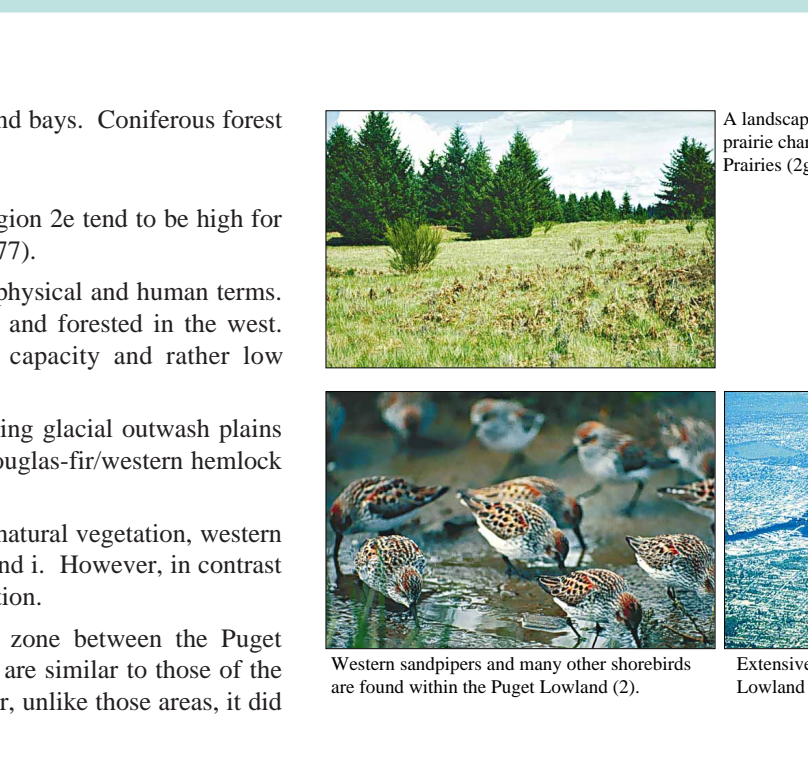
Intensive forestry is a common sight in Ecoregion 4a and 4b.



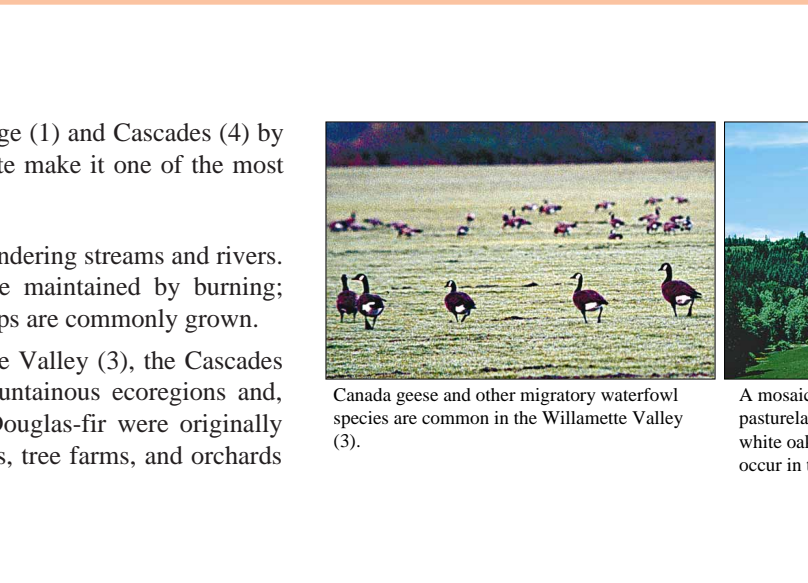
Intensive forestry is a common sight in Ecoregion 4a and 4b.



