# 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 50 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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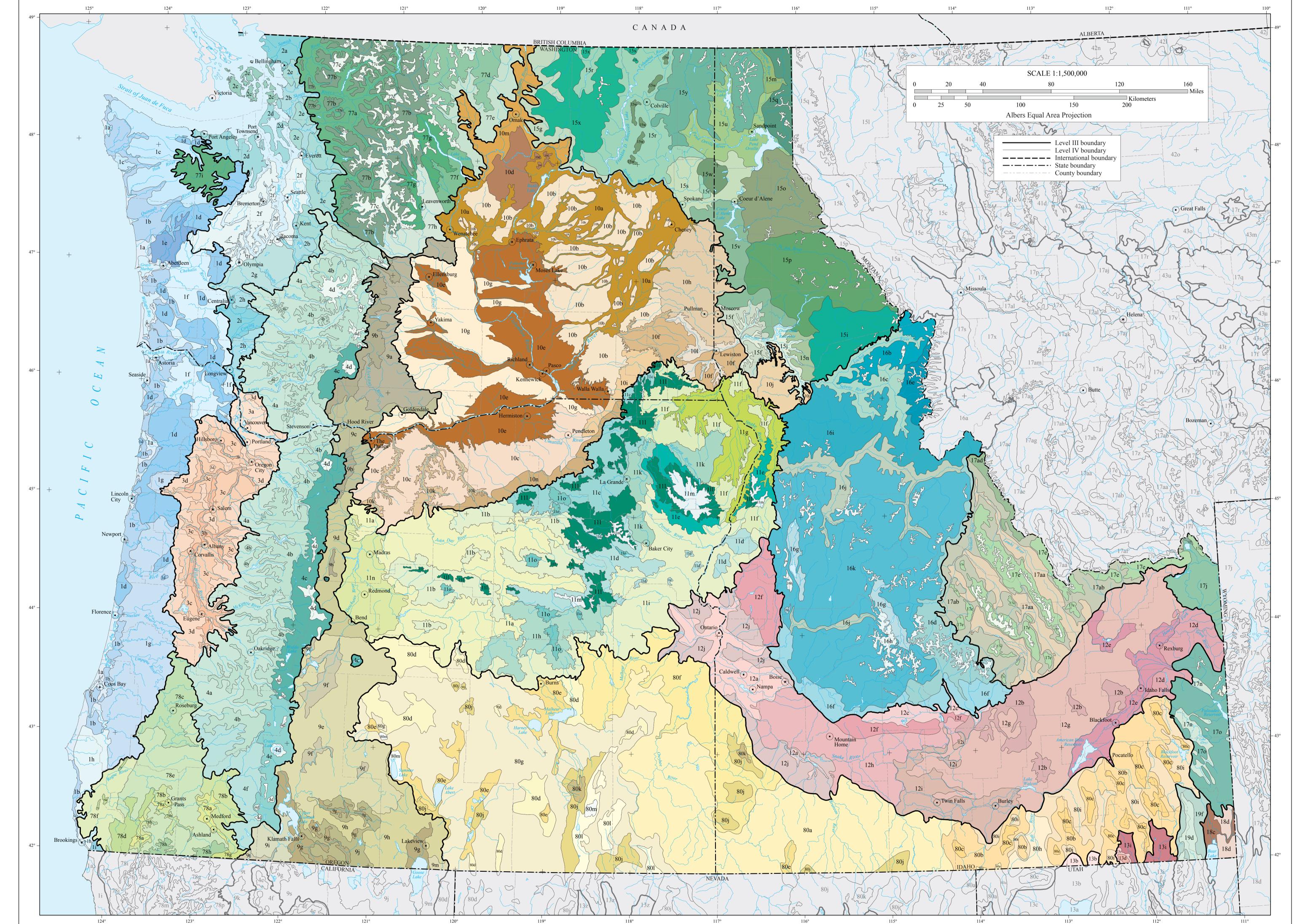
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# 1 Coast Range 1a Coastal Lowlands 1b Coastal Uplands **I**c Low Olympics 1d Volcanics 1e Outwash 1f Willapa Hills 1g Mid-Coastal Sedimentary 1h Southern Oregon Coastal Mountains 1 Northern Franciscan Redwood Forest 2 Puget Lowland 2a Fraser Lowland **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 **3** Willamette Valley **3**a Portland/Vancouver Basin 3b Willamette River and Tributaries Gallery Forest **3**c Prairie Terraces 3d Valley Foothills

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  4b Western Cascades Montane Highlands
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  4d Cascades Subalpine/Alpine
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  12e Upper Snake River Plain
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  12g Eastern Snake River Basalt Plains
  12h Mountain Home Uplands
  12i Magic Valley
  12j Unwooded Alkaline Foothills
- 13b Shadscale-Dominated Saline Basins 13c Sagebrush Basins and Slopes 13d Woodland- and Shrub-Covered Low Mountains 13i Malad and Cache Valleys **15 Northern Rockies** 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 150 Coeur d'Alene Metasedimentary Zone 15p St. Joe Schist–Gneiss Zone 15q Purcell–Cabinet–North Bitterroot Mountains 15r Okanogan-Colville Xeric Valleys and Foothills 15s Spokane Valley Outwash Plains

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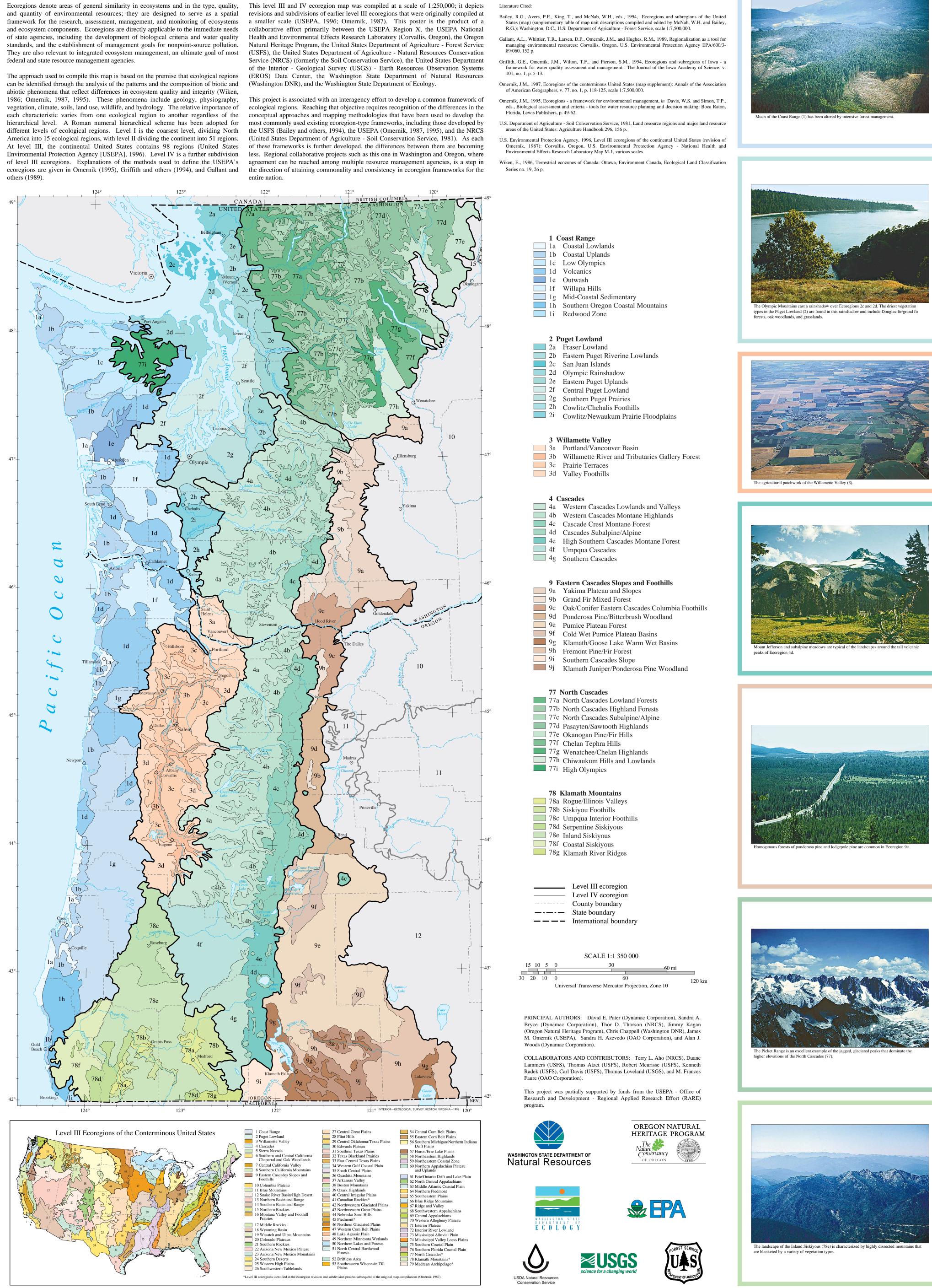
80m Barren Playas

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# Ecoregions of Western Washington and Oregon



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. The Coastal Lowlands ecoregion encompasses estuarine marshes, freshwater lakes, black-water streams, marine terraces, and sand dune areas. Elevations range from sea level to 300 feet. Channelization and

**1** 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, epiphyte-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. The Volcanics ecoregion varies in elevation from 1000 to 4000 feet and is disjunct. Columnar and northern and southern vegetation blend together here and species diversity is high.

pillow basalt outcrops occur. Its mountains may have been offshore seamounts engulfed by continental sediments about 200 million years ago. The basaltic substrate preserves relatively stable summer stream flows that still support spring chinook salmon and summer steelhead. Its forests are intensively managed.

