Appendix A – Ecoregion Descriptions

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INTRODUCTION

The ecological geography of Oregon has a significant influence on the response of streams and stream ecosystems. There is a rich literature on the use of watersheds, basins, or ecoregions as a framework for water quality planning (Griffith, Omernik and Woods, 1999; Omernik and Griffith, 1991, Omernik, 1995, Hughes, Heiskary, Matthews, and Yoder, 1990). Ecoregions are relatively uniform geographic areas that respond in a similar manner to physical activities (rainfall, fire, human land use activities, etc.). The identification of ecoregions within a watershed context is a very important exercise in determining how the different portions of the watershed will respond to physical alterations.

The ecoregions of Oregon have been mapped (Clarke, White and Schaedel, 1991; Omernik and Gallant, 1986; Thiele, Pater, Thorson, Kagan, Chappel and Omernik, 1996) and the Level IV mapping is being reviewed for the High Desert ecoregion (Omernik, personal communication, 2001). In a separate effort Anderson, Borman and Krueger (1998) have identified ecological provinces using different criteria and focusing on the use of soils mapping to differentiate ecological areas of Oregon. A similar approach has been used by the Oregon Natural Heritage Council in their efforts to maintain a list of threatened and endangered species for the state (Oregon Natural Heritage Program, 2001; Defenders of Wildlife, 1998). Ecoregion mapping used for this document is the mapping of the Natural Heritage Program and EPA (Thiele, et.al.).

It is intended that the ecoregion descriptions (Chapter 2) will be used to identify expected characteristics that affect watershed processes.

BACKGROUND ON ECOREGION DESCRIPTIONS

The State of Oregon is divided into ecoregions that have been identified based on climate, geology, physiography, vegetation, soils, land use, wildlife, and hydrology. Each ecoregion has characteristic disturbance regimes that shape the form and function of watersheds in the region. This assessment manual recognizes that watersheds within an ecoregion will have characteristic patterns. Both the Environmental Protection Agency (EPA) and the Oregon Natural Heritage Program (ONHP) have developed ecoregion boundaries for the state of Oregon. Both agencies are also in the process of updating their ecoregion boundaries. The most significant changes are going to occur in southeast Oregon where 13 new level IV ecoregions are being defined. However since the boundaries of these ecoregions have not been finalized at the time of this documents publication. This Appendix uses EPA Level III and Level IV ecoregion descriptions to characterize patterns within a watershed. More information about ecoregions is available from Omernik and Gallant (1986), Omernik (1994), Clarke and Bryce (1997), and Pater et al. (1998).

The purpose of this appendix is to organize information that can be helpful to Watershed Councils in interpreting watershed conditions. The Riparian and Hydrology sections of the manual utilize this information to simplify their assessment process. Addendum 1 at the end of this document gives the percentage of watershed area for

each fifth-field watershed in Oregon by Ecoregion type. The general format of each Ecoregion Description in this draft is as follows:

Title: Title of the ecoregion; corresponds to ecoregion map of Oregon. To obtain GIS coverage of the ecoregion map contact the State Service Center for GIS at 503-378-2166.

Location: General description of the ecoregion location and extent, and elevation ranges for the ecoregion where appropriate. Also included is a small map showing the ecoregion area (in black) and county boundaries (in light gray).

Drainage Basins: A list of the primary drainage basins that occur in the ecoregion is listed. Drainage basins are those identified by the Oregon Water Resources Department. Addendum 1 identifies the percentage of watershed area by ecoregion.

Geology: General geology; type of rock and structure. Information obtained from geology maps, Environmental Protection Agency (EPA) ecoregion descriptions, and expert judgment.

Topography: General description of stream system; channel density and gradient by size class (small, medium, and large streams as indicated on Department of Forestry maps). Information obtained from EPA ecoregion descriptions and expert judgment.

Soil: General soil types by slope steepness. Information obtained from EPA ecoregion descriptions and expert judgment.

Erosion: Relative erosion rates and dominant erosional processes. Information obtained through expert judgment.

Climate Characterization: General descriptions of climatic conditions in each ecoregion.

Mean Annual Precipitation: Mean annual precipitation for each ecoregion as developed by Daly and Taylor, 1998 and from Pater et al. 1998.

Precipitation Pattern: Seasonal distribution of precipitation within each ecoregion and exemplified graphically for one station within each ecoregion. For ecoregions where no data were available, values were extrapolated from nearby stations.

2-Year 24-Hour Precipitation: Range of 2-year 24-hour precipitation values within each eco-region from NOAA, 1973.

Temperature: Mean, maximum, and minimum air temperatures within each ecoregion for July and January per Oregon Climate Service and Pater et al. 1998. For ecoregions where no data were available, values were extrapolated from nearby stations.

Snowpack Development: Characterization of winter snowpack for the ecoregion.

Hydrologic Basin Characteristics: General descriptions of basin characteristics affecting runoff.

Runoff Patterns: General description of runoff exemplified graphically through an annual hydrograph from one stream in each ecoregion. Data were extrapolated from nearby stations for each ecoregion where no data were available.

Peak Flow Generating Processes: Description of dominant peak flow generating process (e.g. rainfall, snowmelt, rain-on-snow).

Peak flow magnitude: Peak flow associated with the 2-year recurrence interval for streams within the ecoregion. Units are cubic feet per second per square mile of drainage area.

Stream Channels: General stream **substrate** descriptions by stream size class (Department of Forestry maps) and relative channel gradient class (lower gradient, higher gradient). Dominant substrate followed by sub-dominant substrate. Information obtained through expert judgment. Relative current abundance of **beaver dams** (many, some, few, none) and seasonal presence (summer only, year-round). Information obtained through expert judgment.

Natural disturbances: Significant landscape-level natural disturbances that can influence vegetation and/or erosion rates (wildfire, large earthquakes, wind storms, disease, insects).

Potential Streamside vegetation: Potential streamside vegetation can be viewed as the vegetation after 120 years of growth with no major natural disturbances and no human-caused disturbances (tree removal, animal grazing, and encroachment of buildings or roads). Does not include description of streamside vegetation following infrequent (average intervals of one to many centuries) and major disturbances such as floods, windstorms, wildfire, or earthquakes. Descriptions are according to valley type (constrained, semi-constrained, and unconstrained). Average widths of the stream-adjacent riparian area (RA1), and (if applicable) upland-adjacent riparian area (RA2) are provided. Dominant species or types (e.g., conifers, hardwoods) of vegetation are described for each zone. Focus is on general pattern with some exceptions noted, such as unstable slopes, wet soils, low terraces, and beaver disturbance.

Streamside vegetation is highly variable and dynamic. Potential streamside vegetation descriptions provide a minimum set of guidelines against which current conditions can be evaluated. Species lists do not comprise a plant community. All of the species listed may not be present together on a site.

Information has been obtained through expert judgment, published literature, and un-published reports.

Current streamside conifer regeneration: Relative abundance of conifers that occupy streamside areas under current conditions, along with factors that influence their abundance or lack of abundance.

Upland vegetation: Common types of upslope overstory and understory vegetation, starting about 200 feet from streams.

Historic Crown Closure: Generalized historic crown closure estimates for upland stands in the ecoregion. This attribute is important for determining hydrologic regimes. All information obtained through expert judgment, primarily from USDA Forest Service forestry professionals

Land Use: Dominant land uses present in the ecoregion.

Other: Includes comments on other factors that influence streams.

This information was compiled from a number of different sources. Table 1 lists the primary sources for the information included in this document. For land use and land cover, descriptions from Pater and others (1998) were used for ecoregions 4-9, and 78. "Potential natural vegetation" was described only where it differed markedly from current land cover types. Comments on that map, generally about land ownership or importance as a water source, were noted in "Additional Comments" section. For ecoregions 10 and 11, native vegetation descriptions were taken from Clarke and Bryce (1997). Land use and land cover are obtained through expert judgment (refer to Clark and Bryce (1997), especially for the Blue Mountains, for their explanation of the complexity of the region). For ecoregion 12 (Snake River Basin/High Desert), descriptions were taken from Omernik and Gallant (1986). Fire history comments for all regions were summarized from Agee (1993). Potential streamside vegetation information was obtained through expert judgment, and from Crowe and Clausnitzer (1997), Diaz and Mellen (1996), Kovalchik (1987), Manning and Padgett (1995), McCain (1998), Atzet (pers. Comm., 2000), Frenkel and Heintz (1987), Hall (pers. Comm. 2000), Hemstrom and Logan (1986), Kovalchik (1987), Kovalchik et. al. (1988), Crowe and others (2000) and Wickramarantne (1983).

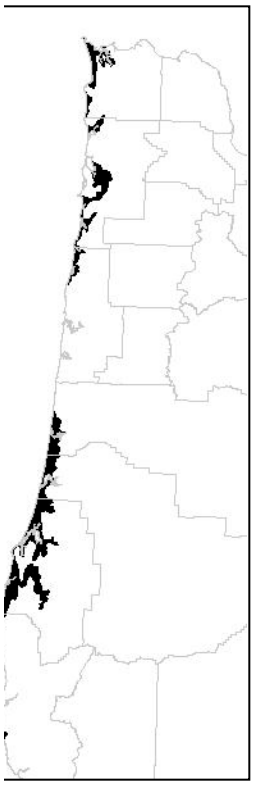
Table 1: Sources of Information for Ecoregion Descriptions.

Topic	Pater et al. (1998)	Clarke and Bryce (1997)	Franklin and Dyrness (1988)	Experience of compilers	Experience of riparian vegetation reviewers	Other
Precipitation	X					Oregon Climate Service, Oregon State University, Website 2000 Daly and Taylor, 1998, NOAA, 1973
Runoff	X	X		X		Greenberg & Welch, 1998 WPN, 2000, USGS Report, 1983 EarthInfo, 1996
Peak flows						Greenberg & Welch, 1998 , WPN, 2001, USGS Report, 1983 EarthInfo, 1996
Geology	X	X		X		
Topography	X	X		X		
Soil type	X	X		X		
Erosion	X	X		X		
Channel substrate	X	X		X		
Beaver dams				X	X	
Natural disturbances	X	X		X		Agee 1993
Potential streamside vegetation				X	X	Crowe and Clausnitzer (1997), Diaz and Mellen (1996), Kovalchik (1987), Manning and Padgett (1995), McCain (1998), Frenkel and Heintz (1987), Hemstrom and Logan (1986), Kovalchik and others (1988), Crowe and others (2000), Wickramarantne (1983).
Current streamside conifer regeneration				X	X	
Upslope vegetation	X	X	X	X	X	

ACKNOWLEDGEMENTS:

The following people helped immensely with information, edits and feedback on the potential streamside vegetation tables: Cindy McCain, Jimmy Kagan, Rick Hall, Dave Hibbs, Tom Atzet, John Wilson, Robert Pabst, Sharon Clarke, and Boone Kauffman. The following USDA Forest Service professionals were consulted for information regarding their local forests: Victoria Rockwell, Dave Powell, Charlie Johnson, Mike Simpson, Diane White, Roger Williams, Bob Reitman and Jo Booser. Many thanks also go to Wendell Hann, Dave Vesely and James Agee for their direction.

ECOREGION DESCRIPTIONS



Coastal Lowlands (1a)

Location: Portions of coastal fringe from Seaside in north to Gold Beach in south.

Drainage Basins: North Coast, Mid Coast and South Coast Basins

Geology: Alluvial deposits on low terraces or dunes (spits) of wind-blown sand.

Topography: Streams are very low gradient and often meander widely. Most streams are influenced by the tide. Tidal marshes and flats and lower meandering streams flow through flat floodplains. Streams sometimes enter shallow coastal lakes with outlets to the ocean.

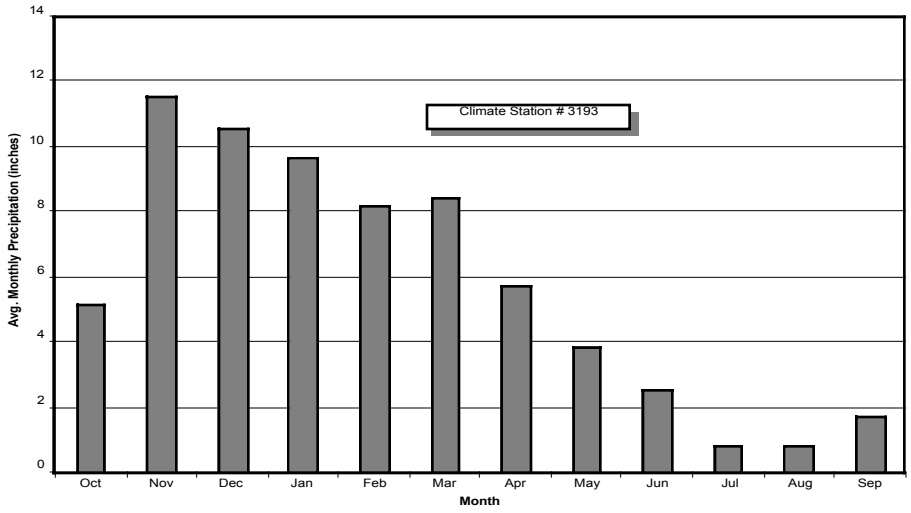
Soil: Soils vary from deep silty clay loams to sand. There are significant areas of peat soil associated with tidal marshes.

Erosion: Erosion rate is low due to the low gradient. These are mostly depositional areas.

Climate characterization: Wet winters, relatively dry summers and mild temperatures throughout the year. Heavy precipitation results from moist air masses moving off the Pacific Ocean onto land especially during winter months.

Mean annual precipitation: 60 to 85 inches.

Precipitation Pattern: Majority of precipitation occurs in the winter months of November, December, and January.



2-year 24 hour precipitation: 3.0 to 5.0 inches

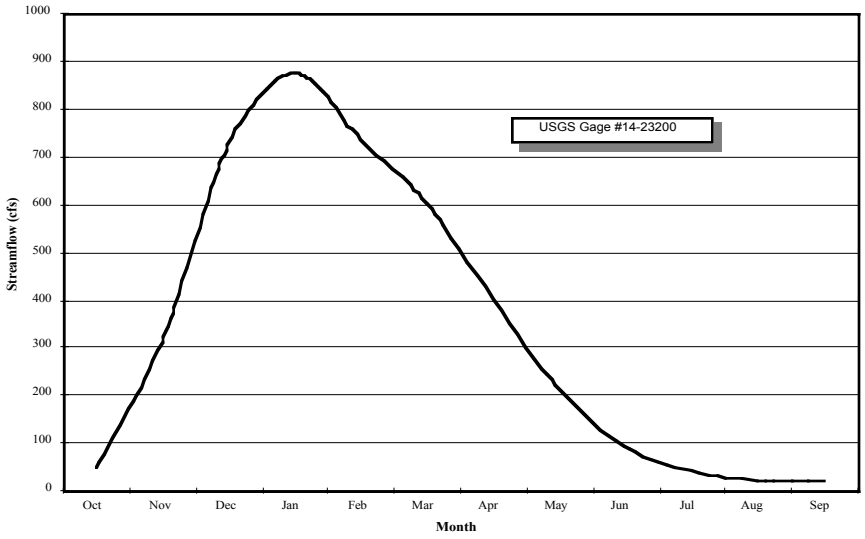
Temperature

	January			*July*		
°F	**50**	**36**	**44**	**68**	**52**	**59**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the Oregon coast is minimal except during unusual storms which bring very cold, moist air to the region.

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average monthly streamflows are the highest in the winter. Runoff



is responsive to precipitation.

Peak flow generating process: Rainstorms. Peak flows are typically generated by rainstorms originating in the Pacific Ocean. Snowmelt is not normally a major factor in flooding.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 100 cfs/mi^2, few greater than 100 cfs/mi^2 in the southern portion of region.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	Fines	Fines	fines / gravel
	higher gradient	N/A	N/A	N/A
Beaver dams	lower gradient	many year-round	many year-round	some in summer
	higher gradient	N/A	N/A	N/A

Natural Disturbances: Extreme wind storms capable of toppling large patches of trees occur about every 35 to 100 years.

Catastrophic earthquakes capable of causing the coastal fringe to subside 5 to 20 feet occur about every 300 – 500 years.

Fires tend to be infrequent in Sitka spruce forests, although they are usually stand-replacing fires since the typical tree species are not fire-tolerant. Fires are more frequent in Douglas-fir/western hemlock forests, although the interval between fires is quite variable.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 zone	RA2 description	Other considerations
Constrained	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	No constrained channels are assumed to exist in this ecoregion
Semi-constrained	0-100'	**Type**: Conifer (thickets of wind-stunted shore pine, Sitka spruce) and shrubs (native and introduced) sometimes alternating with bare sand. **Size**: Medium **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Vegetation sometimes modified by beaver browsing and dam building, and repeated browsing by elk.
Un-constrained	0-100'	**Type**: Conifer (thickets of wind-stunted shore pine, Sitka spruce) and shrubs (native and introduced) such as evergreen huckleberry and salal, sometimes alternating with bare sand. **Size**: Medium **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Vegetation sometimes modified by beaver browsing and dam building, and repeated browsing by elk. Beaver dams sometimes divide stream into many channels, thereby creating extensive wetlands

Estuarine Vegetation: Characteristic plants of coastal marshes and tidal flats include arrowgrass, saltgrass, Alaska alkaligrass, three square bulrush, pacific coast bulrush,

common rush, Baltic rush, Virginia glasswork, sea milkwort, saltmarsh dodder, Oregon gum-plant, and jaumea. Seaside arrowgrass is typical in low habitats, near deep river channels. Higher mudflat habitats are dominated by pacific coast bulrush and Lyngbye's sedge, while mudflats further inland are dominated by tufted hairgrass and Baltic sedge (Franklin and Dyrness 1988).

Current Streamside Conifer Regeneration: Common in areas with good drainage. Sitka spruce can also regenerate in wetter areas where downed logs create an elevated seed bed.

Upland vegetation: Douglas-fir, western hemlock, Sitka spruce, western red-cedar, wetland plants, pasture grasses

Historic Crown Closure: Historically and currently, forest types in this ecoregion have the potential for greater than 70% crown closure. Fire suppression has less impact on the density of stands in Sitka spruce forests, since fires that do occur tend to be stand-replacing fires.

Land Use: Dairy farms, urban/rural residential development, recreation, pastureland.

Other: Fog and strong northwest winds common in summer. Many streams in agricultural and residential settings have been diked or channelized

Coastal Uplands (1b)

Location: Coastal area extending up to 30 miles inland; from Astoria to Brookings.

Drainage Basins: North Coast, Mid Coast, and South Coast Basins

Geology: Geology is weak sandstone.

Topography: Medium and large streams and some small streams are low gradient; few waterfalls exist. Headwater small streams are often steep gradient and are usually bordered by steep slopes. Other streams are bordered by a variety of flat to steep slopes. Watersheds have a high stream density.

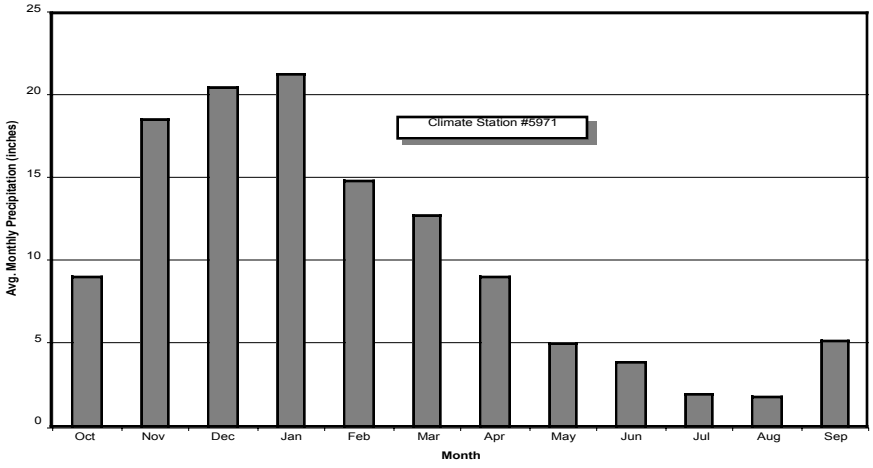
Soil: Mostly deep silt loam.

Erosion: Erosion rate is high due to abundant precipitation, high uplift rates, steep slopes, weak rock, and high landslide occurrence. Landslides are deep-seated earth flows in lower gradient areas or are shallow landslides (often triggering debris slides) in steep headwater channels.

Climate characterization: Wet winters, relatively dry summers and mild temperatures. Heavy precipitation results from moist air masses moving off the Pacific Ocean onto land.

Mean annual precipitation: 70 to 125 inches; up to 200 inches in higher elevations of the coastal mountains

Precipitation Pattern: Highest monthly precipitation occurs in November, December, and January



2-year 24 hour precipitation: 3.5 to 5.5 inches

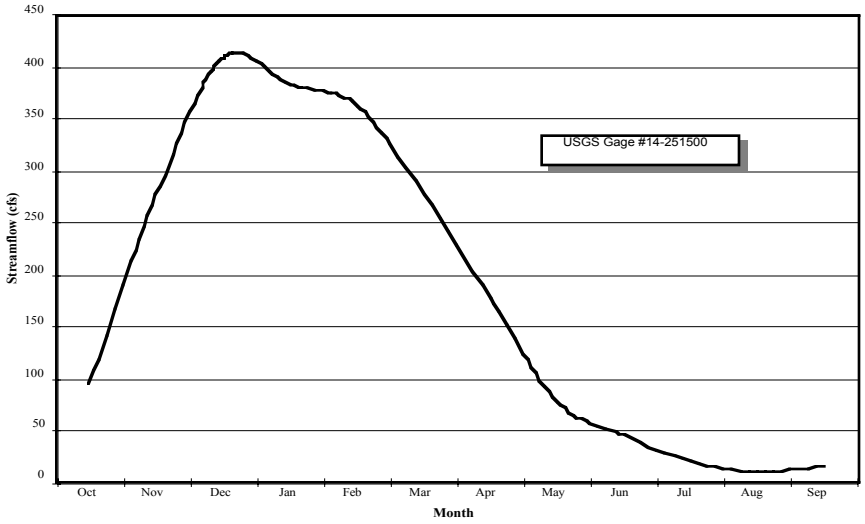
Temperature

	January			*July*		
°F	**48**	**36**	**44**	**68**	**52**	**59**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the Oregon coast is minimal except during unusual storms which bring very cold, moist air to the region.

Hydrologic basin characteristics: Basins oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average monthly streamflows are the highest in the winter.



Peak flow generating process: Rainfall. Peak flows are typically generated by rainstorms originating in the Pacific Ocean. Snowmelt is not normally a major factor in flooding.

Peak flow magnitude (2-year recurrence interval): 50 cfs/mi^2 to 100 cfs/mi^2, few greater than 100 cfs/mi^2.

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	gravel / fines	Fines	fines
	higher gradient	gravel / bedrock	fines / bedrock	bedrock

Beaver dams	lower gradient	many year-round	many year-round	some in summer
	higher gradient	some in summer	few in summer	none

Natural Disturbances: Fires tend to be infrequent in Sitka spruce forests, although, when they occur, they are usually stand-replacing fires since the typical species are not tolerant of fire. Fires are more frequent in Douglas-fir/western hemlock forests, although the interval between fires is quite variable. Large wildfires during late summer and fall once burned large areas of central Coast Range, killing most trees in path. The Coastal Uplands ecoregion was sometimes skipped over by wildfire because of coastal fog influence. Fire suppression has now eliminated most large wildfires.

Extreme wind storms capable of toppling large patches of trees occur about every 35 to 100 years. Young hemlock trees are particularly susceptible to wind damage if located along cutting lines or within streamside buffers.

Catastrophic earthquakes capable of triggering numerous landslides occur about every 300 years.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 zone	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (red alder or others) and shrubs such as salmonberry. **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (western hemlock, Sitka spruce, western redcedar, Douglas-fir). Some hardwoods (primarily alder) may be present **Size**: Large **Density**: Dense	Few conifers where slopes are unstable or perpetually wet.
Semi-constrained	0-50'	**Type**: Hardwoods (red alder or others) and shrubs such as salmonberry and stink currant. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (western hemlock, Sitka spruce, western redcedar, Douglas-fir). Some hardwoods (primarily alder) may be present. **Size**: Large **Density**: Dense	Mostly conifer for some well-drained streamside areas. Few conifers where slopes unstable or perpetually wet. Vegetation sometimes modified by beaver browsing and dam building, and repeated browsing by elk. Usually no conifers on low terraces. For more information regarding streamside plant communities, see McCain (1998).

CHT group	RA1 zone	RA1 description	RA2 zone	RA2 description	Other considerations
Un-constrained	0-75'	**Type**: Hardwoods (red alder or others) and shrubs such as salmonberry and stink currant. **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifers (western hemlock, Sitka spruce, western redcedar, Douglas-fir). Some hardwood (primarily alder) may be present. **Size**: Large **Density**: Dense	Mostly conifer for some well-drained streamside areas. Few conifers where soils are perpetually wet. Vegetation sometimes modified by beaver browsing and dam building, and repeated browsing by elk. Usually no conifers on low terraces. For more information regarding streamside plant communities, see McCain (1998).

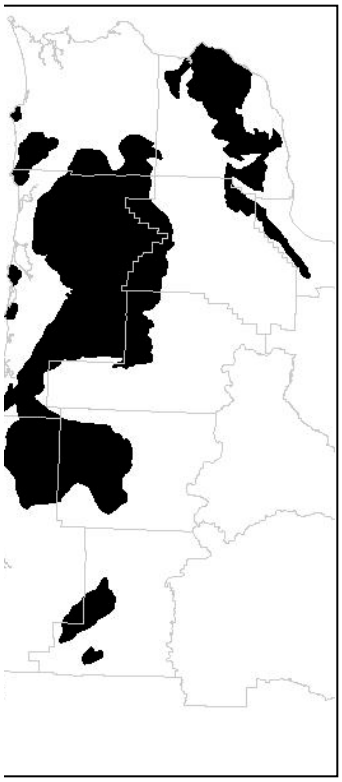
Current Streamside Conifer Regeneration: Usually common within about a mile of the ocean, uncommon beyond, except in some of the larger river valleys that allow persistent penetration of the fog layer farther inland. Competition from non-conifers can be intense, especially where salmonberry, huckleberry, Himalayan blackberry, and alder become established.

Upland vegetation: Douglas-fir, western hemlock, Sitka spruce, western redcedar forests.

Historic Crown Closure: Greater than 70% historic crown closure.

Land Use: Forestry, rural residential development, recreation.

Other:



Volcanics (1d)

Location: Coast Range from Cannon Beach in the north to Florence in the south. Occurs as discrete blocks from the ocean up to 60 miles inland.

Drainage Basins: North Coast, Mid Coast, Lower Willamette Basins

Geology: Volcanic, including basalt flows, dikes and sills, and concreted basalt materials.

Topography: Medium and large streams and some small streams are moderate gradient; waterfalls can be common. Headwater small streams are often steep gradient. Headwater small streams are usually bordered by steep slopes. Other streams are bordered by moderate to steep slopes. Valleys are usually narrow. Watersheds have a stream density that is lower than adjacent watersheds underlain by sedimentary rock.

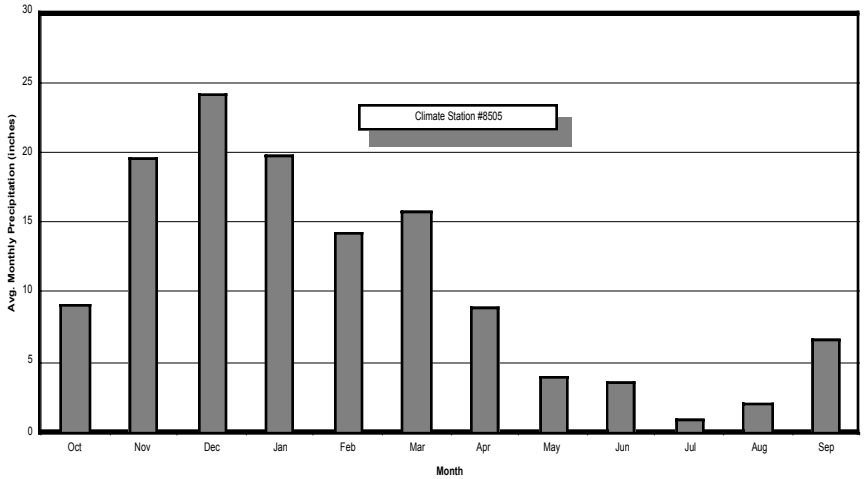
Soil: Gravelly silt loam in lower gradient areas to very gravelly loam in steep areas.

Erosion: Erosion rate is high due to abundant precipitation, high uplift rates, steep slopes, fractured rock, and high landslide occurrence. Landslides are usually shallow (often triggering debris slides) in steep headwater channels. Debris slides capable of traveling long distances.

Climate characterization: Wet winters, relatively dry summers and mild temperatures throughout the year. Heavy precipitation results from moist air masses moving off the Pacific Ocean onto land especially during winter months.

Mean annual precipitation: 70 to 200 inches.

Precipitation Pattern: Majority of precipitation occurs in the winter months of November, December, and January.



2-year 24 hour precipitation: 3.5 to 7.5 inches.

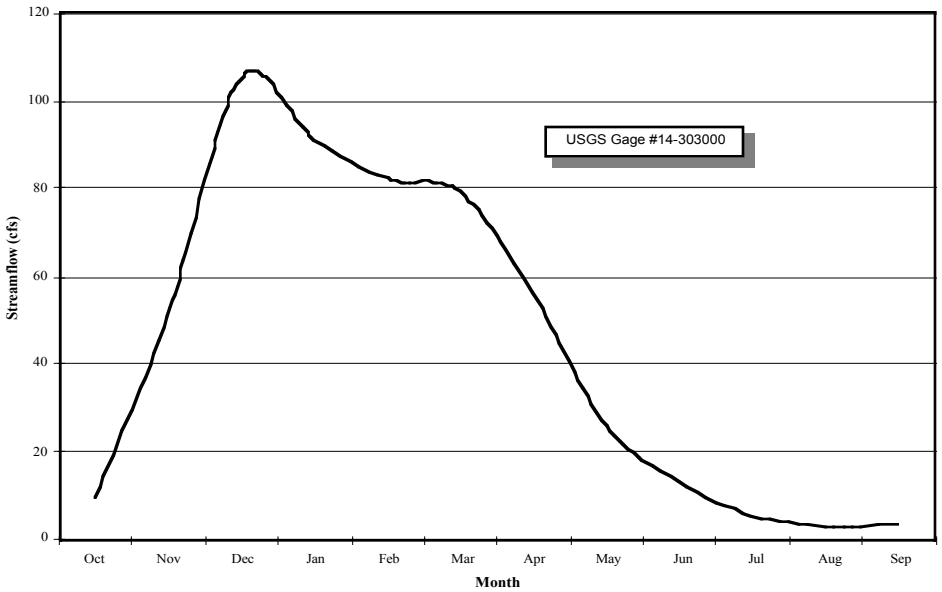
Temperature

	January			*July*		
°F	**46**	**30**	**43**	**76**	**50**	**65**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the Oregon coast is minimal except during unusual storms that bring very cold, moist air to the region. Some of the higher elevations of this ecoregion receive significant amounts of snow (e.g. at Mary's Peak the highest point in Oregon Coast Range, snow often persists until May)

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average monthly streamflows are the highest in the winter.



Peak flow generating process: Rainstorms. Peak flows are typically generated by rainstorms originating in the Pacific Ocean. Snowmelt is not normally a major factor in flooding.

Peak flow magnitude (2-year recurrence interval): 75 cfs/mi^2 to 100 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	Gravel / cobbles	gravel / cobbles	gravel / cobbles
	higher gradient	Cobbles / bedrock	gravel / bedrock	cobbles / bedrock
Beaver dams	lower gradient	Some in summer	a few in summer	None
	higher gradient	A few in summer	none	None

Natural Disturbances: Fires are more frequent in Douglas-fir/western hemlock forests than in their neighboring Sitka spruce forests, although the interval between fires is quite variable. Large wildfires during late summer and fall once burned large areas of central Coast Range, killing most trees in its path. Portions of the Volcanics ecoregion near the ocean were sometimes skipped over by wildfire because of coastal fog influence. Fire suppression has now eliminated most large wildfires.

Extreme windstorms capable of toppling large patches of trees occur about every 35 to 100 years along coastal portion of ecoregion. Young hemlock trees are particularly susceptible to wind damage if located along cutting lines or within streamside buffers.

Catastrophic earthquakes capable of triggering numerous landslides occur about every 300 years.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 zone	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (red alder or others) and shrubs. **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (western hemlock, Sitka spruce, western red cedar, Douglas-fir). Some hardwoods (primarily alder) may be present. **Size**: Large **Density**: Dense	Few conifers where slopes are unstable or perpetually wet. Vegetation seldom modified by beaver browsing and dam building

CHT group	RA1 zone	RA1 description	RA2 zone	RA2 description	Other considerations
Semi-constrained	0-50'	**Type**: Hardwoods (red alder or others) and shrubs such as salmonberry, with sword fern. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (western hemlock, Sitka spruce, western red cedar, Douglas-fir). Some hardwoods (primarily alder) may be present. **Size**: Large **Density**: Dense	Mostly conifer for some well-drained streamside areas. Few conifers where slopes unstable or perpetually wet. Vegetation seldom modified by beaver browsing and dam building, and repeated browsing by elk. Usually no conifers except spruce on low terraces. For more information regarding streamside plant communities, see McCain (1998).
Un-constrained	0-75'	**Type**: Hardwoods (red alder or others) and shrubs such as salmonberry, vine maple, and stink currant **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifers (western hemlock, Sitka spruce, western redcedar, Douglas-fir). Some hardwoods (primarily alder) may be present. **Size**: Large **Density**: Dense	Mostly conifer for some well-drained streamside areas. Few conifers where soils are perpetually wet. Vegetation sometimes modified by beaver browsing and dam building, and repeated browsing by elk. Usually no conifers except spruce on low terraces. For more information regarding streamside plant communities, see McCain (1998).

Current Streamside Conifer Regeneration: Usually common, especially if an organic substrate exists for hemlock and spruce seed regeneration. Competition from non-conifers can be intense, especially where salmonberry, alder, and huckleberry become established.

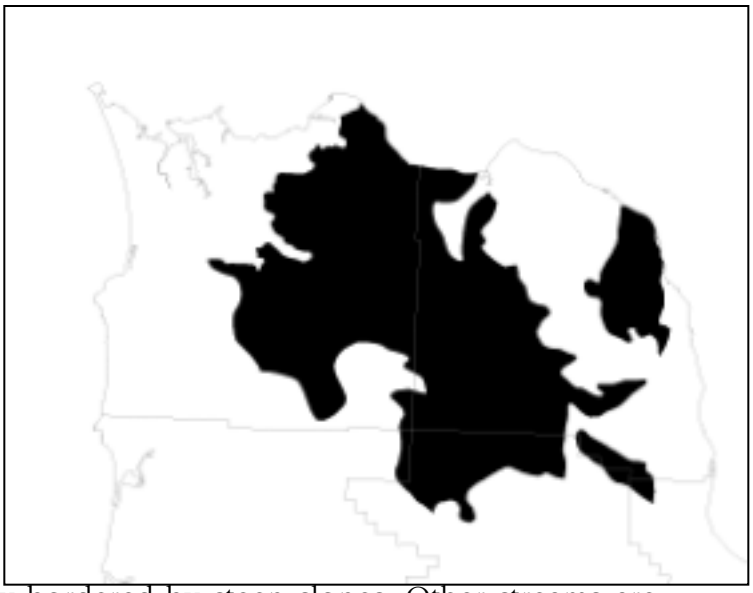
Upland vegetation: Douglas-fir, western hemlock, red alder, western red cedar forests**.**

Historic Crown Closure: Crown closure can be as low as 50% on drier sites. In general, historic crown closure was greater than 70%. Due to the absence of large wildfires, stand densities are greater than in the past.

Land Use: Forestry, rural residential development, recreation.

Other:

Willapa Hills (1f)



Location: Northern Coast Range north of Forest Grove from 20 to 70 miles from the ocean.

Drainage Basins: North Coast, Lower Willamette Basins

Geology: Siltstone, mudstone, or shale.

Topography: Medium and large streams and some small streams are low to moderate gradient; few waterfalls exist. Headwater small streams are often steep. Headwater small streams are usually bordered by steep slopes. Other streams are bordered by a variety of flat to steep slopes. Watersheds have a high stream density. Some small and medium streams are deeply entrenched within V-notch channels.

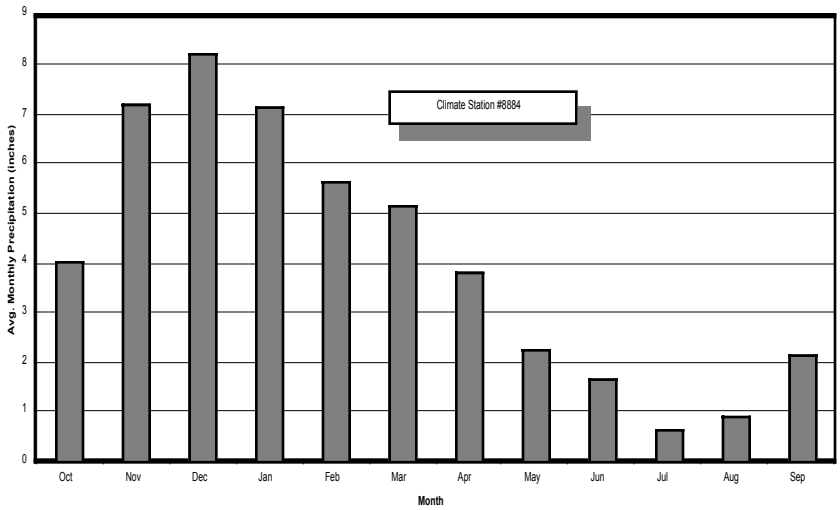
Soil: Soils are very deep to moderately deep silt loams with some area of gravelly loam soils.

Erosion: Erosion rate is high due to abundant precipitation and erodible silt soils. Landslides are not as common as adjacent ecoregions to west. Landslides occur as deep-seated earth flows, or less frequently, as shallow landslides (often triggering debris slides) in steep headwater channels.

Climate characterization: Wet winters, relatively dry summers and mild temperatures throughout the year. Heavy precipitation results from moist air masses moving off the Pacific Ocean onto land especially during winter months.

Mean annual precipitation: 50 to 100 inches

Precipitation Pattern: Majority of precipitation occurs in the winter months of November, December, and January.



2-year 24 hour precipitation: 2.0 to 5.0 inches.

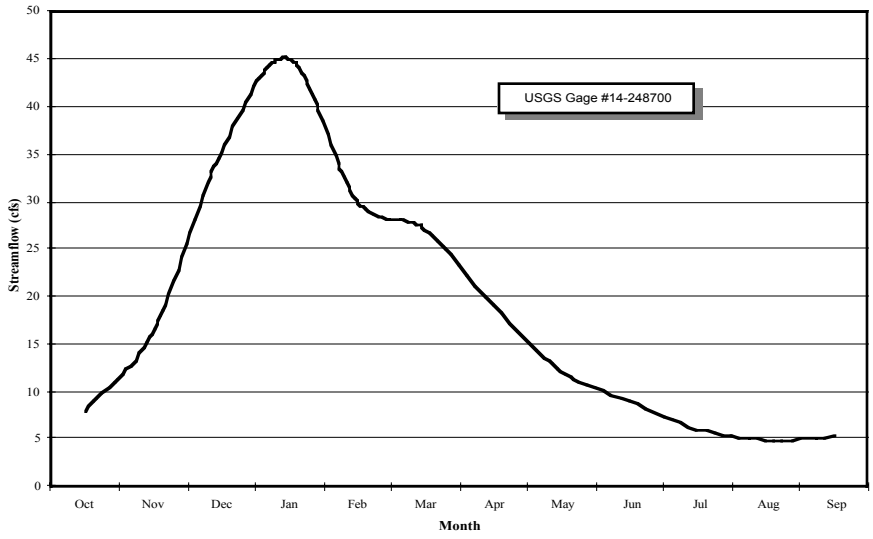
Temperature

	January			*July*		
°F	**46**	**31**	**44**	**76**	**50**	**59**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the Oregon coast is minimal except during unusual storms, which bring very cold, moist air to the region.

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean. A few basins are oriented north draining directly into the Columbia River.

Runoff Patterns: Average monthly streamflows are the highest in the winter.



Peak flow generating process: Rainstorms. Rainstorms originating in the Pacific Ocean typically generate peak flows. Snowmelt is not normally a major factor in flooding.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 75 cfs/mi^2

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	fines	fines
	higher gradient	gravel / fines	fines / gravel	fines / bedrock
Beaver dams	lower gradient	many year-round	many year-round	some in summer
	higher gradient	some in summer	few in summer	none

Natural Disturbances: Fires are more frequent in Douglas-fir/western hemlock forests than in their neighboring Sitka spruce forests, although the interval between fires is quite variable. Large wildfires during late summer and fall once burned large areas of northern Coast Range, killing most trees in its path. Fire suppression has now eliminated most large wildfires.

Ice storms in portions of ecoregion nearest the Columbia River occasionally snap branches of conifers and tops out of alder trees.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (red alder or others) and shrubs. **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (western hemlock, Douglas-fir). Some hardwoods (primarily red alder) may be present. **Size**: Large **Density**: Dense	Few conifers where slopes are unstable.
Semi-constrained	0-50'	**Type**: Hardwoods (red alder or others) and shrubs. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (western hemlock, Douglas-fir). Some hardwoods (primarily red alder) may be present. **Size**: Large **Density**: Dense	Mostly conifer for some well-drained streamside areas. Few conifers where slopes unstable or perpetually wet. Vegetation sometimes modified by beaver browsing and dam building, and repeated browsing by elk. Usually no conifers on low terraces
Un-constrained	0-75'	**Type**: Hardwoods (red alder or others) and shrubs. **Size**: Medium **Density**: Dense	75-100'	**Type**: Mixed (Douglas-fir and red alder) **Size**: Large **Density**: Dense	Mostly conifer for some well-drained streamside areas. Few conifers where soils are perpetually wet. Vegetation sometimes modified by beaver browsing and dam building, and repeated browsing by elk. Usually no conifers on low terraces.

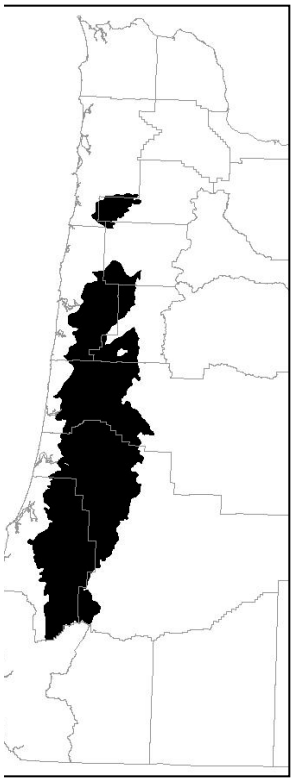
Current Streamside Conifer Regeneration: Somewhat scarce except in western portions of ecoregion where hemlock can become established. Streamside sites often need to be intensively disturbed, followed by control of competing hardwoods and shrubs to ensure conifer regeneration.

Upland vegetation: Douglas-fir, western hemlock, red alder, western red-cedar forests, pasture grasses.

Historic Crown Closure: Crown closure can be as low as 50% on drier sites. In general, historic crown closure is greater than 70%. Due to the absence of large wildfires, stand densities are greater than in the past.

Land Use: Forestry, some rural residential development, pastureland.

Other:



Mid-Coastal Sedimentary (1g)

Location: Central Coast Range; south to upper South Fork Coquille River, north to upper Yamhill River, east to Willamette Valley foothills, west to within 20 miles of ocean.

Drainage Basins: Mid Coast, Umpqua, and South Coast Basins

Geology: Alternating beds of thin siltstone and thick sandstone.

Topography: Medium and large streams and some small streams are low gradient; few waterfalls exist. Headwater small streams are often steep. Headwater small streams are usually bordered by steep slopes. Other streams are bordered by a variety of flat to steep slopes. Watersheds have a high stream density.

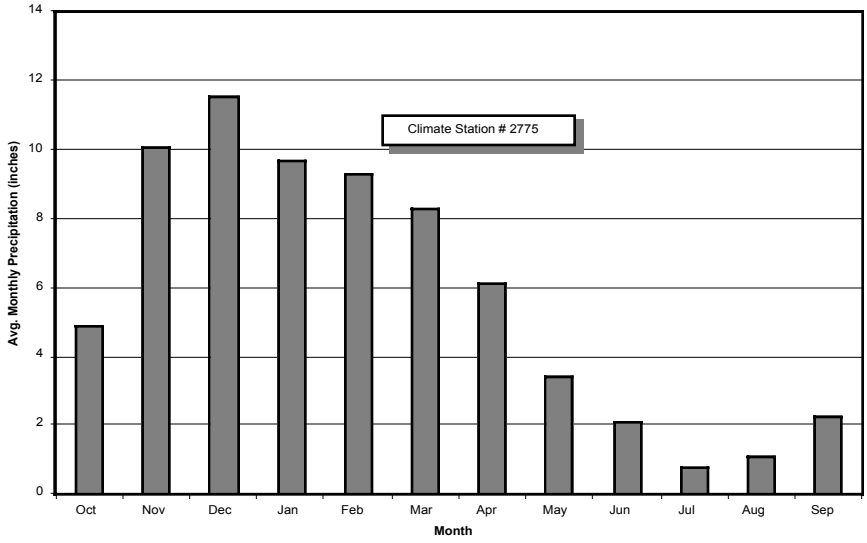
Soil: Gentle slopes are deep clay loam; steeper slopes are shallow gravelly loam.

Erosion: Erosion rate is high due to abundant precipitation, high uplift rates, steep slopes, soft rock, and high landslide occurrence. Landslides are deep-seated earth flows in lower gradient areas or are shallow landslides (often triggering debris slides) in steep headwater channels.

Climate characterization: Wet winters, relatively dry summers and mild temperatures throughout the year. Heavy precipitation results from moist air masses moving off the Pacific Ocean onto land especially during winter months.

Mean annual precipitation: 60 to 130 inches.

Precipitation Pattern: Majority of precipitation occurs in the winter months of November, December, and January.



2-year 24 hour precipitation: 3.5 to 6.5 inches.

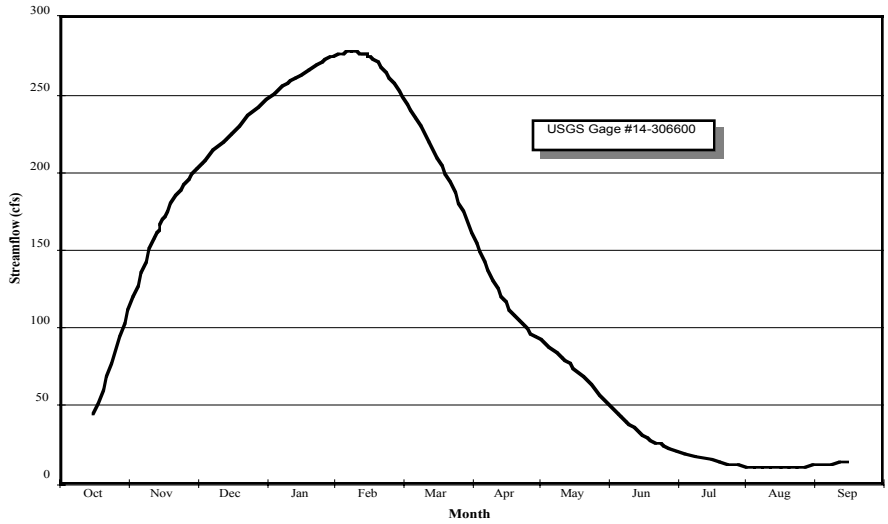
Temperature

	January			*July*		
°F	**48**	**32**	**43**	**78**	**48**	**65**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the Oregon coast is minimal except during unusual storms that bring very cold, moist air to the region.

Hydrologic basin characteristics: Basins drain coastal valleys with peaks ranging from 2,000 to 5,500 feet. Large rivers are oriented toward the west dissecting the coast range and draining into the Pacific Ocean.

Runoff Patterns: Average monthly streamflows are the highest in the winter.



Peak flow generating process: Rainstorms. Rainstorms originating in the Pacific Ocean typically generate peak flows. Snowmelt is not normally a major factor in flooding.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 100 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	gravel / fines	fines / gravel	fines / bedrock
	higher gradient	gravel / bedrock	gravel / bedrock	bedrock
Beaver dams	lower gradient	many year-round	many year-round	some in summer
	higher gradient	some in summer	few in summer	none

Natural Disturbances: Fires are more frequent in Douglas-fir/western hemlock forests than in their neighboring Sitka spruce forests, although the interval between fires is quite variable. Large wildfires during late summer and fall once burned large areas of central Coast Range, killing most trees in its path. Fire suppression has now eliminated most large wildfires.

Extreme windstorms capable of toppling large patches of trees occur about every 35 to 100 years.

Catastrophic earthquakes capable of triggering numerous landslides occur about every 300 years.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 zone	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (red alder or others) and shrubs such as salmonberry and stink currant. **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (Douglas-fir, western hemlock). Some hardwoods (primarily red alder) may be present **Size**: Large **Density**: Dense	Few conifers where slopes are unstable. For more information regarding streamside plant communities, see McCain (1998).
Semi-constrained	0-50'	**Type**: Hardwoods (red alder or others) and shrubs such as salmonberry and vine maple, with swordfern. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (Douglas-fir, western hemlock). Some hardwoods (primarily red alder) may be present. **Size**: Large **Density**: Dense	Mostly conifer for some well-drained streamside areas. Few conifers where slopes unstable or perpetually wet. Vegetation sometimes modified by beaver browsing and dam building, and repeated browsing by elk. Usually no conifers on low terraces. For more information regarding streamside plant communities, see McCain (1998).

CHT group	RA1 zone	RA1 description	RA2 zone	RA2 description	Other considerations
Un-constrained	0-75'	**Type**: Hardwoods (red alder or others) and shrubs such as evergreen huckleberry, pacific rhododendron, salmonberry, stink currant, vine maple, and western hazel. **Size**: Medium **Density**: Dense	75-100'	**Type**: Mixed (Douglas-fir, western hemlock, and red alder). Devil's club and vine maple common in understory) **Size**: Large **Density**: Dense	Mostly conifer for some well-drained streamside areas. Few conifers where soils are perpetually wet. Vegetation sometimes modified by beaver browsing and dam building, and repeated browsing by elk. Usually no conifers on low terraces. For more information regarding streamside plant communities, see McCain (1998).

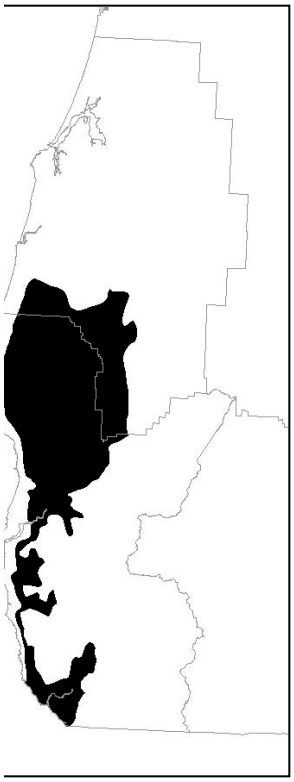
Current Streamside Conifer Regeneration: Uncommon depending on factors such as canopy cover type, availability of local seed source, and availability of suitable substrates. Streamside conifer regeneration is also more common where streamside areas are intensively disturbed, followed by control of competing hardwoods and shrubs.

Upland vegetation: Douglas-fir, western hemlock, red alder, western redcedar forests, pasture grasses.

Historic Crown Closure: Crown closure can be as low as 50% on drier sites. In general, historic crown closure is greater than 70%. Due to the absence of large wildfires, stand densities are greater than in the past.

Land Use: Forestry, pastureland in valleys, some rural residential development.

Other:



Southern Oregon Coastal Mountains (1h)

Location: Southern coastal area from Bandon to Brookings. Inland extent varies from 5 to 20 miles.

Drainage Basins: South Coast and Umpqua Basins

Geology: Geology is a melange of highly-fractured siltstone, shale, sandstone, graywacke, granite, and serpentine.

Topography: Streams are usually high gradient; waterfalls are common. Side slopes are usually steep. Watersheds have a high stream density due to the high precipitation and fractured geology.

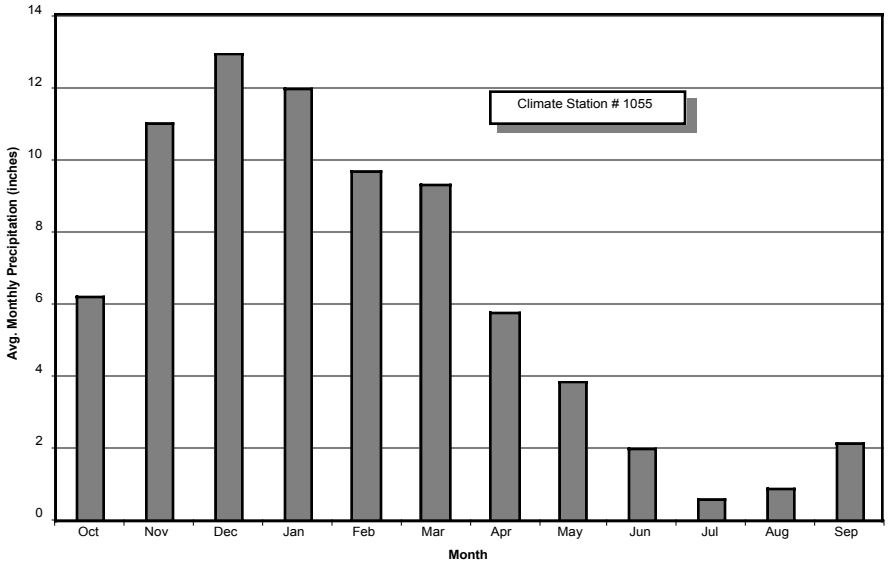
Soil: Soils range from very deep to shallow, silt loam to very gravelly loam.

Erosion: Erosion rate is high due to abundant precipitation, high uplift rates, earthquakes, steep slopes, fractured geology, and high landslide occurrence. Landslides are deep-seated earth flows in lower gradient areas or are shallow landslides (often triggering debris slides) in steep headwater channels

Climate characterization: Wet winters, relatively dry summers and mild temperatures throughout the year. Heavy precipitation results from moist air masses moving off the Pacific Ocean onto land especially during winter months.

Mean annual precipitation: 70 to 140 inches.

Precipitation Pattern: Majority of precipitation occurs in the winter months of November, December, and January.



2-year 24 hour precipitation: 5.0 to 6.0 inches.

Temperature

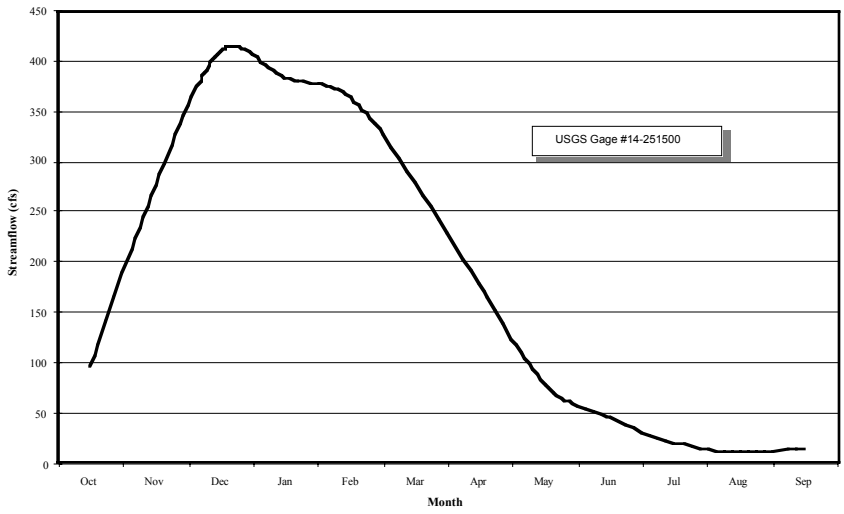
	January			*July*		
°F	**52**	**36**	**48**	**76**	**52**	**59**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the Oregon coast is minimal except during unusual storms that bring very cold, moist air to the region.

Hydrologic basin characteristics: Basins drain coastal valleys with peaks ranging from 2,000 to 5,500 feet. Streams are generally oriented toward the west dissecting the Siskiyou Mountains and draining into the Pacific Ocean.

Runoff patterns: Average monthly streamflows are the highest in the winter.*

* as represented by a stream gage from ecoregion 1b because no daily values were available for this ecoregion.



Peak flow generating process: Rainstorms. Peak flows are typically generated by rainstorms originating in the Pacific Ocean. Snowmelt is not normally a major factor in flooding.

Peak flow magnitude (2-year recurrence interval): 75 cfs/mi^2 to 200 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	gravel	Gravel	gravel / cobbles
	higher gradient	gravel / cobbles	gravel / cobbles	cobbles / bedrock
Beaver dams	lower gradient	some year-round	few year-round	none
	higher gradient	few in summer	none	none

Natural Disturbances: Fires are more frequent in Douglas-fir/western hemlock forests than in their neighboring Sitka spruce forests, although the interval between fires is quite variable. Large wildfires during late summer and fall once burned large areas within southern Coast Range. Fires sometimes skipped over streamside areas. Fire suppression has now eliminated most large wildfires.

Extreme windstorms capable of toppling large patches of trees occur about every 35 to 100 years.

Smaller earthquakes capable of triggering landslides occur every decade or so and catastrophic earthquakes occur about every 300 years.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Mixed (western hemlock, western redcedar, Port-Orford cedar, grand fir, tanoak, myrtle, red alder) and shrubs **Size**: Medium **Density**: Dense	25-100'	**Type**: Mixed (Douglas-fir, western hemlock, western redcedar, Port-Orford cedar, grand fir, tanoak, myrtle, red alder) **Size**: Large **Density**: Dense	
Semi-constrained	0-50'	**Type**: Mixed (western hemlock, western redcedar, Port-Orford cedar, grand fir, tanoak, myrtle, red alder) and shrubs **Size**: Medium **Density**: Dense	50-100'	**Type**: Mixed (Douglas-fir, western hemlock, western redcedar, Port-Orford cedar, grand fir, tanoak, myrtle, red alder) **Size**: Large **Density**: Dense	

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Un-constrained	0-75'	**Type**: Hardwoods (tanoak, myrtle, red alder, Oregon ash) and shrubs. **Size**: Medium **Density**: Dense	75-100'	**Type**: Mixed (Douglas-fir, western hemlock, western redcedar, Port-Orford cedar, grand fir, tanoak, myrtle, red alder) **Size**: Large **Density**: Dense	Areas with mostly conifer often occur on infrequently disturbed higher terraces.

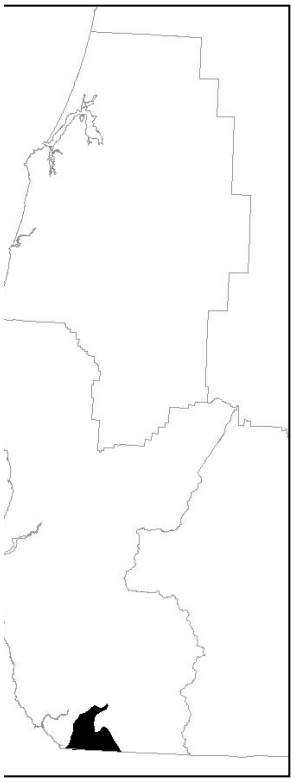
Current Streamside Conifer Regeneration: Somewhat common to uncommon unless streamside areas are intensively disturbed, followed by control of competing hardwoods and shrubs. Conifer regeneration is more common here than in the central and northern coast range.

Upland vegetation: Douglas-fir, western hemlock, tanoak, Port Orford cedar forests, pasture grasses.

Historic Crown Closure: Crown closure can be as low as 50% on drier sites. In general, historic crown closure is greater than 70%. Due to the absence of large wildfires, stand densities are greater than in the past.

Land Use: Land use is mostly commercial forestry. Some farm use in the wider valleys and gentle slopes. Some recreation, and rural residential development.

Other: Irrigation withdrawals result in the partial dewatering of some streams during the summer.



Redwood Zone (1i)

Location: Small coastal area near California border.

Drainage Basin: Rogue Basin

Geology: Geology is highly dissected graywacke.

Topography: Streams usually have a medium gradient; some waterfalls occur. Watersheds have a high stream density due to the high precipitation and fractured geology. Side slopes are moderately steep

Soil: Soils range from very deep to moderately deep, well-drained, silty clay loam to silt loam.

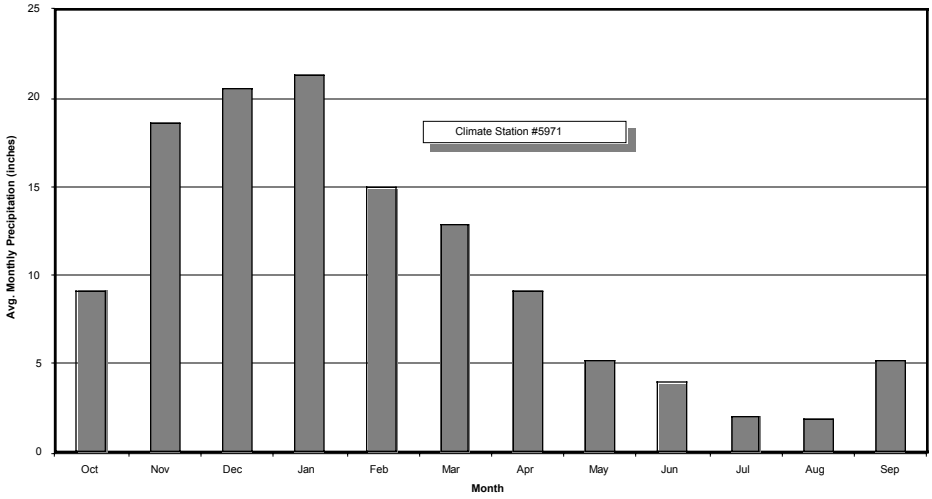
Erosion: Erosion rate is high due to abundant precipitation, high uplift rates, earthquakes, fractured geology, and high landslide occurrence. Landslides are deep-seated earth flows in lower gradient areas or are shallow landslides (often triggering debris slides) in steep headwater channels.