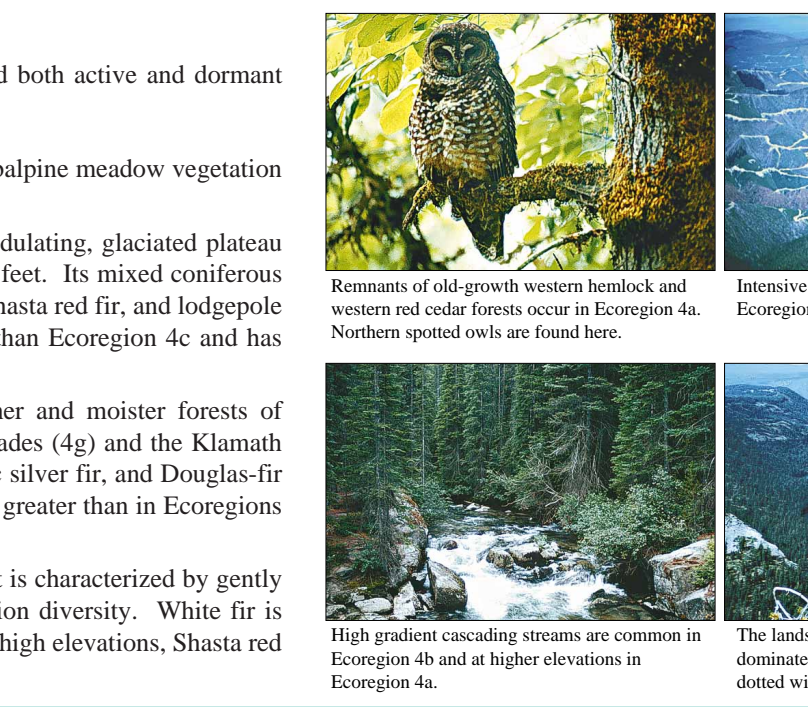
Intensive forestry is a common sight in Ecoregion 4a and 4b.



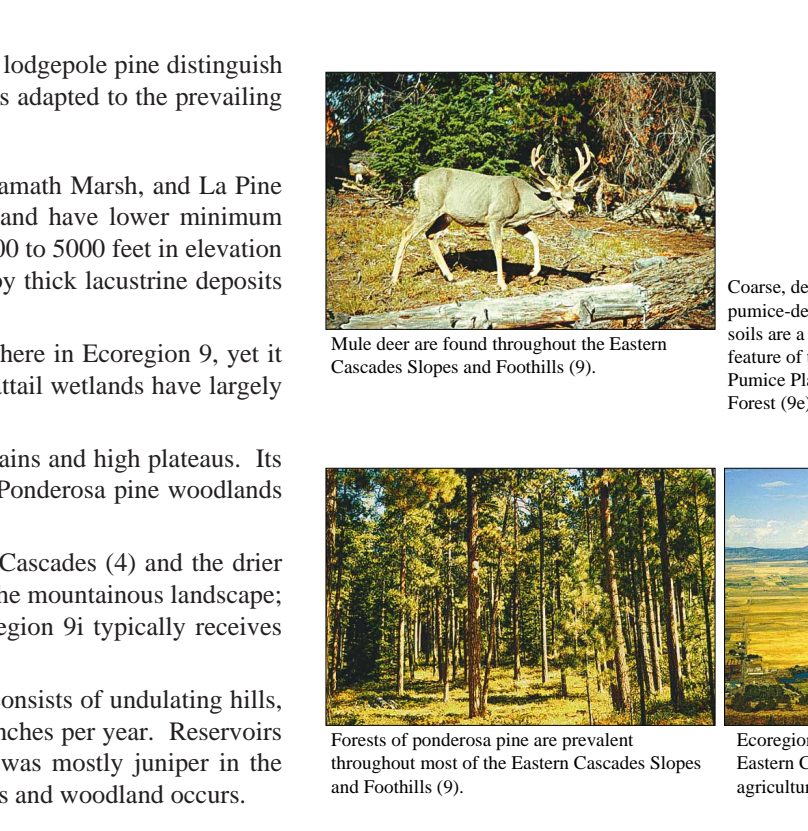
Intensive forestry is a common sight in Ecoregion 4a and 4b.



