Chapter 2 Oregon Profile

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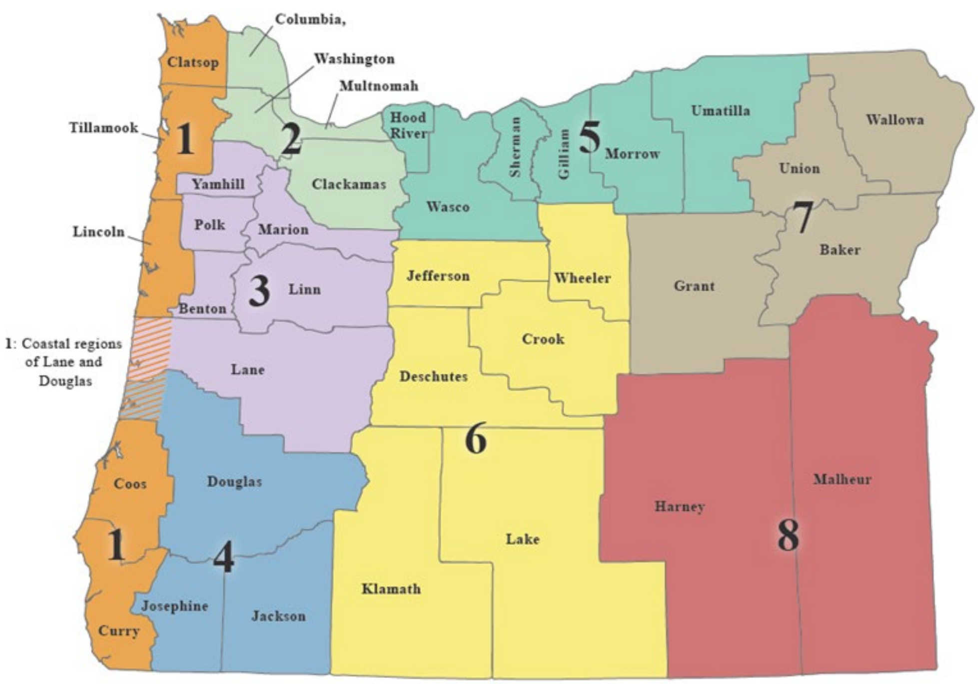
Natural disasters occur when hazards caused by the earth's natural systems intersect with human societies. Therefore, to understand Oregon's risk, it is essential to understand Oregon's physical geography, human geography, built environment, and economy. This helps understand how hazards interact with people, property, infrastructure, economy, environment, and cultural resources, how those interactions with some hazards will change over time, and how vulnerable populations will be affected more acutely. This knowledge will inform mitigation actions that will reduce risks.

The sections below describe portions of these domains at a statewide and regional scale. *Chapter 3: Hazard Identification and Risk Assessment* delves deeper to examine the vulnerability of these domains at a census tract and county scale in greater detail.

2.1 Physical Geography

Oregon has an area of 95,996 square miles. Oregon's physical geography is remarkably diverse due to its large area and volcanic geology. The following sections briefly describe the physical geography of the eight natural hazards mitigation planning regions.

Figure 2.2.1-1 - Oregon NHMP Natural Hazards Regions



Region 1: Oregon Coast

Region 1 is approximately 8,300 square miles in area with the Coast Range mountains, the pacific coast, and numerous rivers and estuaries shaping its topography. Region 1 is bordered to the west by the Pacific Ocean and the Coast Range to the east. The Coast Range's elevations reach over 4,000 feet above sea level in some places. The region extends the entire length of Oregon from Washington State in the North to the California border in the south. This geographic extent means there is a large amount of geological variation along the coast. Major rivers in the region include Siuslaw, Umpqua, Nehalem, Rogue, Yaquina, Siletz, Nestucca, Trask, Wilson, Coos, and Coquille.

Region 2: North Willamette Valley/Portland Metro

Region 2 is approximately 3,700 square miles in area. The Cascade Mountain Range, Coast Mountain Range, Willamette Valley, Columbia and Willamette Rivers, and associated watersheds shape the region's topography. Region 2 is bordered by the Coast Range to the west and the Cascade Mountain Range and the peak of Mt. Hood to the east. The region extends from the Columbia River in the North to the Northern Willamette Valley in the south. Two rivers shape the region's main watersheds, the Columbia River and the

Willamette River. Their confluence is in the Portland area. The region also contains a portion of the Columbia River Gorge, and Mt. Hood National Forest.

Region 3: Mid/Southern Willamette Valley

Region 3 is approximately 9,800 square miles in area. The Cascade Mountain Range, Coast Range, Willamette Valley and associated watersheds shape the region's topography. Region 3 is bordered by the Cascade Mountain Range to the east and the Coast Range to the west. It extends from the Calapooya Mountains in the south to the Portland suburbs in the north. The main watershed in the region is the Willamette River watershed that is fed by other rivers in the east including the Santiam River and the Mckenzie River. A large portion of the Willamette National Forest falls within the eastern portion of the region. The region is an agriculturally vital and productive area for the State.

Region 4: Southwest Oregon

Region 4 is approximately 9,200 square miles in area. The Cascade Mountains, Coast Range, and Siskiyou Mountains, and the Umpqua and Rogue River watersheds shape the region's topography. Region 4 is bordered by the Cascade Mountain Range in the east and the Coast Range in the west. It extends from the Calapooya Divide in the North to the California border in the south. The region is mountainous, with several converging mountain ranges. The Rogue Valley is the largest valley in the region.

Region 5: Mid-Columbia

Region 5 is approximately 10,200 square miles in area. The Columbia River Gorge, the eastern slope of the Cascades, and numerous tributaries to the Columbia River shape the region's topography. Region 5 is bordered by the Cascade Mountain Range in the west and the Umatilla National Forest in the east. The region is bordered by the Columbia River in the north until the river turns north close to Hermiston. The region extends to the Whitman National Forest and the North Fork of the John Day River in the south. The region's major watershed is the Columbia River with all smaller water bodies feeding it including the John Day River and Umatilla River. The region supports crop farming as well as livestock grazing.

Region 6: Central Oregon

Region 6 is approximately 24,000 square miles in size. It is bordered by the Cascade Mountain range to the west, and the California and Nevada borders to the south. Region 6 has a diverse variety of ecological zones and geological features and is shaped by Deschutes, John Day, and Crooked River watersheds to the north and the Klamath River in the south. Large lakes are common in the southern portions of region 6 including Crater Lake and Upper Klamath Lake.

Region 7: Northeast Oregon

Region 7 is approximately 12,800 square miles in area. The region is bordered by the Snake River to the east, Washington to the north and the Umatilla and Whitman National Forests to the north and west. It is characterized by small mountain ranges and canyons and tributaries to the Snake River. The Columbia River Basalt lava flows formed the high plateaus of the region. The Blue Mountains and Wallowa Mountains are in the region. Major rivers in the region include the Grande Ronde and Snake Rivers.

Region 8: Southeast Oregon

Region 8 is approximately 20,200 square miles in area. The region is bordered to the east by Idaho and to the south by Nevada. Steens Mountain and the Harney Basin are prominent geologic features in the region and major rivers in the region include the Malheur and Owyhee.

2.2 Climate

2.2.1 Climate Change

Climate variability and change strongly influence the risk of nine natural hazards covered in the Oregon Natural Hazards Mitigation Plan:

- Coastal Hazards
- High Hazard Potential Dams
- Droughts
- Extreme Heat
- Floods
- Landslides
- Wildfires
- Windstorms
- Winter Storms

Climate change is already affecting Oregon's natural and human systems (Chang et al. 2023, Fleishman 2025). Climate change will increase the frequency, duration, or magnitude of some natural hazards in Oregon, such as extreme heat, droughts, wildfires, floods, landslides, coastal erosion, and coastal flooding. This section presents an overview of climate change as it pertains to climate-related natural hazards in the state.

Oregon tends to have mild, wet winters and warm, dry summers. East of the Cascade Range, winters tend to be colder, summers hotter, and annual precipitation less than west of the Cascade Range due to the rain shadow created by the Cascade Range. Oregon's climate has considerable variability from year to year. That variability is caused in part by changes in the phase and strength of the El Niño–Southern Oscillation, a natural fluctuation of ocean temperature near the equator in the Pacific Ocean that strongly affects global weather patterns and seasonal climate.

Human activities are changing Earth's climate beyond typical levels of natural variability. Oregon's average temperature increased by more than 2°F since 1900. Hot days are becoming hotter and more frequent, and cold days warmer and less frequent. Warmer winters are causing more precipitation to fall as rain and less as snow. Higher temperatures also tend to cause earlier spring snowmelt and peak stream flows, and lower summer stream flows in many rivers. Drier climate, higher temperatures, and expansion of human settlements into wildlands is increasing the number of wildfires and area burned. Sea-level rise is increasing the frequency of coastal flooding and erosion. Each 10°F rise in daily maximum temperature has led to a three-fold increase in heat-related illness in Oregon (Fleishman 2025).

2.2.2 Adapting to Climate Change

In 2010, the State of Oregon produced the Oregon Climate Change Adaptation Framework, which identified 11 climate-related risks for which the state must plan. The state updated the framework in 2021 to add multi-agency strategies to address those risks. Progress towards implementing the framework strategies can be found in Chapter 9 Appendix. The 2025 Oregon NHMP identifies six of those 11 climate risks: drought, extreme heat, coastal erosion, wildfire, flood, and landslides.

In 2007, the Oregon Legislature created the Oregon Climate Change Research Institute (OCCRI) under House Bill 3543. Much of the material in this introduction to climate change comes from the sixth and seventh Oregon Climate Assessments (Fleishman 2023, 2025). All the Oregon climate assessments are available on OCCRI's website at https://blogs.oregonstate.edu/occri/oregon-climate-assessments/.

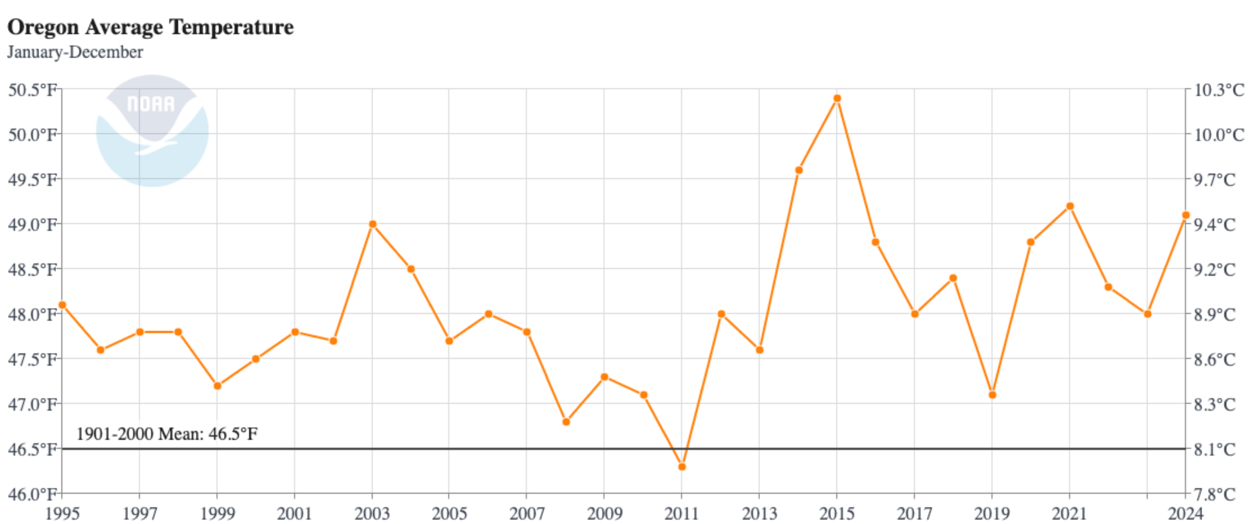
This section does not present a comprehensive assessment of climate change impacts in Oregon or cover all aspects of each hazard. Rather, it presents projections of future temperature, precipitation, and extreme events and describes effects of future conditions on natural hazards in Oregon.

2.2.3 Past and Future Climate in Oregon

2.2.3.1 Historical Climate

The impacts of climate change in Oregon largely result from changes in temperature and precipitation. Oregon's annual average temperature increased by 2.2°F per century from 1895 through 2023 (NCEI 2024). Globally, annual average temperature over the past 30 years (1995–2024) was warmer than the twentieth century average (NCEI 2025). Similarly, from 1995–2024, Oregon's annual average temperature exceeded the twentieth century average except in 2011 (NCEI 2025) (Figure 2.2.3-1).

Figure 2.2.3-1: Annual Average Temperature in Oregon over the Past 30 Years

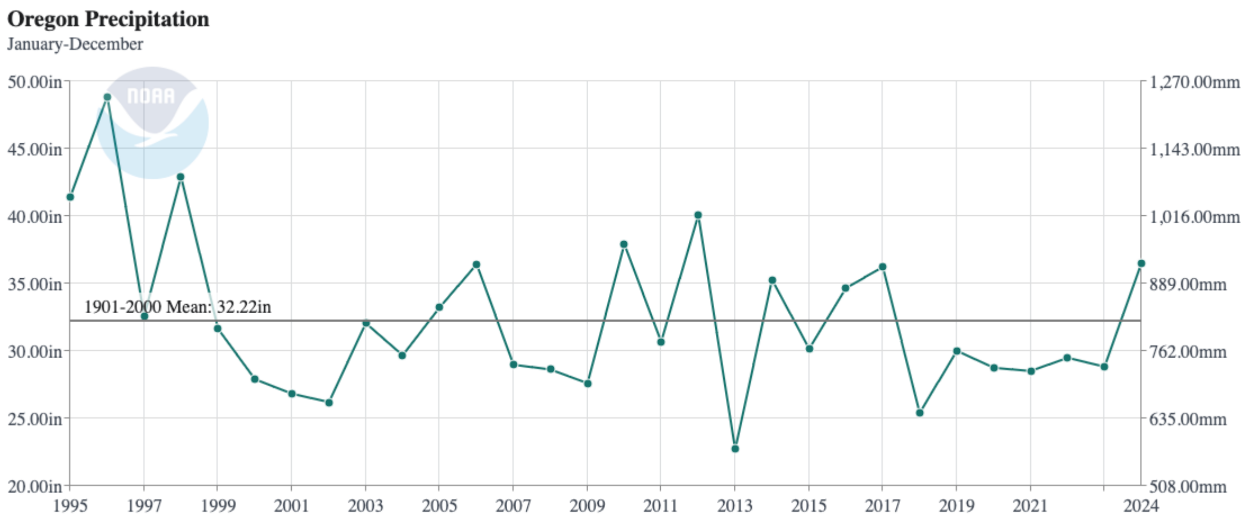


Source: National Centers for Environmental Information.

Oregon's annual precipitation varies considerably among years and has not changed significantly over the observational record. The increase has been about 0.08 inches (0.20 cm) per century from 1895–2023 (NCEI 2024).

In Oregon over the past 30 years precipitation was below the twentieth century average in 18 years and above the average in 12 years.

Figure 2.2.3-2: Annual Statewide Average Precipitation in Oregon over the Past 30 Years



Source: National Centers for Environmental Information.

However, annual precipitation can mask changes in the type, timing, and intensity of precipitation, which have greater impact on social and natural systems than annual totals. For example, statistically significant increases in heavy precipitation have occurred in Oregon (Dalton et al. 2017). Additionally, warmer temperatures are causing more precipitation to fall as rain and less as snow. Annual snowpack is expected to decline by as much as 60 percent by mid-century if emissions continue to rise (Fleishman 2025).

2.2.3.2 Future Climate

Projections of future climate come from computer models of Earth's atmosphere, ocean, and land and their interactions over time and space. Climate models generally refer to both general circulation models (GCMs) and Earth system models (ESMs). GCMs simulate the interactions between the atmosphere and the land and ocean, whereas ESMs also simulate more detailed chemical and biological processes that interact with the physical climate. Global climate models use the fundamental laws of physics and are the most sophisticated tools for understanding the climate. However, they still necessarily simplify the climate system.

Climate modeling institutions worldwide build different global climate models to simulate the future climate with a common set of scenarios of concentrations of greenhouse gases, aerosols, and other external influences on the global climate (climate forcings). The most widely used and most reliable climate projections are based on outputs from downscaled global climate models that were included in the sixth phase of the Climate Model Intercomparison Project (CMIP6; Eyring et al. 2016) and represents the most current understanding of Earth's climate. The CMIP6 models used three scenarios for the global radiative forcing levels and shared socioeconomic pathways (SSPs) (O'Neill et al. 2016). Radiative forcing is the total amount of energy retained in the atmosphere after absorption of incoming solar radiation, which is affected by the reflectivity of Earth's surface; and emission of outgoing long-wave radiation, which is affected by the concentrations of heat-trapping or greenhouse gases. SSPs are assumptions about future global population, technological, and economic growth by 2100.

Table 2.2.3-1: Carbon dioxide emission scenarios and radiative forcing

Scenario	Assumptions on carbon dioxide emissions	Radiative forcing in watts per square meter (W m-2) by 2100	Social and economic assumptions
SSP 2–4.5	Carbon dioxide emissions plateau and then gradually decline by mid-century	4.5	SSP 2 – Continuation of historical social and economic trends, with moderate challenges to mitigation and adaptation
SSP 3–7.0	Carbon dioxide emissions double by 2100	7.0	SSP 3 – Conflicts among regions and substantial challenges to mitigation and adaptation
SSP 5–8.5	Carbon dioxide emissions double by 2050	8.5	SSP 5 – Dependence on fossil fuels with substantial challenges to mitigation, but minor challenges to adaptation

The radiative forcings reflected in the scenarios are 4.5, 7.0, and 8.5 watts per square meter (W m-2) by 2100. The social and economic assumptions in the scenarios are continuation of historical social and economic trends, with moderate challenges to mitigation and adaptation (SSP2-4.45); conflicts among regions and substantial challenges to mitigation and adaptation (SSP3-7.0); and dependence on fossil fuels with substantial challenges to mitigation, but minor challenges to adaptation (SSP5-8.5) (O'Neill et al. 2016). When paired with radiative forcing levels, the SSPs produce trajectories of greenhouse gas emissions that result in different degrees of warming by 2100. SSP 2–4.5 assumes that carbon dioxide emissions plateau and then gradually decline by mid-century. Under SSP 3–7.0, carbon dioxide emissions double by 2100, and SSP 5–8.5 assumes that carbon dioxide emissions double by 2050.

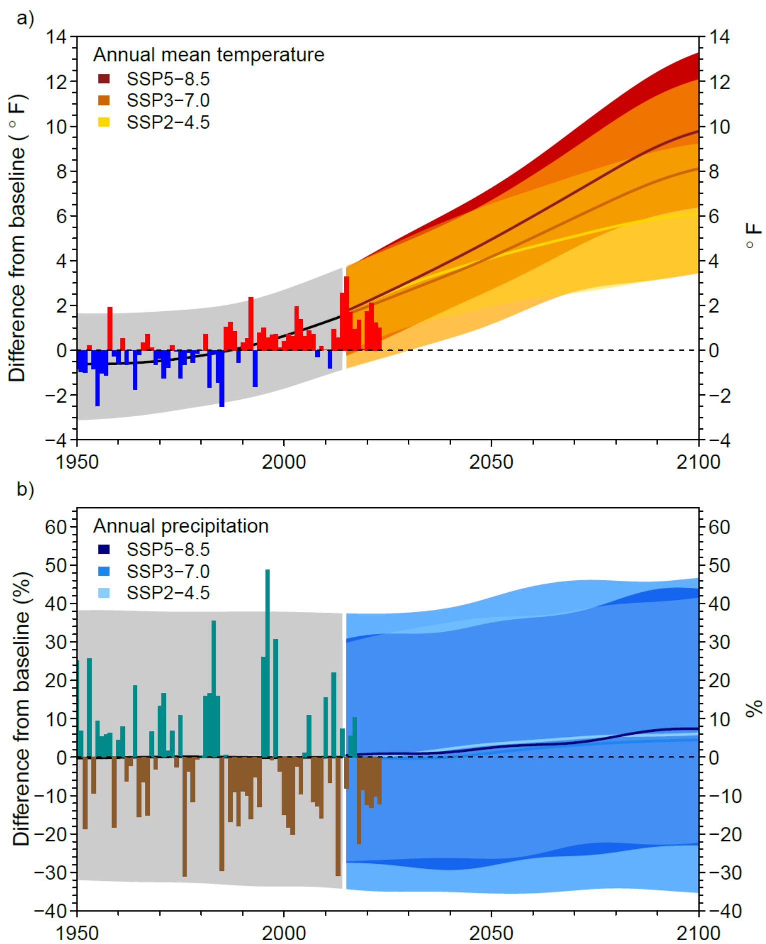
Some climate models are more sensitive than others; they produce greater warming given the same concentration of greenhouse gases. It is best practice to analyze and present an average and range of projections from at least ten global climate models with realistic climate sensitivity that simulate the historical climate well (Mote et al. 2011; Hausfather et al. 2022; Dalton and Bachelet 2023). The equilibrium climate sensitivity is an estimate of the temperature response to carbon dioxide concentrations that have doubled, and remained at that doubled level, after stabilization of temperature over hundreds or thousands of years. The scientific community typically evaluates climate model outputs based on how close they are to the assessed range of climate sensitivity.

Annual

Depending on the scenario, Oregon's annual average temperature is projected to increase by 2.6–3.0°F by 2044, 4.6–5.9°F by 2074, and 5.9–9.1°F by 2100 (Figure 2.2.3-3a). There is no plausible scenario in which Oregon cools in the twenty-first century. At the state level, annual average precipitation is expected to increase by about four to six percent by the late twenty-first century, with wide variability and uncertainty in the projections (Figure 2.2.3-3b).

Colored bars are observed values from the National Centers for Environmental Information. Solid lines are the mean values of simulations from 7–11 downscaled climate models for the years 1950–2100. Shading indicates the range in values from all models. The mean and range were smoothed to emphasize long-term variability.

Figure 2.2.3-3: Observed and projected changes in Oregon's average annual (a) temperature and (b) precipitation relative to 1950–2014 (baseline) under three shared socioeconomic pathways (SSPs).



Source: Fleishman, E., editor. 2025. Seventh Oregon climate assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. doi: 10.5399/osu/1181.

Seasonal

Projections of annual temperature and precipitation are useful for indicating long-term trends, but projected changes in seasonal averages and extremes generally are more relevant for planning and for addressing some of the hazards addressed in this plan.

Temperatures in Oregon in summer are projected to increase more than those in any other season: 3.4–3.5°F (1.9–2.0°C) by 2044, 5.2–7.0°F (2.9–3.9°C) by 2074, and 6.7–10.9°F (3.8–6.1°C) by 2100 (Table 2.2.3-2). The slightly higher annual and seasonal projections under SSP2–4.5 than SSP3–7.0 for the 2015–2044 period likely reflects that the former were based on a smaller set of climate models and ensemble members.

Values are the average of 18 ensemble members from 8 global climate models (SSP 2–4.5), 52 ensemble members from 11 global climate models (SSP 3–7.0), and 18 ensemble members from 7 global climate models (SSP 5–8.5). Values in parentheses are the 5th to 95th percentile ranges across those models. Winter includes December, January, and February; spring includes March, April, and May; summer includes June, July, and August; and autumn includes September, October, and November.

Table 2.2.3-2: Projected Future Changes in Mean Annual and Seasonal Temperature (°F) in Oregon from the Historical Baseline (1950–2014) to Three Periods of Time under Three Shared Socioeconomic Pathways (SSPs).

	2015–2044			2045–2074			2074–2100		
SSP	**2–4.5**	**3–7.0**	**5–8.5**	**2–4.5**	**3–7.0**	**5–8.5**	**2–4.5**	**3–7.0**	**5–8.5**
Annual	2.9 (2.2, 4.4)	2.6 (1.5, 3.5)	3.0 (2.0, 4.5)	4.6 (3.2, 6.6)	5.0 (3.6, 6.4)	5.9 (4.3, 7.7)	5.9 (3.8, 8.6)	7.6 (5.6, 9.8)	9.1 (6.3, 11.9)
Winter	2.7 (1.4, 3.6)	2.3 (0.7, 3.5)	2.9 (1.7, 4.7)	4.5 (3,0, 7.3)	4.5 (2.5, 6.5)	5.6 (3.7, 8.6)	6.0 (3.8, 8.5)	6.7 (4.1, 9.2)	8.5 (6.8, 11.4)
Spring	2.5 (1.5, 4.6)	2.1 (1.3, 2.9)	2.5 (1.3, 4.0)	3.8 (2.0, 5.9)	4 (2.6, 5.5)	4.9 (3.4, 6.9)	4.9 (3.1, 6.9)	6.0 (4.1, 8)	7.3 (5.6, 9.6)
Summer	3.4 (2.4, 4.8)	3.4 (2.1, 4.7)	3.5 (2.3, 5.1)	5.2 (3.5, 7.5)	6.2 (4.4, 8.4)	7.0 (4.6, 9.9)	6.7 (3.9, 10.1)	9.6 (6.5, 12.8)	10.9 (6.8, 15.7)
Autumn	3.0 (1.9, 4.8)	2.7 (1.4, 3.7)	3.2 (1.8, 5.0)	4.9 (3.1, 7.1)	5.2 (3.7, 6.9)	6.2 (4.5, 8.2)	6.0 (3.7, 8.8)	8.0 (6.1, 10.8)	9.6 (6.0, 13.0)

Source: Fleishman, E., editor. 2025. Seventh Oregon climate assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. doi: 10.5399/osu/1181.

Regardless of SSP and time period, average statewide summer precipitation is projected to decrease (Table 2.2.3-3).

Values are the average of 18 ensemble members from 8 global climate models (SSP 2–4.5), 52 ensemble members from 11 global climate models (SSP 3–7.0) and 18 ensemble members from 7 global climate models (SSP 5–8.5). Values in parentheses are the 5th to 95th percentile range across those models. Winter includes December, January, and February; spring includes March, April, and May; summer includes June, July, and August; and autumn includes September, October, and November.

Table 2.2.3-3: Projected Future Changes in Total Annual and Seasonal Precipitation (Percentages) in Oregon from the Historical Baseline (1950–2014) to Three Periods of Time under Three Shared Socioeconomic Pathways (SSPs).