2. Puget Lowland

the highest dairy farm concentration in Washington. **2h** The Eastern Puget Riverine Lowlands ecoregion is composed of floodplains and terraces. Western red dominate the landscape. and support pastureland, cropland, and woodland.

4. Cascades

most important timber producing areas in the Northwest. mountain hemlock and Pacific silver fir.

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 common, and the lower, dryer ecoregions to the east where shrubs and grasslands 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.

ecosystem and are important habitat for migratory waterfowl. The La Pine Basin is underlain by thick lacustrine deposits 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 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 tule, sedge, and cattail wetlands have largely Mule deer are found throughout the Cascades Slopes and Foothills (9). 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 Cascade Slopes and Foothills (9). Soil, climate, and landforms are all highly variable been drained for agriculture. Sagebrush and bunchgrass occur in upland areas. and contribute to a mosaic of vegetation types that includes grasslands, oak woodlands, Douglas-fir/ponderosa **Oh** The terrain of the **Fremont Pine/Fir Forest** ecoregion is composed of mountains and high plateaus. Its pine forests, and western hemlock/Douglas-fir forests. Maritime weather systems sometime enter Ecoregion 9c continental climate and diverse terrain support a range of vegetation types. Ponderosa pine woodlands via the Columbia River Gorge and moderate its otherwise continental climate. are common at lower elevations while white fir is more prevalent in higher areas. **9** The Southern Cascades Slope ecoregion is a transitional zone between the Cascades (4) and the drier 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 Eastern Cascade Slopes and Foothills (9). Forests of ponderosa pine blanket the mountainous landscape;

homogenous stands of ponderosa pine. Bitterbrush grows at lower elevations. Stands of lodgepole pines are white fir, Shasta red fir, and Douglas-fir grow at higher elevations. Much of Ecoregion 9i typically receives rgely absent in contrast to the Pumice Plateau Forest (9e) to the south. more precipitation than Ecoregions 9a, c, d, e, f, g, and j. **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 depressions and flats are dominated by dot the landscape and are important to lowland irrigation. The natural vegetation was mostly juniper in the throughout most of the Eastern Cascades Slopes and Foothills (9). Its south and a mix of ponderosa pine and juniper in the north; today, a mosaic of pastures and woodland occurs.

Douglas-fir, and western red cedar. Pastures occur in the valleys. r/mountain hemlock forests distinguish it from Ecoregion 77a.

# 78. Klamath Mountains

**78a** The **Rogue/Illinois Valleys** ecoregion consists of floodplains and terraces that have a local relief of 100 to 600 feet. It is characterized by hot, dry summers and a native vegetation of Oregon white oak, madrone, Mining and Serpentine. Rare understory species and sparse woodlands grow on its unique soils. Mining and California black oak, ponderosa pine, and grasslands. Today, a mix of orchards, cropland, pastureland, oak associated water quality problems occur. woodland, pine woodland, and rural residential development occurs. Vegetation and land use are more similar to The Inland Siskiyous ecoregion is mountainous. Granitic and sedimentary rock underlie the ecoregion those of northern California's inland valleys than to those of the Willamette Valley (3). and distinguish it from the volcanic mountains of the Cascades (4). Greater fire frequency, less annual The **Siskiyou Foothills** are affected by a Mediterranean climate that is similar to Ecoregion 78a. The precipitation, longer summer droughts, and a lack of tanoak differentiate it from the Coastal Siskiyous (78f). driest area occurs east of Medford and is dominated by oak woodlands, ponderosa pine, and Douglas-fir. **78** The Coastal Siskiyous ecoregion has a wetter and a milder maritime climate than elsewhere in the The wetter foothills adjacent to the Illinois Valley support Douglas-fir, madrone, and incense cedar. Klamath Mountains (78). Productive forests composed of tanoak, Douglas-fir, and some Port Orford **78** The Umpqua Interior Foothills ecoregion is an intermingling of narrow valleys, terraces, and foothills. cedar cover the dissected, mountainous landscape. <sup>1</sup> It contrasts with the terrain of the more mountainous Inland Siskiyous (78e). A mix of oak woodlands, The **Klamath River Ridges** ecoregion has a dry, continental climate and receives, on average, 25 to 35 **78g** inches of rain annually. Low elevation and south-facing sites have a more drought resistant vegetation Douglas-fir, ponderosa pine, and madrone intermingle with pastureland, vineyards, orchards, and row crops. The egetation and land use are similar to those of Ecoregions 78a and 78b. Summers are hot and dry and, although than elsewhere in the Klamath Mountains (78) such as juniper, chaparral, and ponderosa pine. Higher areas and the climate is transitional to both the Willamette and Rogue valleys, it is most similar to the Rogue Valley. 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 Siskiyous (78e).

diking have converted many of its wetlands into dairy pastures; associated stream quality degradation has than most other parts of the Coast Range (1). **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 almost completely replaced the historic forests of the ecoregion. with the historic distribution of Sitka spruce. The extent of the original forest has been greatly reduced by logging

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.

century. Subsequently, many of the wetlands were drained. Pastures, cropland, forests, and urban centers now agricultural productivity.

**2c** The glacial-scoured **San Juan Islands** ecoregion is underlain by sedimentary rock. Well-drained, shallow Puget Lowland (2) grow here and include Douglas-fir/grand fir forests, oak woodlands, and grasslands.

cedar forest, western hemlock forest, and both riverine and wetland habitat were common before the 19th Well-drained, gravelly soils are common and exhibit limited moisture holding capacity and rather low

2h The Cowlitz/Chehalis Foothills are rolling to steeply sloping. The potential natural vegetation, western

often deranged or internal. Its loamy soils tend to retain moisture better than the soils of the San Juan Islands (2c) The Cowlitz/Newaukum Prairie Floodplains ecoregion is a transitional zone between the Puget Lowland (2) and the Willamette Valley (3). Its vegetation, soil, and climate are similar to those of the 2e The Eastern Puget Uplands ecoregion is made up of rolling moraines and foothills and is a zone of Southern Puget Prairies (2g) and the Eastern Puget Riverine Lowlands (2b). However, unlike those areas, it did

Willamette Valley

Rolling prairies, 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.

affected by cold or warm easterly winds that blow through the Columbia River Gorge.

alluvial soils have been largely replaced by agriculture and rural residential, suburban, and urban

Ecoregion 3a is dominated by urban and suburban development, pastures, and nurseries. Weather here is often The Valley Foothills ecoregion is a transitional zone between the Willamette Valley (3), the Cascades (4), and the Coast Range (1). It has less rainfall than adjacent, more mountainous ecoregions and, Canada geese and other migratory waterfowl In the Willamette River and Tributaries Gallery Forest ecoregion, meandering, low-gradient channels consequently, its potential natural vegetation is distinct. Oregon white oak and Douglas-fir were originally species are common in the Willamette Valley

This mountainous ecoregion underlain by Cenozoic volcanics has been affected by alpine glaciations. It is characterized by steep ridges and river valleys in the west, a high plateau in the east, and both active and dorma 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. The Western Cascades Lowlands and Valleys ecoregion is characterized by a network of steep ridges short. Flora and fauna adapted to high elevations include herbaceous and shrubby subalpine meadow vegetation

4a and 4b which have cooler summers.

and narrow valleys. Elevations are generally less than 3200 feet and are the lowest in Ecoregion 4. The and scattered patches of mountain hemlock, subalpine fir, and whitebark pine. wet, mild climate promotes lush forests that are dominated by Douglas-fir and western hemlock. It is one of the **1** The **High Southern Cascades Montane Forest** ecoregion consists of an undulating, glaciated plateau

have been dissected by high-gradient streams. It has lower temperatures than Ecoregion 4a and is pine also occur and increase to the south and east. Ecoregion 4e tends to be drier than Ecoregion 4c and has Northern spotted owls are found here. characterized by a deep annual snow pack. Soils are of the frigid and cryic temperature regimes and support longer periods of summer drought and more intermittent streams. prests dominated by Pacific silver fir, western hemlock, mountain hemlock, Douglas-fir, and noble fir. The Cascade Crest Montane Forest ecoregion consists of an undulating plateau punctuated by volcanic **4f** The Umpqua Cascades ecoregion is a transitional zone between the lusher and moister forests of Ecoregions 4a and 4b to the north and the drier forests of the Southern Cascades (4g) and the Klamath buttes and cones that reach a maximum elevation of about 6500 feet. Its Pliocene and Pleistocene Mountains (78). Vegetation is a mix of grand fir, white fir, western hemlock, Pacific silver fir, and Douglas-fir

volcanics were glaciated leaving numerous lakes in their wake. The ecoregion is extensively forested with with Shasta red fir also occurring and increasing to the south. Vegetation diversity is greater than in Ecoregions 4d The Cascades Subalpine/Alpine ecoregion is an area of high, glaciated, volcanic peaks that rise above 4g The Southern Cascades ecoregion is drier than others in the Cascades (4). It is characterized by gently

subalpine meadows. Elevations range from 5600 to 12000 feet. Active glaciation occurs on the highest sloping mountains, broad valleys, a long summer drought, and high vegetation diversity. White fir is volcanoes and decreases from north to south. The winters are very cold and the growing season is extremely common; at low elevations, Douglas-fir and ponderosa pine become prevalent and, at high elevations, Shasta red

**9a** The unglaciated **Yakima Plateau and Slopes** ecoregion is characterized by plateaus, buttes, and canyons,

The Cold Wet Pumice Plateau Basins ecoregion includes Sycan Marsh, Klamath Marsh, and La Pine a dry continental climate, and open woodlands dominated by ponderosa pine. Fire is an integral part of its 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

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. The North Cascades Lowland Forests ecoregion is composed of low mountains, broad glaciated valleys, according to elevation, microtopography, and slope aspect and affect the distribution of vegetation. Ponderosa 77a and glacial-fed rivers that receive, on average, 60 to 90 inches of precipitation per year. Extensive, pine grows in lower, drier areas and Douglas-fir is found at higher elevations. Bluebunch wheatgrass is

evation and slope aspect; it is less than that received by Ecoregions 77a, b, c, and i which occur to the west.