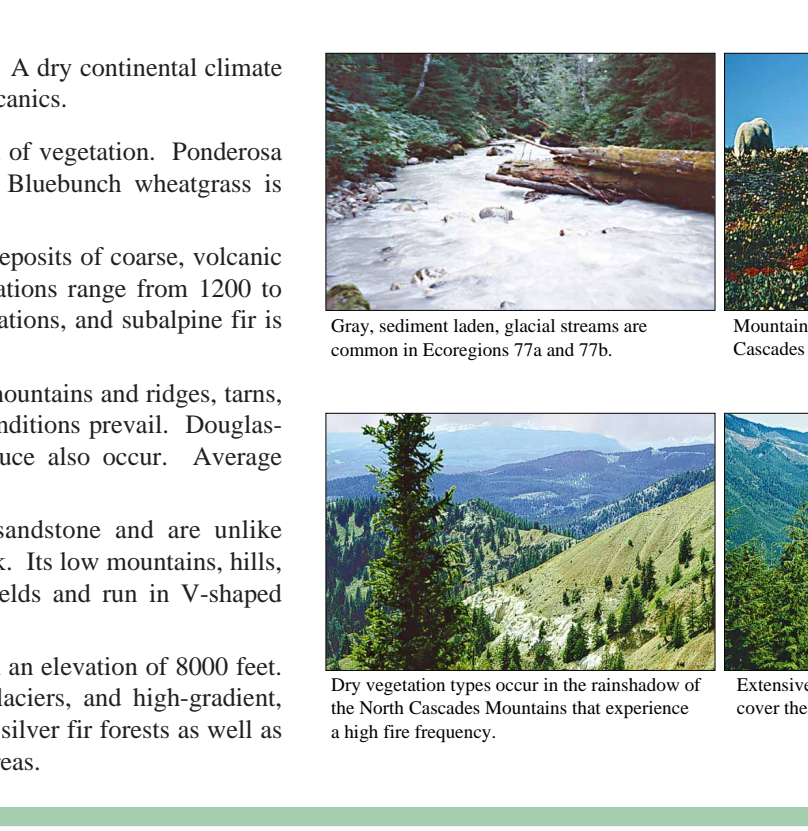
Intensive forestry is a common sight in Ecoregion 4a and 4b.



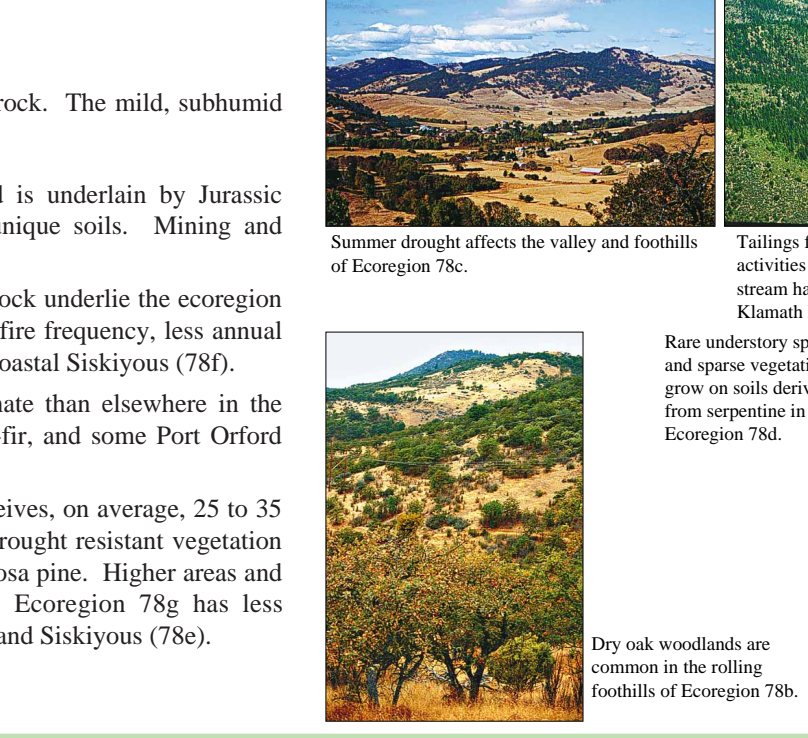
Intensive forestry is a common sight in Ecoregion 4a and 4b.



Intensive forestry is a common sight in Ecoregion 4a and 4b.



Intensive forestry is a common sight in Ecoregion 4a and 4b.



Intensive forestry is a common sight in Ecoregion 4a and 4b.

Summary Table: Characteristics of Ecoregions of Western Washington and Oregon

1. COAST RANGE												
Level IV Ecoregion	Physiography	Geology	Soil	Climate	Potential Natural Vegetation	Land Use and Land Cover						
Area (square miles)	Elevation / Low Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regime	Precipitation (inches)	First Frost (days)	Mean Temperature (January mean, July max, °C)	Potential Natural Vegetation	Land Use and Land Cover		
1a. Coastal Lowlands	986	Marine estuaries, terraces, sand dunes, and spits with low gradient, black water, mean recruitment and rivers and estuaries, low coastal lakes, Channelization and diking common.	Quaternary marine and non-marine terrace deposits, beach and dune sands, alluvium.	Spoodos (Haploberolis), Entisols (Fluvisols), Inceptisols (Haploberolis), Andisols (Fulvudands, Melanoxerands)	Bullards, Netarts, Coquille, Clatsop, Necanic, Brenner, Lin, Quillman. Very deep to deep, silty clay loam to sandy loam.	Temperate / Moisture Regime	60-85	200-240	36.50; 52.68	Silka spruce, western hemlock, western red cedar, estuarine wetland plants.	Douglas-fir/western hemlock/Silka spruce forests, wetlands, dairy farms, urban/rural residential development, recreation, pastureland.	