	2015–2044			2045–2074			2074–2100		
SSP	**2–4.5**	**3–7.0**	**5–8.5**	**2–4.5**	**3–7.0**	**5–8.5**	**2–4.5**	**3–7.0**	**5–8.5**
Annual	0.9 (-3.3, 6.2)	-0.5 (-6.9, 5.6)	0.6 (-6.4, 5.9)	3.9 (-4.4, 15.1)	2.3 (-3.4, 7.6)	3.6 (-4.7, 11.3)	6.2 (1.1, 13.6)	4.3 (-3.1, 12.5)	6.6 (-1.1, 16.4)
Winter	4.1 (-5.7, 13.1)	2.5 (-8.7, 13.5)	3.2 (-11.4, 16)	8.2 (-1.6, 28.2)	7.1 (-3.1, 22.1)	8.8 (-9.3, 25)	10 (-3.4, 21.5)	9.5 (-1.4, 25)	12.7 (-3.7, 35.5)
Spring	1.2 (-5.8, 8.7)	-0.5 (-10.3, 9)	1.8 (-7.6, 8.1)	3.3 (-7.6, 9.7)	1.1 (-6.2, 9.1)	3.0 (-4.9, 17.3)	5.6 (-10.8, 25.6)	2.6 (-8.9, 13.8)	4.0 (-12.8, 18.1)
Summer	-6.2 (-18.8, 3.2)	-8.5 (-22.9, 7)	-8.1 (-25.3, 11)	-5.8 (-19.5, 3.2)	-8.9 (-34.3, 8.8)	-6.8 (-21.8, 10.2)	-3.9 (-26.4, 17.6)	-6.6 (-41.5, 33.9)	-9.2 (-27.1, 23.7)
Autumn	-2.2 (-12.3, 8.0)	-2.7 (-12.3, 7.9)	-1.9 (-12.1, 14.4)	0.9 (-15.7, 12.6)	-0.7 (-13.9, 15.5)	-1.0 (-16.3, 18.7)	4.2 (-13.7, 26.9)	1.2 (-14.3, 25.3)	4.5 (-14.2, 26.3)

Source: Fleishman, E., editor. 2025. Seventh Oregon climate assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. doi: 10.5399/osu/1181.

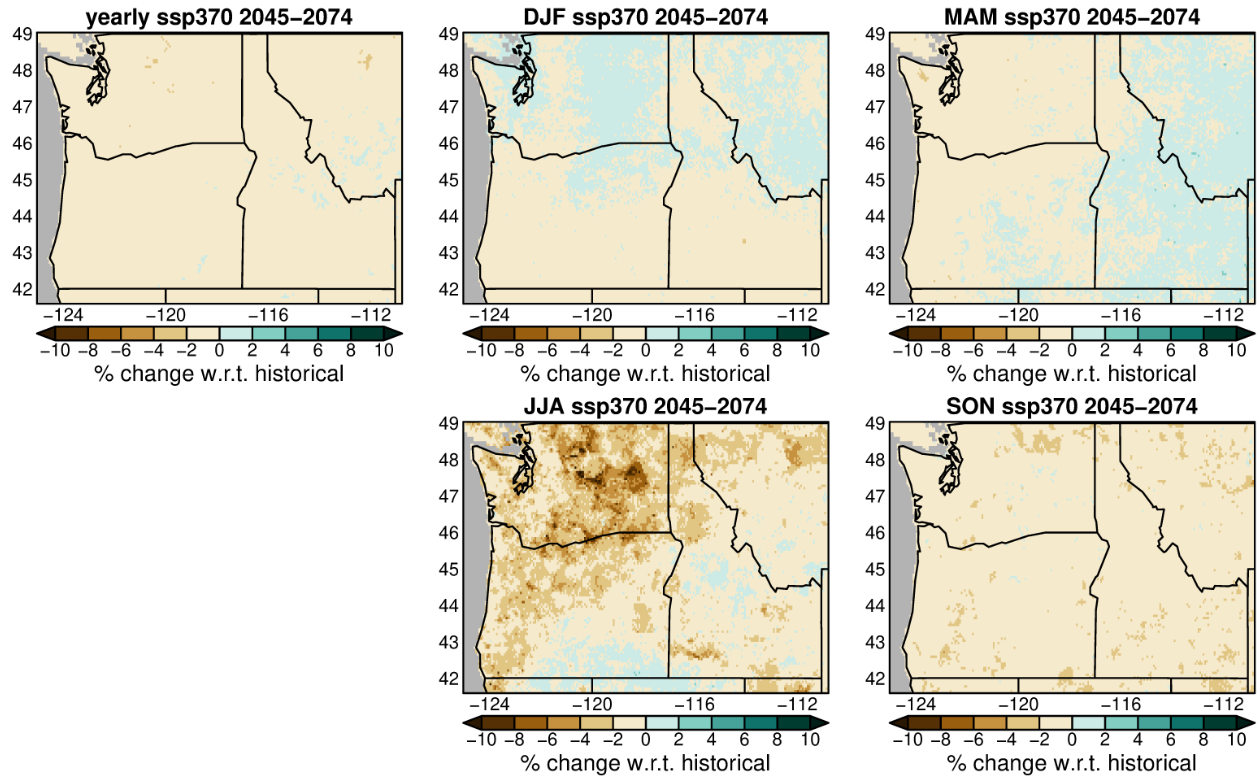
Extremes

Natural hazards are often an expression of extreme conditions. Examples include windstorms, heavy precipitation, floods, droughts, and heat waves.

Precipitation

Extreme precipitation is one of the most common and widespread natural hazards in Oregon. Extreme precipitation events west of the Cascade Range are generally associated with atmospheric rivers—long, narrow swaths of warm, moist air that carry large amounts of water vapor from the tropics to mid-latitudes. Closed low pressure systems often lead to isolated precipitation extremes east of the Cascade Range (Parker & Abatzoglou, 2016). From 1950–2014, precipitation (≥0.5 mm / day) fell on over 65 percent of winter days in the coastal Pacific Northwest and Cascade Range. Over much of Oregon, especially east of the Cascade Range and in the Columbia Plateau, less than 15 percent of summer days were wet. By the middle of the twenty-first century (2045–2074) under an intermediate emissions scenario, the annual average projected increase in precipitation over the Pacific Northwest is about 7.3%. Projections suggest a 0–6 percent decrease in the proportion of wet days in summer, and negligible changes during other seasons (Figure 2.2.3-4). Projected decreases in summer precipitation and the proportion of wet days during summer roughly coincide. These changes, and the fact that the projected reduction in precipitation is stronger than that of proportion of wet days, suggest that reductions in mean summer precipitation are not solely a result of fewer wet days.

Figure 2.2.3-4: Annual and projected average change in the proportion of wet days between 1950–2014 and 2045–2074 given shared socioeconomic pathway (SSP) 3–7.0. DJF, December, January, February; MAM, March, April, May; JJA, June, July, August; SON, September, October, November.

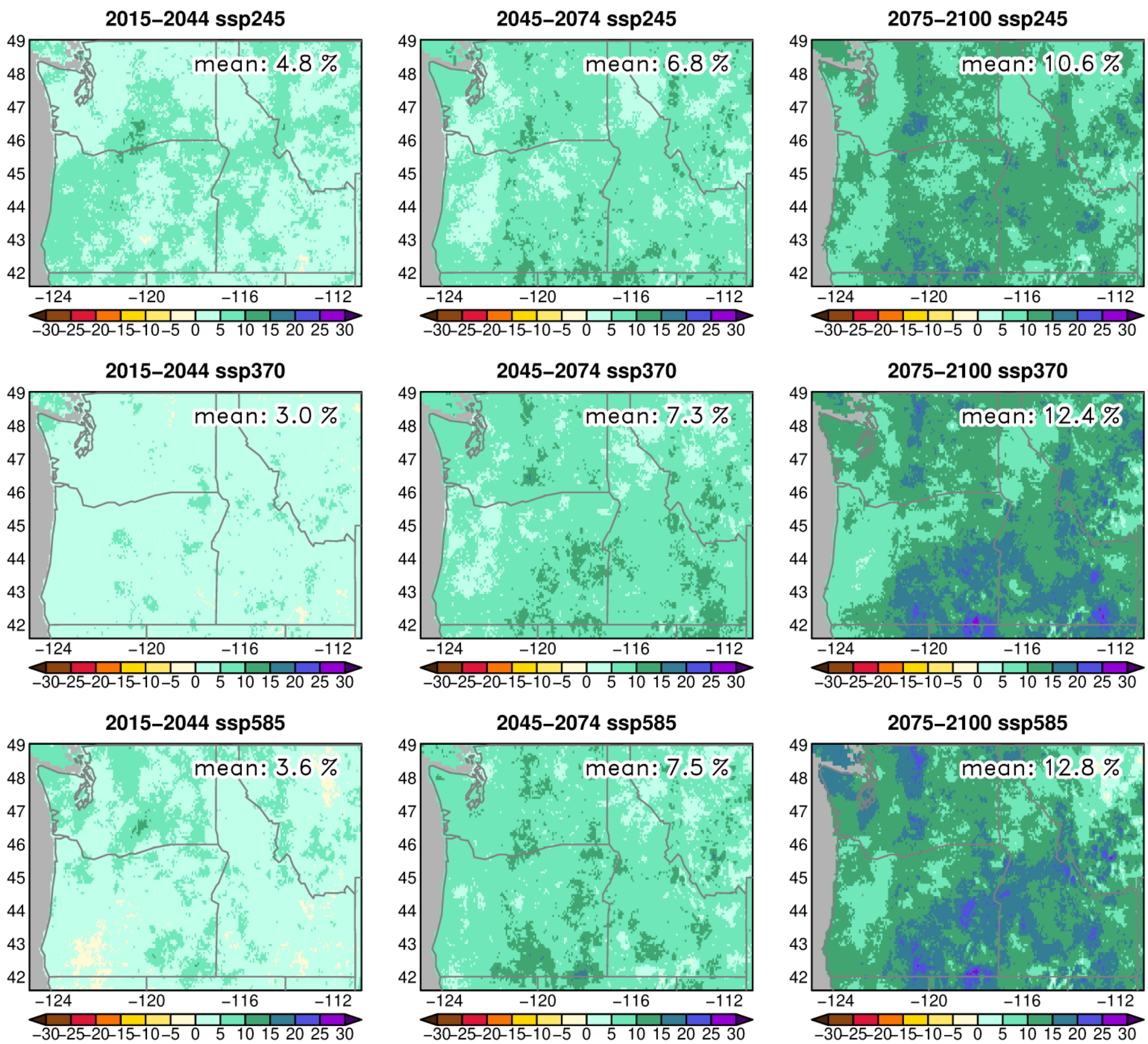


Source: Pierce, D.W., and D.A. Cayan. 2025. Projected changes in Oregon precipitation. Pages 54-78 in E. Fleishman, editor. Seventh Oregon climate assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. doi: 10.5399/osu/1181.

As the atmosphere warms, it holds more water vapor that can precipitate onto Earth (Westra et al. 2014, Kroner et al. 2017, Norris et al. 2019, Harp and Norton 2022). As a result, the intensity of extreme precipitation events is expected to increase. In addition, regional climate modeling results suggest that the rain shadow effect in winter may weaken, leading to relatively larger increases in seasonal precipitation and extreme wet day precipitation east of the Cascade Range and smaller increases west of the Cascade Range (Fleishman 2025).

There are multiple ways to define extreme precipitation, for example, days on which precipitation totals exceed the 95th, 99th, or 99.9th percentiles. At the 99th percentile, by the mid-twenty -first century (2025–2074) and beyond, regardless of emissions scenario, all projected changes across the Pacific Northwest are increases, and the magnitude of the increase becomes larger over time (Figure 2.2.3-5). In Oregon, these changes are greatest in winter, particularly in southeastern Oregon. In western Oregon and the Willamette Valley, the largest projected increases in extreme daily precipitation occur in autumn, with values approaching 10 percent for the 99th percentile and 20 percent for the 99.9th percentile by mid-century.

Figure 2.2.3-5: Average percentage change in precipitation at the 99th percentile of wet days between the historical period (1950–2014) and three periods during the twenty-first century (columns) given three shared socioeconomic pathways (SSPs) (rows). Means over the geographic domain are in the upper right of each panel.



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Extreme Heat

Extreme heat first was included as a natural hazard in the 2020 Oregon NHMP. The inclusion reflected the recognition that as the climate continues to warm, extreme heat poses greater threats to public health and infrastructure. There is no single definition of a heat wave, but heat waves usually are defined with respect to both the relative magnitude of temperature anomalies (e.g., temperatures above the 99th percentile for a given location and season) and the duration of those anomalies (e.g., at least three consecutive days). By this definition, a prolonged period with temperatures exceeding 100°F would not be considered a heat wave if it occurred in Phoenix, Arizona, in July, but would be considered a heat wave if it occurred in Portland, Oregon, in July or in Phoenix in March. Heat waves can occur during any season, although the term “heat wave” is generally reserved for prolonged stretches of extreme heat that pose a substantial health and safety risk. Temperatures in Oregon are most likely to be dangerously high during summer (June–September). Although extremely warm daytime highs often generate the most press coverage and public interest, extremely warm overnight lows often are a greater threat to human health, especially where access to air conditioning is limited (Gershunov et al. 2011).

Extreme warm temperatures are often defined based on absolute thresholds. A common definition of an extremely warm day in the Pacific Northwest is a day on which the maximum temperature is 90°F or above. By this definition, the number of extremely warm days increased significantly across Oregon since 1951.

It is unclear whether extreme heat in the Pacific Northwest is increasing at a faster rate than mean temperature. For example, soil moisture during summer is likely to decrease as summer precipitation decreases, increasing the potential for heat extremes (Rupp et al. 2017, Zhang et al. 2023). However, because soil moisture in the region during summer already is low and the absolute projected decrease in precipitation is small, any effect on temperature also is likely to be small (Rupp et al. 2017, Bercos-Hickey et al. 2022). Climate change also may cause changes in atmospheric circulation patterns that can increase the frequency, intensity, or duration of high-pressure anomalies conducive to heat waves (e.g., Horton et al. 2015, Zhang et al. 2023). In contrast, some models indicated a weakening of strong easterly summer winds since 1970, effectively reducing offshore flow and downslope warming on leeward (in this case, west side) mountain slopes (Mass et al. 2022).

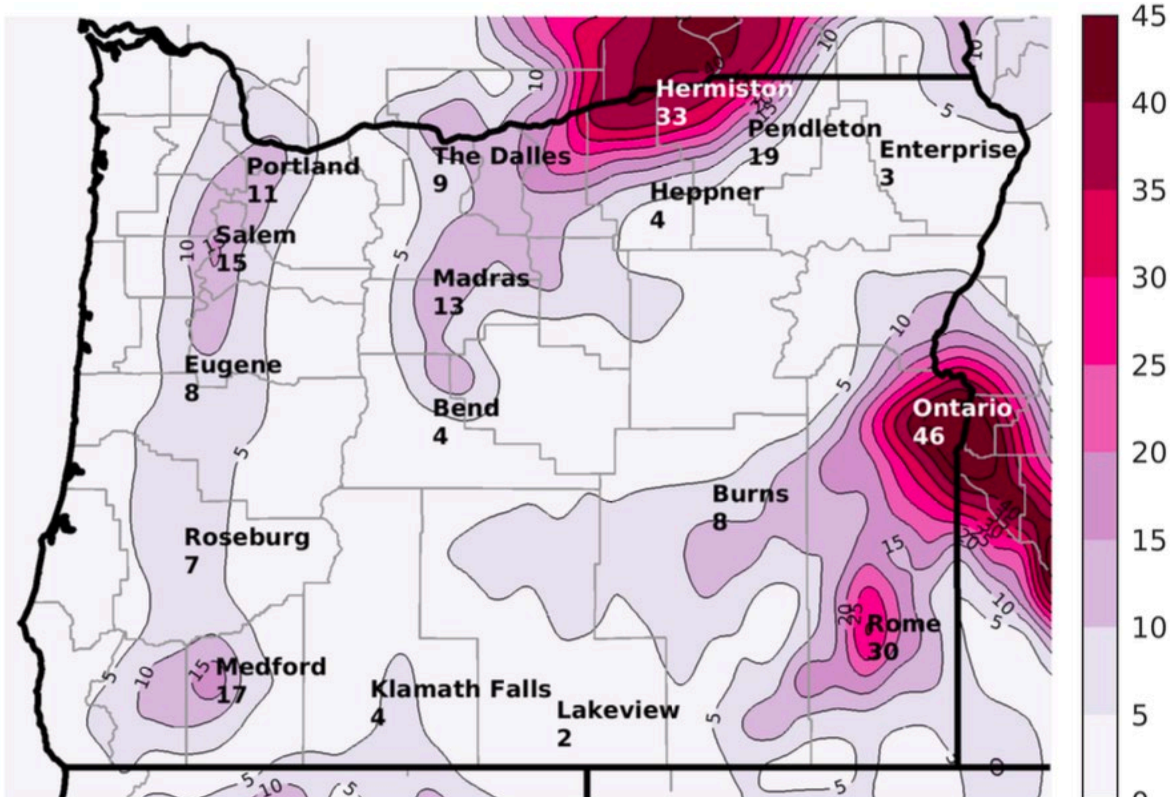
Regardless, climate change will continue to affect extreme heat events in two ways. First, the intensity of extreme heat events will increase further. Second, humans’ perception of extreme heat will change as the frequency of events currently considered to be extreme increases. For example, temperatures that historically occurred on 0.5 percent of days are projected to become more than twice as common. In Portland during the twentieth century, 100°F temperatures occurred about once every 10 years. By 2025, they are likely to occur about once every 2 years.

As air becomes more humid, the human body is less able to cool through the evaporation of perspiration. Therefore, the incidence of heat illness is not necessarily directly correlated with air temperature. The heat index, also known as the apparent temperature, is what the temperature feels like to the human body when relative humidity is combined with air temperature. The heat index describes human health impacts better than air temperature and is now the primary metric Oregon uses for regulating heat in work environments.

When relative humidity is low, the heat index is roughly the same as, or slightly cooler than, the air temperature. As relative humidity increases, the heat index becomes higher than the air temperature, and the difference between the heat index and the air temperature increases. For example, when the air temperature is 90°F, the heat index will be 88°F if the relative humidity is 30 percent, but 100°F if the relative humidity is 60 percent. Historically, heat waves across Oregon rarely were humid (Rastogi et al. 2020). Because high heat and low relative humidity tend to co-occur in Oregon, the heat index is generally a few degrees lower than the actual air temperature. As a result, approximating the heat index with only air temperature would significantly overestimate the number of high heat-index days in Oregon.

The occurrence of high heat-index days varies considerably across Oregon (Figure 2.2.3-6). In western Oregon from 1991–2020, the greatest number of days per year with a heat index above 90°F occurred in the Willamette Valley and Rogue Valley, ranging from an average of 17 days in Medford to 7 days in Roseburg. In much of Oregon east of the Cascade Range, the heat index exceeded 90°F on fewer than 10 days per year. However, the heat index exceeded 90°F in Ontario and Rome (Malheur County) on an average of 46 and 30 days per year, respectively. In northeastern Oregon, the heat index exceeded 90°F in Hermiston and Pendleton on an average of 33 and 19 days per year, respectively. Since 2011, the average number of hours during which most Oregonians were exposed to heat indexes above either 80°F or 90°F increased relative to 1981–2010. In Portland, for example, the average number of exposure hours in 2021 and 2022 was more than three times greater than from 2011–2020.

Figure 2.2.3-6: Average annual number of days from 1991–2020 on which the heat index was 90°F or above. Heat indexes derived from ERA5 atmospheric reanalysis data.



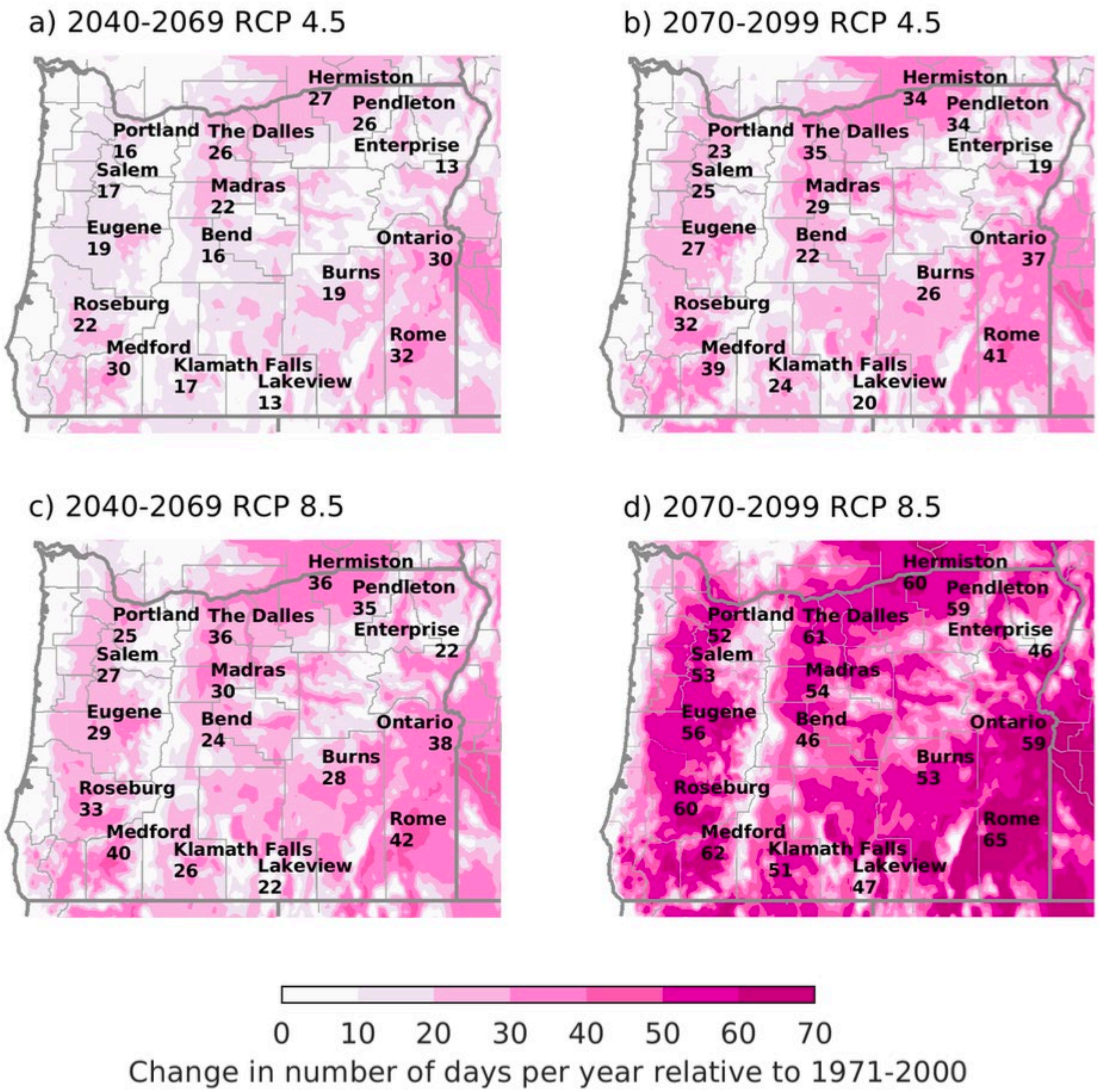
Source: O'Neill, L., N. Siler, P. Loikith, and A. Arends. 2023. Extreme temperatures. Pages 40-51 in E. Fleishman, editor. Sixth Oregon climate assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. doi: 10.5399/osu/1161.

Climate change is projected to alter both temperature and relative humidity, and thus the heat index. Climate models project little change in relative humidity in Oregon, with a decrease of only a few percent in eastern Oregon during summer by the end of the century. Warming over extensive areas is the primary driver of projected future changes in extreme heat index values in the Pacific Northwest (Schoof et al. 2019).

Because the heat index has a nonlinear relation to relative humidity, the projected trends in the heat index are not necessarily constrained to follow those in air temperature. The number of days on which the heat index exceeds 90°F is projected to increase throughout Oregon except at high elevations and on the west side of the Coast Range (Figure 2.2.3-7).

Values are means of 18 downscaled models from the fifth phase of the Coupled Model Intercomparison Project (CMIP5) (Dahl et al. 2019). Note: these figures illustrate change in heat days over a longer time period than the analysis and illustration in the NHMP Extreme Heat chapter.

Figure 2.2.3-7: Increase in the Projected Number of Days per Year with a Heat Index of 90°F or Above Relative to 1971–2000.



Data source: O'Neill, L., N. Siler, P. Loikith, and A. Arends. 2023. Extreme temperatures. Pages 40-51 in E. Fleishman, editor. Sixth Oregon climate assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. doi: 10.5399/osu/1161.

Across the majority of Oregon by the mid-twenty-first century, the mean annual number of days with a heat index above 90°F is projected to increase by 15–30 days assuming moderate increases in emissions of greenhouse gases and 25–40 days assuming higher increases in emissions.

In the Willamette Valley, for example, the annual number of days with an extreme heat index will be double or triple that from 1991–2020. The greatest increases in the number of extreme heat index days by the late twenty-first century, 20–40 days assuming RCP 4.5 and 45–65 days assuming RCP 8.5, will occur near Hermiston, Rome, and Ontario. The number of days with an extreme heat index in these areas is already among the highest in Oregon. In some parts of eastern Oregon given a high-emissions scenario, the heat index is projected to exceed 90°F on most summer days. In large part, these exceedances reflect projected increases in warming in eastern Oregon, which are greater than those in western Oregon, throughout the twenty-first century.

2.2.4 Effect of Oregon's Future Climate Conditions on Natural Hazards

In 2010, Oregon achieved a significant milestone with the publication of two documents that addressed climate change across the state. OCCRI released the first Oregon Climate Assessment (Dello & Mote, 2010), a comprehensive scientific assessment of climate change and its effects on natural and human systems in the state. The state released the Oregon Climate Change Adaptation Framework, which represented the initial efforts of over a dozen state agencies and institutes, including OCCRI, to establish a rigorous means of addressing the effects of climate change across the state.