Climate characterization: Rainstorms. Peak flows are typically generated by rainstorms originating in the Pacific Ocean. Snowmelt is not normally a major factor in flooding.

Mean annual precipitation: 80 to 95 inches.

Precipitation Pattern: Majority of precipitation occurs in the winter months of November, December, and January.*

* as represented by climate data from ecoregion 1b because no climate data were available for this ecoregion.



2-year 24 hour precipitation: 5.0 to 5.5 inches.

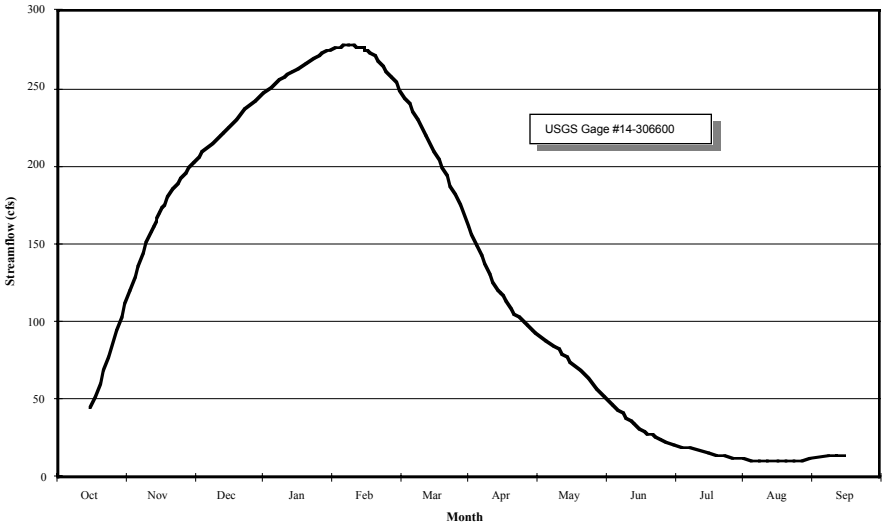
Temperature

	January			*July*		
°F	**50**	**38**	**48**	**74**	**50**	**59**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the Oregon coast is minimal except during unusual storms which bring very cold, moist air to the region.

Hydrologic basin characteristics: Dissected mountains and foothills with medium gradient streams draining to the west, into the Pacific Ocean. Most basins are oriented to the south and west.

Runoff patterns: Average monthly streamflows are the highest in the winter.*



* as represented by a stream gage from ecoregion 1b because no daily values were available for this ecoregion.

Peak flow generating process: Rainstorms. Peak flows are typically generated by rainstorms originating in the Pacific Ocean. Snowmelt is not normally a major factor in flooding.

Peak flow magnitude (2-year recurrence interval): 75 cfs/mi^2 to 200 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	fines	gravel / fines	gravel / cobbles
	higher gradient	gravel / fines	gravel / cobbles	cobbles / bedrock
Beaver dams	lower gradient	some year-round	few year-round	none
	higher gradient	few in summer	none	none

Natural Disturbances: Redwood forests experience fires of moderate severity, although redwood trees are fairly resistant to the effects of most fires. Fire return intervals vary, often depending on site moisture. Large wildfires during late summer and fall once burned large areas within southern Coast Range. Fires sometimes skipped over streamside areas, especially in the Redwood Zone that is frequently influenced by fog. Fire suppression has now eliminated most large wildfires.

Extreme windstorms capable of toppling large patches of trees occur about every 35 to 100 years.

Smaller earthquakes capable of triggering landslides occur every decade or so and catastrophic earthquakes occur about every 300 years.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (tanoak, myrtle, red alder) and shrubs. **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (redwood, Douglas-fir). Some hardwoods may be present. **Size**: Large **Density**: Dense	
Semi-constrained	0-50'	**Type**: Hardwoods (tanoak, myrtle, red alder) and shrubs. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (redwood, Douglas-fir). Some hardwoods may be present. **Size**: Large **Density**: Dense	
Un-constrained	0-75'	**Type**: Hardwoods (tanoak, myrtle, red alder) and shrubs. **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifers (redwood, Douglas-fir). Some hardwoods may be present. **Size**: Large **Density**: Dense	Areas with mostly conifer often occur on infrequently disturbed higher terraces.

Current Streamside Conifer Regeneration: Uncommon unless streamside areas are intensively disturbed, followed by control of competing hardwoods and shrubs.

Upland vegetation: Douglas-fir, coastal redwood forests.

Historic Canopy Closure: Historic canopy closure was greater than 30%. Fire played a role in these forest systems, so they were less dense in the past than they are today.

Land Use: Forestry, recreation, rural residential development.

Other: This ecoregion occurs in a small portion of southern Curry County.

Cowlitz/Chehalis Foothills (2h)

Location: Along the Columbia River, between Clatskanie and Astoria. (Note: this is only a small portion of a large ecoregion, most of which is in Washington State).

Drainage Basin: North Coast Basin

Geology: Pleistocene alpine glacial deposits; Tertiary sandstone and siltstone; Eocene andesite.

Topography: Flat to rolling hills.

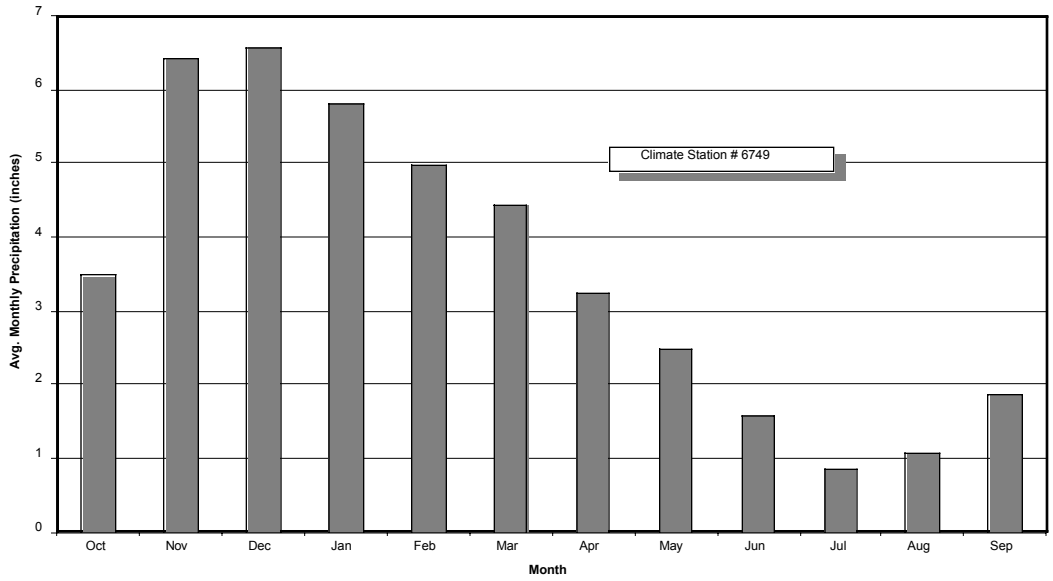
Soil: Very deep, well-drained to very well drained, silty clay loam to loam.

Erosion: Erosion rate is theoretically high due to abundant precipitation and erodible soils, however, the portion of this Ecoregion that is in Oregon is relatively flat, consequently erosion rate is low.

Climate characterization: Wet winters, relatively dry summers and mild temperatures throughout the year. Heavy precipitation results from moist air masses moving off the Pacific Ocean up the Columbia River Corridor.

Mean annual precipitation: 50 to 60 inches.

Precipitation Pattern: Majority of precipitation occurs in the winter months of November, December, and January.*



* as represented by climate data from ecoregion 3a because no climate data were available for this ecoregion.

2-year 24 hour precipitation: 2.0 to 2.5 inches.

Temperature

	January			*July*		
°F	**45**	**33**	**40**	**76**	**50**	**68**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall in the low-lying areas along the banks of the Columbia River is minimal.

Hydrologic basin characteristics: This ecoregion is primarily flood plain with side channels and sloughs influenced by Columbia River processes.

Runoff patterns: Not applicable.

Peak flow generating process: Rainfall.

Peak flow magnitude (2-year recurrence interval): Not applicable.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (red alder or others) & shrubs. **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (western hemlock, Douglas-fir). Some hardwoods (primarily red alder) may be present. **Size**: Large **Density**: Dense	Few conifers where slopes are unstable.
Semi-constrained	0-50'	**Type**: Hardwoods (red alder or others) & shrubs. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (western hemlock, Douglas-fir). Some hardwoods (primarily red alder) may be present. **Size**: Large **Density**: Dense	Mostly conifer for some well-drained streamside areas. Few conifers where slopes unstable or perpetually wet. Vegetation sometimes modified by beaver browsing & dam building, & repeated browsing by elk. Usually no conifers on low terraces
Un-constrained	0-75'	**Type**: Hardwoods (red alder or others) and shrubs. **Size**: Medium **Density**: Dense	75-100'	**Type**: Mixed (western hemlock, Douglas-fir and red alder) **Size**: Large **Density**: Dense	Mostly conifer for some well-drained streamside areas. Few conifers where soils are perpetually wet. Vegetation sometimes modified by beaver browsing and dam building, and repeated browsing by elk. Usually no conifers on low terraces.

Current Streamside Conifer Regeneration:

Upland vegetation: Western hemlock and Western red cedar.

Historic Canopy Closure: Crown closure can be as low as 50% on drier sites. In general, historic crown closure is greater than 70%. Due to the absence of large wildfires, stand densities are greater than in the past.

Land Use: Forestry, rural-residential development, hay farming, pastureland.

Other:

Portland / Vancouver Basin (3a)

Location: Portland metropolitan area, excluding the West Hills.

Drainage Basin: Lower Willamette Basin

Geology: Geology is fluvial deposits from the Missoula floods.

Topography: Streams flow over high terraces and through low hills; channel gradient is usually low. Watersheds have a low stream density. Channel are usually highly altered (channelized and diked) due to city development. Streams usually have headwater tributaries within adjacent ecoregions that are steeper.

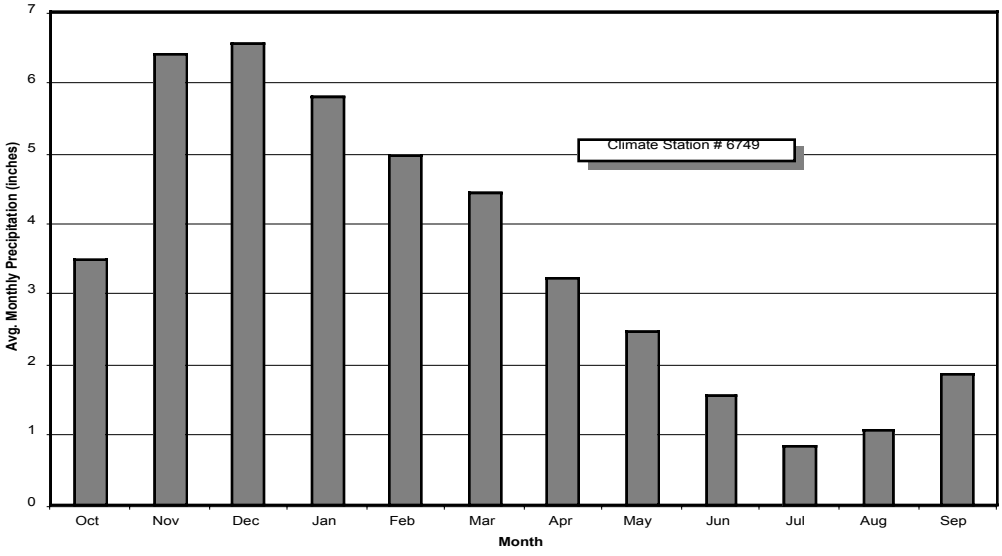
Soil: Soils are deep silty clay loam to loam.

Erosion: Natural erosion rate is low, yet runoff from impermeable city surfaces deliveries sediment to streams.

Climate characterization: Mild climate. Cool, wet winters and warm, dry summers and mild temperatures throughout the year. Predominantly winter rainfall occurs and precipitation increases with elevation.

Mean annual precipitation: 37 to 50 inches

Precipitation Pattern: Majority of precipitation in Northwest Interior Oregon occurs in the winter months of November through February. Often, 50% of the annual precipitation occurs in the winter season.



2-year 24 hour precipitation: 2.0 - 2.5 inches

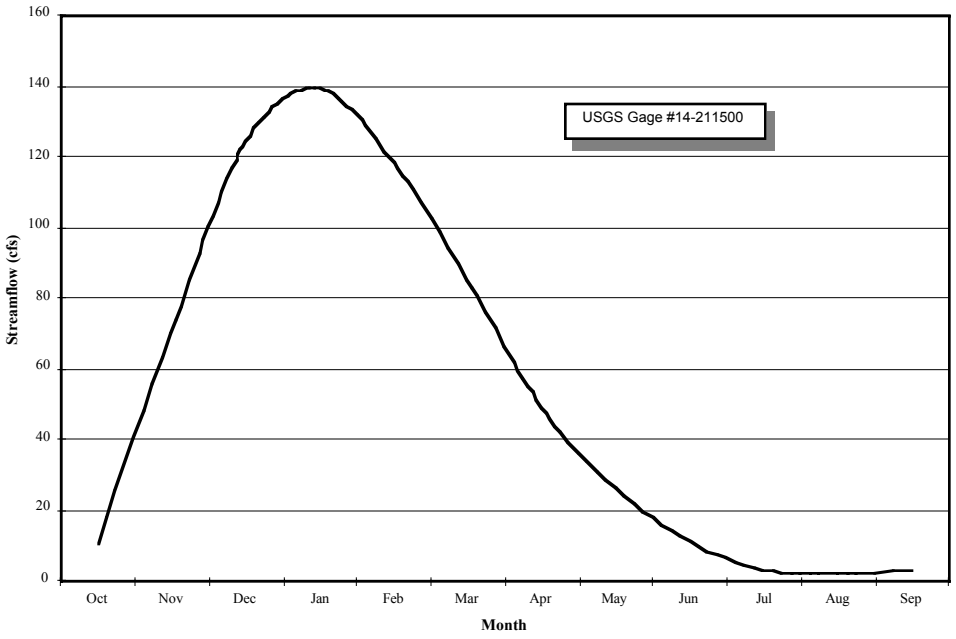
Temperature

	January			*July*		
°F	**45**	**34**	**40**	**80**	**56**	**68**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the interior valleys occurs nearly every year but the amounts are generally quite low.

Hydrologic basin characteristics: The major river basin, the Willamette, is oriented toward the north, draining into the Columbia River.

Runoff patterns: Average monthly streamflows are highest in the winter.



Peak flow generating process: Rainstorms or rain-on-snow events. High streamflows are typically generated by rainfall produced by storms originating in the Pacific Ocean. Snowmelt is not normally a major factor in flooding except in a few of the headwater streams with mean basin elevations above 2300 feet.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 75 cfs/mi^2, few streams >100 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	fines	fines	fines
	Higher gradient	fines / gravel	fines / gravel	fines / gravel
Beaver dams	Lower gradient	none	none	none
	Higher gradient	none	none	none

Natural Disturbances: Periodic burning in the past maintained prairie vegetation and occasionally encroached on streamside vegetation. Fires are no longer a part of the ecosystem.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-100'	**Type**: Hardwoods (red alder, big-leaf maple, Oregon ash) & shrubs (whiplash willow, Douglas spiraea, & snowberry). **Size**: Medium **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Semi-constrained	0-100'	**Type**: Hardwoods (red alder, big-leaf maple, Oregon ash) & shrubs (whiplash willow, Douglas spiraea, & snowberry). **Size**: Medium **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Un-constrained	0-100'	**Type**: Hardwoods (Cottonwood, big-leaf maple, Oregon ash) and shrubs (whiplash willow, Douglas spiraea, and snowberry). **Size**: Medium **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	May include stream-adjacent wetlands with low vegetation or Oregon ash.

Current Streamside Conifer Regeneration: Scarce due to competing hardwoods and shrubs. Landowners usually do not plant conifers in their yards due to worries about excessive shade and windthrow.

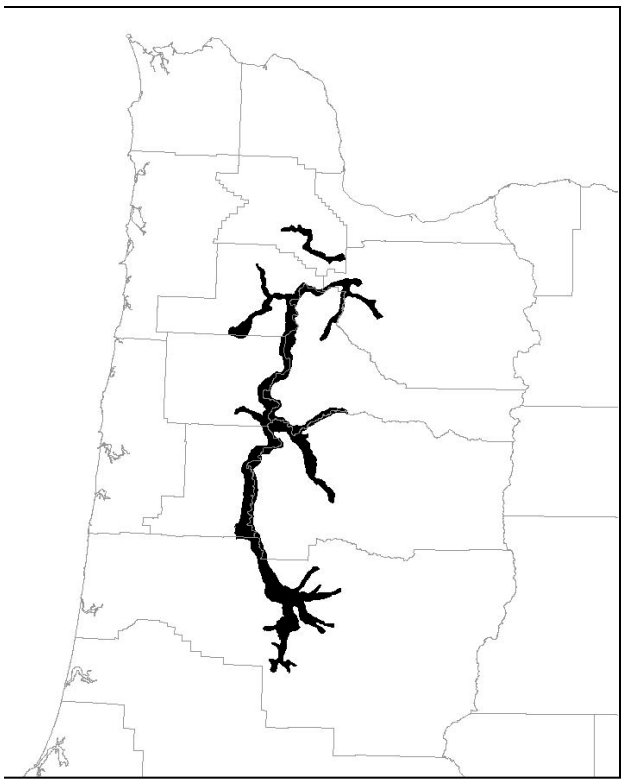
Upland vegetation: Urban and suburban native and exotic vegetation, pasture grasses, crops. Potential natural vegetation includes prairies, Oregon white oak, Douglas-fir, Oregon ash, alder, and Western Red Cedar.

Historic Crown Closure: Dense forests in this area were historically confined to the mountain foothills and floodplains. Most of the landscape was dominated by prairies and oak savannas with less than 30% crown closure. Today, due to fire suppression, prairies are disappearing and dense forests taking their place. Urban and agricultural development has also altered the dominance of prairies and oak savannas.

Land Use: Urban, suburban, rural residential, industrial, pastureland, nursery crops and golf courses.

Other:

Willamette River and Tributaries Gallery Forest (3b)



Location: Corridors along the Willamette River and its major tributaries.

Drainage Basin: Willamette Basin

Geology: Geology is fluvial deposits from the Missoula floods and sediments deposited by the river.

Topography: The rivers have floodplains bordered on each side by either cemented Missoula flood deposits or by rock outcrops. The river meanders within these boundaries, reworking sediments near rivers. Sediment size ranges from silt to cobble.

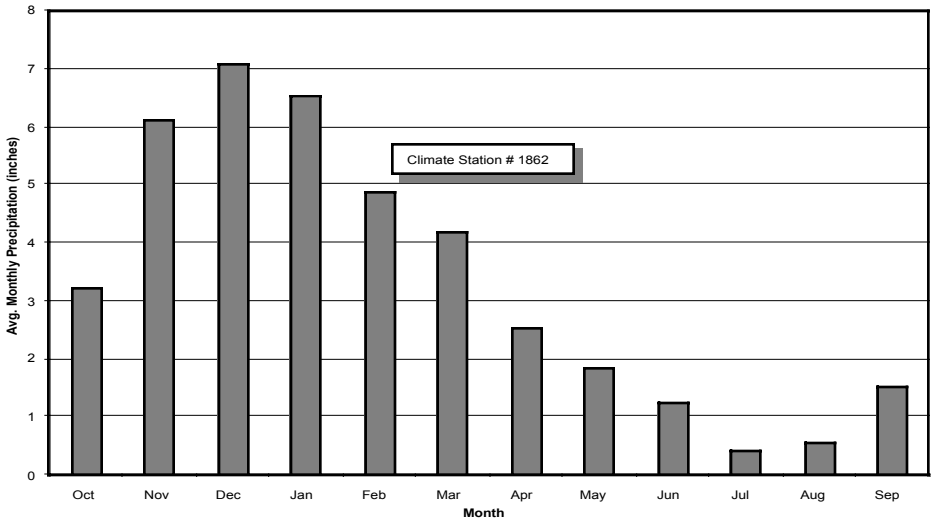
Soil: Soils are deep fertile, silty clay loam to fine sandy loam.

Erosion: Erosion rate is low but sediment loads in rivers can be high during high flows as channels meander.

Climate characterization: Mild climate. Cool, wet winters and warm, dry summers and mild temperatures throughout the year. Predominantly winter rainfall occurs and the amount of precipitation increases with elevation.

Mean annual precipitation: 40 to 50 inches

Precipitation Pattern: Majority of precipitation in Northwest Interior Oregon occurs in the winter months of November through February. Often 50% of the annual precipitation occurs in the winter season.



2-year 24 hour precipitation: 2.0 – 3.0 inches.

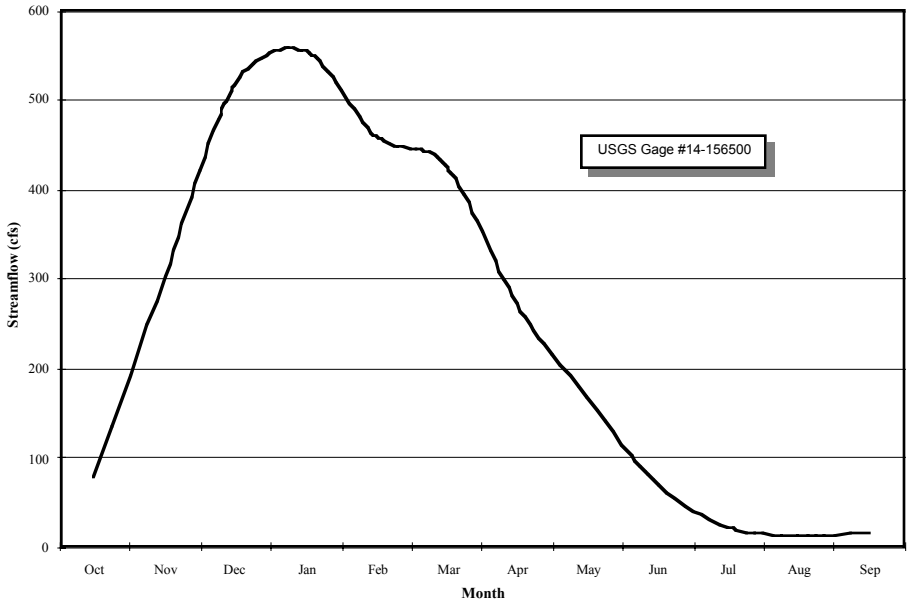
Temperature

	January			*July*		
°F	**46**	**33**	**40**	**85**	**50**	**65**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the interior valleys occurs nearly every year but the amounts are generally quite low.

Hydrologic basin characteristics: The major river basin, the Willamette, is oriented toward the north, draining into the Columbia River.

Runoff patterns: Average monthly streamflows are highest in the winter.



Peak flow generating process: Rainstorms are the primary producer of peak flows.

Peak flow magnitude (2-year recurrence interval): Less than 25 cfs/mi^2.

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	N/A	N/A	fines
	higher gradient	N/A	N/A	gravel / cobbles
Beaver dams	lower gradient	N/A	N/A	none
	higher gradient	N/A	N/A	none

Natural Disturbances: Periodic floods inundate adjacent terraces and channel meandering disturbs vegetation. Frequent low-intensity fires may have been much more common within oak woodlands in the past.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-100'	**Type**: Hardwoods (black cottonwood, Oregon ash, western hawthorn, bigleaf maple) and shrubs (willows, red-osier dogwood, hazelnut, snowberry). **Size**: Large **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Reed canarygrass and Himalayan black-berry (invasive species) often dominate in areas without trees. Oregon white oak, Douglas-fir, and grand fir grow on adjacent terraces.
Semi-constrained	0-100'	**Type**: Hardwoods (black cottonwood, Oregon ash, western hawthorn, bigleaf maple) and shrubs (willows, red-osier dogwood, hazelnut, snowberry). **Size**: Large **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Reed canarygrass and Himalayan black-berry (invasive species) often dominate in areas without trees. Oregon white oak, Douglas-fir, and grand fir grow on adjacent terraces above the flood plain.
Un-constrained	0-100'	**Type**: Hardwoods (black cottonwood, Oregon ash, western hawthorn, bigleaf maple) and shrubs (willows, red-osier dogwood, hazelnut, snowberry). **Size**: Large **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Reed canarygrass and Himalayan black-berry (invasive species) often dominate in areas without trees. Willows dominating the shore are rigid willow, whiplash willow, soft-leaved willow, and cascade range willow. Oregon white oak, Douglas-fir, and grand fir grow on adjacent terraces above the flood plain. Channel often braided, and bare gravel deposits are common following winter high flows.

Current Streamside Conifer Regeneration: Scarce except on some adjacent high terraces.

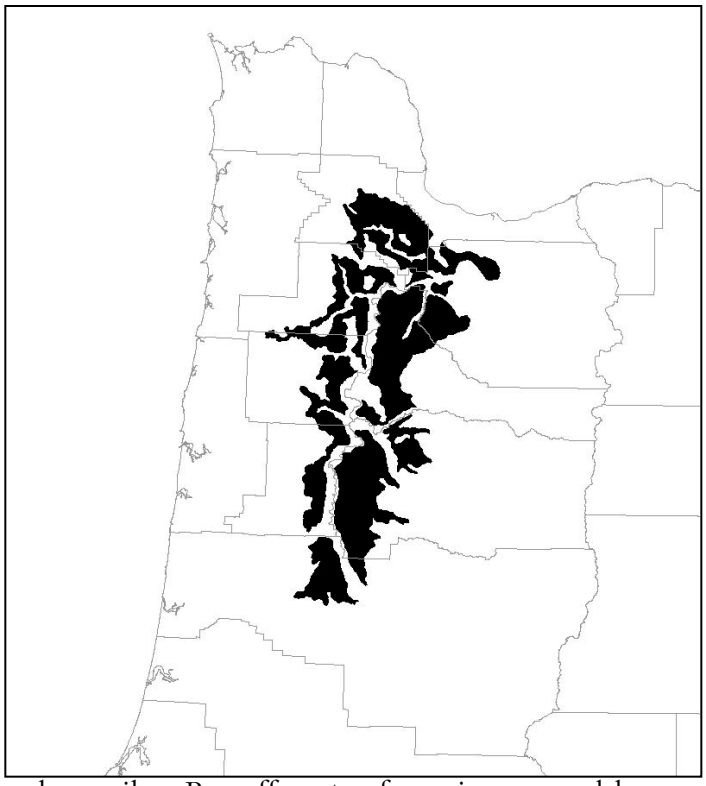
Upland vegetation: Vegetable and fruit crops, pastureland, forested riparian areas, urban and suburban native and exotic vegetation. Potential natural vegetation includes cottonwood, alder, Oregon ash, bigleaf maple, and Douglas-fir.

Historic Crown Closure: The floodplain forests of the Willamette valley were historically dense, greater than 70% crown closure.

Land Use: Vegetable and fruit farming, grass seed production, orchards, other crops, pasturelands, urban, suburban and rural residential development and undeveloped flood plain.

Other: Upstream flood control reservoirs have reduced flood peaks by about one-half, resulting in reduced disturbance of streamside vegetation during the winter. Many banks on outside of river bends have been riprapped to minimize channel meandering. The mainstem channel has been significantly simplified (Johannessen 1970)

Prairie Terraces (3c)



Location: Willamette River valley from Beaverton to Eugene.

Drainage Basin: Willamette Basin

Geology: Geology is fluvial deposits from the Missoula floods.

Topography: Streams are very low gradient; few waterfalls exist. Headwater small streams are often in adjacent and steeper ecoregions. Watersheds have a low stream density. Streams flow across terraces and often are deeply entrenched within clay banks.

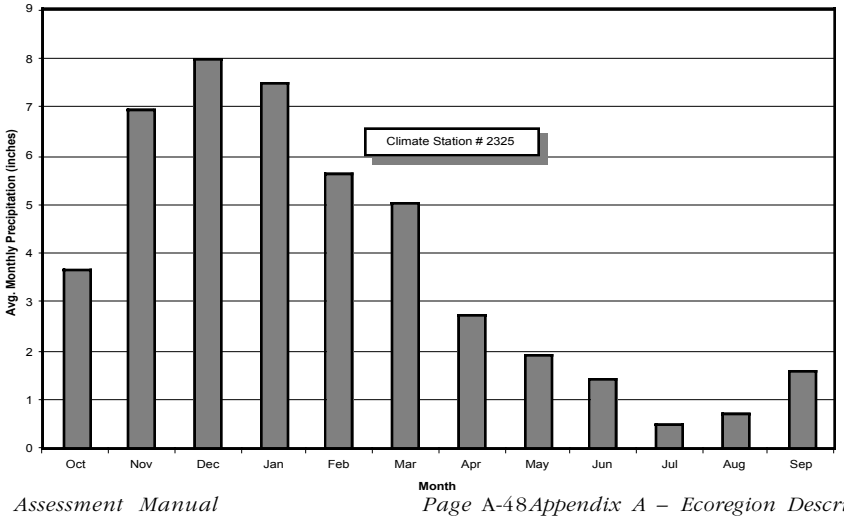
Soil: Soils are deep silty clay loam to silt loam.

Erosion: Erosion rate is low, yet streams are often turbid because of the clay soils. Runoff water from impermeable surfaces can add sediment to streams where they flow through towns.

Climate characterization: Mild climate. Cool, wet winters and warm, dry summers and mild temperatures throughout the year. Predominantly winter rainfall occurs and the amount of precipitation increases with elevation.

Mean annual precipitation: 40 to 50 inches; up to 70 inches in the higher elevations.

Precipitation Pattern: Majority of precipitation in Northwest Interior Oregon occurs in the winter months of November through February. Often 50% of the annual precipitation occurs in the winter season.



2-year 24 hour precipitation: 2.0 to 3.5 inches

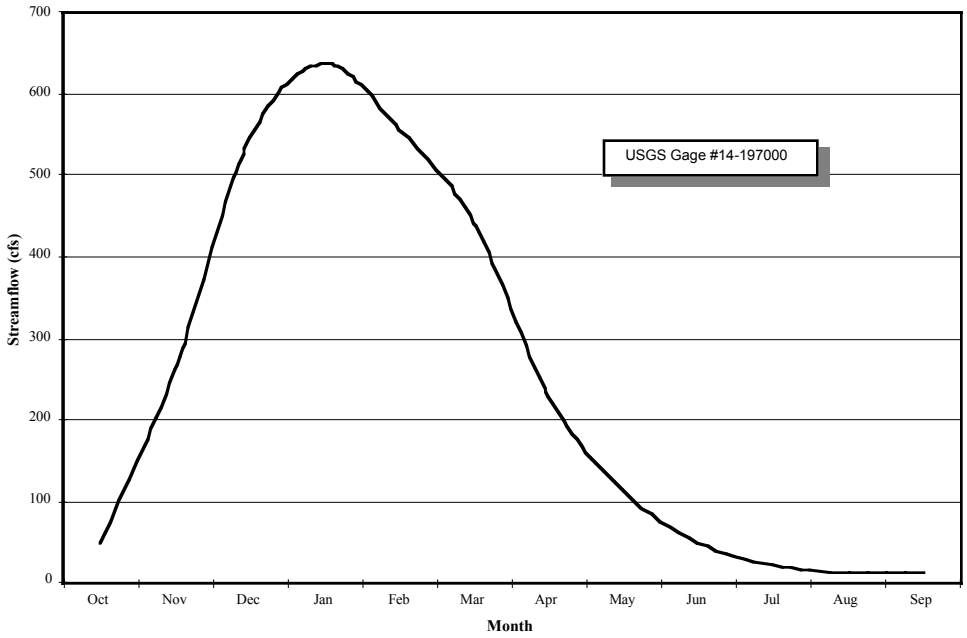
Temperature

	January			*July*		
°F	**46**	**33**	**40**	**85**	**51**	**67**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the interior valleys occurs nearly every year but the amounts are generally quite low.

Hydrologic basin characteristics: The major river basin, the Willamette, is oriented toward the north, draining into the Columbia River.

Runoff patterns: Average monthly streamflows are highest in the winter.



Peak flow generating process: Rainstorms are the primary producer of peak flows.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 75 cfs/mi^2, few streams >75 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	fines	fines	fines
	higher gradient			
Beaver dams	lower gradient	many year-round	many year-round	Some in summer
	higher gradient			

Natural Disturbances: Periodic burning by Native Americans in the past maintained prairie vegetation and occasionally encroached on streamside vegetation. Frequent low-intensity fires may have been much more common within oak woodlands in the past. Fires are no longer a part of the ecosystem.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	100'	**Type**: Hardwoods (black cottonwood, willows, Oregon ash, bigleaf maple, western hawthorn) & shrubs (Douglas spirea, snowberry). **Size**: Large **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Reed canarygrass and Himalayan blackberry (invasive species) often dominate in areas without trees. Oregon white oak, Douglas-fir, and grand fir grow on adjacent terraces that are well-drained.
Semi-constrained	100'	**Type**: Hardwoods (black cottonwood, willows, Oregon ash, bigleaf maple, western hawthorn) & shrubs (Douglas spirea, snowberry). **Size**: Large **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Reed canarygrass and Himalayan blackberry (invasive species) often dominate in areas without trees. Oregon white oak, Douglas-fir, and grand fir grow on adjacent terraces that are well-drained.
Un-constrained	100'	**Type**: Hardwoods (black cottonwood, willows, Oregon ash, bigleaf maple, western hawthorn) & shrubs (Douglas spirea, snowberry). **Size**: Large **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Reed canarygrass and Himalayan blackberry (invasive species) often dominate in areas without trees. Oregon white oak, Douglas-fir, and grand fir grow on adjacent terraces that are well-drained.

Current Streamside Conifer Regeneration: Naturally scarce except on well-drained areas.

Upland vegetation: Grass seed, grain, some forested riparian areas. Potential natural vegetation includes Oregon white oak savanna, and prairies. In wetter areas, includes Oregon ash, Douglas-fir, grand fir wetland vegetation.

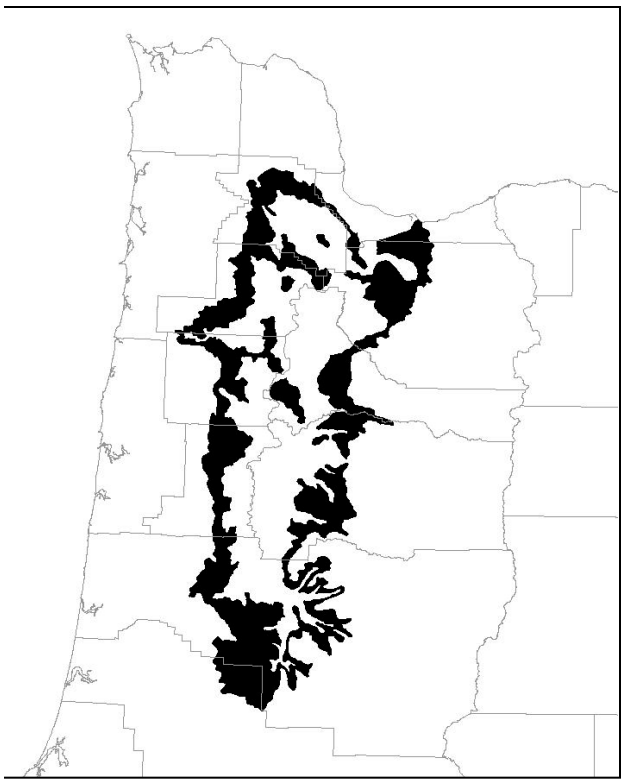
Historic Crown Closure: Dense forests in this area were confined to the mountain foothills and floodplains. Most of the landscape was dominated by prairies and oak

savannas with less than 30% crown closure. Today, due to fire suppression, oak savannas are being replaced by oak woodlands or Douglas fir forests with crown closures of greater than 50%.

Land Use: Farming, urban and rural residential development.

Other: Many streams have been channelized to maximize drainage within fields. Irrigation withdrawals result in the partial dewatering of some streams during the summer. Wetlands have been drained for agricultural production.

Valley Foothills (3d)



Location: Foothills bordering the Willamette River valley.

Drainage Basin: Willamette Basin

Geology: Geology is comprised of basalt or sandstone.

Topography: Streams are moderate gradient; few waterfalls exist. Headwater small streams are sometimes in adjacent and steeper ecoregions. Watersheds have a moderate stream density. Terrain is rolling hills.

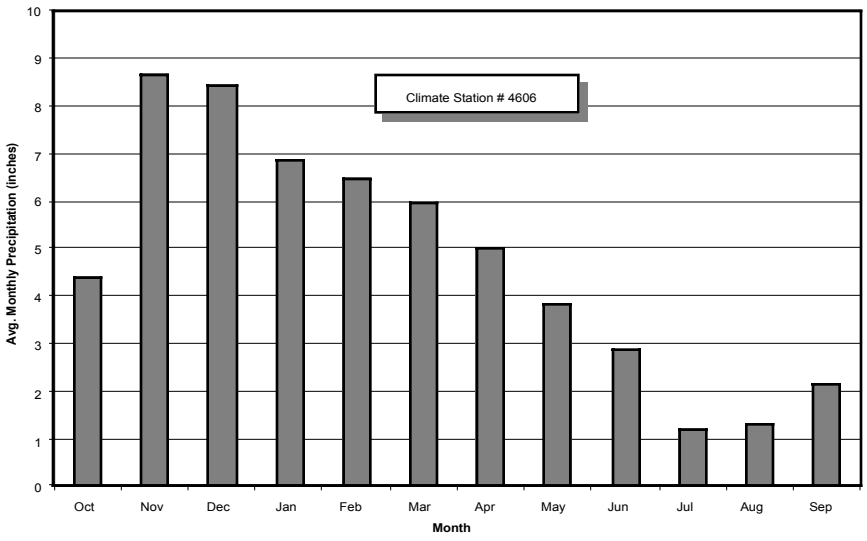
Soil: Soils are deep silty clay loam to silt loam.

Erosion: Erosion rate is low. Landslides are few. Where landslides exist, they are usually in the form of earth flows.

Climate characterization: Mild climate. Cool, wet winters and warm, dry summers and mild temperatures throughout the year. Predominantly winter rainfall occurs and the amount of precipitation increases with elevation.

Mean annual precipitation: 40 to 60 inches; up to 90 inches in higher elevations.

Precipitation Pattern: Majority of precipitation in Northwest Interior Oregon occurs in the winter months of November through February. Often 50% of the annual precipitation occurs in the winter season.



2-year 24 hour precipitation: 2.5 to 4.0 inches.

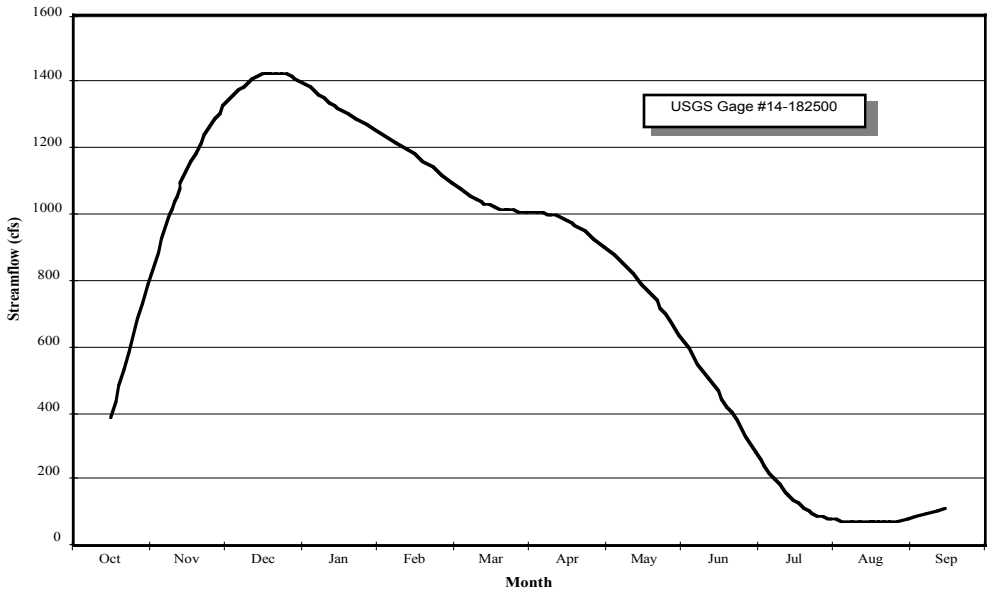
Temperature

	January			*July*		
°F	**46**	**32**	**39**	**80**	**50**	**65**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the interior valleys occurs nearly every year but the amounts are generally quite low. Some of the higher elevations and north-facing slopes in the Cascade foothills receive more snow.

Hydrologic basin characteristics: Tributaries to the Willamette River drain west from the Cascade foothills and east from the coastal mountain range.

Runoff patterns: Average monthly streamflows are highest in the winter; some streams also experience high volumes of runoff during the spring snowmelt period.



Peak flow generating process: In the foothills, as the landscape becomes more mountainous (above 2300 feet in elevation), rain-on-snow events are responsible for producing peak flows as well as rainstorms.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 100 cfs/mi^2, few streams >100 cfs/mi^2.

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	fines	fines
	higher gradient	gravel	fines / gravel	gravel
Beaver dams	lower gradient	many year-round	many year-round	some in summer
	higher gradient	some year-round	some in summer	none

Natural Disturbances: Periodic burning by native Americans in the past maintained prairie vegetation and occasionally encroached on streamside vegetation. Fires are no longer a part of the ecosystem.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Mixed (Douglas-fir, western hemlock, red alder, bigleaf maple) and shrubs (willow, snowberry, Douglas spirea). **Size**: Medium **Density**: Dense	25-100'	**Type**: Mixed (Douglas-fir, grand fir, and bigleaf maple) **Size**: Large **Density**: Dense	Few conifers where slopes are unstable or perpetually wet.
Semi-constrained	0-50'	**Type**: Mixed (Douglas-fir, western hemlock, red alder, bigleaf maple) and shrubs (willow, snowberry, Douglas spirea). **Size**: Medium **Density**: Dense	50-100'	**Type**: Mixed (Douglas-fir, grand fir, and bigleaf maple) **Size**: Large **Density**: Dense	Few conifers where slopes are unstable or perpetually wet. Vegetation is often highly altered where there is significant beaver browsing and dam building.
Un-constrained	0-75'	**Type**: Mixed (Douglas-fir, western hemlock, red alder, bigleaf maple) and shrubs (willow, snowberry, Douglas spirea). **Size**: Medium **Density**: Dense	75-100'	**Type**: Mixed (Douglas-fir, grand fir, and bigleaf maple) **Size**: Large **Density**: Dense	Few conifers where slopes are unstable or perpetually wet. Vegetation is often highly altered where there is significant beaver browsing and dam building.

Current Streamside Conifer Regeneration: Common on well-drained sites. Poorly-drained sites are usually dominated by hardwoods or where beaver are active.

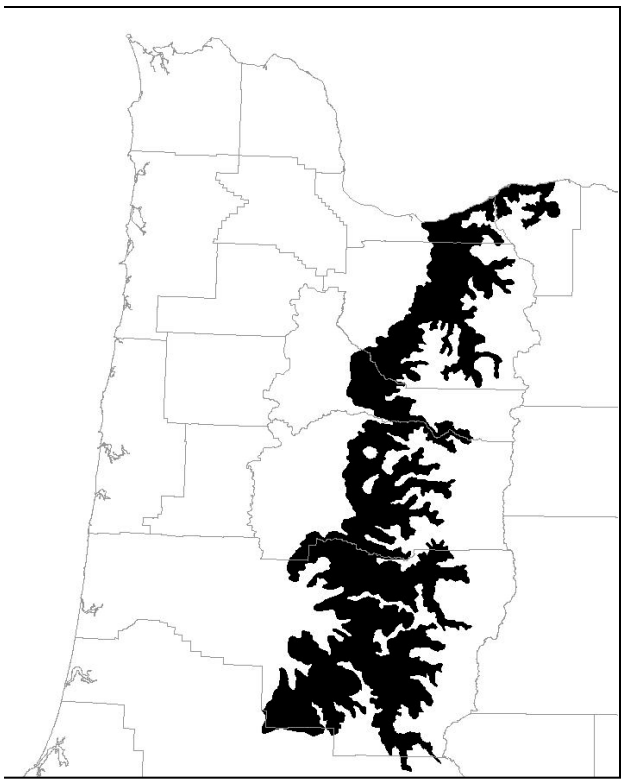
Upland vegetation: Pastureland, conifer and deciduous forests, vineyards, orchards. Potential natural vegetation includes Oregon white oak, madrone; some Douglas-fir and western red cedar.

Historic Crown Closure: Dense forests were historically found in this ecoregion, greater than 30% crown closure.

Land Use: Forestry, farming and rural residential.

Other: Irrigation withdrawals result in the partial dewatering some streams during the summer.

Western Cascades Lowlands and Valleys (4a)



Location: In the western Cascade Mountains east of the Willamette valley at elevations up to 3000 feet.

Drainage Basin: Willamette Basin

Geology: Geology consists of lava flows.

Topography: Large streams flow through steep-sided canyons in western portions of the ecoregion and uncommonly through U-shaped glacial valleys in some eastern portions. Small and medium streams can range from low to high gradient. Waterfalls are common. Watersheds have a moderately high stream density.

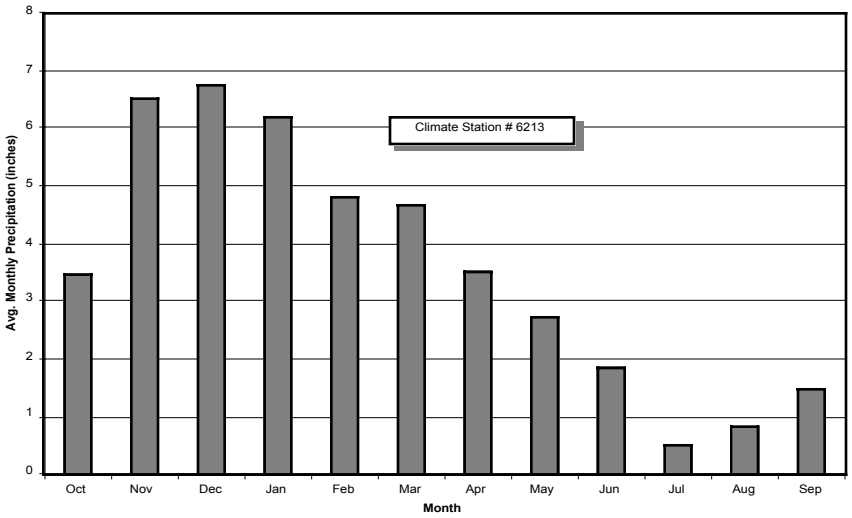
Soil: Soils range widely from deep clay loams to cobbly loams.

Erosion: Erosion rate is moderate due to abundant precipitation and steep slopes. Competent geology keeps erosion rates from being high. Landslides are usually deep-seated earth flows in lower gradient areas. Shallow landslides (often triggering debris slides) sometimes occur in steep headwater channels.

Climate characterization: Mild climate. Cool, wet winters and warm, dry summers and mild temperatures throughout the year. Predominantly winter rainfall occurs and the amount of precipitation increases with elevation.

Mean annual precipitation: 60 to 90 inches; up to 110 inches in the higher elevations in the Cascade Range.

Precipitation Pattern: Majority of precipitation in Northwest Interior Oregon occurs in the winter months of November through February. Often 50% of the annual precipitation occurs in the winter season.



2-year 24 hour precipitation: 3.0 to 4.5 inches

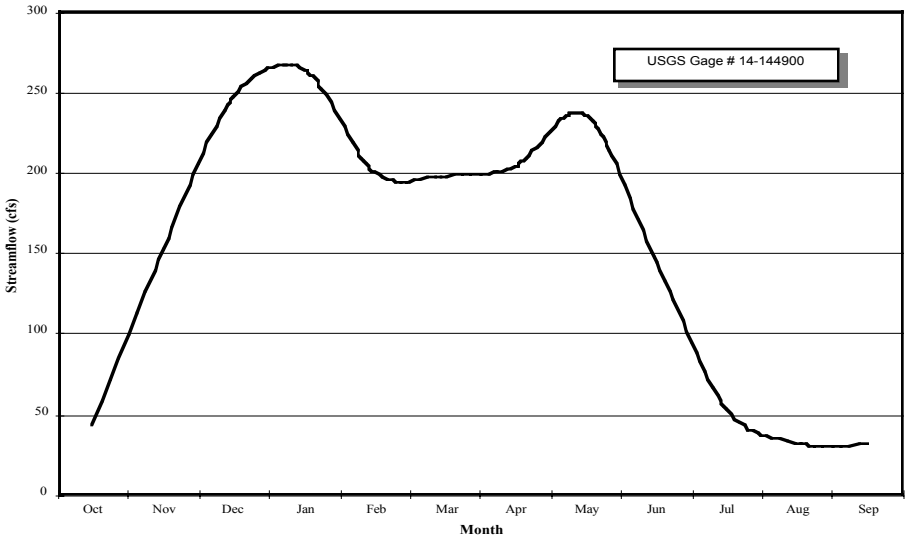
Temperature

	January			*July*		
°F	**41**	**31**	**38**	**78**	**47**	**65**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall along the interior valleys occurs nearly every year but the amounts are generally quite low. Some of the higher elevations and north-facing slopes in the Cascade foothills receive more snow.

Hydrologic basin characteristics: Tributaries to the Willamette River drain toward the west from the Cascade foothills. A few basins are oriented north draining directly into the Columbia River.

Runoff patterns: Average monthly streamflows are highest in the winter; some streams also experience high volumes of runoff during the spring snowmelt period.



Peak flow generating process: In the foothills, as the landscape becomes more mountainous (above 2300 feet in elevation), rain-on-snow events are responsible for producing peak flows as well as rainstorms.

Peak flow magnitude (2-year recurrence interval): 50 cfs/mi^2 to 100 cfs/mi^2, with areas as high as 100 to 200 cfs/mi^2 (e.g. northwest side of Mt. Hood) and others as low as 25-50 (e.g. headwaters of the Willamette).

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	gravel / fines	gravel	gravel
	higher gradient	gravel / bedrock	gravel / bedrock	cobble/ bedrock
Beaver dams	lower gradient	many year-round	some year-round	few in summer
	higher gradient	some in summer	few in summer	none

Natural Disturbances: Douglas-fir/western hemlock forests experience fire more frequently than neighboring silver fir/red fir forests, although the fire return interval is variable. While wildfires during late summer and fall once burned large areas within the lower western Cascade Mountains, streamside areas sometimes escaped the fires. Fire suppression has now eliminated most of these wildfires.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (red alder, cotton-wood, bigleaf maple)and shrubs (vinemaple, red osier dogwood, devil's club, stinkcurrant and salmonberry). **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (Douglas-fir, western hemlock, western redcedar, true firs at higher elevations). Some hardwoods may be present. **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation. These are characterized by herbaceous plants such as Oregon and great oxalis, Cooley's hedgenettle and ladyfern. See Diaz and Mellen (1996) and Campbell and Franklin (1979) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Mixed (Western red cedar, red alder, cotton-wood, bigleaf maple)and shrubs such as vinemaple, red osier dogwood, devil's club, stinkcurrant and salmonberry. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (Douglas-fir, western hemlock, western redcedar, true firs at higher elevations). Some hardwoods may be present. **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation, and are characterized by herbaceous plants such as Oregon and great oxalis, Cooley's hedgenettle and ladyfern, skunk cabbage, and lenticular sedge. See Diaz and Mellen (1996) and Campbell and Franklin (1979) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Mixed (Western red cedar, red alder, cotton-wood, bigleaf maple)and shrubs such as red osier dogwood, devil's club, stinkcurrant and salmonberry. **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifers (Douglas-fir, western hemlock, western redcedar, true firs at higher elevations). Some hardwoods may be present. **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation, and are characterized by herbaceous plants such as Skunk cabbage, Cooley's hedgenettle and ladyfern, lenticular sedge, and yellow monkeyflower. See Diaz and Mellen (1996) and Campbell and Franklin (1979) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Usually common, except where hardwoods become established.

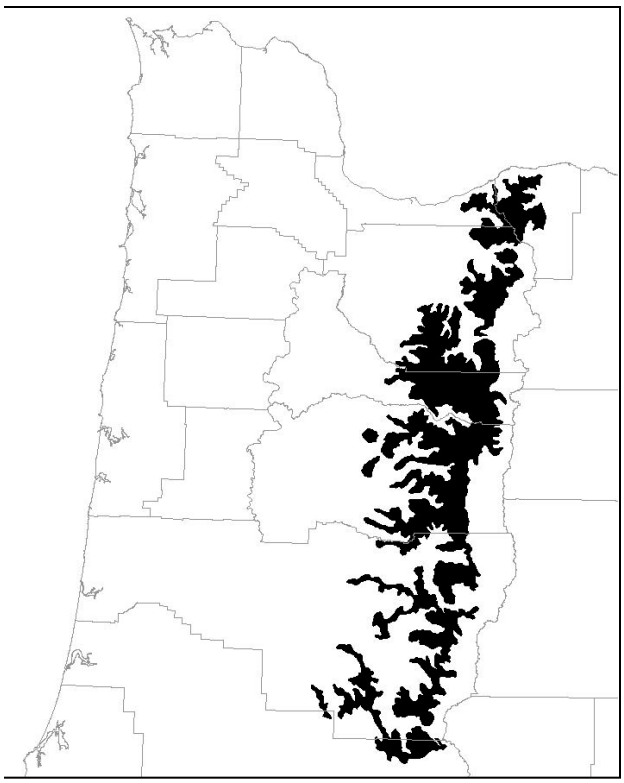
Upland vegetation: Douglas-fir, western hemlock, western red cedar, vine maple and western red alder forests.

Historic Crown Closure: Crown closure can be as low as 50% on drier sites. In general, historic crown closure is greater than 70%. Due to the absence of large wildfires, stand densities are greater than in the past.

Land Use: Forestry, recreation, pastureland in valleys.

Other:

Western Cascades Montane Highlands (4b)



Location: At higher elevations (3000 to 6000 feet) in the western Cascade Mountains north of the Umpqua River.

Drainage Basin: Willamette Basin

Geology: Geology consists of lava flows.

Topography: Consists of steep, glaciated, dissected mountains with moderate to high gradient streams. Waterfalls are common. Watersheds have a moderately high stream density.

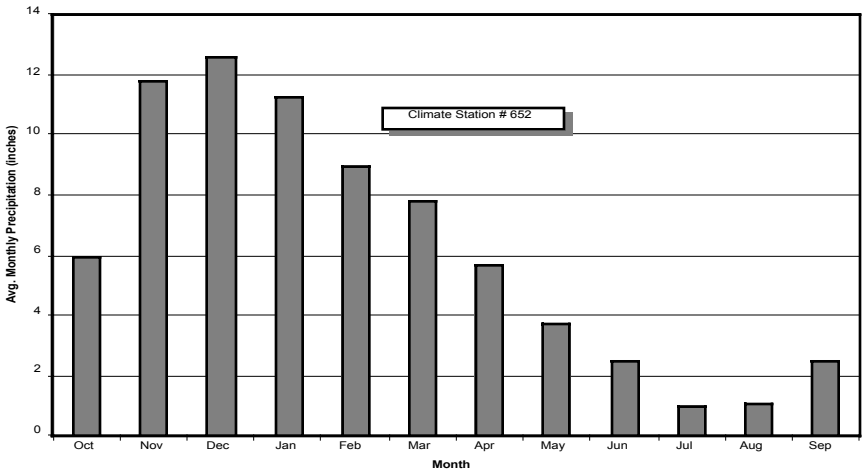
Soil: Soils range widely from deep silt loam to very cobbly loam.

Erosion: Erosion rate is moderate due to abundant precipitation and steep slopes. Competent geology keeps erosion rates from being high. Landslides are usually deep-seated earth flows in lower gradient areas. Shallow landslides (often triggering debris slides) sometimes occur in steep headwater channels.

Climate characterization: Mild climate. Cool, wet winters and warm, dry summers and mild temperatures throughout the year. Predominantly winter rainfall occurs and the amount of precipitation increases with elevation.

Mean annual precipitation: 70 to 90 inches; up to 120 inches in the higher elevations.

Precipitation Pattern: Majority of precipitation in Northwest Interior Oregon occurs in the winter months of November through February. Often 50% of the annual precipitation occurs in the winter season.



2-year 24 hour precipitation: 3.5 to 5.0 inches.

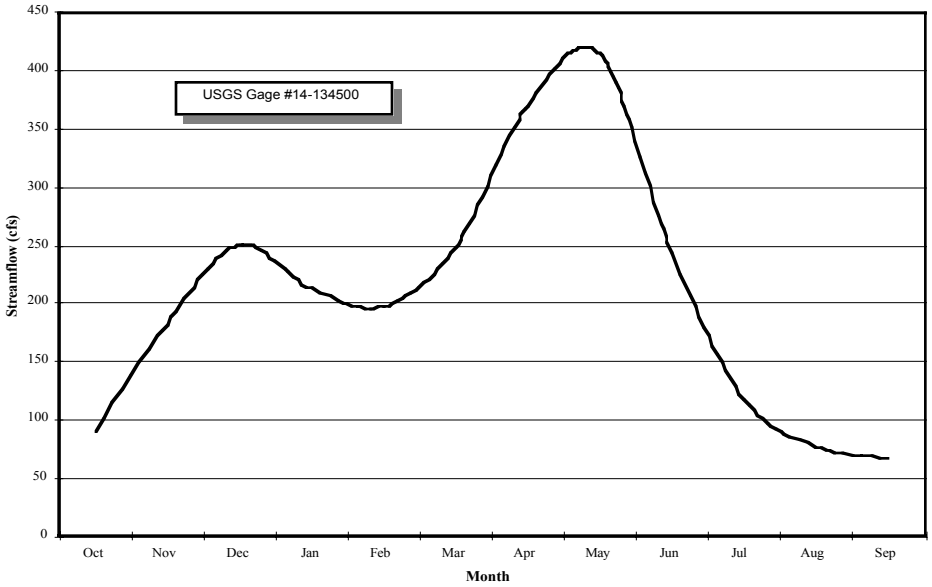
Temperature

	January			*July*		
°F	**37**	**26**	**33**	**75**	**44**	**65**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Much of the precipitation falls as snow with the higher elevations and north-facing slopes in the Cascade foothills receiving the most. In these areas, snow tends to accumulate into a deep snowpack storing water until spring melt.

Hydrologic basin characteristics: Tributaries to the Willamette River drain toward the west from the Cascade foothills. A few basins are oriented north draining directly into the Columbia River.

Runoff patterns: Average monthly streamflows are highest in the spring when they are sustained by snowmelt. Monthly volumes are lower during the winter months, however, winter storms tend to produce the largest daily peak flow values.



Peak flow generating process: In the foothills, as the landscape becomes more mountainous (above 2300 feet in elevation), rain-on-snow events are responsible for producing peak flows as well as rainstorms.

Peak flow magnitude (2-year recurrence interval): 50 cfs/mi^2 to 100 cfs/mi^2, a few basins greater than 200 cfs/mi^2.

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	gravel / fines	gravel	gravel
	higher gradient	gravel / bedrock	gravel / bedrock	cobble/ bedrock
Beaver dams	lower gradient	many year-round	some year-round	none
	higher gradient	a few in summer	none	none

Natural Disturbances: Silver fir forests experience less-frequent fires than neighboring Douglas-fir forests, but burn more frequently than subalpine forests at higher elevations. Fires are infrequent but severe in this forest type.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Shrubs, such as devil's club, stinkcurrant and salmonberry. **Size**: N/A **Density**: N/A	25-100'	**Type**: Conifer (Douglas-fir, western hemlock, western redcedar, and true firs) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation. These communities are characterized by herbaceous plants such as Oregon and great oxalis, brook saxifrage and arrowleaf groundsel, Cooley's hedgenettle and ladyfern. See Diaz and Mellen (1996) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Mixed (Western red cedar, red alder) and shrubs (mountain alder, ovalleaf and Alaska huckleberry, red osier dogwood, devil's club, stinkcurrant and salmonberry). **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifer (Douglas-fir, western hemlock, western redcedar, and true firs) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation, and are characterized by herbaceous plants such as Oregon and great oxalis, brook saxifrage and arrowleaf groundsel, Cooley's hedgenettle and ladyfern, skunkcabbage, and lenticular sedge. See Diaz and Mellen (1996) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Mixed (Western red cedar, red alder) and shrubs (mountain alder, ovalleaf and Alaska huckleberry, red osier dogwood, devil's club, stinkcurrant and salmonberry). **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifer (Douglas-fir, western hemlock, western redcedar, and true firs) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation, and are characterized by herbaceous plants such as Skunk cabbage, Cooley's hedgenettle and ladyfern, lenticular sedge, and yellow monkeyflower See Diaz and Mellen (1996) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Usually common.

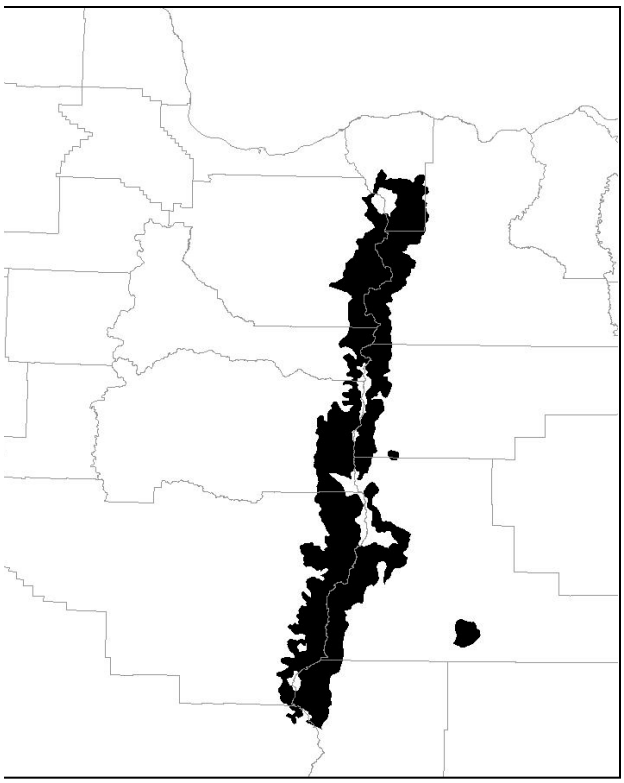
Upland vegetation: Pacific silver fir, western hemlock, Douglas-fir, mountain hemlock, noble fir, subalpine fir, and white fir forests.