1b. Coastal Uplands	2608	Coastal headlands and upland terraces with medium to high gradient, black water streams.	Quaternary glacial drift and marine sandstone.	Entisols (Fluvisols), Inceptisols (Haploberolis), Andisols (Fulvudands, Melanoxerands)	Oreme, Lyell, Astoria, Tompkins, Reedport, Isola, Tolovana. Mostly deep, silty clay loam.	Temperate / Moisture Regime	70-125	190-240	36.48; 52.68	Silka spruce, western hemlock, western red cedar.	Douglas-fir/western hemlock/Silka spruce/western red cedar forests, forestry, rural residential development, recreation.	
1c. Low Olympics	1685	Low mountains with U-shaped valleys and high gradient streams. Higher areas are glaciated.	Lower Tertiary sandstone and siltstone.	Andisols (Fulvudands)	Subsoph, Sorbeks, Mikah. Gravelly loam, silty clay loam, gravelly loam, very gravelly loam.	Mesic, Frigid / Udic	80-200	180-230	30.45; 48.72	Western hemlock, western red cedar; some Douglas-fir. At higher elevations, Pacific silver fir, Mont. yellow-pine-rich rainforest ecosystem in glaciation I.	Western hemlock/western red cedar/Douglas-fir/western hemlock/elder/western red cedar forests, forestry, rural residential development, recreation.	
1d. Volcanics	3585	Steeply sloping mountains. High gradient, cascading streams and rivers occur and have lower summer flow than elsewhere in Ecoregion I.	Tertiary basaltic flows, pillow lavas, tuffaceous basalts, breccia, porphyritic basalt, basaltic sandstone/siltstone conglomerate, mafic mafic sandstone, tuffaceous mafic sandstone/siltstone sandstone.	Andisols (Fulvudands, Haploberolis), Ultisols (Palaerusts), Inceptisols (Xerochrepts, Fulvudands, Melanoxerands)	Bunker, Knappaon, Olympic, Raugh, Hines, Klamath, Harlow, Carey, Mt. Merritt. Very deep to moderately deep, clay loam, gravelly loam, very gravelly loam.	Frigid / Udic	70-200	100-190	30.46; 50.76	Western hemlock, western red cedar, Douglas-fir.	Douglas-fir/western hemlock/elder/western red cedar forests, forestry, rural residential development, recreation.	
1e. Outwash	354	Undulating terraces and plateaus. Medium gradient, streams and rivers occur and have lower summer flow than elsewhere in Ecoregion I.	Quaternary glacial outwash deposits.	Andisols (Fulvudands)	Hogium, Le Bar, Deep, silty loam.	Mesic / Udic	80-120	180-240	34.46; 50.75	Western hemlock, western red cedar; some Douglas-fir, red alder, bigleaf maple.	Douglas-fir/western hemlock/elder/bigleaf maple/western red cedar forests. Hay farming, pasture, forestry, rural residential development.	
1f. Willapa Hills	2028	Low, rolling hills and mountains with medium gradient, sinuous streams and rivers. Low drainage density.	Miocene sandstone, siltstone, shale.	Andisols (Fulvudands, Haploberolis), Alfisols (Glossopsols), Inceptisols (Haploberolis), Entisols (Fluvisols), Eutrochrepts, Dystrichrepts, Eutrochrepts, Fulvudands, Melanoxerands, Vitraquands)	Zenker, Eschomom, Vernonia, Scopania, Goble, Bruun, Amundt, Kinrosson, Albany. Mostly very deep to moderately deep, silty loam; some gravelly loam.	Mesic / Udic	50-100	100-210	31.46; 50.76	Western hemlock, western red cedar, Douglas-fir.	Douglas-fir/western hemlock/elder/western red cedar forests. Forestry, some rural residential development.	
1g. Mid-Coastal	3739	Moderately sloping, dissected mountains with medium to high gradient, sinuous streams.	Eocene marine sandstone, siltstone, conglomerate.	Entisols (Fluvisols), Alfisols (Glossopsols), Inceptisols (Haploberolis), Ultisols (Palaerusts), Mollics (Argiopsols)	Hoquiam, Le Bar, Deep, silty loam.	Mesic / Udic	60-130	110-200	32.48; 48.78	Western hemlock, western red cedar, Douglas-fir.	Douglas-fir/western hemlock/elder/western red cedar forests. Forestry, pastureland in valleys, some rural residential development.	