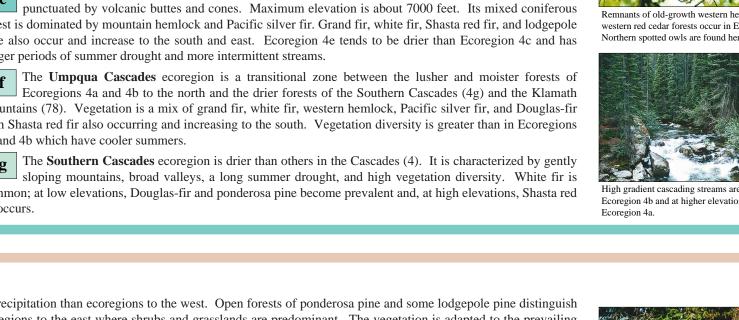
productive rainforests have developed under the mild maritime climate and are dominated by western hemlock, common in the understory of the south and Idaho fescue grows in the north. glas-fir, and western red cedar. Pastures occur in the valleys. The landscape of the North Cascades Highland Forests ecoregion consists of steep, glaciated ridges, 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 5700 feet. Ponderosa pine grows in lower areas, Douglas-fir occurs in the mid-elevations, and subalpine fir is Gray, sediment laden, glacial streams are found above 5000 feet in elevation.

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 **T7g** 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. Douglasmeadows occur around the taller peaks; their flora and fauna is adapted to the prevailing subarctic climate. fir, grand fir, and subalpine fir are common; lodgepole pine and Englemann spruce also occur. Average The Pasayten/Sawtooth Highlands has colder winter temperatures than elsewhere in Ecoregion 77 and has precipitation ranges from only 15 to about 40 inches per year.

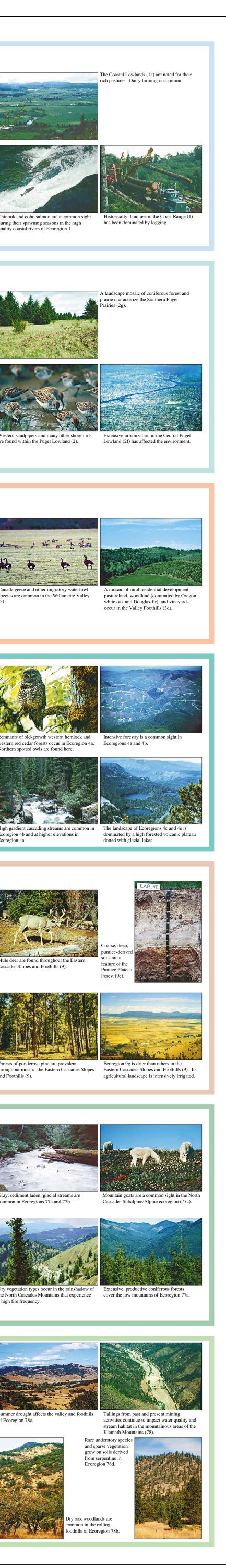
experienced both continental and alpine glaciation. Its landscape of high ridges, plateaus, and trough valleys **77h** The **Chiwaukum Hills and Lowlands** are composed of feldspar-rich sandstone and are unlike s dominated by subalpine fir. In addition, lodgepole pine grows in the northeast, Douglas-fir is found at lower neighboring ecoregions which are underlain by metamorphic and igneous rock. Its low mountains, hills, levations, and many wetlands occur. Mean precipitation is from 25 to 65 inches per year and varies according to and cuestas can be highly erodible and unstable. Streams have high sediment yields and run in V-shaped valleys; their network forms a trellis pattern.

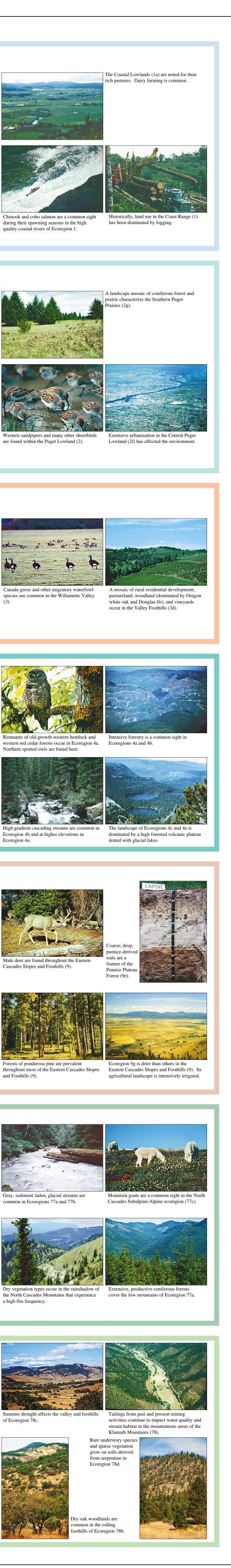
**77e** The glaciated **Okanogan Pine/Fir Hills** ecoregion has rounded mountains and broad, U-shaped valleys. **77i** The **High Olympics** ecoregion contains steep, glaciated mountains that reach an elevation of 8000 feet. Elevations are lower and slope angles are gentler than further west in the jagged, mountainous areas of the Lit is characterized by rock outcrops, tarns, persistent snow pack, alpine glaciers, and high-gradient, North Cascades (77). Precipitation ranges from 10 to 35 inches per year, falling mostly as snow. It is lower than glacial-fed streams. Its vegetation includes subalpine mountain hemlock and Pacific silver fir forests as well as a high fire frequency. elsewhere in Ecoregion 77 and droughty conditions prevail. Precipitation and temperature both vary alpine meadows. Subalpine fir occurs on the xeric soils of northeastern rainshadow areas.

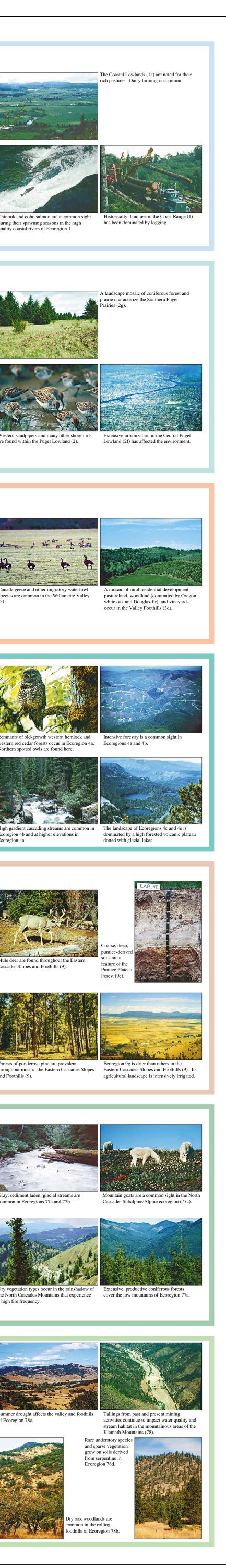
The ecoregion is physically and biologically diverse. Highly dissected, folded mountains, foothills, terraces, and floodplains occur and are underlain by igneous, sedimentary, and some metamorphic rock. The mild, subhumid climate of Ecoregion 78 is characterized by a lengthy summer drought. It supports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