Historic Crown Closure: Historic crown closure typically greater than 30%. Repeated fire can create semi-permanent big huckleberry communities in mountain hemlock forest areas.

Land Use: Forestry and recreation. Only a portion is now available for commercial harvest.

Other: This ecoregion is important to regional water.

Cascade Crest Montane Forest (4c)



Location: Crest of the Cascade Mountains north of the Umpqua River, excluding highest of the volcanic mountains.

Drainage Basins: Willamette, Deschutes, and Hood River Basins

Geology: Geology consists of lava flows and pyroclastic deposits. Some glacial deposits.

Topography: Consists of high elevation volcanic plateaus with buttes and cones. Much of the area has been glaciated. Streams are usually moderate gradient. Waterfalls are infrequent. Watersheds have a moderate stream density.

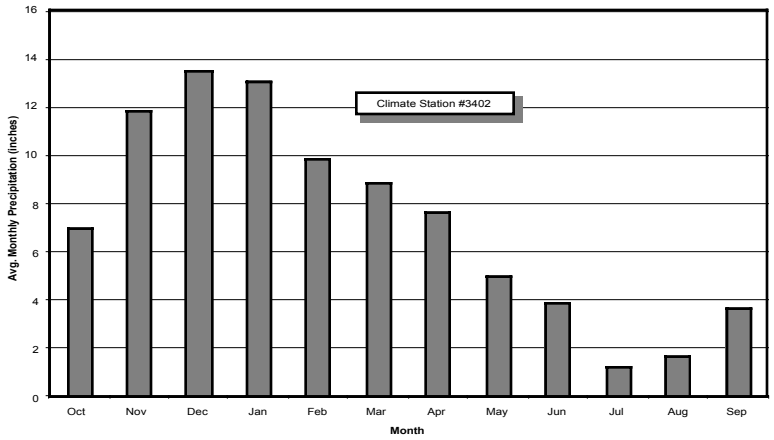
Soil: Soils range widely from sandy loam to very cobbly loam.

Erosion: Erosion rate is low due to competent geology and gentle slopes on the plateaus. Shallow landslides occur on the slopes of steep buttes and cones.

Climate characterization: The Cascade Mountain Range, exerts a strong influence on the climate in this ecoregion and Oregon climate and weather in general. Storms approaching from the west are forced to rise as they reach mountains and as a result release large amounts precipitation on the westward slopes of the Cascades.

Mean annual precipitation: 55 to 80 inches; up to 100 inches in the higher elevations

Precipitation Pattern: Majority of precipitation falls (both as rain and snow) during the winter months of November through March; often greater than 75% of annual total precipitation falls during the winter.



2-year 24 hour precipitation: 3.5 – 5.5 inches.

Temperature

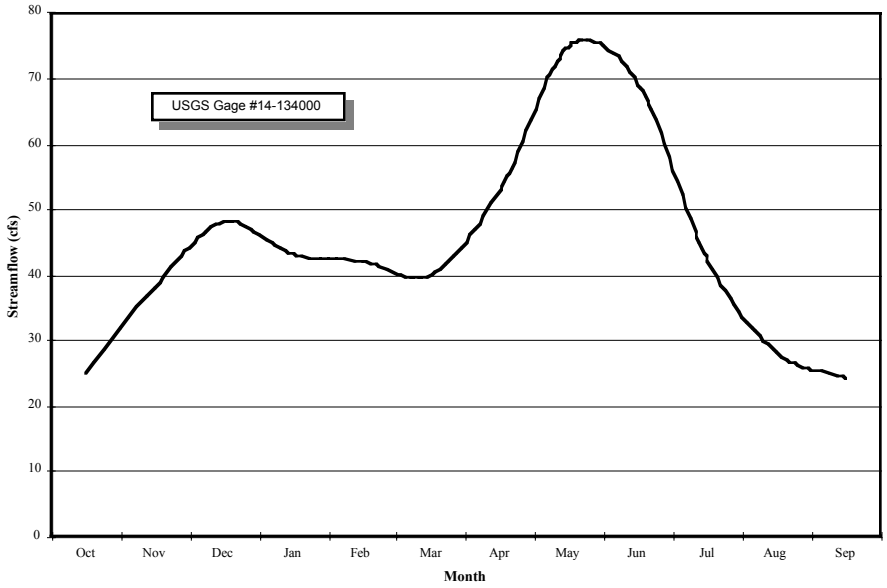
	January			*July*		
°F	**35**	**21**	**28**	**72**	**43**	**60**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowpack depth varies with elevation and aspect. Much of the precipitation falls as snow with the higher elevations and north-facing slopes in the Cascade foothills receiving the most. In these areas, snow tends to accumulate into a deep snowpack storing water until spring melt.

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Willamette Valley or directly north into the Columbia River.

Runoff patterns: Average monthly streamflows are highest in the spring when they are sustained by snowmelt. Monthly volumes are lower during the winter months, however, winter storms tend to produce the largest daily peak flows.

Peak flow generating process: Winter rain-on-snow events are responsible for the



largest floods in this region. Spring snowmelt events can produce peak flows but not often.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 75 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	gravel / fines	gravel
	higher gradient	gravel / fines	gravel	gravel / cobbles
Beaver dams	lower gradient	few year-round	few year-round	none
	higher gradient	few year-round	none	none

Natural Disturbances: Infrequent fires.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Shrubs such as ovalleaf and Alaska huckleberry. **Size**: N/A **Density**: N/A	25-100'	**Type**: Conifer (mountain hemlock and true firs) **Size**: Medium **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation, and are characterized by herbaceous plants such as brook saxifrage and arrowleaf groundsel, Cooley's hedgenettle and ladyfern. See Diaz and Mellen (1996) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Hardwoods (red alder) and shrubs such as mountain alder, and ovalleaf and Alaska huckleberry. **Size**: Small **Density**: Dense	50-100'	**Type**: Conifer (mountain hemlock and true firs) **Size**: Medium **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation, and are characterized by herbaceous plants such as brook saxifrage and arrowleaf groundsel, Cooley's hedgenettle and ladyfern, skunkcabbage, and lenticular sedge. See Diaz and Mellen (1996) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods (red alder) and shrubs such as mountain alder, and ovalleaf and Alaska huckleberry. **Size**: Small **Density**: Dense	75-100'	**Type**: Conifer (mountain hemlock and true firs) **Size**: Medium **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation, and are characterized by herbaceous plants such as Cooley's hedgenettle and ladyfern, skunkcabbage, beaked sedge, brewer sedge, black alpine sedge, Holm's sedge, or lenticular sedge. See Diaz and Mellen (1996) and Kovalchik (1987) for more details about specific plant communities and where they occur.

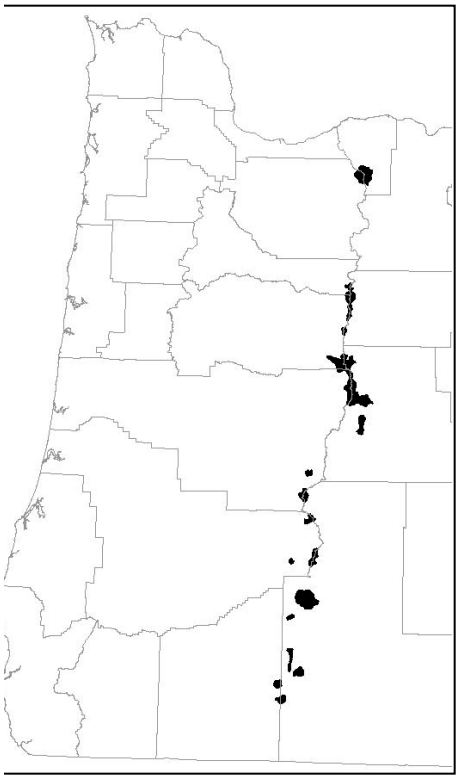
Current Streamside Conifer Regeneration: Somewhat common.

Upland vegetation: Mountain hemlock, Pacific silver fir, Engelmann spruce, lodgepole pine forests.

Historic Crown Closure: Crown closure typically greater than 30%. Repeated fire can create semi-permanent big huckleberry communities in mountain hemlock forest areas.

Land Use: Forestry, recreation.

Other: This ecoregion is an important regional water source.



Cascade Subalpine / Alpine (4d)

Location: Highest of the volcanic mountains along the crest of the Cascade Mountains north of the Umpqua River.

Drainage Basins: Deschutes, Hood River, Umpqua, Rogue and Klamath Basins

Geology: Geology consists of basalt and andesite; deposited as flows and as pyroclastic deposits. Highly glaciated.

Topography: Consists of high elevation volcanic mountains. Streams are high gradient and nearly all do not support fish.

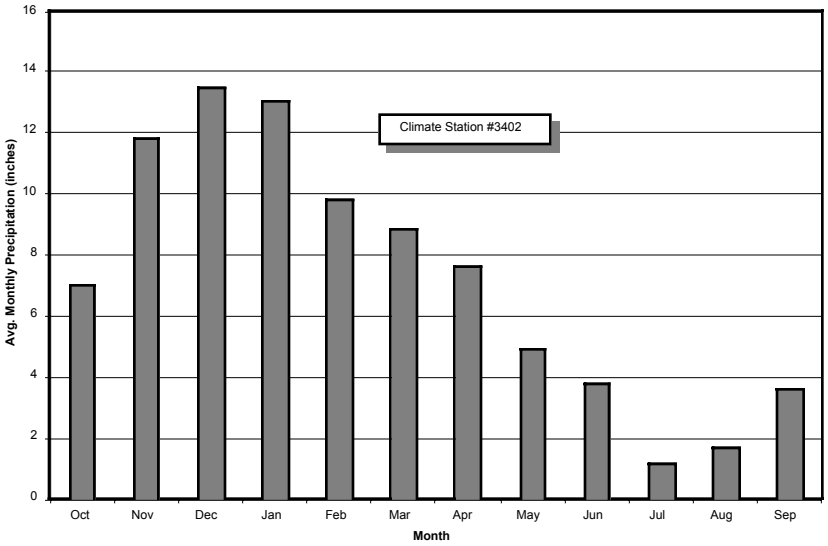
Soil: Soils are bare rock and rubble.

Erosion: Erosion rate is moderate. Occurs mostly in the form of ravel or avalanches. Sediment loads consisting of glacial dust can be high where active glaciers exist.

Climate characterization: The Cascade Mountain Range exerts a strong influence on the climate in this ecoregion and Oregon climate and weather in general. Storms approaching from the west are forced to rise as they reach mountains and as a result release large amounts precipitation on the westward slopes of the Cascades.

Mean annual precipitation: 70 to 90 inches; up to 140 inches in the higher elevations

Precipitation Pattern: Majority of precipitation falls (both as rain and snow) during the winter months of November through March; often greater than 75% of annual total precipitation falls during the winter.*



* as represented by climate data from ecoregion 4c because no climate data were available for this ecoregion.

2-year 24 hour precipitation: 3.5 – 5.5 inches

Temperature

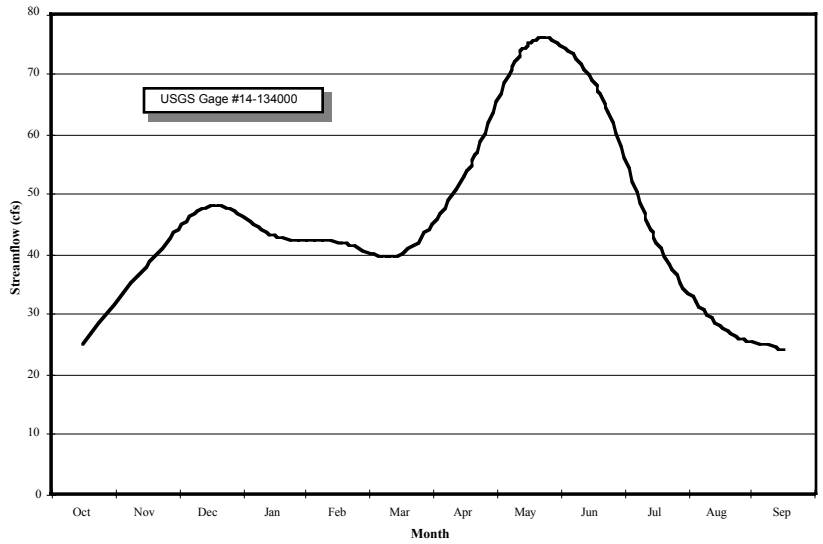
	January			*July*		
°F	**31**	**16**	**28**	**65**	**38**	**60**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Much of the precipitation falls as snow and accumulates into a deep snowpack (e.g. 300" per year at Government Camp). Active snowfields and glaciers are common in the northern portion of this ecoregion.

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Willamette Valley or directly north into the Columbia River

Runoff patterns: Average monthly flows are highest primarily in the spring months.*

* as represented by a stream gage from ecoregion 4c because no daily values were available for this



ecoregion

Peak flow generating process: Spring snowmelt processes likely generate annual peak flows.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 75 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	gravel / cobble	gravel / cobble	gravel / cobble
	higher gradient	cobble / bedrock	cobble / bedrock	cobble / bedrock
Beaver dams	lower gradient	none	none	none
	higher gradient	none	none	none

Natural Disturbances: Avalanches and fires comprise the main disturbances. Infrequent fires in this forest type result in low survival of dominant tree species, and fire intensity depends on weather conditions.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	100'	**Type**: Usually no woody plants. Occasionally mountain alder and Douglas spiraea. **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Streamside vegetation characterized by herbaceous plants such as arrowleaf groundsel, or red mountainheath. See Kovalchik(1987) for more details about specific plant communities and where they occur.
Semi-constrained	100'	**Type**: Usually no woody plants. Occasionally bog blueberry, mountain alder and Douglas spiraea. **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Streamside vegetation characterized by herbaceous plants such as queencup beadlily, widefruit sedge, black alpine sedge, Holm's sedge, or few-flowered spikerush. See Kovalchik (1987) for more details about specific plant communities and where they occur.
Un-constrained	100'	**Type**: Usually no woody plants. Occasionally bog blueberry and mountain alder. **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Streamside vegetation characterized by herbaceous plants such as queencup beadlily, widefruit sedge, beaked sedge, brewer sedge, black alpine sedge, Holm's sedge, or inflated sedge. See Kovalchik (1987) for more details about specific plant communities and where they occur.

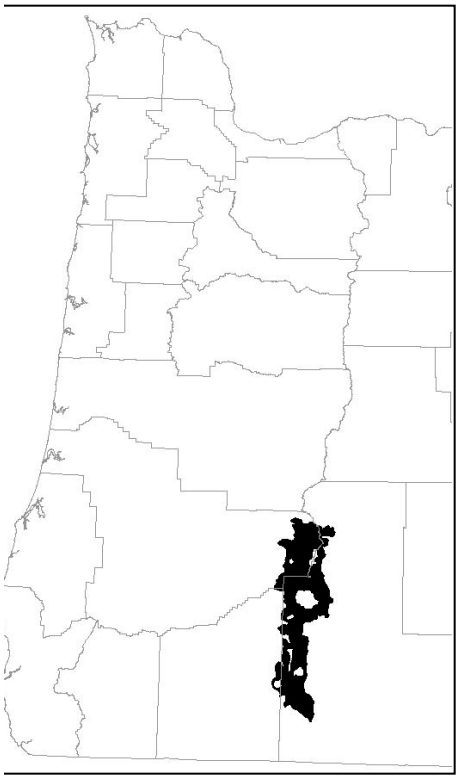
Current Streamside Conifer Regeneration: None.

Upland vegetation: Mountain hemlock, subalpine fir forests, rock, glaciers, subalpine meadows.

Historic Crown Closure: Historic crown closure typically less than 30%. Subalpine fir forests are relatively open types interspersed with subalpine meadows.

Land Use: Recreation.

Other: This ecoregion is an important regional water source.



High Southern Cascades Montane Forest (4e)

Location: Crest of the Cascade Mountains south of the Willamette River, excluding highest of the volcanic mountains.

Drainage Basins: Klamath, Umpqua, and Rogue Basins

Geology: Geology consists of andesite and basalt. Highly glaciated.

Topography: Consists of high elevation volcanic plateaus with buttes and cones. Much of the area has been glaciated. Streams are usually moderate gradient. Waterfalls occur. Watersheds have a moderate stream density.

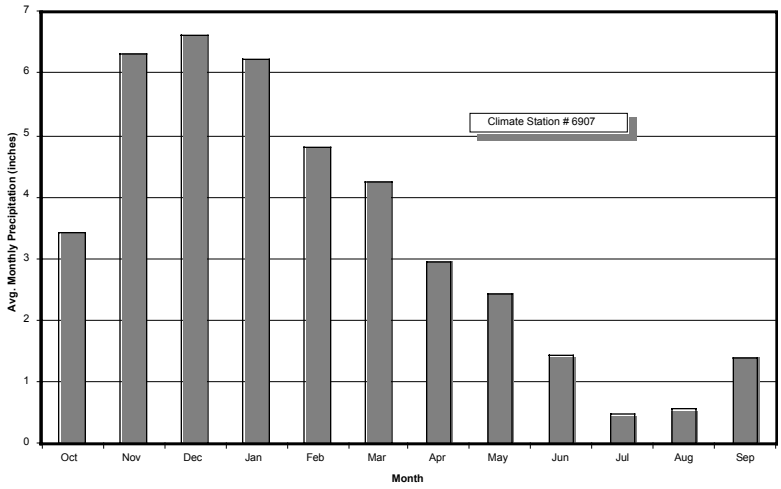
Soil: Soils range from deep, very gravelly and stony loam to gravelly loamy coarse sand.

Erosion: Erosion rate is low due to competent geology and gentle slopes on the plateaus.

Climate characterization: The Cascade Mountain Range, exerts a strong influence on the climate in this ecoregion and Oregon climate and weather in general. Storms approaching from the west are forced to rise as they reach mountains and as a result release large amounts precipitation on the westward slopes of the Cascades.

Mean annual precipitation: 45 to 70 inches; up to 80 inches in the higher elevations.

Precipitation Pattern: Majority of precipitation falls (both as rain and snow) during the winter months of November through March; often greater than 75% of annual total precipitation falls during the winter.*



* as represented by climate data from ecoregion 4g because no climate data were available for this ecoregion.

2-year 24 hour precipitation: 3.0 – 3.5 inches

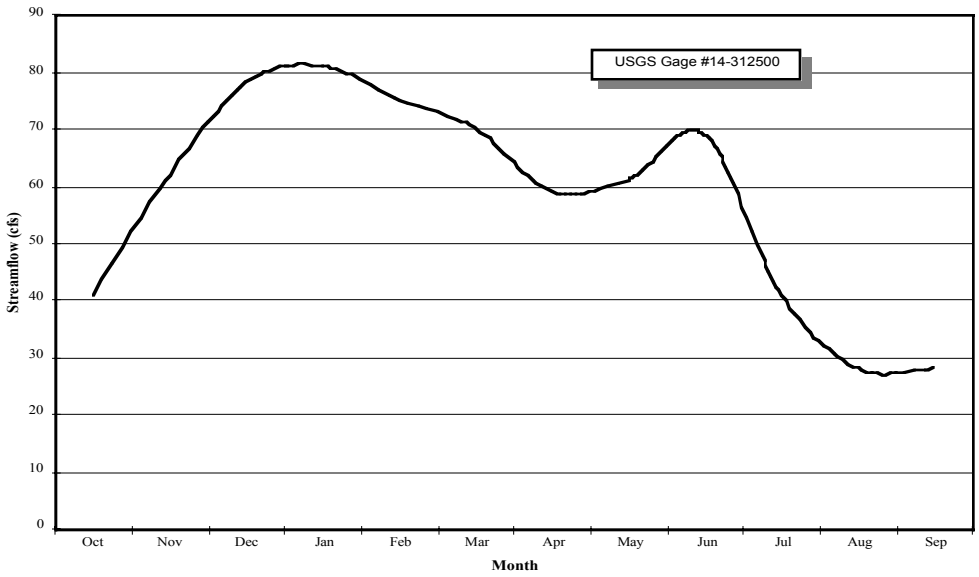
Temperature

	January			*July*		
°F	**37**	**22**	**28**	**74**	**44**	**60**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Varies with elevation and aspect. At the higher elevations, much of the precipitation falls as snow accumulating into deep snowpacks which store water until spring melt.

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Umpqua or Roque River Valleys.

Runoff patterns: Average monthly streamflows are highest in the winter but spring volumes can also be high.



Peak flow generating process: Rain on snow and spring snowmelt. Winter rain-on-snow events tend to produce the largest floods in this region, although, spring snowmelt processes also commonly generate annual peak flows.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 75 cfs/mi^2

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	fines	Gravel / fines	gravel
	higher gradient	gravel / fines	gravel	gravel / cobble
Beaver dams	lower gradient	few year-round	few year-round	none
	higher gradient	few in summer	none	none

Natural Disturbances: White fir and Shasta red fir forests have a higher fire frequency than mountain hemlock forests.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Shrubs such as mountain alder and as bog blueberry. Some conifers (lodgepole pine, white fir) may be present. **Size**: N/A **Density**: N/A	25-100'	**Type**: Conifers (mountain hemlock, true firs, and lodgepole pine) **Size**: Medium **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation in RA1, and are characterized by herbaceous plants such as arrowleaf groundsel, red mountainheath, or few-flowered spikerush. See Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Shrubs such as mountain alder and as bog blueberry. Some conifers (lodgepole pine, white fir) may be present. **Size**: N/A **Density**: N/A	50-100'	**Type**: Conifers (mountain hemlock, true firs, and lodgepole pine) **Size**: Medium **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation in RA1, and are characterized by herbaceous plants such as inflated sedge, Holm's sedge, few-flowered spikerush, or beaked sedge. See Kovalchik (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Shrubs such as mountain alder and as bog blueberry. Some conifers (lodgepole pine, white fir) may be present. **Size**: N/A **Density**: N/A	75-100'	**Type**: Conifers (mountain hemlock, true firs, and lodgepole pine) **Size**: Medium **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation in RA1, and are characterized by herbaceous plants such as inflated sedge, brewer sedge, few-flowered spikerush, or beaked sedge. See Kovalchik (1987) for more details about specific plant communities and where they occur.

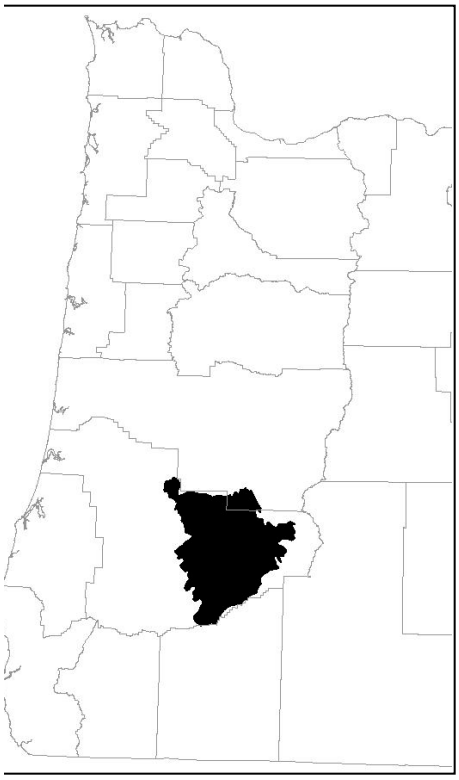
Current Streamside Conifer Regeneration: Usually common.

Upland vegetation: Mountain hemlock, lodgepole pine, Pacific silver fir, white fir, Shasta red fir forests. Rock at higher elevations.

Historic Crown Closure: This mixed conifer region had historic crown closures of greater than 30%.

Land Use: Recreation, forestry, grazing.

Other:



Umpqua Cascades (4f)

Location: Upper Umpqua River watershed in the Cascade Mountains at elevations between 1000 to 5000 feet.

Drainage Basin: Umpqua Basin

Geology: Geology is varied and includes lava flows, breccia, sandstone, and siltstone.

Topography: Consists of highly dissected mountains. Stream gradients are moderate to high. Stream density in watersheds is high.

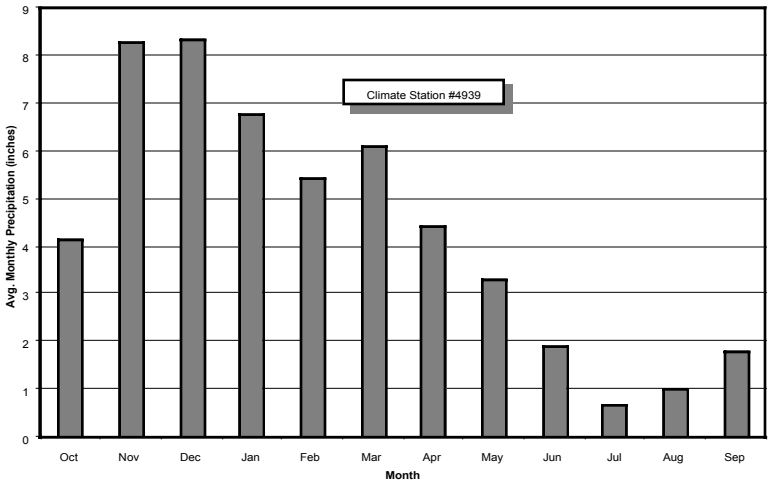
Soil: Soils range widely from deep clay loam to extremely gravelly loam.

Erosion: Erosion rate is moderate due to abundant precipitation and steep slopes. Competent geology in eastern portions keeps erosion rates from being high. Landslides are usually deep-seated earth flows in lower gradient areas. Shallow landslides (often triggering debris slides) sometimes occur in steep headwater channels.

Climate characterization: Southwest Interior Oregon is typically drier and colder than the Northwest interior because much of the area lies in a rain shadow sheltered from the Pacific Ocean by the Coastal Mountain Range. Storms of subtropical origin generate heavy rains and peak flows in this area.

Mean annual precipitation: ranges from 50 to 80 inches; up to 90 inches in higher elevations.

Precipitation Pattern: Majority of precipitation in Northwest Interior Oregon occurs in the winter months of November through March; in some areas as much as 75% of the annual precipitation occurs in the winter season. Occasional summer thunderstorms cause precipitation during the warmer months.



2-year 24 hour precipitation: 2.5 – 4.0 inches

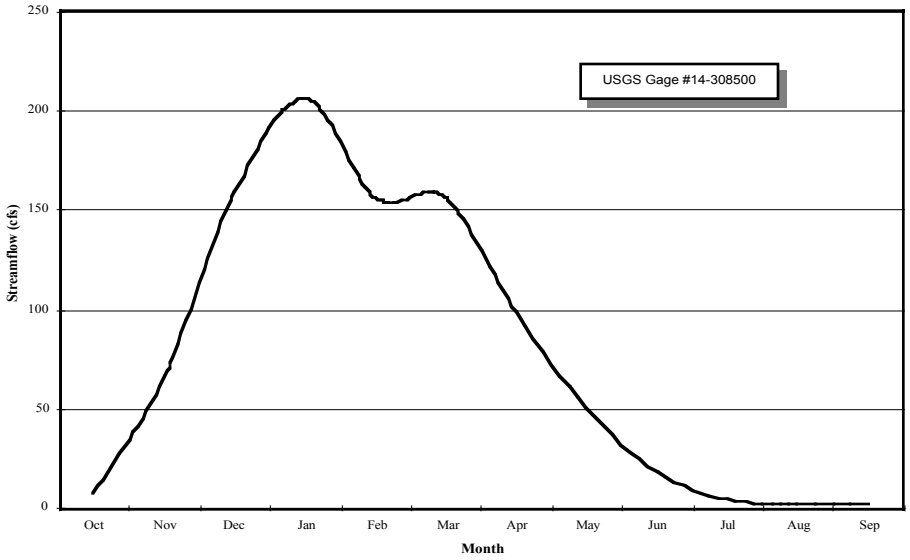
Temperature

	January			*July*		
°F	**42**	**32**	**37**	**82**	**49**	**67**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Varies with elevation and aspect. At the higher elevations and on north-facing slopes along the eastern border (e.g. Quartz Mountian), substantially more snow is reported (from 50 to 120 inches). Here, snow accumulates into deep a snowpack storing water until spring melt.

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average monthly flows occur are highest in the winter and infrequently during spring snowmelt.



Peak flow generating process: Most peak flows are generated by rain-on-snow events.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 50 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	gravel / fines	gravel	gravel
	higher gradient	gravel / cobble	gravel / cobble	cobble/ bedrock
Beaver dams	lower gradient	Many year-round	some year-round	none
	higher gradient	Some in summer	few in summer	none

Natural Disturbances: Lightning fires and intentional burns were once common in this ecoregion during late summer and fall. Fire history depends on many environmental factors. Streamside areas sometimes escaped the fires. Fire suppression has eliminated many wildfires. In the Willamette valley Native Americans commonly used fire to manipulate vegetation for game and "crops". Later, settlers and miners helped to shape the present vegetation composition and structure.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods and shrubs **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifer (Douglas-fir, western hemlock, and incense cedar) **Size**: Large **Density**: Dense	Secondary species like incense-cedar can occupy riparian areas, bogs, seeps, wetlands and Western-redcedar is a common streamside species at the lower elevations. Both have potential for streamside rehabilitation.
Semi-constrained	0-50'	**Type**: Hardwoods and shrubs **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifer (Douglas-fir, western hemlock, and incense cedar) **Size**: Large **Density**: Dense	Secondary species like incense-cedar can occupy riparian areas, bogs, seeps, wetlands and Western-redcedar is a common streamside species at the lower elevations. Both have potential for streamside rehabilitation.
Un-constrained	0-75'	**Type**: Hardwoods and shrubs **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifer (Douglas-fir, western hemlock, and incense cedar) **Size**: Large **Density**: Dense	Secondary species like incense-cedar can occupy riparian areas, bogs, seeps, wetlands and Western-redcedar is a common streamside species at the lower elevations. Both have potential for streamside rehabilitation.

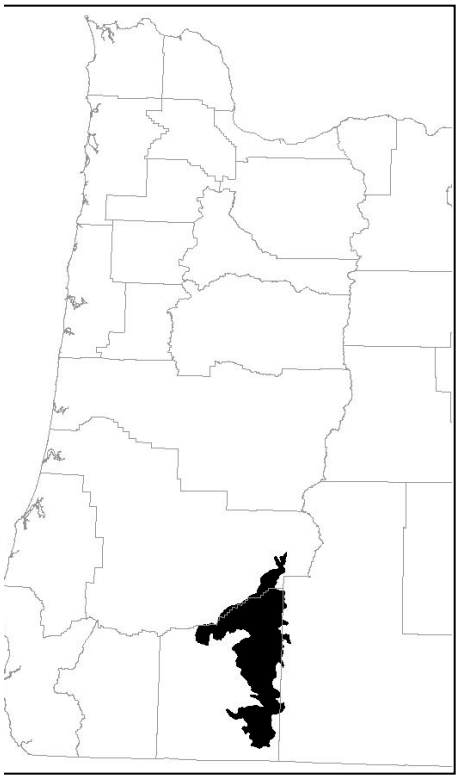
Current Streamside Conifer Regeneration: Usually common.

Upland vegetation: Douglas-fir, white fir, western hemlock, Pacific silver fir, Shasta red fir, mountain hemlock forests.

Historic Crown Closure: Historic crown closure was about 50-55% canopy closure in these forests. A variety of nonforested openings and meadows are found in these forest types.

Land Use: Forestry, recreation. Only a small portion is now available for commercial harvest

Other: This ecoregion is an important regional water source.



Southern Cascades (4g)

Location: Southern Cascade Mountains at elevations between 2500 to 6000 feet.

Drainage Basins: Rogue and Umpqua Basins

Geology: Geology is mainly lava flows of basalt. Some pyroclastic deposits.

Topography: Consists of mountains with moderate slopes. Stream gradients are moderate. Stream density in watersheds is low with a large number of intermittent streams.

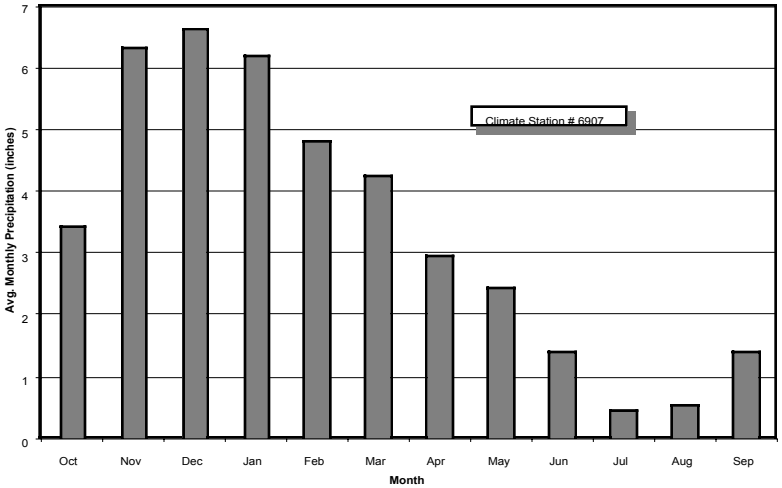
Soil: Soils range from deep loam to cobbly loam.

Erosion: Erosion rate is low due to moderate precipitation, stable geology, and moderate slopes.

Climate characterization: Southwest Interior Oregon is typically drier and colder than the Northwest interior because much of the area lies in a rain shadow sheltered from the Pacific Ocean by the Coastal Mountain Range. Storms of subtropical origin generate heavy rains and peak flows in this area.

Mean annual precipitation: 45 to 60 inches; up to 70 inches in higher elevations.

Precipitation Pattern: Majority of precipitation in Northwest Interior Oregon occurs in the winter months of November through March; in some areas as much as 75% of the annual precipitation occurs in the winter season. Occasional summer thunderstorms cause precipitation during the warmer months.



2-year 24 hour precipitation: 2.0 – 3.5 inches.

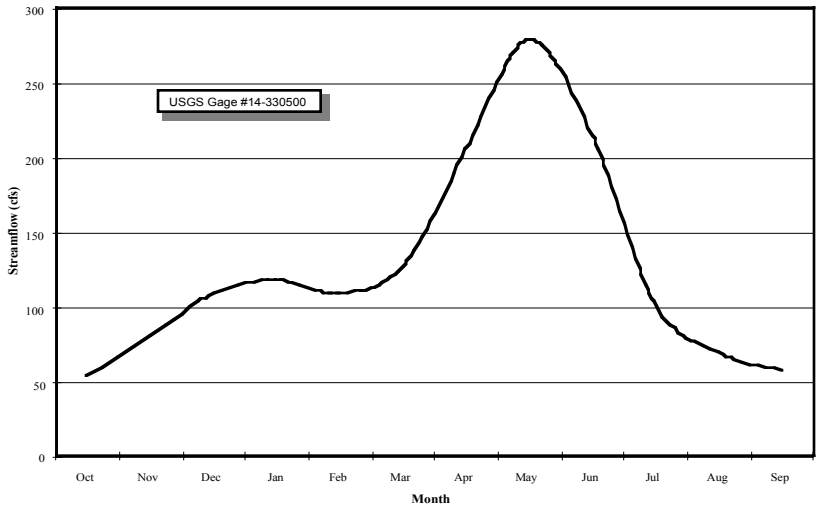
Temperature

	January			*July*		
°F	**45**	**26**	**37**	**85**	**47**	**68**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Varies with elevation and aspect. At the higher elevations and on north-facing slopes along the eastern border (e.g. Quartz Mountian), substantially more snow is reported (from 50 to 120 inches). Here, snow accumulates into deep a snowpack storing water until spring melt.

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average monthly streamflows are highest in the spring due to snowmelt; winter storms however, tend to produce the largest daily peak flows.



Peak flow generating process: Rainstorms or rain-on-snow events. The lowland watersheds experience peak flows generated primarily from rainstorms. Peak flows in the upper basins of the Umpqua/Rogue River valleys with mean basin elevations above 3300 feet generally have some snowmelt component.

Peak flow magnitude (2-year recurrence interval): less than 25 cfs/mi^2 for the majority of basins, few are up to 50 cfs/mi^2.

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	gravel	gravel
	higher gradient	gravel	gravel / cobble	cobble
Beaver dams	lower gradient	many year-round	many year-round	some in summer
	higher gradient	some in summer	some in summer	none

Natural Disturbances: Douglas-fir/ponderosa pine forests have relatively short fire return intervals, with fire intensity dependent on site conditions. Shasta red fir forests have a moderately severe fire regime, with frequencies and intensities intermediate to other forests in the Pacific Northwest. Streamside areas sometimes escaped the fires. Fire suppression has now eliminated many of these wildfires.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods and shrubs such as mountain alder, and Douglas spiraea. Some conifers (white fir) may be present. **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (Douglas-fir, true firs, and incense cedar) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation, and are characterized by herbaceous plants such as arrowleaf groundsel or red mountainheath. See Kovalchik, (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Hardwoods and shrubs such as mountain alder, and Douglas spiraea. Some conifers (white fir) may be present. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (Douglas-fir, true firs, and incense cedar) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation, and are characterized by herbaceous plants such as queencup beadlily, widefruit sedge, Holm's sedge, or few-flowered spikerush. See Kovalchik, (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods and shrubs such as mountain alder, Douglas spiraea, bog blueberry with Sitka sedge, or willows (Booth, Geyer and Lemmon) and widefruit sedge. **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifers (Douglas-fir, true firs, and incense cedar) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation, and are characterized by herbaceous plants such as queencup beadlily, widefruit sedge, inflated sedge, beaked sedge, Holm's sedge, or few-flowered spikerush. See Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Usually common.

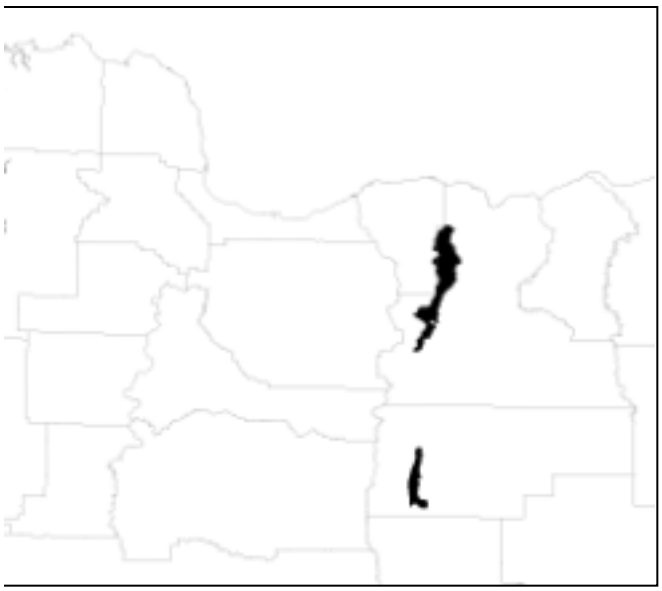
Upland vegetation: Open conifer forest with white fir common. Douglas-fir and ponderosa pine prevalent at lower elevation with Shasta red fir at higher elevations. Potential natural vegetation also includes mountain hemlock at higher elevations.

Historic Crown Closure: These forest types have historically 40-45% canopy crown closure. Fire suppression increases forest density.

Land Use: Forestry, recreation, grazing.

Other: Irrigation withdrawals result in the partial dewatering of some streams during the summer.

Grand Fir Mixed Forest (9b)



Location: Higher elevation east slopes of northern Cascade Mountains.

Drainage Basins: Willamette, Hood River and Deschutes Basins

Geology: Geology consists of andesite and basalt flows.

Topography: Consists of high, glaciated plateaus and mountains with high gradient streams. Moderate stream density.

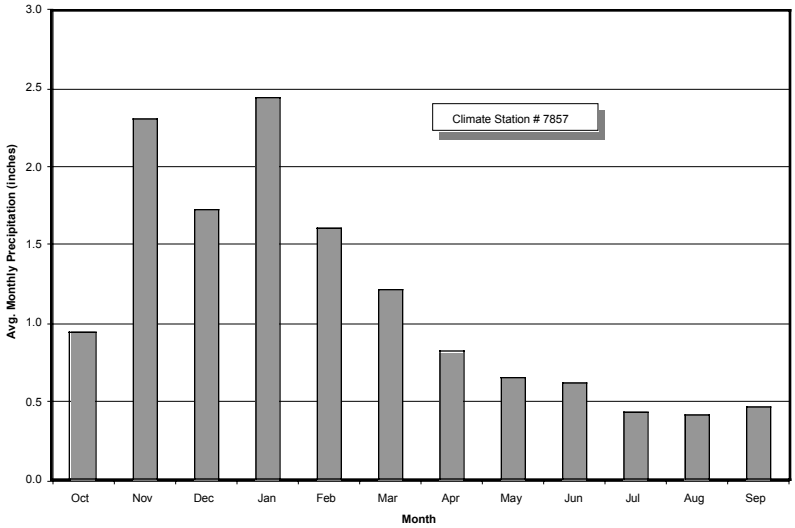
Soil: Soils range widely from loam to stony loam.

Erosion: Erosion rate is low due to competent geology and lower precipitation.

Climate characterization: Eastern slopes of the Cascades are drier than the western slopes due to a rain shadow effect of the mountain range. Low precipitation occurs throughout the year except for at higher elevations. The summers are warm and dry with occasional isolated thunderstorms from July to September.

Mean annual precipitation: 35 to 55 inches; up to 70 inches in higher elevations.

Precipitation Pattern: Majority of the precipitation occurs in the winter months from November to February.*



* as represented by climate data from ecoregion 9d because no climate data were available for this ecoregion.

2-year 24 hour precipitation: 2.0 to 4.5 inches.

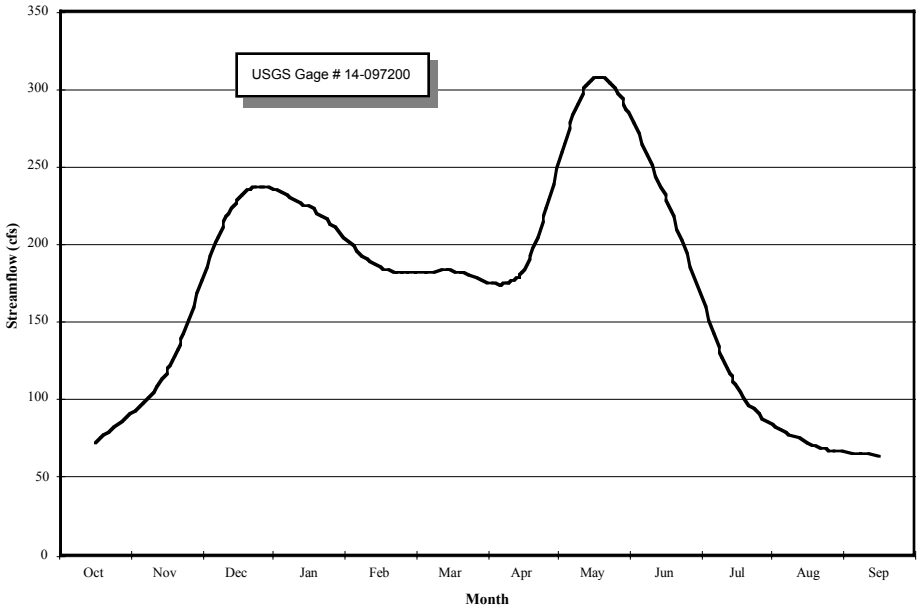
Temperature

	January			*July*		
°F	**32**	**16**	**27**	**77**	**47**	**56**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Precipitation falling over winter tends to accumulate into snowpack, particularly at higher elevations. Snowmelt often contributes to peak flow generation.

Hydrologic basin characteristics: Basins are oriented to the east. Streams have medium to high gradients and drain to Deschutes and Columbia Rivers.

Runoff patterns: Average monthly streamflows are highest in the late spring, early summer months. Some streams also experience high values of runoff during the



winter period.

Peak flow generating process: Winter rain-on-snow , winter rainstorms, and snowmelt.

Peak flow magnitude (2-year recurrence interval): 6 cfs/mi^2 to 20 cfs/mi^2, with a few greater than 20 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	fines	Gravel	gravel / cobbles
	higher gradient	gravel / fines	gravel / cobbles	cobbles
Beaver dams	lower gradient	some year-round	few year-round	None
	higher gradient	few year-round	none	none

Natural Disturbances: Lightning-caused and deliberately set fires were present in this ecoregion in the past. Fire return intervals vary with site conditions.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods and shrubs (such as vinemaple, Douglas spiraea, & mountain alder). Some conifers (grand fir, western red cedar) may be present. **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (grand fir, Douglas-fir, and ponderosa pine (south)) **Size**: Large **Density**: Dense	See Diaz and Mellen (1996) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Hardwoods and shrubs (such as vinemaple, Douglas spiraea, mountain alder, red osier dogwood). Some conifers (grand fir, western red cedar) may be present. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (grand fir, Douglas-fir, and ponderosa pine (south)) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation. These are characterized by herbaceous plants such as skunkcabbage. See Diaz and Mellen (1996) for more details about specific plant communities and where they occur.

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Un-constrained	0-75'	**Type**: Hardwoods and shrubs (such as vinemaple, Douglas spiraea, mountain alder, red osier dogwood and willows (Geyer and Lemmon). Some conifers (grand fir, western red cedar) may be present. **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifers (grand fir, Douglas-fir, and ponderosa pine (south)) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation. These are characterized by herbaceous plants such as skunkcabbage, inflated sedge, beaked sedge or Sitka sedge. See Diaz and Mellen (1996) and Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Usually common.

Upland vegetation: White fir, Douglas-fir forests, some ponderosa pine.

Historic Crown Closure: Historic crown closure was greater than 30%. The range of grand fir has expanded eastward due to fire suppression.

Land Use: Forestry, recreation.

Other: This ecoregion is a regional water source.

Oak / Conifer Eastern Cascades - Columbia Foothills (9c)

Location: Lower elevation east slopes of northern Cascade Mountains.

Drainage Basins: Hood River and Deschutes Basins

Geology: Geology consists of basalt flows.

Topography: Consists of foothills, low mountains, plateaus, and valleys. Moderate channel gradient. Low stream density within watersheds.

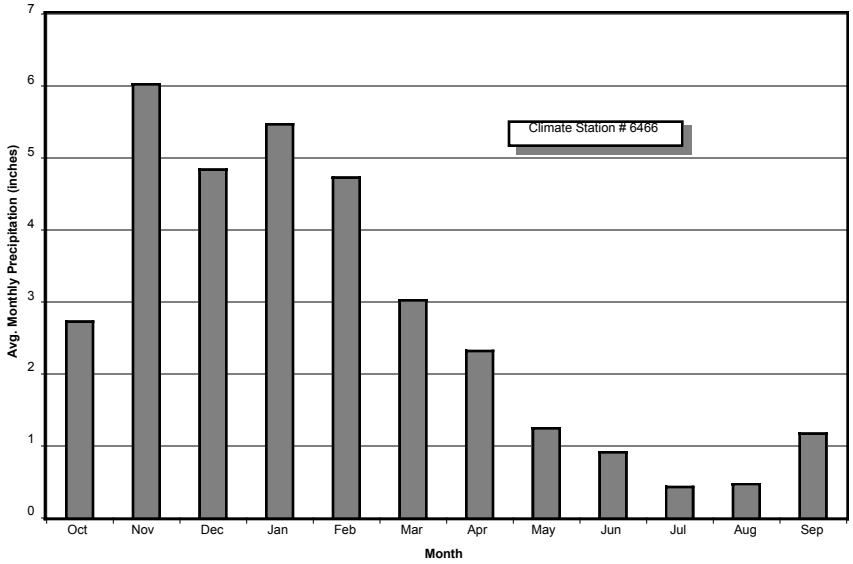
Soil: Soils range widely from loam to stony loam.

Erosion: Erosion rate is low due to competent geology and lower precipitation.

Climate characterization: Eastern slopes of the Cascades are drier than the western slopes due to a rain shadow effect of the mountain range. Low precipitation occurs throughout the year except for at higher elevations. The summers are warm and dry with occasional isolated thunderstorms from July to September.

Mean annual precipitation: 16 to 40 inches; up to 65 inches in higher elevations.

Precipitation Pattern: Majority of the precipitation occurs in the winter months from November to February.



2-year 24 hour precipitation: 1.6 to 4.5 inches.

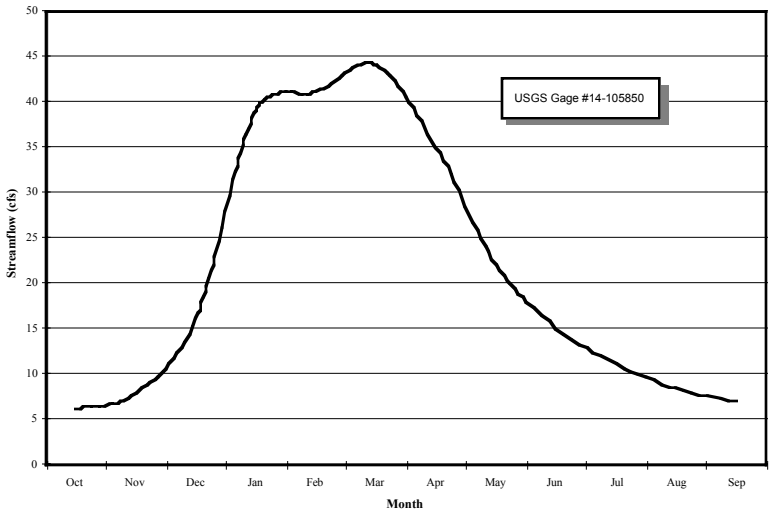
Temperature

	January			*July*		
°F	**40**	**26**	**27**	**82**	**53**	**56**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Precipitation falling over winter tends to accumulate into a snowpack, particularly at higher elevations. Snowmelt often contributes to peak flow generation.

Hydrologic basin characteristics: Basins are oriented to the east and north. Streams have medium gradients and drain to the Deschutes and Columbia Rivers.

Runoff patterns: Average monthly streamflows are the highest in late winter and early spring months from January to early May.



Peak flow generating process: Winter rain-on-snow and winter rainstorms.

Peak flow magnitude (2-year recurrence interval): 4 cfs/mi^2 to 20 cfs/mi^2

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	gravel	gravel / cobbles
	higher gradient	gravel / fines	gravel / cobbles	cobbles / gravel
Beaver dams	lower gradient	some year-round	some year-round	none
	higher	few year-round	none	none

gradient

Natural Disturbances: Fires were more common in Douglas-fir and western hemlock forests in the Eastern Cascades than in similar forest types in the Western Cascades. Fire intensity was variable, and the occurrence of fire increased the proportion of Douglas-fir. Frequent, low-intensity fires were common in ponderosa pine forests in the past, but fire suppression has reduced fire frequency.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods, and shrubs such as mountain alder, water birch and common snowberry. **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifer (Douglas-fir (west), ponderosa pine (east)), with some Oregon white oak (east) **Size**: Large **Density**: Dense	See Diaz and Mellen (1996) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Hardwoods, and shrubs such as mountain alder, water birch and common snowberry. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifer (Douglas-fir (west), ponderosa pine (east)), with some Oregon white oak (east) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation. These are characterized by herbaceous plants such as skunkcabbage. See Diaz and Mellen (1996) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods, and shrubs such as mountain alder, water birch, vine maple, and common snowberry. **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifer (Douglas-fir (west), ponderosa pine (east)), with some Oregon white oak (east) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation. These are characterized by herbaceous plants such as skunkcabbage, inflated sedge, beaked sedge or Sitka sedge. See Diaz and Mellen (1996) and Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Common, except where shrub competition is intense.

Upland vegetation: In the east oak woodlands and ponderosa pine. In the west Douglas-fir and western hemlock forests. Grassland vegetation.

Historic Crown Closure: In the oak woodland and ponderosa pine types, less than 30% historic crown closure. In the Douglas-fir and western hemlock forests, greater than 30% historic crown closure. Fire suppression has increased the density of all forest types.

Land Use: Forestry, recreation, grazing, rural residential, orchards, grain and hay farming in valleys.

Other: Most of this ecoregion is privately owned.

Ponderosa Pine / Bitterbrush Woodland (9d)

Location: Eastern slopes of north-central Cascade Mountains.

Drainage Basin: Deschutes Basin

Geology: Geology consists of Mount Mazama ash and basalt flows.

Topography: Consists of high, undulating plateaus, and canyons. Moderate channel gradient. Low stream density within watersheds. Many streams are dominated by flow from springs.

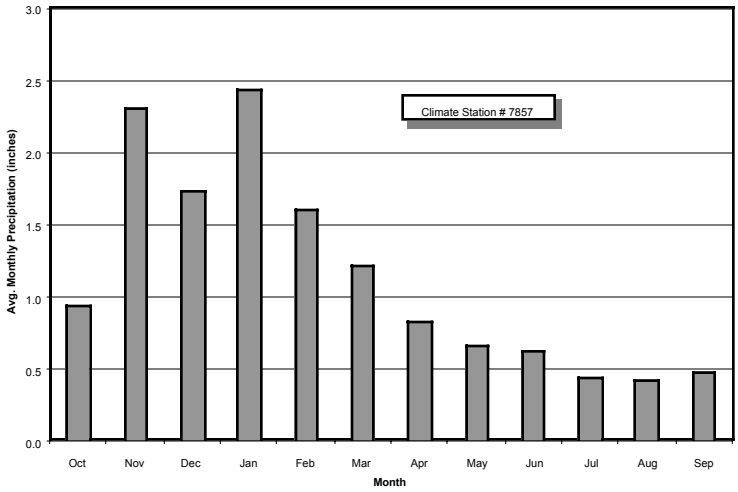
Soil: Soils range widely from loamy sand to gravelly sandy loam that is often derived from ash.

Erosion: Erosion rate is low due to very high infiltration rates and low precipitation.

Climate characterization: Eastern slopes of the Cascades are drier than the western slopes due to a rain shadow effect of the mountain range. Low precipitation occurs throughout the year except for at higher elevations. The summers are warm and dry with occasional isolated thunderstorms from July to September.

Mean annual precipitation: 16 to 35 inches.

Precipitation Pattern: Most precipitation occurs in winter from November to



January.

2-year 24 hour precipitation: 2.5 to 5.5 inches.

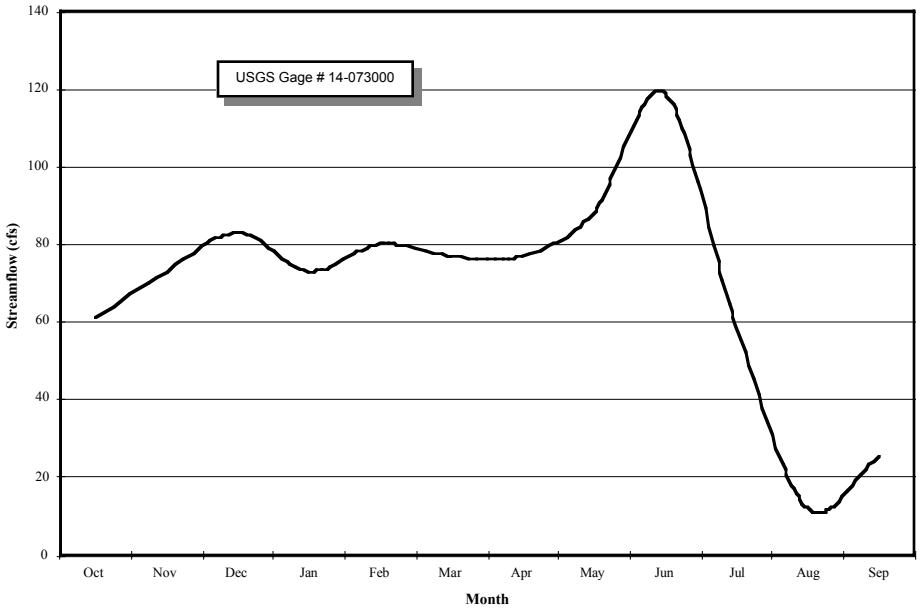
Temperature

	January			*July*		
°F	**40**	**20**	**27**	**82**	**40**	**56**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall occurs often during the cold winter months. Snow accumulates into a deep pack in the higher elevations particularly along the western border of the Cascade Range.

Hydrologic basin characteristics: Basins are oriented to the east and north. Streams have medium gradients and drain to the Deschutes and Columbia Rivers.

Runoff patterns: Average monthly streamflows can be highest in the early summer months. Some streams also experience high values throughout late fall and winter



months.

Peak flow generating process: Winter rain-on-snow, winter rainstorms and snowmelt.

Peak flow magnitude (2-year recurrence interval): 4 cfs/mi^2 to 20 cfs/mi^2, with a few greater than 20 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	fines	fines / gravel	gravel
	Higher gradient	fines / gravel	gravel	gravel / cobble
Beaver dams	Lower gradient	some year-round	some year-round	some year-round
	Higher gradient	some year-round	none	none

Natural Disturbances: Frequent, low-intensity fires were common in ponderosa pine forests in the past, but fire suppression has reduced fire frequency.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Mixed (white fir, hardwoods) & shrubs such as Douglas spirea, & mountain alder **Size**: Medium **Density**: Dense	100'	**Type**: Conifer (Douglas-fir, white fir, and ponderosa pine) **Size**: Large **Density**: Dense	See Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Mixed white fir, hardwoods including quaking aspen) & shrubs such as mountain alder, Douglas spirea & common snowberry. **Size**: Medium **Density**: Dense	100'	**Type**: Conifer (Douglas-fir, white fir, and ponderosa pine) **Size**: Large **Density**: Dense	See Kovalchik (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods (including quaking aspen) & shrubs such as mountain alder, common snowberry, & willows (Geyer & Lemmon). **Size**: Medium **Density**: Dense	100'	**Type**: Conifer (Douglas-fir, white fir, and ponderosa pine) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities that have no woody vegetation in RA1, & are characterized by herbaceous plants such as inflated sedge, beaked sedge or Sitka sedge. See Kovalchik (1987) for more details about specific plant communities & where they occur.

Current Streamside Conifer Regeneration: Common, except where shrubs competition is intense.

Upland vegetation: Ponderosa pine, bitterbrush.

Historic Crown Closure: Less than or equal to 30% historic crown closure. Fire suppression and grazing have altered current stand density and composition. Fire frequency in ponderosa pine forests was historically from 8 to 20 years.

Land Use: Forestry, grazing, recreation.

Other:

Pumice Plateau Forest (9e)

Location: High elevation plateaus east and north of Crater Lake.

Drainage Basins: Deschutes and Klamath Basins

Geology: Geology dominated by Mount Mazama ash and pumice. Ash is underlain by basalt and andesite lava flows.

Topography: Consists of high, undulating volcanic plateau with isolated buttes. Low channel gradient. Very low stream density within watersheds. Most perennial streams are dominated by flow from springs.

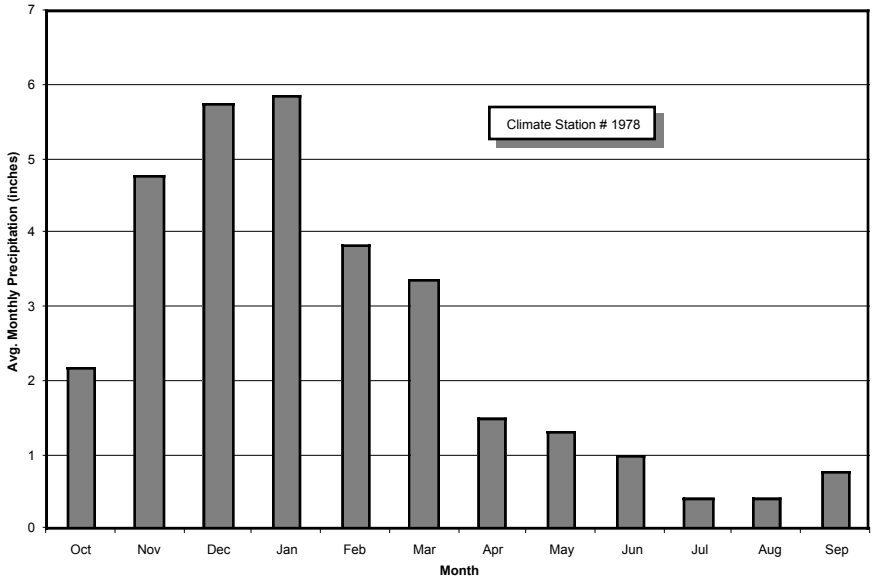
Soil: Soils range from well-drained coarse sandy loam to loamy course sand derived from ash and pumice.

Erosion: Erosion rate is low due to very high infiltration rates and low precipitation.

Climate characterization: Eastern slopes of the Cascades are drier than the western slopes due to a rain shadow effect of the mountain range. Low precipitation occurs throughout the year except for at higher elevations. In general, the high elevations of the plateau experience cool temperatures and a significant amount of snow. The western portion is wetter and accumulates more snow than the eastern portion. The summers are warm and dry.

Mean annual precipitation: 16 to 30 inches.

Precipitation Pattern: Most precipitation occurs in the winter months from November to January.



2-year 24 hour precipitation: 1.4 to 3.0 inches.

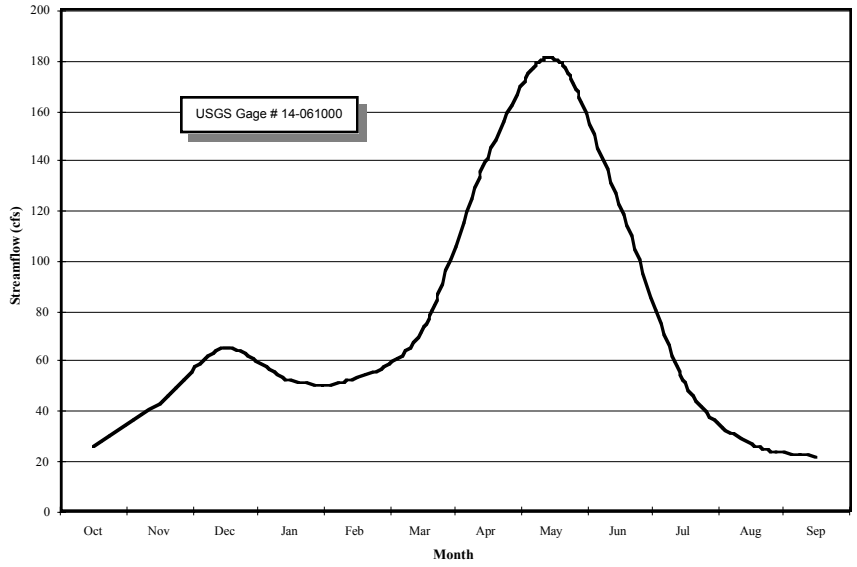
Temperature

	January			*July*		
°F	**37**	**14**	**27**	**80**	**38**	**63**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Due to generally high elevations, the plateau has cool temperatures and receives a significant amount of snow, which accumulates into moderately deep snowpacks. Deeper snowpacks are found at higher elevations and along the western portion of the ecoregion.