1h. Southern Oregon Coastal Mountains	693	Dissected mountains with high gradient, sinuous streams and rivers. This ecoregion is part of the Siskiyou Mountains.	Cretaceous and Jurassic siltstone, shale, sandstone, conglomerate, graywacke, granitic, gneiss, serpentinite.	Entisols (Fluvisols), Alfisols (Glossopsols), Inceptisols (Haploberolis), Ultisols (Palaerusts)	Elkta, Whibrey, Remore, Digger, Umpy, Kinrosson. Very deep to shallow, silty loam to very gravelly sandy loam.	Mesic, Frigid / Xeric	70-140	170-220	36.52; 52.76	Tan oak, Douglas-fir, western hemlock, Port Orford cedar.	Douglas-fir/western hemlock/Tan oak/Port Orford cedar forests. Forestry, recreation, pastureland in valleys, rural residential development.	
1i. Redwood Zone	31	Dissected coastal mountains and foothills with medium gradient, sinuous streams.	Jurassic graywacke.	Entisols (Humitrochrepts), Ultisols (Dystrichrepts)	Boiland, Flora, Loch. Deep to moderately deep, well drained, silty clay loam to silty loam.	Moisture / Udic	80-95	190-280	38.90; 50.74	Coast redwood, Douglas-fir.	Douglas-fir/coast redwood forests. Forestry, recreation, rural residential development.	

2. PUGET LOWLAND												
Level IV Ecoregion	Physiography	Geology	Soil	Climate	Potential Natural Vegetation	Land Use and Land Cover						
Area (square miles)	Elevation / Low Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regime	Precipitation (inches)	First Frost (days)	Mean Temperature (January mean, July max, °C)	Potential Natural Vegetation	Land Use and Land Cover		
2a. Fraser Lowland	344	Undulating glacial drift plains, terraces, and floodplains with low gradient, meandering streams and rivers.	Holocene alluvium, Pleistocene glacial drift.	Spoodos (Haploberolis), Alfisols (Utrouquands)	Lynden, Hale, Trom, Wharton, Lebo. Silty clay to sandy loam.	Mesic / Udic	33-55	150-210	33.44; 50.73	Western hemlock, western red cedar, black cottonwood, Douglas-fir.	Pastureland, dairy farms, hay farming, recreation, rural residential development. Some riparian deciduous forests.	
2b. Eastern Puget Riverine Lowlands	677	Floodplains and terraces with meandering rivers, oxbow lakes, and meander cut. Freshwater and estuarine wetlands occur but are more common in the east.	Fine, Holocene fluvial sediments.	Entisols (Fluvisols)	Sligo, Sumas, Sultan, Deep, fertile, silty loam.	Mesic / Xeric	32-40	160-220	34.44; 52.75	Western red cedar, western hemlock; some red alder, black cottonwood, bigleaf maple, Silka spruce.	Cropland and pastureland (often on reclaimed wetlands). Black cottonwood, industrial activity. Some riparian deciduous woodland, coniferous forests, wetlands.	
2c. San Juan Islands	218	Glacial scoured islands with small intermittent streams and limited surface water.	Mesozoic and Paleozoic sedimentary rock.	Spoodos (Haploberolis), Alfisols (Palaerusts), Inceptisols (Haploberolis), Andisols (Melanoxerands, Vitraquands)	Roche, San Juan, Picket, Bow, Cleveland. Very gravelly silt loam to gravelly loam.	Mesic / Xeric	20-35	160-226	36.46; 52.62	Douglas-fir, grand fir; some oak woodlands, grasslands, red cedar.	Coniferous forests, some oak woodlands, grasslands, red cedar and pastureland, recreation, rural residential development, towns.	
2d. Olympic Rainshadow	758	Rolling glacial till plains with small, low to medium gradient streams. Drainage patterns are often denuded or minimal. Fresh water supplies are limited in the east.	Pleistocene Vashon glacial ground moraine deposits.	Inceptisols (Dystrichrepts, Xerochrepts), Spoodos (Haploberolis)	Whidbey, Hoopes (on Whidbey Island), Nisqually, Cullen, Gullam. Moderately deep, gravelly sandy loam to very gravelly sandy loam.	Mesic / Xeric	10-40	160-230	36.45; 51.64	Western hemlock, western red cedar; Douglas-fir; some grasslands, grand fir.	Pasture and cropland, woodland dominated by Douglas-fir; some grasslands, rural residential development.	