OCCRI has since produced six biennial assessments (2013, 2017, 2019, 2021, 2023, 2025) (https://blogs.oregonstate.edu/occri/oregon-climate-assessments/). The second Oregon Climate Assessment (Dalton, M.M., P.W. Mote, and A.K. Snover, 2013) first introduced climate change information in the 2015 Oregon NHMP. The third and fourth Oregon Climate Assessments (Dalton, Dello, Hawkins, Mote, & Rupp, 2017) (Mote, Abatzoglou, Dello, Hegewisch, & Rupp, 2019) contributed to updates of the climate change information in the 2020 Oregon NHMP.

Development of Oregon's 2010 Climate Change Adaptation Framework was significant in that the state began to address the need to plan for the effects of future climate conditions. Furthermore, Oregon's 2010 Framework was the first state-level adaptation strategy based on climate risks as opposed to affected sectors. Oregon's 2010 Framework laid out 11 climate risks that are of concern to the state. The risks provided a consistent basis for agencies and communities to review plans and decisions to identify measures to reduce those risks. Many of the risks in the 2010 Oregon Framework are natural hazards. DLCD revised the 2010 Climate Change Framework in 2021 to include interagency strategies to respond to climate risks. Governor Brown adopted the revised Framework and the State IHMT appended it to the Oregon NHMP in 2021. The state's Climate Change Adaptation Framework Implementation Team is updating the 2020 Framework and the 2025 Oregon NHMP concurrently.

A summary of the principal effects of climate change on the natural hazards addressed in the 2025 Oregon NHMP, and their effects on different Oregon Natural Hazard Mitigation Planning Regions where relevant, follows. DLCD has renamed the 2010 Framework's "climate risks" as "climate drivers of change" for clarity in Table 2.2.4-1 and the following discussion.

Table 2.2.4-1: Relationship Between Climate Change Adaptation Framework Climate Drivers of Change and Hazards in the Oregon NHMP

	Oregon NHMP Hazards						
Climate Change Adaptation Framework Climate Drivers of Change	Coastal Hazards	Droughts	Extreme Heat	Wildfire	Floods	Landslides	Winter Storms
Increased temperatures*	X	X	X	X	X	X	X
Changes in hydrology*	X	X			X	X	X
Increased wildfires		X		X	X	X	
Increase in ocean temperatures and changes in ocean chemistry	X				X		X
Increased drought		X		X			
Increased coastal erosion	X					X	
Changes in habitat	X						
Increase in invasive species and pests		X		X			
Loss of wetland ecosystems and services					X		
Increased frequency of extreme precipitation events and flooding	X				X	X	X
Increased landslides						X	

*Primary climate drivers of natural hazards

Source: DLCD

2.2.4.1 Coastal Hazards

Regions affected: 1

Sea level rise plays a key role in increased incidence of coastal erosion and flooding. The Oregon coast is within Cascadia, which is defined by the subduction of the Juan de Fuca Plate under the North American Plate. Tectonics has a substantial effect on the region's exposure to chronic coastal hazards through its influence on geomorphology and rates of relative sea-level rise (Burgette et al. 2009, Komar et al. 2011). Primarily due to tectonic uplift, relative sea-level rise rates are slower in Oregon than in many other coastal regions of the United States. In some areas of the Oregon coast, tectonic uplift has kept pace with increases in sea level. However, relative sea-level rise rates along much of the Oregon coast are at least 1 mm per year less than the current global average (~3.4 mm [0.13 in] per year; Sweet et al. 2022).

In 2022, the National Oceanic and Atmospheric Administration (NOAA) released regional sea-level rise scenarios for the United States coastline from 2000–2150 that incorporate the best estimates of uplift. By 2050, the expected rise in sea level will cause total water levels to increase and change coastal flood regimes throughout the United States, with major and moderate high-tide flood events occurring as frequently as moderate and minor high-tide flood events occur today.

Substantial uncertainties hamper quantification of how climate change will affect storminess patterns. Historically, for example, major coastal flooding and erosion along the Oregon coast was more likely during El Niño years (e.g., Barnard et al. 2015). Due to anomalies in physical processes, such as elevated water levels and higher wave energy from the southwest, local erosion along the west coast of the United States tends to be high during strong El Niño events. Coastal flooding and erosion deplete sand from beaches and make them more susceptible to elevated water levels and enhanced wave energy during future storms.

Higher precipitation rates during El Niño events can increase runoff and compound flooding hazards by elevating the local sea surface.

Relative sea-level rise narrows the gap in elevations between commonly occurring high tides and the thresholds above which coastal flooding and erosion begin. Therefore, increases in extreme coastal water levels along the Oregon coast increase coastal erosion and coastal flooding impacts. A multi-decadal, statewide analysis identified both a general increase in shoreline erosion along the Oregon coast in recent decades and significant spatial variation within and among littoral cells (coastal compartments within which sediment movement is self-contained) (Light 2021). Shoreline change was statistically significant in 17 of the 18 primary littoral cells along the Oregon coast from 2002–2016. The average statewide rate of change from 2002–2016 was -2.3 ft per year. The highest average erosion rates tended to be in southern Oregon.

Taherkhani et al. (2020) used data from tide gauge stations and projections of future sea-level rise (Kopp et al. 2014) to investigate continuous shifts in flooding along coastlines in the United States. They found that approximately 2.8 in of sea-level rise along the Oregon coast doubles the odds that annual flood levels will exceed the 50-year event threshold (a level with a 2 percent chance of occurring in a given year). The odds of this magnitude of flooding double approximately every 6 years until 2075.

Increases in water levels due to sea-level rise and possible changes in patterns of storminess will increase the frequency and magnitude of coastal erosion and flooding. The U.S. Army Corps of Engineers used Climate Central's (2021) Surging Seas Risk Finder to estimate the potential effects of 1 and 2 feet of sea-level rise on populations, land, property, and infrastructure within the United States (USACE 2022). On the Oregon coast, approximately 781 homes and 1318 people are within the area that would be inundated by 1 foot of sea-level rise (USACE 2022). An estimated 18 percent of those individuals have high social vulnerability as estimated based on 29 variables related to wealth, racial and social status, ethnicity, age, health insurance, special needs, ethnicity, employment, and gender. An additional 307 homes and 627 individuals, 157 of them with high social vulnerability, are located within the area that would be inundated by 2 feet of sea-level rise.

Many residents in coastal cities may need evacuation assistance during a flood. Sea-level rise on the Oregon coast also may lead to changes in navigation channels (e.g., leading to an increase in dredging and adjustment of channel location and dimensions), increased scouring at structure foundations, and decreased clearance under bridges and port infrastructure (USACE 2022). U.S. Highway 101 and other major transportation routes and facilities along the Oregon coastline will become increasingly susceptible to erosion, flooding, and landslides as climate changes.

Public access is one of the coastal resources most at risk from accelerating sea level rise. Rising seas may dramatically impact beaches, accessways, and recreational amenities (e.g., parking lots, bathrooms, signs). Public access to the coast is important to the economic viability, quality of life, and health and well-being of members of the community, including low-income and underserved populations. By providing low-cost outdoor recreational opportunities through public access to Oregon's beaches and estuaries, communities can improve their overall economic and health outcomes. Where development already exists, and particularly where there is substantial shoreline armoring to protect this development, Oregon may lose significant recreational beach areas. Additional shoreline armoring and riprap can decrease access to public sandy recreational beaches, remove or impact public access locations to the water, diminish the ability to include accessibility features at public access sites, hinder lateral beach access, require increased costs and maintenance of public access amenities, and contribute to a general loss of public access locations. These places that are at increased risk provide economic, health, and environmental benefits for everyone. The potential loss of beach and shoreline recreation areas represents a significant potential impact to an important and treasured resource.

The Oregon Coastal Program produced a Sea Level Risk Planning Guide for Coastal Oregon in 2022 to assist communities with addressing the consequences of sea level rise. (SLR_Planning_Guide_V1.pdf)

2.2.4.2 Extreme Heat

Regions affected: 1-8

The frequency, duration, and magnitude of extreme heat is projected to increase in all eight NHMP planning regions. By mid-century (2045–2054), the projected mean number of days with maximum temperatures above the 90th percentile for the region from 1981–2010 ranges from 34.7 (region 1) to 46.5 (region 8), and the mean number of days above 90˚F from 1 (region 1) to 53.3 (region 8).

Certain populations are considered at particularly high risk of heat-related illness and death. Extreme heat also exacerbates interpersonal violence (Miles-Novelo and Anderson, 2019; Stechemesser et al., 2022). Vulnerable populations include outdoor workers in agriculture, forestry, and other sectors; residents of urban heat islands; people with preexisting conditions or without housing or air conditioning; pregnant people; older adults; children; low-income communities; and communities of color (York et al., 2020; Ho et al., 2021). Extreme heat events can disrupt transportation, leading railroad track to bend or roadway joints to buckle (Jacobs, et al., 2018). In addition, heat waves can increase the demands on electric power for cooling, increasing the risk of cascading failures within the electric power network (Clarke, et al., 2018).

2.2.4.3 Droughts

Regions affected: 1-8

There are many conceptual and quantitative definitions of drought (Wilhite and Glantz 1985, Rasmussen et al. 1993), some of which are objective and some of which are subjective. The simplest definition of drought is insufficient water to meet demand (Redmond 2002, Swann 2018). However, the precise definition of drought depends on the location and context. Meteorological drought traditionally has been defined just by lack of precipitation but is better defined as evaporative demand that exceeds precipitation over a prolonged period. Hydrological drought occurs when extended periods of meteorological drought affect surface water supply or soil moisture and is most consequential for society when water supply does not meet human demand. Meteorological and hydrological drought are driven by physical factors and do not describe impacts on humans or ecosystems. Several other types of drought are defined based on their effects on particular components of human and natural systems. For example, agricultural drought occurs when lack of surface or subsurface water supply adversely affects agricultural production.

Another noteworthy type of drought is flash drought. Flash droughts, which occasionally occur throughout Oregon (Pendergrass et al. 2020, Otkin et al. 2022), are characterized by rapid-onset periods of elevated surface temperatures, low relative humidities, precipitation deficits, and rapid declines in soil moisture. These conditions often occur in Oregon during heat waves in late spring and summer, and the adverse impacts of flash drought can emerge in as little as a week (Mo and Lettenmaier 2015, Rupp et al. 2017).

Regional climate model simulations indicate that precipitation will likely increase across much of Oregon during the twenty-first century, particularly east of the Cascade Range. Projected changes in precipitation in western Oregon are more uncertain. In contrast, potential evapotranspiration is projected to increase across the state. Although many plants are expected to transpire less water as carbon dioxide (CO_2) concentrations increase over the next century (Swann et al. 2016, Yang et al. 2019), that increase in water-use efficiency only partially will offset he increase in atmospheric dryness due to warmer temperatures. Climate models suggest that drought risk likely will increase over the twenty-first century on the western slopes of the Cascade Range and the southern Coast Range, decrease in the Deschutes and John Day basins in north-central Oregon, and change little elsewhere. However, due to a shift in the seasonal distribution of precipitation, drought risk during summer is likely to increase statewide.

2.2.4.4 Wildfires

Regions affected: 1-8

Contemporary wildfire risk is affected by interactions among plant physiology, climate, and human activities. High temperatures are a major contributor to desiccation of dead vegetation, whereas dry air reduces moisture in live vegetation. The drier the air, the more plants transpire and lose water. Dry dead or living vegetation is more likely to burn than wet vegetation. Extreme wildfires are more likely to occur when vegetation is dry and weather conditions conducive to fire, including high temperatures, aridity, and wind speeds (Reilly *et al.*, 2022), coincide. Coincidence among these extremes is becoming more common (Abatzoglou *et al.*, 2021a). Such wildfires can cause widespread loss of structures and the loss of human lives (Abatzoglou *et al.*, 2021b).

Historically, wildfires were less active overnight, and the probability of fire expansion generally was evaluated based on daytime conditions. However, across the western United States, the number of nights during which atmospheric conditions are conducive to burning has increased by 45 percent since 1979 (Balch et al., 2022). The intensity and duration of wildfires is expected to increase as nights continue to become hotter and drier (Chiodi et al., 2021; Balch et al., 2022).

Human activities have modified fire dynamics in the western United States through fragmentation and exploitation of these ecosystems, increased recreational activity, and the introduction of highly flammable, non-native annual grasses. Over 80 percent of ignitions in the United States are now human-caused (Balch et al., 2017). Projections that include concurrent increases in aridity, temperature, and intensification of land use indicate that area burned and the frequency of wildfires will continue to increase in the Pacific Northwest, and wildfire intensity will increase (Sheehan et al., 2015; Dalton et al., 2017; Mote et al., 2019; Dalton and Fleishman, 2021; Rupp and Holz, 2023).

The duration of the fire weather season in forests of the Northwest increased by 43 percent from 1979 through 2019 (Jones *et al.*, 2022). Similarly, the number of days per year on which fire danger was extreme increased by 166 percent from 1979 through 2019 (Jones *et al.*, 2022). Multiple metrics of fire danger and climate models projected that in Oregon, the number of summer days with high fire danger will increase through the end of the twenty-first century, particularly in the Cascade Range, Coast Range, and Klamath Mountains (Gergel et al., 2017, Brown et al., 2021).

Wildfire Smoke

Wildfire smoke poses a much greater threat, in terms of deaths and total costs to society, than wildfire flames per se (Fleishman, 2023). Wildfire smoke also impairs visibility near ground level and at altitudes where firefighting aircraft and evacuation helicopters fly (Nolte et al., 2018). Hazardous levels of air pollution are most common near wildfires, but extensive fires in the western United States and Canada in recent decades have generated taller plumes of smoke and injected a greater volume of fine particulate matter (particles less than 2.5 micrometers in diameter [$PM_{2.5}$]) at high altitudes, increasing long-range transport of these particulates and posing a health hazard to larger numbers of people both near to and far from those wildfires (Wilmot *et al.*, 2022; Rupp and Holz, 2023).

Wildfires are the primary cause of exceedances of air quality standards for $PM_{2.5}$ in western Oregon and parts of eastern Oregon (Liu et al., 2016), particularly in August and September (Wilmot et al., 2021). Across the western United States, $PM_{2.5}$ concentrations from wildfires were projected to increase 160 percent by 2046–2051, relative to 2004–2009, under a moderate emissions scenario (Liu *et al.*, 2016). Global climate models that were integrated with an empirical statistical model projected that $PM_{2.5}$ concentrations in August and September in the Northwest will double under a lower (emissions scenario and triple under a higher emissions scenario by 2080–2100 compared to 1997–2020 (Xie et al., 2022).

Exposure to $PM_{2.5}$ aggravates chronic cardiovascular and respiratory illnesses (Cascio, 2018). In addition, exposure to $PM_{2.5}$ increases susceptibility to viral respiratory infections (Henderson, 2020). Furthermore, wildfire smoke can disrupt outdoor recreational and social activities, in turn affecting physical and mental health (Nolte et al., 2018). Excess asthma events due to $PM_{2.5}$ from wildfire smoke were projected to increase in Oregon by about 42 per 10,000 persons, resulting in a projected increase in cost of more than $250,000 per 10,000 persons (Stowell et al., 2021). Those at high risk of adverse health outcomes as a result of wildfire smoke include people with preexisting conditions, outdoor workers, children, pregnant people, older adults, and rural and tribal communities (York et al., 2020; Ho et al., 2021). Poor air quality and increases in airborne allergens are most likely to affect communities with low incomes, high non-White or farmworker populations, or that are near highways and industrial facilities; outdoor workers; and those with preexisting conditions (York et al., 2020; Ho et al., 2021).

2.2.4.5 Winter Storms

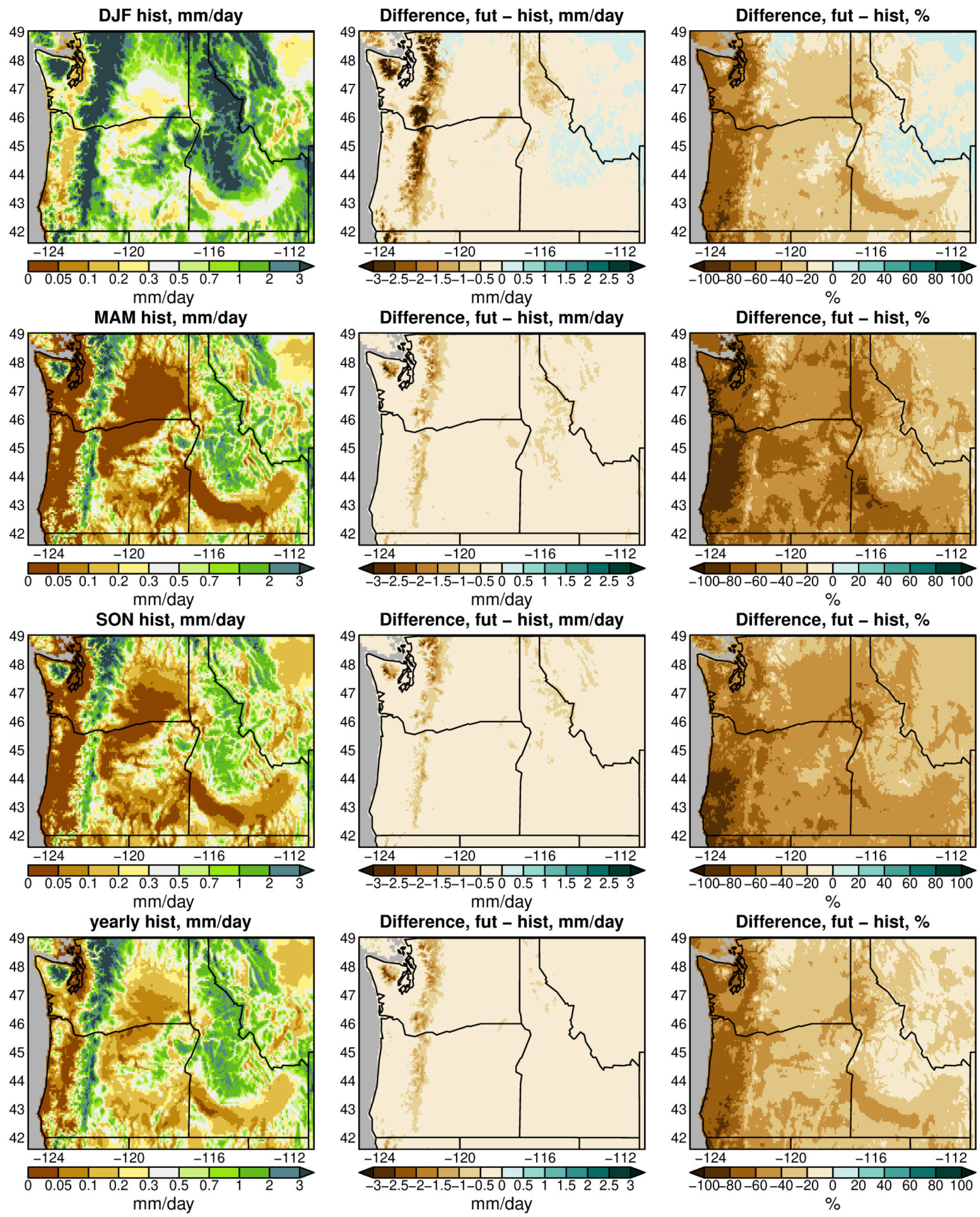
Regions affected: 1-8

Diverse human and natural systems are affected by the proportions of precipitation that fall as rain and snow. Snow acts as a large, natural reservoir of water that accumulates during winter and is released slowly during spring and summer. Lack of snow in winter increases the likelihood of hydrological or agricultural drought during the following spring and summer. Rather than estimating snow depth, we estimated the water content of the snow that falls (the snow water equivalent, SWE). For example, if 10 cm of snow falls on a given day and that snow contains 1 cm of water, the SWE snowfall is 1 cm.

In Oregon, the proportion of annual total precipitation that falls as snow is projected to decrease by 10–20 percent from the Cascade Range and to the east by the middle of the twenty-first century. The largest decreases, 40–80 percent across much of the state, are in spring. Over the period 1950–2100, snowfall is projected to decrease by no less than 50 percent in any part of Oregon, with decreases of 65 percent or more in the Cascade Range and foothills of the eastern Cascade Range and over 85 percent in western Oregon.

Absolute snowfall (SWE) is another way to evaluate changes in precipitation type. In Oregon, the largest projected annual changes in absolute snowfall between 1950–2014 and mid-century are in winter in the Cascade Range, where decreases in SWE of 2–3 mm/day are common (Figure 2.2.4-1). These changes represent relative decreases in SWE of 20–60 percent. The largest relative seasonal changes in absolute snowfall occur during spring, with decreases exceeding 80 percent in western Oregon, albeit snow rarely falls in this region. Projected changes during autumn are similar to those during spring. Winter SWE snowfall is projected to decrease by mid-century across most of Oregon, in many regions by 40 percent or more. In parts of the northern Cascade Range, however, SWE snowfall is projected to increase by mid-century before declining toward the end of the century.

Figure 2.2.4-1: Left column: Historical (1950–2014) seasonal and annual snow water equivalent. Middle column: Average projected absolute change in snow water equivalent between the historical period and the mid-twenty-first century (2045–2074) given shared socioeconomic pathway 3–7.0. Right column: Multi-model ensemble average projected percentage change in snow water equivalent between the historical period and the mid-twenty-first century. DJF, December, January, and February (winter); MAM, March, April, and May (spring); SON, September, October, and November (autumn).



Source: Pierce, D.W., and D.A. Cayan. 2025. Projected changes in Oregon precipitation. Pages 54-78 in E. Fleishman, editor. Seventh Oregon climate assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. doi: 10.5399/osu/1181.

2.2.4.6 Floods

Regions affected: 1-8

Streams in the Northwest are projected to shift toward higher winter runoff, lower summer and fall runoff, and earlier peak runoff, particularly in snow-dominated regions (Raymondi et al., 2013; Naz et al., 2016). These changes are expected as a result of increases in the intensity of heavy precipitation; warmer temperatures that cause more precipitation to fall as rain and less as snow, and snow to melt earlier in spring; and increasing winter precipitation and decreasing summer precipitation (Dalton et al., 2017, 2021; Mote et al., 2019).

Warming temperatures and increasing winter precipitation are expected to increase flood risk in many basins in the Northwest, particularly mid- to low-elevation, mixed rain-and-snow basins in which winter temperatures are near freezing (Tohver et al., 2014). The greatest projected changes in peak streamflow magnitudes are at intermediate elevations in the Cascade Range and Blue Mountains (Safeeq et al., 2015). Regional hydroclimate models projected increases in extreme high flows throughout most of the Northwest, especially west of the Cascade crest (Salathé et al., 2014; Najafi and Moradkhani, 2015; Naz et al., 2016). Rainfall-driven floods are more sensitive to increases in precipitation than snowmelt-driven floods. Therefore, the projected increases in total precipitation, and in rain relative to snow, likely will increase flood magnitudes in the region (Chegwidden et al., 2020).

Across the western United States, the average magnitudes of major floods are projected to increase by 14–19 percent by 2010–2039, 21–30 percent by 2040–2069, and 31–43 percent by 2070–2099, compared to the 1971–2000 historical baseline, under a higher emissions scenario (Maurer et al., 2018). Major floods are defined as daily peak flow magnitudes that are associated with 100-year to 10-year return periods (1–10 percent probability that this daily flow magnitude will be exceeded in a given year).

Some of the Northwest’s highest floods occur when large volumes of warm rain from atmospheric rivers fall on a deep snowpack (Safeeq et al., 2015). The frequency and amount of moisture transported by atmospheric rivers is projected to increase along the West Coast in response to increases in air temperature (Kossin et al., 2017), which in turn increases the likelihood of flooding (Konrad and Dettinger, 2017).

Future changes in the frequency of rain-on-snow events likely will vary along elevational gradients. At lower elevations, the frequency is projected to decrease due to decreasing snowpack, whereas at higher elevations the frequency is projected to increase due to the shift from snow to rain (Surfleet and Tullos, 2013; Safeeq et al., 2015; Musselman et al., 2018). The likely effects on streamflow of such changes in frequency of rain-on-snow events vary. For example, projections for the Santiam River, Oregon, indicated an increase in annual peak daily flows with return intervals less than 10 years, but a decrease in annual peak daily flows with return intervals of 10 or more years (Surfleet and Tullos, 2013). Average runoff from rain-on-snow events in watersheds in western Oregon and the mid-Columbia River basin was projected to decline due to depletion of the snowpack (Musselman et al., 2018), which may imply that the driver of floods in these areas shifts from rain-on-snow events to rainfall that exceeds soil capacity (Berghuijs et al., 2016; Musselman et al., 2018).

Populations considered particularly vulnerable to the direct and indirect effects of extreme precipitation, from the storms themselves to floods and landslides, include people dependent on medical equipment that requires electricity, older adults, children, and pregnant people (York et al., 2020; Ho et al., 2021). Some utility companies provide consultation and additional outreach to individuals who are dependent on electricity for a medical device. Among the diverse health risks associated with extreme precipitation are injuries, toxic exposures, displacement, disruptions in medical care, and negative mental health outcomes (York et al., 2020; Ho et al., 2021).

2.2.4.7 Landslides

Regions affected: 1-8

In Oregon, the incidence of landslides is strongly correlated with rainfall when the soil becomes saturated, so projected increases in extreme precipitation likely will increase the probability of landslides. Landslide risk also can become high when heavy rain falls on an area that burned within approximately the past five to ten years. The probability that extreme rainfall will occur within one year after an extreme fire-weather event in Oregon or Washington was projected to increase by 700 percent from the period 1980–2005 to 2100 under a higher emissions scenario (Touma et al., 2022). Similarly, projections suggested that by 2100, 90 percent of extreme fire-weather events across Oregon and Washington are likely to be succeeded within five years by three or more extreme rainfall events (Touma et al., 2022). Although fire weather is not synonymous with wildfire, these results highlight the increasing likelihood of compounded climate extremes that elevate the risk of natural hazards. An increase in the number of landslides will increase risks to life and damage to property and infrastructure, and disrupt transportation and the distribution of water, food, and essential services.

2.2.4.8 Windstorms

Regions affected: 1-8

Mean near-surface wind speeds in Oregon are expected to decrease slightly in the future in response to global climate change (Pryor et al. 2012, Jeong and Sushama 2019, Chen 2020, Mass et al. 2022). However, this decrease in the mean wind speed may not translate to a decrease in extreme winds. Although projections are highly uncertain, climate models tend to agree that the magnitude of extreme wind speed will increase in western Oregon (Pryor et al. 2012, Jeong and Sushama 2019). An extreme wind refers to an annual maximum wind speed with a given probability of being exceeded, such as 5 percent probability of exceedance (a 20-year mean return period) or 2 percent probability of exceedance (a 50-year mean return period). Such increases are not projected in eastern Oregon.