Hydrologic basin characteristics: Basins have a variety of orientations in the region. Northern basins drain mainly northeast into the Deschutes River. Southern sections drain mainly to the south to the Sprage and Klamath Rivers. Some basins have a northern orientation and drain into lakes and marshes in Lake County.

Runoff patterns: Average monthly streamflows are highest in the late spring and early summer months. Some streams also experience high flow values in the fall and winter.



Peak flow generating process: Primarily spring rain-on-snow, spring snowmelt and spring rainstorms; winter rain-on-snow can also produce peak flows though less commonly.

Peak flow magnitude (2-year recurrence interval): 4 cfs/mi^2 to 10 cfs/mi^2, a few are greater than 10 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	fines	fines	fines
	Higher gradient	fines / gravel	fines / gravel	fines / gravel
Beaver dams	Lower gradient	some year-round	some year-round	some year-round
	Higher gradient			

Natural Disturbances: Frequent, low-intensity fires were common in ponderosa pine forests in the past, but fire suppression has reduced fire frequency.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Conifers (white fir,) & shrubs (mountain alder, Douglas spiraea with queencup beadlily). **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifer (lodge-pole pine primarily; white fir, Douglas-fir, mountain hemlock, and ponderosa pine in steeper terrain) **Size**: Medium **Density**: Dense	See Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Conifers (lodegepole pine, ponderosa pine) & shrubs such as bearberry, wax currant, bitterbrush, bog blueberry, & Douglas spiraea. Mountain alder & common snowberry occur with ponderosa pine. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifer (lodge-pole pine primarily; white fir, Douglas-fir, mountain hemlock, and ponderosa pine in steeper terrain) **Size**: Medium **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as widefruit sedge, and aquatic sedge at higher elevations. See Kovalchik (1987) for more details about specific plant communities and where they occur.

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Un-constrained	0-75'	**Type**: Mixed (lodgepole pine, ponderosa pine, aspen) with shrubs such as bearberry, wax currant, bitterbrush, bog blueberry, Douglas spiraea mountain alder, common snowberry, and willows (Booth, Geyer and Lemmon). **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifer (lodge-pole pine primarily; white fir, Douglas-fir, mountain hemlock, and ponderosa pine in steeper terrain) **Size**: Medium **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as widefruit sedge, Sitka sedge, inflated sedge, beaked sedge or aquatic sedge at higher elevations. See Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Common, except where shrubs competition is intense.

Upland vegetation: Lodgepole pine (on flats and in depressions) and ponderosa pine (on slopes) forests.

Historic Crown Closure: Canopy closure in lodgepole pine forests was dependent on the fire cycle. Lodgepole pine forests have a 40-50 year fire cycle. Newly burned areas are open. Young forests that developed as a result of a fire are very dense. As they mature, these lodgepole forests thin out, and then they burn again. The mountain pine beetle also influences forest crown closure and fire fuel loads. Ponderosa pine forests had less than or equal to 30% historic crown closure Fire frequency in ponderosa pine forests was historically from 8 to 20 years.

Land Use: Forestry and grazing.

Other: Most of this ecoregion is publicly owned.

Cold Wet Pumice Plateau Basins (9f)

Location: High elevation basins south of Bend (La Pine, Sycan, and Klamath marshes)

Drainage Basins: Deschutes and Malheur Lake Basins

Geology: Geology consists of Mount Mazama ash underlain by river and lake deposits.

Topography: Consists of depressions with forested wetlands, marshes, shallow lakes, and reservoirs. Streams are very low gradient and originate in adjacent ecoregions with higher precipitation.

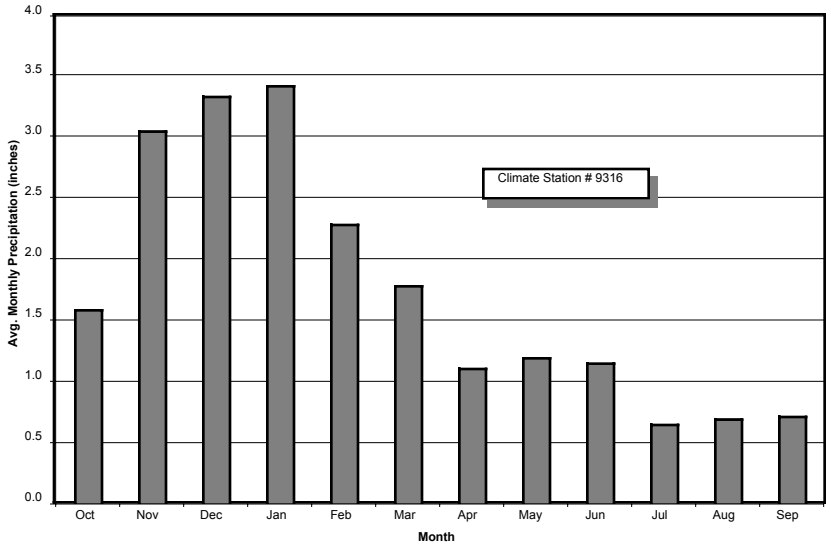
Soil: Soils range widely from mucky silt loam to sandy loam.

Erosion: Erosion rate is low due to very high infiltration rates and low precipitation. These are depositional areas.

Climate characterization: Eastern slopes of the Cascades are drier than the western slopes due to a rain shadow effect of the mountain range. Low precipitation occurs throughout the year except for at higher elevations. In general, the high elevations of the plateau experience cool temperatures and receive a significant amount of snow. The summers are warm and dry.

Mean annual precipitation: 20 to 25 inches.

Precipitation Pattern: Most precipitation occurs in the winter months of November, December, and January.



2-year 24 hour precipitation: 1.6 to 3.0 inches

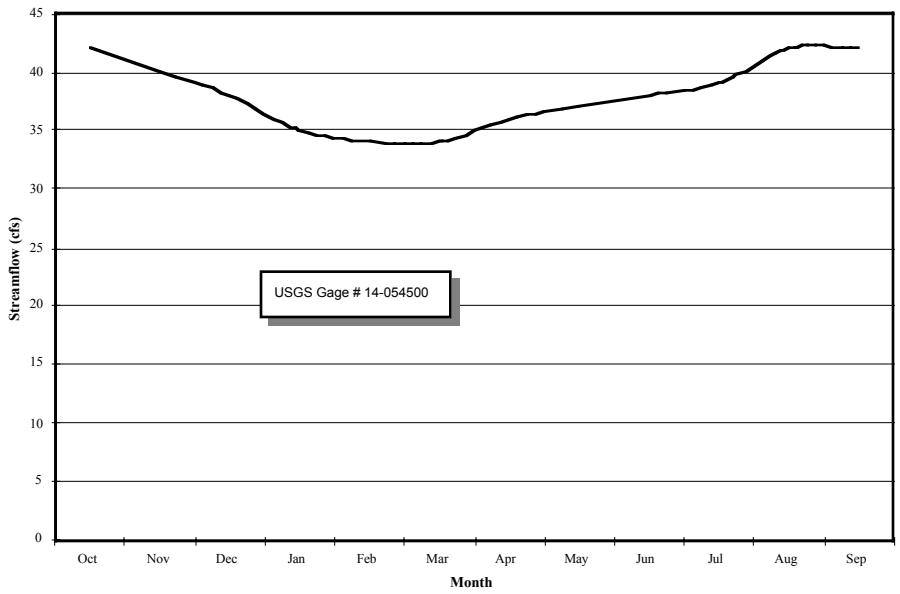
Temperature

	January			*July*		
°F	**38**	**12**	**28**	**80**	**38**	**62**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Due to generally high elevations, the plateau has cool temperatures and receives a significant amount of snow, which accumulates into moderately deep snowpacks. Deeper snowpacks are found at higher elevations.

Hydrologic basin characteristics: Most basins are oriented to the northeast and drain to the Deschutes River. Streams are low gradient and have abundant wetlands.

Runoff patterns: Average monthly streamflows tend to be higher in fall, although some streams experience very little variation in runoff values throughout the year.



Peak flow generating process: Spring snowmelt and summer rainstorms.

Peak flow magnitude (2-year recurrence interval): Less than 10 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	Fines	Fines	Fines
	higher gradient	N/A	N/A	N/A
Beaver dams	lower gradient	many year-round	many year-round	some year-round
	higher gradient	N/A	N/A	N/A

Natural Disturbances: Bark beetles periodically kill a majority of the lodgepole pine near streams and marshes.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size:** N/A **Density**: N/A	No constrained channels are assumed to exist in this ecoregion
Semi-constrained	0-25'	**Type**: Shrubs such as bearberry, wax currant, bitterbrush, bog blueberry, and Douglas spiraea. Willows and wetland vegetation. **Size**: N/A **Density**: N/A	25-100'	**Type**: Conifer (lodge-pole pine) **Size**: Medium **Density**: Sparse	Under certain circumstances, there are a few potential plant communities that have no woody vegetation in RA1, & are characterized by herbaceous plants such as widefruit sedge, & aquatic sedge at higher elevations. See Kovalchik B. (1987) for more details about specific plant communities & where they occur.
Un-constrained	0-50'	**Type**: Shrubs such as bearberry, wax currant, bitterbrush, bog blueberry, and Douglas spiraea. Willows and wetland vegetation. **Size**: N/A **Density**: N/A	50-100'	**Type**: Conifer (lodge-pole pine) **Size**: Medium **Density**: Sparse	Under certain circumstances, there are a few potential plant communities that have no woody vegetation in RA1, & are characterized by herbaceous plants such as widefruit sedge, Sitka sedge, inflated sedge, beaked sedge, or aquatic sedge at higher elevations. See Kovalchik B. (1987) for more details about specific plant communities & where they occur.

Current Streamside Conifer Regeneration: Common, except where water table is too high.

Upland vegetation: Lodgepole pine, forested wetlands (willow and lodgepole pine), wetland and meadow vegetation (such as tules, sedges and tufted hairgrass). Potential natural vegetation in the La Pine basin includes lodgepole pine and wet forested

wetlands. Potential natural vegetation in the Sycan and Klamath marshes includes a mixture of wetland vegetation.

Historic Crown Closure: Less than 30% historic crown closure. Fire suppression and grazing have altered current stand density and composition.

Land Use: Grazing, rural residential, forestry, duck hunting, and recreation.

Other:

Cold Wet Pumice Plateau Basins (9f)

Location: High elevation basins south of Bend (La Pine, Sycan, and Klamath marshes)

Drainage Basins: Deschutes and Klamath Basins

Geology: Geology consists of Mount Mazama ash underlain by river and lake deposits.

Topography: Consists of depressions with forested wetlands, marshes, shallow lakes, and reservoirs. Streams are very low gradient and originate in adjacent ecoregions with higher precipitation.

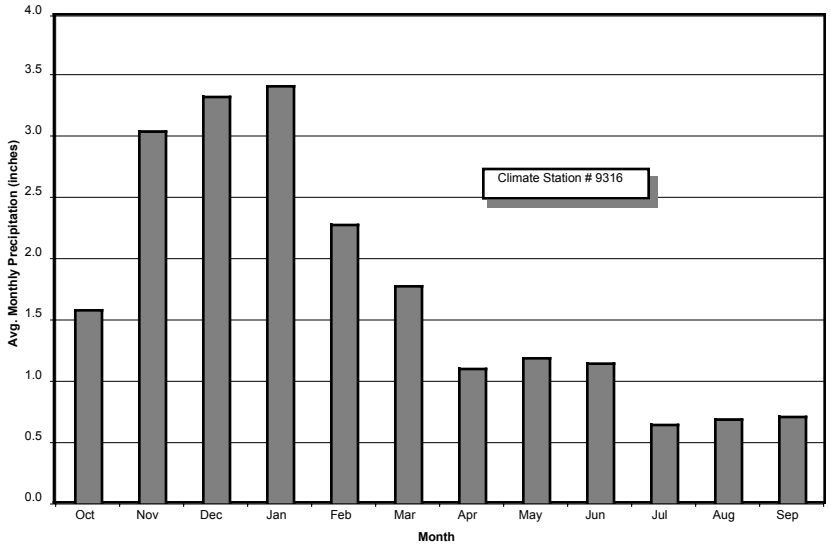
Soil: Soils range widely from mucky silt loam to sandy loam.

Erosion: Erosion rate is low due to very high infiltration rates and low precipitation. These are depositional areas.

Climate characterization: Eastern slopes of the Cascades are drier than the western slopes due to a rain shadow effect of the mountain range. Low precipitation occurs throughout the year except for at higher elevations. In general, the high elevations of the plateau experience cool temperatures and receive a significant amount of snow. The summers are warm and dry.

Mean annual precipitation: 20 to 25 inches.

Precipitation Pattern: Most precipitation occurs in the winter months of November, December, and January.



2-year 24 hour precipitation: 1.6 to 3.0 inches

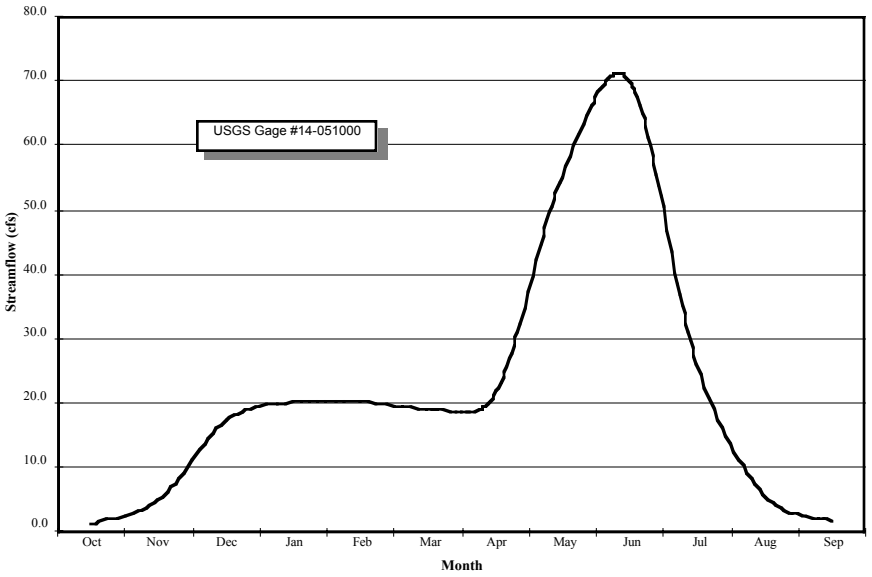
Temperature

	January			*July*		
°F	**38**	**12**	**28**	**80**	**38**	**62**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Due to generally high elevations, the plateau has cool temperatures and receives a significant amount of snow, which accumulates into moderately deep snowpacks. Deeper snowpacks are found at higher elevations.

Hydrologic basin characteristics: Most basins are oriented to the northeast and drain to the Deschutes River. Streams are low gradient and have abundant wetlands.

Runoff patterns: Average monthly streamflows tend to be higher in spring and fall; most streams experience lower flows in the winter months.



Peak flow generating process: Spring snowmelt and summer rainstorms.

Peak flow magnitude (2-year recurrence interval): Less than 10 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	Fines	Fines	Fines
	higher gradient	N/A	N/A	N/A
Beaver dams	lower gradient	many year-round	many year-round	some year-round
	higher gradient	N/A	N/A	N/A

Natural Disturbances: Bark beetles periodically kill a majority of the lodgepole pine near streams and marshes.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size:** N/A **Density**: N/A	No constrained channels are assumed to exist in this ecoregion
Semi-constrained	0-25'	**Type**: Shrubs such as bearberry, wax currant, bitterbrush, bog blueberry, and spiraea. Willows and wetland vegetation. **Size**: N/A **Density**: N/A	25-100'	**Type**: Conifer (lodge-pole pine) **Size**: Medium **Density**: Sparse	Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as widefruit sedge, and aquatic sedge at higher elevations. See Kovalchik B. (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-50'	**Type**: Shrubs such as bearberry, wax currant, bitterbrush, bog blueberry, and spiraea. Willows and wetland vegetation. **Size**: N/A **Density**: N/A	50-100'	**Type**: Conifer (lodge-pole pine) **Size**: Medium **Density**: Sparse	Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as widefruit sedge, Sitka sedge, inflated sedge, beaked sedge, or aquatic sedge at higher elevations. See Kovalchik B. (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Common, except where water table is too high.

Upland vegetation: Lodgepole pine, forested wetlands (willow and lodgepole pine), wetland and meadow vegetation (such as tules, sedges and tufted hairgrass). Potential natural vegetation in the La Pine basin includes lodgepole pine and wet forested

wetlands. Potential natural vegetation in the Sycan and Klamath marshes includes a mixture of wetland vegetation.

Historic Crown Closure: Less than 30% historic crown closure. Fire suppression and grazing have altered current stand density and composition.

Land Use: Grazing, rural residential, forestry, duck hunting, and recreation.

Other:

Klamath / Goose Lake Warm Wet Basins (9g)

Location: Basins south and east of Crater Lake

Drainage Basins: Klamath and Malheur Lake Basins

Geology: Geology consists of lake and river sediments.

Topography: Consists of depressions with wetlands. Streams are very low gradient and originate in adjacent ecoregions with higher precipitation. Streams often are channelized to improve drainage on surrounding farmland.

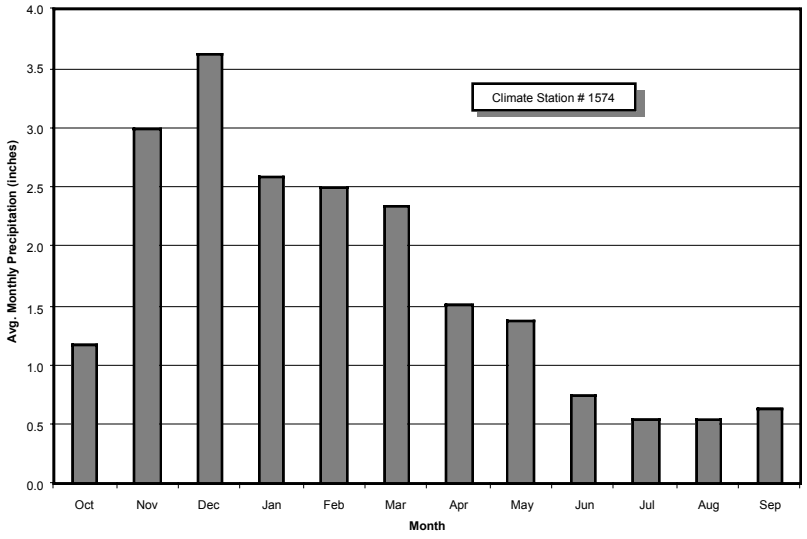
Soil: Soils range widely from deep peaty muck to silt loam and are imperfectly drained.

Erosion: Erosion rate is low due to low precipitation and flat terrain. These are depositional areas.

Climate characterization: Eastern slopes of the Cascades are drier than the western slopes due to a rain shadow effect of the mountain range. Low precipitation occurs throughout the year except for at higher elevations. In general, the high elevations of the plateau experience cool temperatures and a significant amount of snow. The western portion is wetter and accumulates more snow than the eastern portion. The summers are warm and dry.

Mean annual precipitation: 10 to 18 inches; up to 40 inches in higher elevations.

Precipitation Pattern: Most precipitation occurs in the winter months, predominately in November and January.



2-year 24 hour precipitation: 1.2 to 2.5 inches

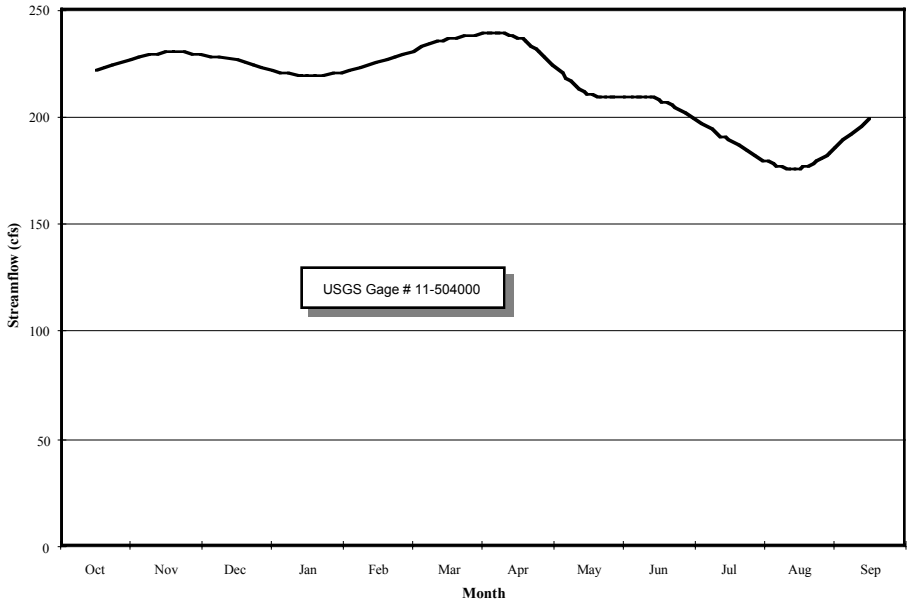
Temperature

	January			*July*		
°F	**39**	**21**	**27**	**85**	**51**	**63**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Due to generally high elevations, the plateau has cool temperatures and receives a significant amount of snow, which accumulates into moderately deep snowpacks. Deeper snowpacks are found at higher elevations and along the western portion of the ecoregion.

Hydrologic basin characteristics: Basins are oriented mainly to the west and south. Streams drain into rivers, such as the Lost, Sprague and Klamath Rivers, or into lakes, i.e. Goose Lake and Upper Klamath Lake. Streams have low gradients and abundant wetlands.

Runoff patterns: Average monthly streamflows tend to be slighlty higher in winter and spring; many of the streams in this ecoregion experience very little variation in runoff values throughout the year.



Peak flow generating process: Spring snowmelt and summer rainstorms.

Peak flow magnitude (2-year recurrence interval): Less than 10 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	Fines	Fines	Fines
	higher gradient	N/A	N/A	N/A
Beaver dams	lower gradient	many year-round	many year-round	Some year-round
	higher gradient	N/A	N/A	N/A

Natural Disturbances:

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	No constrained channels are assumed to exist in this ecoregion.
Semi-constrained	0-100'	**Type**: Wetland vegetation (tules, cattails, and sedges) **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Wetlands include widefruit sedge, few flowered spikerush and aquatic sedge at higher elevations. See Kovalchik (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-100'	**Type**: Wetland vegetation (tules, cattails, and sedges) **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Wetlands include widefruit sedge, few flowered spikerush, inflated sedge, beaked sedge or aquatic sedge at higher elevations. See Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Never occurred naturally.

Upland vegetation: Sagebrush, bunchgrass, crops, pasture grasses.

Historic Crown Closure: Less than 30% historic crown closure.

Land Use: Cropland, pastureland, wildlife refuge

Other:

Fremont Pine / Fir Forest (9h)

Location: High elevation mountains of south-central Oregon.

Drainage Basins: Klamath and Malheur Lakes Basins

Geology: Geology ranges widely from basalt and rhyolite flows to sandstone and siltstone.

Topography: Consists of steeply to moderately sloping mountains and high plateaus. Most streams are higher gradient. Low stream density within watersheds. Many streams are dominated by flow from springs.

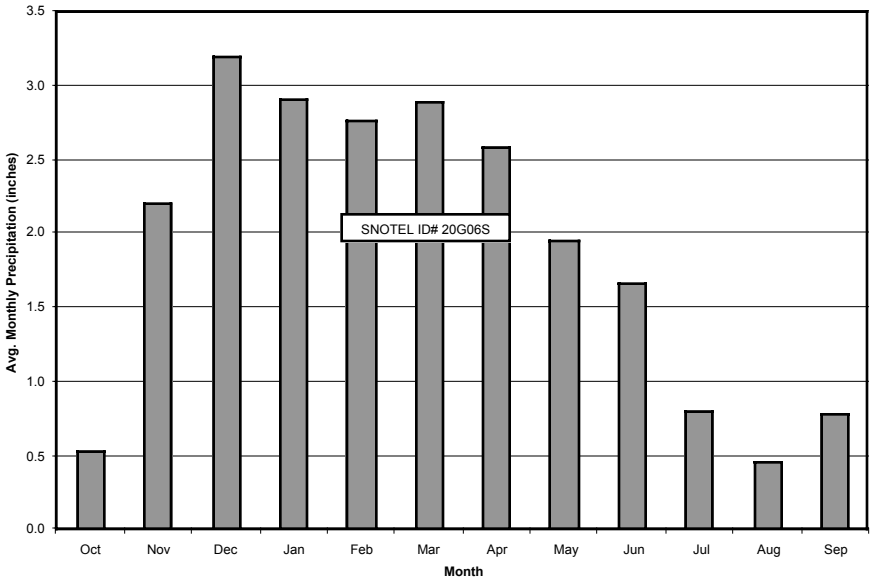
Soil: Soils range from deep sandy loam to stony loam.

Erosion: Erosion rate is low due competent geology and low precipitation.

Climate characterization: Eastern slopes of the Cascades are drier than the western slopes due to a rain shadow effect of the mountain range. Low precipitation occurs throughout the year except for at higher elevations. In general, the high elevations of the plateau experience cool temperatures and a significant amount of snow. The western portion is wetter and accumulates more snow than the eastern portion. The summers are warm and dry.

Mean annual precipitation: 15 to 40 inches

Precipitation Pattern: Majority of the precipitation occurs during the winter and early spring months from December to April.



2-year 24 hour precipitation: 1.2 to 1.4 inches

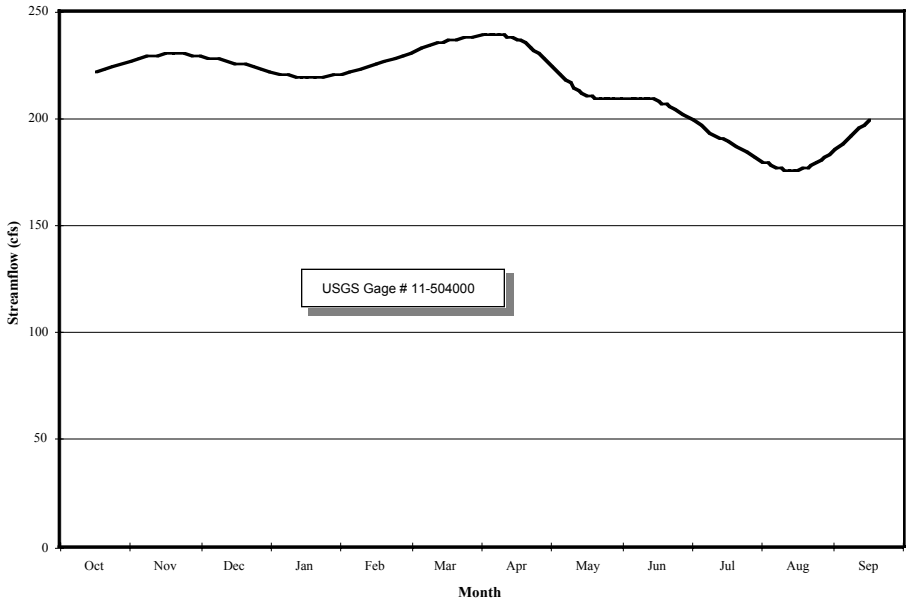
Temperature

	January			*July*		
°F	**38**	**15**	**27**	**85**	**42**	**63**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Due to generally high elevations, the plateau has cool temperatures and receives a significant amount of snow, which accumulates into moderately deep snowpacks. Deeper snowpacks are found at higher elevations.

Hydrologic basin characteristics: Mainly high gradient streams draining mountains and plateaus. Basins are oriented to the east and west and contain tributaries to Upper Klamath and Goose Lake respectively.

Runoff patterns: Average monthly streamflows tend to be slightly higher in winter and spring, although many of the streams in this ecoregion experience very little variation in runoff values throughout the year.*



* as represented by a stream gage from ecoregion 9g because no daily values were available for this ecoregion.

Peak flow generating process: Spring snowmelt and summer rainstorms.

Peak flow magnitude (2-year recurrence interval): 6 cfs/mi^2 to 20 cfs/mi^2

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	Fines	fines / gravel	gravel
	higher gradient	fines / gravel	gravel	gravel / cobble
Beaver dams	lower gradient	many year-round	some year-round	some in summer
	higher gradient	some year-round	none	none

Natural Disturbances: Frequent, low-intensity fires were common in ponderosa pine forests in the past. Low- to moderate-intensity fires were also fairly common in white fir forests in the past. Fire suppression has reduced fire frequency.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Mixed (white fir, hardwoods) & shrubs (mountain alder). **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifer (white fir and ponderosa pine) **Size**: Large **Density**: Dense	See Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Mixed (white fir, hardwoods) & shrubs (mountain alder & common snowberry). **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifer (white fir and ponderosa pine) **Size**: Large **Density**: Dense	See Kovalchik 1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods (including aspen) & shrubs (such as mountain alder, common snowberry, willows). Wooly sedge or aquatic sedge at high elevations. Some conifers (white fir) may be present. **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifer (white fir and ponderosa pine) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as widefruit sedge, inflated sedge, beaked sedge, or aquatic sedge at higher elevations. See Kovalchik (1987) for more details about specific plant communities & where they occur.

Current Streamside Conifer Regeneration: Common.

Upland vegetation: Ponderosa pine, white fir forests. Whitebark pine at higher elevations. Also lodgepole pine, juniper.

Historic Crown Closure: Less than 30% historic crown closure. Fire suppression and grazing have altered current stand density and composition. Historic fire frequency in ponderosa pine forests was between 8 to 20 years.

Land Use: Forestry, grazing and recreation.

Other: Most of this ecoregion is publicly owned. Elevation, slope angle and slope aspect affect vegetation types.

Southern Cascade Slope (9i)

Location: Higher elevation terrain draining to the Klamath River.

Drainage Basin: Klamath Basin

Geology: Geology basalt and andesite lava flows.

Topography: Consists of gentle to moderate sloping mountains. Streams are moderate to high gradient. Low stream density within watersheds. Many streams in west are dominated by flow from springs.

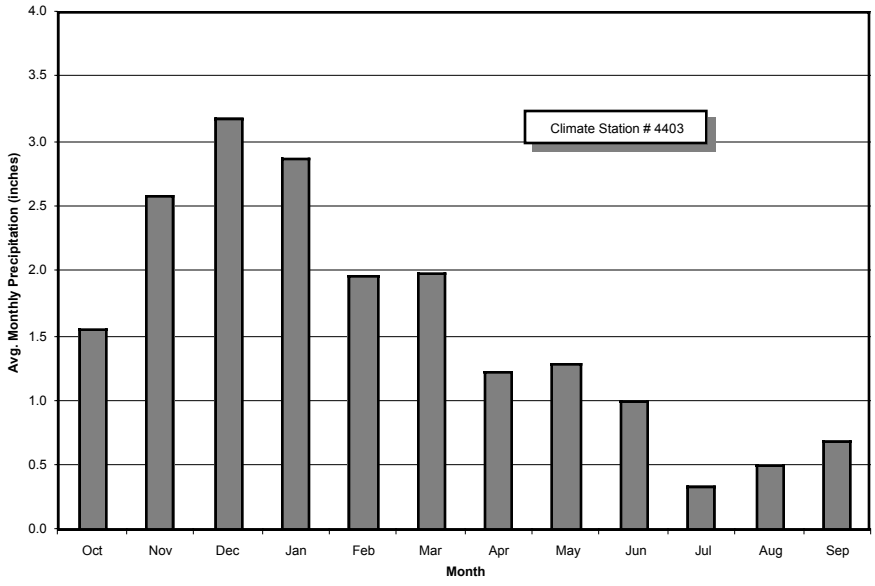
Soil: Soils range from deep loam to stony loam.

Erosion: Erosion rate is low due competent geology and low precipitation.

Climate characterization: Eastern slopes of the Cascades are drier than the western slopes due to a rain shadow effect of the range. Low precipitation occurs throughout the year except for higher elevations. The summers are warm and dry with occasional isolated thunderstorms from July to September.

Mean annual precipitation: 25 to 40 inches

Precipitation Pattern: Most precipitation occurs in the winter months of November, December, and January.



2-year 24 hour precipitation: 1.8 to 3.0 inches

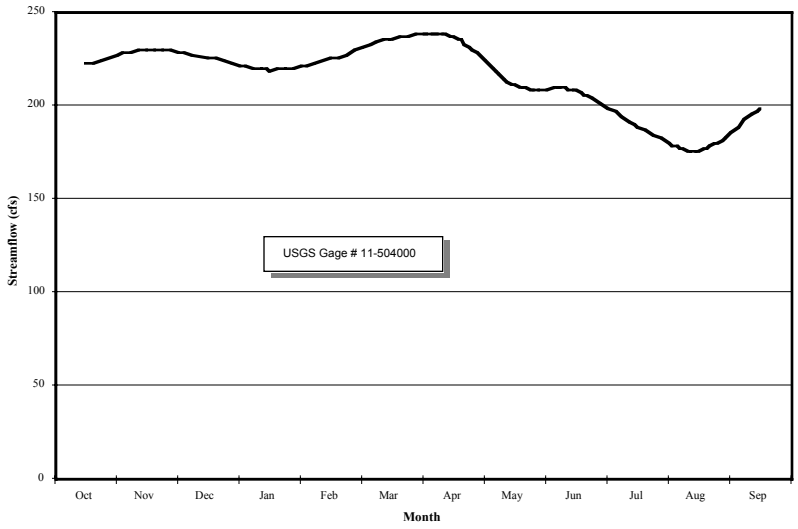
Temperature

	January			*July*		
°F	**34**	**20**	**27**	**82**	**47**	**63**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Due to generally high elevations, the plateau has cool temperatures and receives a significant amount of snow, which accumulates into moderately deep snowpacks. Deeper snowpacks are found at higher elevations.

Hydrologic basin characteristics: Basin orientation is to the south with streams draining into California and the Pacific Ocean.

Runoff patterns: Average monthly streamflows tend to be slightly higher in winter and spring, although many of the streams in this ecoregion experience very little variation in runoff values throughout the year.*



* as represented by a stream gage from ecoregion 9g because no daily values were available for this ecoregion.

Peak flow generating process: Spring snowmelt and summer rainstorms.

Peak flow magnitude (2-year recurrence interval): Less than 10 cfs/mi^2

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	fines	fines / gravel	gravel
	higher gradient	fines / gravel	gravel	gravel / cobble
Beaver dams	lower gradient	some year-round	some year-round	some in summer
	higher gradient	some year-round	none	none

Natural Disturbances: Both lightning-caused and deliberately set fires were present in this ecoregion in the past.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Mixed (white fir and hardwoods). Shrubs (Douglas spiraea, mountain alder). **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (white fir and ponderosa pine) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation, and are characterized by herbaceous plants such as arrowleaf groundsel. See Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Mixed (white fir and hardwoods). Shrubs (Douglas spiraea, mountain alder). **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (white fir and ponderosa pine) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation, and are characterized by herbaceous plants such as queencup beadlily, widefruit sedge, Holm's sedge, or few-flowered spikerush. See Kovalchik (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Mixed (white fir and hardwoods; including aspen). Shrubs (Douglas spiraea, mountain alder, bog blueberry, willows) **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (white fir and ponderosa pine) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation, and are characterized by herbaceous plants such as queencup beadlily, widefruit sedge, inflated sedge, beaked sedge, Holm's sedge, or few-flowered spikerush. See Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Common.

Upland vegetation: Ponderosa pine forests, at higher elevations white fir, Shasta red fir, and Douglas-fir.

Historic Crown Closure: Less than 30% historic crown closure. Fire suppression and grazing have altered current stand density and composition. Fire frequency in Ponderosa pine forests were historically from 8 to 20 years.

Land Use: Forestry, grazing and recreation.

Other:

Klamath Juniper / Ponderosa Pine Woodland (9j)

Location: Moderate elevation terrain in the south-central portion of the state.

Drainage Basin: Klamath Basin

Geology: Geology ranges widely from basalt to sandstone and siltstone

Topography: Consists of undulating hills, benches, and escarpments. Streams have moderate gradient. Low stream density within watersheds. Many streams are dominated by flow from springs.

Soil: Soils range from stony clay loam to very gravelly loam.

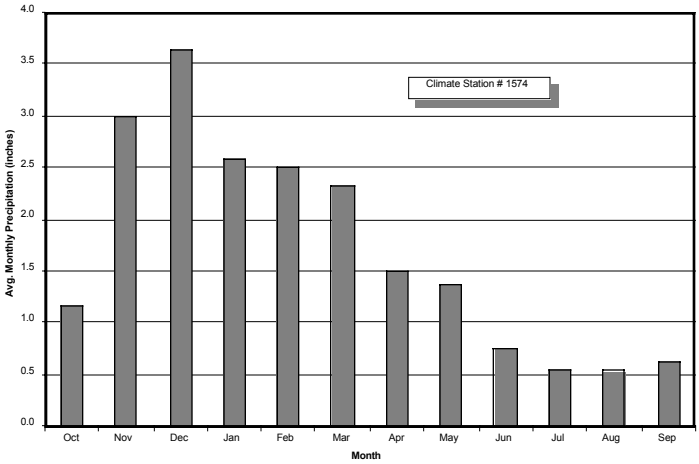
Erosion: Erosion rate is low due competent geology and low precipitation.

Climate characterization: Eastern slopes of the Cascades are drier than the western slopes due to a rain shadow effect of the mountain range. Low precipitation occurs throughout the year except for at higher elevations. In general, the high elevations of the plateau experience cool temperatures and a significant amount of snow. The western portion is wetter and accumulates more snow than the eastern portion. The summers are warm and dry.

Mean annual precipitation: 12 to 20 inches

Precipitation Pattern: Most precipitation occurs in the winter months, predominately in November and January.

* as represented by climate data from ecoregion 9g because no climate data were available for this ecoregion.



2-year 24 hour precipitation: 1.2 to 2.0 inches

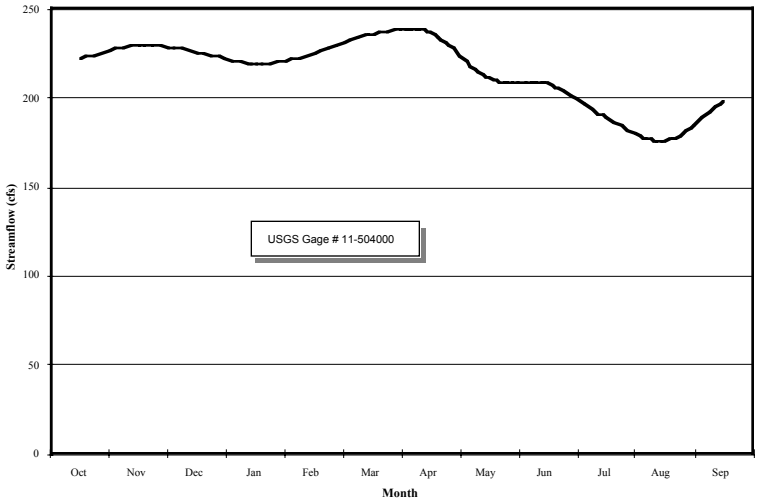
Temperature

	January			*July*		
°F	**40**	**21**	**27**	**83**	**49**	**63**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Due to generally high elevations, the plateau has cool temperatures and receives a significant amount of snow, which accumulates into moderately deep snowpacks. Deeper snowpacks are found at higher elevations.

Hydrologic basin characteristics: Basins are oriented to the south with medium gradient streams draining to the Sprague and Lost Rivers.

Runoff patterns: Average monthly streamflows tend to be slightly higher in winter and spring, although many of the streams in this ecoregion experience very little variation in runoff values throughout the year.*



* as represented by a stream gage from ecoregion 9g because no daily values were available for this ecoregion.

Peak flow generating process: Spring snowmelt and summer rainstorms.

Peak flow magnitude (2-year recurrence interval): Less than 10 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	fines	fines / gravel	gravel
	higher gradient	fines / gravel	gravel	gravel / cobble
Beaver dams	lower gradient	some year-round	some year-round	some in summer
	higher gradient	some year-round	none	none

Natural Disturbances: Frequent, low-intensity fires were common in ponderosa pine forests in the past, but fire suppression has reduced fire frequency

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Shrubs such as mountain alder and Douglas spiraea. **Size**: N/A **Density**: N/A	25-100'	**Type**: Conifers (ponderosa pine) **Size**: Large **Density**: Dense	See Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Shrubs such as mountain alder and Douglas spiraea. Also big or silver sage, and Cusick bluegrass. **Size**: N/A **Density**: N/A	50-100'	**Type**: Conifers (ponderosa pine) **Size**: Large **Density**: Dense	See Kovalchik (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Shrubs such as big or silver sage, and Cusick bluegrass. Willows (Booth, Geyer and Lemmon) and sedges. **Size**: N/A **Density**: N/A	75-100'	**Type**: Conifers (ponderosa pine) **Size**: Large **Density**: Dense	Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as widefruit sedge, inflated sedge, beaked sedge, or aquatic sedge at higher elevations. See Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Common.

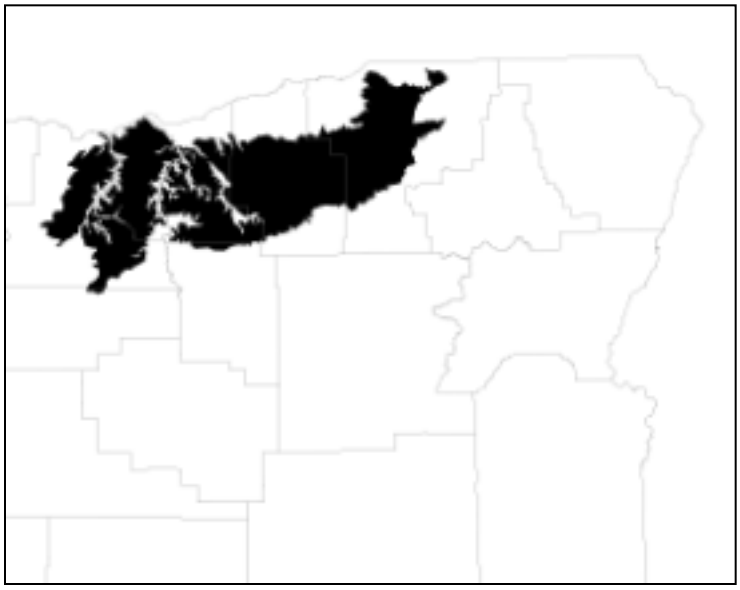
Upland vegetation: A mosaic of pastures and woodland. In the south, juniper. In the north, ponderosa pine and juniper. Also, bunchgrass and both low and big sagebrush.

Historic Crown Closure: Less than 30% historic crown closure. Fire suppression and grazing have altered current stand density and composition. Fire frequency in Ponderosa pine forests were historically from 8 to 20 years.

Land Use: Forestry, recreation, grazing.

Other: Reservoirs in this ecoregion are important to lowland irrigation.

Umatilla Plateau (10c)



Location: High plateau south of the Columbia River and north of the Blue Mountains

Drainage Basins: Umatilla, John Day, Deschutes and Hood River Basins

Geology: Geology is wind-deposited soil underlain by basalt flows.

Topography: Consists of undulating hills and plateaus dissected by steep-sided canyons, in which, the major rivers flow. Streams have a moderate gradient. Stream density is low within watersheds.

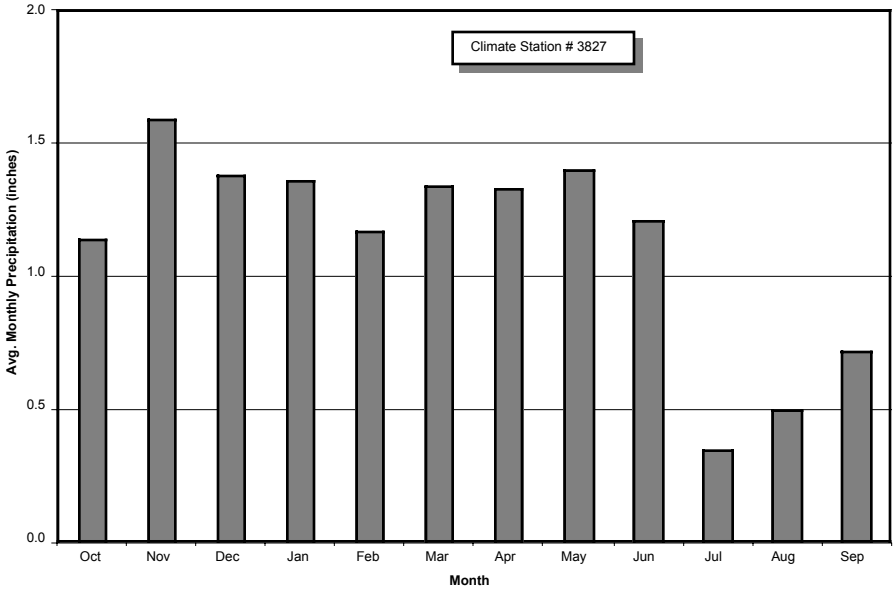
Soil: Wind-deposited silt soils, thick in north and thin in south.

Erosion: Erosion rate is moderate; precipitation is usually low, yet high-intensity thunderstorms can occur during summer, causing rill and gully erosion.

Climate characterization: Climate is continental with a marine influence. The relatively dry climate is due to the rain shadow effect from the Cascade Mountain range. Winters are cold and summers hot with an occasional thunderstorm. Majority of the precipitation falls in winter, mainly as snow in the higher elevations.

Mean annual precipitation: 10 to 20 inches.

Precipitation Pattern: The majority of the precipitation is spread out during late fall, winter, and early summer from October to June.



2-year 24 hour precipitation: From less than 1.0 to 1.6 inches.

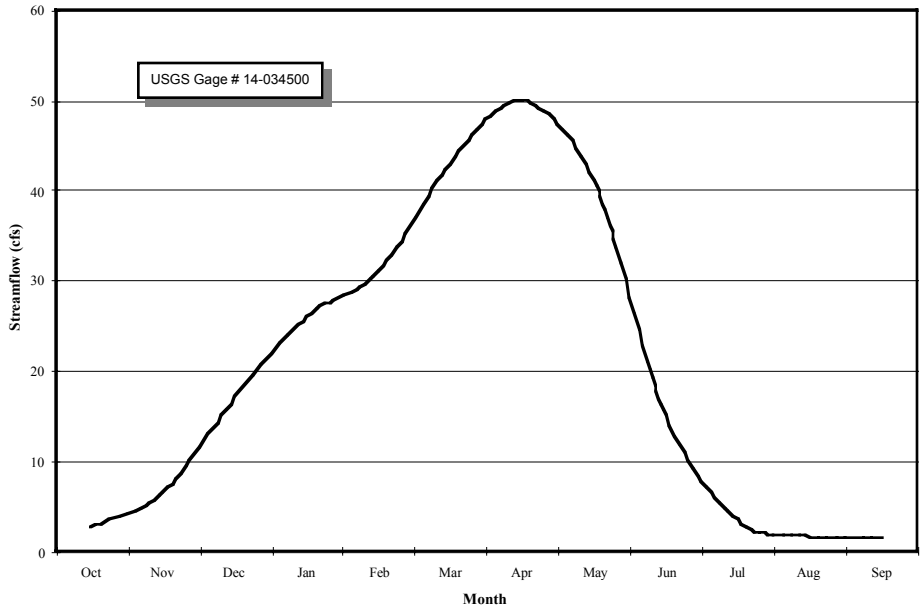
Temperature

	January			*July*		
°F	**41**	**27**	**33**	**85**	**56**	**70**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Most precipitation during winter months falls as snow and snowmelt can minimally contribute to runoff. Deep snowpacks rarely develop below 3,000 feet.

Hydrologic basin characteristics: Basins are oriented to the north, draining into the Columbia River. Streams generally have a moderate gradient.

Runoff patterns: Average monthly streamflows are highest in the spring months.



Peak flow generating process: Rainfall

Peak flow magnitude (2-year recurrence interval): less than 10 cfs/mi^2, with a few 10 cfs/mi^2 to 20 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	gravel	gravel / cobble
	higher gradient	gravel	gravel / cobble	cobble
Beaver dams	lower gradient	Some year-round	some year-round	some in summer
	higher gradient	Few year-round	none	none

Natural Disturbances:

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Shrubs such as Douglas spirea, red osier dogwood, willows, water birch, and mountain alder. **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Semi-constrained	0-50'	**Type**: Shrubs such as Douglas spirea, red osier dogwood, willows, water birch, and mountain alder. **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Un-constrained	0-75'	**Type**: Shrubs such as Douglas spirea, red osier dogwood, willows, water birch, and mountain alder. **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	

Current Streamside Conifer Regeneration: Naturally not present.

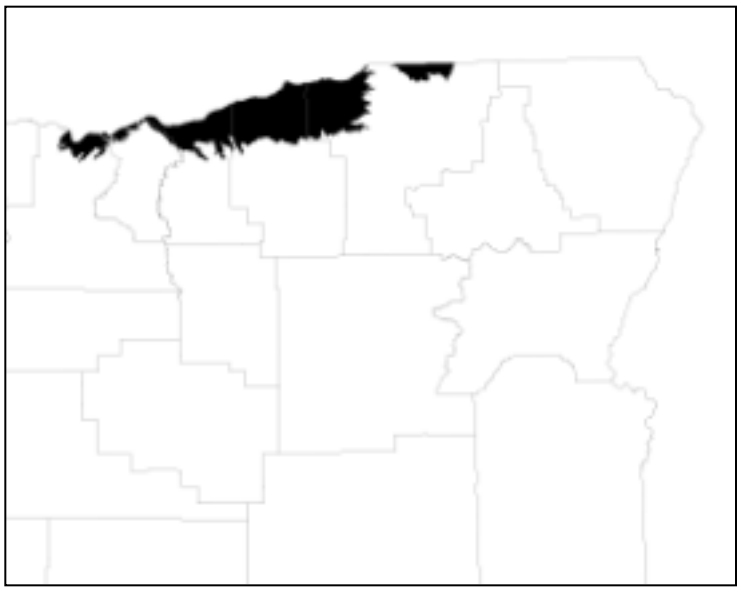
Upland vegetation: Agricultural crops (primarily wheat). Native vegetation includes bluebunch wheatgrass, Idaho fescue, rose, hawthorn, and snowberry.

Historic Crown Closure: Less than 30%.

Land Use: Wheat farming, grazing.

Other:

Pleistocene Lake Basin (10e)



Location: Lowlands immediately south of the Columbia River in north-central Oregon.

Drainage Basins: Umatilla, John Day and Hood River, and Deschutes Basins

Geology: Geology is lake deposits caused by temporary ponding during the Missoula floods.

Topography: Consists of low-gradient slopes. Streams have a moderate to low gradient. Stream density is very low within watersheds. Perennial streams originate in the Blue Mountains. Many streams are intermittent.

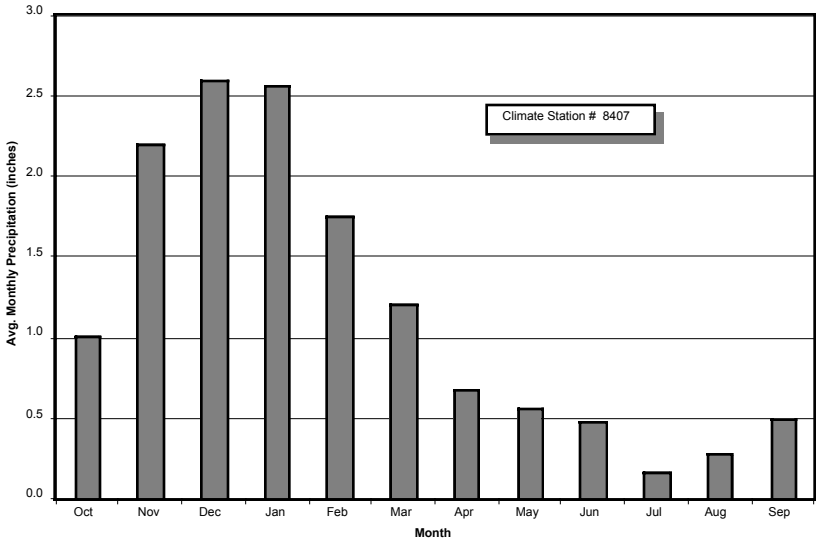
Soil: Flood-deposited silty loams.

Erosion: Erosion rate is low due to low precipitation and gentle slopes.

Climate characterization: Climate is continental with a marine influence. The relatively dry climate is due to the rain shadow effect from the Cascade Mountain range. Winters are cold and summers hot with an occasional thunderstorm. Majority of the precipitation falls in winter, mainly as snow in the higher elevations. Vigorous winds are common in and around the Columbia Gorge during winter and summer months. Moderation of air temperatures can occur as west flowing maritime air reaches the region through the Columbia River corridor. By contrast, large-scale easterly airflows can bring very cold continental air into the region.

Mean annual precipitation: 5 to 10 inches.

Precipitation Pattern: Majority of the precipitation occurs during the winter months of November, December, and January.



2-year 24 hour precipitation: From less than 1.0 to 1.2 inches

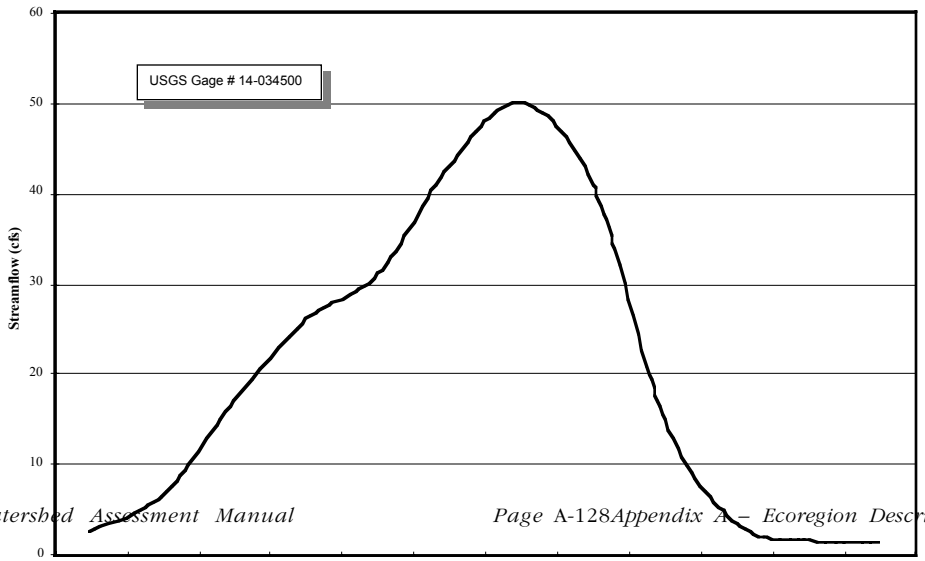
Temperature

	January			*July*		
°F	**43**	**30**	**37**	**88**	**60**	**74**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Winter precipitation falls primarily as rain in lower elevation and snow on ridges. Snowpack development can occur at the higher elevations, however they likely do not persist for long.

Hydrologic basin characteristics: Basins are oriented to the north, draining into the Columbia River. Streams have a medium to low gradient.

Runoff patterns: Average monthly streamflows are highest in the spring months.*



* as represented by a stream gage from ecoregion 10c because no daily values were available for this ecoregion.

Peak flow generating process: Rainfall

Peak flow magnitude (2-year recurrence interval): Less than 10cfs/mi^2

Stream channels:

		Small	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	gravel	gravel / cobble
	higher gradient	gravel	gravel / cobble	cobble
Beaver dams	lower gradient	few year-round	few year-round	few in summer
	higher gradient	few year-round	none	none

Natural Disturbances:

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Shrubs such as mountain alder, red osier dogwood and willows. **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Semi-constrained	0-50'	**Type**: Shrubs such as mountain alder, red osier dogwood & willows. Galleries of black cottonwood occurred in areas of perennial streamflow. **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Un-constrained	0-75'	**Type**: Shrubs such as mountain alder, red osier dogwood and willows. Galleries of black cottonwood occurred in areas of perennial streamflow **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	

Current Streamside Conifer Regeneration: Naturally not present.

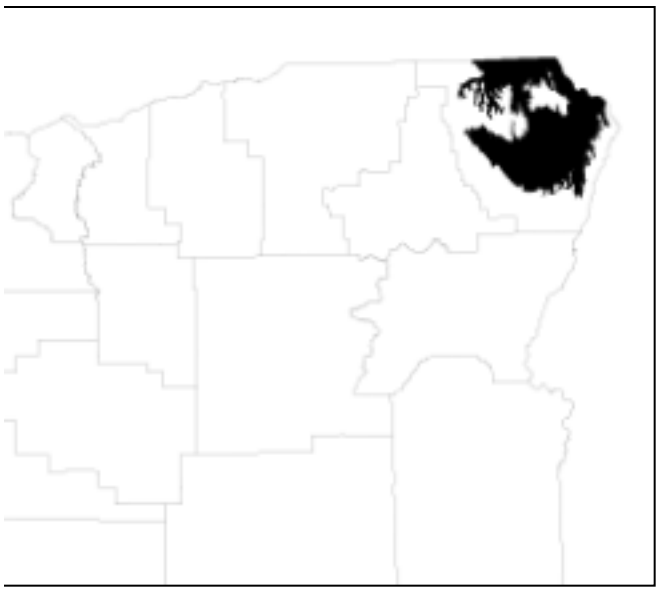
Upland vegetation: Big sagebrush, bluebunch wheatgrass.

Historic Crown Closure: Less than 30%.

Land use:

Other:

Canyons and Dissected Uplands (10f)



Location: Canyons and uplands in far northeast Oregon.

Drainage Basin: Grande Ronde Basin

Geology: Geology is basalt lava flows.

Topography: Consists of undulating hills dissected by steep-sided canyons (Joseph Creek watershed and portions of the Wallowa River, Imnaha River, Grande Ronde River, and Wenaha River watersheds). Streams have a moderate to high gradient. Stream density is moderate within watersheds. Many streams are intermittent.

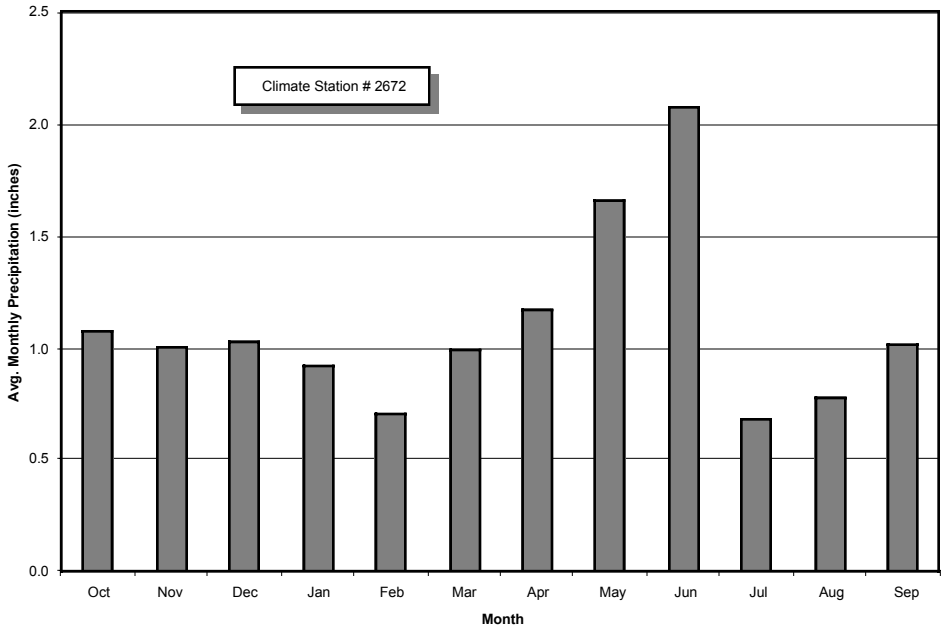
Soil: Clay loam to gravelly clay loam

Erosion: Erosion rate is low due to low precipitation and gentle slopes.

Climate characterization: Continental climate with short, dry summers and long cold winters. Climate varies over a broad temperature and precipitation ranges because sharp elevational differences create localized microclimates. Precipitation tends to fall as light snow in the winter, spring and fall rains, or occasional summer thunderstorms.

Mean annual precipitation: 10 to 25 inches

Precipitation Pattern: Most precipitation occurs during the spring and summer



months.

2-year 24 hour precipitation: 1.0 to 1.4 inches.

Temperature

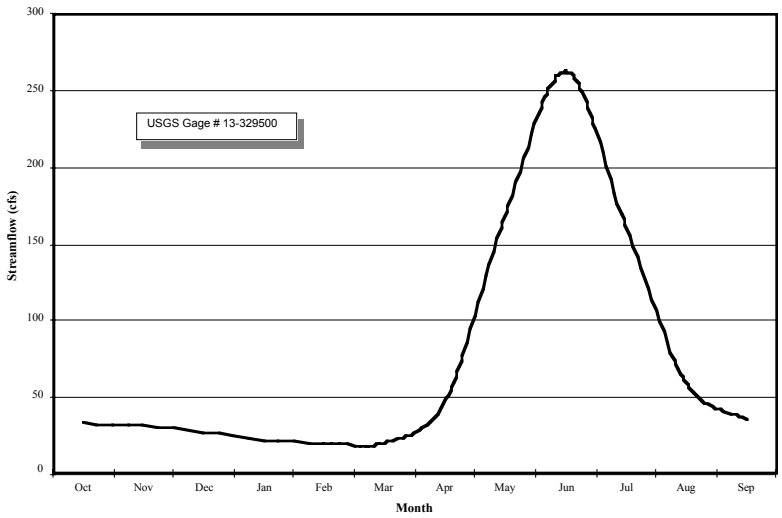
	January			*July*		
°F	**33**	**12**	**23**	**78**	**41**	**60**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Precipitation falling over winter tends to accumulate into snowpack, particularly at higher elevations. Snowmelt often contributes to peak flow generation.