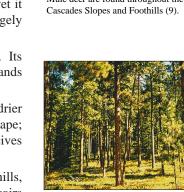




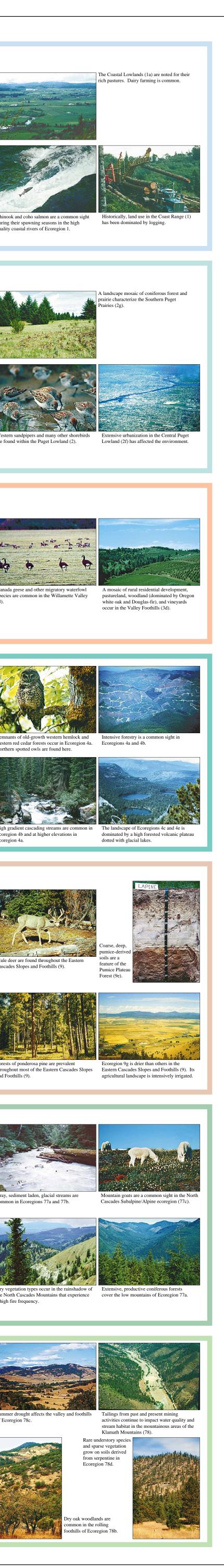


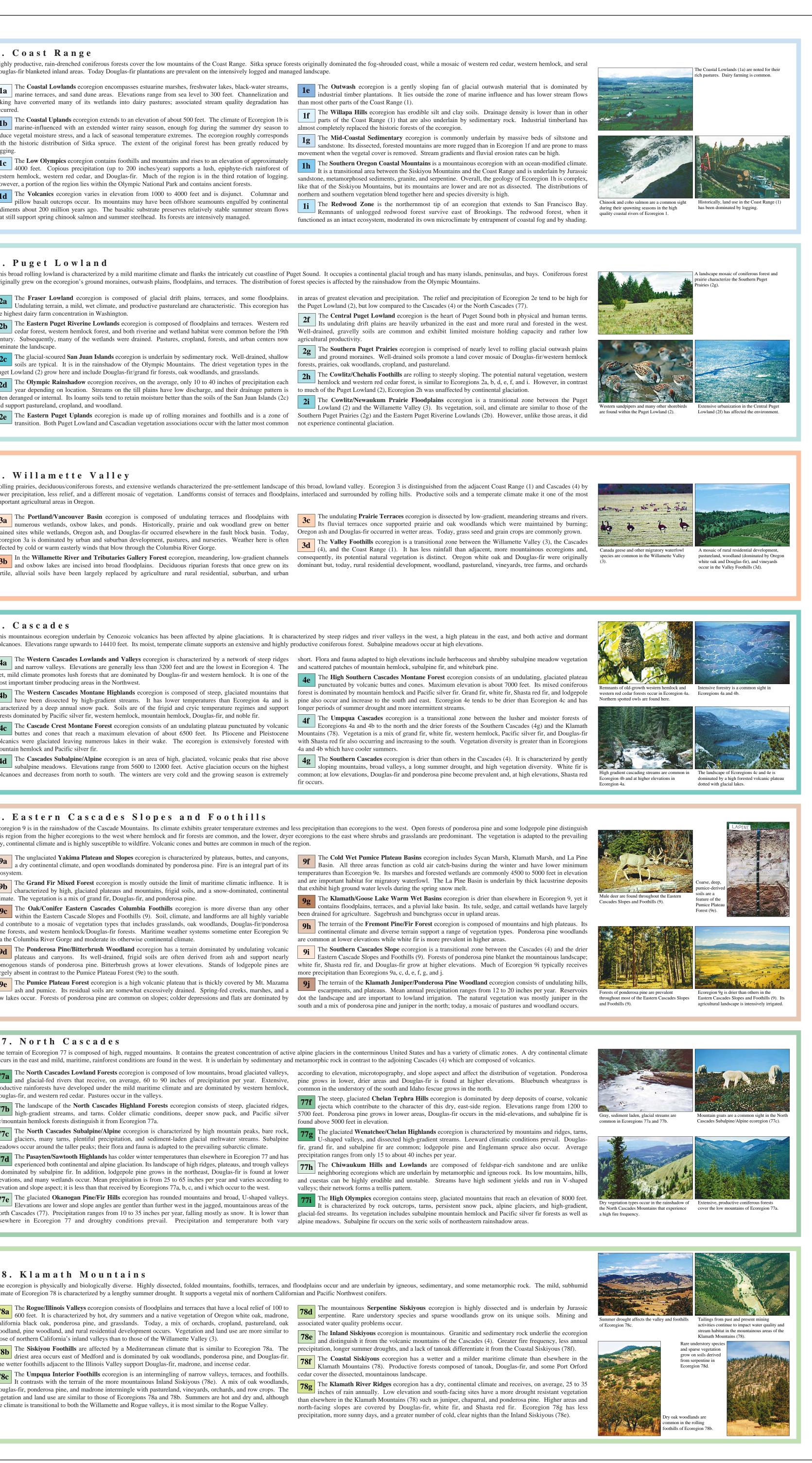












The Olympic Rainshadow ecoregion receives, on the average, only 10 to 40 inches of precipitation each hemlock and western red cedar forest, is similar to Ecoregions 2a, b, d, e, f, and i. However, in contrast

**2a** The **Fraser Lowland** ecoregion is composed of glacial drift plains, terraces, and some floodplains. in areas of greatest elevation and precipitation. The relief and precipitation of Ecoregion 2e tend to be high for Undulating terrain, a mild, wet climate, and productive pastureland are characteristic. This ecoregion has the Puget Lowland (2), but low compared to the Cascades (4) or the North Cascades (77). **2f** The **Central Puget Lowland** ecoregion is the heart of Puget Sound both in physical and human terms. Its undulating drift plains are heavily urbanized in the east and more rural and forested in the west.

**2g** The **Southern Puget Prairies** ecoregion is comprised of nearly level to rolling glacial outwash plains and ground moraines. Well-drained soils promote a land cover mosaic of Douglas-fir/western hemlock

Remnants of unlogged redwood forest survive east of Brookings. The redwood forest, when it functioned as an intact ecosystem, moderated its own microclimate by entrapment of coastal fog and by shading.

**1f** The **Willapa Hills** ecoregion has erodible silt and clay soils. Drainage density is lower than in other

**1h** The **Southern Oregon Coastal Mountains** is a mountainous ecoregion with an ocean-modified climate.

sandstone, metamorphosed sediments, granite, and serpentine. Overall, the geology of Ecoregion 1h is complex,

like that of the Siskiyou Mountains, but its mountains are lower and are not as dissected. The distributions of

11 The **Redwood Zone** is the northernmost tip of an ecoregion that extends to San Francisco Bay.

It is a transitional area between the Siskiyou Mountains and the Coast Range and is underlain by Jurassic

movement when the vegetal cover is removed. Stream gradients and fluvial erosion rates can be high.

parts of the Coast Range (1) that are also underlain by sedimentary rock. Industrial timberland has

The **Portland/Vancouver Basin** ecoregion is composed of undulating terraces and floodplains with numerous wetlands, oxbow lakes, and ponds. Historically, prairie and oak woodland grew on better Its fluvial terraces once supported prairie and oak woodlands which were maintained by burning;

drained sites while wetlands, Oregon ash, and Douglas-fir occurred elsewhere in the fault block basin. Today, Oregon ash and Douglas-fir occurred in wetter areas. Today, grass seed and grain crops are commonly grown. and oxbow lakes are incised into broad floodplains. Deciduous riparian forests that once grew on its dominant but, today, rural residential development, woodland, pastureland, vineyards, tree farms, and orchards

soils are typical. It is in the rainshadow of the Olympic Mountains. The driest vegetation types in the forests, prairies, oak woodlands, cropland, and pastureland. transition. Both Puget Lowland and Cascadian vegetation associations occur with the latter most common not experience continental glaciation.

year depending on location. Streams on the till plains have low discharge, and their drainage pattern is to much of the Puget Lowland (2), Ecoregion 2h was unaffected by continental glaciation.

Level IV Ecoregion		Physiography		Geology		Soil			Climate		Potential Natural	Land Use and Land Cover
	Area (square miles)		Elevation / Local Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max, (°F)	Vegetation	
1a. Coastal Lowlands	986	Marine estuaries, terraces, sand dunes, and spits with low gradient, black water, mean- dering streams and rivers and shallow coastal lakes. Channelization and diking common.	0-300 / 10-180	Quaternary marine and non-marine terrace deposits, beach and dune sands, alluvium.	Spodosols (Haplorthods), Entisols (Fluvaquents), Inceptisols (Tropaquepts), Andisols (Fulvudands, Melanudands)	Bullards, Netarts, Coquille, Clatsop, Nestucca, Brenner, Lint, Quillamook. Very deep to deep, silty clay loam to sandy loam.	Isomesic/ Udic	60-85	200-240	36/50; 52/68	Sitka spruce, western hemlock, western red cedar, estuarine wetland plants.	Douglas-fir/western hemlock/Sitka 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.	0-500 / 100-1000	Quaternary glacial drift and marine sandstone.	Inceptisols (Haplumbrepts, Humitropepts), Andisols (Fulvudands)	Ozette, Lytell, Astoria, Templeton, Reedsport, Ecola, Tolovana. Mostly deep, silt loam.	Isomesic/ Udic	70-125	190-240	36/48; 52/68	Sitka spruce, western hemlock, western red cedar.	Douglas-fir/western hemlock/Sitka 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 were glaciated.	0-4000 / 800-2800	Lower Tertiary sandstone and siltstone.	Andisols (Fulvudands)	Snahopish, Solleks, Makah. Gravelly loam and 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. Most epiphytic-rich rainforest ecosystem in Ecoregion 1.	Western hemlock/western red cedar/Douglas- fir/Pacific silver fir/red alder/ bigleaf maple forests. Forestry, recreation, some rural residential development.
1d. Volcanics	3585	Steeply sloping mountains. High gradient, cascading streams and rivers occur and have stable summer flow.	0-5701 / 700-4000	Tertiary basaltic flows, pillow lavas, tuffaceous basalt, breccia, porphyritic basalt, basaltic sandstone/siltstone/conglomerate, concretionary marine siltstone, tuffaceous mudstone/siltstone/sandstone.	Andisols (Fulvudands, Hapludands), Ultisols (Palehumults)	Bunker, Knappton, Olympic, Raught, Hemcross, Klistan, Harslow, Caterl, Laderly, Murtip. Very deep to moder- ately deep, gravelly silt loam, silty clay loam, silt loam, loam, gravelly loam, very gravelly loam.	Frigid, Mesic/ Udic	70-200	100-190	30/46; 50/76	Western hemlock, western red cedar, Douglas-fir.	Douglas-fir/western hemlock/red alder/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 1.	20-1000 / 100-800	Pleistocene glacial outwash deposits.	Andisols (Fulvudands)	Hoquiam, Le Bar. Deep, silt 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/red alder/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.	0-3020 / 300-1400	Miocene sandstone, siltstone, shale.	Andisols (Fulvudands, Hapludands), Alfisols (Hapludalfs), Inceptisols (Haplumbrepts, Dystrochrepts, Eutrochrepts, Fragiumbrepts)	Zenker, Elochoman, Vernonia, Scaponia, Goble, Braun, Anunde, Rinearson, Alstony. Mostly very deep to moderately deep, silt 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/red alder/western red cedar forests. Forestry, some rural residential development, pastureland.
1g. Mid-Coastal Sedimentary	3739	Moderately sloping, dissected mountains with medium to high gradient, sinuous streams.	300-2000 / 100-1500	Eocene marine sandstone, siltstone, mudstone, conglomerate.	Inceptisols (Dystrochrepts, Eutrochrepts, Haplumbrepts), Ultisols (Palehumults, Haplohumults)	Preacher, Bohannon, Digger, Blachly, Honeygrove, McDuff. Very deep to moderately deep, clay loam to gravelly loam.	Mesic/ Udic	60-130	110-200	32/48; 48/78	Western hemlock, western red cedar, Douglas-fir.	Douglas-fir/western hemlock/red alder/western red cedar forests. Forestry, pastureland in valleys, some rural residential development.
1h. Southern Oregon Coastal Mountains		Dissected mountains with high gradient, sinuous streams and rivers. This ecoregion is part of the Siskiyou Mountains.	0-3400 / 800-1800	Cretaceous and Jurassic siltstone, shale, sandstone, conglomerate, graywacke, granite, diorite, serpentine.	Inceptisols (Dystrochrepts, Eutrochrepts, Haplumbrepts)	Etelka, Whobrey, Remote, Digger, Ump- coos, Rinearson. Very deep to shallow, silt loam to very gravelly sandy loam.	- Mesic, Frigid/ Xeric	70-140	170-220	36/52; 52/76	Tanoak, Douglas-fir, western hemlock, Port Orford cedar.	Douglas-fir/western hemlock/tanoak/Port Orfor cedar forests. Forestry, recreation, pasture-land in valleys, rural residential development.
1i. Redwood Zone	31	Dissected coastal mountains and foothills with medium gradient, sinuous streams.	0-2000 / 1000-1800	Jurassic graywacke.	Inceptisols (Humitropepts), Ultisols (Haplohumults)	Bosland, Floras, Loeb. Deep to moderately deep, well drained, silty clay loam to silt loam.	Isomesic/ Udic	80-95	190-280	38/50; 50/74	Coast redwood, Douglas-fir.	Douglas-fir/coast redwood forests. Forestry, recreation, rural residential development.