Oregon's location accounts for some of the uncertainty in the response of strong winds to climate change. In Oregon, the most severe windstorms occur from October through April and are associated with extratropical cyclones (cyclones that occur from 30–60° latitude) (Read 2003, 2007; Mass and Dotson 2010). Although future changes in wind speeds in extratropical cyclones are expected to be small, the projected poleward shift in the storm tracks of these cyclones could lead to substantial changes in extreme wind speeds in some regions (Seneviratne et al. 2021). Whether the speed of strong winds in Oregon changes depends on the current and future mean and variability of the storm tracks' locations. One study indicated that by 2081–2099 relative to 1981–1999, assuming a high emissions scenario, extratropical cyclones that generate severe winds will shift northward by an average of 2.2° over the North Pacific (Seiler and Zwiers 2016). Therefore, such cyclones will become more frequent north of 45°N and less frequent and weaker south of 45°N. Oregon lies between about 42°N and 46°N. Accordingly, it is highly uncertain whether the frequency of extratropical cyclones with severe winds in Oregon will change.

The intensity of strong offshore (easterly) winds typically is less than that of winter windstorms. Nevertheless, offshore winds play a major role in summer heat waves in Oregon because they displace cooler marine air west of the Cascade Range (Brewer and Mass 2016). Projections from global climate models, assuming a high emissions scenario, suggested a decrease in the frequency of strong offshore winds over western Oregon and Washington in July and August (Brewer and Mass 2016).

In late summer and autumn and prior to the onset of the autumn rains, particularly strong and dry easterly winds promote the rapid spread of wildfire. East winds were key drivers of the largest wildfires on record in western Oregon, including the 2020 Labor Days fires (Abatzoglou et al. 2021, Mass et al. 2021, Reilly et al. 2022). Research that incorporated regional climate models and accounted for the effects of the Cascade Range indicated that from the preindustrial to the current era, the frequency of autumn (September through November) east winds along the Cascade Range in Oregon decreased by ~2 percent (Hawkins et al. 2022). There are some indications that by the year 2099 relative to 1970, assuming a high emissions scenario, the frequency of notably strong easterly winds will decrease modestly west of the Cascade Range.

Understanding of how anthropogenic emissions may affect local winds in Oregon remains limited. Due to their coarse spatial resolution, global climate models and all but the highest-resolution regional climate models cannot adequately simulate mountain slope and valley winds, coastal winds, sea breezes, and winds associated with thunderstorms (Doblas-Reyes et al. 2021). Large numbers of simulations from multiple high-resolution (0.6 to 6 mi) regional climate models ultimately will be required to estimate, with high confidence, changes in these types of winds across Oregon.

2.2.5 Evolving Climate Science and the Oregon NHMP

Oregon is committed to planning and understanding how climate change will impact its residents and their livelihoods, cultural identity, and well-being. Climate change will exacerbate natural hazards such as drought, wildfire, and extreme heat in Oregon.

Oregon sits at the forefront of climate change research in the United States. For example, the Oregon Climate Change Research Institute (OCCRI) facilitates research on physical, biological, and social sciences among Oregon's public universities that supports the needs of Oregon state agencies and communities. OCCRI and numerous state agencies and federal partners conduct annual or biennial assessments of climate change, its effects, and efforts to mitigate and adapt to climate change.

The 2025 NHMP relied in part on outputs from global climate models that were included in the sixth phase of the Coupled Model Intercomparison Project (CMIP6). The spacing of grid cells in the CMIP6 climate models is relatively coarse, typically in the range of 43 to 124 mi. Therefore, the models are unable to resolve many topographic features that affect local climate. In Oregon, these features include the Coast Range, Willamette Valley, and Cascade Range. For this reason, the NHMP used outputs of global climate model data that were statistically downscaled to a roughly 3.7-mile grid. Downscaling adds the effects of local topography to the original global climate model results, which is necessary to accurately represent climate in regions with complex terrain. The models that contributed to the NHMP were selected following evaluation of their ability to realistically capture major weather processes that affect the west coast of the United States.

Oregon committed to addressing how climate change affects each climate-related hazard in this 2025 plan to the extent that the science allowed doing so, and to acknowledging uncertainties in the science. As a result, this plan reflects emerging understanding of the effects of climate change on extreme heat, drought, flood, wildfire, and coastal hazards, and in turn the effects of those hazards on Oregonians. Such knowledge will inform investments that better enable all of Oregon's populations and communities to avoid, prepare for, and recover from hazard events.

2.2.6 Social and Public Health Consequences of Changing Conditions

More days of extreme heat, wildfire, smoke, harmful algae blooms, floods and other environmental consequences of a changing climate affect people's mental and physical health as well as causing physical harm. State agencies are taking action to understand and address these challenges.

The Department of Land Conservation and Development produced a social vulnerability assessment to better understand how communities and individuals are experiencing and coping with changing climate conditions. DLCD learned that people across the state value access to the outdoors, community gatherings, clean air and water, high-quality food, and local decision-making authority. Many Oregonians are concerned about how climate change might impact their wellbeing, livelihoods, and sense of place. Workshop and survey participants want their state government and local governments to support and facilitate locally relevant adaptation actions intended to strengthen the built and social environment.

The Oregon Health Authority's 2023 climate and health report summarizes some of these measures. In 2023, OHA's Public Health Division established indicators to measure the public health system's progress in building community resilience to health effects of a changing climate. In 2023, state and federal leaders increased investments to protect people in Oregon at the highest risk of health impacts from climate change-driven health risks; to make homes more resilient to extreme weather; and to increase tree canopy across the state to reduce heat island effects. The 2023 Legislature directed and provided funding to OHA and the Department of Environmental Quality (DEQ) to establish a state Harmful Algae Blooms monitoring and advisory program to protect Oregonians recreating in the state's rivers, lakes and reservoirs, and strengthen protections for surface waters that are the source of drinking water for public water systems. The Oregon Climate Action Commission added to their workplan the intention to establish in 2025 a resilience and adaptation work group to coordinate implementation of the Climate Change Adaptation Framework.

These findings and initiatives highlight that natural hazards mitigation must include more than just hardening buildings and infrastructure. It must take a well-being-centered approach that includes strengthening communities' ability to benefit from, cope with, and respond to change.

2.3 Human Geography

2.3.1 Tribal Nations

According to the 2020 U.S. census, a total of 185,723 American Indian people live in the Oregon, making up approximately 4 percent of the population. They include enrolled members of Oregon's nine federally recognized tribes as well as enrolled members of tribes based outside of Oregon. A federally recognized tribe is an American Indian tribal entity that has a government-to-government relationship with the United States and has inherent rights of self-government and sovereignty. They also are entitled to certain federal benefits, services, and protections. (US Department of the Interior, 2020) The nine federally recognized tribes in Oregon are all separate and sovereign governments with unique cultures and mitigation needs based on their histories, locations, and relationships to the United States federal government. Tribal members in Oregon are both citizens of their tribe and citizens of Oregon and the United States. The sections below describe each of the nine federally recognized tribes in more detail and provide links to further information from the tribes themselves. (Oregon Blue Book, 2025)

Burns Paiute Tribe

The Burns Paiute tribe is made up of primarily the Wadatika Band of Northern Paiute people but also has ties to all other Northern Paiute Bands. They were forcibly removed from their lands in 1879 to live in Ft. Simcoe, WA until they were able to gain federal recognition in 1969. (LCIS, 2025) The traditional homelands of the Burns Paiute include 5,250 square miles of land in Central-Southeastern Oregon, Northern Nevada, Northwestern California and Western Idaho. The Burns Paiute still maintain title to much of their territory. The Tribe currently has 402 enrolled members with 142 people living on the reservation. For more information on their history, culture, and government see their website: About the Tribe – BPT (ODHS, 2025)

Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians (CTCLUSI)

The Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians (CTCLUSI) are made up of the Hanis and Miluk bands of the Coos Tribe, the Lower Umpqua Tribe and the Siuslaw Tribe. Their homelands are in the central and southern Oregon Coast, making up approximately 1.6 million acres between the Coast Range and Pacific Coast. (LCIS, 2025)

Although both Coos bands lived near one another on the Coos River tributaries, they spoke different dialects of the Coos language and had their own unique history and cultural differences. The Tribes trace their ancestry back to the inhabitants of the South-Central coast of Oregon. They regained their federal recognition in 1984, almost thirty years after the Western Oregon Termination Act in 1954. For more information on their history, culture, and government, see their website: https://ctclusi.org/history/ . (ODHS, 2025)

Confederated Tribes of Grand Ronde

The Confederated Tribes of the Grand Ronde Community of Oregon is made up of over 30 Tribes and bands from Western Oregon, Northern California, and Southwest Washington. However, there are five main bands: Molalla, Rogue River, Kalapuya, Chasta, and Umpqua. The tribe is governed by a nine-member Tribal Council that is elected by the Tribe's voting membership. They have approximately 5,400 enrolled Tribal members. (LCIS, 2025)

Tribal members were forcefully removed from their homelands with ratified and unratified treaties with the U.S. government between 1853 and 1855. Their federal recognition was terminated in 1954 which stripped them of their land. Federal recognition was restored through the hard work of tribal leadership in 1983. The Confederated Tribes of the Grand Ronde regained 9,811 acres of their original reservation in 1988. The Tribe is active throughout its ancestral homelands but located in Western Oregon, where it has an 11,500-acre reservation in Yamhill and Polk Counties. For more information on their history, culture, and government, see their website: https://www.grandronde.org/history-culture/history/our-story/. (ODHS, 2025)

Confederated Tribes of Siletz Indians

The Confederated Tribes of Siletz Indians is a federally recognized confederation of 27 bands representing at least ten languages, originating from Northern California to Southern Washington. (LCIS, 2025) They include members of the Clatsop, Chinook, Klickitat, Molala, Kalapuya, Tillamook, Alsea, Siuslaw/Lower Umpqua, Coos, Coquille, Upper Umpqua, Tututni, Chetco, Tolowa, Takelma, Galice/Applegate and Shasta. Each tribe has a unique history, culture, and legal relationship with the federal government. Federal recognition of the Confederated Tribes of Siletz Indians was terminated by the United States government in 1955. In November 1977, they were the first Tribe in Oregon and second in the United States to be fully restored to federal recognition. The Tribe manages a 3,666-acre reservation located in Lincoln County, Oregon. For more information on their history, culture, and government, see their website: https://www.ctsi.nsn.us/introduction/. (ODHS, 2025)

Confederated Tribes of the Umatilla Indian Reservation

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) is made up of three Tribes: Cayuse, Umatilla and Walla Walla. The CTUIR has over 3,100 Tribal members, nearly half of whom live on or near the Umatilla Reservation. The Reservation is about 172,000 acres (about 273 square miles) located in Northeastern Oregon. CTUIR is governed by a constitution and bylaws adopted in 1949. (LCIS, 2025) The governing body is the nine-member Board of Trustees, elected every two years by the General Council. In 1855, the three Tribes signed a treaty with the U.S. government, in which they ceded over 6.4 million acres to the United States. In the treaty, the Tribes reserved rights to fish, hunt and gather foods and medicines such as roots and berries, and pasture livestock on unclaimed lands. Tribal members continue to exercise these rights throughout the CTUIR's area of traditional use, which includes harvesting fish at Willamette Falls in Western Oregon and hunting buffalo in the Greater Yellowstone area. For more information on their history, culture, and government see their website: https://ctuir.org/about/. (ODHS, 2025)

Confederated Tribes of the Warm Springs

The Confederated Tribes of Warm Springs is made up of the Wasco, Paiute, and Warm Springs Tribes. The Warm Springs Indian Reservation is in North Central Oregon. In 1937, the three Tribes organized as the Confederated Tribes of the Warm Springs Reservation of Oregon by adopting a constitution and bylaws for tribal government. (LCIS, 2025) Despite the great loss of traditional culture that occurred because of settlement on the reservation, the people of the Warm Springs Reservation have succeeded in maintaining many of their ancient traditions and values. For more information: https://warmsprings-nsn.gov/history/. (ODHS, 2025)

Cow Creek Band of Umpqua Tribe of Indians

The Cow Creek Tribal Nation is in Southwestern Oregon between the Cascades and Coast ranges in the Umpqua and Rogue River watersheds. The tribal nation has over 1,800 members. They are governed by an elected eleven-member council known as the Tribal Board of Directors. They were one of the first tribes to secure a treaty with the United States government in 1854, ceding more than 800 square miles of land. They were never given the reservation their Treaty promised. (LCIS, 2025) Without a reservation, tribal members remained in their homelands. Their Tribal Government Office in Roseburg, Oregon, houses the Tribal Government body and programs, the Cow Creek Tribal Gaming Commission, and the Cow Creek Health and Wellness Center. For more information on their history, culture, and government see their website: https://www.cowcreek-nsn.gov/tribal-story/. (ODHS, 2025)

Coquille Indian Tribe

The Coquille Tribe has more than 1,100 members whose ancestors were Athabaskan and Miluk speakers who lived in the Coquille River watershed and lower Coos Bay. Their treaty with the U.S. government was never ratified, and they lost federal recognition in 1954 with termination. They regained their federal recognition in 1989 and have regained more than 10,000 acres of their ancestral homeland. (LCIS, 2025) The Coquille Indian Tribe's service area covers 15,603 square miles of Coos, Curry, Douglas, Jackson and Lane counties. Approximately 350 Tribal members live in Coos County. After the tribe regained federal recognition and their full sovereignty rights were restored in 1989, the Coquille Tribal government created an administrative program that now provides housing, health care, education, elder care, law enforcement and judicial services to its members. For more information on their history, culture, and government, see their website: https://www.coquilletribe.org/our-people/. (ODHS, 2025)

Klamath Tribes

The Klamath Tribes consists of the Klamath, Modoc and Yahooskin-Paiute people. Thay have over 5,700 enrolled members, with a government headquarters in Klamath County. The present-day Klamath Indian Reservation consists of 12 small, non-contiguous parcels of land in Klamath County. (LCIS, 2025) These land areas are generally located in and near the communities of Chiloquin and Klamath Falls. Their government's function is to protect human and cultural resources and treaty rights, and to provide for the development and delivery of social and economic opportunities. For more information on their history, culture, and government: https://klamathtribes.org/history/. (ODHS, 2025)

2.3.2 Land Use

Balancing growth and land use with hazard mitigation is key to planning resilient communities. Understanding where development is occurring or is likely to occur based on land use patterns is integral to developing mitigation actions.

In 1973, Oregon passed Senate Bill 100 which created a statewide land use planning system and established the Land Conservation and Development Commission (LCDC) and the Department of Land Conservation and Development (DLCD). The bill was a response to concerns around rapid population growth in Oregon and a desire to curb suburban sprawl and preserve open space, agricultural land, and forest land. LCDC's first task was to develop Oregon's statewide planning goals to guide the development of local comprehensive land use plans. LCDC initially developed 14 goals that were adopted in 1974. The list of goals has since grown to 19 goals that express the state's policies on land use and related topics like citizen involvement, housing, and natural resources. As a result of Senate Bill 100 and the Statewide Planning Goals, Oregon has been able to maintain a distinct separation between urban and rural land uses and maintain a large proportion of its open space and rural farm and forest land. The following sections describe how some of these goals relate to understanding Oregon's land use and development patterns.

Goal 3: Agricultural Lands

Under Goal 3, counties are required to inventory, preserve, maintain agricultural land through exclusive farm use (EFU) zoning. EFU zoning restricts developments that are not related to agriculture to minimize uses that conflict with farming. As a result, while many Oregonians live in agricultural land, minimum parcel size requirements of 80 acres leads to far less density of development in agricultural areas.

Goal 4: Forest Lands

Goal 4 is designed to protect working forest land around the state, preserving it for commercial forestry. Goal 4 requires that counties identify and designate forest land in their comprehensive plan and conserve forest lands for forest uses. Goal 4 places development restrictions on forest lands that prevent it from being divided into parcels that are too small to manage for timber, habitat, recreation, and watershed protection. Some forest land is qualified for development of dwellings, but development is far less dense than in urban areas.

Goal 7: Areas Subject to Natural Hazards

Goal 7 requires that jurisdictions apply the appropriate safeguards when planning for development in places subject to natural hazards such as floods or landslides. This especially pertains to local floodplain regulations that meet the minimum of the National Flood Insurance Program as well as additional safeguards to prevent development in hazard areas.

Goal 14: Urbanization

Goal 14 requires that cities plan for twenty years of future growth and land needs and that they zone enough land to meet those needs. Each incorporated city has an established Urban Growth Boundary which separates urbanizable land from rural land. Most Oregonians live in Urban areas. Approximately 65 percent of Oregon's population lives in urban areas, vs. 33 percent in rural areas and 2 percent in frontier areas or counties with six or fewer people per square mile. (OHSU, 2024)

Goal 16: Estuarine Resources

Goal 16 guides planning and management of estuaries in Oregon. Estuaries are the tidal mouth of a river where fresh river water meets tidal ocean water. Estuaries are delicate ecosystems that have adapted to the brackish water of the environment and are some of the most productive ecosystems in the world. Goal 16 aims "to recognize and protect the unique environmental, economic, and social values of each estuary and associated wetlands." Goal 16 requires that locally adopted estuary management plans designate uses for different areas within each estuary based on biological and physical characteristics, that function similarly to zoning codes.

Goal 17: Coastal Shorelands

Goal 17 guides planning and management requirements for lands bordering estuaries, ocean shore, and coastal lakes. Goal 17's requirements are generally combined with other planning goals to direct the use of shoreland areas. The Goal 17 requirement states that shorelands especially suited for water dependent uses be protected for that use and that local zoning regulations prevent other uses in designated coastal shoreland areas.

Goal 18: Beaches and Dunes

Goal 18 guides the conservation and protection of beach and dune resources and reducing exposure to coastal hazards. Local governments are required to inventory beaches and dunes and describe their stability, movement, groundwater resources, hazards, and values. Goal 18 prohibits development on the most sensitive and hazardous landforms including beaches and dunes and other areas subject to severe erosion and flooding.

2.3.2.2 Settlement Patterns

Oregon's settlement patterns have evolved significantly over time, influenced by factors that include geography, economy, cultural shifts, and Oregon's statewide planning system. Before 1750 when white settlers began entering the region, the Pacific Northwest was home to approximately 200,000 indigenous people with populations concentrated along the Columbia River, in the western valleys and around coastal estuaries and inlets. People who lived in the great basin, Columbia plateau, and valleys tended to move to different places throughout the year for subsistence food. Coastal groups tended to live in fixed village sites because there were abundant year-round food sources. (Oregon History Project, 2002)

The modern era of white settlement began in 1830 when people from New England and the Midwest migrated to the area and established their first permanent settlement in the Willamette River valley. Settlement patterns followed fertile lands for agriculture and forests for timber and by the turn of the 20th century, two-thirds of Oregon's population lived in rural areas. The railroad was finished in 1883, giving Oregon a stronger link to the rest of the country and improving the opportunity for economic growth. The development of the railroad especially stimulated agriculture and forestry. Cities began to grow rapidly as industrial and manufacturing bases expanded. By the early twenty-first century, three-fourths of the state population lived in urban areas. In 1973, Oregon's government established the statewide land use planning program which included land use planning goals for the state. The establishment of the program included the designation of urban growth boundaries that further restricted development outside of cities. As of 2024, approximately 65 percent of Oregon's population lived in urban areas. (OHSU Office of Rural Health, 2024)

Recently, Oregon has experienced episodic and explosive growth with reasons for migrating including the state's clean air and water, small cities, and scenic natural environment. (Highsmith, 2024) Populations tend to cluster around major road corridors and waterways. Table 2.3.2-1 outlines the settlement patterns in each mitigation planning region.

Table 2.3.2-1: Settlement Patterns by Mitigation Planning Region

Region 1: Oregon Coast	The region's population is clustered around the Oregon Coast Highway 101 corridor and the cities of Astoria, Tillamook, Newport, Florence, Coos Bay, Brookings, and some unincorporated areas.
Region 2: North Willamette Valley/Portland Metro	The region's largest population is clustered around the Portland Metro area and numerous major transportation corridors and waterways.

Region 3: Mid/Southern Willamette Valley	The region's population is clustered around the I-5 corridor, other highway corridors, and various waterways. Population centers of this region include the cities of Eugene, Albany, Corvallis, and Salem.
Region 4: Southwest Oregon	The region's population is clustered around the I-5 corridor, other highway corridors, and various waterways. The region's major population centers include the cities of Ashland, Medford, Grants Pass and Roseburg.
Region 5: Mid-Columbia	The region's population is clustered around the I-84 corridor and the cities of Hood River, Pendleton, and The Dalles.
Region 6: Central Oregon	The region's population is clustered around the US-97 corridor, other highway corridors, and various waterways. The region's major population centers include the cities of Bend, Klamath Falls, Madras, and Redmond.
Region 7: Northeast Oregon	The region's population is clustered around the I-84 corridor and the cities of Baker City, La Grande, John Day, and Enterprise.
Region 8: Southeast Oregon	The region's population is clustered around the I-84 corridor, US-97 corridor, and the cities of Burns, Hines, Ontario, and Vale.

2.3.2.3 Land Ownership

Oregon's 95,997 square miles of land area is owned by a mix of landowners including federal government agencies, state government agencies, tribal governments, cities and counties, and private landowners. Lands owned by federal, state, and tribal land entities are summarized below in the following sections.

Federal Lands

Four major federal land management agencies administer lands within the State of Oregon: Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), National Park Service (NPS) in the Department of the Interior (DOI), and the U.S. Forest Service (USFS) in the Department of Agriculture. The Department of Defense (DOD) also administers lands within Oregon. DOD land consists of military bases, training ranges, and other military associated uses. This does not include federal lands managed by other agencies such as the Bureau of Reclamation or Tribal lands, many of which are held in trust by the federal government but are not owned by the federal government. (CRS, 2020)

32,244,257 acres, or 52 percent of the total land area of Oregon is administered by these federal land management agencies. The areas of land they manage are shown in Table 2.3.2-2. Between 1990 and 2018, Oregon saw a 0.6 percent increase in federal land area.

Table 2.3.2-2: Federal Land Ownership by Agency

Agency	Land Ownership Area (acres)
Bureau of Land Management	15,742,384
U.S. Forest Service	15,697,445

U.S. Fish and Wildlife Service	575,379
National Park Service	196,197
Department of Defense	32,852

Source: Congressional Research Service. (2020, February 21). *Federal Land Ownership: Overview and Data.* Retrieved February 19, 2025 from https://crsreports.congress.gov/product/pdf/R/R42346

State Lands

The Department of State Lands (DSL) and 27 other Oregon state agencies and universities own and manage land across the state. DSL also oversees the beds and banks of lakes, river segments, territorial sea, and tidally influenced bays and estuaries. According to DSL's 2024 State Land Inventory System Report, state-owned and managed land totals to 1,777,583 acres. DSL and the Department of Forestry own and manage the largest segments, with 774,515 acres (44%) and 711,225 acres (40%), respectively. Department of Fish and Wildlife owns and manages the third largest amount at 139,534 acres (8%), followed by Parks and Recreation Department at 97,031 acres (6%). The remaining agencies own or manage 1 percent or less of state-owned land. (DSL, 2024)

Tribal Lands

Two types of Tribally owned land exist in Oregon: reservations and land held in trust by the United States for the use or benefit of tribes. Reservations are lands reserved for a tribe by the federal government as permanent tribal homelands. Lands held in trust are held in trust by the United States Federal Government for use or benefit of tribes. Trust lands are often located in or near reservations. Tribes have the authority to purchase land and petition the United States Federal Government to hold it in trust. As of 2016, about 897,535 acres of land in Oregon were tribal reservation or trust lands. "Ceded lands" is another type of land that is mentioned in this plan in relationship to the Tribes. "Ceded lands" refers to lands that tribes did not claim in treaties. Often, Native people who lived on ceded lands were not consulted or did not give their consent in the treaty making process. (ODE, 2025) Refer to the section of this chapter entitled *Tribal Nations* for more information on the Nine Federally Recognized Tribes' reservation land. (LPRO, 2016)

2.3.3 Demographics

Demographic characteristics describe the distinguishing features of the state's population including age, gender, race, ethnicity, and income. Demographic attributes can help to understand the vulnerabilities of a community or region and the state's ability to cope with, adapt to, and recover from natural disasters.

2.3.3.1 Population

Historical and projected population change are key factors in understanding where people live now and where they may live in the future and how they may be affected by natural disasters. Population change includes two major components: natural increase (births minus deaths) and net migration (in-migrants minus out-migrants) (USDA, 2025). If a population increases substantially, a community's capacity to provide adequate housing stock, services, or resources for all populations after a disaster may be stressed or compromised.

Table 2.3.3-1 shows population change between 2020 and 2023, according to the U.S. Census Bureau American Community Survey, and projected population change between 2023 and 2040 based on Portland State University's Population Research Center's population projections. Population data shows that the population across the state is generally growing with the most growth since 2020 in Region 6 (5.3%) followed by Regions 5 (3.5%) and 8 (3.4%). Projected growth between 2023 and 2040 is expected to be highest in Region 2 (24.4%) and Region 6 (25.2%).