Hydrologic basin characteristics: Basins are oriented to the north which have canyons 2,000 to 5,000 feet deep. Streams flow into the Imnaha, Wallowa and Grande Ronde Rivers.

Runoff patterns: Average monthly streamflows are highest in the spring months.*

* as represented by a stream gage from ecoregion 11e because no daily values were available for this



ecoregion.

Peak flow generating process: Rainfall

Peak flow magnitude (2-year recurrence interval): 6 cfs/mi^2 to 20 cfs/mi^2, few greater than 20 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	fines / gravel	gravel	gravel
	higher gradient	gravel	gravel / cobble	cobble
Beaver dams	Lower gradient	some year-round	some year-round	few in summer
	higher gradient	some in summer	none	none

Natural Disturbances: Fire is not a major disturbance in this area, since the dominant grasses are not affected by it. Grazing tends to eliminate the larger perennial grasses and favors annual grasses like cheatgrass (Franklin and Dyrness 1988).

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (willow, cottonwood) and shrubs. **Size**: Medium **Density**: Dense	25-100'	**Type**: Conifers (Douglas-fir, white fir, lodgepole pine, and ponderosa pine) **Size**: Large **Density**: Sparse	Few streamside trees in driest portions of ecoregion.
Semi-constrained	0-50'	**Type**: Hardwoods (willow, cottonwood) and shrubs. **Size**: Medium **Density**: Dense	50-100'	**Type**: Conifers (Douglas-fir, white fir, lodgepole pine, and ponderosa pine) **Size**: Large **Density**: Sparse	Few streamside trees in driest portions of ecoregion.
Un-constrained	0-75'	**Type**: Hardwoods (willow, cottonwood) and shrubs (primarily willows and dogwood). Also aquatic sedge or woolly sedge, shrubby cinquefoil, silver sage, big sage. **Size**: Medium **Density**: Dense	75-100'	**Type**: Conifers (Douglas-fir, white fir, lodgepole pine, and ponderosa pine) **Size**: Large **Density**: Sparse	Few streamside trees in driest portions of ecoregion. Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as aquatic sedge at higher elevations. See Crowe (1997) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Common.

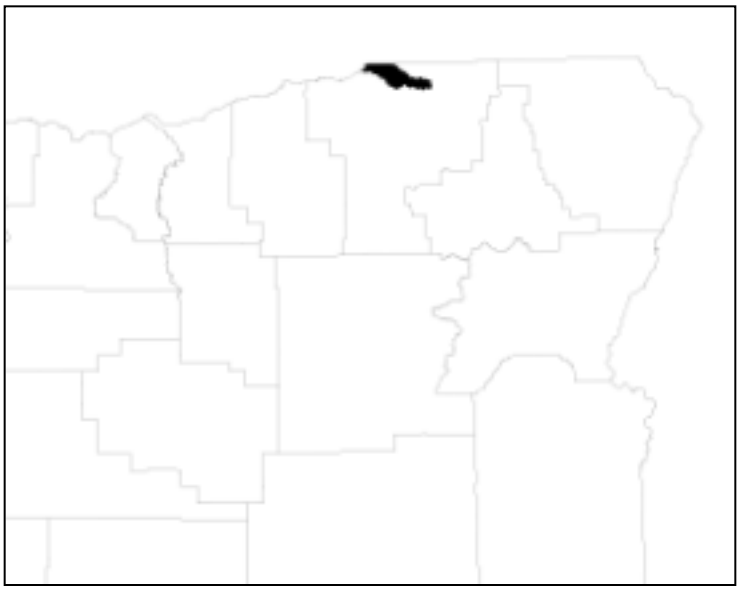
Upland vegetation: Native vegetation includes bluebunch wheatgrass, rose and common snowberry.

Historic Crown Closure: Less than 30%.

Land Use: Grazing, forestry.

Other:

Yakima Folds (10g)



Location: Undulating hills and valleys east of Hermiston and north of Pendleton.

Drainage Basin: Umatilla Basin

Geology: Geology is basalt lava flows.

Topography: Consists of undulating hills and valleys. Streams have a moderate gradient. Stream density is low within watersheds. Most streams are intermittent. Some springs occur.

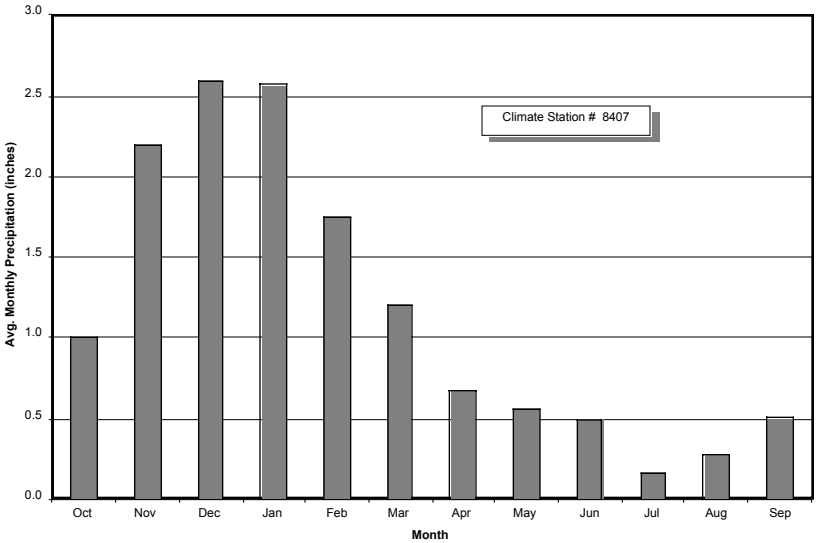
Soil: Clay loam

Erosion: Erosion rate is moderate.

Climate characterization: Vigorous winds are common in and around the Columbia Gorge during winter and summer months. Moderation of air temperatures can occur as west flowing maritime air reaches the region through the Columbia River corridor. By contrast, large-scale easterly air flows can bring very cold continental air into the region.

Mean annual precipitation: 10 to 20 inches

Precipitation Pattern: Majority of the precipitation occurs during the winter months of November, December and January.*



* as represented by climate data from ecoregion 10e because no climate data were available for this ecoregion.

2-year 24 hour precipitation: Less than 1.0 to 1.2 inches.

Temperature

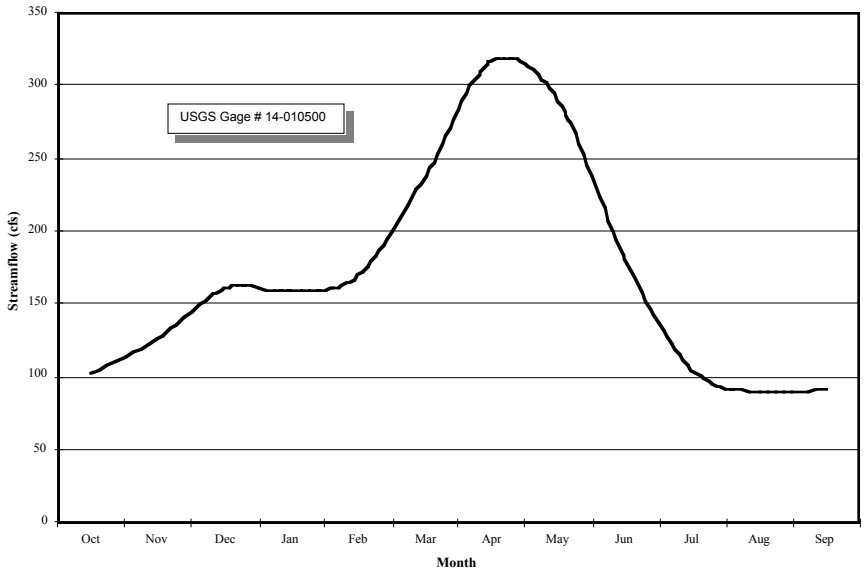
	January			*July*		
°F	**42**	**28**	**35**	**89**	**59**	**74**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Winter precipitation falls primarily as rain in lower elevation and snow on ridges. Snowpack development can occur at the higher elevations, however they likely do not persist for long.

Hydrologic basin characteristics: Basins oriented to the north and south.

Runoff patterns: Average monthly streamflows are highest in the spring months.*

* as represented by a stream gage from ecoregion 10i because no daily values were available for this ecoregion.



Peak flow generating process: Rainfall

Peak flow magnitude (2-year recurrence interval): Less than 10 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	gravel	gravel
	higher gradient	gravel	gravel / cobble	cobble
Beaver dams	lower gradient	none	none	none
	higher gradient	none	none	none

Natural Disturbances: Sagebrush is seriously affected by fire in this region, completely killing it. The dominant grasses are not affected by fire and can regenerate from subterranean roots. Grazing tends to eliminate the larger perennial grasses and favors annual grasses like cheatgrass. A combination of overgrazing and fire can develop an annual rangeland dominated by cheatgrass and rabbitbrush. (Franklin and Dyrness 1988).

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (Cottonwood, willow) and shrubs such as mountain alder, red osier dogwood, willows and water birch. **Size**: Medium **Density**: Sparse	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Semi-constrained	0-50'	**Type**: Shrubs such as mountain alder, red osier dogwood willows and water birch. Galleries of black cottonwood occurred in areas of perennial streamflow. **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Un-constrained	0-75'	**Type**: Shrubs such as mountain alder, red osier dogwood willows and water birch. Galleries of black cottonwood occurred in areas of perennial streamflow **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	

Current Streamside Conifer Regeneration: Conifers do not occur naturally.

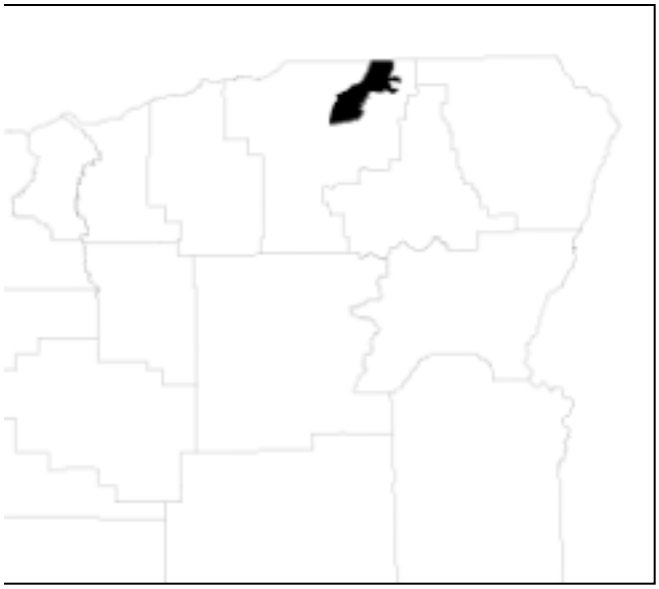
Upland vegetation: Wheat. Native vegetation includes big sage, bluebunch wheatgrass, Idaho fescue, hawkweeds and bitterbrush.

Historic Crown Closure: Less than 30% historic crown closure.

Land Use: Wheat farming, cattle grazing.

Other:

Deep Loess Foothills (10i)



Location: Foothills of the Blue Mountains east of Pendleton.

Drainage Basin: Umatilla Basin

Geology: Geology is basalt lava flows

Topography: Consists of undulating hills. Streams have a moderate gradient. Streams originate within ecoregions to the east that have more rain and snow.

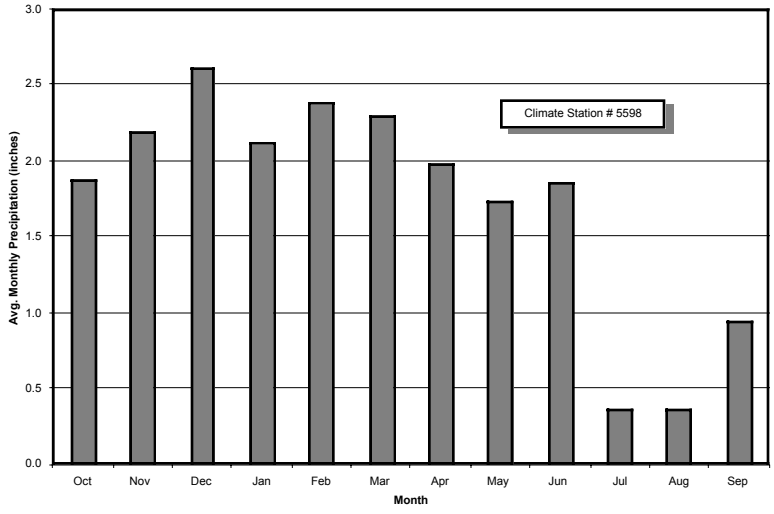
Soil: Silty loams

Erosion: Erosion rate is low due to low precipitation and moderate slopes.

Climate characterization: Climate is continental with a marine influence. The relatively dry climate is due to the rain shadow effect from the Cascade Mountain range. Winters are cold and summers hot with an occasional thunderstorm. Majority of the precipitation falls in winter, mainly as snow in the higher elevations.

Mean annual precipitation: 15 to 30 inches.

Precipitation Pattern: Monthly precipitation is spread throughout the fall, winter and spring months, with highest peaks in December.



2-year 24 hour precipitation: 1.2 to 1.8 inches.

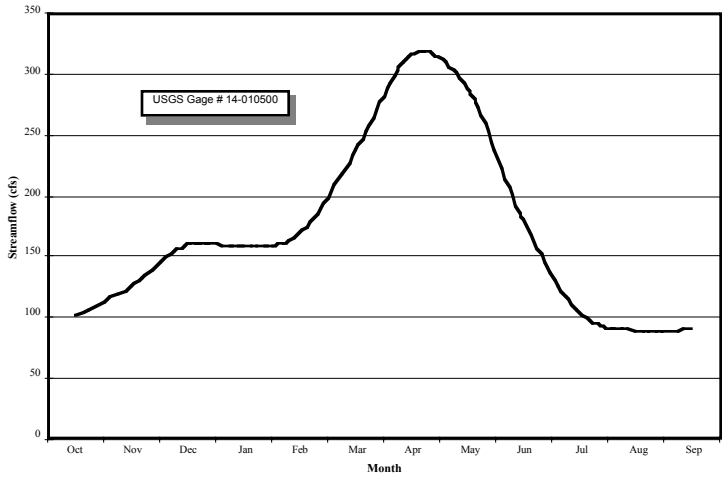
Temperature

	January			*July*		
°F	**42**	**28**	**35**	**89**	**59**	**74**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Most precipitation during winter months falls as snow and snowmelt can minimally contribute to runoff. Deep snowpacks rarely develop below 3,000 feet.

Hydrologic basin characteristics: Basins are oriented to the northwest and drain into the Umatilla, Walla Walla and the Columbia Rivers.

Runoff patterns: Average monthly streamflows are highest in the spring months.



Peak flow generating process: Rainfall

Peak flow magnitude (2-year recurrence interval): 10 cfs/mi^2 to 20 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	gravel	gravel
	higher gradient	gravel	gravel / cobble	cobble
Beaver dams	lower gradient	few year-round	few year-round	none
	higher gradient	few in summer	none	none

Natural Disturbances: Fire is not a major disturbance in this area, since the dominant grasses are not affected by it. Grazing tends to eliminate the larger perennial grasses and favors annual grasses like cheatgrass (Franklin and Dyrness 1988).

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (primarily cottonwoods) and shrubs such as willows, mountain alder, red- osier dogwood and water birch. **Size**: Medium **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Semi-constrained	0-50'	**Type**: Hardwoods (primarily cottonwoods) and shrubs such as willows, mountain alder, red- osier dogwood and water birch. **Size**: Medium **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Un-constrained	0-75'	**Type**: Hardwoods (primarily cottonwoods) and shrubs such as willows, mountain alder, red- osier dogwood and water birch. **Size**: Medium **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	

Current Streamside Conifer Regeneration: None occur naturally.

Upland vegetation: Native vegetation includes Idaho fescue and snowberry.

Historic Crown Closure: Less than 30% historic crown closure.

Land Use: Grazing.

Other:

Deschutes / John Day Canyons (10k)

Location: Deep canyons of the Deschutes River and John Day River.

Drainage Basin: John Day Basin

Geology: Geology is basalt lava flows

Topography: Consists of very steep-sided canyons cutting through plateaus. Streams have a moderate to steep gradient. Main rivers originate within ecoregions to the south that have more rain and snow. Perennial tributary streams often originate at springs at the base of canyon walls.

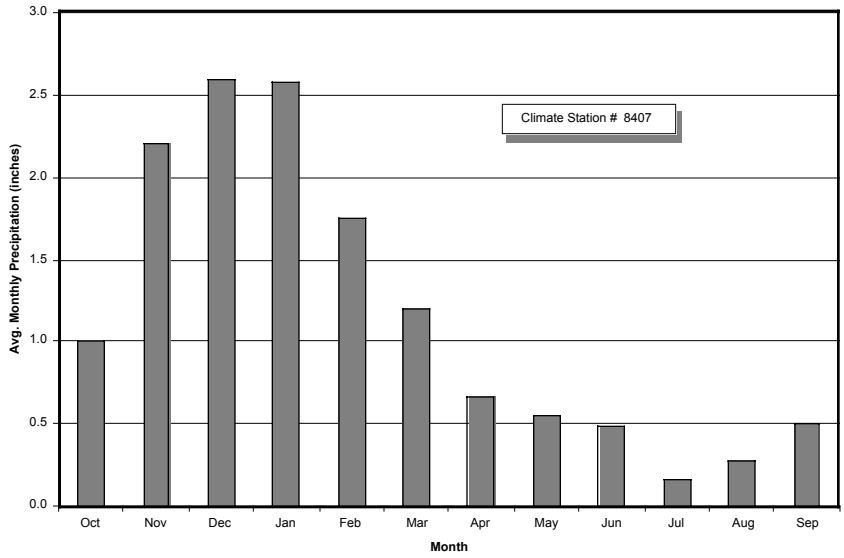
Soil: Clay loam to gravelly loam.

Erosion: Erosion rate is moderate. Most erosion occurs during high intensity runoff events during snow melt periods or during thunderstorms. Shallow landslides usually occur in steep depressions along canyon walls and often trigger debris torrents that travel to the main river or stream.

Climate characterization: Climate is continental with a marine influence. The relatively dry climate is due to the rain shadow effect from the Cascade Mountain range. Winters are cold and summers hot with an occasional thunderstorm. Majority of the precipitation falls in winter, mainly as snow in the higher elevations.

Mean annual precipitation: 10 to 15 inches.

Precipitation Pattern: Majority of the precipitation occurs during the winter months of November, December and January.*



* as represented by climate data from ecoregion 10e because no climate data were available for this ecoregion.

2-year 24 hour precipitation: 1.2 to 1.6 inches

Temperature

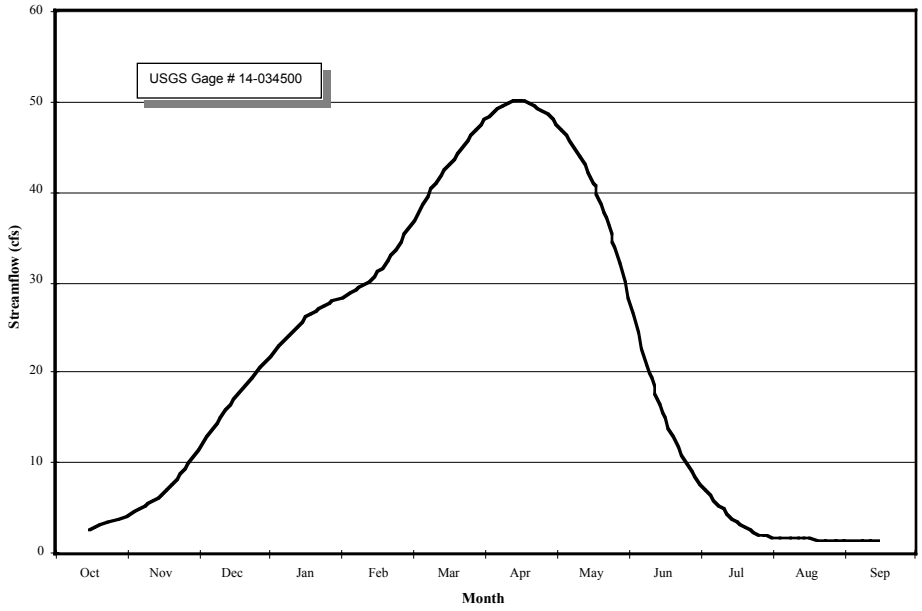
	January			*July*		
°F	**38**	**24**	**31**	**82**	**54**	**68**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Winter precipitation falls primarily as rain in lower elevation and snow on ridges. Snowpack development can occur at the higher elevations, however they likely do not persist for long.

Hydrologic basin characteristics: Basins oriented to the north, draining to the Columbia River.

Runoff patterns: Average monthly streamflows are highest in the spring months.*

* as represented by a stream gage from ecoregion 10c because no daily values were available for this ecoregion.



Peak flow generating process: Primarily rainfall; some peaks are generated by rain-on-snow events although the volumetric contribution of the snowmelt to runoff is limited.

Peak flow magnitude (2-year recurrence interval): 6 cfs/mi^2 to 20 cfs/mi^2, with few greater than 20 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	gravel	gravel / cobble	cobble
	higher gradient	cobble	cobble / boulder	cobble/ boulder
Beaver dams	lower gradient	few year-round	none	none
	higher gradient	few in summer	none	none

Natural Disturbances: The dominant grasses are not affected fire. Grazing tends to eliminate the larger perennial grasses and favors annual grasses like cheatgrass (Franklin and Dyrness 1988).

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (white alder, willow) and shrubs such as willow and red-osier dogwood. Infrequent ponderosa pine. **Size**: Medium **Density**: Sparse	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Semi-constrained	0-50'	**Type**: Hardwoods (cottonwood galleries, willow, white alder) and shrubs such as willow and red-osier dogwood. Infrequent ponderosa pine. **Size**: Medium **Density**: Sparse	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Un-constrained	0-75'	**Type**: Hardwoods (cottonwood galleries, willow, white alder) and shrubs such as willow and red-osier dogwood. Infrequent ponderosa pine. **Size**: Medium **Density**: Sparse	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	

Current Streamside Conifer Regeneration: Few occur naturally.

Upland vegetation: Agricultural crops (primarily wheat). Native vegetation includes juniper, bluebunch wheatgrass, and Idaho fescue.

Historic Crown Closure: Less than 30% historic crown closure.

Land Use: Wheat farming, grazing, recreation.

Other:

John Day/Clarno Uplands (11a)

Location: Dry foothills that surround the western perimeter of the Blue Mountains and separates the north-central Blue Mountains from the southern Blue Mountains and Ochoco Mountains.

Drainage Basins: John Day, Goose and Summer Lakes, Malheur Lakes, and Deschutes Basins

Geology: Geology is ash beds and eroded remnants of a mountain chain.

Topography: Consists of highly dissected hills, palisades, and ash beds. Steep-sided canyons of the John Day and Crooked Rivers cut deeply through surrounding terrain. Streams have a low to moderate gradient. Main rivers originate within surrounding ecoregions that have more rain and snow.

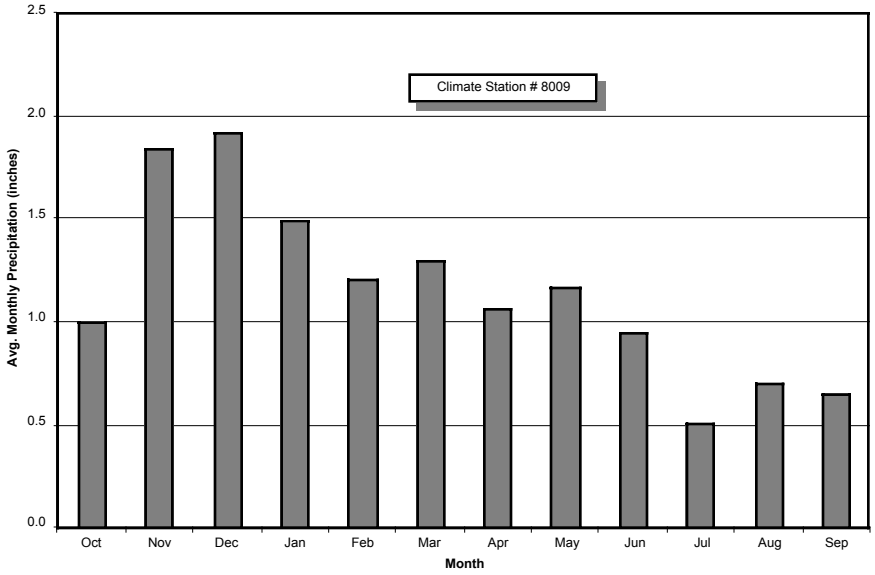
Soil: Deep to bedrock; stony loam surface layer with a clay loam or clay subsoil.

Erosion: Erosion rate is high in ash-dominated areas. Most erosion occurs during high intensity runoff events during snow melt periods or during thunderstorms.

Climate characterization: Continental climate with low precipitation and wide temperature extremes is moderated by a marine influence spreading southward from Columbia Gorge and eastward through the low passes of the Cascade Mountain range. Marine influence brings in more moisture and less extreme temperature fluctuations than other parts of the Blue Mountains.

Mean annual precipitation: 10 to 20 inches.

Precipitation Pattern: Majority of the precipitation occurs in the winter months of November, December, and January.



2-year 24 hour precipitation: 1.2 to 1.8 inches.

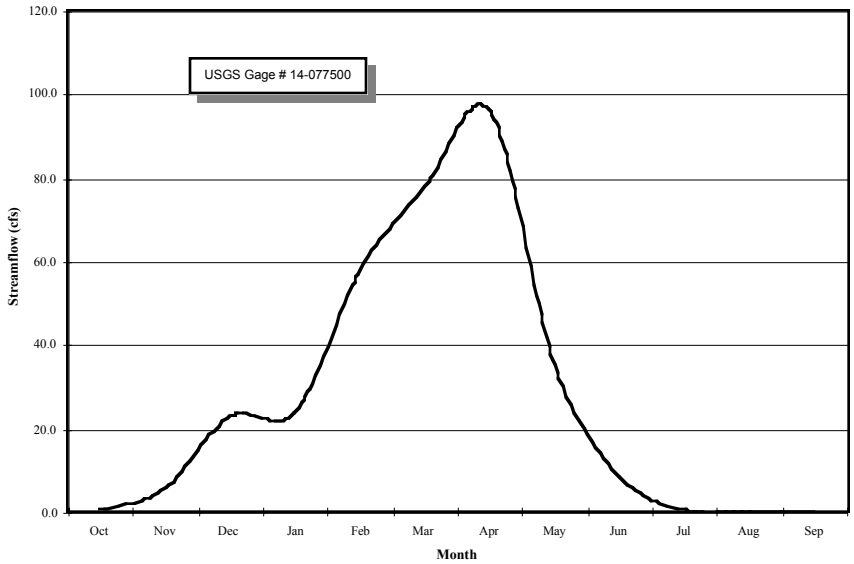
Temperature

	January			*July*		
°F	**42**	**24**	**34**	**87**	**48**	**68**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Precipitation falls primarily as rain during the spring and fall months, and as light snow in the winter months. Shallow snowpacks can accumulate at higher elevations.

Hydrologic basin characteristics: Basins oriented to the west, draining to the John Day and the Columbia River , and into the Crooked River to the Deschutes River.

Runoff patterns: Average monthly streamflows are highest in the spring months.



Peak flow generating process: Primarily winter rainstorms and winter rain-on-snow with occasional spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): Mainly less than 20 cfs/mi^2, and a few greater than 20 cfs/mi^2

Stream channels:

		Small	*Medium*	*Large*
Substrate	Lower gradient	Fines / gravel	Gravel	Gravel /cobble
	Higher gradient	Gravel	Gravel / cobble	Gravel / cobble
Beaver dams	Lower gradient	Some year-round	Few year-round	None
	Higher gradient	Few in summer	None	None

Natural Disturbances: Frequent fire except where suppressed

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (cottonwood and alder) and shrubs (willows, mountain alder and Douglas spiraea.) Infrequent Juniper. **Size**: Small **Density**: Sparse	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Fire suppression and grazing over the last decades has caused an increase in juniper abundance and a decline in grass dominance. See Kovalchik (1987) and Crowe (1997) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Hardwoods (cottonwood and alder) and shrubs (willows, mountain alder, Douglas spiraea and common snowberry). Infrequent ponderosa pine. **Size**: Small **Density**: Sparse	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Fire suppression and grazing over the last decades has caused an increase in juniper abundance and a decline in grass dominance. See Kovalchik (1987) and Crowe (1997) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods (cottonwood, alder and aspen) and shrubs (willows, mountain alder, Douglas spiraea and common snowberry). Infrequent ponderosa pine. **Size**: Small **Density**: Sparse	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Fire suppression and grazing over the last decades has caused an increase in juniper abundance and a decline in grass dominance. Under certain circumstances, there are a few potential plant communities having no woody vegetation in RA1, and are characterized by herbaceous plants such as beaked sedge or aquatic sedge at higher elevations. See Kovalchik (1987)and Crowe (1997) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Some juniper and ponderosa pine.

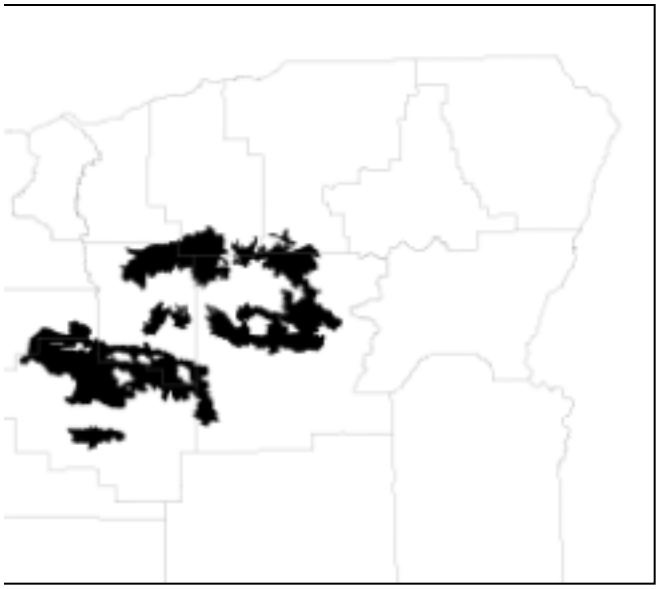
Upland vegetation: Native vegetation includes juniper, bluebunch wheatgrass, and Idaho fescue.

Historic Crown Closure: Less than 30% historic crown closure.

Land Use: Irrigated pasture, grazing, recreation.

Other:

John Day/Clarno Highlands (11b)



Location: High elevation slopes that surround the western perimeter of the Blue Mountains and separates the north-central Blue Mountains from the southern Blue Mountains and Ochoco Mountains.

Drainage Basins: John Day and Deschutes Basins

Geology: Geology is varied; includes basalt flows and eroded remnants of a mountain chain.

Topography: Consists of dissected hills with some steep-sided. Streams have a low to moderate gradient. Main rivers originate within surrounding ecoregions that have more rain and snow.

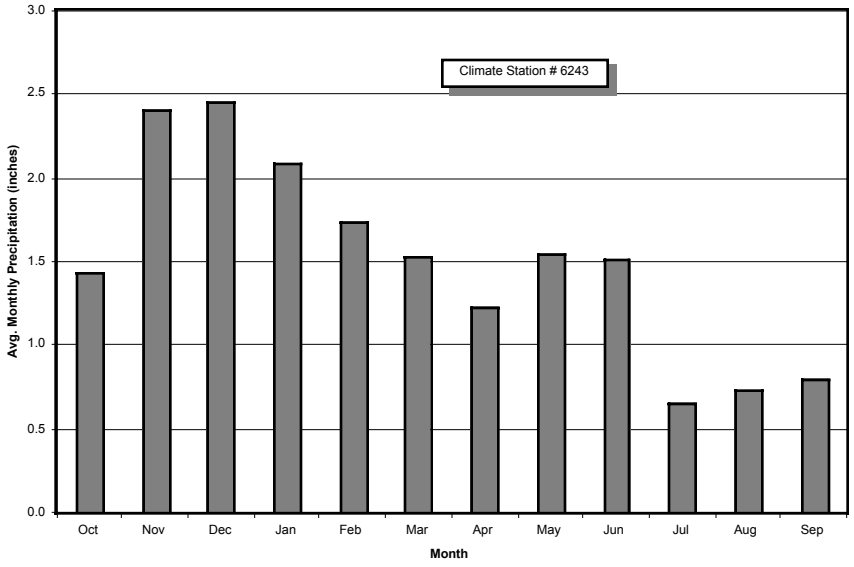
Soil: Subsoils are variable across ecoregion; surface soil often can be dominated by Mount Mazama ash, especially on north facing slopes.

Erosion: Erosion rate is moderate. Most erosion occurs during high intensity runoff events during snow melt periods or during thunderstorms.

Climate characterization: Continental climate with low precipitation and wide temperature extremes is moderated by a marine influence spreading southward from Columbia Gorge and eastward through the low passes of the Cascade Mountain range. Marine influence brings in more moisture and less extreme temperature fluctuations than other parts of the Blue Mountains.

Mean annual precipitation: 15 to 30 inches.

Precipitation Pattern: Majority of precipitation occurs in the winter months of November, December, and January.



2-year 24 hour precipitation: 1.2 to 1.6 inches.

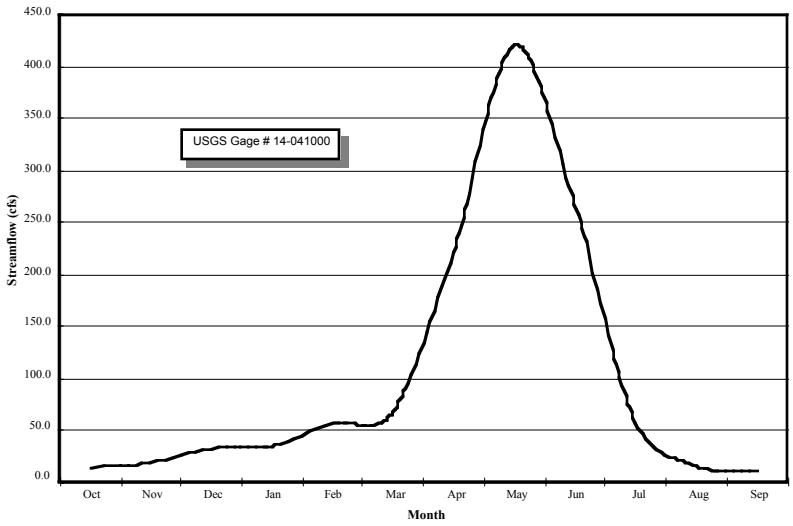
Temperature

	January			*July*		
°F	**40**	**22**	**31**	**82**	**42**	**62**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Much of the winter precipitation falls as snow that accumulates into moderately deep snowpacks. The deepest snowpacks are found at higher elevations (e.g. Ochoco Mountains).

Hydrologic basin characteristics: Basins oriented to the north and south draining to the John Day and the Columbia Rivers, and into the Crooked River to the Deschutes River.

Runoff patterns: Average monthly streamflows are highest in the late spring and summer months.



Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt events.

Peak flow magnitude (2-year recurrence interval): Mainly less than 20 cfs/mi^2, and a few greater than 20 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	Fines / gravel	Gravel	Gravel /cobble
	Higher gradient	Gravel	Gravel / cobble	Gravel / cobble
Beaver dams	Lower gradient	Some year-round	Few year-round	None
	Higher gradient	Few in summer	None	None

Natural Disturbances: Frequent fire except where suppressed.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (alder & cotton-wood) and shrubs (willows, Sitka alder, mountain alder) **Size**: Small **Density**: Dense	25-100'	**Type**: Conifers (infrequent true fir and ponderosa pine) **Size**: Medium **Density**: Sparse	Fire suppression in recent decades has caused an increase in true fir dominance. See Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Hardwoods (alder & cotton-wood) and shrubs (willows, Sitka alder, mountain alder and common snowberry) **Size**: Small **Density**: Dense	50-100'	**Type**: Conifers (infrequent true fir and ponderosa pine) **Size**: Medium **Density**: Sparse	Fire suppression in recent decades has caused an increase in true fir dominance. See Kovalchik (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods (alder, willow, cottonwood & aspen) and shrubs (willows, Sitka alder, mountain alder and common snowberry, shrubby cinquefoil) **Size**: Small **Density**: Dense	75-100'	**Type**: Conifers (infrequent true fir and ponderosa pine) **Size**: Medium **Density**: Sparse	Fire suppression in recent decades has caused an increase in true fir dominance. Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such beaked sedge or aquatic sedge at higher elevations. See Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Some true fir, ponderosa pine.

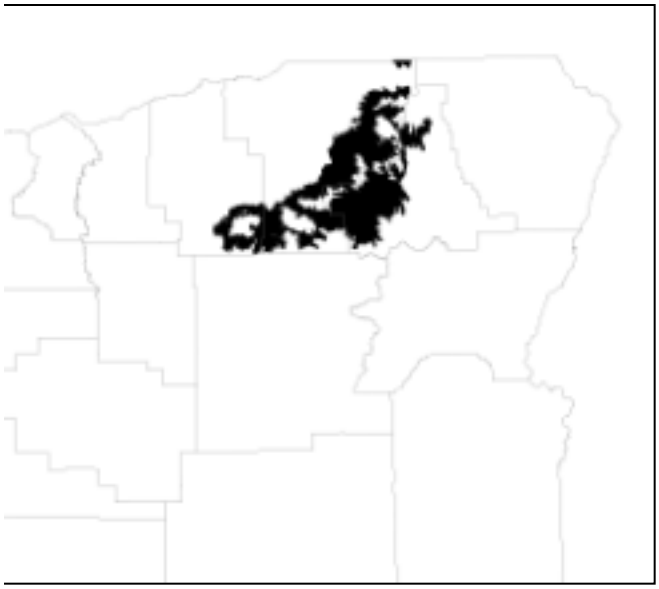
Upland vegetation: Native vegetation includes grasses, ponderosa pine, true fir

Historic Crown Closure: Historically and currently, the forests in this ecoregion were highly variable. Historic canopy closure was <30% in the areas dominated by ponderosa pine savannas. Some park-like ponderosa pine stands had canopy closures of 40-60%. Some pole sized stands that originated after fire had densities of greater than 70%. Other forest types in this region also had canopy closures of greater than 30%.

Land Use: Grazing, timber harvest

Other:

Maritime-Influenced Zone (11c)



Location: Western slopes of the northern Blue Mountains that are influenced by marine weather systems that move east through the break in the Cascade Range at the Columbia River gorge.

Drainage Basins: John Day, Grande Ronde, and Umatilla Basins

Geology: Geology is mostly Columbia River basalts.

Topography: Consists of rolling hills with some steep-sided canyons. Streams have a moderate gradient. Main rivers originate within surrounding ecoregions that have more rain and snow.

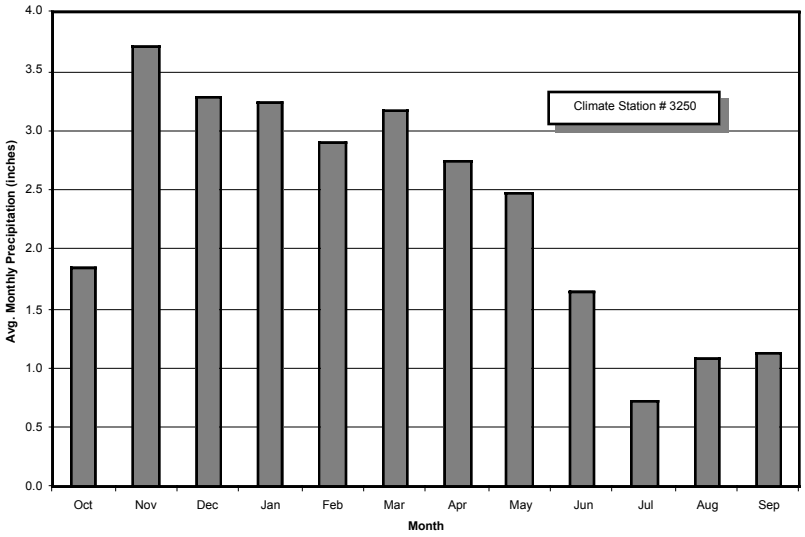
Soil: Subsoils are derived from basalt but surface layers (up to 3 feet deep) consist of weathered ash and loess.

Erosion: Erosion rate is low. Most erosion occurs during high intensity runoff events during snow melt periods or during thunderstorms.

Climate characterization: Continental climate with low precipitation and wide temperature extremes is moderated by a marine influence spreading southward from Columbia Gorge and eastward through the low passes of the Cascade Mountain range. Marine influence brings in more moisture and less extreme temperature fluctuations than other parts of the Blue Mountains.

Mean annual precipitation: 20 to 35 inches; up to 45 inches in higher elevations.

Precipitation Pattern: Majority of the precipitation occurs in the winter months, November, December and January, and early spring during February and March.



2-year 24 hour precipitation: 1.4 to 2.0 inches.

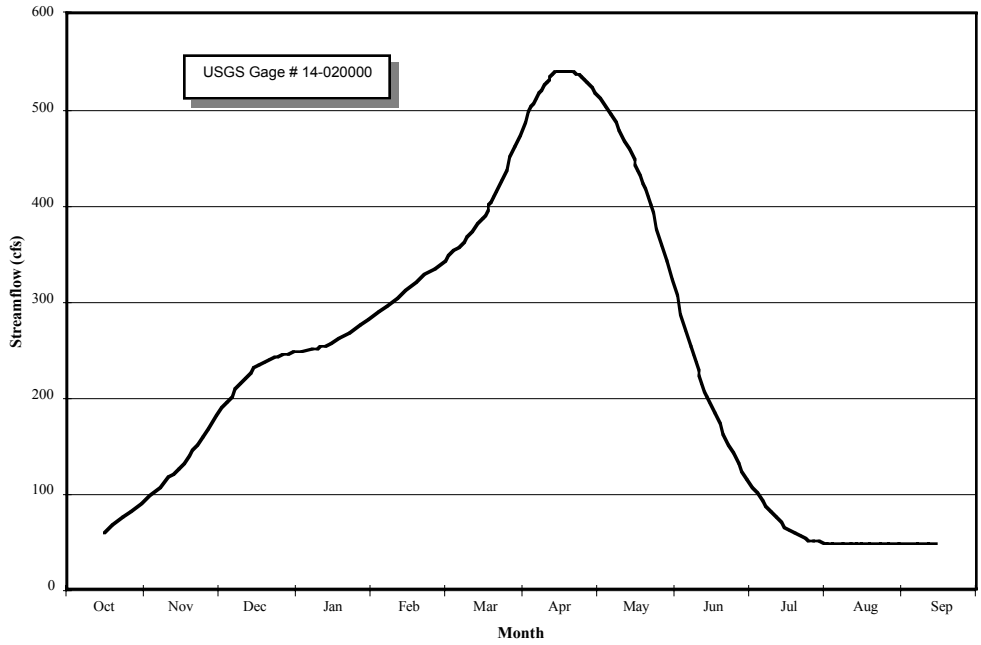
Temperature

	January			*July*		
°F	**38**	**24**	**31**	**86**	**53**	**69**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Maritime influence brings in precipitation, some in the form of snow. Shallow snowpacks can develop, particularly in the higher elevations where the most snow falls.

Hydrologic basin characteristics: Basins are oriented to the north and east. Northern basins contain tributary streams to the Columbia River. Eastern basins tend to drain into tributaries of the Snake River.

Runoff patterns: Average monthly streamflows are highest in the spring months.



Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): 6 cfs/mi^2 to 20 cfs/mi^2, with a few greater than 20 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	Fines / gravel	Gravel	Gravel /cobble
	Higher gradient	Gravel	Gravel / cobble	Gravel / cobble
Beaver dams	Lower gradient	Some year-round	Few year-round	None
	Higher gradient	Few in summer	None	None

Natural Disturbances: Frequent fire except where suppressed.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (cottonwood) and shrubs (willows & mountain alder). **Size**: Small **Density**: Dense	25-100'	**Type**: Conifers (Douglas-fir with ponderosa pine at lower elevation). **Size**: Large **Density**: Dense	See Crowe (1997) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Hardwoods (cottonwood, willow, alder) and shrubs (willows, mountain alder & common snowberry). **Size**: Small **Density**: Dense	50-100'	**Type**: Conifers (Douglas-fir with ponderosa pine at lower elevation). **Size**: Large **Density**: Dense	See Crowe (1997) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods (cottonwood, willow, alder & aspen) and shrubs (willows, mountain alder & common snowberry, shrubby cinquefoil). **Size**: Small **Density**: Dense	75-100'	**Type**: Conifers (Douglas-fir with ponderosa pine at lower elevation). **Size**: Large **Density**: Dense	See Crowe (1997) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Douglas-fir and ponderosa pine.

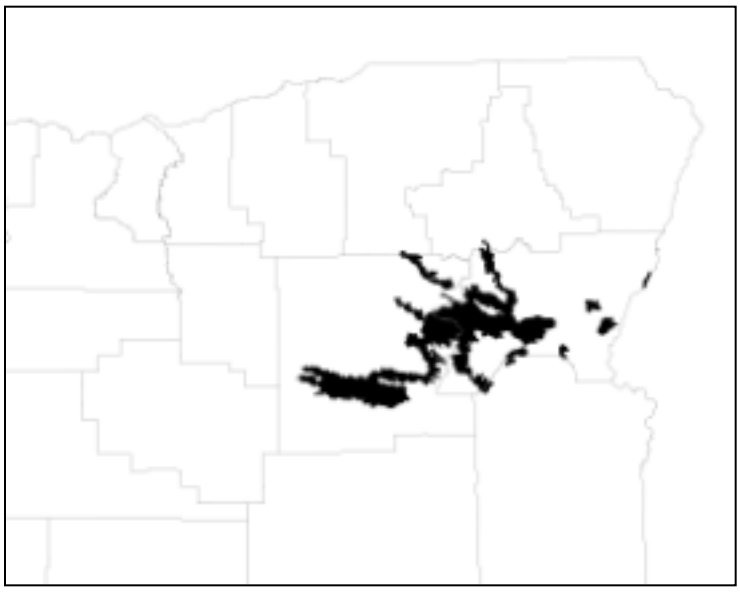
Upland vegetation: Native vegetation includes shrubs, Douglas-fir, and ponderosa pine.

Historic Crown Closure: At lower elevations, less than 30% historic crown closure. In the past, the lower elevations of this ecoregion were dominated by ponderosa pine savannas. Ponderosa pine savannas have all but disappeared due to fire suppression. At higher elevations, the forest is dominated by Douglas-fir and historic crown closure was greater than 30%.

Land Use: Grazing, timber harvest

Other:

Melange (11d)



Location: High-elevation central core of the Blue Mountains, including Elkhorn, Greenhorn, Vinegar, Aldrich, and Strawberry Mountains.

Drainage Basins: Powder, John Day, and Malheur Lake Basins

Geology: Geology is varied and complex, ranging from metamorphic to volcanic.

Topography: Consists of steep slopes with some rocky outcrops. Some areas influenced by glaciation. Streams have a moderate to high gradient.

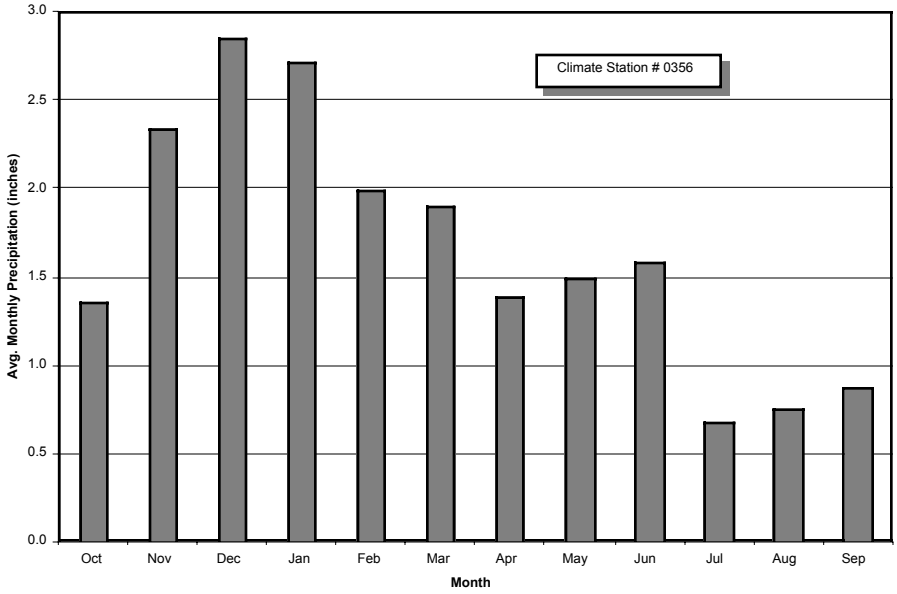
Soil: Soils are highly variable depending on parent material and existence of ash deposits. Many soils derived from metamorphic rock dry early in the summer.

Erosion: Erosion rate is low. Most erosion occurs during high intensity runoff events during snow melt periods or during thunderstorms.

Climate characterization: Continental climate with short, dry summers and long cold winters. Climate varies over a broad temperature and precipitation ranges because sharp elevational differences create localized microclimates. Precipitation tends to fall as light snow in the winter, spring and fall rains, or occasional summer thunderstorms.

Mean annual precipitation: 15 to 25 inches.

Precipitation Pattern: Most precipitation occurs in the winter months of November, December and January.



2-year 24 hour precipitation: 1.4 to 2.0 inches.

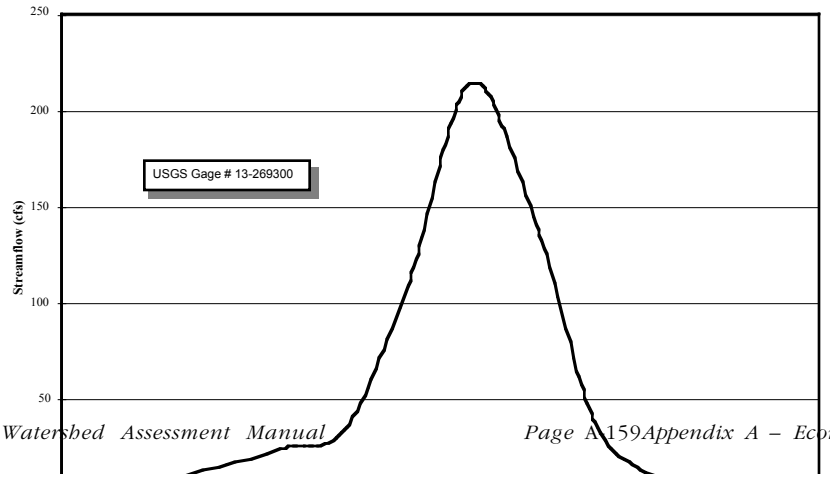
Temperature

	January			*July*		
°F	**35**	**11**	**23**	**81**	**39**	**60**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Maritime influence brings in precipitation, some in the form of snow. Shallow snowpacks can develop, particularly in the higher elevations where the most snow falls.

Hydrologic basin characteristics: Basins are oriented to the north and east. Northern basins contain tributary streams to the Columbia River. Eastern basins tend to drain into tributaries of the Snake River.

Runoff patterns: Average monthly streamflows are highest in the spring months.



Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): From less than 10 cfs/mi^2 to a few greater than 10 cfs/mi^2

Stream channels:

		Small	*Medium*	*Large*
Substrate	Lower gradient	Gravel	Gravel / cobble	Gravel /cobble
	Higher gradient	Gravel / cobble	Cobble	Cobble / boulder
Beaver dams	Lower gradient	Some year-round	Few year-round	None
	Higher gradient	Few in summer	None	None

Natural Disturbances: Frequent fire except where suppressed.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (alder & cotton-wood) and shrubs (willows, Sitka alder, mountain alder) **Size**: Small **Density**: Dense	25-100'	**Type**: Conifers (Douglas-fir, true fir, ponderosa pine) **Size**: Large **Density**: Dense	Fire suppression has favored establishment of true fir. See Crowe (1997) and Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Hardwoods (alder & cotton-wood) and shrubs (willows, Sitka alder, mountain alder, and common snowberry) **Size**: Small **Density**: Dense	50-100'	**Type**: Conifers (Douglas-fir, true fir, ponderosa pine) **Size**: Large **Density**: Dense	Fire suppression has favored establishment of true fir. See Crowe (1997) and Kovalchik (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods (alder, cottonwood, willow & aspen) and shrubs (willows, Sitka alder, mountain alder, and common snowberry) **Size**: Small **Density**: Dense	75-100'	**Type**: Conifers (Douglas-fir, true fir, ponderosa pine) **Size**: Large **Density**: Dense	Fire suppression has favored establishment of true fir. Under certain circumstances, there are a few potential plant communities having no woody vegetation in RA1, & are characterized by herbaceous plants such as beaked sedge, bluejoint reedgrass, or aquatic sedge at higher elevations. See Crowe (1997) & Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Douglas-fir, true fir, and ponderosa pine.

Upland vegetation: Native vegetation includes Douglas-fir, true fir, lodgepole pine and ponderosa pine.

Historic Crown Closure: These higher elevation forests had greater than 30% historic crown closure. Fire suppression and grazing have altered current stand density and composition. Fire frequency in ponderosa pine forests were historically from 8 to 20 years.

Land Use: Grazing, timber harvest, recreation

Other:

Wallowas/Seven Devils Mountains (11e)

Location: Lower and middle slopes of the Wallowa Mountains.

Drainage Basins: Powder and Grande Ronde Basins

Geology: Geology is varied and complex, ranging from metamorphic to basalt flows.

Topography: Consists of moderate to steep slopes. Streams have a moderate to high gradient and commonly flow through constricted canyons.

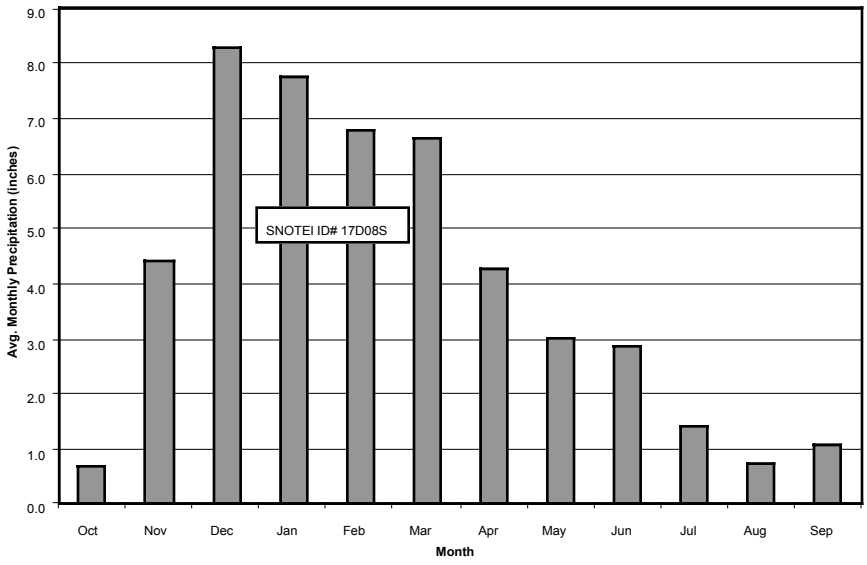
Soil: Soils are usually highly productive, except for the southern portion of the ecoregion and on very steep slopes. Soils are derived from parent material with some ash influence.

Erosion: Erosion rate is moderate. Most erosion occurs during high intensity runoff events during snow melt periods or during thunderstorms.

Climate characterization: Continental climate with short, dry summers and long cold winters. Temperature extremes are particularly notable in the southern slopes. However, the northwest part of the ecoregion has a marine influence moderating the temperature fluctuations.

Mean annual precipitation: 20 to 40 inches.

Precipitation Pattern: Majority of the precipitation falls in the winter months from December to March.



2-year 24 hour precipitation: 1.2 to 1.6 inches.

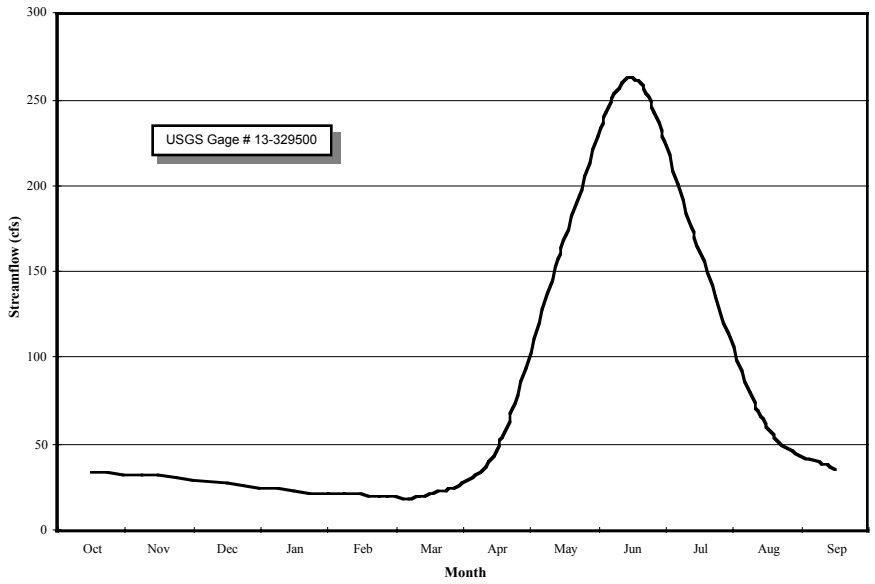
Temperature

	January			*July*		
°F	**39**	**22**	**30**	**88**	**46**	**67**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Southern mountain slopes are often quite dry, while northwest slopes accumulate more snow. The northwest portion of the Wallowa Mountians gets the most precipitation and snow. Above 5000 feet, two-thirds of the total precipitation falls as snow and accumulates into deep snowpacks.

Hydrologic basin characteristics: Radial drainage predominates from the domed structure of the Wallowa Mountains. Eagle Cap mountain is the source for many of the major streams.

Runoff patterns: Average monthly streamflows are highest in the late spring and early summer months.



Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): 10 cfs/mi^2 to 20 cfs/mi^2, with a few less than 10 cfs/mi^2 and few greater than 20 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	Gravel	Gravel / cobble	Cobble / boulder
	Higher gradient	Gravel / cobble	Cobble	Boulder / cobble
Beaver dams	Lower gradient	Some year-round	Few year-round	None
	Higher gradient	Few in summer	None	None

Natural Disturbances: Frequent fire except where suppressed.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (willow, alder, dogwood) and shrubs (willows, Sitka alder, bog blueberry, mountain alder). Conifer (Engelmann spruce) may be present in some areas. **Size**: Small **Density**: Dense	25-100'	**Type**: Conifers (Engelmann spruce, Douglas-fir, true fir, larch, lodgepole pine **Size**: Medium **Density**: Dense	Disease, insects, and fire often suppress one or more tree species. Under certain circumstances, there are a few potential plant communities which have no woody vegetation, and are characterized by herbaceous plants such as queencup beadlily and widefruit sedge. See Crowe (1997) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Hardwoods (willow, alder, dogwood) and shrubs (willows, Sitka alder, bog blueberry, mountain alder, common snowberry). Conifer (Engelmann spruce) may be present in some areas. **Size**: Small **Density**: Dense	50-100'	**Type**: Conifers (Engelmann spruce, Douglas-fir, true fir, larch, lodgepole pine **Size**: Medium **Density**: Dense	Disease, insects, and fire often suppress one or more tree species. Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as aquatic sedge at higher elevations, queencup beadlily, smallfruit bulrush, and widefruit sedge. See Crowe (1997) for more details about specific plant communities and where they occur.

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Un-constrained	0-75'	**Type**: Hardwoods (willow, alder, dogwood) and shrubs (willows, Sitka alder, bog blueberry, mountain alder, common snowberry). Conifer (Engelmann spruce) may be present in some areas. **Size**: Small **Density**: Dense	75-100'	**Type**: Conifers (Engelmann spruce, Douglas-fir, true fir, larch, lodgepole pine **Size**: Medium **Density**: Dense	Disease, insects, and fire often suppress one or more tree species. Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as aquatic sedge at higher elevations, queencup beadlily, smallfruit bulrush, bluejoint reedgrass, aquatic sedge, and widefruit sedge. See Crowe (1997) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Engelmann spruce, Douglas-fir, true fir, lodgepole pine.

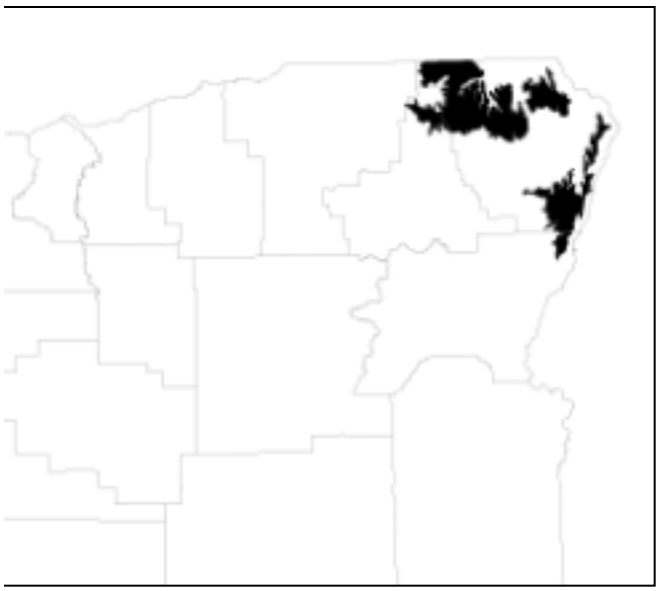
Upland vegetation: Native vegetation includes Engelmann spruce, Douglas-fir, true fir, lodgepole pine, ponderosa pine, and larch.