2. Level IV Ecoregion	_	GET LOWLAND Physiography		Geology		Soil			Climate		Potential Natural	Land Use and Land Cover
	Area (square miles)		Elevation / Local Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max, (°F)	Vegetation	
2a. Fraser Lowland	344	Undulating glacial drift plains, terraces, and floodplains with low gradient, meandering streams and rivers.	0-400 / 50-300	Holocene alluvium; Pleistocene glacial drift.	Spodosols (Haplorthods), Alfisols (Umbraqualfs)	Lynden, Hale, Tromp, Whatcom, Labounty. Silty to sandy loam.	Mesic/ Udic	33-55	150-210	33/44; 50/73	Western hemlock, western red cedar; some red alder, bigleaf maple, black cottonwood, Douglas-fir.	Pastureland, dairy farms, hay farming, urban/rural residential development. Some riparian deciduous forests.
2b. Eastern Puget Riverine Lowlands	677	Floodplains and terraces with meandering rivers, oxbow lakes, and meander scars. Freshwater and estuarine wetlands occur but were more common in the past.	0-800 / 100-600	Fine, Holocene fluvial sediments.	Entisols (Fluvaquents), Inceptisols (Xerochrepts)	Skagit, Sumas, Sultan. Deep, fertile, silt loam.	Mesic/ Xeric	32-40	160-220	34/44; 52/75	Western red cedar, western hemlock; some red alder, black cottonwood, bigleaf maple, Sitka spruce.	Cropland and pastureland (often on reclaimed wetland), rural residential/suburban/urban/ 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.	0-2400 / 150-2000	Mesozoic and Paleozoic sedimentary rock.	Spodosols (Haplorthods), Alfisols (Palexeralfs), Inceptisols (Xerochrepts), Andisols (Melanoxerands, Vitraquands)	Roche, San Juan, Pickett, Bow, Coveland. 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. Crop 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 deranged or internal. Fresh water supplies are limited in the east.	0-1800 / 300-1000	Pleistocene Vashon glacial ground moraine deposits.	Inceptisols (Durochrepts, Xerochrepts), Spodosols (Haplorthods)	Whidbey, Hoypus (on Whidbey Island), Elwha, Clallam, Catla. Moderately deep, gravelly sandy loam to very gravelly loamy sand.	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. Forestry, rural residential development.
2e. Eastern Puget Uplands	1142	Rolling moraines and foothills with lakes and sinuous streams and rivers.	0-2677 / 500-2000	Pleistocene Vashon glacial moraine deposits; Tertiary sedimentary rock.	Inceptisols (Durochrepts, Xerochrepts), Andisols (Vitrixerands)	Tokul, 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/suburban/urban 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.	0-1000 / 200-1000	Pleistocene drift, Vashon glacial till.	Inceptisols (Durochrepts, Xerochrepts)	Alderwood, Harstine, Poulsbo, Ragnar. 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 forests, forestry, limited agriculture, rural residential development.
2g. Southern Puget Prairies	809	Nearly level to rolling glacial outwash and till plains with low gradient streams and lakes.	0-900 / 200-500	Pleistocene Vashon glacial outwash and till deposits.	Inceptisols (Durochrepts, Xerumbrepts), Andisols (Melanoxerands)	Alderwood, Everett, Spanaway, Nisqually. Deep, moderately well drained to somewhat excessively well drained, gravelly loam, gravelly sandy loam, very gravelly sandy loam, loamy fine sand.	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. Cowlitz/Chehalis Foothills	437	Low, rolling to steeply sloping hills with medium to high gradient streams. Unaffected by continental Vashon glaciation.	300-1200 / 400-800	Pleistocene alpine glacial deposits; Tertiary sandstone and siltstone; Eocene andesite.	Ultisols (Palehumults), Alfisols (Palexeralfs)	Olympic, Melbourne, Buckpeak, Cen- tralia. 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, hay farming, pastureland.
2i. Cowlitz/Newaukum Prairie Floodplains		Rolling terraces and floodplains with meandering streams and oxbow lakes. Unaffected by continental Vashon glaciation.	150-800 / 200-500	Holocene alluvial deposits; Pleistocene alpine glacial outwash material.	Ultisols (Palehumults), Alfisols (Palexeralfs, Glossaqualfs), Mollisols (Argiaquolls)	Salkum, Prather. On prairies: Lacamas. On floodplains: Reed. Very deep to deep, silty clay loam to silt 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, forestry.

Level IV Ecoregion		Physiography		Geology	Soil				Climate		Potential Natural	Land Use and Land Cover
	Area (square miles)		Elevation / Local Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max, (°F)	Vegetation	
3a. Portland/ Vancouver Basin	574	Undulating terraces and floodplains with low gradient, meandering streams. Numerous wetlands, oxbow lakes and ponds.	0-300 / 20-250	Pleistocene unconsolidated and semi- consolidated, glacial/fluvial deposits in a fault block basin.	Mollisols (Haplaquolls, Argixer- olls, Endoaquolls), Inceptisols (Xerochrepts, Fragiumbrepts), Alfisols (Glossudalfs, Haploxeralfs)	Sauvie, Rafton, Hillsboro, Gee, Dollar, Multnomah, Latourell, Quatama. Deep, silty clay loam to loam.	Mesic/ Xeric	37-50	165-210	34/45; 56/80	Prairies (maintained by Native American burning), Oregon white oak, Douglas-fir, Oregon ash, alder, western red cedar.	Urban/suburban/rural residential/industrial activity, pastureland, nursery crops.
3b. Willamette River and Tributaries Gallery Forest	675	Floodplains with low gradient, incised, strongly meandering rivers and associated oxbow lakes/meander scars.	40-500 / 10-80	Holocene and Pleistocene fluvial sediments.	Mollisols (Haploxerolls, Endoaquolls), Vertisols (Endoaquerts)	Cloquato, Newberg, Chehalis, Wapato, Waldo, Bashaw. Very deep to deep, fertile, silty clay loam to fine sandy loam.	Mesic/ Xeric	40-50	165-210	33/46; 50/85	Cottonwood, alder, Oregon ash, bigleaf maple, Douglas-fir.	Vegetable and fruit farming, pastureland, urban/suburban/rural residential development, forested riparian areas, flood control.
<b>3c. Prairie Terraces</b>	1971	Nearly level to undulating fluvial terraces with sluggish, meandering streams and rivers. Historically, seasonal wetlands and ponds were common. Many streams now channelized.	160-500 / 10-150	Pleistocene lacustrine and fluvial sedimentary deposits.	Alfisols (Albaqualfs), Mollisols (Argialbolls, Argixerolls), Inceptisols (Xerochrepts)	Woodburn, Aloha, Willamette, Dayton, Amity, Concord, Malabon, Coburg, Salem. Very deep to deep, silty clay loam to silt loam.	Mesic/ Xeric	40-50	165-210	33/46; 51/85	Oregon white oak, prairies (maintained by Native American burning). In wetter areas: Oregon ash, Douglas-fir.	Grass seed, grain farming (often on reclaimed wetland). Also urban/rural residential development and some forested riparian zones
3d. Valley Foothills	2527	Rolling foothills with medium gradient, sinuous streams.	10-1500 / 400-1000	Miocene andesitic basalt and marine sandstone.	Alfisols (Haploxeralfs), Ultisols (Haplohumults, Palehumults), Mollisols (Haploxerolls), Inceptisols (Fragiumbrepts)	Bellpine, Jory, Nekia, Hazelair, Willakenzie, Laurelwood, Cascade. Moderately deep to very deep, silty clay loam to silt 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.	Rural residential development, pastureland, coniferous and deciduous forests, forestry, vineyards, Christmas tree farms, orchards.