Table 2.3.3-1: Population estimate and forecast by region and county

	2020	2023	Percent Change (2020-2023)	2040 Projected	Percent Change (2023-2040)
Oregon	4,176,346	4,238,714	1.5%	4,999,744	18.0%
Region 1	202,838	207,741	2.4%	220,434	6.1%
Clatsop County	39,656	41,343	4.3%	45,579	10.2%
Coos County	64,175	64,832	1.0%	65,046	0.3%
Curry County	22,889	23,463	2.5%	24,881	6.0%
Lincoln County	49,336	50,632	2.6%	54,558	7.8%
Tillamook County	26,782	27,471	2.6%	30,369	10.5%
Region 2	1,872,831	1,879,615	0.4%	2,338,532	24.4%
Clackamas County	415,084	422,308	1.7%	484,850	14.8%
Columbia County	52,117	53,178	2.0%	57,857	8.8%
Multnomah County	809,869	803,863	-0.7%	1,065,047	32.5%
Washington County	595,761	600,266	0.8%	730,778	21.7%
Region 3	1,131,692	1,151,988	1.8%	1,281,588	11.3%
Benton County	92,168	96,359	4.5%	107,674	11.7%
Lane County	377,749	382,628	1.3%	406,335	6.2%
Linn County	127,216	129,794	2.0%	144,960	11.7%
Marion County	343,742	346,532	0.8%	386,083	11.4%
Polk County	84,730	88,553	4.5%	109,059	23.2%
Yamhill County	106,087	108,122	1.9%	127,477	17.9%
Region 4	415,893	422,439	1.6%	478,563	13.3%
Douglas County	110,015	111,807	1.6%	115,610	3.4%
Jackson County	218,781	222,563	1.7%	264,909	19.0%
Josephine County	87,097	88,069	1.1%	98,044	11.3%
Region 5	141,870	146,807	3.5%	162,541	10.7%
Gilliam County	1,896	2,002	5.6%	2,197	9.7%
Hood River County	23,270	23,958	3.0%	27,487	14.7%
Morrow County	11,425	12,249	7.2%	13,317	8.7%

	2020	2023	Percent Change (2020-2023)	2040 Projected	Percent Change (2023-2040)
Sherman County	1,686	1,908	13.2%	1,892	-0.8%
Umatilla County	77,319	80,087	3.6%	88,881	11.0%
Wasco County	26,274	26,603	1.3%	28,767	8.1%
Region 6	316,449	333,150	5.3%	417,151	25.2%
Crook County	23,733	25,651	8.1%	31,410	22.5%
Deschutes County	191,749	203,026	5.9%	275,905	35.9%
Jefferson County	24,048	24,973	3.8%	28,338	13.5%
Klamath County	67,606	69,812	3.3%	71,597	2.6%
Lake County	7,896	8,254	4.5%	8,451	2.4%
Wheeler County	1,417	1,434	1.2%	1,450	1.1%
Region 7	56,831	57,758	1.6%	57,508	-0.4%
Baker County	16,090	16,796	4.4%	16,810	0.1%
Grant County	7,174	7,238	0.9%	6,762	-6.6%
Union County	26,502	26,192	-1.2%	26,977	3.0%
Wallowa County	7,065	7,532	6.6%	6,959	-7.6%
Region 8	37,942	39,216	3.4%	43,426	10.7%
Harney County	7,310	7,515	2.8%	7,520	0.1%
Malheur County	30,632	31,701	3.5%	35,906	13.3%

Sources: U.S. Census Bureau American Community Survey 2023 5-Year Estimates; Population Research Center, Portland State University, 2022-2025 Population Forecasts; Metro Population Forecasts

2.3.3.2 Social Vulnerability

Natural disasters do not affect everyone equally. Social vulnerability describes that difference in susceptibility to the adverse impacts of natural hazards based on social groups and access to certain resources. Factors of social vulnerability include poverty status, race, disability status, or access to a vehicle. Identifying social vulnerability helps to identify the unique needs of different groups or people who are part of multiple groups in a natural disaster.

Social vulnerability can be defined and measured in many ways. Each method and definition includes groups and metrics differently. This NHMP's risk assessment includes several metrics for social vulnerability. The list below describes the complete list of social data used in the risk assessment.:

- Census Community Resilience Estimates which include:
    - Poverty status
    - Number of caregivers in a household
    - Housing unit level crowding
    - Communication barrier
    - Employment status
    - Disability status
    - Health insurance coverage

    - Age (65+)
    - Vehicle Access
    - Broadband Internet access
- Race
- Members of religious groups
- Number of cultural organizations that are funded by Oregon Cultural Trust
- Center for Disease Control and Prevention (CDC): Pregnancy Risk Assessment Monitoring System (PRAMS) Data which gives information on social cohesion
- Number of mobile homes
- Housing Tenure
- Number of hospital beds
- Distance to a hospital

Chapter 3: Hazard Identification and Risk Assessment gives a deeper analysis of how these metrics are specifically used to measure social vulnerability for the State NHMP. The remainder of the social vulnerability section gives a more general statewide overview of these demographic data and compares them to national data.

Community Resilience Estimate Related Data

The Census's Community Resilience Estimate measures vulnerability and resilience based on poverty, caregivers in the household, household crowding, language barrier, employment status, disability status, health insurance coverage, age, vehicle access, and broadband access. Table 2.3.3-2 shows how the state of Oregon compares to the United States in each of these categories. Oregon has a higher percentage of persons with disabilities (15 percent and 13 percent respectively) and a higher percentage of persons over age 65 (19 percent and 17 percent respectively) than the United States as a whole. The state is similar to the United States in the remaining categories, except that a lower percentage of Oregonians (15%) than Americans as a whole (22%) speak a language other than English at home.

Table 2.3.3-2: Community Resilience Estimate (CRE) Related Data

Category	Oregon	United States
Percentage of population below the poverty line	12%	12%
Percentage of single householder with children households	5%	6%
Percentage of housing units considered crowded*	3%	3%
Percentage of population that speak language other than English at home	15%	22%
Unemployment rate (ages 16 and over)	5%	5%
Percentage of noninstitutionalized population with a disability	15%	13%
Percentage of population without health insurance	6%	9%
Percentage of population over age 65	19%	17%

Category	Oregon	United States
Percentage of households with zero vehicles available	7%	8%
Percentage of households without broadband	8%	10%

*****A housing unit with more than one person per room is considered crowded. (U.S. Census Bureau, 2000)
Sources: U.S. Census Bureau American Community Survey 2023 5-Year Estimates

Race and Ethnicity

The CRE does not include race or ethnicity in its calculation. However, research has shown that communities of color are more vulnerable to hazards due to higher social vulnerability that can amplify the impacts of hazards. Table 2.3.3-3 shows race and ethnicity in Oregon and the United States based on the 2020 census. Oregon's white population (72%) is much higher than the United States (58%). All other racial groups are a smaller percentage in Oregon than in the United States, except Two or More Races (6 percent and 4 percent respectively). However, Oregon's Hispanic and Latino population makes up a considerable proportion of the state's population with 14%. Although other racial groups make up small portions of the population, they still need to be considered in mitigation actions. It is also important to note that although the census aims to reach the entire U.S. population, certain groups such as Hispanic or Latino populations, Black or African American populations, and American Indian and Alaska Native population living on reservations are historically undercounted by the census. (U.S. Census Bureau, 2023)

Table 2.3.3-3: Race and Ethnicity Data

Label	Oregon	United States
Hispanic Or Latino	14%	19%
Not Hispanic or Latino	86%	81%
White	72%	58%
Black or African American	2%	12%
American Indian and Alaska Native	1%	1%
Asian	5%	6%
Native Hawaiian and Other Pacific Islander	0%	0%
Some Other Race	1%	1%
Two or more races	6%	4%

Sources: U.S. Census Bureau 2020 Census

Housing

Housing tenure, type of housing, and whether a person is experiencing homelessness, all factors in their vulnerability to hazards. Renters are more vulnerable to natural hazards and the effects of natural disasters because they generally have less wealth than homeowners and tend to receive less government assistance after a natural disaster. (Hersher, 2024) People who live in mobile homes are also vulnerable because mobile homes are constructed less resiliently and are often made of lower quality materials than other housing types. They also often have lower quality infrastructure and are often located in more hazard prone locations. People experiencing homelessness, especially those that are unsheltered, are among the most vulnerable to natural disasters. (Curran-Groome, et. al., 2025)

Table 2.3.3-4 shows housing related demographic data in Oregon vs. the United States. Oregon has a higher percentage of renters, mobile home housing units, and people experiencing homelessness than the United States.

Table 2.3.3-4: Housing related demographic data

Category	Oregon	United States
Percentage of occupied housing units that are owner occupied	63%	65%
Percentage of occupied housing units that are renter occupied	37%	35%
Percentage of occupied housing units that are mobile homes or other type of housing*	7.6%	5.3%
People experiencing homelessness (Point in Time Count January 2023)**	20,142 (48/10,000)	653,104 (20/10,000)

*In table S2504 of American Community Survey Data, this category falls under "Units in Structure", other categories are 1 detached, 1 attached, 2 apartments, 3 or 4 apartments, 5 to 9 apartments, 10 or more apartment
**Point in time counts are based on data collected on the number of people experiencing homelessness for a single point in time – the last 10 days in January. 653,104 Americans experiencing homelessness equates to 20 out of every 10,000. 20,142 Oregonians experiencing homelessness equate to 48 out of every 10,000 people.
Sources: U.S. Census Bureau American Community Survey 2023 5-Year Estimates; United States Department of Housing and Urban Development *The 2023 Annual Homelessness Assessment Report to* Congress.

Tourist Population

Tourists are not counted in population statistics and are therefore considered separately in this analysis. According to Travel Oregon's 2023 Report, *The Economic Impact of Travel,* more than 29.9 million visitors stayed at least one night in Oregon in 2023. Table 2.3.3-5 shows the total number of person trips in 2023, or visitors that spent at least one night in a location. The table uses Travel Oregon's regional designations which are different from the hazard mitigation regions used in the rest of this NHMP. Visitor numbers were calculated through a combination of visitor surveys, visitor air travel, and lodging data. (Travel Oregon, 2024) In 2023, the Portland region of West Clackamas, Columbia, West Multnomah and Washington counties had the most visitors, with a total of 8,290,870. The Willamette Valley region followed the Portland region with a total of 7,137,950.

Table 2.3.3-5: Tourist data by Travel Oregon tourist region

Region	Counties	2023 Person-Trips to the Region
Central Coast	Douglas (minus coastal area), Lane (minus coastal area), Lincoln	2,260,770
Central Oregon	Crook, Deschutes, Jefferson, South Wasco	3,432,850
Eastern Oregon	Baker, Gilliam, Grant, Harney, Malheur, Morrow, Sherman, Umatilla, Union, Wallowa, Wheeler	2,124,600
Mt. Hood and Columbia River Gorge	East Clackamas, Hood River, East Multnomah, North Wasco	1,355,390
North Coast	Clatsop, Tillamook	1,980,830
Portland Region	West Clackamas, Columbia, West Multnomah, Washington	8,290,870
South Coast	Coos, Curry	1,682,710
Southern Oregon	East Douglas, Jackson, Josephine, Klamath, Lake	4,152,230
Willamette Valley	Benton, South Clackamas, East Lane, Linn, Marion, Polk, Yamhill	7,137,950

Sources: Travel Oregon. (2023). *The Economic Impact of Travel.*

Tourists are particularly vulnerable during natural hazard events because they are often unfamiliar with the hazards in the region and do not have the knowledge or materials needed to take care of themselves in a disaster. For example, a typical tourist unfamiliar with the region may have difficulty identifying or using evacuation routes or finding shelter in the event of an earthquake or wildfire. A typical tourist is less likely to have supplies that locals would likely have in a disaster. Tourists also usually do not have a local support network to fall back on.

2.3.4 Cultural Resources

Oregon recognizes the importance of protecting and preserving the natural, cultural, and historic resources found throughout the state. Oregon's history and future economic growth are tied to the deliberate efforts to preserve these resources. Oregon's recognized experts — Oregon Parks and Recreation Department, the State Historic Preservation Office, and the Oregon Heritage Commission — are essential partners in the identification, protection, and preservation of Natural, Cultural, and Historical Resources (NCHR) and their intersection with mitigation projects.

The State's success in preserving cultural resources through intentional planning and mitigation efforts, collaborative partnerships, and creative approaches is an ongoing process. Local, tribal, state, and national partners work collaboratively to increase the awareness of Natural, Cultural, and Historical Resources (NCHRs) and identify opportunities to protect them through existing site-specific plans and actions. OEM is committed to requiring local jurisdictions to follow all applicable laws, rules, and regulations related to resource protection in mitigation projects.

NCHR-related information is available on the Oregon Parks and Recreation Department (OPRD) website. OPRD also encourages that NHCRs be considered in disaster planning. The information OPDR provides is designed to assist emergency managers, organizations, and agencies charged with protecting and preserving collections, sites, and artifacts to make informed decisions related to NCHR. OPRD promotes awareness, Best Management Practices, and dialog within the emergency management community and the professionals that maintain these important resources. (OPRD, 2025)

OEM curates and manages a GIS system called RAPTOR (Real-Time Assessment and Planning Tool for Oregon). RAPTOR is used by emergency managers before, during, and after disasters to stay informed of developing situations and maintain awareness of hazards or resources at risk. NCHR information in RAPTOR ensures emergency managers are aware of resources at risk and allows them to consider those resources when developing mitigation, response, and recovery actions. RAPTOR currently only includes the historic sites inventory from the State Historic Preservation Office. Other cultural resources, including tribal natural and cultural resource, are classified for their protection. Therefore, consultation directly with tribes' cultural resource departments is important when making mitigation decisions. Refer to the next section entitled *Tribal Natural and Cultural Resources* for more information about each of the Nine Federally Recognized Tribes' approaches to natural and cultural resources.

The 2025 State Hazard Risk Assessment (Chapter 3) uses an inventory of cultural organizations that are eligible for funding by the Oregon Cultural Trust as the data source for cultural resources. The analysis considers these locations as both assets that have the potential for exposure to natural hazard impacts as well as the potential to serve as venues to bring communities together and foster social cohesion. The risk assessment analysis used cultural related buildings from the Oregon Cultural Trust, an inventory of cultural organizations statewide. Refer to Chapter 3: Hazard Identification and Risk Assessment for further information.

2.3.5 Tribal Natural and Cultural Resources

Indigenous people often do not draw a hard line between natural resources and cultural resources because the relationship between humans and nature is treated in a more intertwined, less anthropocentric, and less commodified manner. (Naknanuk, 2022) As sovereign and separate government entities, each Tribe has its own approach to natural and cultural resource preservation, stewardship, and education. The sections below summarize each of the nine federally recognized Tribes' approaches to natural and cultural resources.

Burns Paiute Tribe

The Burns Paiute Tribe website states that financial resources to protect cultural resources and preserve their heritage are scarce. They were only recently able to re-establish and maintain a culture and heritage department. The department seeks and acquires resources to ensure that their tribal history, language, and traditional ways of life are preserved and sustained. They also perform federally mandated cultural resource management activities on and off the reservation. The Culture and Heritage Department's work focuses on gaining stronger ties and preserving the knowledge of elders. Programs include archaeology, The

Waditka Yaduan Language Preservation Project, Tribal Historic Preservation Office, Cultural Resource Management, and Research. (Burns Paiute, 2025)

Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians (CTCLUSI)

CTCLUSI's Natural Resources & Cultural Department has established programs to protect lands, waters, and cultural and natural resources. Programs include Air and Water programs (monitoring and investigating contamination to those resources with ongoing mitigation), Tribal Response Program (remediation of contaminated properties, response planning and actions to protect tribal resources), Restoration and Wetlands Program, Forest Management Program, Tribal Historic Preservation Program. Additional programs are also available to tribal and youth members including cultural stewardship, tobacco prevention, and language. (CTCLUSI, 2022)

Confederated Tribes of Grand Ronde

The mission of the Cultural Resources Department of the Confederated Tribes of the Grande Ronde is to "support a healthy community by facilitating dialogue, maintaining continuity, and providing protection of tribal lifeways for the benefit of future generations" (Confederated Tribes of Grand Ronde, 2025)

The Cultural Resources Department includes the Historic Preservation Office, Cultural Education, and the Chachalu Museum and Cultural Center. The Historic Preservation Office focuses their work on Archeology, Research, and the Cultural Protection Program. They coordinate with federal and state agencies on projects throughout ceded and ancestral homelands and advocate for the tribe's cultural resources. The Cultural Education program provides the tribal community with cultural classes and events that allow tribal members to gain a deeper understanding of cultural knowledge and identity. (Confederated Tribes of Grand Ronde, 2025)

Confederated Tribes of Siletz Indians

The Confederated Tribes of Siletz Indian's government includes a natural resources department with a mission to "protect, enhance, and provide for the wise use of all the Tribe's natural resources in a manner which will ensure that all generations to come will benefit from these resources. This philosophy applies to all lands to which the Tribe is historically tied, including its ancient, aboriginal, ancestral lands, its Coast Reservation, and its current and future land holdings." The Natural Resources department focuses their work on Tribal forestry, aquatics, wildlife, hunting and fishing, housing, and environmental protection. (Confederated Tribes of Siletz Indians, 2025)

The tribe organizes the Nesika Illahee Powwow every summer in Siletz Oregon with dancing, drumming, and singing and vendors representing indigenous American arts, crafts, and food. (Confederated Tribes of Siletz Indians, 2025) They also organize a language program that teaches Southwest Oregon/Northwest Californian Athabaskan language. Their Healthy Traditions Project provides education to members on the use of traditional foods. (Confederated Tribes of Siletz Indians, 2025)

Confederated Tribes of the Umatilla Indian Reservation (CTUIR)

CTUIR has established a program within their Department of Natural Resources called the Cultural Resources Protection Program. The program promotes the protection, preservation, and perpetuation of

CTUIR's culturally significant resources both on and off their reservation. However, all other CTUIR government departments are in part responsible for cultural resources.

CTUIR's comprehensive plan emphasizes cultural resources in three elements: Natural Resources, Cultural Heritage, and Treaty Rights. Specific focuses include protecting and preserving culturally significant places and resources including graves and sacred items of members and ancestors both on the reservation and in ceded lands and traditional use areas, protecting and restoring First Foods and exercising First Foods rights, and protecting, preserving and perpetuating culturally significant places and resources for current and future generations. (CTUIR, 2021)

Confederated Tribes of Warm Springs

The Confederated Tribes of the Warm Springs government includes a natural resources branch with a mission to "plan and execute a balanced direction for the protection, use, and enhancement to all tribal natural resources." Their work includes parks and outdoor recreation, conservation land programs, cultural resources, range and agriculture, forestry, fisheries, wildlife, water and soil, and GIS.

The cultural resources office is part of the Natural Resources Branch that works for the protection, preservation, and enhancement of cultural resources. They focus on cultural inventories on reservation. They also work off-reservation with federal, state, county, and city entities to protect and enhance tribal cultural resources. They act as the technical advisor for the tribe on the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, and the Archeological Resources Protection Act. (Confederated Tribes of Warm Springs, 2021)

Cow Creek Band of Umpqua Tribe of Indians

The Cultural Resources Department and the Natural Resources Department are separate departments of the tribal government. The cultural resources program focuses on helping Tribal members connect with traditional ways. Their focus is discovering, restoring, and preserving culture to share with members through cultural arts, events and the Takelma language. The natural resources department focuses on protection, preservation, and restoration of the flora, fauna, and earth and maintaining a connection to cultural sites and history. (Cow Creek Band of Umpqua Tribe of Indians, 2025)

Coquille Indian Tribe

The Coquille Indian Tribe have several programs that focus on natural and cultural resources. They emphasize Potlach, or the ancient practice of greeting, feeding, and bestowing gifts on guests in their work, events, and classes. Their cultural work includes a focus on artisanship, ancient foods, preserving knowledge of canoeing, traditional dances and ceremonies, and language revitalization. They have a Tribal Historic Preservation Office with archaeologists and historians who focus on preserving and interpreting cultural sites and resources. They also have a cooperative management agreement with the Oregon Department of fish and Wildlife in Coos, Curry, Douglas, Jackson, and Lane Counties for management of fish and wildlife. (Coquille Tribe, 2022)

Klamath Tribes

Natural and cultural resources fall under several departments and committees within the Klamath Tribes. The Natural Resources Department focuses on protecting, preserving, and enhancing natural resources. The department includes: The Game Management Program, Aquatic Ecologist and Research Biologist, Natural

Resource Specialist in timber, and GIS. The Klamath Tribes also have the Ambodat (meaning in, at, or near the water) Department that "implements programs to restore and enhance the aquatic resources upon which the tribal members depend for their livelihood." They also have a language department that focuses on keeping the Klamath language alive and educating tribal members.

The Klamath Tribes also have a Culture and Heritage committee that advise the tribal chairman and tribal council on identification, perseveration, and protection of the traditional culture and heritage of the tribes. (The Klamath Tribes, 2025)

2.4 Built Environment

2.4.1 Infrastructure

Understanding the strengths and weaknesses of infrastructure systems is key to understanding how natural hazards will affect Oregon. It is also key to mitigating for hazards and preparing infrastructure to withstand those hazards. The following sections are an overview of transportation, energy, telecommunications, and water and wastewater in Oregon.

2.4.1.1 Transportation

Roads

Natural hazards and emergency events disrupt automobile traffic, create gridlock, and shut down local transit systems, making evacuations and emergency operations difficult. Roads and transportation infrastructure are also community lifelines that need to be restored as quickly as possible after a natural disaster to allow for the movement of people and supplies. The following sections describe the major highways in each region.

Region 1: Oregon Coast

Most of the population bases in Region 1 are located along the region's major freeway, US-101. US-101, also called the Oregon Coast Highway, runs north-south along the entire Oregon coast. It is the only continuous passage west of the Coast Range for automobiles and trucks traveling along the coast. Routes through the Coast Range that connect to US-101 link coastal communities the interior of the state.

Region 2: North Willamette Valley/Portland Metro

The largest population centers in Region 2 are located along the region's major freeways: I-5, State Route 205, and I-84. I-5 runs north-south through region 2. It is the main passage for automobiles and trucks traveling through the west coast states. Route 205 is a loop route that serves Portland and Vancouver and provides access through the eastern side of the Portland metro region. I-84 runs east-west and is the main passage for automobiles and trucks traveling east along the Columbia River.

Region 3: Mid/Southern Willamette Valley

The highway system in the Region 3 centers on I-5 which runs north-south through the region. Several major east-west highways intersect it connecting the region to the I-5 corridor including Route 20, Route 22, and Route 58 which are all ODOT Lifeline Routes.

Region 4: Southwest Oregon

The cities of Ashland, Grants Pass, Medford, and Roseburg, the largest population centers in the region, are located along Interstate 5. I-5 runs north-south through the region and is the main passage for automobiles and trucks traveling along the West Coast. Route 109 and Route 140, which are both ODOT lifeline routes, connect to I-5 in this region.

Region 5: Mid-Columbia

The largest population bases in Region 5 are located along the region’s major freeway, I-84. I-84 is the main east-west passage for automobiles and trucks traveling east along the Oregon and Washington border. Route 97 and Route 197, which are ODOT lifeline routes, run north south and connect to 1-84 along the Columbia River.

Region 6: Central Oregon

The largest population bases in the Central Oregon region are located along the region’s major highways, including US-97, US-20, and US-26. All three routes are ODOT lifeline routes.

Region 7: Northeast Oregon

The largest population centers in Region 7 are located along the region’s major freeway, I-84. I-84 runs northwest to southeast across the region. US-26, US-244, OR-245, and US-395 provide access west into Grant County. OR-82 provides access into Wallowa County. Additional north-south access is provided from Wallowa County to Washington via OR-3.

Region 8: Southeast Oregon

The largest population bases in the Southeast Oregon region are located along the region’s major highways: I-84, US-20, US-26, and US-95. I-84 runs northwest to southeast. US-20, US-26, and US-95 provide access east and west into Idaho and central Oregon counties. US-395 provides access into Lake County.

Bridges

Oregon’s rivers and varied topography have led to the construction of numerous bridges to maintain transportation connections across the state. Non-functional bridges disrupt local and freight traffic, emergency operations, and sever lifelines routes. These disruptions will have the potential to increase local economic losses if industries are unable to transport goods.

Many bridges across the state are part of the state and interstate highway system maintained by the Oregon Department of Transportation (ODOT). ODOT manages 2,773 bridges as of their 2023 Bridge Condition Report. ODOT’s inventory does not include all bridges across the state. Cities and counties maintain some bridges. The bridge layer on ODOT’s GIS tool, TransGIS, has a total of

10,343 bridge and culvert structures statewide which includes both ODOT owned structures and structures owned by other entities. (ODOT, 2024)

ODOT's 2023 Bridge Condition Report details the state of bridge conditions on state highways. ODOT assesses bridge conditions based on both ODOT data and the National Bridge Inventory. They summarize conditions using several measures, but most often use the National Bridge Inventory rating for bridge components, the deficient bridge classification, and structural condition rating. The structural condition rating rates bridges on a scale from very poor to very good. Only 44 bridges were in poor condition, or structurally deficient, in 2023. However, trends show that bridge conditions overall are slowly declining. (ODOT, 2023)

ODOT also tracks bridge key performance measures, a percentage of ODOT bridges not in distressed condition. The target percentage is 78 percent of bridges not distressed. In 2023, 77.9 percent of bridges were not in distressed condition. This rate is below the target but an improvement over the 2022 rating of 77.2%. ODOT has concerns that overall bridge ratings will continue to deteriorate as bridges across the state continue to age. ODOT has been unable to obtain enough funding to keep up with continued deterioration. The Department replaced three bridges in 2023 but would need to replace approximately 27 bridges annually to keep up with the 100-year design life of bridges. (ODOT, 2023)

ODOT operates a seismic retrofit program that prioritizes bridges for seismic retrofits based on the routes that would be most important in a seismic event. The program has five phases. Phase 1 routes provide a connection to the Redmond airport, east-west freight movement, and the north-south U.S. 97 corridor. Phase 2 routes connect the Willamette Valley with coastal communities and southern Oregon. Phase 3 adds redundancy and capacity to routes that were strengthened in phase 1 and 2. Phase 4 finalizes all proposed seismic lifeline corridors. Phase 5 is 12 full replacements of major bridges. of the program includes 709 bridges total. As of 2023, 35 of those bridge projects had been completed and 18 more had been funded. The program is facing significant challenges with the complexity of these projects as well as increased construction costs. (ODOT, 2023)

Railroads

Oregon's rail system is critical to the state's economy, energy, and food systems. Rail systems export lumber and wood products, pulp and paper, and other goods produced in Oregon and transport products from other states to and through Oregon (ODOT, 2020). Disruptions to the rail system can result in economic losses. The potential for harm from rail accidents can also have serious implications for local communities, particularly if they are carrying hazardous materials.

Region 1: Oregon Coast

Region 1 rail lines are short lines and freight routes, connecting the coast to larger rail lines and inland metropolitan areas. Curry County is the only coastal community without rail. The region's rail providers are the Portland & Western Railroad (PNWR), Port of Tillamook Bay Railroad (POTB), and the Coos Bay Rail Link (CBRL). The PNWR lines in Clatsop County connect Astoria to the Portland Metro Area. The POTB line connects Tillamook to inland railways operated by PNWR. Though there is no commuter rail line in the region, the Oregon Coast Scenic Railroad runs short scenic rail excursions along the coast near Tillamook.