Historic Crown Closure: Lower elevation ponderosa pine forests and drier lodgepole pine forests had less than 30% canopy closure. Higher elevation forests had greater than 30% historic crown closure. Some park-like stands of ponderosa pine had canopy closures of 40-60%. Alpine types (Engelmann spruce/fir) have greater canopy closures up to alpine, where they become more open due to cold temperatures.

Land Use: Grazing, timber harvest, recreation

Other:

Canyons and Dissected Highlands (11f)



Location: Higher elevation canyons and uplands in far northeast Oregon and adjacent to the Snake River canyon.

Drainage Basins: Grande Ronde, and Powder Basins

Geology: Geology is basalt lava flows.

Topography: Consists of highly-eroded and dissected upper elevation areas. Streams have a moderate to high gradient. Stream density is moderate within watersheds.

Soil: Clay loam to gravelly clay loam derived from basalt with a ash and loess (western portion) mantle.

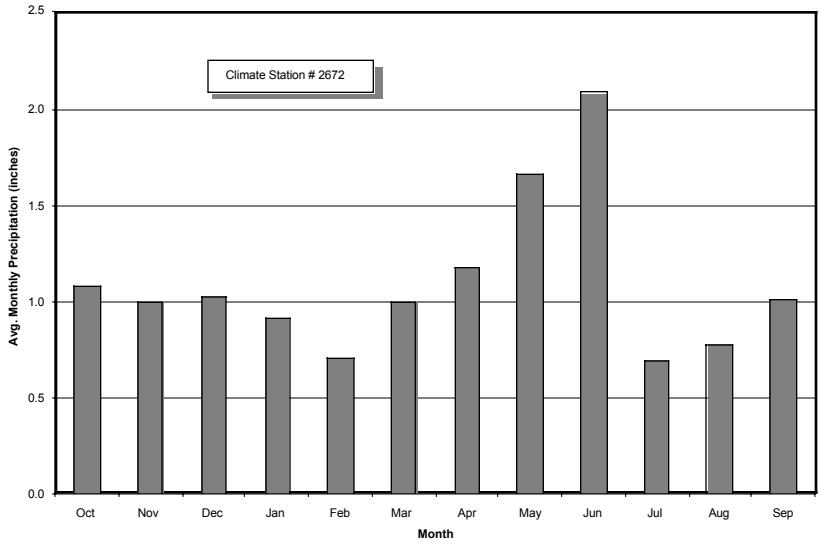
Erosion: Erosion rate is moderate due to moderate precipitation and stable geology.

Climate characterization: Continental climate with short, dry summers and long cold winters. Climate varies over a broad temperature and precipitation ranges because sharp elevational differences create localized microclimates. Precipitation tends to fall as light snow in the winter, spring and fall rains, or occasional summer thunderstorms.

Mean annual precipitation: 20 to 50 inches.

Precipitation Pattern: Majority of precipitation occurs in the late spring and early summer months.*

* as represented by climate data from ecoregion 10f because no climate data were available for this



ecoregion.

2-year 24 hour precipitation: 1.4 to 2.0 inches.

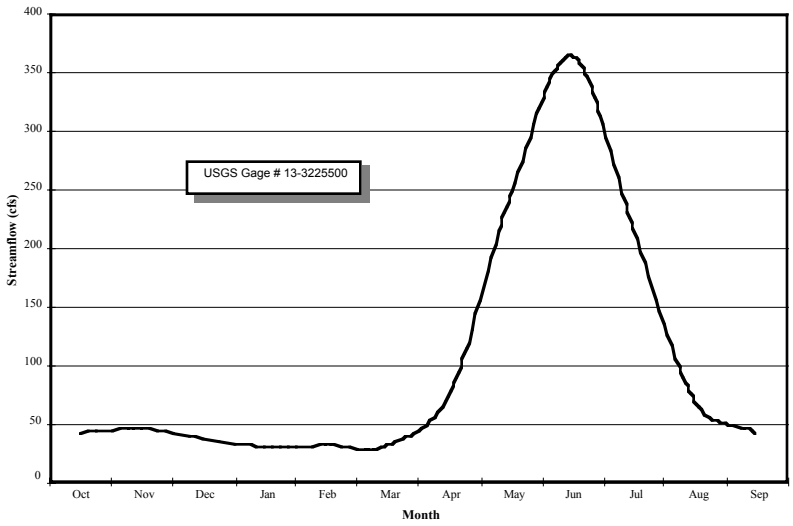
Temperature

	January			*July*		
°F	**33**	**12**	**23**	**78**	**41**	**60**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Much of the winter precipitation falls as light snow and can accumulate into shallow snowpacks. The highest peaks in the ecoregion can develop very deep snowpacks.

Hydrologic basin characteristics: Basins are oriented northward and stream drain to the Grande Ronde and Snake Rivers.

Runoff patterns: Average monthly streamflows are highest in the late spring and early summer months.



Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): 10 cfs/mi^2 to 60 cfs/mi^2, with a few less than 10 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	Fines / gravel	Gravel	Gravel
	Higher gradient	Gravel	Gravel / cobble	Cobble
Beaver dams	Lower gradient	Few year-round	Few year-round	None
	Higher gradient	Few in summer	None	None

Natural Disturbances: Periodic fire.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Mixed (Engelmann spruce, willows, dogwood) and shrubs (mountain alder). **Size**: Small **Density**: Dense	25-100'	**Type**: Conifers (Engelmann spruce, Douglas-fir, true fir, lodgepole pine, and ponderosa pine) **Size**: Medium **Density**: Dense	Disease, insects, and fire often suppress one or more tree species. See Crowe (1997) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Mixed (Engelmann spruce, red alder) and shrubs (pacific ninebark, mountain alder and common snowberry) **Size**: Small **Density**: Dense	50-100'	**Type**: Conifers (Engelmann spruce, Douglas-fir, true fir, lodgepole pine, and ponderosa pine) **Size**: Medium **Density**: Dense	Disease, insects, and fire often suppress one or more tree species. Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as aquatic sedge at higher elevations. See Crowe (1997) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods (willows, dogwood, aspen) and shrubs (Geyer, Booth and Lemmon willow , Mountain alder, common snowberry, shrubby cinquefoil, silver sage, big sage) and sedges. **Size**: Small **Density**: Dense	75-100"	**Type**: Conifers (Engelmann spruce, Douglas-fir, true fir, lodgepole pine, and ponderosa pine) **Size**: Medium **Density**: Dense	Disease, insects, and fire often suppress one or more tree species. Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as tufted hairgrass, bluejoint reedgrass, or aquatic sedge at higher elevations. See Crowe (1997) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Common.

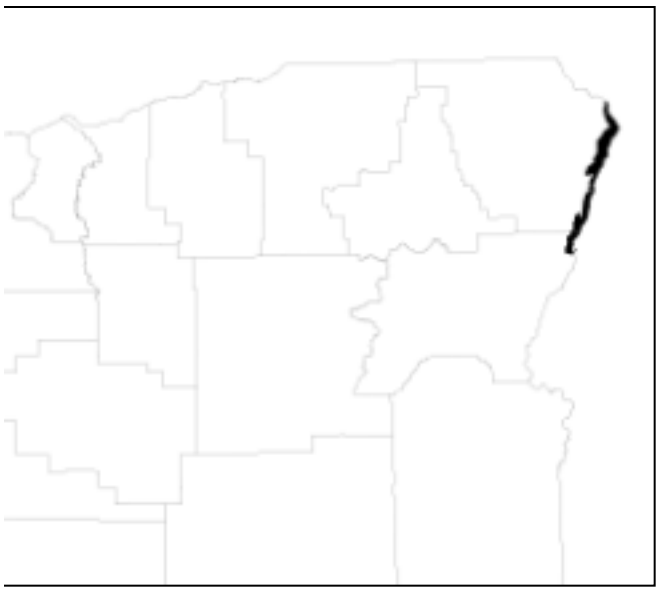
Upland vegetation: Native vegetation includes bluebunch wheatgrass, Douglas-fir, white fir, lodgepole pine, true fir, and ponderosa pine.

Historic Crown Closure: This ecoregion has high variability due to aspect. There are stringers of timber on the north facing slopes having a thick canopy of trees. The south facing slopes have grasses. The ponderosa and lodgepole pine types are more open. All types are greater than 30% historic canopy closure.

Land Use: Grazing, forestry, recreation.

Other:

Snake and Salmon River Canyons (11g)



Location: Canyons draining to the Snake River canyon in far northeast Oregon.

Geology: Geology is basalt lava flows.

Topography: Consists of highly dissected steep slopes with some benches. Stream density is moderate but most are intermittent.

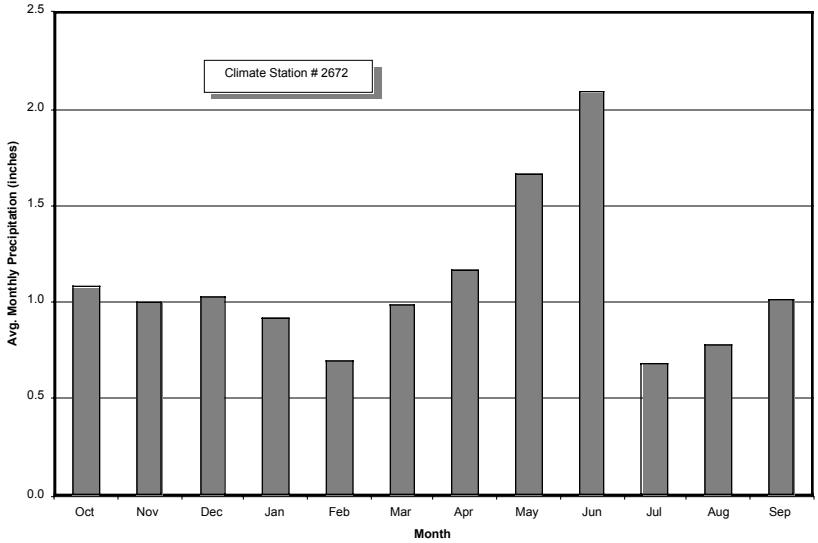
Soil: Gravelly clay loam with some loess on north slopes.

Erosion: Erosion rate is moderate due to low precipitation and steep slopes.

Climate characterization: Continental climate with short, dry summers and long cold winters. Climate varies over a broad temperature and precipitation ranges because sharp elevational differences create localized microclimates. Precipitation tends to fall as light snow in the winter, spring and fall rains, or occasional summer thunderstorms.

Mean annual precipitation: 10 to 30 inches.

Precipitation Pattern: Majority of the precipitation falls in the spring and early summer months.*



* as represented by climate data from ecoregion 10f because no climate data were available for this ecoregion.

2-year 24 hour precipitation: 1.4 to 1.6

Temperature

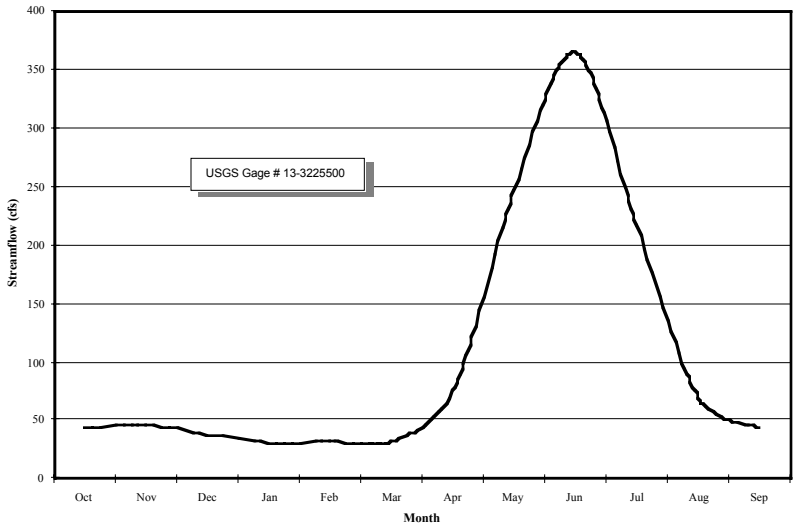
	January			*July*		
°F	**39**	**21**	**30**	**92**	**55**	**73**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Much of the winter precipitation falls as light snow which can accumulate into shallow snowpacks.

Hydrologic basin characteristics: Basins are oriented to the east and streams flow into the Snake River.

Runoff patterns: Average monthly streamflows are highest in the spring months.*

* as represented by a stream gage from ecoregion 11f because no daily values were available for this ecoregion.



Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): 10 cfs/mi^2 to 60 cfs/mi^2, with a few less than 10 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	Fines / gravel	Gravel	Gravel
	Higher gradient	Gravel	Gravel / cobble	Cobble
Beaver dams	Lower gradient	Few year-round	None	None
	Higher gradient	None	None	None

Natural Disturbances: Periodic fire.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (willows, dogwood) and shrubs. **Size**: Small **Density**: Sparse	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	.
Semi-constrained	0-50'	**Type**: Hardwoods (cottonwood, willows, dogwood) and shrubs. **Size**: Medium **Density**: Sparse	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Un-constrained	0-100'	**Type**: Hardwoods (cottonwood, willows, dogwood) and shrubs (Geyer, Booth, Lemmon, Bebb willows, shrubby cinquefoil, silver sage, big sage) **Size**: Medium **Density**: Sparse	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as tufted hairgrass, or aquatic sedge at higher elevations. See Crowe (1997) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: None.

Upland vegetation: Native vegetation includes bluebunch wheatgrass, Sandberg's bluegrass, Idaho fescue, and spiny greenbush.

Historic Crown Closure: Less than 30% historic crown closure.

Land Use: Grazing

Other:

Continental Zone Highlands (11h)

Location: South-central and southwestern Blue Mountains.

Drainage Basins: Malheur, Malheur Lake and John Day Basins

Geology: Geology is rhyolite and ash flow tuffs.

Topography: Consists of undulating hills. Streams have a low to moderate gradient.

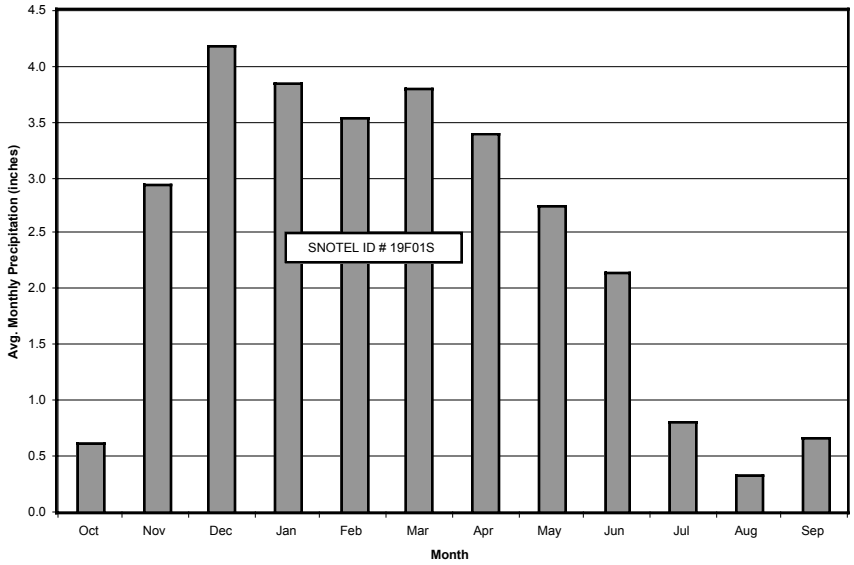
Soil: Soils are derived from rhyolite and ash flow tuffs; shallow and cobbly.

Erosion: Erosion rate is low due to moderate slopes, resistant soils, and low rainfall.

Climate characterization: Continental climate with short, dry summers and long cold winters. Climate varies over a broad temperature and precipitation ranges because sharp elevational differences create localized microclimates. Precipitation tends to fall as light snow in the winter, spring and fall rains, or occasional summer thunderstorms.

Mean annual precipitation: 15 to 30 inches.

Precipitation Pattern: Majority of the precipitation falls in the winter and ear;y spring months from November to May.



2-year 24 hour precipitation: 1.2 to 1.6 inches.

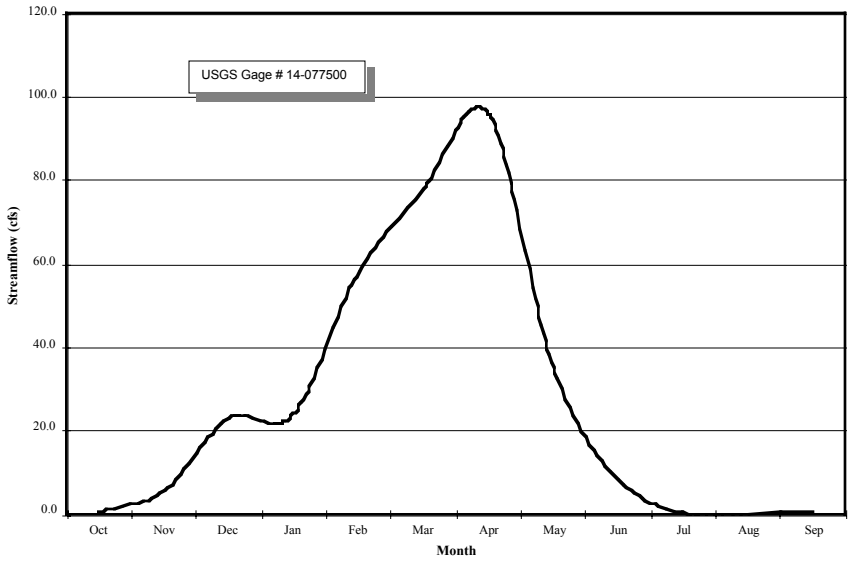
Temperature

	January			*July*		
°F	**39**	**21**	**30**	**92**	**55**	**73**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Much of winter precipitation falls as snow which accumulates into moderately deep snowpacks. Higher elevations hold the deepest snowpacks..

Hydrologic basin characteristics: Stream density is less than other Blue Mountain ecoregions and intermittent streams are more prevalent. Major streams flowing south typically end in the Harney Basin

Runoff patterns: Average monthly streamflows are highest in the spring months.*



* as represented by a stream gage from ecoregion 11a because no daily values were available for this ecoregion.

Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): Less than 10 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	Fines / gravel	Gravel	Gravel /cobble
	Higher gradient	Gravel	Gravel / cobble	Gravel / cobble
Beaver dams	Lower gradient	Some year-round	Few year-round	None
	Higher gradient	Few in summer	None	None

Natural Disturbances: Frequent fire except where suppressed.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Mixed (white fir, hardwoods) and shrubs (willows, mountain alder). **Size**: Small **Density**: Dense	25-100'	**Type**: Conifers (white fir, Douglas-fir, lodgepole pine, and ponderosa pine **Size**: Large **Density**: Sparse	Under certain circumstances, there are a few potential plant communities that have no woody vegetation in RA1, and are characterized by herbaceous plants such as aquatic sedge at higher elevations. See Crowe (1997) and Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Mixed (white fir, willows, black cottonwood, alder) and shrubs (common snowberry, mountain alder). **Size**: Small **Density**: Dense	50-100'	**Type**: Conifers (white fir, Douglas-fir, lodgepole pine, and ponderosa pine **Size**: Large **Density**: Sparse	Under certain circumstances, there are a few potential plant communities that have no woody vegetation in RA1, and are characterized by herbaceous plants such as aquatic sedge at higher elevations. See Crowe (1997) and Kovalchik(1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods (black cottonwood, aspen) and shrubs (pacific, Booth, Geyer and Lemmon willow, common snowberry, Mountain alder). **Size**: Small **Density**: Dense	75-100'	**Type**: Conifers (white fir, Douglas-fir, lodgepole pine, and ponderosa pine **Size**: Large **Density**: Sparse	Under certain circumstances, there are a few potential plant communities that have no woody vegetation in RA1, and are characterized by herbaceous plants such as beaked sedge, bluejoint reedgrass, or aquatic sedge at higher elevations. See Crowe (1997) and Kovalchik(1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: White fir, Douglas-fir, lodgepole pine, and ponderosa pine.

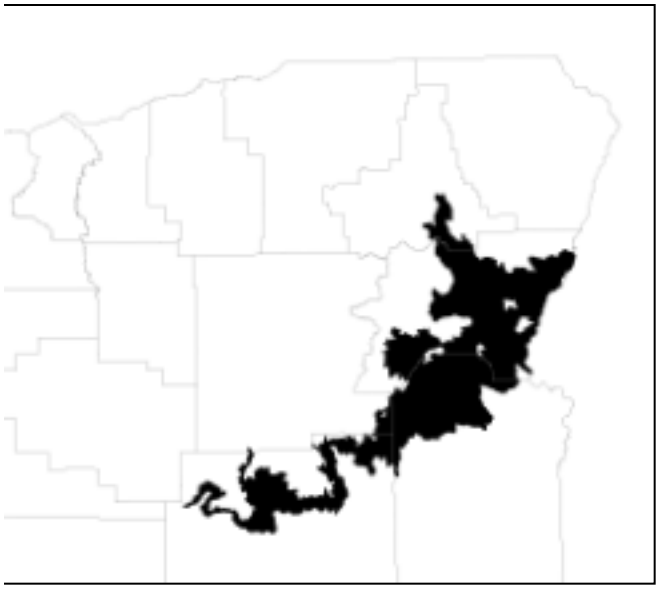
Upland vegetation: Native vegetation includes grasses, ponderosa pine, lodgepole pine, white fir, and Douglas-fir

Historic Crown Closure: At lower elevations, less than 30% historic crown closure. Lower elevation areas were predominately ponderosa pine savannas historically. Ponderosa pine savannas have all but disappeared due to fire suppression. At higher elevations, historic crown closure was greater than 30%.

Land Use: Grazing, timber harvest

Other:

Continental Zone Foothills (11i)



Location: Southern fringe of Blue Mountains.

Drainage Basins: Powder, Grande Ronde, Malheur, and Malheur Lake Basins

Geology: Geology is basalt flows and breccia (west) and melange geology of the Blue Mountain core (east).

Topography: Consists of lower-elevation undulating hills Streams have a low gradient.

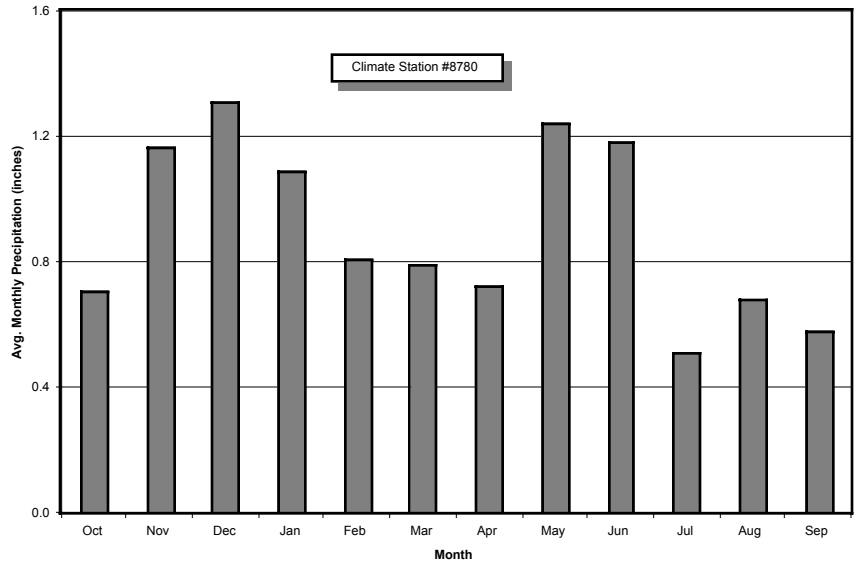
Soil: Soils are stony loam with a gravelly clay loam subsoil.

Erosion: Erosion rate is low due to moderate slopes, resistant soils, and low rainfall.

Climate characterization: Continental climate with short, dry summers and long cold winters. Climate varies over a broad temperature and precipitation ranges because sharp elevational differences create localized microclimates. Precipitation tends to fall as light snow in the winter, spring and fall rains, or occasional summer thunderstorms.

Mean annual precipitation: 10 to 25 inches.

Precipitation Pattern: Precipitation peaks in winter and late spring.



2-year 24 hour precipitation: Less than 1.0 to 1.6 inches.

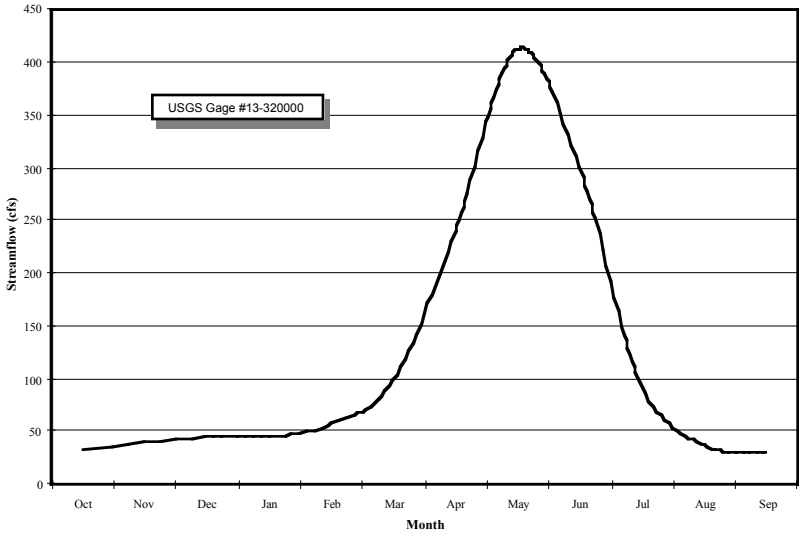
Temperature

	January			*July*		
°F	**36**	**17**	**27**	**89**	**54**	**72**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Much of the winter precipitation falls as light snow and can accumulate into shallow snowpacks. The highest peaks in the ecoregion can develop very deep snowpacks.

Hydrologic basin characteristics: Basins have southward orientation. In the western end of the region, streams drain into the Harney marshes. The streams in the eastern section are tributaries to the Snake River.

Runoff patterns: Average monthly streamflows are highest in late spring and early summer months.



Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): 6 cfs/mi^2 to 20 cfs/mi^2, with a few greater than 20 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	Fines / gravel	Gravel	Gravel /cobble
	Higher gradient	Gravel	Gravel / cobble	Gravel / cobble
Beaver dams	Lower gradient	Some year-round	Few year-round	None
	Higher gradient	Few in summer	None	None

Natural Disturbances: Frequent fire except where suppressed.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Shrubs (willows). **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	
Semi-constrained	0-50'	**Type**: Shrubs (willows, sagebrush) and Cusick's bluegrass. **Size**: N/A **Density**: N/A	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	See Crowe (1997) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods (aspen) and shrubs (Booth, Geyer and Lemmon willows, shrubby cinquefoil, silver sage, big sage) and Cusick's bluegrass, wooly sedge. **Size**: Small **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Under certain circumstances, there are a few potential plant communities having no woody vegetation in RA1, and are characterized by herbaceous plants such as beaked sedge, tufted hairgrass, or aquatic sedge at higher elevations. See Crowe (1997) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: None.

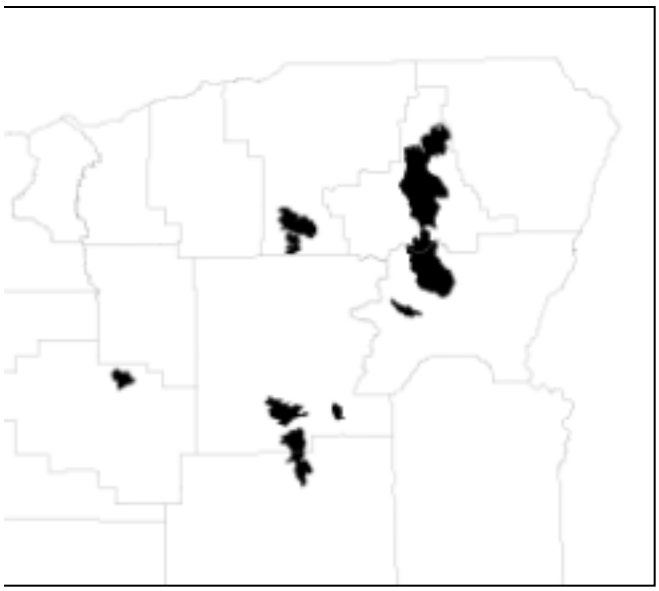
Upland vegetation: Native vegetation includes grasses, sagebrush, bitterbrush, and some juniper.

Historic Crown Closure: Less than 30% historic crown closure.

Land Use: Grazing with some irrigated agriculture.

Other:

Blue Mountains Basins (11k)



Location: Scattered basins in the Blue Mountains.

Drainage Basins: Grande Ronde, Powder, John Day, Deschutes, and Malheur Lake Basins

Geology: Geology is varied depending on location. Many basins are depositional areas for alluvium, loess, and ash.

Topography: Consists of flat basins. Streams are usually channelized to drain the basin and transport irrigation water.

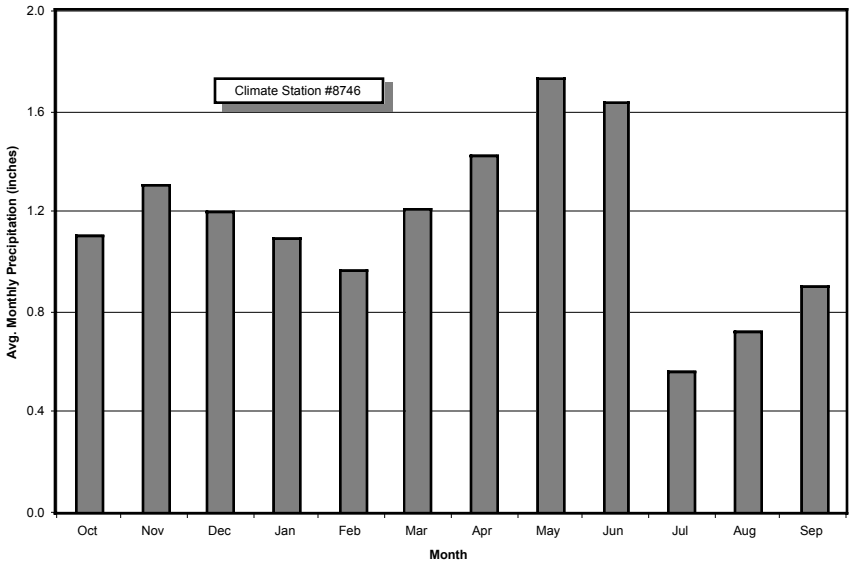
Soil: Soils are deep and fine-textured.

Erosion: Erosion rate is low due to gentle terrain.

Climate characterization: Continental climate with short, dry summers and long cold winters. Temperature extremes are particularly notable in the dry southern valley of the Grande Ronde River. Marine influences moderate the climate slightly at the eastern end of the Grande Ronde valley.

Mean annual precipitation: 10 to 25 inches.

Precipitation Pattern: Most precipitation occurs in spring and early summer.



2-year 24 hour precipitation: 1.6 to 1.8 inches.

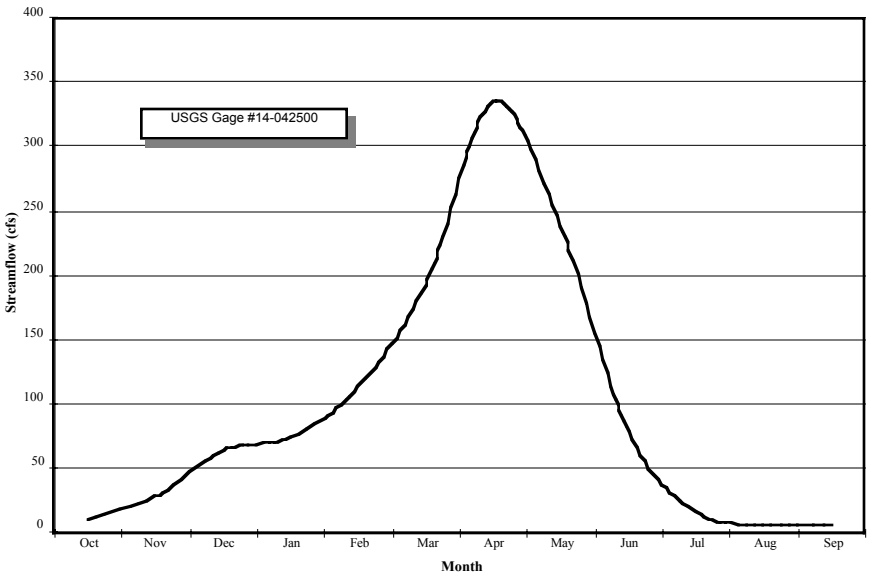
Temperature

	January			*July*		
°F	**39**	**22**	**30**	**88**	**46**	**67**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Much of the winter precipitation falls as light snow and can accumulate into shallow snowpacks. The highest peaks in the ecoregion can develop very deep snowpacks.

Hydrologic basin characteristics: Basins are areas of depressions within the Blue Mountains. The orientations vary from basin to basin. Streams are slow and meandering.

Runoff patterns: Average monthly streamflows are highest in the spring months.



Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): 6 cfs/mi^2 to 10 cfs/mi^2, with a few greater than 10 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	Fines	Fines	Fines
	Higher gradient	Fines / Gravel	Fines / Gravel	Fines / Gravel
Beaver dams	Lower gradient	Some year-round	Few year-round	None
	Higher gradient	N/A	N/A	N/A

Natural Disturbances: Fire has little effect in these regions, since major species can regenerate from underground rootstocks. Heavy grazing causes decline in both grasses and shrubs (Franklin and Dyrness 1988).

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (cottonwoods), and shrubs (willows). **Size**: Small **Density**: Dense	N.A.	**Type**: N/A **Size**: N/A **Density**: N/A	
Semi-constrained	0-50'	**Type**: Hardwoods (cottonwoods), and shrubs (willows). **Size**: Small **Density**: Dense	N.A.	**Type**: N/A **Size**: N/A **Density**: N/A	.
Un-constrained	0-75'	**Type**: Hardwoods (cottonwoods, aspen), and shrubs (willows). **Size**: Small **Density**: Dense	N.A.	**Type**: N/A **Size**: N/A **Density**: N/A	Under certain circumstances, there are a few potential plant communities having no woody vegetation in RA1, and are characterized by herbaceous plants such as beaked sedge, or aquatic sedge at higher elevations. See Crowe (1997) and Kovalchik B. (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: None.

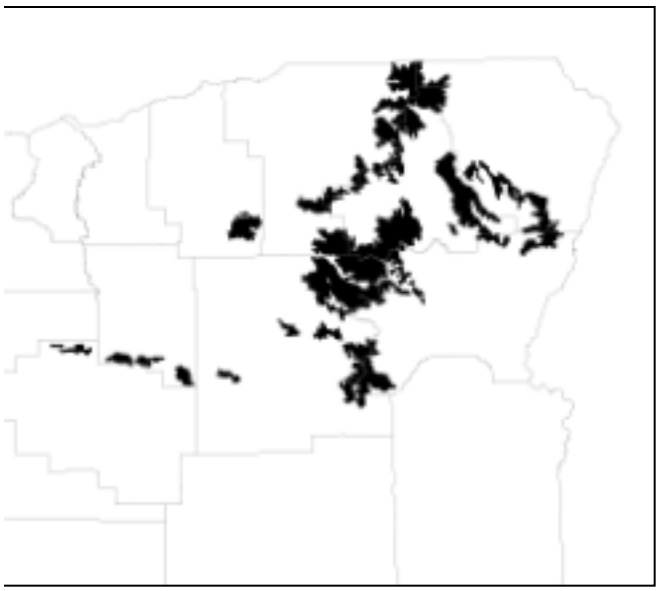
Upland vegetation: Streams surrounded by agriculture and grazing. Potential natural vegetation of the terraces and hills consist of Idaho fescue, common snowberry and Sandberg's bluegrass.

Historic Crown Closure: Less than 30% historic crown closure.

Land Use: Irrigated agriculture and grazing.

Other:

Mesic forest zone (11l)



Location: Upper slopes throughout the Blue Mountains ecoregion.

Drainage Basins Grande Ronde, Umatilla, John Day and Deschutes Basins

:Geology: Geology is varied depending on location.

Topography: Consists of moderate to steep slopes. Streams have a moderate to high gradient and commonly flow through constricted canyons.

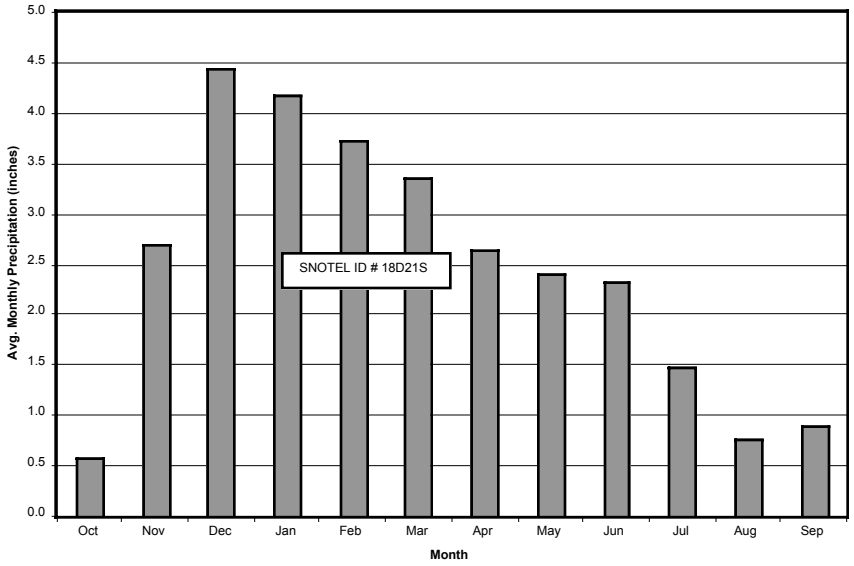
Soil: Soils are usually highly productive and soil moisture is abundant

Erosion: Erosion rate is moderate. Most erosion occurs during high intensity runoff events during snow melt periods or during thunderstorms.

Climate characterization: Continental climate with short, dry summers and long cold winters. Climate varies over a broad temperature and precipitation ranges because sharp elevational differences create localized microclimates. Precipitation tends to fall as light snow in the winter, spring and fall rains, and occasional summer thunderstorms.

Mean annual precipitation: 20 to 50 inches.

Precipitation Pattern: Majority of the precipitation falls in the winter and early spring months from November to April.



2-year 24 hour precipitation: 1.8 to 2.4 inches.

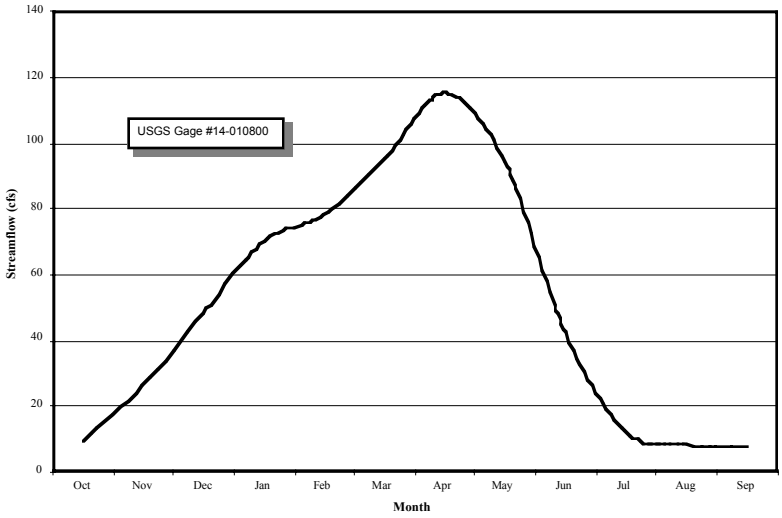
Temperature

	January			*July*		
°F	**35**	**11**	**23**	**81**	**39**	**60**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: High annual precipitation falls mainly as snow developing a heavy snowpack that persists late into summer.

Hydrologic basin characteristics: These basins are in the higher elevations with varying orientations. The streams flow into many of the rivers that drain the Blue Mountains.

Runoff patterns: Average monthly streamflows are highest in the spring months.



Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): 6 cfs/mi^2 to 20 cfs/mi^2, with a few greater than 20 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	Gravel	Gravel / cobble	Cobble
	Higher gradient	Gravel / cobble	Cobble	Boulder / cobble
Beaver dams	Lower gradient	Some year-round	Few year-round	None
	Higher gradient	Few in summer	None	None

Natural Disturbances: Frequent fire except where suppressed.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods and shrubs (willows, bog blueberry, dogwood, mountain alder) **Size**: Small **Density**: Dense	25-100'	**Type**: Conifers (Engelmann spruce, Douglas-fir, true fir, larch, lodgepole pine) **Size**: Large **Density**: Dense	Disease, insects, and fire often suppress one or more tree species. Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as aquatic sedge at higher elevations, queencup beadlily and widefruit sedge. See Crowe (1997) and Kovalchik (1987) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Hardwoods and shrubs (willows, bog blueberry, dogwood, mountain alder, Pacific ninebark, common snowberry). **Size**: Small **Density**: Dense	50-100'	**Type**: Conifers (Engelmann spruce, Douglas-fir, true fir, larch, lodgepole pine) **Size**: Large **Density**: Dense	Disease, insects, and fire often suppress one or more tree species. Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as aquatic sedge at higher elevations, queencup beadlily, smallfruit bulrush, widefruit sedge, beaked sedge, or aquatic sedge at higher elevations. See Crowe (1997) and Kovalchik (1987) for more details about specific plant communities and where they occur.
Un-constrained	0-75'	**Type**: Hardwoods and shrubs (willows, bog blueberry, dogwood, mountain alder, Pacific ninebark, common snowberry). **Size**: Small **Density**: Dense	75-100'	**Type**: Conifers (Engelmann spruce, Douglas-fir, true fir, larch, lodgepole pine) **Size**: Large **Density**: Dense	Disease, insects, and fire often suppress one or more tree species. Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as aquatic sedge at higher elevations, queencup beadlily, smallfruit bulrush, bluejoint reedgrass, aquatic sedge, and widefruit sedge. See Crowe (1997) and Kovalchik (1987) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Engelmann spruce, Douglas-fir, true fir, lodgepole pine.

Upland vegetation: Native vegetation includes Engelmann spruce, Douglas-fir, true fir, lodgepole pine, ponderosa pine, and larch.

Historic Crown Closure: These higher elevation forests had greater than 30% historic crown closure. Fire suppression and grazing have altered current stand density and composition.

Land Use: Grazing, timber harvest, recreation

Other:

Subalpine Zone (11m)

Location: Highest elevations in the Wallowa Mountains.

Drainage Basins: Grande Ronde, Powder, and John Day Basins

Geology: Geology is varied and modified by glaciation.

Topography: Consists of moderate to steep slopes. Streams have a moderate to high gradient and commonly flow through meadows and then through constricted canyons.

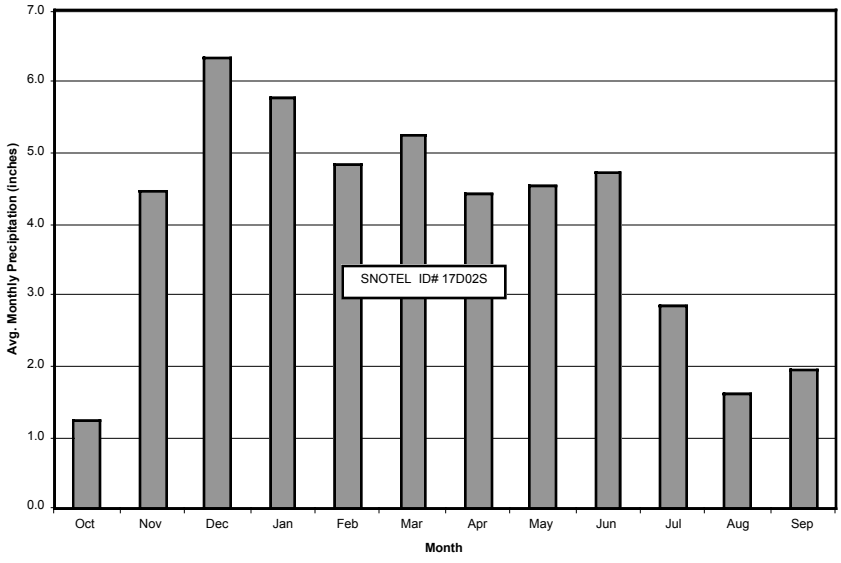
Soil: Soils are fine-textured in meadows and rocky in canyon areas.

Erosion: Erosion rate is low. Most erosion occurs during high intensity runoff events during snow melt periods or during thunderstorms.

Climate characterization: Continental climate with long cold winters, heavy snowpack and high annual precipitation.

Mean annual precipitation: 50 to 75 inches.

Precipitation Pattern: Majority of precipitation occurs in the winter, with additional peaks in March and again in early summer.



2-year 24 hour precipitation: 2.0 to 2.6 inches.

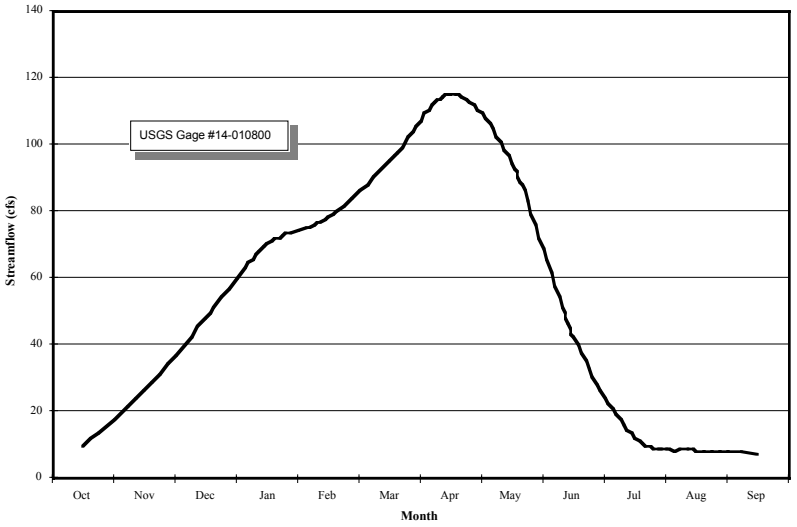
Temperature

	January			*July*		
°F	**35**	**11**	**23**	**81**	**39**	**60**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: High annual precipitation falls mainly as snow developing into a heavy snowpack that persists late into summer.

Hydrologic basin characteristics: The streams are perennial streams depending on snowpack conditions. Most streams are headwaters for Blue Mountain rivers.

Runoff patterns: Average monthly streamflows are highest in the spring months.*



* as represented by a stream gage from ecoregion 11l because no daily values were available for this ecoregion.

Peak flow generating process: Primarily spring rain, spring rain-on-snow, and snowmelt.

Peak flow magnitude (2-year recurrence interval): 6 cfs/mi^2 to 20 cfs/mi^2, with a few greater than 20 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	Lower gradient	Fine / gravel	Gravel / cobble	Cobble
	Higher gradient	Gravel / cobble	Cobble	Boulder / cobble
Beaver dams	Lower gradient	None	None	None
	Higher gradient	None	None	None

Natural Disturbances: Avalanches and fires comprise the main disturbances. Infrequent fires in this forest type result in low survival of dominant tree species, and fire intensity depends on weather conditions.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Conifers (subalpine fir) and shrubs (willows, mountain alder, Sitka alder, bog blueberry) with ladyfern, arrowleaf groundsel and queencup beadlily. **Size**: Small **Density**: Sparse	25-100'	**Type**: Conifers (Grand fir, Engelmann spruce and subalpine fir) **Size**: Medium **Density**: Sparse	Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as black alpine sedge, showy sedge and aquatic sedge at higher elevations, queencup beadlily and widefruit sedge in lower areas. See Crowe (1997) and Cole (1982) for more details about specific plant communities and where they occur.
Semi-constrained	0-50'	**Type**: Conifer (subalpine fir) and shrubs (willow, mountain alder, Sitka alder, common snowberry, bog blueberry) with ladyfern, arrowleaf groundsel, Holm's sedge and queencup beadlily. **Size**: Small **Density**: Sparse	50-100'	**Type**: Conifers (Grand fir, Engelmann spruce and subalpine fir **Size**: Medium **Density**: Sparse	Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as black alpine sedge, showy sedge and aquatic sedge at higher elevations, queencup beadlily, smallfruit bulrush, Holm's sedge, and widefruit sedge in lower areas. See Crowe (1997) and Cole (1982) for more details about specific plant communities and where they occur.

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Un-constrained	0-75'	**Type**: Conifer (subalpine fir) and shrubs (willows, mountain alder, common snowberry, bog blueberry) meadow vegetation and queencup beadlily. **Size**: Small **Density**: Sparse	75-100'	**Type**: Conifers (Grand fir, Engelmann spruce and subalpine fir **Size**: Medium **Density**: Sparse	Under certain circumstances, there are a few potential plant communities which have no woody vegetation in RA1, and are characterized by herbaceous plants such as black alpine sedge, showy sedge and aquatic sedge at higher elevations, queencup beadlily, smallfruit bulrush, Bluejoint reedgrass, Holm's sedge, woodrush sedge and widefruit sedge in lower areas. See Crowe (1997) and Cole (1982) for more details about specific plant communities and where they occur.

Current Streamside Conifer Regeneration: Engelmann spruce subalpine fir.

Upland vegetation: Native vegetation includes Engelmann spruce, subalpine fir, meadows.

Historic Crown Closure: Historic crown closure typically greater than 30%. In the higher alpine areas, subalpine forest type canopy closures decrease as you approach alpine, where they become more open and interspersed with meadows due to cold temperatures

Land Use: Recreation

Other:

Snake River Basin / High Desert (12)

Location: Southeast corner of Oregon

Drainage Basins: Owyhee, Malheur, Malheur Lake and Deschutes Basins

Geology: Geology dominated by basalts (63% of area) and lake deposits (23%). Also includes areas of colluvium on volcanic rocks (8% of area) and sandstone and shale (6% of area) (Clawges and Price, 1999)

Topography: The majority of the ecoregion consists of dissected lava plains, rolling hills, alluvial fans, valleys, and scattered mountains. The south-central portion of the ecoregion is composed of northerly trending, fault-block ranges and intervening, drier basins. The northwest corner of the ecoregion is considerably lower and less rugged than adjacent areas, with many alluvial valleys bordering the Snake River. The northwest corner of the ecoregion extends into the Deschutes River Valley, and is much flatter than the rest of the ecoregion. Much of the ecoregion is internally drained. (Bryce and Woods, 2000)

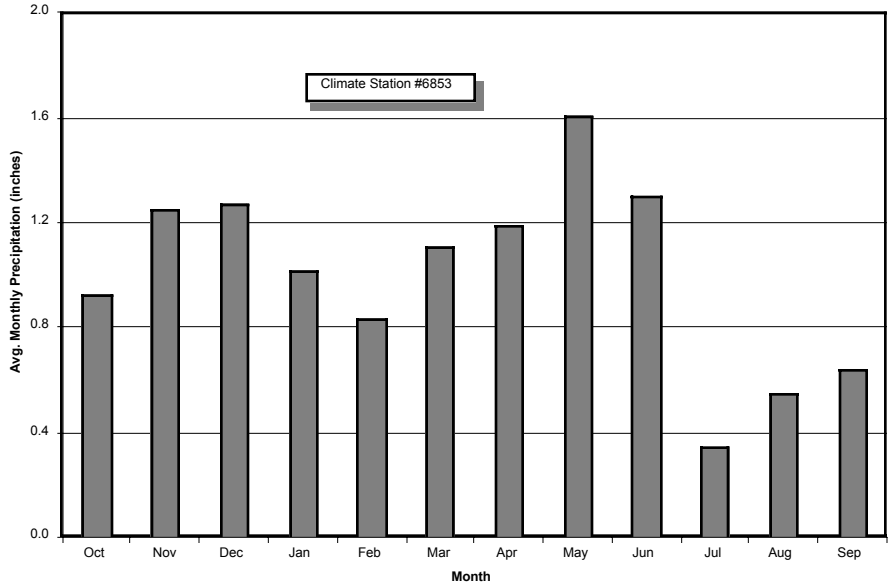
Soil: Soils are generally rocky and thin, low in organic matter and high in minerals, derived from underlying volcanic rock, or occasionally from sedimentary layers that have been exposed by erosion. Areas exist of soils derived from volcanic ash and welded tuffs which has resulted in unique soils with a high clay content and an unusual chemical composition (Kagan, 2000).

Erosion: Erosion rates vary across this wide ecoregion, however, rates are generally low due to low precipitation, competent geology and moderate slopes.

Climate characterization: Arid climate with extreme ranges in daily and seasonal temperatures. In general, springs are moist and cold winters bring moisture in the form of snow. Summers are hot and dry with occasional thunderstorms. Temperature extremes are more pronounced (colder winters and hotter summers) in the southeast corner of the state (Owyhee area).

Mean annual precipitation: 5 to 15 inches; up to 45 inches in higher elevations.

Precipitation Pattern: A majority of precipitation occurs in the summer months, with some areas experiencing high values of rainfall in the winter months as well. Annual precipitation, particularly in the southeastern extent of this region, tends to be distributed more evenly throughout the year than stations in other eastern Oregon



ecoregions.

2-year 24 hour precipitation: <1.0 to 1.8 inches.

Temperature

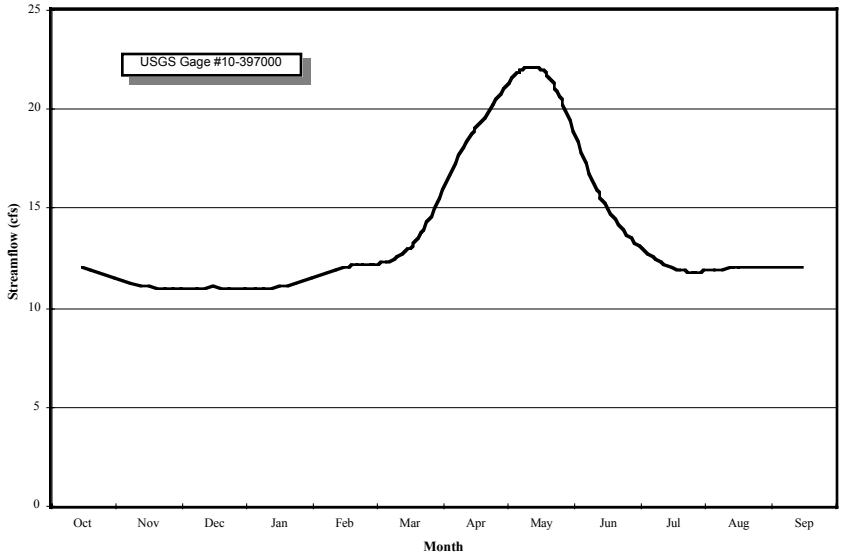
	January			*July*		
°F	**39**	**21**	**30**	**86**	**50**	**68**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall occurs often during the cold winter months. Snow accumulates into a pack in the higher elevations particularly in the basin and range area along the flanks of the Steens Mountain Range. In the Owhyee area, located in the far southeastern corner of the state, snowpack accumulation reported at the one snow course station is minimal due to low amounts of precipitation. Areas at higher elevations (>4,700 feet) and along the northern border with the Blue Mountain Ecoregion report deeper snowpacks.

Hydrologic basin characteristics: Some of Eastern Oregon's major rivers flow northerly across the High Lava Plains region, located in the northern portion of 12a , however most of the water originates in adjoining ecoregions. The lava plateau had no major lakes and few large wetlands prior to manmade reservoirs and irrigation systems (Kagan, 2001). Similarly, the mid-portion of 12a, called the Basin and Range region, supports very few river systems; instead, runoff supplies seasonal lakes and marshes, particularly in the northern part. In the far southeastern portion of this ecoregion, fairly coincident with the boundaries of Malhuer County lies the Owhyee region. Here, broad undulating plateaus are cut by deep riverine canyons that tend to

flow northeastward through either the Owhyee River basin or the lower Malheur River into the Snake River system near the Idaho border.

Runoff patterns: Average monthly streamflows are the greatest during the spring months. Very few river systems flow through or originate in the Basin and Range portion of this ecoregion. Runoff from precipitation and mountain snowpacks in this area often flows into flat, alkaline playas, where it forms seasonal shallow lakes and



marshes.

Peak flow generating process: In the Lava Plains area, peak flows occur typically in the winter months and can be generated by either rainstorms or rain-on-snow events. Frozen ground contributes to the winter flooding events. Spring peak flows associated with both rain and snowmelt can also occur in the Lava Plains area though less frequently.

Peak flows in the Basin and Range area can occur in any season produced by many different processes, however, spring peak flows generated by snowmelt tend to be most common particularly in the eastern portion. Summer rainstorms also generate peak flows in this area although, infrequently.

Similarly, peak flows can occur in any season in the Owyhee area. The occurrence of peak flows was fairly evenly split between seasons as reported at many of stream gages. Winter rainstorms and winter rain-on-snow processes actively generate many of the winter peak flows, particularly in the northern area bordering the Blue Mountains Ecoregion. Spring peak flows are commonly generated by both rainfall and snowmelt in this area. Summer thunderstorms produce a substantially higher percentage of annual peak flows in the Owyhee area than in any other eastern Oregon ecoregion.

Peak flow magnitude (2-year recurrence interval): most streams less than 10 cfs/mi^2; a few streams reported higher peak flows from 10 to 60 cfs/mi^2 and even up

to 100 cfs/mi^2 particularly in the northern portion of the Owyhee area where localized cloudburst storms are more common.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods (Black & narrow leaf cottonwoods, aspen) & shrubs (willows, mountain alder, hawthorn, chokecherry, wood's rose & silver sage). **Size**: Small **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Hall (2000). Personal Communication. Also see Manning & Padgett (1995) for more information regarding riparian plant communities in this region.
Semi-constrained	0-50'	**Type**: Hardwoods (Black & narrow leaf cottonwoods, aspen) & shrubs (willows, mountain alder, hawthorn, chokecherry, wood's rose & silver sage). **Size:** Small **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Hall (2000). Personal Communication. Also see Manning & Padgett (1995) for more information regarding riparian plant communities in this region.
Un-constrained	0-75'	**Type**: Hardwoods (Black & narrow leaf cottonwoods, aspen) & shrubs (willows, mountain alder, hawthorn, chokecherry, wood's rose & silver sage). **Size:** Small **Density**: Dense	N/A	**Type**: N/A **Size**: N/A **Density**: N/A	Hall (2000). Personal Communication. Also see Manning & Padgett (1995) for more information regarding riparian plant communities in this region.

Current Streamside Conifer Regeneration: Never occurred naturally.

Upland vegetation: Sagebrush, snowberry, bitterbrush, Idaho fescue, bluebunch wheatgrass, sandberg's bluegrass, and other range grasses.

Historic Crown Closure: Less than 30% historic crown closure.

Land Use: Range, cattle grazing**.**

Other: Additional References Cited:

Clawges, R.M. and C.V. Price . 1999. Digital Data Sets Describing Principal Aquifers, Surficial Geology, and Ground-Water Regions of the Conterminous United States. U.S. Geological Survey Open-File Report 99-77, Rapid City, South Dakota

Kagan, J.S. 2000. Metadata for ORNHP / ODFW Ecoregions of Oregon. Available online at ftp://ftp.sscgis.state.or.us/pub/data/statewide/k250/ecoreg.doc

Bryce, S.A. and A.J. Woods. 2000. Level III and IV Ecoregion Descriptions for Oregon, Draft 8, 11/29/00. Available online at ftp://ftp.sscgis.state.or.us/pub/data/statewide/k250/ecoreg.doc

Rogue / Illinois Valleys (78a)

Location: Southwest Oregon; broad mountain valleys of the Rogue River and Illinois River

Drainage Basin: Rogue Basin

Geology: Floodplain deposits.

Topography: Consists of terraces and floodplain deposits. Streams originate in adjacent ecoregions having higher precipitation. Stream channels are low gradient and valleys are broad. Stream density within watersheds is low.

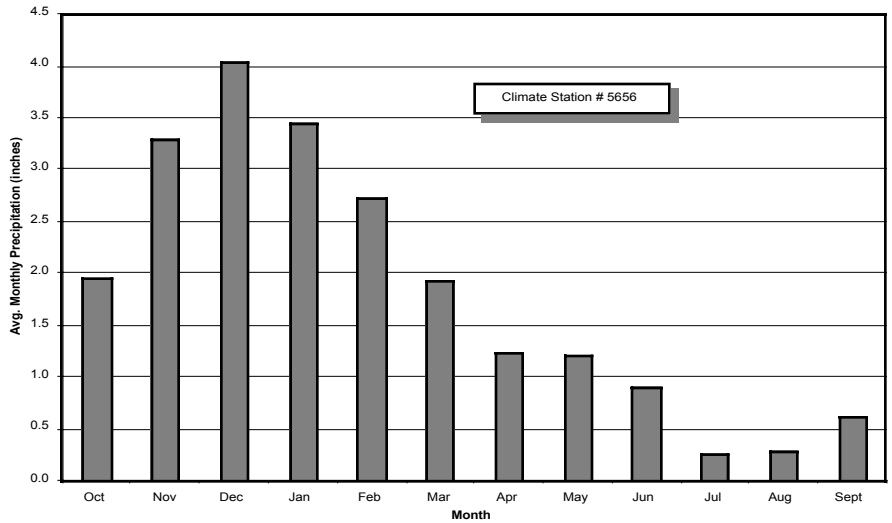
Soil: Soils range from deep silty clay loam to gravelly loam.

Erosion: Natural erosion rate is low due to gentle slopes and low precipitation. Runoff from agricultural land and impermeable surfaces in towns elevate suspended sediment loads within some streams.

Climate characterization: Southwest Interior Oregon is typically drier and colder than the Northwest interior because much of the area lies in a rain shadow sheltered from the Pacific Ocean by the Coastal Mountain Range. Storms of subtropical origin generate heavy rains and peak flows in this area.

Mean annual precipitation: 20 to 60 inches.

Precipitation Pattern: Majority of precipitation in Southwest Interior Oregon occurs in the winter months of November through March; in some areas as much as 75% of the annual precipitation occurs in the winter season. Occasional summer thunderstorms cause precipitation during the warmer months.



2-year 24 hour precipitation: 2.0 to 5.5 inches.