Level IV Ecoregion		Physiography		Geology		Soil			Climate		Potential Natural	Land Use and Land Cover
_	Area (square miles)		Elevation / Local Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max, (°F)	Vegetation	
4a. Western Cascades Lowlands and Valleys	6302	Westerly trending ridges and valleys with reservoirs and medium gradient rivers and streams. U-shaped, glaciated valleys in the east.	800-4000 / 400-3000	Oligocene-Eocene andesitic, basaltic, and rhyolitic lava flows and breccia.	Inceptisols (Haplumbrepts), Ultisols (Haplohumults, Palehumults), Andisols (Haploxerands)	Klickitat, Kinney, McCully, Peavine, Honeygrove, Orford, Olympic, Cinebar. Very deep to deep, clay loam, silty clay loam, silt loam, gravelly clay loam, gravelly silt loam, cobbly loam.	Mesic/ Udic	60-90	120-180	31/41; 47/78	Western hemlock, western red cedar, Douglas-fir.	Douglas-fir/western hemlock/western red cedar/vine maple/red alder forests are wide- spread. Forestry and recreation are important land uses and pastureland occurs 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.	2800-5900 / 2000-3100	Oligocene-Miocene andesitic and basaltic lava flows and breccia.	Inceptisols (Haplumbrepts), Andisols (Hapludands, Fulvicryands, Haplocryands)	Keel, Hummington, Aschoff, Bull Run, Illahee, Mellowmoon. Very deep to moderately deep, silt loam, gravelly silt loam, gravelly loam, cobbly loam.	Frigid, Cryic/ 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/ Douglas-fir/mountain hemlock/noble fir/sub- alpine fir/grand fir/white fir forests. Common land uses include forestry and recreation. Eco- region 4b is an important regional water source.
4c. Cascade Crest Montane Forest	2219	High, undulating, volcanic plateau punctuated by buttes and cones. Sinuous, medium gradient streams flow through the glaciated landscape. Numerous glacial rock basin lakes. Small lakes on collapsed lava flows. Wetland areas are found in southwestern Washington Cascades.	4000-6500 / 500-2500	Pleistocene-Pliocene basaltic and andesitic lava flows, breccia, pyroclastic deposits; some Pleistocene alpine glacial deposits.	Spodosols (Haplocryods, Humicryods), Andisols (Fulvicryands), Inceptisols (Cryandepts)	Lastance, Talapus, Thader, Mt. Hood, Dinzer, Vanson, Sinnice, Tradedollar. Very gravelly silt loam, stony fine sandy 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, Englemann spruce, and lodgepole pine 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. Active snowfields and glaciers more common to the north. Active and dormant volcanoes.	5600-14410 / 1600-8000	Pleistocene basalt and andesite; some alpine glacial deposits.	Entisols (Cryorthents)	Bare rock, rubble.	Cryic/ Udic, Peradic	75-140	0-30	16/31; 38/65	Herbaceous and shrubby subalpine meadow vegetation; scattered mountain hemlock, subalpine fir stands.	Bare rock, glaciers, subalpine meadows, and forests. Land uses include back-country recreation. 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 alpine glaciation. Many glacial rock-basin lakes occur. Its intermittent and permanent streams have medium to high gradients.	4000-8208 / 700-2500	Pleistocene alpine glacial deposits; Pliocene and Miocene andesite and olivine basalt.	Andisols (Vitricryands), Mollisols (Cryoborolls), Inceptisols (Cryochrepts), Spodosols (Haplocryods)	Woodcock, Oatman, Otwin, Lapine, Winopee, Steiger. Very deep to deep, very gravelly and stony loam to gravelly loamy coarse sand.	Cryic/ Udic	45-70	70-100	23/37; 44/74	Mountain hemlock, lodgepole pine, Pacific silver fir; some grand 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.	1000-5300 / 1200-2800	Tertiary pyroclastic rocks, basalt and basaltic andesite lava flows, breccia, tuff, sandstone, siltstone.	Ultisols (Palehumults), Inceptisols (Haplumbrepts)	Orford, Honeygrove, Gustin, Klickitat, Harrington, Kinney, Illahee, Scaredman, Mellowmoon. Very deep to moderately deep, clay loam, gravelly clay loam, gravelly silt loam, very gravelly loam, extremely 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; some Shasta red fir, mountain hemlock.	Douglas-fir/white fir/western hemlock/ Pacific silver fir/Shasta red fir/mountain hemlock forests. Land uses include forestry and recreation. Ecoregion 4f is an important regional water source.
4g. Southern Cascades	1049	Mountains with moderate slopes, broad valleys, and medium to high gradient streams and rivers. Reservoirs, a few large mountain plateau lakes of glacial origin, and a high number of intermittent streams.	2600-5800 / 400-2400	Pliocene basalt and basaltic andesite.	Alfisols (Haploxeralfs), Inceptisols (Xerochrepts, Xerumbrepts), Ultisols (Palexerults), Mollisols (Argixerolls)	s Freezener, Geppert, Straight, Farva, Pinehurst, Dumont, Coyata. Moderately deep to deep, 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 often common. Douglas-fir and ponderosa pine are prevalent at low elevations and Shasta red fir grows at high elevations. Land uses include forestry, recreation, and some grazing. Ecoregion 4g is an important regional water source.