Region 2: North Willamette Valley/Portland Metro

Region 2’s major (Class I) freight rail providers are the Union Pacific (UP) and the Burlington Northern-Santa Fe (BNSF) railroads. The Port of Portland is a major marine gateway for rail freight. The region has six major rail yards and terminals operated by UP and BNSF, all located in Portland. Amtrak provides passenger rail service through the region. The Portland Westside Express Service provides commuter rail in Washington County. The Portland area is also serviced by a regional transit system (TriMet) that provides light rail service in the greater Portland Metropolitan area.

Region 3: Mid/Southern Willamette Valley

Region 3’s railroads primarily run north-south. The Union Pacific Railroad is the major freight rail provider in the region. An Amtrak passenger train also runs on the UP line. It runs north to Spokane and south to Southern California where the tracks turn east and continue to Texas. Other freight railroads in the region include Central Oregon and Pacific, the Albany and Eastern, the Portland and Western, the Hampton Railway, the Willamette and Pacific, and the Willamette Valley Railway.

Region 4: Southwest Oregon

The region’s rail providers are the Central Oregon & Pacific and the Rogue Valley Terminal Railroad. The Central Oregon & Pacific Line follows I-5 through the region, then runs west through Lane County and loops back into region 4 through Reedsport. The Rogue Valley Terminal Railroad is a short 12-mile spur off the Central Oregon & Pacific Line in Jackson County (ODOT, 2020). There is no passenger rail in the region.

Region 5: Mid-Columbia

The region’s major freight rail providers are the Union Pacific (UP) and the Burlington Northern-Santa Fe (BNSF) railroads. UP operates two major rail yards in the region in The Dalles and Hinkle. Hinkle Yard serves as UP’s system yard and locomotive service and repair yard for Oregon and the greater northwest area. (ODOT, 2020) Amtrak provides passenger rail service along the Columbia River Gorge and eastward via the Empire Builder line, on the Washington side of the river.

Region 6: Central Oregon

The region’s major (Class I) freight rail providers are the Union Pacific and the Burlington Northern-Santa Fe railroads. BNSF and UP operate one major rail yard in Klamath Falls. The Klamath Falls Yard, which consists of two adjacent yards, is used for switching, storing rail cars, and locomotive repair. (ODOT, 2020) Amtrak provides passenger rail service from the Willamette Valley south through region 6 and southward to Los Angeles, California, with stops in Chemult and Klamath Falls.

Region 7: Northeast Oregon

The region’s major (Class I) freight rail providers are the Union Pacific and the Burlington Northern-Santa Fe railroads. The Class I rail line follows the I-84 corridor. Another non-class I rail line provides access to Enterprise in Wallowa County. Grant County has no active rail lines. UP operates one rail yard in the region, in La Grande. (ODOT, 2020) Region 7 does not have passenger rail service.

Region 8: Southeast Oregon

The region's major freight rail providers are the Union Pacific and the Burlington Northern-Santa Fe railroads. The rail line follows the I-84 corridor. Another non-Class I rail line provides access to the City of Vale. Harney county has no active rail lines. UP operates two rail yards in Ontario and Nyssa. (ODOT, 2020) Region 8 does not have passenger rail service.

Airports

During and after natural disasters, public and private airports are important staging areas for emergency response activities. Public airport delays and closures will impact the ability for people to leave the region by air during and after a natural disaster. Businesses relying on air freight and the tourism industry may also be impacted by airport closures. The sections below detail major airports in each region and Table 2.4.1-1 gives a full count of the number of public and private airports and heliports in each region.

Region 1: Oregon Coast

Southwest Oregon Regional Airport in North Bend is the only commercial airport in the region and is the fifth busiest airport in Oregon. The airport is owned, operated and administered by Coos County Airport District. In 2023 about 50 passengers boarded planes at the Southwest Oregon Regional Airport each day. (FAA, 2024)

Region 2: North Willamette Valley/Portland Metro

Portland International Airport is the only primary commercial airport in the region and is the busiest airport in Oregon (FAA, 2024). The airport is owned, operated, and administered by the Port of Portland. In 2023, approximately 22,300 passengers boarded planes each day. (FAA, 2024) Approximately 71,000 flights flew out of Portland International Airport in 2023. (BTS, 2024) The Port of Portland also operates two relief airports, Portland-Hillsboro and Portland-Troutdale, which serve the region.

Region 3: Mid/Southern Willamette Valley

Eugene Airport is the largest public airport in the region and the second busiest airport in Oregon (FAA, 2024). The airport is owned, operated, and administered by the City of Eugene. In 2023 about 2,300 passengers boarded planes at the Eugene airport each day. (FAA, 2024)

Region 4: Southwest Oregon

Rogue Valley International-Medford Airport is the only commercial airport in the region and is the fourth busiest airport in Oregon. (FAA, 2024) The airport is owned, operated and administered by Jackson County. (FAA, 2025) In 2023, approximately 1,300 passengers boarded planes at Rogue Valley International-Medford Airport each day. (FAA, 2024)

Region 5: Mid-Columbia

The Eastern Oregon Regional Airport is the only commercial airport in the region and the seventh busiest airport in Oregon. (FAA, 2024) The airport is owned and operated by the city of Pendleton.

Three round trip flights between Portland and Pendleton leave the airport daily. (City of Pendleton, 2025).

Region 6: Central Oregon

The Redmond Regional Airport is the only commercial airport in the region and is the third busiest airport in Oregon. (FAA, 2024) The airport is owned and operated by the city of Redmond. (FAA, 2025) In 2023, about 1,500 passengers boarded planes at the airport daily. This airport has been identified to become a primary airport following a Cascadia Subduction Zone (CSZ) seismic event if Portland International Airport is incapacitated.

Region 7: Northeast Oregon

Northeast Oregon has no commercial airports and several general aviation public airports including Baker City and La Grande airports.

Region 8: Southeast Oregon

The Southeast Oregon region has no commercial airports and several general aviation public airports including the Burns and Ontario Municipal airports.

Table 2.4.1-2 - Public and Private Airports and Heliports by Region

	Number of Airports by FAA Designation				
	Public Airport	**Private Airport**	**Public Heliport**	**Private Heliport**	**Total**
Region 1	16	6	0	10	32
Region 2	11	32	1	22	66
Region 3	17	63	0	21	101
Region 4	10	29	0	11	50
Region 5	9	18	0	8	35
Region 6	17	40	0	11	68
Region 7	13	20	0	1	34
Region 8	6	17	0	1	24

Source: FAA Airport Data and Information Portal. (2025). *Published Data.* Airport Data and Information Portal

Ports

Oregon's ports have historically provided services for timber transport and for commercial and recreational fishing. Over the years, ports in Oregon have evolved to provide recreational, commercial, and economic services to Oregon residents and businesses by providing industrial land and infrastructure (river, rail, road, and air) and by promoting fresh seafood, fishing trips, and ecotourism. Oregon has 23 ports, with nine located in cities along the Columbia River and fourteen along the Pacific Coast. The ports along the Columbia River are a part of the Columbia-Snake port system that also includes ports in Washington and Idaho. Ports are special districts that function similarly to a local government entity with an elected board of commissioners. (Oregon Legislature, 2010)

Region 1: Oregon Coast

Ports in the Oregon Coast Region are a major contributor to the local, regional, and national economies. In the North Coast, Ports include Astoria, Nehalem, and Garibaldi, and Tillamook Bay. The Port of Astoria is a deep-water port and includes facilities for cruise ships. In the Central Coast, ports include Newport, Toledo, Alsea, and Siuslaw. Newport and Siuslaw are active fishing ports that also provide an array of businesses catering to tourists. Port of Newport is a deep-water Port. In the South Coast, ports include Umpqua, Coos Bay, Bandon, Port Orford, Gold Beach, and Brookings-Harbor. The Port of Coos Bay is Oregon's largest coastal deep-draft harbor and supports cargo ships. (Oregon Legislature, 2010)

Region 2: North Willamette Valley/Portland Metro

Region 2 includes two ports: Port of Columbia County and Port of Portland. Port of Columbia County owns eight industrial properties that total 2,400 acres along 51 miles of the Columbia River. (Port of Columbia, 2025) Port of Portland is responsible for overseeing the Portland International Airport and other aviation and marine activities in the Portland Metro area. The Port of Portland includes three marine terminals, five industrial parks, and three airports (Port of Portland, 2025).

Region 5: Mid-Columbia

Region 5 includes three ports: Port of Cascade Locks, Port of The Dalles, and Port of Hood River. The port district of Port of Cascade Locks is approximately 347 square miles. The port's holdings include industrial land, a marine park, and the Bridge of the Gods. (Port of Cascade Locks, 2024) The Port of Hood River covers about half of Hood River County, extending south from the Columbia River through the Hood River Valley. It provides five types of facilities and services in the region: bridge, marina, airport, recreation, and property development. (Port of Hood River, 2025). Port of The Dalles district is approximately 664 square miles and covers the northern third of Wasco County. It includes industrial land and The Dalles Marina (Port of The Dalles, 2025).

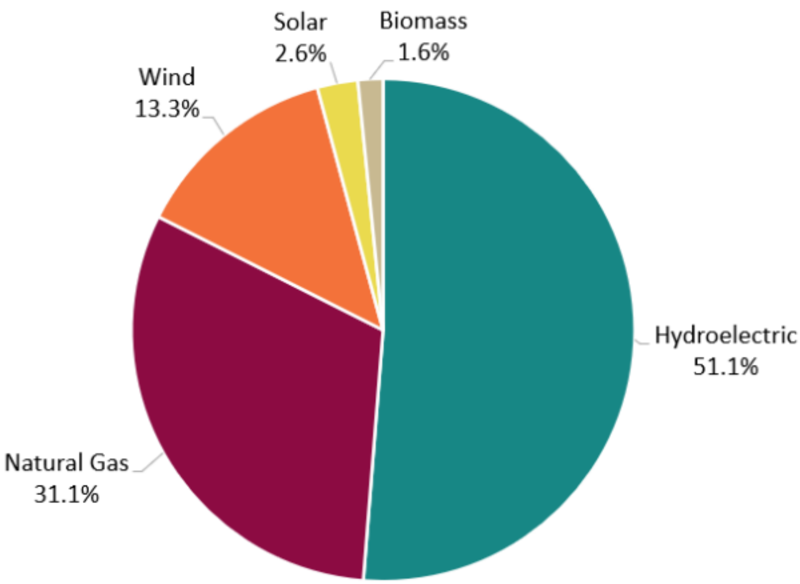
2.4.1.2 Energy

Safe and reliable energy systems are community lifelines in a natural disaster that need to be restored as soon as possible following a natural disaster. Energy systems are also vulnerable to hazards depending on the mode of production, transmission, and end use. Natural disasters can add stress to energy infrastructure that may lead to system damage or disruption in service. Energy systems in Oregon mainly break down into three categories: electricity, transportation fuel, and direct-use fuels. In 2022, 32 percent of energy used in Oregon was electricity. Thirty-one percent of energy use in 2022 was direct-use fuels which includes fuel oil and natural gas used for heat and other purposes like gas stoves. Thirty-seven percent of energy consumption was transportation fuels, almost all of which is imported from outside of the state. The following sections give further details on the energy produced and used in Oregon. (ODOE, 2024)

Electricity

Oregon’s electricity is produced using a diverse array of resources. Figure 2.4.1-1 shows that in 2022 hydropower was used to generate more than half of the state’s electricity (51%). Hydropower is followed by natural gas (31%), and wind (13%). Approximately 69 percent of electricity generated in Oregon is from non-greenhouse gas emitting resources. Energy produced in Oregon is both used in Oregon and sold to utilities in other states. In 2022, 37 percent of the state’s hydropower and 45 percent of its wind generation were exported. (ODOE, 2024)

Figure 2.4.1-1 - Sources used to generate electricity produced in Oregon



Note: Based on data from 2022

Source: Oregon Department of Energy, 2024.

Oregon’s eight natural hazards mitigation planning regions are served by three investor-owned electric utilities and 38 customer-owned or publicly owned electric utilities. (ODOE, 2021) All regions have electricity-generating facilities. (U.S. Department of Homeland Security, 2023) The following sections describe each region’s electric system. Table 2.4.1-2 lists electric power-generating facilities by region.

Region 1: Oregon Coast

Region 1 has only two power plants, both of which are powered by biomass. (U.S. Department of Homeland Security, 2023) The Bonneville Power Administration (BPA) is the area’s wholesale electricity distributor. Pacific Power and Light (Pacific Power) is the largest investor-owned utility company serving the region. The Blachly-Lane Electric Cooperative, Coos-Curry Electric Cooperative, and Western Oregon Electric Cooperative serve portions of the region. The Bandon Municipal Utility District serves an area around the City of Bandon in Coos County. In addition, the Tillamook People’s Utility District, Central Lincoln People’s Utility District, and Consumers Power Inc. serve portions of the region. (ODOE, 2021)

Region 2: North Willamette Valley/Portland Metro

Portland General Electric (PGE) is the largest investor-owned utility in the region, serving large areas of Clackamas, Multnomah, and Washington Counties. Pacific Power and Light (Pacific Power) is another investor-owned utility company serving a small portion of Multnomah County. The Western Oregon Electric Cooperative, Inc. provides electricity for portions of the region. Three municipal utility districts also support portions of the region: City of Cascade Locks, City of Forest Grove, and City of Canby. In addition, the Clatskanie People's Utility District and the Columbia River People's Utility District serve portions of the region. (ODOE, 2021)

The Bonneville Dam is the Bonneville Power Administration's major dam in the region, located on the Columbia River. Other dams in the region are located on Willamette, Clackamas, and Sandy Rivers.

Region 3: Mid/Southern Willamette Valley

The Bonneville Power Administration is Region 3's wholesale electricity distributor. Pacific Power and Light (Pacific Power) is the largest investor-owned utility company in the region, serving primarily Linn, Polk, and Marion Counties. Portland General Electric serves Marion and Yamhill Counties. The Blachly-Lane Electric Cooperative, Lane County Electric Cooperative, and Western Oregon Electric Cooperative each serve a portion of region 3. Four municipal utility districts serve the region: Eugene Water and Electric Board, Monmouth Power and Light Department, McMinnville Water and Light, and Springfield Utility Board. In addition, the Central Lincoln People's Utility District, Consumer's Power, Inc., Emerald People's Utility District, and Salem serve portions of the region. (ODOE, 2021)

The Detroit, Carmen-Smith, and Lookout Point dams generate the most power in the region. BPA's dams in region 3 are: Big Cliff and Detroit Dams on the North Santiam River, Foster and Green Peter Dams on the South Santiam River, Cougar Dam on the McKenzie River, and Dexter, Lookout Point, and Hills Creek Dams on the Middle Fork of the Willamette River.

Region 4: Southwest Oregon

The Bonneville Power Administration is Region 4's wholesale electricity distributor. Most of the region is served by Pacific Power and Light. The Coos-Curry Electric Cooperative and the Douglas Electric Cooperative serve portions of Douglas and Josephine Counties. The Umpqua Indian Utility Cooperative serves the Cow Creek Band of Umpqua Tribe of Indians, including the Seven Feathers Casino Resort in Douglas County. (ODOE, 2021)

Hydropower dams are primarily located on the Applegate, Rogue, and Umpqua Rivers.

Region 5: Mid-Columbia

The Bonneville Power Administration is Region 5's wholesale electricity distributor. Pacific Power and Light is the primary investor-owned utility company serving portions of Gilliam, Hood River, Morrow, Sherman, and Umatilla Counties. The region's electric cooperatives are the Hood River Electric Cooperative, Wasco Electric Cooperative, Columbia Basin Cooperative, Umatilla Cooperative, Columbia Power Cooperative, and Central Electric Cooperative. Two utility districts serve the region: City of Cascade Locks and Milton-Freewater. In addition, the Northern Wasco People's Utility District serves portions of the region. (ODOE, 2021)

The major BPA dams in the region are located on the Columbia River in communities of The Dalles, John Day, and McNary.

Region 6: Central Oregon

The Bonneville Power Administration is Region 6's wholesale electricity distributor. Pacific Power and Light is the primary investor-owned utility company serving portions of Crook, Deschutes, Jefferson, Klamath, and Lake Counties. The region's electric cooperatives are: Central Electric Cooperative, Columbia Basin Cooperative, Columbia Power Cooperative, Harney Electric Cooperative, Midstate Electric Cooperative, Surprise Valley Electric Cooperative, and Wasco Electric Cooperative. (ODOE, 2021)

The major BPA dams in the region are the Pelton and Round Butte Dams on the Deschutes River.

Region 7: Northeast Oregon

The Bonneville Power Administration is Region 7's wholesale electricity distributor. Pacific Power and Light is the primary investor-owned utility company serving Wallowa County. Idaho Power Company serves portions of Baker County. The region's electric cooperatives are Oregon Trail Electric Cooperative, Central Electric Cooperative, Columbia Power Cooperative, and the Umatilla Electric Cooperative. The Oregon Trail Electric Cooperative serves the major population centers in the region. (ODOE, 2021)

Major dams in the region are the Brownlee, Oxbow, and Hells Canyon Dams on the Snake River.

Region 8: Southeast Oregon

The Bonneville Power Administration is the area's wholesale electricity distributor. Idaho Power is the primary investor-owned utility company serving Harney and Malheur Counties. The region's electric cooperatives include the Harney Electric Cooperative, and the Oregon Trail Electric Cooperative. (ODOE, 2021)

Table 2.4.1-4: Electric power plants by region and fuel source -only operational plants included

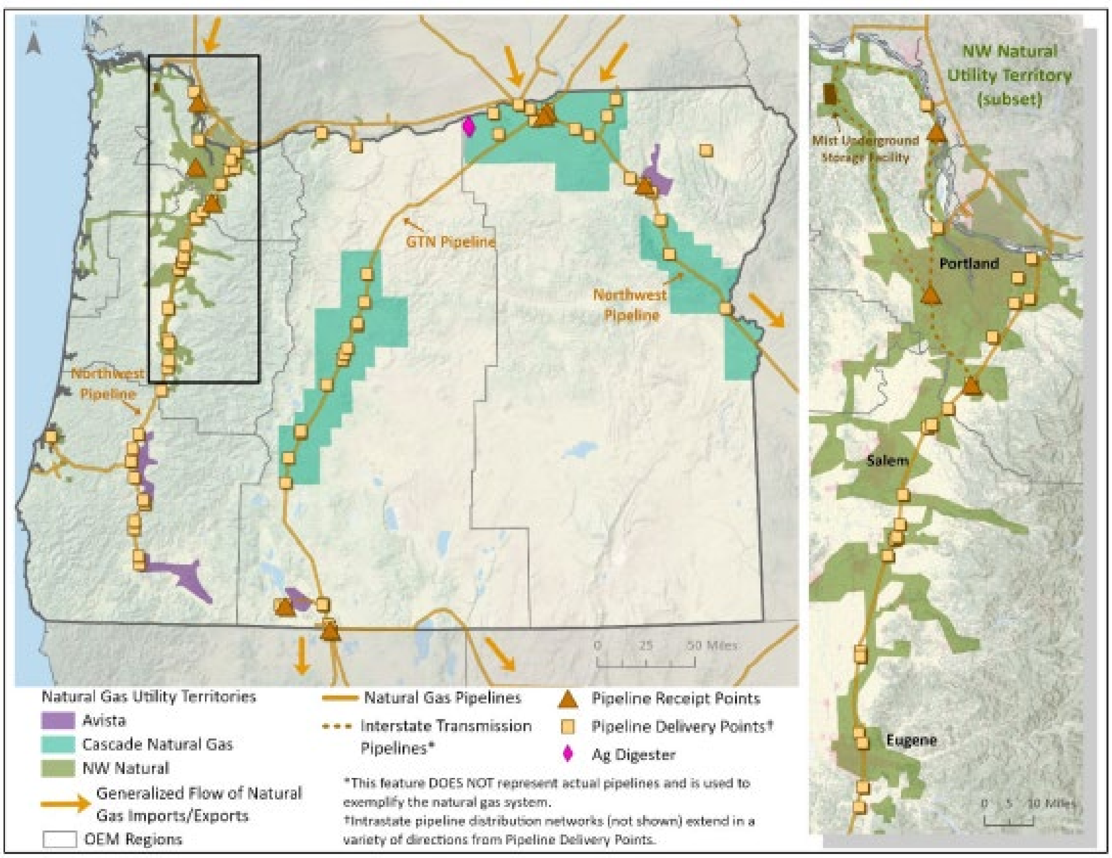
	Hydro-electric	Fossil Fuel	Wind	Biomass	Solar	Geothermal	Total Power Plants
Region 1	0	0	0	2	0	0	2
Region 2	9	3	0	1	6	0	19
Region 3	13	2	0	7	11	0	33
Region 4	16	0	0	4	1	0	21
Region 5	5	5	35	3	2	0	50
Region 6	12	2	0	0	16	0	30
Region 7	3	0	6	0	1	0	10
Region 8	2	0	0	0	5	1	8

Source: U.S. Department of Homeland Security Geospatial Management Office – Homeland Infrastructure Foundation Level Database Authoritative Feature Class for Power Plants. Updated September 21, 2023. https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::power-plants-2/about

Natural Gas

Liquefied natural gas (LNG) is transported into Oregon via pipelines. No natural gas is produced in Oregon. Natural gas is used both as a direct use fuel source, and as fuel for producing electricity at power plants. As noted below, LNG pipelines run through some hazard mitigation regions. The Mist Underground Natural Gas Storage Facility is also located in Columbia County, in Region 2. LNG pipelines and natural gas storage facilities are vulnerable to earthquakes and can cause danger to human life, safety, and environmental impacts in the case of a release. Figure 2.4.1-2 shows existing LNG pipelines and natural gas utility territories in Oregon.

Figure 2.4.1-2 - Liquefied Natural Gas Pipelines and Infrastructure in Oregon



Source: Oregon Department of Energy. (2024). Energy Security Plan. https://www.oregon.gov/energy/safety-resiliency/Documents/2024-Oregon-Energy-Security-Plan.pdf

Oregon is served by three natural gas utilities: NW Natural, Cascade Natural Gas, and Avista. They do not serve the entirety of the state. NW Natural is mainly concentrated in the northwestern portion of the state, in Regions 1, 2, and 3 and small portions of Regions 4 and 5. Cascade Natural

Gas mainly serves portions of central Oregon, portions of Malheur and Baker Counties, and portions of Umatilla and Morrow County Avista serves small areas around Roseburg, Medford, Klamath Falls, and La Grande. For a detailed map of utilities, refer to Oregon Department of Energy's "Find Your Utility" tool (ODOE Find Your Utility).

Liquid Fuels

Liquid fuels generally refer to fossil fuels and alternative fuels like ethanol and biodiesel that are mainly but not exclusively used to power transportation. Most liquid fuels used in Oregon are produced outside of the state. Fuel is transported into the state via truck, barge, rail, and pipeline. Over 90 percent of liquid fuels in Oregon come from refineries in Washington. The remaining 10 percent come from refineries in Salt Lake City and the San Francisco Bay Area.

Most fuels used in Oregon are transported into the state via the Olympic Pipeline which generally follows I-5 south from the Canadian Border to the Portland fuel terminals at the Critical Energy Infrastructure Hub (refer to the section titled Critical Energy Infrastructure Hub for more information about where the fuel terminals are located). Smaller portions of fuel are also delivered to the state via truck from Washington, Idaho and Nevada. Maritime vessels also supplement the flow of fuel to the Portland fuel terminals. (ODOE, 2024)

From the Portland Fuel Terminals, the Kinder Morgan Pipeline transports diesel fuel to the Eugene terminal, the main terminal for central and southwest Oregon. Pipelines also carry jet fuel to Portland International Airports. Barges are used to deliver fuels from the Portland terminals up the Columbia River to terminals in Umatilla County. After fuels are transported to other terminals, they are dispersed to smaller storage facilities, retailers (like gas stations), and end users across the state via truck. (ODOE, 2024)

Critical Energy Infrastructure Hub

Oregon's critical energy infrastructure hub (CEI Hub) is in Region 2, in north Portland. It is located along a six-mile stretch of the Willamette River between Sauvie Island to the north and the Fremont Bridge along US-30 to the South. The following energy sector facilities are located at the CEI Hub:

- All of Oregon's major liquid fuel port terminals
- Liquid fuel transmission pipelines and transfer stations
- Natural gas transmission pipelines
- Liquefied natural gas storage facility
- High-voltage electrical substations and transmission lines
- Electrical substations for local distribution

In 2013, DOGAMI conducted a study of the CEI Hub's earthquake risk. (Wang, Bartlett, & Miles, 2013) The study determined that most facilities at the site are constructed on soils susceptible to liquefaction and that the various energy sector facilities have significant seismic risks. An additional study by ECONorthwest for Multnomah County Office of Sustainability and Portland Bureau of Emergency Management in 2022 came to similar conclusions and inventoried the magnitude and extent of a potential fossil fuel release from the CEI Hub. Impacts would likely include loss of life and injuries, effects on navigation and river-related commercial activity, short- and long-term environmental effects, short- and long-term air quality impacts, and impacts on cultural resources.

In 2019, the Multnomah County Board of Commissioners adopted a resolution against the expansion of fossil fuel transportation and storage infrastructure in the county and that supports efforts to require the industry to bear the full cost of damages. (ECONorthwest, 2022)

2.4.1.3 Telecommunications

Telecommunications infrastructure includes television, telephone, broadband internet, radio, and ham radio. These systems are key for maintaining communications capabilities during natural disaster events and other emergency situations to keep citizens safe and informed. Additionally, responders depend on telecommunications infrastructure to be routed to sites where they are needed.

OEM coordinates the Oregon Emergency Response System (OERS) that manages state resources in response to natural and technological emergencies involving multi-jurisdictional cooperation between all levels of government and the private sector. It was established in 1972 to improve communication and coordination between government agencies. (OEM, 2025)

Television

Television serves as a major provider for local, regional, and national news and weather information and can play a vital role in emergency communications. The local primary stations identified as emergency messengers are identified in the Oregon State Emergency Alert System Plan which is required by the Federal Communication Commission (SECC, 2022).