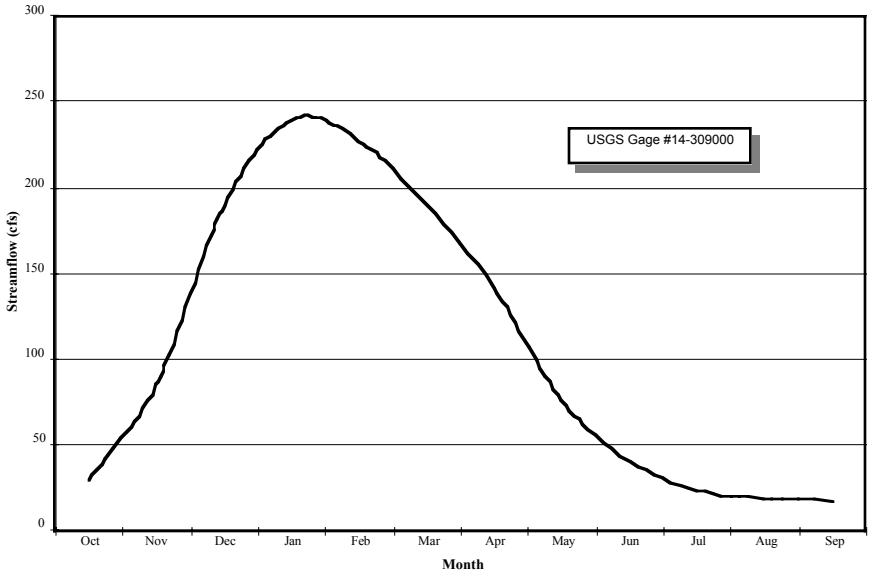
Temperature

	January			*July*		
°F	**47**	**31**	**39**	**89**	**51**	**70**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall occurs every winter in Southwest Oregon (20-30 inches a year in the valleys), although much of it melts within a few days and a snowpack seldom develops.

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average monthly streamflows are the highest in the winter



months.*

* as represented by a stream gage from ecoregion 78e because no daily values were available for this ecoregion.

Peak flow generating process: Rainstorms or rain-on-snow events. The lowland watersheds experience peak flows generated primarily from rainstorms. Peak flows in the upper basins of the Umpqua/Rogue River valleys with mean basin elevations above 3300 feet generally have some snowmelt component.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 50 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	gravel	gravel	gravel
	higher gradient	gravel	gravel / cobble	cobble
Beaver dams	lower gradient	some year-round	some year-round	none
	higher gradient	some in summer	some in summer	none

Natural Disturbances: Fires in pine woodlands were fairly frequent in the past. Fire intensity varied with local site conditions. Currently fire management "control" has decreased the frequency of fires, however, the proportion of high intensity fire has increased. It is not uncommon to find stands or sites that indicate the fire return interval was less than 10 years. Less is known about fire frequency in oak woodlands; although fire tends to be spread by grasses, it both spreads and ends quickly. Streamside areas sometimes escaped the fires. Fire suppression has now eliminated many of these wildfires.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Willows and other shrubs. **Size**: N/A **Density**: N/A	25-100'	**Type**: Mixed (Cottonwood and ponderosa pine) **Size**: Medium **Density**: Dense	
Semi-constrained	0-50'	**Type**: Willows and other shrubs. **Size**: N/A **Density**: N/A	50-100'	**Type**: Mixed (Cottonwood and ponderosa pine) **Size**: Medium **Density**: Dense	
Un-constrained	0-75'	**Type**: Willows and other shrubs. **Size**: N/A **Density**: N/A	75-100'	**Type**: Mixed (Cottonwood and ponderosa pine) **Size**: Medium **Density**: Dense	

Current Streamside Conifer Regeneration: Ponderosa pine are now uncommon due to use of near-stream areas for agriculture and residential areas.

Upland vegetation: Orchard, crop and pastureland; oak woodland and pine woodland. Potential natural vegetation includes Oregon white oak, madrone, California black oak, ponderosa pine and grasslands.

Historic Crown Closure: Dense forests in this area were confined to the mountain foothills and floodplains. Much of the landscape was dominated by prairies and oak savannas with less than 30% crown closure. Today, due to fire suppression, oak

savannas are being replaced by oak woodlands or Douglas fir forests with crown closures of greater than 50%.

Land Use: Orchard and row crop farming, pastures, rural residential development, towns and forested lands.

Other: Irrigation withdrawals result in the partial dewatering of some streams during the summer. Upstream reservoir releases and transfers of water from other basins keep flows high in other streams during the summer.

Siskiyou Foothills (78b)

Location: Southwest Oregon; moderately sloping mountains adjacent to broad valleys.

Drainage Basin: Rogue Basin

Geology: Basalt lava flows east of Medford and, in the west, sandstone and shale.

Topography: Consists of moderately sloping mountains. Many streams are intermittent or originate in adjacent ecoregions having higher precipitation. Stream channels are moderate gradient. Stream density within watersheds is low.

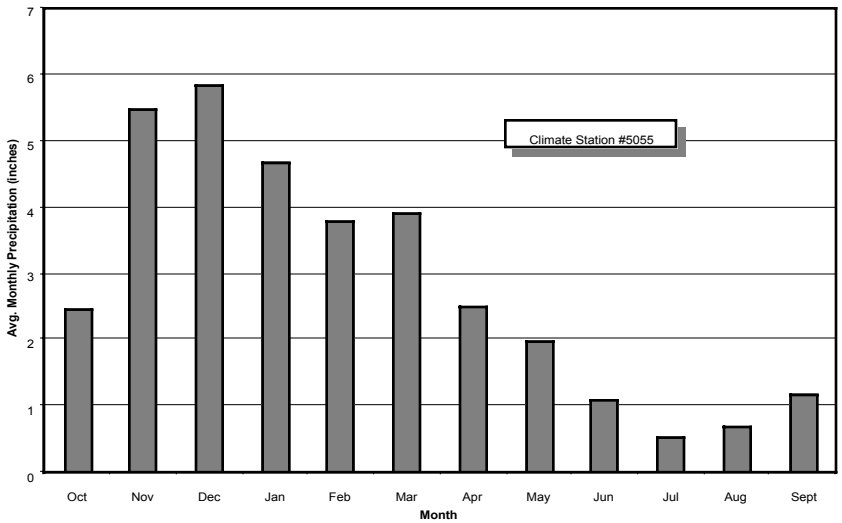
Soil: Soils range from deep clay to gravelly loam.

Erosion: Natural erosion rate is moderate due to moderate slopes and low precipitation. Erosion potential greatest during summer thunderstorms.

Climate characterization: Southwest Interior Oregon is typically drier and colder than the Northwest interior because much of the area lies in a rain shadow sheltered from the Pacific Ocean by the Coastal Mountain Range. Storms of subtropical origin generate heavy rains and peak flows in this area.

Mean annual precipitation: 25 to 45 inches; up to 65 inches in higher elevations.

Precipitation Pattern: Majority of precipitation in Southwest Interior Oregon occurs in the winter months of November through March; in some areas as much as 75% of the annual precipitation occurs in the winter season. Occasional summer thunderstorms cause precipitation during the warmer months.



2-year 24 hour precipitation: 2.0 to 3.0 inches.

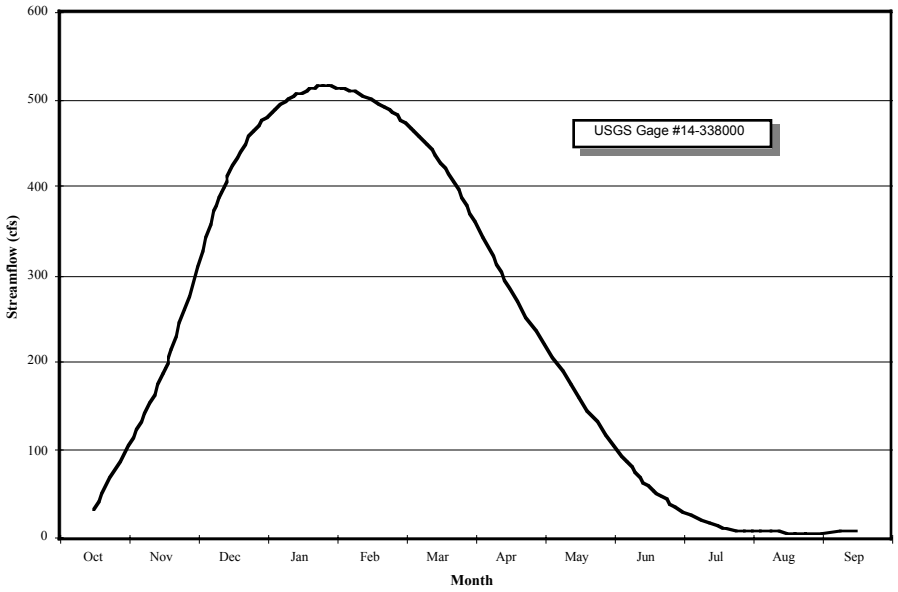
Temperature

	January			*July*		
°F	**45**	**28**	**38**	**87**	**50**	**70**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall occurs every winter in Southwest Oregon (20-30 inches a year in the valleys), although much of it melts within a few days and a snowpack seldom develops. Substantially more snow is reported at higher elevations and on north-facing slopes (e.g. Sexton Summit).

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average month streamflows are the highest in the winter months.



Peak flow generating process: Rainstorms or rain-on-snow events. The lowland watersheds experience peak flows generated primarily from rainstorms. Peak flows in the upper basins of the Umpqua/Rogue River valleys with mean basin elevations above 3300 feet generally have some snowmelt component.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 50 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	gravel	gravel
	higher gradient	gravel	gravel / cobble	cobble
Beaver dams	lower gradient	some year-round	some year-round	none
	higher gradient	some in summer	some in summer	none

Natural Disturbances: Both lightning-caused and human-caused fires were common in this region in the past. Streamside areas sometimes escaped the fires. Past fires varied in severity, depending on specific site conditions. Wildfires still occur but with lesser frequency and a greater proportion of high severity fire.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Willows and other shrubs. **Size**: N/A **Density**: N/A	25-100'	**Type**: Mixed (Cottonwood & other hardwoods, ponderosa pine; Douglas-fir & incense cedar in wetter locations) **Size**: Medium **Density**: Dense	
Semi-constrained	0-50'	**Type**: Willows and other shrubs. **Size**: N/A **Density**: N/A	50-100'	**Type**: Mixed (Cottonwood & other hardwoods, ponderosa pine; Douglas-fir & incense cedar in wetter locations) **Size**: Medium **Density**: Dense	
Un-constrained	0-75'	**Type**: Willows and other shrubs. **Size**: N/A **Density**: N/A	75-100'	**Type**: Mixed (Cottonwood & other hardwoods, ponderosa pine; Douglas-fir & incense cedar in wetter locations) **Size**: Medium **Density**: Dense	

Current Streamside Conifer Regeneration: Conifer regeneration near streams is somewhat common, except where grazing excludes their establishment.

Upland vegetation: Drier areas east of Medford dominated by oak woodlands and ponderosa pine. Wetter areas dominated by Douglas-fir and incense cedar. Orchards, pasture grasses, row crops. Potential natural vegetation includes Oregon white oak, madrone, California black oak, ponderosa pine and Douglas-fir.

Historic Crown Closure: Dense forests in this area were confined to the mountain foothills and floodplains. Much of the landscape was dominated by prairies and oak

savannas with less than 30% crown closure. Today, due to fire suppression, oak savannas are being replaced by oak woodlands or Douglas fir or ponderosa pine forests with crown closures of greater than 50%.

Land Use: Grazing, rural residential, orchards, some cropland and some forestry.

Other: Irrigation withdrawals result in the partial dewatering of some streams during the summer. Upstream reservoir releases and transfers of water from other basins keep flows high in other streams during the summer.

Umpqua Interior Foothills (78c)

Location: Foothills of the mid-Umpqua watershed.

Drainage Basin: Umpqua Basin

Geology: Sandstone or basalt.

Topography: Consists of narrow valleys, terraces and steep foothills. A number of streams become intermittent during the summer due to the low precipitation. Stream channels are moderate gradient. Stream density within watersheds is moderate in sandstone geology and low in basalt geology.

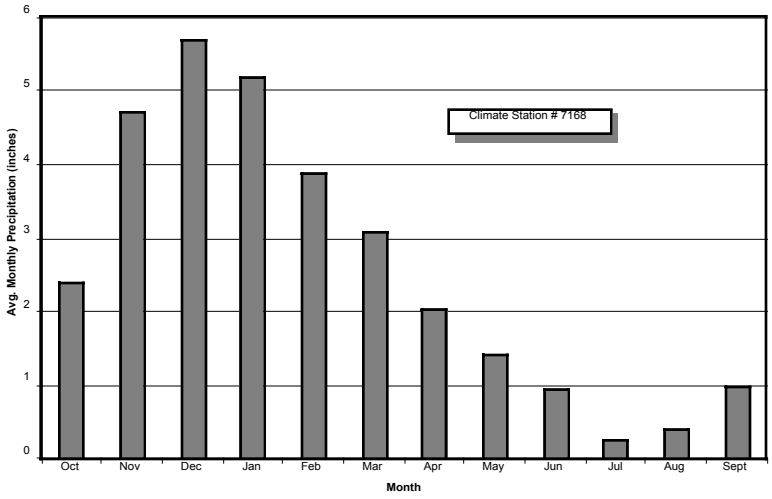
Soil: Soils range from deep silty clay loam to gravelly loam.

Erosion: Natural erosion rate is moderate. Some shallow landslides occur in the steeper headwater tributaries.

Climate characterization: Southwest Interior Oregon is typically drier and colder than the Northwest interior because much of the area lies in a rain shadow sheltered from the Pacific Ocean by the Coastal Mountain Range. Storms of subtropical origin generate heavy rains and peak flows in this area.

Mean annual precipitation: 30 to 50 inches.

Precipitation Pattern: Majority of precipitation in Southwest Interior Oregon occurs in the winter months of November through March; in some areas as much as 75% of the annual precipitation occurs in the winter season. Occasional summer thunderstorms cause precipitation during the warmer months.



2-year 24 hour precipitation: 2.5 to 3.0 inches.

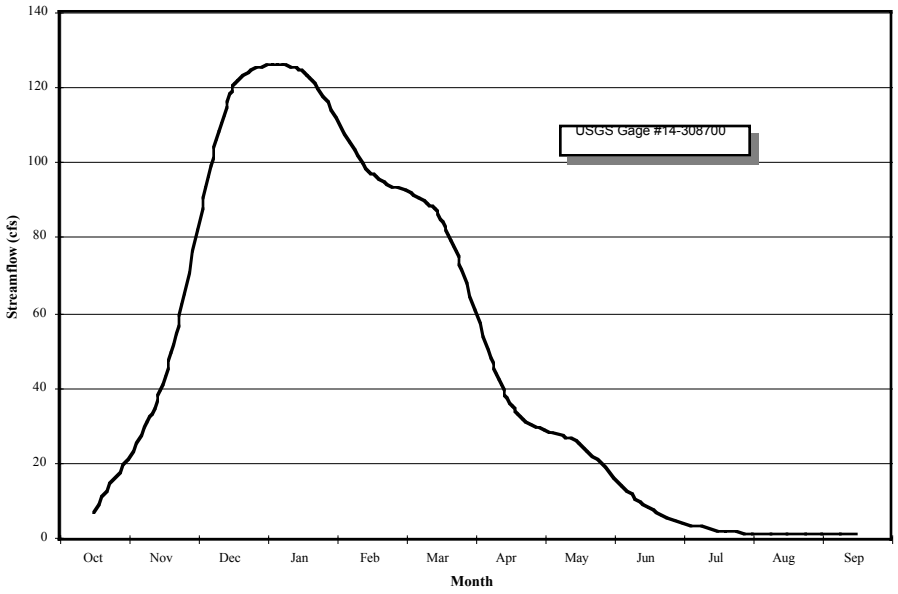
Temperature

	January			*July*		
°F	**49**	**34**	**41**	**84**	**53**	**68**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall occurs every winter in Southwest Oregon (20-30 inches a year in the valleys), although much of it melts within a few days and a snowpack seldom develops.

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average monthly streamflows are the highest in the winter.



Peak flow generating process: Rainstorms or rain-on-snow events. The lowland watersheds experience peak flows generated primarily from rainstorms. Peak flows in the upper basins of the Umpqua River valleys with mean basin elevations above 3300 feet generally have some snowmelt component.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 75 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	fines / gravel	gravel	gravel / cobble
	higher gradient	gravel	gravel / cobble	cobble / bedrock
Beaver dams	lower gradient	many year-round	some year-round	some in summer
	higher gradient	some in summer	some in summer	none

Natural Disturbances: Both lightning-caused and human-caused fires were common in this region in the past. Streamside areas sometimes escaped the fires. Past fires varied in severity, depending on specific site conditions. Fire suppression has eliminated most wildfires. Wildfires still occur but with lesser frequency and a greater proportion of high severity fire.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Hardwoods and shrubs. **Size**: Small **Density**: Dense	25-100'	**Type**: Mixed (Douglas-fir, ponderosa pine, and alder) **Size**: Large **Density**: Dense	
Semi-constrained	0-50'	**Type**: Hardwoods and shrubs. **Size**: Small **Density**: Dense	50-100'	**Type**: Mixed (Douglas-fir, ponderosa pine, and alder) **Size**: Large **Density**: Dense	
Un-constrained	0-75'	**Type**: Hardwoods and shrubs. **Size**: Small **Density**: Dense	75-100'	**Type**: Mixed (Douglas-fir, ponderosa pine, and alder) **Size**: Large **Density**: Dense	

Current Streamside Conifer Regeneration: Common except where competition from hardwoods is intense.

Upland vegetation: Oak woodlands and coniferous forests intermingled with pastures, vineyards, orchards and row crops. Potential natural vegetation includes Oregon white oak, madrone, ponderosa pine and Douglas-fir.

Historic Crown Closure: Dense forests in this area were confined to the mountain foothills and floodplains. Much of the landscape was dominated by prairies and oak savannas with less than 30% crown closure. Today, due to fire suppression, oak savannas are being replaced by oak woodlands or Douglas fir forests with crown closures of greater than 50%.

Land Use: Rural residential, towns, orchards, vineyards, row crops, pastures, and woodlands.

Other: Irrigation withdrawals result in the partial dewatering of some streams during the summer.

Serpentine Siskiyous (78d)

Location: Southwest mountains having soils derived from serpentine. (Note: this ecoregion is confined to the mountainous areas with ultramafic geology; it does occur on the valley floor and a variety of other topographic positions in the area.

Drainage Basins: Rogue and Klamath Basins

Geology: Underlain by serpentine rock.

Topography: Highly dissected mountains. Stream channels are usually high gradient. Water falls are common. Stream density within watersheds is high, valleys are narrow.

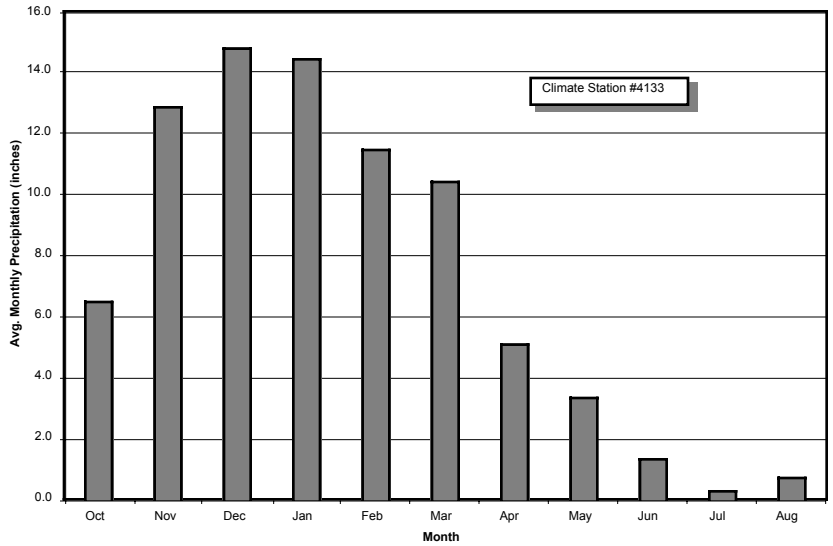
Soil: Soils are derived from serpentine rock which results in sparse vegetation and a limited number of species. Soils range from stony clay loam to gravelly loam.

Erosion: Natural erosion rate is high due to steep terrain and high winter precipitation.

Climate characterization: Southwest Interior Oregon is typically drier and colder than the Northwest interior because much of the area lies in a rain shadow sheltered from the Pacific Ocean by the Coastal Mountain Range. Storms of subtropical origin generate heavy rains and peak flows in this area.

Mean annual precipitation: 45 to 145 inches.

Precipitation Pattern: Majority of precipitation in Southwest Interior Oregon occurs in the winter months of November through March; in some areas as much as 75% of the annual precipitation occurs in the winter season. Occasional summer thunderstorms cause precipitation during the warmer months.*



* as represented by climate data from ecoregion 78f because no climate data were available for this ecoregion.

2-year 24 hour precipitation: 3.0 to 6.0 inches.

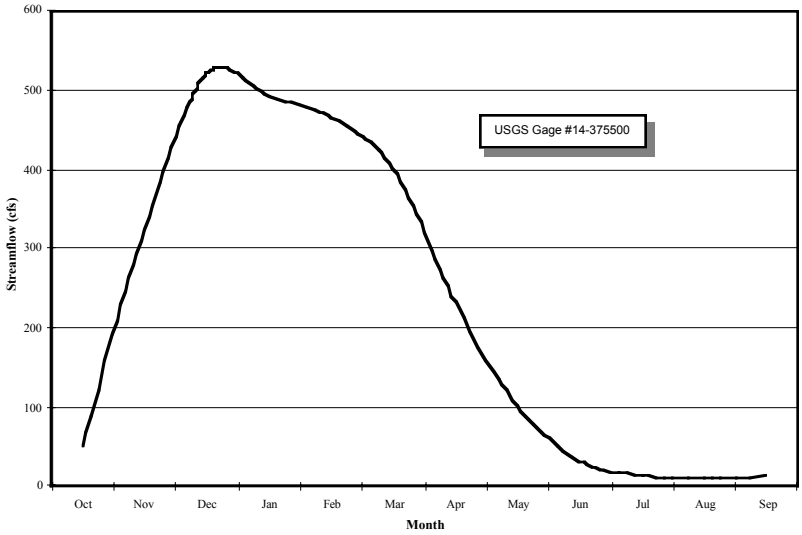
Temperature

	January			*July*		
°F	**44**	**32**	**39**	**82**	**49**	**69**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall occurs every winter in Southwest Oregon (20-30 inches a year in the valleys), although much of it melts within a few days and a snowpack seldom develops. Substantially more snow is reported at higher elevations and on north-facing slopes (e.g. Onion and Squaw peaks in the Klamath Mountains).

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average monthly streamflows are the highest in the winter.



Peak flow generating process: Rainstorms or rain-on-snow events. The lowland watersheds experience peak flows generated primarily from rainstorms. Peak flows in the upper basins of the Umpqua/Rogue River valleys with mean basin elevations above 3300 feet generally have some snowmelt component.

Peak flow magnitude (2-year recurrence interval): 75 cfs/mi^2 to 100 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	gravel	cobbles / gravel	cobbles
	higher gradient	gravel / cobbles	cobbles	cobble / bedrock
Beaver dams	lower gradient	few year-round	few year-round	none
	higher gradient	none	none	none

Natural Disturbances: Both lightning-caused and human-caused fires were common in this region in the past. In streamside areas (in the ultramafics) fire was/is even less frequent since one of the major factors in frequency is "fuel" production. Riparian ultramafic vegetation is some of the least often disturbed by fire on the landscape, the least is high elevation ultramafic riparian. Past fires varied in severity, depending on specific site conditions. Fire suppression has eliminated many wildfires.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Willow, azalea and other shrubs. **Size**: N/A **Density**: N/A	25-100'	**Type**: Mixed (Jeffrey pine, tanoak, and Douglas-fir) **Size**: Medium **Density**: Sparse	
Semi-constrained	0-50'	**Type**: Willow, azalea and other shrubs. **Size**: N/A **Density**: N/A	50-100'	**Type**: Mixed (Jeffrey pine, tanoak, and Douglas-fir) **Size**: Medium **Density**: Sparse	
Un-constrained	0-75'	**Type**: Willow, azalea and other shrubs. **Size**: N/A **Density**: N/A	75-100'	**Type**: Mixed (Jeffrey pine, tanoak, and Douglas-fir) **Size**: Medium **Density**: Sparse	

Current Streamside Conifer Regeneration: Common except where tanoak becomes established.

Upland vegetation: Sparse woodlands with unique understory vegetation. Potential natural vegetation includes Jeffrey pine, tanoak, Douglas-fir, and unique understory plants (California coffeberry, huckleberry oak, manzanita, silktassel,)due to soils derived from underlying serpentine rock.

Historic Crown Closure: Less than 30% historic crown closure. Landscape exhibits savanna habitat characteristics. Substrate plays as large a role in forest density patterns as fire and other disturbance.

Land Use: Recreation, forestry and mining.

Other: This ecoregion is a regional water source.

Inland Siskiyous (78e)

Location: Southwest mountains draining into the Rogue River and Illinois River.

Drainage Basins: Umpqua and Rogue Basins

Geology: Underlain by granitic rock, shale, or sandstone.

Topography: Highly dissected mountains. Stream channels are usually moderate to high gradient. Waterfalls occur. Stream density within watersheds is high, valleys are narrow.

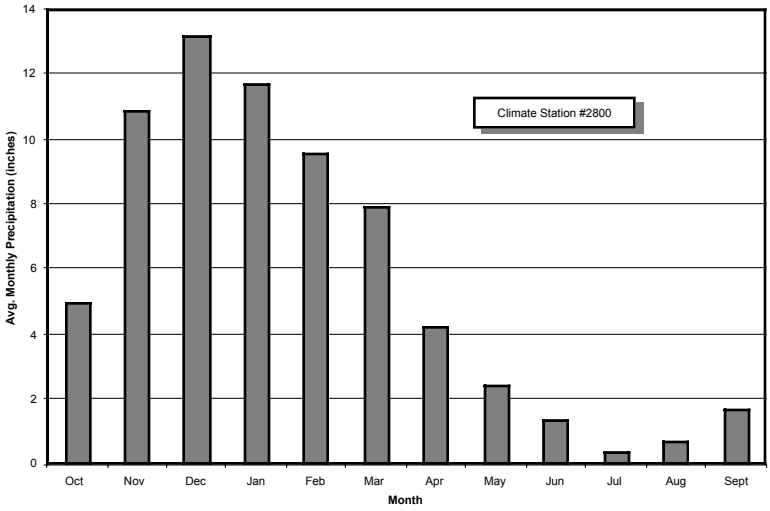
Soil: Soils range from stony clay loam to cobbly loam.

Erosion: Natural erosion rate is high due to steep terrain and high winter precipitation.

Climate characterization: Southwest Interior Oregon is typically drier and colder than the Northwest interior because much of the area lies in a rain shadow sheltered from the Pacific Ocean by the Coastal Mountain Range. Storms of subtropical origin generate heavy rains and peak flows in this area.

Mean annual precipitation: 35 to 70 inches; up to 89 inches in higher elevations.

Precipitation Pattern: Majority of precipitation in Southwest Interior Oregon occurs in the winter months of November through March; in some areas as much as 75% of the annual precipitation occurs in the winter season. Occasional summer thunderstorms cause precipitation during the warmer months.



2-year 24 hour precipitation: 3.0 to 5.5 inches.

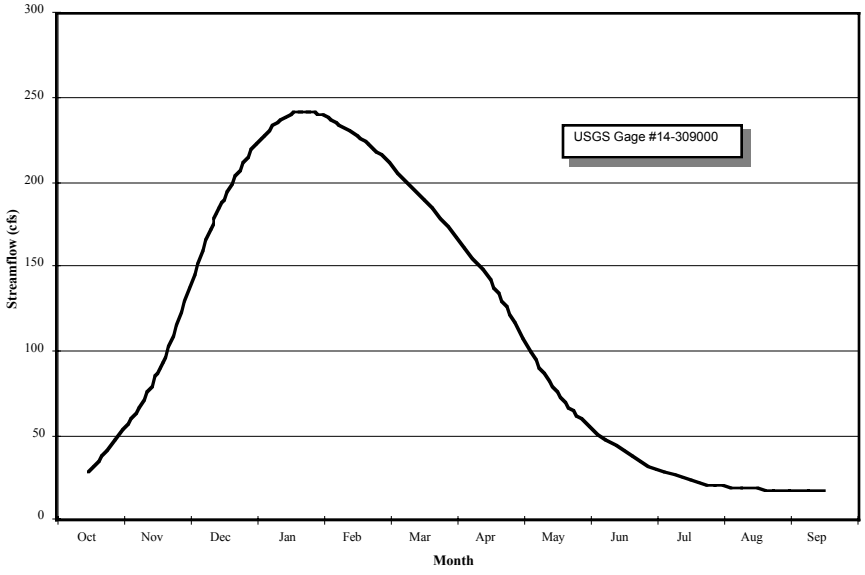
Temperature

	January			*July*		
°F	**44**	**29**	**39**	**86**	**50**	**69**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall occurs every winter in Southwest Oregon (20-30 inches a year in the valleys), although much of it melts within a few days and a snowpack seldom develops. Substantially more snow is reported at higher elevations and on north-facing slopes (e.g. Mount Ashland and Sexton Summit).

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average monthly streamflows are the highest in the winter.



Peak flow generating process: Rainstorms or rain-on-snow events. The lowland watersheds experience peak flows generated primarily from rainstorms. Peak flows in the upper basins of the Rogue River valleys with mean basin elevations above 3300 feet generally have some snowmelt component.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 75 cfs/mi^2, a few are greater than 100 cfs/mi^2.

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	gravel	cobbles / gravel	Cobbles
	higher gradient	gravel / cobbles	cobbles	cobble / bedrock
Beaver dams	lower gradient	some year-round	some year-round	None
	higher gradient	few in summer	few in summer	none

Natural Disturbances: Both lightning-caused and human-caused fires were common in this region in the past. Streamside areas sometimes escaped the fires. Past fires varied in severity, depending on specific site conditions. Fire suppression has eliminated many wildfires.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Mixed (White fir, Douglas- fir, incense cedar, Port-Orford cedar, and hardwoods) and shrubs. **Size**: Small **Density**: Dense	25-100'	**Type**: Conifer (Douglas-fir, ponderosa pine, incense cedar, and white fir beyond) **Size**: Large **Density**: Dense	The dominant conifers occupy all but the largest streams. As you go from hillside to draws, there are subtle changes is composition. As you descend into major draws the frequency of riparian associated vegetation increases, but it's only the major streams that have a significant component of hardwoods, and even then white fir, Douglas fir, incense cedar and Port-Orford-cedar are adjacent to the streams.
Semi-constrained	0-50'	**Type**: Mixed (White fir, Douglas- fir, incense cedar, Port-Orford cedar, and hardwoods) and shrubs. **Size**: Small **Density**: Dense	50-100'	**Type**: Conifer (Douglas-fir, ponderosa pine, incense cedar, and white fir beyond) **Size**: Large **Density**: Dense	The dominant conifers occupy all but the largest streams. As you go from hillside to draws, there are subtle changes is composition. As you descend into major draws the frequency of riparian associated vegetation increases, but it's only the major streams that have a significant component of hardwoods, and even then white fir, Douglas fir, incense cedar and Port-Orford-cedar are adjacent to the streams.

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Un-constrained	0-75'	**Type**: Mixed (White fir, Douglas- fir, incense cedar, Port-Orford cedar, and hardwoods) and shrubs. **Size**: Small **Density**: Dense	75-100'	**Type**: Conifer (Douglas-fir, ponderosa pine, incense cedar, and white fir beyond) **Size**: Large **Density**: Dense	The dominant conifers occupy all but the largest streams. As you go from hillside to draws, there are subtle changes is composition. As you descend into major draws the frequency of riparian associated vegetation increases, but it's only the major streams that have a significant component of hardwoods, and even then white fir, Douglas fir, incense cedar and Port-Orford-cedar are adjacent to the streams.

Current Streamside Conifer Regeneration: Common except where shrubs become established.

Upland vegetation: Coniferous forests. Potential natural vegetation includes white fir, tanoak, Shasta red fir, Douglas-fir, ponderosa pine and incense cedar. Oregon white oak is not but an occasional PNV species, and white fir is the most common series in the upland Siskiyous.

Historic Crown Closure: Greater than 30% historic crown closure. Historically, fire played a role in these forests and fire suppression has significantly increased stand densities.

Land Use: Forestry, recreation, mining, rural residential development.

Other:

Coastal Siskiyous (78f)

Location: Steep southwest mountains located within 60 miles of the coast.

Drainage Basins: South Coast and Rogue Basins

Geology: Underlain by conglomerates, sandstone, or siltstone.

Topography: Highly dissected mountains. Stream channels are usually high gradient. Waterfalls are common. Stream density within watersheds is high, valleys are narrow.

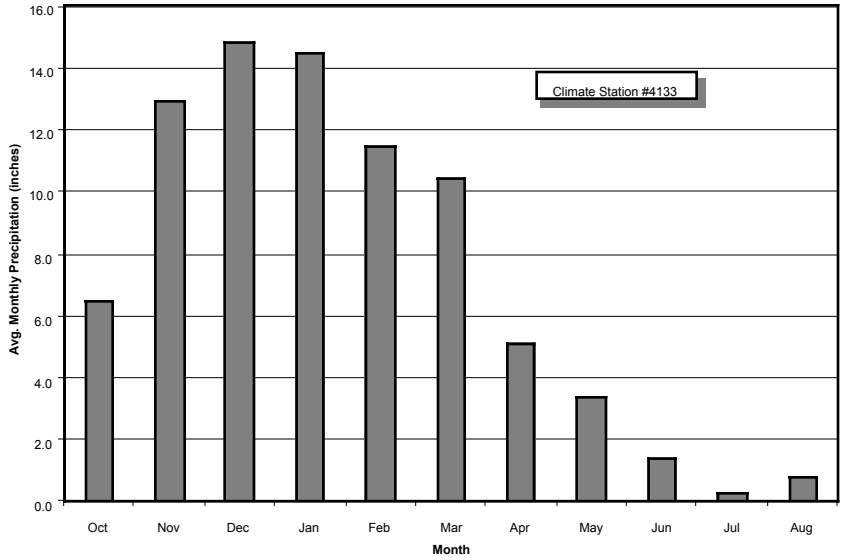
Soil: Soils range from deep, very gravelly silt loam to very gravelly loam.

Erosion: Natural erosion rate is high due to steep terrain, high winter precipitation, and high uplift rates, and weak rock.

Climate characterization: Southwest Interior Oregon is typically drier and colder than the Northwest interior because much of the area lies in a rain shadow sheltered from the Pacific Ocean by the Coastal Mountain Range. Storms of subtropical origin generate heavy rains and peak flows in this area.

Mean annual precipitation: 70 to 130 inches; up to 165 inches in higher elevations.

Precipitation Pattern: Majority of precipitation in Southwest Interior Oregon occurs in the winter months of November through March; in some areas as much as 75% of the annual precipitation occurs in the winter season. Occasional summer thunderstorms cause precipitation during the warmer months.



2-year 24 hour precipitation: 6.0 to 6.5 inches.

Temperature

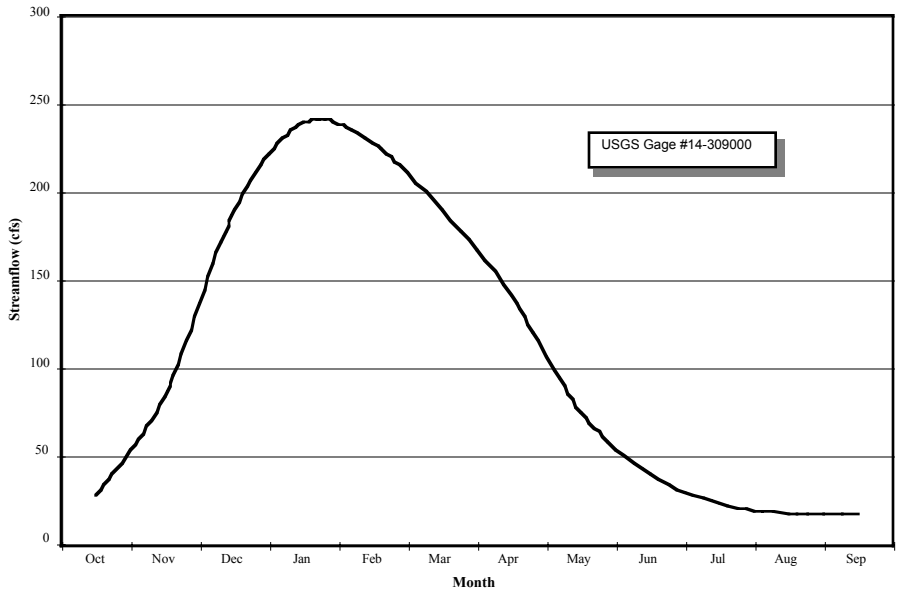
	January			*July*		
°F	**50**	**38**	**39**	**76**	**50**	**69**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall occurs every winter in Southwest Oregon (20-30 inches a year in the valleys), although much of it melts within a few days and a snowpack seldom develops. Substantially more snow is reported at higher elevations and on north-facing slopes (e.g. Onion and Squaw peaks in the Klamath Mountains).

Hydrologic basin characteristics: Basins are oriented toward the west, draining into the Pacific Ocean or into larger streams that drain into the ocean.

Runoff patterns: Average monthly streamflows are the highest in the winter.*

* as represented by a stream gage from ecoregion 78e because no daily values were available for this ecoregion.



Peak flow generating process: Rainstorms or rain-on-snow events. The lowland watersheds experience peak flows generated primarily from rainstorms. Peak flows in the upper basins in the Coastal Siskiyous may have some snowmelt component.

Peak flow magnitude (2-year recurrence interval): 75 cfs/mi^2 to 200 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	gravel	cobbles / gravel	cobbles
	higher gradient	gravel / cobbles	cobbles	cobble / bedrock
Beaver dams	lower gradient	some year-round	some year-round	none
	higher gradient	few in summer	few in summer	none

Natural Disturbances: Both lightning-caused and human-caused fires were common in this region in the past. Streamside areas sometimes escaped the fires. (Here, fires are less common than in the inland Siskiyous because of the coastal "wet" influence and cloud cover. Lightning has a little more difficult time igniting fuels. But when fires do occur, they are more severe and of greater extent than those further inland). Past fires varied in severity, depending on specific site conditions. Fire suppression has reduced the frequency of wildfires.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Mixed (Sitka spruce, western hemlock, alder, myrtle, and bigleaf maple). **Size**: Small **Density**: Dense	25-100'	**Type**: Mixed (Douglas-fir, Port Orford cedar, and Jeffrey pine, and tanoak) **Size**: Large **Density**: Dense	As you go perpendicular from the stream, the amount of hardwoods decrease and conifers increase.
Semi-constrained	0-50'	**Type**: Mixed (Sitka spruce, western hemlock, alder, myrtle, and bigleaf maple). **Size**: Small **Density**: Dense	50-100'	**Type**: Mixed (Douglas-fir, Port Orford cedar, and Jeffrey pine, and tanoak) **Size**: Large **Density**: Dense	As you go perpendicular from the stream, the amount of hardwoods decrease and conifers increase.
Un-constrained	0-75'	**Type**: Mixed (Sitka spruce, western hemlock, alder, myrtle, and bigleaf maple). **Size**: Small **Density**: Dense	75-100'	**Type**: Mixed (Douglas-fir, Port Orford cedar, and Jeffrey pine, and tanoak) **Size**: Large **Density**: Dense	As you go perpendicular from the stream, the amount of hardwoods decrease and conifers increase.

Current Streamside Conifer Regeneration: Common except where tanoak becomes established. Here, tanoak can inhibit conifer regeneration significantly, inland it is much less competitive.

Upland vegetation: Douglas-fir, white fir, western hemlock, and tanoak forests. Potential natural vegetation also includes Jeffrey pine and some Port Orford cedar.

Historic Crown Closure: Greater than 30% historic crown closure. Fire suppression increases density of forest stands.

Land Use: Forestry, recreation, rural residential development, some mining. Much of this area is managed by the National Forest so commercial forestry activities have been greatly curtailed in recent years.

Other:

Klamath River Ridges (78g)

Location: Most southern extent of Cascade Mountains within Oregon.

Drainage Basins: Klamath Basin

Geology: Underlain by basalt flows or granitic rock.

Topography: Highly dissected mountains. Stream channels are usually high gradient; many are intermittent. Waterfalls occur. Stream density is moderate, valleys are narrow.

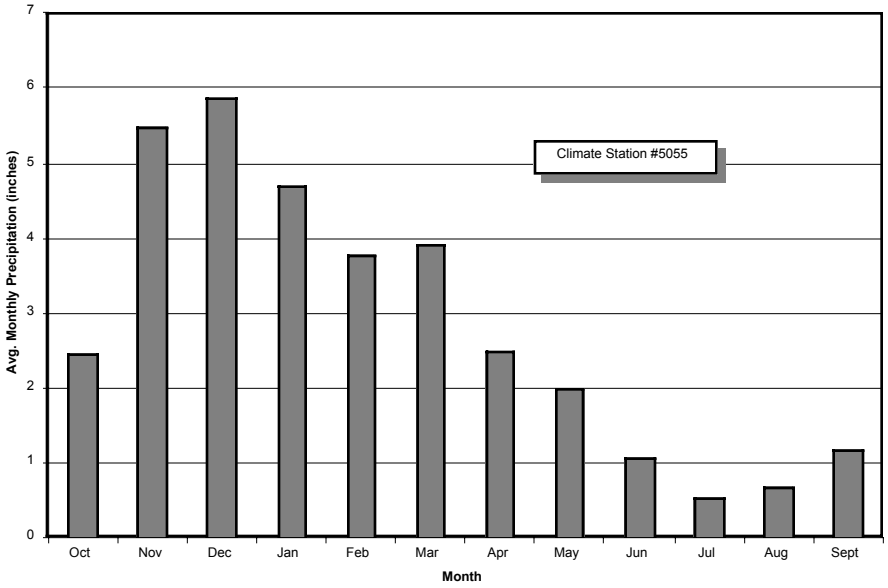
Soil: Soils range from loam to very cobbly loam.

Erosion: Natural erosion rate is low due to low precipitation and competent rock.

Climate characterization: Southwest Interior Oregon is typically drier and colder than the Northwest interior because much of the area lies in a rain shadow sheltered from the Pacific Ocean by the Coastal Mountain Range. Storms of subtropical origin generate heavy rains and peak flows in this area.

Mean annual precipitation: 25 to 35 inches.

Precipitation Pattern: Majority of precipitation in Southwest Interior Oregon occurs in the winter months of November through March; in some areas as much as 75% of the annual precipitation occurs in the winter season. Occasional summer thunderstorms cause precipitation during the warmer months.*



* as represented by climate data from ecoregion 78b because no climate data were available for this ecoregion.

2-year 24 hour precipitation: 2.0 to 3.0 inches.

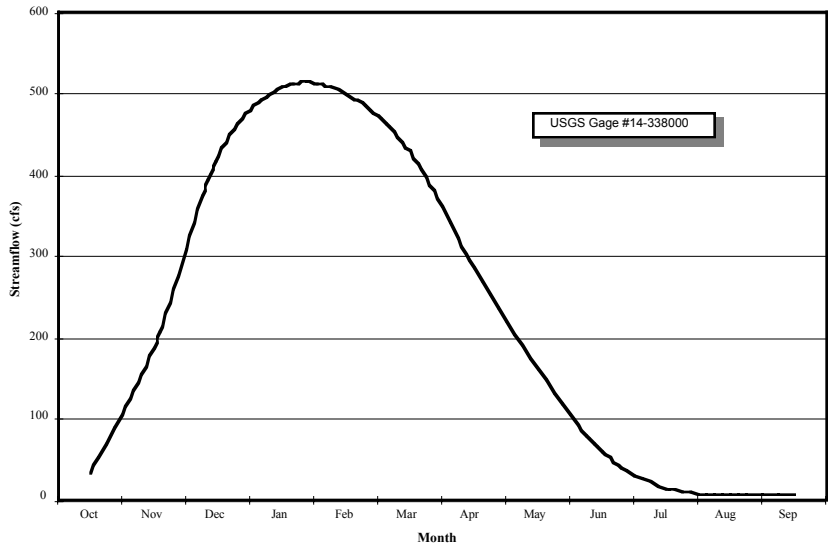
Temperature

	January			*July*		
°F	**42**	**24**	**39**	**88**	**49**	**69**
	Maximum	Minimum	Mean	Maximum	Minimum	Mean

Snowpack development: Snowfall occurs every winter in Southwest Oregon (20-30 inches a year in the valleys), although much of it melts within a few days and a snowpack seldom develops. Substantially more snow is reported at higher elevations and on north-facing slopes.

Hydrologic basin characteristics: Basins are oriented primarily toward the south, draining into tributaries of the Klamath River through California eventually to the Pacific Ocean.

Runoff patterns: Average monthly streamflows are the highest in the winter.*



* as represented by a stream gage from ecoregion 78b because no daily values were available for this ecoregion.

Peak flow generating process: Rainstorms or rain-on-snow events. The lowland watersheds experience peak flows generated primarily from rainstorms. Peak flows in the upper basins with mean basin elevations above 3300 feet generally have some snowmelt component.

Peak flow magnitude (2-year recurrence interval): 25 cfs/mi^2 to 50 cfs/mi^2

Stream channels:		*Small*	*Medium*	*Large*
Substrate	lower gradient	gravel / fines	gravel	gravel / cobble
	higher gradient	gravel	gravel / cobble	cobble
Beaver dams	lower gradient	some year-round	some year-round	none
	higher gradient	few in summer	few in summer	none

Natural Disturbances: Both lightning-caused and human-caused fires were common in this region in the past. In the high elevation ridges, although lightning is a frequent event, fires are less common than the "inland" sites. Lower fuel production, lower temperature, higher orographic precipitation, and since lightning is often associated with rain, keeps fire less frequent. Streamside areas sometimes escaped the fires. Streams and headwater areas are more exposed, and less developed as drainages, and more like adjacent upland areas. Past fires varied in severity, depending on specific site conditions. Fire suppression has reduced the frequency of wildfires.

Potential streamside vegetation:

CHT group	RA1 zone	RA1 description	RA2 width	RA2 description	Other considerations
Constrained	0-25'	**Type**: Shrubs (Vine maple, Douglas-maple, thin-leaved huckleberry and grouse huckleberry) and grass. **Size**: N/A **Density**: N/A	25-100'	**Type**: Conifers (Douglas-fir, true fir, and ponderosa pine) **Size**: Large **Density**: Dense	
Semi-constrained	0-50'	**Type**: Shrubs (Vine maple, Douglas-maple, thin-leaved huckleberry and grouse huckleberry) and grass. **Size**: N/A **Density**: N/A	50-100'	**Type**: Conifers (Douglas-fir, true fir, and ponderosa pine) **Size**: Large **Density**: Dense	
Un-constrained	0-75'	**Type**: Shrubs (thin-leaved huckleberry and grouse huckleberry) and grass. **Size**: N/A **Density**: N/A	75-100'	**Type**: Conifers (Douglas-fir, true fir, and ponderosa pine) **Size**: Large **Density**: Dense	There are probably very few unconstrained reaches.

Current Streamside Conifer Regeneration: Common except where shrubs or shallow soils limit.

Upland vegetation: Coniferous forests, woodlands, savannah and chaparral. Potential natural vegetation includes white fir, Shasta red fir and mountain hemlock at the highest elevations. Douglas-fir on the S. facing slopes with the barrens and chaparral at higher elevations and on north-facing slopes; and ponderosa pine, juniper and chaparral at lower elevations and on south-facing slopes.

Historic Crown Closure: A variety of crown closure types occur in this region. Coniferous forests and woodlands have typically greater than 30% crown closure. Savannah and chaparral exhibit less than 30% crown closure. Absence of fire increases forest, woodland, and savanna tree densities.

Land Use: Forestry, grazing, and recreation.

Other:

REFERENCES

Agee, J.K. 1993. Fire ecology of Pacific Northwest forests. Island Press, Covelo, CA. 493 pp.

Anderson, E.W., M.M. Borman, and W.C. Krueger. 1998. The Ecological Provinces of Oregon: A treatise on the basic ecological geography of the state. Oregon Agricultural Experiment Station. May 1998. 138p.

Atzet, T. 4/2000. Personal Communication. USDA Forest Service, Siskiyou National Forest.

Bates, R.L., and J.A. Jackson, 1984. Dictionary of geological terms. American Geological Institute, Anchor Books/Doubleday, New York, NY. 571 pp.

Benner, P. A. and J. R. Sedell. 1997. Upper Willamette River Landscape: A Historic Perspective. Chapter 2 in David Dunnette and Antonius Laenen, eds. River Quality, Dynamics and Restoration. CRC Press, Inc. New York.

Booser, J. 4/2000. Personal Communication. USDA Forest Service, Deschutes National Forest.

Bryce, Sandra A. and S.E. Clarke. 1996. Landscape-Level Ecological Regions: Linking State-Level Ecoregion Frameworks with Stream Habitat Classifications. Environmental Management 20(3):297-311.

Bryce, Sandra A., J.M. Omernik, and D.P. Larsen. 1999. Ecoregions: A Geographic Framework to Guide Risk Characterization and Ecosystem Management. Environmental Practice 1(3): 141-155.

Campbell, Alsie G. and J. F. Franklin. 1979. Riparan Vegetation in Oregon's Western Cascade Mountains: Composition, Biomass, and Autumn Phenology. Bulletin No. 14. Coniferous Forest Biome, U.S./International Biological Program. 90 pp.

Clarke, S.E., D. White, and A..L.Schaedel. 1991. Oregon, USA, Ecological Regions and Subregions for Water Quality Management. Environmental Management. 15(6):847-856.

Clarke, S.E. and S.A. Bryce, eds. 1997. Hierarchical subdivisions of the Columbia Plateau and Blue Mountains Ecoregions, Oregon and Washington. Gen. Tech. Rep. PNW-GTR-395. U.S.F.S. Pacific Northwest Research Station, Portland, OR. 114 pp.

Cole, David N. (1982). Vegetation of Two Drainages in Eagle Cap Wilderness, Wallowa Mountains, Oregon. Research Paper INT-288. U.S.F.S. Intermountain Forest and Range Experiment Station, Ogden, UT.

Crowe, E. A. and R. R. Clausnitzer. 1997. Mid-Montane Wetland Plant Associations of the Malheur, Umatilla and Wallowa-Whitman National Forests. USDA Forest Service, Pacific Northwest Region, R6-NR-ECOL-TP-22-97.

Daly, Christopher and G. Taylor, August 1998. "1961-1990 Monthly Precipitation Maps for Conterminous U.S." as map shapefile from http://www.ftw.nrcs.usda.gov/prism/prismdata_state.html

Defenders of Wildlife. 1998. Oregon's Living Landscape: Strategies and Opportunities to Conserve Biodiversity. 218p.

Diaz, N. M. and T. K. Mellen. 1996. Riparian Ecological Types, Gifford Pinchot and Mt. Hood National Forests, Columbia River Gorge National Scenic Area. USDA Forest Service, Pacific Northwest Region, R6-NR-TP-10-96.

EarthInfo, CD^2, 1996. "USGS Peak Values" Boulder, CO.

Franklin, J.L. & C.T. Dyrness, 1988 . Natural vegetation of Oregon and Washington. Oregon State University Press, Corvallis OR.

Frenkel, R. E. and E. R. Heinitz. 1987. Composition and structure of Oregon ash (*Fraxinus latifolia*) forest in William L. Finley National Wildlife Refuge, Oregon. Northwest Science 61(4):203-212.

Greenberg, J. and Karen Welch, 1998. "Hydrologic Process Identification for Western Oregon". Prepared for Boise Cascade Corporation.

Griffith, G.E., J.M. Omernik, and A.J. Woods. 1999. Ecoregions, watersheds, basins, and HUCs: How state and federal agencies frame water quality. Journal of soil and water conservation. 54(4):666-677.

Hall, R. 1/3/2000. Personal Communication, Ecologist, Burns District Office, Bureau of Land Management, Burns Oregon. (541)573-4400.

Harris, D.D., Larry Hubbard, and Lawrence Hubbard, 1979. "Magnitude and Frequency of Floods in Western Oregon", US Geological Survey, Open File Report 79-553.

Harris, D.D., Lawrence Hubbard, 1983. "Magnitude and Frequency of Floods in Eastern Oregon", US Geological Survey, Open File Report 82-4078.

Hemstrom, M. A., and S. E. Logan. 1986. Plant Association and Management Guide, Siuslaw National Forest. USDA Forest Service, Pacific Northwest Region, R6-ECOL-220-1986b.

Hughes, Robert M., S.A. Heiskary, W.J. Matthews, and C.O.Yoder. 1994. Use of Ecoregions in Biological Monitoring. In: Biological Monitoring of Aquatic Systems. S.L. Loeb and A. Spacie eds. Lewis Publishers. Boca Raton, Fl. Pp.125-151.

Hughes, R.M. and J. Omernik. 1981. Use and Misues of the Terms Watershed and Stream Order. American Fisheries Society Warmwater Streams Symposium pp. 320-326.

Hughes, R.M., E.Rexstad, and C.E.Bond. 1987. The Relationship of Aquatic Ecoregions, River Basins and Physiographic Provinces to the Icthyogeographic Regions of Oregon. Copeia. 2: 423-432.

Johannessen, Carl, et. al. 1970. The Vegetation of the Willamette Valley. Annals of the Association of American Geographers 61:286-302.

Kovalchik, B. L., W. E. Hopkins, and S. J. Brunsfeld. 1988. Major Indicator Shrubs and Herbs in Riparian Zones on National Forests of Central Oregon. USDA Forest Service, Pacific Northwest Region, R6-ECOL-TP-005-88.

Kovalchik, B. L. 1987. Riparian Zone Associations; Deschutes, Ochoco, Fremont and Winema National Forests. USDA Forest Service, Pacific Northwest Region, R6-ECOL-TP-279-87.

Manning, M. E. and W. G. Padgett. 1995. Riparian Community Type Classification for Humboldt and Toiyabe National Forests, Nevada and Eastern California. USDA Forest Service, Intermountain Region, R4-ECOL-95-01.

McCain, C. 1998. Introduction to draft descriptions: Siuslaw National Forest Common Streamside Communities. Unpublished report.

Meehan, W.H., ed., 1991. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society special publication 19, Bethesda, MD. 751 pp.

NOAA Atlas 2, volume X, 1973. "Isopluvials of 2-Yr 24-Hr Precipitation in Tenths of an Inch." Prepared for U.S. Department of Agriculture, Soil Conservation Service, Engineering Division.

Omernik, J.M. and G. E. Griffith. 1991. Ecological regions versus hydrologic units: Frameworks for managing water quality. Journal of Soil and Water Conservation. 46(5):334-340.

Omernik, J.M. and A.L. Gallant, 1986. Ecoregions of the Pacific Northwest. United States Environmental Protection Agency, Corvallis, OR. EPA/600/3-86/033.

Omernik, J., 1994. Ecoregions: a spatial framework for environmental management. Chapter 5 in W.S. Davis and T.P. Simon, eds. Biological assessment and criteria: tools for water resource planning and decision making, Lewis Publishers, Boca Raton, FL.

Oregon Natural Heritage Program. 2001. Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Naural Heritage Program. Portland, OR 94pp.

Oregon State Climate Center, Oregon State University, 2000, at http://www.ocs.orst.edu.

Orr, E.L. and W.N. Orr, 1996. Geology of the Pacific Northwest. McGraw-Hill, New York, NY. 408 pp.

Pater, D.E., S.A. Bryce, T.D. Thorson, J. Kagan, C. Chappell, J. Omernik, S.H. Azevedo, and A.J. Woods, 1998. Ecoregions of Western Washington and Oregon. Map. United States Environmental Protection Agency, and other state and federal co-operators, Corvallis, OR.

Powell, D. 4/2000. Personal Communication. USDA Forest Service, Umatilla National Forest.

Rosgen, D., 1996. Applied river morphology. Wildland Hydrology, Pagosa Springs, CO.

Reitman, R. 4/2000. Personal Communication. USDA Forest Service, Winema National Forest.

Rock, R. and M. Simpson. 4/2000. Personal Communication. USDA Forest Service, Ochoco National Forest.

Rockwell, V. 4/2000. Personal Communication. USDA Forest Service, Wallowa-Whitman National Forest.

Thiele, S., D.E. Pater, T.D. Thorson, J. Kagan, C. Chappel;, and J. Omernik. Level III and IV ecoregions of Oregon and Washington. Map. United States Environmental Protection Agency, and other state and federal co-operators, Corvallis, OR.

Watershed Professionals Network, 2001. "Hydrologic Process Identification for Eastern Oregon." Prepared for Oregon Watershed Enhancement Board.

White, D. 4/2000. Personal Communication. USDA Forest Service, Umpqua National Forest.

Whittier, T.R., R.M. Hughes and D.P. Larsen. 1988. Correspondence Between Ecoregions and Spatial Patterns in Streams Ecosystems in Oregon. Can. J. Fish Aquatic Sci. 45:1264-1278.

Wiberg, c. and Green, S. 1972. Blackwater Island Research Natural Area, supplement No. 11 to: Franklin, J. F., F. C. Hall, C. T. Dyrness and C. Maser. Federal research natural areas in Oregon and Washington: A guidebook for scientists and educators. USDA Forest Service PNW Forest and Range Experiment Station. 20 p.

Williams, R. 4/2000. Personal Communication. USDA Forest Service, Fremont National Forest.

Wilson, J. 4/2000. Personal Communication. Oregon State University.

Wickramarantne, S. N. 1983. Vegetation changes in the Willamette River greenway, Benton and Linn Counties, Oregon: 1972 - 1981. Thesis. Oregon State University, Corvallis, Or. 118 p.