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Level IV Ecoregion	n	Physiography		Geology		Soil			Climate		Potential Natural	Land Use and Land Cover
	Area (square miles)		Elevation / Local Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max, (°F)	Vegetation	
9a. Yakima Plateau and Slopes	1793	High, unglaciated plateaus, buttes, and canyons with medium to high gradient, permanent and intermittent streams and rivers. Springs occur especially in the south.	2500-5000 / 400-2000	Pleistocene and Miocene basalt flows.	Alfisols (Haploxeralfs), Inceptisols (Xerochrepts), Mollisols (Haploxerolls, Argixerolls)	Satus, Jumpe, Sutkin, Sapkin. Stony to very stony loam.	Frigid/Xeric; Mesic at lower elevations	16-35	90-130	18/35; 52/82	Ponderosa pine, bitterbrush, Oregon white oak, Douglas-fir.	Open ponderosa pine and bitterbrush; some Douglas-fir and Oregon white oak. Forestry, recreation, and grazing. Mainly Yakima Nation land.
9b. Grand Fir Mixed Forest	974	High, glaciated plateaus and mountains with high gradient, permanent streams and rivers. Scattered glacial rock-basin lakes.		Pleistocene and Miocene andesite and basalt flows.	Andisols (Vitrixerands, Vitricryands), Inceptisols (Xerumbrepts), Mollisols (Haploxeralfs), Spodosols (Cryorthods)	Yallani, Bins, Bindle, Ketchly, Nomlas, Twolakes, Stirrup. Loam, sandy loam, gravelly sandy loam, gravelly loam, stony loam.	Frigid/Xeric; Udic at higher elevations	35-55	50-90	16/32; 47/77	Grand fir, Douglas-fir.	Grand fir/Douglas-fir forests; some ponderosa pine. Forestry, recreation and a regional water source. Mostly publicly owned; some Yakima Nation land.
9c. Oak/Conifer Eastern Cascades Columbia Foothills	1024	Foothills, low mountains, plateaus, and valleys with permanent and intermittent, mostly medium gradient, streams and rivers.		Pleistocene basalt; Miocene Columbia River basalt.	Alfisols (Haploxeralfs), Mollisols (Haploxerolls), Inceptisols (Xerochrepts)	Underwood, McGowan, Gunn, Wamic, Hesslan, Skyline. Mostly very deep to moderately deep, loam, stony loam, very cobbly loam.	Mesic/ Xeric	16-40	90-140	26/40; 53/82	Douglas-fir, ponderosa pine, Oregon white oak, grasslands.	In the east: oak woodlands and ponderosa pine. In the west: Douglas-fir and western hemlock. Some grasslands also occur. Common land uses include forestry, recreation, grazing, rural residential development, orchards, and, in the valleys, grain and hay farming. Mostly privately owned land.
9d. Ponderosa Pine/Bitterbrush Woodland		High, undulating plateaus and canyons with permanent, medium gradient streams. Stream flow consistent year around due to volcanic- influenced hydrogeology.		Mt. Mazama ash; Pleistocene and Pliocene olivine basalt, olivine bearing andesite.	Andisols (Vitrixerands)	Sisters, Wanoga, Fremkle, Allingham, Circle. Well drained, loamy sand to gravelly sandy loam that is often derived from ash.	Frigid/ Xeric	16-35	50-90	20/40; 40/82	Ponderosa pine, bitterbrush.	Mainly ponderosa pine and bitterbrush. Common land uses include forestry, grazing, and recreation. Most of the land is owned by the public or the Warm Springs Nation.
9e. Pumice Plateau Forest		High, undulating volcanic plateau with isolated buttes and permanent and intermittent, low to medium gradient streams. Spring fed creeks, marshes, and a few lakes.		Mt. Mazama ash and pumice; Pleistocene basalt and andesite; Miocene olivine basalt.	Andisols (Vitricryands)	Shanahan, Lapine, Steiger, Maset, Yaw- hee. Very deep to moderately deep, well drained to excessively drained, coarse sandy loam to gravelly loamy coarse sand that is often derived from pumice.	Cryic/ Xeric	16-30	10-50	14/37; 38/80	On flats and depressions where pumice deposits are thickest: lodgepole pine. On slopes: ponderosa pine.	Lodgepole pine and ponderosa pine forests. Forestry and grazing. Most of the land is owned by the public.
9f. Cold Wet Pumice Plateau Basins		High elevation basins with forested wetlands, marshes, lakes, reservoirs. Medium to low gradient rivers are important habitat for migratory waterfowl. Extensive marsh areas in the south. High ground water tables in the La Pine Basin.	/	Thick Mt. Mazama ash deposits, semi- consolidated lacustrine and fluvial sediments of Pleistocene age.	Andisols (Cryaquands, Vitricryands), Mollisols (Cryaquolls)	Tutni, Sunriver, Wickiup. Mucky silt loam, loamy sands, sandy loam.	Cryic/ Aquic	20-25	10-50	12/38; 38/80	La Pine Basin: lodgepole pine and wet, forested wetlands. Sycan and Klamath marshes: wetland vegetation.	Wetland meadow vegetation (e.g. tules, tufted hairgrass), lodgepole pine stands, and forested wetlands (e.g. willow and lodgepole pine). Grazing, rural residential, wood cutting, duck hunting, and recreation. A mix of publicly and privately owned land.
9g. Klamath/Goose Lake Warm Wet Basins		Floodplains, terraces, and pluvial lake basins with low-gradient streams. Historically abundant wetlands. Many have been drained for agriculture.	/	Unconsolidated and semi-consolidated lacustrine and fluvial sediments of Holocene and Pleistocene age.	Histosols (Borohemists), Aridisols (Haplodurids), Inceptisols (Humaquepts), Mollisols (Haploxerolls, Endoaquolls, Argixerolls, Durixerolls), Andisols (Cryaquands)	Lather, Henley, Tulana, Kirk, Lakeview, Ozamis, Drews, Deter, Salisbury. Often very deep to deep, peaty muck, clay loam, silt loam,	Mesic/ Xeric	10-18	90-120	21/39; 51/85	Big sagebrush, bunchgrass, wetland plants (tules, cattails, sedges).	Sagebrush, bunchgrass, some wetlands. Cropland, pastureland, and rural residential development. Mainly privately owned land.
9h. Fremont Pine/Fir Forest		Steeply to moderately sloping mountains and high plateaus with mostly high gradient, intermittent streams. Also, reservoirs, a few glacial rock-basin lakes, numerous springs.		Miocene basalt, rhyolite, tuffaceous lava flows, sandstone, siltstone.	Mollisols (Argixerolls, Haploxerolls), Andisols (Vitrixerands)	Winterim, Royst, Mound, Woodchopper, Rogger, Polander. Very deep to moderately deep, sandy loam to stony loam.	Cryic, Frigid/ Xeric	15-40	30-70	15/38; 42/85	At lower elevations: ponderosa pine, white fir. At higher elevations: whitebark pine.	Ponderosa pine/white fir forests occur; some lodgepole pine, juniper, whitebark pine. Elevation, slope angle, and slope aspect affect vegetation types. Common land uses include forestry, grazing, and recreation. Mainly publicly owned land.
9i. Southern Cascades Slope		Gentle to moderate sloping mountains with permanent and intermittent, medium to high gradient streams. A few permanent and intermittent lakes with associated wetlands. Springs in the west.	3600-6300 / 500-2700	Miocene basaltic andesite.	Mollisols (Cryoborolls, Argixerolls)	Woodcock, Pokegema, Pinehurst, Greystoke. Deep, loam to stony loam.	Cryic, Frigid/ Xeric	25-40	30-70	20/34; 47/82	Ponderosa pine. At higher elevations: white fir.	Ponderosa pine forests occur; white fir, Shasta red fir, and Douglas-fir grow at higher elevations. Common land uses include forestry, grazing, and recreation. Mainly publicly owned land.
9j. Klamath Juniper/ Ponderosa Pine Woodland		Undulating hills, benches, and escarpments with intermittent and permanent, medium gradient streams. A few small plateau lakes occur but reservoirs are more common.		Miocene olivine basalt, tuffaceous sandstone, siltstone.	Mollisols (Argixerolls, Haploxerolls)	Lorella, Nuss, Merlin, Royst, Winterim. Stony clay loam, loam, very stony loam, gravelly loam, very gravelly loam.	Mesic, Frigid/ Xeric	12-20	60-120	21/40; 49/83	In south: juniper. In north: a mix of ponderosa pine and juniper. Also bunchgrass and both low and big sagebrush.	Mosaic of pastures and woodland; some forestry and recreational activity. Its reservoirs are important to lowland irrigation. A mix of publicly and privately owned land.

77.	ΝΟ	RTH CASCADES										
Level IV Ecoregio		Physiography		Geology		Soil			Climate		Potential Natural	Land Use and Land Cover
	Area (square miles)		Elevation / Local Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max, (°F)	Vegetation	
77a. North Cascades Lowland Forests	1998	Low mountains and broad, glaciated valleys with permanent, medium gradient, glacial-fed rivers and streams. Reservoirs and glacial lakes.	400-3400 / 1200-3000	Mesozoic and Paleozoic conglomerates, slate, graywacke.	Andisols (Haplocryands), Spodosols (Humicryods, Duricryods)	Getchell, Kindy, Potchub. Deep to moderately deep, silt loam, gravelly silt loam.	Mesic, Frigid/ Udic	60-90	120-200	30/43; 49/76	Western hemlock, western red cedar, Douglas-fir.	Mainly western hemlock/Douglas-fir/western red cedar forests. Forestry is the dominant land use; rural residential development, recreation, and valley grazing also occurs. A mix of publicly and privately owned land.
77b. North Cascades Highland Forests	3140	Steep, glaciated ridges; with permanent, cascading glacial streams and glacial rock-basin lakes. Some rock outcroppings.	2800-6400 / 2600-3600	In west: Paleozoic sandstone and slate. In east: Tertiary and pre-Cretaceous schist.	Spodosols (Duricryods, Haplocryods), Histosols (Cryofolists)	Reggad, Altapeak, Chinkmin. Very deep to moderately deep, sandy loam, gravelly sandy loam, very cobbly muck.	Frigid, Cryic/ Udic	60-120	80-120	25/42; 47/71	Pacific silver fir, mountain hemlock, western hemlock; some subalpine fir.	Extensive forests composed primarily of Pacific silver fir and mountain hemlock. Common land uses include forestry and recreation. Most of the land is in public ownership.
77c. North Cascades Subalpine/ Alpine	1671	High mountain peaks with bare rock, glaciers, cirques. Permanent, high gradient, sediment- laden, glacial meltwater streams and glacial rock-basin lakes.	5500-10775 / 1500-2200	Recent volcanics; Tertiary and pre- Cretaceous gneiss and schist; Mesozoic granitic rocks and marine sedimentary rocks.	Spodosols (Haplocryods), Inceptisols (Cryumbrepts), Andisols (Vitricryands)	Undifferentiated, bare rock and rubble.	Cryic/ Udic	80-140	40-70	13/36; 42/62	Herbaceous and shrub alpine meadow vegetation; some mountain hemlock, subalpine fir, subalpine larch.	Alpine meadows, bare rock, glaciers, snowfields, some subalpine forests. Wilderness recreation is a common land use. Most of the land is publicly owned and is a regional water source.
77d. Pasayten/ Sawtooth Highlands	1165	High, glaciated ridges, plateaus, and U-shaped valleys with numerous wetlands. Small glacial rock-basin lakes and both permanent and intermittent, high gradient streams.	4000-7882 / 1800-3600	Tertiary and pre-Cretaceous metamorphic rocks; Mesozoic marine sandstone, shale, granitic rock.	Inceptisols (Cryochrepts, Cryumbrepts)	Myerscreek, Devore, Crocamp. Fine sandy loam to very stony sandy loam.	Cryic/ Xeric	25-65	50-90	8/27; 45/70	Mixed subalpine fir with subalpine spruce, lodgepole pine in the northeast. At lower elevations: some Douglas-fir. At higher elevations: whitebark pine, subalpine fir.	Forests, forestry, wilderness recreation, grazing, and some mining. The land is mainly publicly owned and serves as a regional water source.
77e. Okanogan Pine/Fir Hills	1171	Rounded mountains, ridges, and U-shaped valleys with medium to high gradient, permanent and intermittent streams and rivers. Some alpine glacial rock-basin lakes and irrigation storage reservoirs.	2500-5500 / 1400-3000	Mesozoic marine sandstone, shale, granitic rocks; pre-Cretaceous gneiss and schist.	Inceptisols (Xerochrepts), Alfisols (Haploxeralfs)	Watony, Siegel. Very deep to deep, very stony coarse sandy loam, gravelly loam.	Frigid, Cryic/ Xeric	10-35	80-110	12/30; 50/80	Ponderosa pine and Douglas-fir. At high elevations: some subalpine fir. Common understory in the north: Idaho fescue. Common understory in the south: bluebunch wheatgrass.	Mostly woodland. Common land uses include forestry, recreation, grazing, rural residential development. A mix of publicly and privately owned land.
77f. Chelan Tephra Hills	435	Steep, glaciated mountains and ridges with medium to high gradient rivers and streams. A few glacial rock-basin lakes.	1200-6094 / 2000-4000	Thick deposits of volcanic ejecta (tephra); Miocene basalt; Cretaceous mixed metamorphic and igneous rocks; Precambrian gneiss and schist.	Andisols (Vitrixerands), Inceptisols (Xerochrepts), Alfisols (Haploxeralfs)	Bonner, Eloika, Roslyn, Martella, Natkim, Choralmont, Palmich, Ram- parter. Very deep to deep, often tephra- dominated, silt loam, gravelly silt loam, sandy loam, cindery sandy loam, gravelly sandy loam. Fine ashy surface.	Mesic, Frigid/ Xeric	16-35	80-110	18/30; 48/78	Mainly ponderosa pine and Douglas- fir; some grand fir and subalpine fir on higher ridge crests.	Forest. Common land uses include recreation, forestry, and grazing. Most of the land is publicly owned.
77g. Wenatchee/ Chelan Highlands	742	Steep, glaciated, mountains, ridges, and U- shaped valleys with mostly high gradient streams and rivers. A few glacial rock-basin lakes.	1100-6500 / 2400-5400	Pre-Tertiary and Cretaceous gneiss and schist; Mesozoic granitic rocks and serpentine.	Andisols (Vitricryands), Spodosols (Haplocryods)	Totem, Wedge, Esmeralda. Sandy loam, cindery sandy loam, bouldery sandy loam. Often ashy.	Frigid, Cryic/ Xeric	25-55	75-105	16/32; 48/76	Douglas fir, grand fir, subalpine fir, pine grass; some lodgepole pine, ponderosa pine, Englemann spruce.	Coniferous forest with wilderness recreation activity occurring. The land is mostly publicly owned and is a regional water source.
77h. Chiwaukum Hills and Lowlands	795	Low mountains, hills, cuestas, and V-shaped valleys with a trellis drainage pattern. The permanent and intermittent streams have steep gradients and high sediment loads. Glacial basins often contain lakes and were formed by alpine glaciation. South of the continental glacial limit.	/ 400-3200	Paleocene to Cretaceous arkose with interbedded conglomerate, sandstone, siltstone.	Inceptisols (Xerochrepts), Alfisols (Haploxeralfs), Spodosols (Cryohumods)	Index, Nard, Ardenmont. Loam to loamy sand. Tends to be shallow in the south and deeper in the north.	Mesic, Frigid/ Xeric	15-40	75-120	18/34; 50/81	Ponderosa pine, Douglas-fir, grand fir, bitterbrush, pinegrass, some subalpine fir.	Mostly coniferous woodland with forestry, recreation, grazing, some rural residential development. A mix of publicly and privately owned land.
77i. High Olympics	596	Steep, glaciated mountains with cirques, alpine glaciers, persistent snow pack, bare rock, cascading glacier-fed streams, and glacial rock-basin lakes.	3000-7965 / 2400-3800	Lower Tertiary sandstone and siltstone.	Spodosols (Cryorthods), Entisols (Cryorthents)	Undifferentiated soils, bare rock, rubble.	Frigid, Cryic/ Udic, Xeric	70-250	80-120	34/24; 44/68	Mountain hemlock, Pacific silver fir, subalpine meadows. On the xeric soils of rainshadow areas in the northeast: subalpine fir.	Subalpine coniferous forests and meadows with bare rock, glaciers, snowfields, and wilderness recreational activity occurring. It is a regional water source.