Telephone and Broadband

Landline telephone, mobile wireless telephone, and broadband providers serve each of the eight natural hazards mitigation planning regions. Broadband technology is provided in all regions via cable, digital subscriber line (DSL), fiber, fixed wireless, and/or mobile wireless. However, there are still gaps in internet access across the state. Certain populations are more likely to disproportionately lack access to broadband internet including:

- Households with annual income at or below 150 percent of the federal poverty level
- Older adults (60+)
- Veterans
- Individuals with disabilities
- Individuals with a language barrier
- Individuals who are members of racial or ethnic minority groups
- Residents of rural areas (American Immigration Council, 2022)

Landline telephones are not very common throughout the state. Residents in rural areas rely more heavily on landlines due to less consistent cellular reception outside of major transportation corridors. Wireless providers sometimes offer free emergency mobile phones to those impacted by disasters, which can aid communication when landlines and broadband service are unavailable.

Radio

Radio is readily available to those who live within each of the eight natural hazards mitigation planning regions and can be accessed through car radios, emergency radios, and home sound systems. Radio is a major communication tool for weather and emergency messages. Radio transmitters for each region are identified in the Oregon State Emergency Alert System Plan (SECC, 2022)

Ham Radio

Amateur radio, or ham radio, is a service provided by licensed amateur radio operators. Ham radio is an alternate means of communicating when normal systems are down or at capacity. Emergency communication is a priority for the Amateur Radio Relay League (ARRL), the national association for amateur radio operators. Each region is served by Amateur Radio Emergency Service (ARES) districts. Radio Amateur Civil Emergency Services (RACES) is a special phase of amateur radio recognized by FEMA that provides radio communications for civil preparedness purposes including natural disasters. The Oregon Section of the American Relay Radio League has more information on their ARES webpage.

2.4.1.4 Water and Wastewater

Drinking water, stormwater, and wastewater systems are all vulnerable to natural hazards and those vulnerabilities can have repercussions on human health, ecosystems, and industry. They are all key lifelines that will need to be restored as quickly as possible in the event of a natural disaster.

Drinking Water

In most of Oregon, municipal drinking water supplies are obtained primarily from a combination of surface water and groundwater sources. Of the 935 total community water systems in Oregon, approximately 150 systems use surface water as their primary source and 665 use groundwater. However, of the 138 systems across the state that serve populations of over 10,000 people, 72 have surface water as their primary source and only 12 have groundwater as their primary source. (OPH, 2025) Because of high levels of turbidity in streams during heavy rain events, many communities are investing in new well fields. Earthquakes pose a major threat to water supply because of the risk of dam failure at reservoirs.

Rural residents draw water from surface water, groundwater wells, or springs. Areas with sedimentary and volcanic soils may be subject to high levels of arsenic, hydrogen sulfide, and fecal coliform bacteria, which can impact the safety of groundwater sources. In areas where no new live-flow water rights are available, farmers and ranchers are using above-ground storage to supply water for crop irrigation during dry seasons. At times, urban water districts with surplus water have sold water to rural areas.

Surface sources for drinking water are vulnerable to pollution caused by non-point sources and point sources. Pollution is a major threat to surface water quality, and may include stormwater runoff from roadways, agricultural operations, timber harvest, erosion and sedimentation. DEQ, ODA, and ODF have programs in place to address water quality concerns caused by land management practices. However, many water bodies continue to not meet water quality standards and pesticide benchmarks. In general, ODA's water quality rules and Confined Animal Feeding Operations (CAFO) program do provide some protection. However, the CAFO program is designed to provide water quality protection for up to a certain design storm, not for a major flood or other natural hazard event. Landslides, flood events, earthquakes and resulting liquefaction can cause increased erosion and sedimentation in waterways.

Underground water supplies and aging or outdated infrastructure such as reservoirs, treatment facilities, and pump stations can be severed or damaged during a seismic event. Rigid materials such as cast iron may snap under the pressure of liquefaction. More flexible materials such as polyvinyl chloride (PVC) and ductile iron may pull apart at joints under the same stresses. These types of infrastructure damage could result in a loss of water pressure in municipal water supply systems, thus limiting access to potable water. This can lead to unsanitary conditions that may threaten human health and limit fire suppression.

Region 1: Oregon Coast

In Region 1 municipal drinking water is mainly supplied by surface water. Each county's water is drawn from several major waterways, including the Youngs, Nehalem, Wilson, Nestucca, Siletz, Yaquina, Alsea, Siuslaw, Umpqua, Coos, Coquille, and Rogue Rivers. Limited access to water due to low summer flows has become a major concern in the region. New water rights cannot be purchased in region 1. Conservation approaches now allow landowners to share or sell a portion of their water rights to downstream users.

Region 2: North Willamette Valley/Portland Metro

In Region 2 municipal drinking water mainly comes from surface water with supplementary groundwater when needed. The Bull Run watershed is the primary drinking source for the City of Portland. For many communities in region 2, the Willamette River is both a source of potable water and a discharge location for wastewater treatment facilities. The Portland Water Bureau has water wholesale contracts with 19 other water providers in the Portland area that serve about 351,000 people. Wholesale contracts are with cities, water districts, and private water companies. (PWB, 2025) Cities that draw water from the Willamette River face water rights disputes and issues related to water quality.

Region 3: Mid/Southern Willamette Valley

Most of Region 3's municipal drinking water supply is from surface water sources with supplementary ground water sources. For many communities in region 3, the Willamette River is both a source of potable water and a discharge location for clean wastewater treatment plant effluent. Cities that draw water from the Willamette River face water rights disputes and issues related to water quality.

Region 4: Southwest Oregon

Most of Region 4's municipal drinking water supply is obtained from surface water. In Jackson and Josephine Counties, the Rogue River provides municipal water supplies to most cities. The City of

Cave Junction, however, uses water from the Illinois River. In Douglas County, most cities source their water from the Umpqua River and its tributaries.

Region 5: Mid-Columbia

The drinking water supply in Region 5 is drawn from a combination of surface, well, and spring sources. In the eastern and western portions of the region, surface water sources are often supplemented by groundwater. The region's central counties use groundwater as a primary source, supplemented with springs where they are available. In this part of the region groundwater shortages are increasing. Water quality in the region's municipal supply is good. Water quality could be threatened as older or damaged well infrastructure may not filter coliform and other bacteria as effectively as newer infrastructure.

Region 6: Central Oregon

In Region 6 municipal drinking water supply is from both surface and ground sources. In Crook, Deschutes, Jefferson, and Klamath Counties, rural areas use surface water sources. In the upper basin of Klamath County, rural drinking water is drawn from springs. The lower basin draws water from Klamath Lake for drinking water and irrigation. In rural areas of Lake County, drinking water is primarily drawn from wells. The region's cities primarily draw drinking water from wells except Bend, which draws water from Bridge Creek, a spring-fed waterway. A small portion of the City of Lakeview's drinking water is drawn from springs.

Region 7: Northeast Oregon

In Region 7 municipal drinking water supply is from both surface and ground sources. In Wallowa and Grant Counties, most municipal drinking water is from wells and supplemented by surface water. In Grant County, cities draw drinking water equally from a combination of surface and ground sources. Baker City draws its water from mountain springs. Other cities in Baker County depend primarily on groundwater wells for municipal drinking water. Rural residents also obtain water primarily from both surface sources and groundwater wells.

Region 8: Southeast Oregon

In Region 8, most municipal drinking water is from groundwater wells. The City of Ontario primarily draws drinking water from the Snake River. The City of Nyssa also uses the Snake River as a secondary water source. The City of Vale primarily uses the Malheur River as a primary source and groundwater wells as a backup. Rural areas in Malheur County draw drinking water from the Owyhee River, Beulah Reservoir, and Billy Creek. In Harney County, rural drinking water is drawn primarily from groundwater wells. Irrigation water is generally from surface sources and distributed through established irrigation districts in Malheur County. In Harney County, irrigation water is drawn from a combination of groundwater wells and surface sources including the Silvies, Donner und Blitzen River, and smaller tributary creeks. Water shortages have become common in region 8. Low levels of snowpack can lead to severe shortages in a region that is already subject to annual shortages. Low precipitation levels can lead to low levels of groundwater recharge, which could impact both agricultural and municipal supplies. Additionally, no new water rights are available for surface water, although groundwater rights are still available in Malheur County.

Stormwater

Stormwater runoff is precipitation that flows over land or impervious surfaces rather than infiltrating where it lands. Stormwater runoff can pick up pollutants, such as sediments and chemicals, and wash them into water bodies, causing non-point source pollution. In urbanized areas, where larger portions of the land surface are impervious due to development, a lack of treatment for non-point source pollution can lead to adverse impacts to surface water quality. If the downstream water body is used for drinking water, this can affect drinking water quality. Non-point source pollution can also lead to environmental issues, such as increases in surface water temperatures or increased concentrations of nutrients that can adversely affect habitat health. Furthermore, large volumes of fast-moving stormwater entering surface waterways can cause erosion issues and impact the integrity of roads and other infrastructure. (EPA, 2025)

Sewer infrastructure is also vulnerable to more intense storms and increased runoff from impervious areas. Leaves, trash, and other debris can clog stormwater systems. In urban areas with combined sewers, where stormwater runoff, sewage, and industrial wastewater are all transported in one pipe, large amounts of stormwater runoff into the storm sewer can lead to combined sewer overflows (CSOs). Combined sewer overflows happen when the amount of runoff exceeds the capacity of the sewer system and untreated stormwater and wastewater flow directly into nearby waterbodies. CSOs present a heightened health threat as sewage can be discharged directly into surface water bodies instead of being treated at wastewater treatment plants. (EPA, 2024) Underground stormwater and wastewater pipes are also vulnerable to damage by seismic events.

Requirements for stormwater mitigation vary by region due to differences in precipitation and amounts of development. Low impact development (LID), or stormwater infrastructure that uses or mimics natural processes to infiltrate, evaporate, or use stormwater, can alleviate or lighten the burden to a jurisdiction’s storm sewer system. Low impact development aims to manage stormwater runoff as close to the source as possible and avoid discharging it into storm sewer systems. Where stormwater does need to enter storm sewers, LID can decrease volume, flow rate, and temperature of the stormwater. (EPA, 2024) The City of Portland has been recognized as a national innovator in stormwater management and code because of its progressive LID stormwater mitigation strategies in the City’s building code. However, most jurisdictions do not require LID strategies in their building codes. Requiring decentralized LID stormwater management strategies could help reduce the burden of new development on storm sewer systems and increase a community’s resilience to flooding and seismic events, among other hazards.

Wastewater

Wastewater is water that has been generated from residential, commercial, industrial, mining, or agricultural operations that require advanced treatment. (EPA, 2025) Wastewater collection and treatment systems generally fall into two categories: decentralized systems and centralized systems. Decentralized systems treat sewage close to where wastewater is generated rather than transporting it to a centralized wastewater treatment location. Decentralized systems are most commonly individual septic systems or small community cluster systems. Decentralized systems are used more often in small communities and rural areas where distance, terrain, or cost prevent the construction of centralized systems. Almost 25 percent of households in the United States are on a decentralized wastewater system. (EPA, 2024) Decentralized wastewater systems in Oregon are governed by OAR 340-071 *Onsite Wastewater Treatment Systems.* The state's onsite wastewater management program is implemented by the Oregon Department of Environmental Quality (DEQ). Septic system permits have been required in Oregon since 1972. DEQ maintains records for Baker, Coos, Jackson, Union, and Wallowa counties. All other counties maintain septic permits at a county level. Contacts for each county can be found on the DEQ website: Oregon DEQ - Onsite Septic Staff and County Agent Contact Information

Centralized systems are municipal sewer systems that transport wastewater via pipes to a central wastewater treatment facility. After wastewater is treated, it is discharged to surface water our groundwater. Most urbanized areas use centralized sewer systems. Across the United States about 75 percent of households are connected to centralized sewer systems. (EPA, 2024) Centralized wastewater systems in Oregon are governed by OAR 860-037 *Wastewater Service Regulation for Joint Water/Wastewater Utilities.* Under the Clean Water Act, every wastewater treatment plant is required to maintain a National Pollutant Discharge Elimination System (NPDES) permit. Oregon DEQ issues NPDES permits, except those on tribal lands which are issued by EPA. Of the nine federally recognized tribes' land, only the Confederated Tribes of Warm Springs Reservation Wastewater Treatment Plant holds an EPA NPDES permit (EPA, 2024). Statewide, there is a total of 49 major wastewater treatment plants and 117 minor treatment plants. Plants are heavily concentrated in regions 1, 2, 3, and 4 and along the Columbia River where population density is higher. (U.S. Department of Homeland Security, 2025)

2.5 Economy

The impact of natural hazards on economic conditions depends on many variables. The vulnerability of businesses' labor, capital, suppliers, and customers are all relevant factors. (Zhang , Lindell, & Prater, 2009) Some industries, such as manufacturing and construction, rebound quickly and even thrive following a disaster. Others, like wholesale and retail, rebound more slowly or never recover (Zhang , Lindell, & Prater, 2009). Economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how employment sectors, workforce participants, financial and natural resources, and critical infrastructure are interconnected and interdependent.

2.5.1 Employment and Unemployment

Natural disasters do not impact all labor market participants equally. Unemployed and underemployed populations are disproportionately affected by disaster events. Research shows that employment outcomes can be especially bad for people physically displaced by a disaster (Karoly & Zissimopoulos, 2010). Moreover, those who are unemployed and many who are employed in low-wage positions lack access to employee benefit plans that provide income and healthcare supports (Flanagan B. E., Gregory , Hallisey, Heitgerd, & Lewis, 2011). Income deprivation and inaccessible healthcare, ruinous in the best of times, are felt more severely following a disaster. It is important to understand existing labor force characteristics and existing market trends to build a resilient workforce and mitigate the scope and intensity of disruptions and economic pain. Table 2.5.1-1 shows the total civilian labor force in each region, which includes people who are employed and unemployed in each county in each region. Table 2.5.1-1 shows the seasonally adjusted unemployment rate in each county and region.

Table 2.5.1-1: Civilian Labor Force, 2024

	Total Civilian Labor Force	Employed Workers	Unemployed
Oregon	2,190,716	2,100,284	90,432
Region 1			
Clatsop	20,078	19,264	814
Coos	26,735	25,455	1,280
Curry	8,888	8,427	461
Lincoln	21,419	20,398	1,021
Tillamook	12,281	11,804	477
Region 2			
Clackamas	227,136	218,507	8,629
Columbia	25,165	23,977	1,188
Multnomah	469,142	450,297	18,845
Washington	335,961	323,656	12,305
Region 3			
Benton	50,772	49,069	1,703
Lane	185,674	177,912	7,762
Linn	61,804	59,019	2,785
Marion	174,621	167,527	7,094
Polk	43,849	42,097	1,752
Yamhill	56,611	54,485	2,126
Region 4			
Douglas	47,706	45,308	2,398
Jackson	107,225	102,214	5,011
Josephine	35,995	33,992	2,003
Region 5			
Gilliam	943	898	45
Hood River	14,185	13,727	458
Morrow	6,123	5,894	229
Sherman	987	952	35
Umatilla	38,705	37,104	1,601
Wasco	13,600	13,050	550
Region 6			
Crook	11,416	10,789	627
Deschutes	106,779	102,529	4,250
Jefferson	10,459	9,972	487
Klamath	30,322	28,663	1,659
Lake	3,567	3,397	170
Wheeler	833	808	25
Region 7			
Baker	7,115	6,822	293

	Total Civilian Labor Force	Employed Workers	Unemployed
Grant	3,126	2,938	188
Union	12,153	11,588	565
Wallowa	3,630	3,472	158
Region 8			
Harney	3,598	3,445	153
Malheur	13,319	12,825	494

Source: Oregon Employment Department, 2025

Table 2.5.1-2: Annual seasonally adjusted unemployment rate (%)

	2019	2020	2021	2022	2023
United States	3.7	8.1	5.3	3.6	3.6
Oregon	3.7	7.6	5.2	3.9	3.7
Region 1					
Clatsop County	3.7	9.5	5.9	4.0	3.7
Coos County	4.8	8.6	6.2	5.0	4.5
Curry County	5.1	8.7	6.6	5.1	4.6
Lincoln County	4.3	10.8	6.7	4.9	4.2
Tillamook County	3.8	8.0	5.4	4.2	3.8
Region 2					
Columbia County	4.4	7.9	5.7	4.5	4.4
Clackamas County	3.4	7.2	4.8	3.6	3.4
Multnomah County	3.2	8.6	5.4	3.7	3.6
Washington County	3.1	6.5	4.4	3.3	3.2
Region 3					
Benton County	3.0	5.6	3.9	3.3	3.0
Lane County	4.0	7.9	5.5	4.3	4.0
Linn County	4.3	7.7	5.6	4.4	4.1
Marion County	3.9	7.0	5.1	4.0	3.7
Polk County	4.0	6.5	4.8	4.0	3.8
Yamhill County	3.4	6.8	4.7	3.6	3.5
Region 4					
Douglas County	4.8	7.8	5.8	4.9	4.7
Jackson County	4.3	7.8	5.4	4.4	4.3
Josephine County	4.9	7.9	6.2	5.3	5.1
Region 5					
Gilliam County	3.6	6.2	4.8	3.7	4.2
Hood River County	3.1	6.3	4.5	3.4	3.0
Morrow County	4.1	5.2	4.6	3.9	3.4
Sherman County	3.5	6.2	4.3	3.1	3.8

	2019	2020	2021	2022	2023
Umatilla County	4.8	6.8	5.2	4.3	4.1
Wasco County	4.1	7.1	5.2	4.1	4.0
Region 6					
Crook County	5.1	8.8	6.6	5.1	5.5
Deschutes County	3.9	7.9	5.3	3.9	3.7
Jefferson County	5	8.3	6.4	5.2	4.6
Klamath County	6.1	8.7	6.7	5.7	5.2
Lake County	5.4	5.7	5.5	5.1	5
Wheeler County	4.2	4.5	3.3	3.2	2.8
Region 7					
Baker County	4.6	7.2	5.1	4.5	4.3
Grant County	6.8	8.4	6.6	5.8	5
Union County	4.8	7.9	5.6	4.5	3.9
Wallowa County	5.7	7.2	5.4	5.1	4.4
Region 8					
Harney County	5.3	6	5.1	4.6	4.2
Malheur County	4.1	5.3	4.4	4.1	3.7

2.5.2 Supersectors

The North American Industry Classification System (NAICS) is a framework used by the United States, Canada, and Mexico to collect, analyze, and publish data about the North American economy. The classification system groups economic units with similar production processes according to a six-digit hierarchical structure that designates the sector, subsector, industry group, NAICS industry, and national industry (Office of Management and Budget , 2020). The U.S. Bureau of Labor Statistics through its Quarterly Census of Employment and Wages program adds to the NAICS hierarchy by grouping NAICS sectors into supersectors. (U.S. Bureau of Labor Statistics, 2019) This section describes regional economic activity through these supersectors.

Identifying supersectors with many business establishments and targeting mitigation strategies to support them can help the region's resilience. A business establishment is an "economic unit… that produces goods or provides services. It is typically at a single physical location and engaged in one, or predominantly one, type of economic activity" (U.S. Bureau of Labor Statistics, 2019). Individual business establishments are also likely to be impacted by natural hazards, with small businesses experiencing a disproportionate amount of risk.

Each supersector faces distinct vulnerabilities to natural hazards. Identifying a region's dominant supersectors and the underlying industries enables communities to target mitigation activities toward those industries' specific sensitivities. Each of the primary private employment supersectors represented across the state has sensitivity to natural hazards, as follows:

- **Trade, Transportation, and Utilities:** Retail Trade is the largest employment subsector within the Trade, Transportation, and Utilities sector. Retail Trade is vulnerable to disruptions in the disposable income of residents and to disruptions in the transportation system. Residents' discretionary spending diminishes after natural disasters as spending priorities tend to focus on essential items.

- **Leisure and Hospitality:** This sector primarily serves regional residents with disposable income and tourists. Following a natural disaster, residents may have less disposable income. Tourists may choose not to visit a region with unstable infrastructure.

- **Education and Health Services:** The industries in these sectors play important roles in emergency response in the event of a disaster.

- **Manufacturing:** This sector is highly dependent upon transportation networks to access supplies and send finished products to outside markets. For these reasons, the manufacturing sector may be susceptible to disruptions in transportation infrastructure. However, manufacturers are frequently less dependent on local markets for sales, which may contribute to the economic resilience of this sector.

- **Professional and Business Services:** This sector is composed of professional service providing industries including scientific and technical professionals, management professionals and administrative and support services (e.g., engineering, law, headquarters, temp help, etc.). In general, this sector has low vulnerability to natural disasters. Vulnerability is increased if suppliers are affected or physical infrastructure such as buildings, roads, telecommunications, or water systems is damaged. Mitigation efforts for this sector should include preparing business continuity and recovery plans.

- **Natural Resources and Mining:** The primary industries within this sector regionally are largely crop and animal production. These industries tend to fluctuate seasonally and are vulnerable to a variety of natural hazards (winter storms, floods, etc.). In addition to the loss of farm production, wages could be lost due to natural disasters. These industries are also dependent upon transportation systems that are vulnerable to disasters.

The following sections detail the five major supersectors in each region, as well as business establishment size and employment by sector.

Region 1: Oregon Coast

In 2024, the five major supersectors by share of employment in Region 1 were:

1. Leisure and Hospitality
2. Trade, Transportation and Utilities
3. Local Government
4. Education and Health Services
5. Manufacturing

Retail businesses are concentrated in the larger cities of the region and disruption of the transportation system could sever the connectivity between people living throughout the region and these retail hubs. The importance of Health and Social Assistance industries is underscored in Region 1 because of the significant share of older adults and individuals with a disability. Health care is a relatively stable revenue sector regionally with an abundant distribution of businesses primarily serving a local population. More than half of all business establishments in Region 1 have fewer than five employees.

Table 2.5.2-1 - Business establishment size by county, 2022 (Region 1)

County	Total Business Establishments	Fewer than 5	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Clatsop	1,604	900	321	220	119	29	11	N	N	N
Coos	1,618	878	325	228	137	30	12	5	N	N
Curry	702	424	145	79	46	3	N	3	N	N
Lincoln	1,632	934	351	197	117	20	9	3	N	N
Tillamook	763	437	168	91	48	12	4	N	N	N
Total by Size	6,319	3,573	1,310	815	467	94	36	11	0	0

Source: Bureau of Labor Statistics, County Business Patterns 2022

Table 2.5.2-2: 2024 Covered Employment by Sector, Region 1

	Region 1		Clatsop County		Coos County		Curry County		Lincoln County		Tillamook County	
Industry	Total Employment	%	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%
Total all ownerships	78,289	100%	19,816	100%	23,008	100%	6,588	100%	18,881	100%	9,996	100%
Total private coverage	64,116	82%	17,524	88%	17,699	77%	5,436	83%	15,258	81%	8,199	82%
Natural resources and mining	2,108	3%	187	1%	769	3%	214	3%	265	1%	673	7%
Construction	3,885	5%	1,115	6%	1,124	5%	375	6%	830	4%	441	4%
Manufacturing	6,870	9%	2,071	10%	1,507	7%	644	10%	940	5%	1,708	17%
Trade, transportation and utilities	13,697	18%	3,576	18%	4,149	18%	1,221	19%	3,230	17%	1,521	15%
Information	455	1%	131	1%	136	1%	43	1%	95	1%	50	1%
Financial activities	2,533	3%	527	3%	750	3%	238	4%	824	4%	194	2%
Professional and business services	5,343	7%	1,135	6%	2,207	10%	349	5%	1,269	7%	383	4%
Education and health services	10,187	13%	2,715	14%	3,267	14%	802	12%	2,226	12%	1,177	12%
Leisure and hospitality	16,780	21%	5,446	27%	3,196	14%	1,344	20%	5,127	27%	1,667	17%
Other services	2,196	3%	608	3%	582	3%	190	3%	435	2%	381	4%
Unclassified	41	0%	12	0%	12	0%	(c)	(c)	17	0%	(c)	(c)
Total all government	14,172	18%	2,292	12%	5,309	23%	1,152	17%	3,623	19%	1,796	18%
Total federal government	1,066	1%	178	1%	329	1%	113	2%	326	2%	120	1%
Total state government	1,760	2%	381	2%	461	2%	162	2%	365	2%	391	4%
Total local government	11,347	14%	1,733	9%	4,519	20%	877	13%	2,932	16%	1,286	13%

Note: (c) = confidential information not provided by the Oregon Employment Department to prevent identifying specific businesses.
Source: Oregon Employment Department. (2025). Quarterly Census of Employment and Wages. Retrieved from Qualityinfo.org

Region 2: North Willamette Valley/Portland Metro

In 2024, the five major supersectors by share of employment in region 2 were:

1. Trade, Transportation and Utilities
2. Professional and Business Services
3. Education and Health Services
4. Manufacturing
5. Leisure and Hospitality

Retail businesses are concentrated in the larger cities of the region and are most numerous in the Portland Metro area. The importance of the healthcare and social assistance sector is underscored in region 2 because the region serves as a hub for health care.

More than half of all business establishments in region 2 have fewer than 5 employees. Region 2 also includes 46 employers with workforces exceeding 1,000 employees, representing a concentration of employment in certain sectors in Washington County in particular.