ADDENDUM 1. PERCENTAGE WATERSHED AREA BY ECOREGION TYPE

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
Black Rock Desert Basin: Upper Quinn Sub-Basin	
1604020102	12a (100%)
1604020108	12a (100%)
1604020109	12a (100%)
1604020110	12a (100%)
1604020111	12a (100%)
Black Rock Desert Basin: Thousand-Virgin Sub-Basin	
1604020508	12a (100%)
1604020509	12a (100%)
1604020510	12a (100%)
1604020511	12a (100%)
Middle Snake-Boise Basin: Middle Snake-Succor Sub-Basin	
1705010301	12a (100%)
1705010320	12a (100%)
1705010321	12a (100%)
1705010322	12a (100%)
1705010323	12a (100%)
Middle Snake-Boise Basin: South Fork Owyhee Sub-Basin	
1705010524	12a (100%)
Middle Snake-Boise Basin: East Little Owyhee Sub-Basin	
1705010601	12a (100%)
1705010608	12a (100%)
1705010609	12a (100%)
Middle Snake-Boise Basin: Middle Owyhee Sub-Basin	
1705010701	12a (100%)
1705010702	12a (100%)
1705010703	12a (100%)
1705010704	12a (100%)
1705010705	12a (100%)
1705010706	12a (100%)
1705010707	12a (100%)
1705010708	12a (100%)
1705010709	12a (100%)
1705010710	12a (100%)
1705010711	12a (100%)
1705010712	12a (100%)
1705010713	12a (100%)
1705010714	12a (100%)
1705010715	12a (100%)
1705010716	12a (100%)
Middle Snake-Boise Basin: Jordan Sub-Basin	
1705010801	12a (100%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1705010802	12a (100%)
1705010803	12a (100%)
1705010804	12a (100%)
1705010805	12a (100%)
1705010806	12a (100%)
1705010807	12a (100%)
1705010813	12a (100%)
1705010814	12a (100%)
Middle Snake-Boise Basin: Crooked-Rattlesnake Sub-Basin	
1705010901	12a (100%)
1705010902	12a (100%)
1705010903	12a (100%)
1705010904	12a (100%)
1705010905	12a (100%)
1705010906	12a (100%)
1705010907	12a (100%)
1705010908	12a (100%)
1705010909	12a (100%)
1705010910	12a (100%)
1705010911	12a (100%)
1705010912	12a (100%)
1705010913	12a (100%)
1705010914	12a (100%)
Middle Snake-Boise Basin: Lower Owyhee Sub-Basin	
1705011001	12a (100%)
1705011002	12a (100%)
1705011003	12a (100%)
1705011004	12a (100%)
1705011005	12a (100%)
1705011006	12a (100%)
1705011007	12a (100%)
1705011008	12a (100%)
1705011009	12a (100%)
1705011010	12a (100%)
1705011011	12a (100%)
1705011012	12a (100%)
1705011013	12a (100%)
1705011014	12a (100%)
1705011015	12a (100%)
1705011016	12a (100%)
1705011017	12a (100%)
1705011018	12a (100%)
1705011019	12a (100%)
1705011020	12a (100%)
1705011021	12a (100%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1705011022	12a (100%)
1705011023	12a (100%)
1705011024	12a (100%)
1705011025	12a (100%)
Middle Snake-Boise Basin: Middle Snake-Payette Sub-Basin	
1705011501	12a (100%)
1705011502	12a (100%)
1705011503	12a (100%)
Middle Snake-Boise Basin: Upper Malheur Sub-Basin	
1705011601	12a (100%)
1705011602	12a (100%)
1705011603	12a (100%)
1705011604	12a (100%)
1705011605	12a (100%)
1705011606	12a (100%)
1705011607	12a (100%)
1705011608	12a (100%)
1705011609	12a (100%)
1705011610	11i (4%), 12a(96%)
1705011611	12a (100%)
1705011612	11i (45%), 12a(55%)
1705011613	11h (39%), 11i(35%), 11k(2%), 12a(25%)
1705011614	11h (7%), 11i(66%), 12a(27%)
1705011615	11h (62%), 11i(28%), 12a(10%)
1705011616	11h (24%), 11i(56%), 12a(20%)
1705011617	11h (71%), 11i(1%), 11k(9%), 11l(5%), 11m(14%)
1705011618	11h (18%), 11i(49%), 12a(32%)
1705011619	11i (4%), 12a(96%)
1705011620	11i (53%), 12a(47%)
1705011621	11h (54%), 11i(20%), 11l(23%), 11m(3%)
1705011622	11d (0%), 11h(23%), 11i(63%), 11l(13%)
Middle Snake-Boise Basin: Lower Malheur Sub-Basin	
1705011701	12a (100%)
1705011702	12a (100%)
1705011703	12a (100%)
1705011704	12a (100%)
1705011705	12a (100%)
1705011706	12a (100%)
1705011707	12a (100%)
1705011708	12a (100%)
1705011709	12a (100%)
1705011710	12a (100%)
1705011711	12a (100%)
1705011712	12a (100%)
1705011713	12a (100%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
Middle Snake-Boise Basin: Bully Sub-Basin	
1705011801	12a (100%)
1705011802	11i (47%), 12a(53%)
1705011803	12a (100%)
1705011804	11i (24%), 12a(76%)
1705011805	11i (92%), 12a(8%)
1705011806	11i (54%), 12a(46%)
1705011807	11i (98%), 12a(2%)
1705011808	11i (55%), 12a(45%)
Middle Snake-Boise Basin: Willow Sub-Basin	
1705011901	12a (100%)
1705011902	11i (18%), 12a(82%)
1705011903	11i (59%), 12a(41%)
1705011904	11i (88%), 12a(12%)
1705011905	11i (99%), 12a(1%)
1705011906	11i (100%)
1705011907	11d (2%), 11i(98%)
1705011908	11d (12%), 11i(88%)
1705011909	11i (13%), 12a(87%)
1705011910	11i (100%)
Middle Snake-Boise Basin: Weiser Sub-Basin	
1705012401	12a (100%)
Middle Snake-Powder Basin: Brownlee Reservoir Sub-Basin	
1705020101	11d (1%), 11f(9%), 11g(74%), 11i(16%)
1705020106	11d (27%), 11i(73%)
1705020108	11d (6%), 11i(94%)
1705020109	11d (20%), 11i(80%)
1705020111	11i (42%), 12a(58%)
1705020112	12a (100%)
1705020114	11d (0%), 11e(8%), 11g(4%), 11i(85%), 11l(3%), 11m(0%)
1705020115	11e (21%), 11i(43%), 11l(13%), 11m(23%)
1705020116	11e (32%), 11i(24%), 11l(24%), 11m(20%)
1705020117	11e (51%), 11i(32%), 11l(10%), 11m(7%)
1705020118	11e (8%), 11f(48%), 11g(1%), 11i(5%), 11l(34%), 11m(4%)
1705020119	12a (100%)
Middle Snake-Powder Basin: Burnt Sub-Basin	
1705020201	11d (6%), 11i(84%), 12a(10%)
1705020202	11d (11%), 11i(89%)
1705020203	11d (1%), 11i(99%)
1705020204	11d (10%), 11i(90%)
1705020205	11d (10%), 11i(90%)
1705020206	11d (34%), 11i(66%)
1705020207	11d (34%), 11i(66%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1705020208	11d (24%), 11h(0%), 11i(68%), 11l(8%)
1705020209	11d (42%), 11i(37%), 11l(21%)
1705020210	11d (92%), 11i(2%), 11l(6%)
Middle Snake-Powder Basin: Powder Sub-Basin	
1705020301	11i (100%)
1705020302	11d (6%), 11i(94%)
1705020303	11d (21%), 11i(79%)
1705020304	11e (14%), 11i(86%)
1705020305	11i (100%)
1705020306	11i (100%)
1705020307	11d (25%), 11i(70%), 11k(5%)
1705020308	11d (35%), 11i(59%), 11k(0%), 11l(2%), 11m(3%)
1705020309	11d (73%), 11i(7%), 11k(8%), 11l(4%), 11m(7%)
1705020310	11d (51%), 11k(14%), 11l(23%), 11m(11%)
1705020311	11i (19%), 11k(81%)
1705020312	11d (15%), 11i(5%), 11k(60%), 11l(10%), 11m(10%)
1705020313	11d (22%), 11k(3%), 11l(55%), 11m(20%)
1705020314	11i (4%), 11k(30%), 11l(66%)
1705020315	11e (4%), 11i(92%), 11k(4%)
1705020316	11e (7%), 11i(46%), 11k(28%), 11l(19%)
1705020317	11e (50%), 11i(46%), 11l(4%)
1705020318	11e (25%), 11l(23%), 11m(52%)
1705020319	11e (63%), 11i(37%)
1705020320	11e (65%), 11i(30%), 11l(0%), 11m(5%)
1705020321	11d (0%), 11e(0%), 11i(100%)
Lower Snake Basin: Hells Canyon Sub-Basin	
1706010101	10f (100%)
1706010104	10f (65%), 11g(35%)
1706010105	10f (22%), 11f(5%), 11g(73%)
1706010106	11f (7%), 11g(93%)
1706010108	11f (22%), 11g(78%)
1706010110	10f (79%), 11f(21%)
Lower Snake Basin: Imnaha Sub-Basin	
1706010201	10f (94%), 11f(6%)
1706010202	10f (74%), 11f(26%), 11g(0%)
1706010203	10f (73%), 11f(26%), 11g(0%)
1706010204	10f (86%), 11f(14%), 11g(0%)
1706010205	10f (99%), 11f(1%)
1706010206	10f (39%), 11f(61%)
1706010207	11f (97%), 11g(0%), 11l(2%)
1706010208	11f (15%), 11l(27%), 11m(59%)
1706010209	10f (57%), 11f(11%), 11l(20%), 11m(12%)
1706010210	10f (24%), 11f(39%), 11l(26%), 11m(11%)
1706010211	10f (99%), 11f(1%)
Lower Snake Basin: Lower Snake-Asotin Sub-Basin	

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1706010304	10f (100%)
1706010305	10f (90%), 11f(10%)
Lower Snake Basin: Upper Grande Ronde Sub-Basin	
1706010401	11c (7%), 11e(3%), 11f(37%), 11k(52%), 11l(1%)
1706010402	11c (2%), 11e(20%), 11k(78%), 11l(1%)
1706010403	11e (27%), 11k(12%), 11l(61%)
1706010404	11e (19%), 11k(35%), 11l(46%)
1706010405	11c (32%), 11k(62%), 11l(6%)
1706010406	11e (28%), 11i(16%), 11k(32%), 11l(24%)
1706010407	11c (1%), 11e(11%), 11i(29%), 11k(43%), 11l(16%)
1706010408	11e (42%), 11i(7%), 11k(2%), 11l(41%), 11m(9%)
1706010409	11c (0%), 11e(0%), 11i(16%), 11k(62%), 11l(21%)
1706010410	11c (59%), 11l(41%)
1706010411	11c (26%), 11l(73%), 11m(1%)
1706010412	11c (61%), 11l(39%)
1706010413	11c (70%), 11l(30%)
1706010414	11c (100%)
1706010415	11c (70%), 11l(30%)
1706010416	11c (67%), 11l(33%)
1706010417	11c (73%), 11l(27%)
1706010418	11c (80%), 11l(20%)
1706010419	11c (59%), 11l(41%)
1706010420	11c (32%), 11k(58%), 11l(10%)
1706010421	11c (56%), 11k(6%), 11l(39%)
1706010422	11c (42%), 11k(8%), 11l(50%)
1706010423	11c (19%), 11f(51%), 11l(30%)
1706010424	11f (22%), 11l(78%)
Lower Snake Basin: Wallowa Sub-Basin	
1706010501	11e (3%), 11f(95%), 11k(2%)
1706010502	10f (22%), 11e(37%), 11f(41%)
1706010503	10f (29%), 11f(71%)
1706010504	10f (52%), 11f(48%)
1706010505	10f (92%), 11e(8%)
1706010506	10f (20%), 11e(20%), 11l(22%), 11m(39%)
1706010507	10f (57%), 11e(6%), 11f(2%), 11l(14%), 11m(21%)
1706010508	10f (89%), 11f(4%), 11l(6%), 11m(1%)
1706010509	10f (9%), 11e(13%), 11f(0%), 11l(18%), 11m(59%)
1706010510	11e (2%), 11l(27%), 11m(71%)
1706010511	11e (40%), 11l(53%), 11m(7%)
1706010512	11e (29%), 11l(19%), 11m(52%)
1706010513	11e (90%), 11l(8%), 11m(1%)
1706010514	11e (83%), 11k(6%), 11l(11%), 11m(1%)
Lower Snake Basin: Lower Grande Ronde Sub-Basin	
1706010601	10f (100%)
1706010602	10f (91%), 11f(9%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1706010603	10f (73%), 11f(27%)
1706010604	10f (90%), 11f(10%)
1706010605	10f (57%), 11f(43%)
1706010606	10f (93%), 11f(7%)
1706010607	10f (45%), 11f(55%)
1706010608	10f (20%), 11f(80%)
1706010609	10f (18%), 11f(82%)
1706010610	10f (100%)
1706010611	10f (61%), 11f(39%)
1706010612	10f (100%)
1706010613	10f (100%), 11f(0%)
1706010614	10f (59%), 11f(41%)
1706010615	10f (47%), 11f(53%)
1706010616	10f (30%), 11f(70%)
1706010617	10f (21%), 11f(79%)
1706010618	10f (13%), 11f(86%), 11l(1%)
1706010619	11f (61%), 11l(39%)
1706010620	10f (6%), 11f(93%), 11l(1%)
1706010621	11f (79%), 11l(20%), 11m(1%)
1706010622	11f (100%)
1706010623	10f (0%), 11f(100%)
Middle Columbia Basin: Middle Columbia-Lake Wall Sub-Basin	
1707010101	10e (43%), 10g(57%)
1707010102	10c (16%), 10e(9%), 10g(74%)
1707010103	10c (1%), 10e(99%)
1707010104	10e (100%)
1707010105	10e (100%)
1707010106	10c (79%), 10e(21%)
1707010107	10c (24%), 10e(76%)
1707010108	10c (32%), 10e(68%)
1707010109	10e (100%)
1707010110	10c (2%), 10e(98%)
1707010111	10c (33%), 10e(67%)
1707010112	10c (11%), 10e(89%)
Middle Columbia Basin: Walla Walla Sub-Basin	
1707010201	10e (84%), 10g(16%)
1707010204	10c (15%), 10e(85%)
1707010217	11c (32%), 11f(0%), 11l(68%), 11m(0%)
1707010218	10i (72%), 11c(0%), 11l(28%)
1707010219	10c (1%), 10e(11%), 10i(56%), 11c(6%), 11l(26%)
1707010220	10i (20%), 11c(30%), 11f(0%), 11l(50%)
1707010221	10c (19%), 10e(19%), 10g(9%), 10i(28%), 11c(21%), 11l(5%)
1707010222	10e (1%), 10g(99%)
Middle Columbia Basin: Umatilla Sub-Basin	

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1707010301	10c (2%), 10e(98%)
1707010302	10c (87%), 10e(13%), 10g(0%)
1707010303	10c (59%), 10e(41%)
1707010304	10c (10%), 10g(12%), 10i(56%), 11c(18%), 11l(5%)
1707010305	10c (43%), 10g(6%), 10i(51%)
1707010306	10c (91%), 10i(9%)
1707010307	10c (50%), 10e(50%)
1707010308	10c (53%), 10e(47%)
1707010309	10c (79%), 10i(14%), 11c(7%)
1707010310	10c (51%), 10i(16%), 11c(33%)
1707010311	10i (2%), 11c(68%), 11l(30%)
1707010312	11c (40%), 11l(60%)
1707010313	11c (21%), 11l(79%)
1707010314	11c (93%), 11l(7%)
1707010315	11c (68%), 11l(32%)
1707010316	11c (64%), 11l(36%)
1707010317	10c (1%), 11c(99%)
1707010318	11c (87%), 11l(13%)
1707010319	11c (100%)
1707010320	10c (94%), 11c(6%)
1707010321	10c (77%), 11c(23%)
1707010322	10c (3%), 11c(86%), 11l(11%)
1707010323	10c (92%), 11c(8%)
1707010324	10c (58%), 11c(34%), 11l(8%)
1707010325	10c (100%), 11c(0%)
1707010326	10c (100%)
1707010327	10c (76%), 10e(24%)
1707010328	10c (81%), 11c(19%), 11k(1%)
1707010329	10c (69%), 11c(28%), 11l(2%)
1707010330	10c (100%)
1707010331	10c (100%)
1707010332	10c (98%), 11c(2%)
1707010333	10c (99%), 10e(1%)
1707010334	10c (100%)
1707010335	10c (31%), 10e(69%)
1707010336	10c (58%), 10e(42%)
1707010337	10c (2%), 10e(98%)
Middle Columbia Basin: Willow Sub-Basin	
1707010401	10c (0%), 10e(100%)
1707010402	10c (55%), 10e(45%)
1707010403	10c (100%)
1707010404	10c (100%)
1707010405	10c (100%), 11c(0%)
1707010406	10c (73%), 11c(16%), 11l(11%)
1707010407	10c (54%), 11b(4%), 11c(36%), 11l(5%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1707010408	10c (100%)
1707010409	10c (100%)
1707010410	10c (100%)
1707010411	10c (100%)
1707010412	10c (77%), 10e(23%)
1707010413	10c (64%), 10e(36%)
Middle Columbia Basin: Middle Columbia-Hood Sub-Basin	
1707010501 (Hood River East Fork)	4a (3%), 4c(53%), 4d(11%), 9c(33%)
1707010502 (Hood River Middle Fork)	4b (41%), 4c(28%), 4d(15%), 9c(16%)
1707010503 (Hood River W. Fork)	4a (21%), 4b(67%), 4c(6%), 4d(3%), 9c(2%)
1707010504 (Columbia Gorge Tribs E.)	4a (61%), 4b(36%), 9c(3%)
1707010505 (Hood River Main Stem Tribs)	4a (14%), 4b(3%), 9c(83%)
1707010506 (Mill Creek)	10e (13%), 4c(4%), 9b(10%), 9c(73%)
1707010507 (Five Mile Creek)	10c (15%), 10e(28%), 4c(3%), 9b(14%), 9c(41%)
1707010508 (Spanish Hollow Creek)	10c (79%), 10e(21%), 10k(0%)
1707010509 (Fifteen Mile Creek)	10c (58%), 10e(13%), 10k(0%), 4c(2%), 9b(8%), 9c(19%)
John Day Basin: Upper John Day Sub-Basin	
1707020101	11a (81%), 11b(19%)
1707020102	11a (87%), 11b(13%)
1707020103	11a (74%), 11b(25%), 11l(2%)
1707020104	11a (44%), 11b(41%), 11l(15%)
1707020105	11a (42%), 11b(41%), 11l(17%)
1707020106	11a (73%), 11b(25%), 11l(2%)
1707020107	11a (75%), 11b(4%), 11d(15%), 11l(6%)
1707020108	11a (43%), 11b(41%), 11d(1%), 11h(6%), 11l(8%)
1707020109	11a (32%), 11d(43%), 11h(23%), 11l(3%)
1707020110	11a (41%), 11b(22%), 11h(37%)
1707020111	11a (35%), 11h(62%), 11i(3%)
1707020112	11a (54%), 11b(19%), 11d(26%), 11l(1%)
1707020113	11a (64%), 11b(12%), 11d(24%)
1707020114	11a (28%), 11b(71%), 11l(1%)
1707020115	11a (59%), 11d(41%)
1707020116	11a (4%), 11d(87%), 11h(1%), 11k(0%), 11m(8%)
1707020117	11a (48%), 11b(12%), 11d(29%), 11m(11%)
1707020118	11a (43%), 11b(16%), 11d(24%), 11l(9%), 11m(8%)
1707020119	11a (24%), 11d(37%), 11l(33%), 11m(7%)
John Day Basin: North Fork John Day Sub-Basin	
1707020201	11a (99%), 11b(1%)
1707020202	11a (47%), 11b(53%)
1707020203	11b (100%)
1707020204	11a (13%), 11b(55%), 11c(26%), 11l(6%)
1707020206	11a (15%), 11b(41%), 11c(25%), 11l(18%)
1707020207	11b (21%), 11c(34%), 11l(44%)
1707020208	11b (17%), 11c(82%), 11l(1%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1707020209	11a (1%), 11b(65%), 11c(34%)
1707020210	11b (28%), 11c(43%), 11k(29%)
1707020211	11b (7%), 11c(73%), 11l(20%)
1707020212	11c (48%), 11k(46%), 11l(6%)
1707020213	11c (33%), 11k(35%), 11l(32%)
1707020214	11c (88%), 11l(12%)
1707020215	11c (25%), 11k(11%), 11l(64%)
1707020216	11c (53%), 11k(47%), 11l(0%)
1707020217	11c (20%), 11k(13%), 11l(66%)
1707020218	11b (51%), 11c(11%), 11d(8%), 11k(3%), 11l(27%)
1707020219	11d (14%), 11l(86%)
1707020220	11d (23%), 11l(73%), 11m(4%)
1707020221	11d (6%), 11l(87%), 11m(8%)
1707020222	11d (11%), 11l(84%), 11m(5%)
1707020223	11l (81%), 11m(19%)
1707020224	11b (65%), 11l(35%)
1707020225	11b (93%), 11l(7%)
1707020226	11a (76%), 11b(24%)
1707020227	11a (49%), 11b(49%), 11l(2%)
1707020228	11a (21%), 11b(79%)
1707020229	11a (87%), 11b(13%)
1707020230	11a (46%), 11b(54%)
John Day Basin: Middle Fork John Day Sub-Basin	
1707020301	11a (76%), 11b(24%)
1707020302	11a (52%), 11b(48%)
1707020303	11a (21%), 11b(48%), 11d(3%), 11l(27%), 11m(2%)
1707020304	11a (1%), 11b(71%), 11d(13%), 11l(11%), 11m(4%)
1707020305	11b (23%), 11d(51%), 11l(21%), 11m(5%)
1707020306	11d (87%), 11l(13%)
1707020307	11d (44%), 11l(56%)
1707020308	11b (93%), 11l(7%)
1707020309	11a (94%), 11b(6%)
1707020310	11a (31%), 11b(49%), 11l(20%)
1707020311	11a (88%), 11b(12%)
John Day Basin: Lower John Day Sub-Basin	
1707020401	10c (48%), 10e(51%), 10k(1%)
1707020402	10c (45%), 10e(32%), 10k(24%)
1707020403	10c (88%), 10k(12%)
1707020404	10c (62%), 10e(4%), 10k(34%)
1707020405	10c (76%), 10k(24%)
1707020406	10c (69%), 10k(31%)
1707020407	10c (64%), 10k(36%)
1707020408	10c (42%), 10k(58%)
1707020409	10c (78%), 10k(22%)
1707020410	10c (30%), 10k(70%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1707020411	10c (41%), 10k(59%)
1707020412	10c (82%), 10k(0%), 11a(0%), 11b(18%)
1707020413	10c (45%), 10k(15%), 11b(40%), 11c(0%)
1707020414	10c (47%), 10k(5%), 11b(48%)
1707020415	10c (25%), 10k(12%), 11b(64%)
1707020416	10k (12%), 11a(88%)
1707020417	10c (42%), 10k(25%), 11a(33%)
1707020418	10c (2%), 10k(2%), 11a(62%), 11b(34%)
1707020419	11a (93%), 11b(7%)
1707020420	11a (100%)
1707020421	11a (100%)
1707020422	11a (74%), 11b(26%)
1707020423	11a (42%), 11b(58%)
1707020424	11a (77%), 11b(23%)
1707020425	11a (57%), 11b(43%)
1707020426	11a (86%), 11b(14%)
1707020427	11a (74%), 11b(26%)
1707020428	11a (78%), 11b(22%)
1707020429	11a (95%), 11b(5%)
1707020430	11a (75%), 11b(19%), 11l(6%)
1707020431	11a (60%), 11b(33%), 11l(7%)
1707020432	11a (84%), 11b(16%)
1707020433	11a (100%)
1707020434	10c (32%), 10k(66%), 11a(2%)
1707020435	10c (57%), 10k(43%)
1707020436	10c (74%), 10k(26%)
1707020437	10c (100%)
1707020438	10c (94%), 10e(0%), 10k(6%)
Deschutes River Basin: Upper Deschutes Sub-Basin	
1707030101 (Upper Middle Metolius)	12a (88%), 9d(12%)
1707030102 (Squa Creek)	12a (72%), 9b(1%), 9d(26%)
1707030103 (Upper Three Creek)	12a (100%)
1707030104	12a (47%), 4c(3%), 9d(50%)
1707030105 (Tumalo Creek)	12a (2%), 4c(30%), 4d(11%), 9d(57%)
1707030106 (Lower Deschutes)	4c (6%), 4d(2%), 9d(28%), 9e(59%), 9f(5%)
1707030107 (Upper Deschutes)	9e (51%), 9f(49%)
1707030108 (Middle Deschutes)	4c (40%), 4d(1%), 9e(34%), 9f(24%)
1707030109 (Upper Deschutes)	4c (57%), 4d(5%), 9e(20%), 9f(18%)
1707030110 (Elk Lake (Sparks))	4c (79%), 4d(21%)
1707030111 (Three Creek)	12a (10%), 4c(17%), 4d(11%), 9d(61%)
1707030112 (Indian Ford Creek)	12a (0%), 4c(14%), 4d(12%), 9b(2%), 9d(72%)
1707030113 (Metolius Upper)	4c (46%), 4d(5%), 9b(1%), 9d(48%)
1707030114 (Metolius Lower)	4c (47%), 4d(11%), 9b(4%), 9d(38%)
1707030115 (Upper Metolius)	12a (1%), 4c(17%), 4d(4%), 9b(8%), 9d(70%)
1707030116 (Metolius Middle)	12a (5%), 4c(1%), 9b(30%), 9d(64%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
Deschutes River Basin: Little Deschutes Sub-Basin	
1707030201 (Paulina Lake)	4c (15%), 9e(52%), 9f(33%)
1707030202 (Lower Little Deschutes)	4c (2%), 9e(64%), 9f(34%)
1707030203 (Lower Little Deschutes)	9e (49%), 9f(51%)
1707030204 (Lower Little Deschutes River)	9e (79%), 9f(21%)
1707030205 (Crescent Creek)	4c (48%), 4d(3%), 4e(5%), 9e(38%), 9f(6%)
1707030206 (Upper Little Deschutes)	4e (18%), 9e(33%), 9f(49%)
1707030207 (Middle Little Deschutes River)	9e (43%), 9f(57%)
Deschutes River Basin: Beaver-South Fork Sub-Basin	
1707030301	11a (94%), 11b(6%)
1707030302	11a (91%), 11b(9%)
1707030303	11a (31%), 11b(68%), 11l(1%)
1707030304	11a (86%), 11b(14%)
1707030305	11a (44%), 11b(53%), 11l(3%)
1707030306	11a (82%), 11b(4%), 11h(14%)
1707030307	11a (99%), 11h(1%)
1707030308	11a (100%)
1707030309	11a (98%), 12a(2%)
1707030310	11a (95%), 11h(5%)
1707030311	11a (63%), 12a(37%)
1707030312	11a (29%), 12a(71%)
1707030313	11a (37%), 11h(4%), 12a(60%)
1707030314	12a (100%)
1707030315	12a (100%)
1707030316	11a (10%), 12a(90%)
1707030317	11a (95%), 12a(5%)
Deschutes River Basin: Upper Crooked Sub-Basin	
1707030401	11a (91%), 11b(3%), 12a(7%)
1707030402	11a (75%), 11b(25%)
1707030403	11a (50%), 11b(50%)
1707030404	11a (64%), 11b(36%)
1707030405	11a (58%), 11b(42%)
1707030406	11a (1%), 11b(70%), 11k(22%), 11l(8%)
1707030407	11b (97%), 11k(3%)
1707030408	11a (2%), 11b(90%), 11l(8%)
1707030409	11a (75%), 11b(25%)
1707030410	11a (100%)
1707030411	11a (98%), 11b(2%)
1707030412	11a (81%), 11b(19%)
1707030413	11a (43%), 11b(57%)
1707030414	11a (50%), 11b(50%)
1707030415	11a (95%), 11b(2%), 12a(2%)
1707030416	11a (96%), 11b(4%), 12a(0%)
Deschutes River Basin: Lower Crooked Sub-Basin	
1707030501	11a (25%), 12a(75%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1707030504	11a (24%), 11b(6%), 12a(70%)
1707030505	11a (32%), 11b(2%), 12a(65%)
1707030506	11a (20%), 11b(73%), 11l(2%), 12a(5%)
1707030507	11a (12%), 11b(80%), 11l(8%)
1707030508	11a (73%), 11b(23%), 12a(3%)
1707030509	11a (2%), 11b(98%), 11l(0%)
1707030510	11a (3%), 11b(97%), 11l(0%)
1707030511	11a (0%), 12a(100%)
1707030512	12a (100%)
1707030513	12a (90%), 4c(0%), 9e(9%)
1707030514	11a (20%), 12a(80%)
1707030515	11a (9%), 12a(82%), 9e(8%)
1707030516	11a (40%), 12a(60%)
1707030517	12a (13%), 4c(1%), 9e(86%)
1707030518	12a (74%), 9e(26%)
1707030519	4c (2%), 9e(98%)
1707030520	12a (36%), 4c(4%), 9d(29%), 9e(31%)
1707030521	11a (0%), 12a(100%)
Deschutes River Basin: Lower Deschutes Sub-Basin	
1707030601	10c (51%), 10e(3%), 10k(47%)
1707030602	10c (52%), 10k(48%)
1707030603	10c (69%), 10k(31%)
1707030604	10c (62%), 10k(38%)
1707030605	10c (94%), 10k(6%)
1707030606	10c (95%), 10k(5%)
1707030607	10c (78%), 10k(22%)
1707030608	10c (91%), 10k(9%)
1707030609	10c (27%), 10k(40%), 11a(34%)
1707030610	10c (5%), 10k(0%), 11a(65%), 12a(29%)
1707030611	11a (0%), 12a(92%), 9d(8%)
1707030612	11a (31%), 12a(69%)
1707030613	11a (29%), 11b(22%), 12a(49%)
1707030614	12a (21%), 9d(79%)
1707030615	11a (16%), 12a(32%), 4c(17%), 4d(1%), 9d(35%)
1707030616	12a (9%), 4c(20%), 9d(71%)
1707030617	4c (45%), 9d(55%)
1707030618	11a (74%), 12a(24%), 9d(2%)
1707030619	11a (3%), 12a(36%), 9d(61%)
1707030620	4c (35%), 9d(65%)
1707030621 (Warm Springs River)	4c (57%), 9b(0%), 9d(43%)
1707030622	4c (36%), 9b(13%), 9d(51%)
1707030623	11a (59%), 12a(1%), 9b(0%), 9d(40%)
1707030624	10c (4%), 10k(47%), 11a(49%), 9d(0%)
1707030625	10c (65%), 10k(2%), 11a(5%), 9d(28%)
1707030626 (White River)	10c (32%), 4c(5%), 9b(16%), 9c(30%), 9d(18%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1707030627 (Upper White River)	4c (84%), 4d(1%), 9b(15%), 9d(0%)
1707030628 (Rock-Threemile Creeks (White R.))	10c (41%), 4c(9%), 9b(6%), 9c(44%)
1707030629	10c (16%), 4c(28%), 9b(18%), 9c(38%)
1707030630 (Badger-Tyg Creeks (White R.))	10c (23%), 4c(2%), 9b(26%), 9c(48%)
1707030631	10c (99%), 10k(1%)
Deschutes River Basin: Trout Sub-Basin	
1707030701	10c (73%), 11a(1%), 12a(26%)
1707030702	10c (8%), 11a(91%), 12a(1%)
1707030703	10c (92%), 11a(8%)
1707030704	10c (7%), 10k(0%), 11a(93%)
1707030705	11a (100%)
1707030706	11a (26%), 11b(68%), 11l(7%)
1707030707	11a (83%), 11b(14%), 12a(3%)
1707030708	11a (100%)
1707030709	11a (34%), 12a(66%)
Lower Columbia Basin: Lower Columbia-Sandy Sub-Basin	
1708000101 (Salmon River)	4a (28%), 4b(37%), 4c(34%), 4d(1%)
1708000102 (Upper Sandy River)	4a (30%), 4b(45%), 4c(16%), 4d(10%)
1708000103 (Middle Sandy River)	3d (1%), 4a(96%), 4b(3%)
1708000104 (Bull Run/Little Sandy River)	4a (57%), 4b(43%)
1708000105 (Columbia Gorge Tributaries W.)	3a (2%), 3d(3%), 4a(73%), 4b(22%)
1708000106 (Gordon Creek/Lower Sandy River)	3a (10%), 3d(31%), 4a(58%), 4b(1%)
Lower Columbia Basin: Lower Columbia-Clatskanie Sub-Basin	
1708000301 (Clatskanie River)	1d (90%), 1f(10%)
1708000302 (Beaver Creek)	1d (52%), 1f(37%), 2h(1%), 3a(10%)
1708000303 (Plympton Creek)	1b (0%), 1d(11%), 1f(89%)
Lower Columbia Basin: Lower Columbia Sub-Basin	
1708000601 (Young's Bay Tributaries)	1a (18%), 1b(63%), 1f(19%)
1708000602 (Big Creek / Gnat Creek)	1a (1%), 1b(43%), 1f(56%)
Willamette Basin: Middle Fork Willamette Sub-Basin	
1709000101 (Middle Fork Willamette River, Lower)	3b (40%), 3d(40%), 4a(20%)
1709000102 (Little Fall Creek)	3b (0%), 3d(14%), 4a(68%), 4b(18%)
1709000103 (Lost Creek)	3b (2%), 3d(31%), 4a(65%), 4b(2%)
1709000115 (Fall Creek)	3b (0%), 3d(5%), 4a(76%), 4b(20%)
1709000116 (Winberry Creek)	3b (6%), 3d(17%), 4a(64%), 4b(13%)
1709000117 (North Fork, Middle Fork Willamette River, Lower)	4a (72%), 4b(28%)
1709000118 (Salmon Creek)	4a (41%), 4b(40%), 4c(17%), 4d(2%)
1709000119 (Willamette River, Middle Fork, Minor Tributaries)	3b (1%), 3d(11%), 4a(81%), 4b(7%)
1709000120 (Salt Creek)	4a (29%), 4b(20%), 4c(48%), 4d(3%)
1709000121 (Willamette River, Middle Fork, Downstream Tributaries)	4a (64%), 4b(36%), 4f(0%)
1709000122 (Hills Creek)	4a (52%), 4b(45%), 4c(3%)
1709000123 (Willamette River, Upper Middle Fork)	4a (24%), 4b(50%), 4c(20%), 4d(5%), 4e(0%),

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
	4f(0%)
1709000124 (North Fork, Middle Fork Willamette River, Upper)	4a (3%), 4b(28%), 4c(68%), 4d(0%)
Willamette Basin: Coast Fork Willamette Sub-Basin	
1709000201 (Layng Creek)	4a (71%), 4b(29%), 4f(0%)
1709000202 (Mosby Creek)	3b (1%), 3d(12%), 4a(81%), 4b(5%), 4f(1%)
1709000203 (Willamette River, Coast Fork, Upper)	3b (5%), 3d(38%), 4a(57%), 4f(0%)
1709000204 (Row River, Lower)	3b (7%), 3d(22%), 4a(71%)
1709000205 (Willamette River, Coast Fork, Lower)	3b (36%), 3d(45%), 4a(19%)
Willamette Basin: Upper Willamette Sub-Basin	
1709000301 (Long Tom River)	1g (7%), 3b(4%), 3c(32%), 3d(56%)
1709000302 (Muddy Creek)	3b (38%), 3c(47%), 3d(11%), 4a(3%)
1709000303 (Calapooia River)	3c (37%), 3d(31%), 4a(24%), 4b(9%)
1709000304 (Oak Creek)	3b (19%), 3c(74%), 3d(7%)
1709000305 (Mary's River)	1d (8%), 1g(28%), 3b(1%), 3c(25%), 3d(38%)
1709000306 (Luckiamute River)	1d (17%), 1g(17%), 3b(7%), 3c(23%), 3d(38%)
Willamette Basin: Mckenzie Sub-Basin	
1709000401 (Mckenzie River, Lower)	3b (11%), 3c(1%), 3d(11%), 4a(72%), 4b(5%)
1709000402 (Mohawk River)	3b (5%), 3d(19%), 4a(76%)
1709000407 (Mckenzie River, Upper)	4a (3%), 4b(25%), 4c(60%), 4d(11%)
1709000410 (Blue River)	4a (48%), 4b(52%)
1709000411 (Mckenzie River, Minor Tributaries)	4a (91%), 4b(9%)
1709000412 (Quartz Creek)	4a (50%), 4b(50%)
1709000413 (Mckenzie River, South Fork)	4a (25%), 4b(41%), 4c(34%)
1709000414 (Horse Creek)	4a (11%), 4b(22%), 4c(63%), 4d(4%)
Willamette Basin: North Santiam Sub-Basin	
1709000501 (North Santiam River, Upper)	4a (7%), 4b(46%), 4c(41%), 4d(6%)
1709000502 (Breitenbush River)	4a (1%), 4b(74%), 4c(22%), 4d(3%)
1709000503 (Detroit Reservoir Tributaries)	4a (33%), 4b(67%)
1709000504 (North Santiam River, Middle)	3d (12%), 4a(67%), 4b(21%)
1709000505 (Little North Santiam River)	3d (2%), 4a(36%), 4b(62%)
1709000506 (North Santiam River, Lower)	3b (28%), 3c(29%), 3d(35%), 4a(8%)
Willamette Basin: South Santiam Sub-Basin	
1709000601 (Hamilton Creek/South Santiam River)	3b (22%), 3c(7%), 3d(46%), 4a(22%), 4b(2%)
1709000602 (Crabtree Creek)	3b (0%), 3c(33%), 3d(14%), 4a(38%), 4b(15%)
1709000603 (Thomas Creek)	3b (1%), 3c(13%), 3d(32%), 4a(42%), 4b(11%)
1709000604 (Quartzville Creek)	4a (60%), 4b(40%)
1709000605 (Middle Santiam River)	4a (33%), 4b(66%), 4c(1%)
1709000606 (South Santiam River)	4a (40%), 4b(60%)
1709000607 (Foster Reservoir/South Santiam River)	3d (0%), 4a(95%), 4b(5%)
1709000608 (Wiley Creek)	3d (2%), 4a(82%), 4b(16%)
Willamette Basin: Middle Willamette Sub-Basin	
1709000701 (Mill Creek)	3b (0%), 3c(47%), 3d(49%), 4a(4%)
1709000702 (Rickreall Creek)	1d (14%), 3b(21%), 3c(39%), 3d(25%)
1709000703 (Willamette River, Salem To Newberg	3b (27%), 3c(53%), 3d(20%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
Tributaries)	
1709000704 (Abernathey Creek)	3b (10%), 3c(33%), 3d(56%)
Willamette Basin: Yamhill Sub-Basin	
1709000801 (Upper South Yamhill River)	1d (30%), 1g(38%), 3c(8%), 3d(24%)
1709000802 (Willamina Creek)	1d (24%), 1g(35%), 3c(3%), 3d(38%)
1709000803 (Mill Creek)	1d (66%), 3c(5%), 3d(28%)
1709000804 (Lower South Yamhill River)	1d (6%), 3b(19%), 3c(32%), 3d(43%)
1709000805 (Salt Creek)	1d (1%), 3b(0%), 3c(53%), 3d(46%)
1709000806 (North Yamhill River)	1d (20%), 3b(6%), 3c(26%), 3d(48%)
1709000807 (Yamhill River)	3b (21%), 3c(65%), 3d(13%)
Willamette Basin: Molalla-Pudding Sub-Basin	
1709000901 (Senecal Creek/Mill Creek)	3b (20%), 3c(80%)
1709000902 (Molalla River, Lower)	3b (22%), 3c(55%), 3d(10%), 4a(14%)
1709000903 (Milk Creek)	3b (2%), 3c(3%), 3d(62%), 4a(32%), 4b(1%)
1709000904 (Abiqua Creek)	3b (7%), 3c(27%), 3d(3%), 4a(57%), 4b(6%)
1709000905 (Rock Creek)	3b (0%), 3c(76%), 3d(19%), 4a(5%)
1709000906 (Molalla River, Upper)	4a (54%), 4b(46%)
1709000907 (Silver Creek)	3b (0%), 3c(44%), 3d(31%), 4a(24%), 4b(0%)
Willamette Basin: Tualatin Sub-Basin	
1709001001 (Dairy Creek)	1d (11%), 1f(13%), 3b(0%), 3c(35%), 3d(41%)
1709001002 (Gales Creek)	1d (26%), 1f(7%), 3b(6%), 3c(23%), 3d(38%)
1709001003 (Scoggins Creek)	1d (29%), 3b(0%), 3c(18%), 3d(53%)
1709001004 (Rock Creek)	1d (2%), 3b(8%), 3c(62%), 3d(29%)
1709001005 (Lower Tualatin River)	1d (1%), 3b(12%), 3c(67%), 3d(21%)
Willamette Basin: Clackamas Sub-Basin	
1709001101 (Clackamas River, Upper)	4a (11%), 4b(30%), 4c(59%)
1709001102 (Collawash River)	4a (27%), 4b(73%)
1709001103 (Clackamas River, Oak Grove Fork)	4a (7%), 4b(17%), 4c(77%)
1709001104 (C0Llawash River, Hotsprings Fk)	4a (52%), 4b(48%)
1709001105 (Lower Clackamas River)	3c (3%), 3d(11%), 4a(76%), 4b(9%)
1709001106 (Roaring River)	3c (21%), 3d(50%), 4a(28%), 4b(1%)
Willamette Basin: Lower Willamette Sub-Basin	
1709001201 (Johnson Creek)	3a (35%), 3c(17%), 3d(47%)
1709001202 (Scappoose Creek/Multnomah Channel)	1d (27%), 1f(11%), 3a(61%), 3c(0%), 3d(1%)
Northern Oregon Coastal Basin: Necanicum Sub-Basin	
1710020101 (Necanicum River)	1a (21%), 1b(45%), 1d(33%), 1f(1%)
Northern Oregon Coastal Basin: Nehalem Sub-Basin	
1710020201 (Upper Nehalem River)	1d (24%), 1f(76%)
1710020202 (Middle Nehalem River)	1d (15%), 1f(85%)
1710020203 (Lower Nehalem River)	1b (0%), 1d(25%), 1f(75%)
1710020204 (Salmonberry River)	1d (97%), 1f(3%)
1710020205 (North Fork Nehalem River)	1a (8%), 1b(57%), 1d(30%), 1f(4%)
1710020206 (Cook Creek / Lower Nehalem River)	1a (7%), 1b(17%), 1d(76%)
Northern Oregon Coastal Basin: Wilson-Trask-Nestucca Sub-Basin	

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1710020301 (Little Nestucca River)	1a (7%), 1b(3%), 1d(56%), 1g(34%)
1710020302 (Nestucca River)	1a (6%), 1b(13%), 1d(68%), 1g(13%)
1710020303 (Tillamook River)	1a (33%), 1b(52%), 1d(15%)
1710020304 (Trask River)	1a (11%), 1b(3%), 1d(86%)
1710020305 (Wilson River)	1a (4%), 1b(1%), 1d(96%)
1710020306 (Kilchis River)	1a (2%), 1b(5%), 1d(93%)
1710020307 (Miami River)	1b (23%), 1d(77%)
1710020308 (Tillamook Bay)	1a (41%), 1b(49%), 1d(10%)
1710020309 (Netarts / Sand Lake / Neskowin Creek Frontal)	1a (19%), 1b(42%), 1d(39%)
Northern Oregon Coastal Basin: Siletz-Yaquina Sub-Basin	
1710020401 (Upper Yaquina River)	1b (1%), 1g(99%)
1710020402 (Big Elk Creek)	1b (0%), 1d(2%), 1g(98%)
1710020403 (Lower Yaquina River)	1b (86%), 1g(14%)
1710020404 (Upper Siletz River)	1d (85%), 1g(15%)
1710020405 (Middle Siletz River)	1b (9%), 1d(68%), 1g(23%)
1710020406 (Rock Creek / Siletz River)	1b (3%), 1g(97%)
1710020407 (Lower Siletz River)	1b (67%), 1d(21%), 1g(12%)
1710020408 (Schooner Drift / Drift Creek)	1a (11%), 1b(12%), 1d(77%)
1710020409 (Salmon River)	1a (8%), 1b(12%), 1d(80%), 1g(0%)
1710020410 (Devils Lake / Depoe Bay / Newport Frontal)	1a (18%), 1b(79%), 1d(3%)
Northern Oregon Coastal Basin: Alsea Sub-Basin	
1710020501 (Upper Alsea River)	1d (34%), 1g(66%)
1710020502 (Five Rivers / Lobster Creek)	1g (100%)
1710020503 (Drift Creek)	1b (19%), 1g(81%)
1710020504 (Lower Alsea River)	1b (17%), 1d(11%), 1g(72%)
1710020505 (Beaver Creek / Waldport / Vingie Creek Frontal)	1b (66%), 1d(14%), 1g(20%)
1710020506 (Yachats River)	1b (17%), 1d(41%), 1g(42%)
1710020507 (Cummins Creek/Tenmile Creek/Mercer Lake Frontal)	1a (10%), 1b(1%), 1d(84%), 1g(5%)
Northern Oregon Coastal Basin: Siuslaw Sub-Basin	
1710020601 (Upper Siuslaw River)	1g (57%), 3d(43%)
1710020602 (Wolf Creek)	1g (98%), 3d(2%)
1710020603 (Wildcat Creek)	1g (98%), 3d(2%)
1710020604 (Lake Creek)	1g (100%)
1710020605 (Deadwood Creek)	1g (100%)
1710020606 (Indian Creek)	1d (0%), 1g(100%)
1710020607 (North Fork Siuslaw River)	1a (2%), 1b(15%), 1d(2%), 1g(81%)
1710020608 (Lower Siuslaw River)	1a (9%), 1b(2%), 1g(89%)
Northern Oregon Coastal Basin: Siltcoos Sub-Basin	
1710020701 (Waohink/Siltcoos/Tahkenitch Lake Frontal)	1a (46%), 1b(32%), 1g(22%)
Southern Oregon Coastal Basin: North Umpqua Sub-Basin	
1710030101 (Diamond Lake)	4d (7%), 4e(93%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1710030102 (Lemolo Lake)	4c (1%), 4d(7%), 4e(90%), 4f(2%)
1710030103 (Upper North Umpqua)	4b (5%), 4c(1%), 4e(21%), 4f(74%)
1710030104 (Clearwater River)	4d (3%), 4e(57%), 4f(37%), 4g(3%)
1710030105 (Fish Creek)	4e (0%), 4f(87%), 4g(12%)
1710030106 (Boulder Creek)	4b (13%), 4f(87%)
1710030107 (Middle North Umpqua)	4f (100%)
1710030108 (Steamboat Creek)	4b (14%), 4f(86%)
1710030109 (Canton Creek)	4a (0%), 4b(2%), 4f(98%)
1710030110 (Rock Creek)	4a (0%), 4f(100%)
1710030111 (Little River)	4f (90%), 78c(10%)
1710030112 (Lower North Umpqua)	4f (7%), 78c(93%)
Southern Oregon Coastal Basin: South Umpqua Sub-Basin	
1710030201 (Upper South Umpqua)	4f (100%), 4g(0%)
1710030202 (Jackson Creek)	4f (97%), 4g(3%)
1710030203 (Middle South Umpqua)	4f (100%)
1710030204 (Elk Creek (S. Umpqua Basin))	4f (77%), 4g(3%), 78e(19%)
1710030205 (South Umpqua)	4f (12%), 78c(26%), 78e(62%)
1710030206 (Upper Cow Creek)	4f (3%), 4g(0%), 78e(97%)
1710030207 (Middle Cow Creek)	78e (100%)
1710030208 (West Fork Cow Creek)	1g (68%), 78d(0%), 78e(28%), 78f(5%)
1710030209 (Lower Cow Creek)	1g (1%), 78c(15%), 78e(84%)
1710030210 (Middle South Umpqua)	78c (86%), 78e(14%)
1710030211 (Myrtle Creek)	4f (18%), 78c(25%), 78e(57%)
1710030212 (Ollala Looking glass)	1g (2%), 78c(57%), 78e(41%)
1710030213 (Lower South Umpqua)	1g (1%), 4f(2%), 78c(82%), 78e(15%)
Southern Oregon Coastal Basin: Umpqua Sub-Basin	
1710030301 (Calapooya)	1g (0%), 4a(1%), 4f(36%), 78c(63%)
1710030302 (Upper Umpqua)	1g (80%), 78c(20%)
1710030303 (Elk Creek Rose)	1g (27%), 3d(31%), 4a(0%), 4f(12%), 78c(30%)
1710030304 (Middle Umpqua River)	1g (100%)
1710030305 (Mill Creek / Umpqua River)	1g (100%)
1710030306 (Upper Smith River)	1g (92%), 3d(8%)
1710030307 (North Fork Smith River / Lower Smith River)	1a (0%), 1b(12%), 1g(87%)
1710030308 (Lower Umpqua River)	1a (12%), 1b(33%), 1g(55%)
Southern Oregon Coastal Basin: Coos Sub-Basin	
1710030401 (South Fork Coos)	1a (1%), 1b(3%), 1g(96%), 78c(0%)
1710030402 (West Fork Millicoma River)	1a (1%), 1b(2%), 1g(97%)
1710030403 (Umpqua Dunes / Tenmile Frontal)	1a (46%), 1b(20%), 1g(35%)
1710030404 (Lower Coos River? / Coos Bay)	1a (41%), 1b(48%), 1g(11%)
Southern Oregon Coastal Basin: Coquille Sub-Basin	
1710030501 (South Fork Coquille River)	1g (63%), 1h(36%), 78f(1%)
1710030502 (South Fork Coquille)	1a (5%), 1b(5%), 1g(12%), 1h(78%)
1710030503 (Middle Fork Coquille)	1a (0%), 1g(79%), 1h(1%), 78c(9%), 78e(12%)
1710030504 (East Fork Coquille)	1g (100%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1710030505 (North Fork Coquille)	1a (2%), 1g(98%)
1710030506 (Middle Main Coquille)	1a (25%), 1b(45%), 1g(23%), 1h(7%)
1710030507 (Lower Coquille)	1a (53%), 1b(43%), 1g(3%), 1h(1%)
Southern Oregon Coastal Basin: Sixes Sub-Basin	
1710030601 (Humbug Nesika Frontal)	1a (12%), 1b(36%), 1h(52%)
1710030602 (Elk River)	1a (7%), 1h(93%)
1710030603 (Sixes River)	1a (8%), 1h(92%)
1710030604 (New River Frontal)	1a (38%), 1b(0%), 1h(62%)
Southern Oregon Coastal Basin: Upper Rogue Sub-Basin	
1710030701 (Upper Rogue River)	4d (2%), 4e(31%), 4f(0%), 4g(66%), 78b(0%)
1710030702 (South Fork Rogue River)	4d (3%), 4e(36%), 4g(61%), 78b(0%)
1710030703 (Rogue River-Lost Creek)	4g (41%), 78b(59%)
1710030704 (Big Butte Creek)	4d (2%), 4e(6%), 4g(77%), 78b(14%)
1710030705 (Elk Creek (Rogue Basin))	4f (0%), 4g(86%), 78b(14%)
1710030706 (Trail Creek)	4f (1%), 4g(72%), 78b(27%), 78e(0%)
1710030707 (Rogue River-Shady Cove)	4g (0%), 78a(17%), 78b(82%)
1710030708 (Little Butte Creek)	4d (2%), 4e(2%), 4g(33%), 78a(5%), 78b(55%), 9i(2%)
Southern Oregon Coastal Basin: Middle Rogue Sub-Basin	
1710030801 (Bear Creek)	4g (9%), 78a(24%), 78b(29%), 78e(34%), 78g(3%)
1710030802 (Rogue River-Gold Hill)	78a (23%), 78b(17%), 78e(61%)
1710030803 (Evans Creek)	4g (2%), 78b(7%), 78e(91%)
1710030804 (Rogue River-Grants Pass)	78a (32%), 78b(23%), 78e(45%)
Southern Oregon Coastal Basin: Applegate Sub-Basin	
1710030901 (Upper Applegate River)	78d (8%), 78e(92%)
1710030902 (Upper Applegate River-Star/Beaver/Palmer)	78b (6%), 78d(0%), 78e(94%)
1710030903 (Little Applegate River)	78b (0%), 78d(17%), 78e(83%), 78g(0%)
1710030904 (Middle Applegate River)	78b (15%), 78e(85%)
1710030905 (Williams Creek)	78b (31%), 78e(69%)
1710030906 (Lower Applegate River)	78a (5%), 78b(34%), 78d(11%), 78e(50%)
Southern Oregon Coastal Basin: Lower Rogue Sub-Basin	
1710031001 (Rogue River-Rec Section)	78a (7%), 78b(8%), 78d(23%), 78e(62%)
1710031002 (Jumpoff Joe Creek)	78b (41%), 78e(59%)
1710031003 (Grave Creek)	78e (100%)
1710031004 (Rogue River-BLM Wild Section)	1g (0%), 78d(3%), 78e(61%), 78f(35%)
1710031005 (Rogue River-USFS Wild Section)	1g (1%), 78d(6%), 78f(93%)
1710031006 (Rogue River-Illahe)	1g (0%), 1h(9%), 78f(91%)
1710031007 (Lobster Creek)	1h (100%), 78f(0%)
1710031008 (Lower Rogue River)	1b (11%), 1h(26%), 78f(63%)
Southern Oregon Coastal Basin: Illinois Sub-Basin	
1710031101 (East Fork Illinois River)	78a (28%), 78b(32%), 78e(40%)
1710031102 (Althouse Creek)	78a (20%), 78b(22%), 78e(58%)
1710031103 (Sucker Creek)	78a (5%), 78b(4%), 78e(91%)
1710031104 (West Fork Illinois River)	78a (19%), 78b(13%), 78d(57%), 78e(10%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1710031105 (Deer Creek)	78a (8%), 78b(28%), 78d(13%), 78e(52%)
1710031106 (Illinois River-Josephine)	78a (7%), 78b(6%), 78d(62%), 78e(23%), 78f(2%)
1710031107 (Briggs Creek)	78d (36%), 78e(64%)
1710031108 (Illinois River-Klondike)	78d (12%), 78e(29%), 78f(59%)
1710031109 (Silver Creek)	78d (18%), 78e(67%), 78f(15%)
1710031110 (Indigo Creek)	78e (33%), 78f(67%)
1710031111 (Illinois River-Lawson)	78d (11%), 78f(89%)
Southern Oregon Coastal Basin: Chetco Sub-Basin	
1710031201 (Upper Chetco River)	78d (44%), 78f(56%)
1710031202 (Lower Chetco River)	1h (16%), 1i(0%), 78d(1%), 78f(83%)
1710031203 (Chetco River)	1h (32%), 1i(3%), 78f(65%)
1710031204 (Pistol River)	1a (2%), 1b(1%), 1h(14%), 78d(1%), 78f(82%)
1710031205 (Hunter Creek)	1b (12%), 1h(44%), 78f(44%)
1710031206 (Cape Ferrelo Frontal)	1a (4%), 1b(31%), 1h(50%), 78f(14%)
1710031207 (Winchuck River)	1h (5%), 1i(48%), 78f(47%)
Oregon Closed Basins: Harney-Malheur Lakes Sub-Basin	
1712000101	12a (100%)
1712000102	12a (100%)
1712000103	12a (100%)
1712000104	11h (13%), 11i(60%), 12a(28%)
1712000105	11h (28%), 11i(37%), 11k(0%), 12a(35%)
1712000106	11h (21%), 11i(34%), 11k(0%), 12a(45%)
1712000107	12a (100%)
1712000108	12a (100%)
1712000109	12a (100%)
1712000110	12a (100%)
1712000111	12a (100%)
1712000112	12a (100%)
Oregon Closed Basins: Silvies Sub-Basin	
1712000201	11i (4%), 12a(96%)
1712000202	11h (12%), 11i(74%), 12a(14%)
1712000203	11i (84%), 12a(16%)
1712000204	11h (50%), 11i(50%)
1712000205	11h (77%), 11i(23%)
1712000206	11h (95%), 11i(5%)
1712000207	11h (76%), 11i(22%), 11k(2%)
1712000208	11h (49%), 11k(51%)
1712000209	11h (52%), 11k(48%)
1712000210	11h (73%), 11k(27%)
1712000211	11d (3%), 11h(80%), 11k(13%), 11m(4%)
1712000212	11d (21%), 11h(46%), 11k(33%)
Oregon Closed Basins: Donner Und Blitzen Sub-Basin	
1712000301	12a (100%)
1712000302	12a (100%)
1712000303	12a (100%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1712000304	12a (100%)
1712000305	12a (100%)
1712000306	12a (100%)
Oregon Closed Basins: Silver Sub-Basin	
1712000401	12a (100%)
1712000402	12a (100%)
1712000403	12a (100%)
1712000404	12a (100%)
1712000405	12a (100%)
1712000406	12a (100%)
1712000407	12a (100%)
1712000408	12a (100%)
1712000409	12a (100%)
1712000410	12a (100%)
1712000411	12a (100%)
1712000412	12a (100%)
1712000413	12a (100%)
1712000414	11a (8%), 11h(0%), 12a(91%)
1712000415	11a (4%), 11h(36%), 11i(8%), 12a(51%)
1712000416	11h (77%), 11i(21%), 12a(3%)
1712000417	11a (1%), 11h(99%)
1712000418	11h (48%), 11i(41%), 12a(11%)
1712000419	11h (34%), 11i(22%), 12a(44%)
1712000420	11h (25%), 11i(29%), 12a(47%)
1712000421	12a (100%)
1712000422	12a (100%)
Oregon Closed Basins: Summer Lake Sub-Basin	
1712000501	12a (100%)
1712000502	12a (100%)
1712000503	12a (100%)
1712000504	12a (91%), 9e(9%)
1712000505	12a (100%)
1712000506	12a (100%)
1712000507	12a (100%)
1712000508	12a (100%)
1712000509	12a (100%)
1712000510	12a (100%)
1712000511	12a (100%)
1712000512	12a (100%)
1712000513	12a (100%)
1712000514	12a (100%)
1712000515	12a (100%)
1712000516	12a (100%)
1712000517 (Silver Lake)	12a (100%)
1712000518	12a (97%), 9e(3%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1712000519 (Summer Lake North)	12a (80%), 9e(6%), 9h(13%)
1712000520	12a (100%)
1712000521 (Summer Lake South)	12a (76%), 9e(2%), 9h(22%)
1712000522 (Duncan Creek)	12a (35%), 9e(65%), 9h(0%)
1712000523 (Silver Creek)	9e (100%)
1712000524	12a (10%), 9e(90%)
1712000525 (Murdoc Creek)	12a (56%), 9e(44%)
1712000526 (Bridge Creek)	12a (62%), 9e(38%)
1712000527	12a (100%)
1712000528	12a (24%), 9e(76%)
1712000529 (Buck Creek)	9e (100%)
1712000530	12a (39%), 9e(61%)
1712000531	12a (79%), 9e(21%)
1712000532 (Silver Lake (Deschutes))	12a (4%), 9e(96%)
1712000533	12a (26%), 4c(1%), 9e(73%)
Oregon Closed Basins: Lake Abert Sub-Basin	
1712000601 (Lake Abert)	12a (100%)
1712000602 (Chewaucan River)	12a (91%), 9h(9%)
1712000603 (Crooked Creek)	12a (30%), 9g(12%), 9h(58%)
1712000604 (Upper Crooked Creek)	12a (30%), 9h(70%)
1712000605 (Moss Creek)	12a (50%), 9h(50%)
1712000606	9h (100%)
1712000607 (Dairy/Elder Creek)	9e (40%), 9h(60%)
1712000608 (Chewaucan River)	12a (0%), 9e(24%), 9h(76%)
1712000609	12a (100%)
Oregon Closed Basins: Warner Lakes Sub-Basin	
1712000701	12a (100%)
1712000702 (Lakes)	12a (100%)
1712000703	12a (100%)
1712000704 (Twentymile Creek)	12a (100%)
1712000705 (Upper Deep Creek)	12a (100%)
1712000706 (Honey/Fish Creek)	12a (100%)
1712000707	12a (56%), 9h(44%)
1712000708	12a (63%), 9h(37%)
1712000710	12a (29%), 9h(71%)
1712000711	12a (93%), 9h(7%)
1712000712	12a (100%)
1712000713	12a (93%), 9h(7%)
1712000714	12a (100%)
1712000715	12a (100%)
1712000716	12a (100%)
1712000717	12a (100%)
1712000718	12a (100%)
1712000719	12a (100%)
1712000720	12a (52%), 9h(48%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
Oregon Closed Basins: Guano. Nevada Sub-Basin	
1712000801	12a (100%)
1712000802	12a (100%)
1712000803	12a (100%)
1712000804	12a (100%)
1712000805	12a (100%)
1712000806	12a (100%)
1712000807	12a (100%)
1712000808	12a (100%)
1712000809	12a (100%)
1712000810	12a (100%)
1712000811	12a (100%)
1712000812	12a (100%)
1712000813	12a (100%)
1712000814	12a (100%)
1712000815	12a (100%)
1712000816	12a (100%)
1712000817	12a (100%)
1712000818	12a (100%)
1712000819	12a (100%)
1712000824	12a (100%)
1712000825	12a (100%)
1712000826	12a (100%)
1712000827	12a (100%)
1712000828	12a (100%)
1712000829	12a (100%)
1712000830	12a (100%)
1712000831	12a (100%)
1712000832	12a (100%)
Oregon Closed Basins: Alvord Lake Sub-Basin	
1712000901	12a (100%)
1712000902	12a (100%)
1712000903	12a (100%)
1712000904	12a (100%)
1712000905	12a (100%)
1712000906	12a (100%)
1712000907	12a (100%)
1712000908	12a (100%)
1712000909	12a (100%)
1712000910	12a (100%)
1712000911	12a (100%)
1712000912	12a (100%)
1712000913	12a (100%)
1712000914	12a (100%)
1712000915	12a (100%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1712000916	12a (100%)
1712000917	12a (100%)
1712000918	12a (100%)
1712000919	12a (100%)
1712000920	12a (100%)
1712000921	12a (100%)
1712000922	12a (100%)
1712000923	12a (100%)
1712000924	12a (100%)
Northern California Coastal Basin: Smith Cal Or Sub-Basin	
1801010101 (North Fork Smith River)	1i (1%), 78d(67%), 78f(32%)
1801010102 (Middle Fork Smith River)	78d (100%)
1801010103	1i (100%)
Klamath Basin: Williamson Sub-Basin	
1801020101 (Williamson River Above Klamath Marsh)	9e (97%), 9f(3%)
1801020102 (Williamson River At Klamath Marsh)	4d (2%), 4e(18%), 9e(66%), 9f(13%)
1801020103 (Williamson River Above Sprague River)	9e (97%), 9f(3%)
1801020104 (Williamson River)	9e (40%), 9g(44%), 9h(11%), 9j(5%)
1801020105 (Crater Lake)	4d (100%)
Klamath Basin: Sprague Sub-Basin	
1801020201 (Sycan River Above Sycan Marsh)	9e (100%), 9h(0%)
1801020202 (Sycan River At Sycan Mars)	9e (84%), 9f(16%)
1801020203 (Sycan River Above Sprague River)	9e (85%), 9g(5%), 9j(10%)
1801020204 (North Fork Sprague River)	9e (83%), 9g(3%), 9j(13%)
1801020205 (South Fork Sprague River)	9e (12%), 9g(1%), 9h(61%), 9j(27%)
1801020206 (Sprague River Above Sycan River)	9g (1%), 9h(73%), 9j(26%)
1801020207 (Sprague River Above Williamson River)	9e (8%), 9g(18%), 9h(31%), 9j(43%)
1801020208 (Sprague River Valley)	9e (55%), 9g(11%), 9h(17%), 9j(18%)
Klamath Basin: Upper Klamath Lake Sub-Basin	
1801020301 (Upper Klamath Lake)	4d (2%), 4e(38%), 9e(27%), 9g(34%)
1801020302 (Klamath Lake)	4d (3%), 4e(21%), 9e(0%), 9g(52%), 9h(1%), 9i(18%), 9j(6%)
1801020303 (Fourmile Creek)	4d (10%), 4e(88%), 9g(0%), 9i(1%)
1801020304	9i (100%)
1801020305	9i (100%)
Klamath Basin: Lost Sub-Basin	
1801020401 (Willow Creek)	9g (1%), 9h(74%), 9j(26%)
1801020406	9h (100%)
1801020408	9g (15%), 9h(11%), 9j(74%)
1801020412	9g (45%), 9j(55%)
1801020414	9g (61%), 9i(14%), 9j(25%)
1801020416	9g (70%), 9h(0%), 9i(10%), 9j(19%)
1801020417	9g (39%), 9h(2%), 9j(58%)

Watershed # (Name, if available)	Percentage watershed area by ecoregions type
1801020418	9e (10%), 9g(28%), 9h(44%), 9j(18%)
1801020419	9e (1%), 9g(7%), 9h(63%), 9j(29%)
1801020420	9g (17%), 9h(79%), 9j(4%)
Klamath Basin: Butte Sub-Basin	
1801020502	9i (100%)
Klamath Basin: Upper Klamath Sub-Basin	
1801020605 (Beaver Creek (Klamath Basin))	78d (28%), 78e(0%), 78g(72%)
1801020606 (Cottonwood Creek)	78e (0%), 78g(100%)
1801020607	1h (100%)
1801020608	78g (100%)
1801020609	4g (33%), 78g(31%), 9i(36%)
1801020610	4g (81%), 78g(19%)
1801020611	4g (34%), 9i(66%)
1801020612	9i (100%)
1801020613	4e (12%), 4g(0%), 9i(88%)
Klamath Basin: Lower Klamath California Sub-Basin	
1801020900	78e (100%)
Oregon-California Closed basins: Goose Lake Sub-Basin	
1802000101 (Drews Creek)	9g (97%), 9h(3%)
1802000104 (Goose Lake)	9g (13%), 9h(87%)
1802000105	9h (100%)
1802000106	9h (100%)
1802000107	9g (88%), 9h(12%)
1802000108	9g (30%), 9h(70%)
1802000109	9g (16%), 9h(84%)
1802000110	9g (42%), 9h(58%)
1802000111	9g (47%), 9h(53%)
1802000114	9g (28%), 9h(72%)