2e. Eastern Puget Uplands	1142	Rolling mountains and foothills with lakes and sinuous streams and rivers.	Tertiary sedimentary rock.	Inceptisols (Dystrichrepts, Xerochrepts), Alfisols (Vitruvands)	Tikal, Alderwood, Everett. Very gravelly sandy loam to gravelly loam.	Mesic / Xeric, Udic	35-65	145-200	32.43; 50.72	Western hemlock, western red cedar; some Douglas-fir.	Douglas-fir and western hemlock forests, forestry, pastureland and cropland, rural residential development.	
2f. Central Puget Lowland	1698	Undulating glacial drift plains with lakes and small, sinuous streams. Coastline is irregularly shaped, it is characterized by many bays and some cliffs.	Pleistocene drift, Vashon glacial till.	Entisols (Dystrichrepts, Xerochrepts)	Alderwood, Hastine, Padnos, Rauger, Deep, well drained, gravelly sandy loam; also fine sandy loam.	Mesic / Xeric	35-70	160-210	35.44; 52.75	Western hemlock, western red cedar; Douglas-fir; some red alder, bigleaf maple.	Urban/suburban industrial activity especially in east. Elsewhere, Douglas-fir/western hemlock forest, forestry, recreation, rural residential development.	
2g. Southern Puget Prairies	809	Nearly level to rolling glacial outwash and till plains with low gradient streams and lakes.	Pleistocene Vashon glacial outwash and till deposits.	Inceptisols (Dystrichrepts, Xerochrepts), Andisols (Melanoxerands)	Alderwood, Everett, Spanaway, Ditham, Pithon, Ona, Traskie, Lacamas. On floodplains: Reed. Very deep to deep, silty clay loam to silty loam.	Mesic / Xeric	40-55	150-210	34.46; 52.77	Douglas-fir, prairies; some oak woodland, western hemlock, red cedar.	Douglas-fir/western hemlock forests, prairies, oak woodlands, forestry, hay farming, pastureland. Mix of military and private land ownership.	
2h. Cowitz/Chualar Foothills	437	Low, rolling to steeply sloping hills with medium to high gradient streams. Unaffected by continental Vashon glaciation.	Pleistocene alpine glacial deposits; Tertiary sandstone; Eocene andesite.	Ultisols (Palaerusts), Alfisols (Xerochrepts)	Chilmark, Melbourn, Backpack, Central. Very deep, well drained to very well drained, silty clay loam to loam.	Mesic / Xeric	50-60	150-200	33.45; 50.76	Western hemlock, western red cedar; some Douglas-fir, bigleaf maple.	Douglas-fir and western hemlock forests, forestry, rural residential development, some coniferous and deciduous forests.	
2i. Prairie/Newquam Cowlitz-Newquam	357	Rolling terraces and floodplains with meandering streams and oxbow lakes. Unaffected by continental Vashon glaciation.	Holocene alluvial deposits; Pleistocene alpine glacial outwash material.	Ultisols (Palaerusts), Alfisols (Xerochrepts), Glossopsols, Mollics (Argiopsols)	Washburn, Ona, Traskie, Lacamas. On floodplains: Reed. Very deep to deep, silty clay loam to silty loam.	Mesic / Xeric	45-55	150-220	35.47; 52.78	Western red cedar, western hemlock; some Douglas-fir, bigleaf maple, oak woodlands, prairies.	Pastureland, cropland, rural residential development, some coniferous and deciduous forests.	

3. WILLAMETTE VALLEY												
Level IV Ecoregion	Physiography	Geology	Soil	Climate	Potential Natural Vegetation	Land Use and Land Cover						
Area (square miles)	Elevation / Low Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regime	Precipitation (inches)	First Frost (days)	Mean Temperature (January mean, July max, °C)	Potential Natural Vegetation	Land Use and Land Cover		
3a. Portland/Vancouver Basin	571	Undulating terraces and floodplains with low gradient, meandering streams. Numerous wetlands, oxbow lakes and ponds.	Pleistocene unconsolidated and semi-consolidated, glacial fluvial deposits in a fault block basin.	Mollics (Haploberolis), Argisols (Endopsols), Inceptisols (Xerochrepts, Fulvudands, Melanoxerands)	Savio, Rafion, Hillbros, Gee, Dallar, Mulholland, Latourette, Quatana. Deep, silty clay loam to loam.	Mesic / Xeric	37-50	165-210	34.45; 56.80	Prairie (maintained by Native Americans), Oregon white oak, Douglas-fir, Oregon ash, western red cedar.	Urban/suburban rural residential/industrial activity, pastureland, nursery crops.	