78.	KL	AMATH MOUNTA	INS									
Level IV Ecoregio	n	Physiography		Geology		Soil			Climate		Potential Natural	Land Use and Land Cover
	Area (square miles)		Elevation / Local Relief (feet)	Surficial material and bedrock	Order (Great Groups)	Common Soil Series	Temperature / Moisture Regimes	Precipitation Mean annual (inches)	Frost Free Mean annual (days)	Mean Temperature January min/max; July min/max, (°F)	Vegetation	
78a. Rogue/Illinois Valleys	285	Terraces and floodplains in mountain valleys. Streams and rivers are perennial.	1100-1800 / 100-600	Holocene fluvial terrace and floodplain deposits.	Mollisols (Haploxerolls, Argixerolls), Alfisols (Palexeralfs), Inceptisols (Xerochrepts, Endoaquepts)	On floodplains: Newberg, Camas, Evans. On valley terraces: Medford, Foehlin, Central Point. On fans: Ruch, Barron, Clawson. Deep to very deep, silty clay loam to gravelly loam.	Mesic/ Xeric	20-60	120-180		Oregon white oak, madrone, California black oak, ponderosa pine, grasslands.	A mix of orchards, cropland, pastureland, oak woodland, pine woodland, towns, rural residential development.
78b. Siskiyou Foothills	818	Moderately sloping mountain foothills with reservoirs and perennial and intermittent streams and rivers.	1500-4000 / 600-2000	In the east: Eocene basaltic lava flows. In the west: Jurassic sandstone and shale.	Mollisols (Haploxerolls, Argixerolls), Inceptisols (Xerochrepts), Vertisols (Haploxererts)	Medco, McMullin, McNull, Brader, Debenger, Carney. Mostly moderately deep, clay, cobbly clay loam, loam, gravelly loam.	Mesic/ Xeric	25-45	110-160		Ponderosa pine, Douglas-fir, Oregon white oak, California black oak, madrone.	Drier areas east of Medford: dominated by oak woodlands and ponderosa pine. Wetter areas: Douglas-fir and incense cedar. A mix of grazing, rural residential development, orchards, some cropland, and some forestry.
78c. Umpqua Interior Foothills	921	Narrow interior valleys, terraces, and foothills.	450-2000 / 400-1550	Holocene fluvial terrace deposits; Pliocene marine sandstone; Eocene basalt.	Mollisols (Haploxerolls, Argixerolls, Argiaquolls), Alfisols (Haploxeralfs), Inceptisols (Xerochrepts)	On terraces: Conser, Newberg, Rose- burg. On foothills: Oakland, Sutherlin, Nonpareil. Mostly moderately deep to very deep, silty clay loam to loam.	Mesic/ Xeric	30-50	120-180		Oregon white oak, Douglas-fir, ponderosa pine, madrone.	A mix of oak woodlands and coniferous forests intermingle with pastureland, vineyards, orchards, row crops, rural residential development, and towns.
78d. Serpentine Siskiyous	441	Highly dissected mountains with permanent and intermittent, high gradient streams.	1500-4200 / 1000-2200	Jurassic ultramafic rocks.	Alfisols (Haploxeralfs), Inceptisols (Xerochrepts)	Pearsoll, Dubakella, Eightlar, Perdin, Gravecreek. Stony clay loam to cobbly loam.	Mesic, Frigid/ Xeric, Udic	45-140	70-140	32/44; 49/82	Jeffrey pine, tanoak, Douglas-fir. Unique understory species and sparse woodland vegetation caused by soils derived from underlying serpentine.	Sparse woodland with unique understory vegetation. Common land uses include back country recreation, forestry, and mining. Ecoregion 78d is a regional water source.
78e. Inland Siskiyous	2610	Highly dissected mountains with permanent and intermittent streams. A few small lakes at higher elevations.	1000-6000 / 1000-2800	Jurassic granitic rocks, shale, sandstone.	Alfisols (Haploxeralfs), Inceptisols (Xerochrepts), Ultisols (Haploxerults)	Vannoy, Caris, Offenbacher, Josephine, Beekman, Kanid, Siskiyou, Tethrick. Deep to moderately deep, silt loam to gravelly loam.	Mesic, Frigid/ Xeric	35-70	90-160	29/44; 50/86	Douglas-fir, ponderosa pine, Oregon white oak, incense cedar, grand fir.	Coniferous forests. Forestry, recreation, rural residential development, and mining. Ecoregion 78e is a regional water source.
78f. Coastal Siskiyous	853	Highly dissected mountains with perennial and intermittent, high gradient streams and a few small, alpine glacial lakes.	/ 1000-2700	Cretaceous and Jurassic conglomerate, sandstone, siltstone.	Inceptisols (Xerochrepts, Dystrochrepts), Ultisols (Palehumults, Palexerults)	Fritsland, Bravo, Cassiday, Deadline, Barkshanty, Nailkeg, Jayar, Althouse, Skymor, Atring, Kanid, Acker. Mostly moderately deep to very deep, very gravelly silt loam to very gravelly loam. On benches and ridge tops: moderately deep, silty clay loams.	Mesic, Frigid/ Udic, Xeric	70-130	100-190	38/50; 50/76	Tanoak, Douglas-fir; some Port Orford cedar and Jeffrey pine.	Forests composed primarily of tanoak and Douglas-fir are common. Land uses include forestry, recreation, rural residential development and some mining.
78g. Klamath River Ridges	122	Highly dissected mountains with perennial and intermittent, high gradient streams.	3800-7000 / 1000-3000	Miocene and Oligocene basaltic and andesitic flows; Jurassic granitic rocks.	Mollisols (Argixerolls, Haploxerolls)	Skookum, McMullin, McNull. Loam to very cobbly loam.	Mesic/ Xeric	25-35	90-160		Higher elevations and north-facing slopes: Douglas-fir, white fir, Shasta red fir. Lower elevations and south- facing slopes: ponderosa pine, western juniper, chaparral.	Coniferous forest, woodlands, savanna, and chaparral. Common land uses include forestry and recreation.

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