3b. Willamette River and Traskie/Galley Valley	675	Floodplains with low gradient, incised, strongly meandering rivers and associated oxbow lakes/meander scars.	Holocene and Pleistocene fluvial sediments.	Mollics (Haploberolis), Endopsols (Endopsols)	Cloquah, Newberg, Chualar, Wapato, Ditham, Pithon, Ona, Traskie, Lacamas. Very deep to deep, silty clay loam to fine sand.	Mesic / Xeric	40-50	165-210	33.46; 50.73	Cottonwood, alder, Oregon ash, bigleaf maple, Douglas-fir.	Vegetable and fruit farming, pastureland, cropland, rural residential development, forested riparian areas, flood control.	
3c. Prairie Terraces	1971	Nearly level to undulating fluvial terraces with sluggish, meandering streams and rivers. Reservoirs, a few large mountain lakes are found in southwestern Washington Cascades region.	Pleistocene lacustrine and fluvial sedimentary deposits.	Alfisols (Abaquasols), Argisols (Argiopsols), Mollics (Xerochrepts)	Woodburn, Abba, Willamette, Doyton, Avary, Concord, Malabon, Woodburn, Salem. Very deep to deep, silty clay loam to silty loam.	Mesic / Xeric	40-50	165-210	33.46; 51.85	Oregon white oak, prairies (maintained by Native American burning), low elevation Douglas-fir more common. Some western red cedar.	Grass seed, grain farming (often on reclaimed wetland). Also urban/rural residential development, some coniferous and deciduous forests.	
3d. Valley Foothills	2527	Rolling foothills with medium gradient, sinuous streams.	Miocene andesitic basalt and marine sandstone.	Alfisols (Haploberolis), Alfisols (Haploberolis), Mollics (Haploberolis), Inceptisols (Fulgurands)	Bellevue, Joy, Nika, Hazelton, Willamette, Lathropwood, Cascade. Moderately deep to very deep, silty clay loam to silty loam.	Mesic / Xeric	40-60	165-210	32.46; 50.80	On drier sites: Oregon white oak and madrone. In moister areas: Douglas-fir more common. Some western red cedar, vineyards, Christmas tree farms, orchards.	Rural residential development, pastureland, vineyards, Christmas tree farms, orchards.	

4. CASCADES												
Level IV Ecoregion	Physiography	Geology	Soil	Climate	Potential Natural Vegetation	Land Use and Land Cover						
Area (square miles)	Elevation / Low Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regime	Precipitation (inches)	First Frost (days)	Mean Temperature (January mean, July max, °C)	Potential Natural Vegetation	Land Use and Land Cover		
4a. Western Cascades Lowlands and Valleys	6302	Weakly trending ridges and valleys with reservoirs and medium gradient rivers in the east. U-shaped, glaciated valleys in the east.	Oligocene-Eocene andesitic, basaltic, and rhyolitic lava flows and breccia.	Inceptisols (Haploberolis), Ultisols (Haploberolis), Andisols (Fulvudands)	Klickitat, Kinney, McCall, Peavine, Honeygrove, Oxford, Olympic, Ciesbar. Very deep to deep, clay loam, silty clay loam, silty loam, gravelly silty loam, gravelly silty loam, cobbly loam.	Mesic / Udic	60-90	120-180	31.44; 47.78	Western hemlock, western red cedar, Douglas-fir.	Douglas-fir/western hemlock/western red cedar/forestry maple/red alder/western red cedar. Forestry and recreation are cooperative with Oregon Department of Forestry and occur in lower valleys.	
4b. Western Cascades Montane Highlands	4557	Steep, glaciated, dissected mountains and ridges with high to medium gradient streams and glacial rock-basin lakes.	Oligocene-Miocene andesitic and basaltic lava flows and breccia.	Inceptisols (Haploberolis), Alfisols (Haploberolis), Fulvudands (Fulvudands)	Keel, Hammington, Aschhoff, Bell. Very deep to moderately deep, silty loam, gravelly silty loam, gravelly loam, cobbly loam.	Frigid / Udic	70-120	80-120	26.37; 44.75	Pacific silver fir, western hemlock, mountain hemlock, Douglas-fir; some noble fir. Ecoregion 4b is higher in elevation than Ecoregion 4a and is snow influenced.	Extensive Pacific silver fir/western hemlock/mountain hemlock, Douglas-fir; some noble fir. Ecoregion 4b is higher in elevation than Ecoregion 4a and is snow influenced. Ecoregion 4b is an important regional water source.	
4c. Cascade Crest Montane Forest	2219	High, undulating, volcanic plateau with glaciated, undulating streams through the plicated landscape. Numerous glacial rock basin lakes. Small lakes on collapsed lava flows. Wetland areas are found in southwestern Washington Cascades region.	Pleistocene-Pliocene basaltic and andesitic lava flows, breccia, pyroclastic deposits; some Pleistocene alpine glacial deposits.	Spoodos (Haploberolis), Alfisols (Haploberolis), Inceptisols (Xerochrepts)	Lustance, Talpus, Thader, Mt. Hood, Honeygrove, Oregon ash, very gravelly silty loam, sandy loam, very cobbly loam.	Cryic / Udic	55-100	30-90	21.35; 43.72	Mountain hemlock, Pacific silver fir; some grand fir, noble fir.	Forests composed of mountain hemlock, Pacific silver fir, Douglas-fir, western hemlock, fir are extensive. Land uses include back-country recreation and some forestry. Ecoregion 4c is an important regional water source.	
4d. Cascades Subalpine/Alpine	719	High, glaciated, volcanic peaks with cascading streams, glacial cirques, and tarns. Snowfields and glaciers more common to the north. Active and dormant volcanoes.	Pleistocene basalt and andesite; some alpine glacial deposits.	Entisols (Cryobertis)	Bare rock, rubble.	Cryic / Udic, Fersic	75-140	0-30	16.31; 38.65	Herbaceous and shrubby subalpine meadow vegetation; scattered mountain hemlock, subalpine fir stands.	Bare rock, rubble, subalpine meadows and rivers. Land uses include back-country recreation and some forestry. Ecoregion 4d is an important regional water source.	
4e. High Southern Cascades Montane Forest	916	High, undulating plateau punctuated by volcanic peaks and affected by late glaciation. Many glacial rock-basin lakes occur. Its intermittent and permanent streams have medium to high gradients.	Pleistocene alpine glacial deposits; Pliocene and Miocene andesite and siliceous basalts.	Andisols (Vitruvands), Mollics (Cryobertis), Inceptisols (Xerochrepts), Spoodos (Haploberolis)	Woodcock, Outram, Owen, Lapine, Wilpore, Steiger. Very deep to deep, very gravelly and stony loam to gravelly loam coarse sand.	Cryic / Udic	45-70	70-100	23.37; 44.74	Mountain hemlock, bigleaf maple, Pacific silver fir, Douglas-fir, white fir, Shasta red fir.	Mostly coniferous forest with some bare rock at higher elevations. Land uses include back-country recreation and some forestry and grazing.	
4f. Umpqua Cascades	1594	Highly dissected mountains with a few small lakes and high to medium gradient streams and rivers.	Tertiary pyroclastic rocks, basalt, and andesite.	Ultisols (Palaerusts), Inceptisols (Haploberolis)	Oxford, Honeygrove, Gustin, Klickitat, Harrington, Kinney, Blaine, Scurdamin, Mellowmound. Very deep to moderately deep, clay loam, gravelly moderately silty loam, very gravelly loam, cobbly loam.	Mesic, Frigid / Udic	50-80	80-180	32.42; 49.82	Grand fir, white fir, western hemlock, Pacific silver fir, Douglas-fir, western hemlock, Shasta red fir, mountain hemlock.	Douglas-fir/white fir/western hemlock/Pacific silver fir/western hemlock/white fir forests. Land uses include forestry and recreation. Ecoregion 4f is an important regional water source.	
4g. Southern Cascades	1049	Mountains with moderate to high gradient streams and rivers. Reservoirs, a few large mountain lakes of glacial origin, and a high amount of intermittent streams.	Pliocene basalt and basaltic andesite.	Alfisols (Haploberolis), Inceptisols (Xerochrepts), Xerochrepts, Alfisols (Palaerusts), Mollics (Argiopsols)	Freesnozer, Gumpert, Stright, Fairva, Pinhook, Damon, Coyana. Very deep to moderately deep, clay loam, gravelly loam, very cobbly loam.	Mesic, Frigid / Xeric	45-60	90-120	26.45; 47.85	White fir, Douglas-fir, ponderosa pine; some Shasta red fir, mountain hemlock.	Extensive rather open conifer forests with white fir rather common. Douglas-fir and ponderosa pine occur. Land uses include forestry and grazing. Ecoregion 4g is an important regional water source.	

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