Table 2.5.2-3: Business establishment size by county, 2022 (Region 2)

County	Total Business Establishments	Fewer than 5	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Clackamas	12,830	7,413	2,287	1,541	1,074	305	150	39	17	4
Columbia	1,011	566	221	122	76	17	7	N	N	N
Multnomah	27,434	14,786	4,960	3,668	2,551	811	464	129	42	23
Washington	16,302	8,710	3,010	2,102	1,542	517	304	72	26	19
Total by Size	57,577	31,475	10,478	7,433	5,243	1,650	925	240	85	46

Source: Bureau of Labor Statistics, County Business Patterns 2022

Table 2.5.2-4: 2024 Covered employment by sector, Region 2

	Region 2		Clackamas County		Columbia County		Multnomah County		Washington County	
Industry	Total Employment	%	Employment	%	Employment	%	Employment	%	Employment	%
Total all ownerships	991,205	100%	173,967	100%	11,713	100%	496,871	100%	308,654	100%
Total private coverage	878,804	89%	159,034	91%	10,039	86%	423,565	85%	286,166	93%
Natural resources and mining	11,645	1%	5,157	3%	442	4%	1,998	0%	4,048	1%
Construction	61,342	6%	14,791	9%	697	6%	26,342	5%	19,512	6%
Manufacturing	101,220	10%	17,662	10%	1,483	13%	29,717	6%	52,358	17%
Trade, transportation and utilities	182,103	18%	33,595	19%	2,316	20%	92,200	19%	53,992	17%
Information	20,983	2%	2,626	2%	63	1%	11,309	2%	6,985	2%
Financial activities	46,555	5%	7,669	4%	397	3%	24,482	5%	14,007	5%
Professional and business services	161,211	16%	24,704	14%	1,039	9%	81,626	16%	53,842	17%
Education and health services	155,102	16%	28,328	16%	1,654	14%	82,642	17%	42,478	14%
Leisure and hospitality	100,254	10%	17,450	10%	1,465	13%	53,293	11%	28,046	9%
Other services	37,336	4%	6,842	4%	468	4%	19,410	4%	10,616	3%
Unclassified	1,057	0%	211	0%	16	0%	546	0%	284	0%
Total all government	112,401	11%	14,933	9%	1,674	14%	73,306	15%	22,488	7%
Total federal government	14,678	1%	1,269	1%	77	1%	12,343	2%	989	0%
Total state government	10,056	1%	1,695	1%	222	2%	5,343	1%	2,796	1%
Total local government	87,670	9%	11,969	7%	1,376	12%	55,621	11%	18,704	6%

Note: (c) = confidential information not provided by the Oregon Employment Department to prevent identifying specific businesses.

Source: Oregon Employment Department. (2025). Quarterly Census of Employment and Wages. Retrieved from Qualityinfo.org

Region 3: Mid/Southern Willamette Valley

In 2024 the five major supersectors by share of employment in Region 3 were:

1. Education and Health Services
2. Trade, Transportation and Utilities
3. Local Government
4. Leisure and Hospitality
5. Manufacturing

Health care is a relatively stable revenue sector regionally with an abundant distribution of businesses primarily serving a local population. Retail businesses are concentrated in the larger cities of the region. The timber manufacturing industry is particularly vulnerable to droughts, landslides, and wildfires.

More than half of all business establishments in region 3 have fewer than 5 employees. Region 3 also includes employers with workforces exceeding 1,000 employees, representing a concentration of employment in certain sectors.

Table 2.5.2-5: Business establishment size by county, 2022 (Region 3)

County	Total Business Establishments	Fewer than 5	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Benton	2,202	1,174	436	319	192	55	20	3	N	N
Lake	191	113	46	24	5	N	N	N	N	N
Linn	2,805	1,468	573	396	257	52	41	10	6	N
Marion	9,073	4,769	1,817	1,263	851	236	93	33	8	3
Polk	1,598	927	304	207	119	19	18	3	N	N
Yamhill	2,763	1,583	545	316	232	49	29	5	3	N
Total by Size	18,632	10,034	3,721	2,525	1,656	411	201	54	17	3

Source: Bureau of Labor Statistics, County Business Patterns 2022

Table 2.5.2-6: 2024 Covered employment by sector, Region 3

			Benton County		Lane County		Linn County		Marion County		Polk county		Yamhill County	
Industry	Total Employment	%	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%
Total all ownerships	476,677	100%	37,441	100%	156,133	100%	48,624	100%	172,970	100%	22,564	100%	38,945	100%
Total private coverage	393,886	83%	28,435	76%	132,118	85%	42,883	88%	137,214	79%	17,868	79%	35,368	91%
Natural resources and mining	29,339	6%	1,169	3%	2,859	2%	2,997	6%	15,536	9%	2,737	12%	4,041	10%
Construction	27,992	6%	1,301	3%	7,563	5%	3,320	7%	12,309	7%	1,312	6%	2,187	6%
Manufacturing	44,372	9%	2,534	7%	14,353	9%	8,358	17%	10,618	6%	1,683	7%	6,826	18%
Trade, transportation and utilities	77,650	16%	4,528	12%	28,425	18%	10,256	21%	26,955	16%	2,542	11%	4,944	13%
Information	4,688	1%	662	2%	1,820	1%	289	1%	1,524	1%	112	1%	281	1%
Financial activities	16,774	4%	1,152	3%	7,035	5%	1,168	2%	5,795	3%	514	2%	1,110	3%
Professional and business services	43,770	9%	4,297	11%	17,418	11%	3,503	7%	14,893	9%	1,332	6%	2,327	6%
Education and health services	87,541	18%	7,108	19%	29,731	19%	7,603	16%	30,151	17%	4,505	20%	8,443	22%
Leisure and hospitality	46,291	10%	4,162	11%	17,548	11%	3,930	8%	14,305	8%	2,381	11%	3,965	10%
Other services	15,029	3%	1,479	4%	5,223	3%	1,411	3%	5,006	3%	712	3%	1,198	3%
Unclassified	441	0%	44	0%	144	0%	47	0%	121	0%	37	0%	48	0%
Total all government	82,793	17%	9,006	24%	24,016	15%	5,742	12%	35,756	21%	4,696	21%	3,577	9%
Total federal government	4,984	1%	540	1%	2,051	1%	395	1%	1,467	1%	89	0%	442	1%
Total state government	26,624	6%	342	1%	2,026	1%	683	1%	23,018	13%	290	1%	265	1%
Total local government	51,184	11%	8,124	22%	19,939	13%	4,664	10%	11,271	7%	4,316	19%	2,870	7%

			Benton County		Lane County		Linn County		Marion County		Polk county		Yamhill County	
Industry	Total Employment	%	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%

Note: (c) = confidential information not provided by the Oregon Employment Department to prevent identifying specific businesses.

Source: Oregon Employment Department. (2025). Quarterly Census of Employment and Wages. Retrieved from Qualityinfo.org

Region 4: Southwest Oregon

In 2024, the five major supersectors by share of employment in Region 4 were:

1. Education and Health Services
2. Trade, Transportation and Utilities
3. Leisure and Hospitality
4. Manufacturing
5. Local Government

The importance of Health and Social Assistance industries is underscored in region 4 because of the significant share of older adults and individuals with a disability.

More than half of all business establishments in Region 4 have fewer than 5 employees.

Table 2.5.2-7: Business establishment size by county, 2022 (Region 4)

County	Total Business Establishments	Fewer than 5	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Douglas	2,717	1,520	527	341	221	68	27	9	N	N
Jackson	6,554	3,605	1,281	856	552	159	83	13	N	3
Josephine	2,157	1,171	444	293	174	46	24	N	3	N
Total by Size	11,428	6,296	2,252	1,490	947	273	134	22	3	3

Source: Bureau of Labor Statistics, County Business Patterns 2022

Table 2.5.2-8: 2024 Covered employment by sector, Region 4

	Region 4		Douglas County		Jackson County		Josephine County	
Industry	Total Employment	Percent	Employment	Percent	Employment	Percent	Employment	Percent
Total all ownerships	160,558	100%	38,143	100%	91,056	100%	31,359	100%
Total private coverage	140,660	88%	31,380	82%	80,884	89%	28,396	91%
Natural resources and mining	7,303	5%	1,741	5%	4,669	5%	893	3%
Construction	8,379	5%	1,766	5%	5,453	6%	1,160	4%
Manufacturing	14,157	9%	4,584	12%	6,786	7%	2,787	9%
Trade, transportation and utilities	31,279	19%	6,955	18%	19,140	21%	5,184	17%
Information	1,420	1%	336	1%	855	1%	229	1%
Financial activities	5,346	3%	1,023	3%	2,889	3%	1,434	5%
Professional and business services	12,470	8%	2,942	8%	7,810	9%	1,718	5%
Education and health services	36,733	23%	6,834	18%	19,507	21%	10,392	33%
Leisure and hospitality	18,294	11%	3,886	10%	10,844	12%	3,564	11%
Other services	5,139	3%	1,279	3%	2,855	3%	1,005	3%
Unclassified	140	0%	35	0%	76	0%	29	0%
Total all government	19,898	12%	6,763	18%	10,172	11%	2,963	9%
Total federal government	3,851	2%	1,508	4%	2,014	2%	329	1%
Total state government	2,584	2%	707	2%	1,298	1%	579	2%
Total local government	13,463	8%	4,549	12%	6,859	8%	2,055	7%

Note: (c) = confidential information not provided by the Oregon Employment Department to prevent identifying specific businesses.
Source: Oregon Employment Department. (2025). Quarterly Census of Employment and Wages. Retrieved from Qualityinfo.org

Region 5: Mid-Columbia

In 2024, the five major supersectors by share of employment in Region 5 were:

1. Trade, Transportation and Utilities
2. Natural Resources and Mining
3. Education and Health Services
4. Local Government
5. Leisure and Hospitality

While smaller in overall employment figures, growth in the Information sector via increasing rates of data center development is driving economic growth in some counties in region 5. Because there are few employers in this sector, but employment is proportionally significant, employment data is confidential.

More than half of all business establishments in Region 5 have fewer than 5 employees.

Table 2.5.2-9: Business establishment size by county, 2022 (Region 5)

County	Total Business Establishments	Fewer than 5	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Gilliam	67	39	16	6	3	3	N	N	N	N
Hood River	1,049	591	211	138	78	20	7	N	N	N
Morrow	215	121	43	21	17	5	5	N	N	N
Sherman	55	31	13	5	5	N	N	N	N	N
Umatilla	1,587	796	362	214	146	37	19	6	5	N
Wasco	720	401	138	101	57	14	7	N	N	N
Total by Size	3,693	1,979	783	485	306	79	38	6	5	0

Source: Bureau of Labor Statistics, County Business Patterns 2022

Table 2.5.2-10: 2024 Covered employment by sector, Region 5

	Region 5		Gilliam County		Hood River County		Morrow County		Sherman County		Umatilla County		Wasco County	
Industry	Total Employment	%	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%
Total all ownerships	69,840	100%	1,007	100%	14,483	100%	7,208	100%	995	100%	33,619	100%	12,528	100%
Total private coverage	58,161	83%	746	74%	13,331	92%	6,278	87%	685	69%	26,553	79%	10,568	84%
Natural resources and mining	11,733	17%	54	5%	3,157	22%	1,530	21%	37	4%	4,445	13%	2,510	20%
Construction	2,950	4%	(c)	(c)	537	4%	338	5%	67	7%	1,579	5%	429	3%
Manufacturing	6,407	9%	19	2%	1,785	12%	1,578	22%	(c)	(c)	2,549	8%	476	4%
Trade, transportation and utilities	12,074	17%	112	11%	1,945	13%	838	12%	367	37%	6,803	20%	2,009	16%
Information	(c)	(c)	(c)	(c)	104	1%	(c)	(c)	(c)	(c)	(c)	(c)	269	2%
Financial activities	1,250	2%	10	1%	258	2%	50	1%	(c)	(c)	717	2%	215	2%
Professional and business services	3,513	5%	208	21%	954	7%	399	6%	18	2%	1,369	4%	565	5%
Education and health services	9,094	13%	74	7%	1,986	14%	330	5%	23	2%	4,448	13%	2,233	18%
Leisure and hospitality	7,175	10%	38	4%	2,273	16%	239	3%	94	9%	3,058	9%	1,473	12%
Other services	1,607	2%	41	4%	321	2%	74	1%	22	2%	775	2%	374	3%
Unclassified	(c)	(c)	(c)	(c)	12	0%	(c)	(c)	(c)	(c)	(c)	(c)	15	0%
Total all government	11,680	17%	261	26%	1,152	8%	930	13%	311	31%	7,066	21%	1,960	16%
Total federal government	1,276	2%	14	1%	165	1%	67	1%	156	16%	558	2%	316	3%
Total state government	2,130	3%	19	2%	118	1%	48	1%	23	2%	1,614	5%	308	2%
Total local government	8,273	12%	228	23%	868	6%	815	11%	132	13%	4,894	15%	1,336	11%

Note: (c) = confidential information not provided by the Oregon Employment Department to prevent identifying specific businesses.
Source: Oregon Employment Department. (2025). Quarterly Census of Employment and Wages. Retrieved from Qualityinfo.org

Region 6: Central Oregon

In 2024, the five major supersectors, by share of employment in region 6 were:

1. Trade, Transportation, and Utilities
2. Education and Health Services
3. Leisure and Hospitality
4. Professional and Business Services
5. Local Government

More than half of all business establishments in Region 6 have fewer than 5 employees.

Table 2.5.2-11: Business establishment size by county, 2022 (Region 6)

County	Total Business Establishments	Fewer than 5	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Crook	634	390	118	68	45	4	5	3	N	N
Deschutes	8,456	5,235	1,396	978	629	141	57	16	3	N
Jefferson	451	272	100	39	33	N	5	N	N	N
Klamath	1,549	840	338	187	134	30	13	5	N	N
Lake	191	113	46	24	5	N	N	N	N	N
Wheeler	29	20	3	5	N	N	N	N	N	N
Total by Size	11,310	6,870	2,001	1,301	846	175	80	24	3	0

Source: Bureau of Labor Statistics, County Business Patterns 2022

Table 2.5.2-12: 2024 Covered employment by sector, Region 6

	Region 6		Crook County		Deschutes County		Jefferson County		Klamath County		Lake County		Wheeler County	
Industry	Total Employment	%	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%	Employment	%
Total all ownerships	135,924	100%	7,617	100%	94,288	100%	6,949	100%	24,083	100%	2,627	100%	360	100%
Total private coverage	118,118	87%	6,373	84%	85,576	91%	4,901	71%	19,469	81%	1,583	60%	216	60%
Natural resources and mining	2,983	2%	(c)	(c)	982	1%	361	5%	1,175	5%	440	17%	25	7%
Construction	10,310	8%	836	11%	7,905	8%	160	2%	1,321	5%	79	3%	9	3%
Manufacturing	10,166	7%	696	9%	6,497	7%	1,175	17%	1,595	7%	203	8%	(c)	(c)
Trade, transportation and utilities	23,788	18%	1,253	16%	16,724	18%	946	14%	4,500	19%	333	13%	32	9%
Information	(c)	(c)	(c)	(c)	1,662	2%	43	1%	118	0%	20	1%	(c)	(c)
Financial activities	4,531	3%	197	3%	3,527	4%	98	1%	671	3%	38	1%	(c)	(c)
Professional and business services	13,843	10%	607	8%	11,255	12%	254	4%	1,637	7%	87	3%	3	1%
Education and health services	23,664	17%	826	11%	17,088	18%	888	13%	4,685	19%	113	4%	64	18%
Leisure and hospitality	20,919	15%	909	12%	16,248	17%	763	11%	2,790	12%	165	6%	44	12%
Other services	5,081	4%	305	4%	3,518	4%	209	3%	944	4%	98	4%	7	2%
Unclassified	(c)	(c)	(c)	(c)	169	0%	(c)	(c)	32	0%	(c)	(c)	144	40%
Total all government	17,668	13%	1,244	16%	8,712	9%	2,048	29%	4,615	19%	1,044	40%	5	1%
Total federal government	2,716	2%	377	5%	1,129	1%	96	1%	841	3%	235	9%	38	11%
Total state government	2,583	2%	135	2%	1,152	1%	373	5%	619	3%	203	8%	101	28%
Total local government	12,610	9%	732	10%	6,431	7%	1,578	23%	3,155	13%	606	23%	108	30%

Note: (c) = confidential information not provided by the Oregon Employment Department to prevent identifying specific businesses.

Source: Oregon Employment Department. (2025). Quarterly Census of Employment and Wages. Retrieved from Qualityinfo.org

Region 7: Northeast Oregon

In 2024, the five major supersectors by share of employment in region 7 were:

1. Trade, Transportation and Utilities
2. Education and Health Services
3. Local Government
4. Leisure and Hospitality
5. Manufacturing

More than half of all business establishments in region 7 have fewer than 5 employees.

Table 2.5.2-13: Business establishment size by county, 2022 (Region 7)

County	Total Business Establishments	Fewer than 5	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Baker	524	316	104	60	28	9	6	N	N	N
Grant	212	140	37	23	8	3	N	N	N	N
Union	736	391	160	114	52	10	4	5	N	N
Wallowa	367	261	58	30	14	3	N	N	N	N
Total by Size	1,839	1,108	359	227	102	25	10	5	0	0

Source: Bureau of Labor Statistics, County Business Patterns 2022

Table 2.5.2-14: 2024 Covered employment by sector, Region 7

	Region 7		Baker County		Grant County		Union County		Wallowa County	
Industry	Total Employment	Percent	Employment	Percent	Employment	Percent	Employment	Percent	Employment	Percent
Total all ownerships	21,573	100%	5,595	100%	2,541	100%	10,378	100%	3,059	100%
Total private coverage	16,792	78%	4,471	80%	1,548	61%	8,472	82%	2,301	75%
Natural resources and mining	1,149	5%	185	3%	288	11%	499	5%	177	6%
Construction	1,188	6%	247	4%	101	4%	633	6%	207	7%
Manufacturing	2,041	9%	574	10%	95	4%	1,203	12%	169	6%
Trade, transportation and utilities	3,939	18%	1,202	21%	322	13%	1,921	19%	494	16.%
Information	204	1%	56	1%	52	2%	67	1%	29	1%
Financial activities	612	3%	115	2%	62	2%	329	3%	106	3%
Professional and business services	1,255	6%	332	6%	135	5%	616	6%	172	6%
Education and health services	3,457	16%	1,034	18%	197	8%	1,840	18%	386	13%
Leisure and hospitality	2,206	10%	526	9%	212	8%	1,046	10%	422	14%
Other services	711	3%	197	4%	77	3%	304	3%	133	4%
Unclassified	(c)	(c)	(c)	(c)	(c)	(c)	15	0%	(c)	(c)
Total all government	4,782	22%	1,124	20%	993	39%	1,906	18%	759	25%
Total federal government	972	5%	243	4%	299	12%	302	3%	128	4%
Total state government	981	5%	239	4%	158	6%	452	4%	132	4%
Total local government	2,828	13%	641	11%	536	21%	1,152	11%	499	16%

Note: (c) = confidential information not provided by the Oregon Employment Department to prevent identifying specific businesses.

Source: Oregon Employment Department. (2025). Quarterly Census of Employment and Wages. Retrieved from Qualityinfo.org

Region 8: Southeast Oregon

In 2024, the five major supersectors by share of employment in Region 8 were:

1. Trade, Transportation and Utilities
2. Education and Health Services
3. Natural Resources and Mining
4. Local Government
5. Leisure and Hospitality

More than half of all business establishments in Region 8 have fewer than 5 employees.

Table 2.5.2-15: Business establishment size by county, 2022 (Region 8)

County	Total Business Establishments	Fewer than 5	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000 or more
Harney	216	130	44	24	15	N	N	N	N	N
Malheur	731	372	156	103	77	17	N	3	N	N
Total by Size	947	502	200	127	92	17	0	3	0	0

Source: Bureau of Labor Statistics, County Business Patterns 2022

Table 2.5.2-16: 2024 Covered employment by sector, Region 8

	Region 8		Harney County		Malheur County	
Industry	Total Employment	Percent	Employment	Percent	Employment	Percent
Total all ownerships	15,885	100%	2,576	100%	13,309	100%
Total private coverage	11,730	74%	1,559	61%	10,171	76%
Natural resources and mining	1,733	11%	238	9%	1,495	11%
Construction	412	3%	114	4%	298	2%
Manufacturing	(c)	(c)	(c)	(c)	1,104	8%
Trade, transportation and utilities	3,580	23%	417	16%	3,163	24%
Information	(c)	(c)	(c)	(c)	81	1%
Financial activities	291	2%	51	2%	240	2%
Professional and business services	499	3%	94	4%	405	3%
Education and health services	2,105	13%	243	9%	1,862	14%
Leisure and hospitality	1,576	10%	309	12%	1,267	10%
Other services	321	2%	75	3%	246	2%
Unclassified	(c)	(c)	(c)	(c)	10	0%
Total all government	4,155	26%	1,017	39%	3,138	24%
Total federal government	472	3%	258	10%	214	2%
Total state government	1,545	10%	140	5%	1,405	11%
Total local government	2,138	13%	619	24%	1,519	11%

Note: (c) = confidential information not provided by the Oregon Employment Department to prevent identifying specific businesses.
Source: Oregon Employment Department. (2025). Quarterly Census of Employment and Wages. Retrieved from Qualityinfo.org

2.5.3 Agricultural Economy

Agriculture is an important component of Oregon's economy and represents a significant portion of developed land use and export trade value produced in Oregon. Market sales of agricultural products in Oregon, including crops, livestock, and nursery production represented $6.7 billion in income to Oregon farms and ranches in 2022. Thirteen percent of Oregon's gross domestic product comes from agriculture. Agriculture is directly and indirectly responsible for over 686,000 jobs, or 20.3 percent of jobs statewide. This translates to approximately $29 billion in wages and $12 billion in taxes. Agriculture produces almost $3 billion in traded-sector exports. (DLCD, 2023) Approximately 15 percent of sales in Oregon's economy are linked to agriculture, food, and fiber industries. (OSU, 2021)

More extreme temperature and precipitation can prevent crops from growing. Extreme events, especially floods and droughts, can harm crops and reduce yields. (USGCRP, 2014) Drought could become a challenge in areas where rising summer temperatures cause soils to become drier. Although increased irrigation might be possible in some places, in other places water supplies may also be reduced, leaving less water available for irrigation when more is needed. Oregon's small farms are particularly vulnerable to natural hazards exacerbated by climate change. The following sections include tables showing the total number of farms in each county within a region and their market sales of agricultural products.

Table 2.5.3-1: Agricultural product market values by county, 2022

	Total Farms	Market Sales Value of Agricultural Products ($1,000)
Oregon	35,547	6,771,166
Region 1		
Clatsop	211	9,355
Coos	543	66,948
Curry	169	19,531
Lincoln	299	6,995
Tillamook	241	160,694
Region 2		
Clackamas	4,156	510,305
Columbia	723	64,858
Multnomah	680	95,892
Washington	1,793	326,039
Region 3		
Benton	995	122,806
Lane	2,375	137,593
Linn	2,138	342,098
Marion	2,477	874,627
Polk	1,158	249,678
Yamhill	2,000	418,319
Region 4		

Total Farms		Market Sales Value of Agricultural Products ($1,000)
Douglas	1,811	89,758
Jackson	2,396	105,350
Josephine	605	38,410
Region 5		
Gilliam	155	42,682
Hood River	497	134,605
Morrow	341	866,052
Sherman	173	54,820
Umatilla	1,616	525,616
Wasco	458	137,967
Region 6		
Crook	609	53,399
Deschutes	1,572	39,986
Jefferson	348	62,653
Klamath	828	170,284
Lake	353	175,700
Wheeler	153	9,549
Region 7		
Baker	676	101,338
Grant	374	29,563
Union	806	74,790
Wallowa	480	42,943
Region 8		
Harney	477	99,336
Malheur	861	510,625

Source: U.S. Department of Agriculture, 2022 Census of Agriculture

2.5.4 Economic Trends and Issues

A strong and diverse economic base increases the ability of individuals, families, and communities to absorb impacts of a disaster and recover more quickly. Therefore, the current and anticipated financial conditions of a community are strong determinants of community resilience. Supporting the growth of dominant industries and employment sectors, as well as emerging sectors identified in this analysis, can help regions become more resilient to economic downturns that often follow a hazard event (Stahl et al., 2000).

Region 1: Oregon Coast

The economic analysis of the region shows the following situations increase Oregon Coastal communities' level of vulnerability to natural hazard events:

- Unemployment rates are higher than the state average in Curry, Coos, and Lincoln and Tillamook Counties.
- The region’s most competitive industries employ a small share of the overall population.
- The regional economy is heavily dependent on tourism and seasonal employment.
- The regional economy is lacking opportunities for highly skilled employees, limiting the income potential of coastal residents.
- Many of the region's most concentrated industries are natural resource-based or depend on natural resource industries. These sectors are especially vulnerable to the impacts of climate change.

Region 2: North Willamette Valley/Portland Metro

The economic analysis of the region shows the economy in Region 2 has experienced strong growth in recent years and has a diversity of high paying, traded industries. The following situations increase Region 2’s level of vulnerability to natural hazard events:

- Although Region 2 represents the largest share of the state’s employment and advanced manufacturing industries, it is also responsible for 15 percent of the state’s overall agricultural production by dollar value.
- Unemployment in Columbia County is consistently higher than its regional peers and higher than the statewide average.
- The Portland metro area is the economic hub for the state. Any disruptions caused by a natural hazard could ripple throughout the other regions.

Region 3: Mid/Southern Willamette Valley

The economic analysis of the region shows the following situations increase Region 3’s level of vulnerability to natural hazard events:

- Unemployment in Linn and Lane Counties is consistently higher than its regional counterparts and higher than the statewide average.
- Many of the region's most concentrated industries are natural resource-based or depend on natural resource industries. These sectors are especially vulnerable to the impacts of climate change.
- 11,000 farms, especially small and medium-sized farms in Region 3, are vulnerable to drought and extreme heat.
- The Forestry and Logging subsector, an area of competitive advantage for the region, has been consistently shedding jobs for over a decade.

Region 4: Southwest Oregon

The economic analysis of the region shows the following situations increase the region’s level of vulnerability to natural hazard events:

- Unemployment in all three regional counties is consistently higher than the statewide average.

- Within the region, unemployment in Douglas and Josephine Counties is regularly higher than unemployment rates in Jackson County.
- The region is dependent on tourism which might increasingly be impacted by annually occurring disasters like wildfire and drought.
- Many of the region's most concentrated industries, including agriculture, are natural resource-based or depend on natural resource industries. These sectors are especially vulnerable to the impacts of climate change.
- The regional economy has fewer opportunities for highly skilled employees, limiting the income potential of residents in Region 4.

Region 5: Mid-Columbia

The economic analysis of the region shows the following situations increase the regional communities' level of vulnerability to natural hazard events:

- Unemployment in Gilliam County is increasing relative to the statewide average.
- A growing share of local governments in Umatilla and Morrow Counties are increasingly dependent on the construction and operation of data centers to provide tax revenue.
- Region 5 is a significant agricultural production region of Oregon, responsible for over $1.7 billion in market sales in 2022.
- Many of the region's most concentrated industries are natural resource-based or depend on natural resource industries. These sectors are especially vulnerable to the impacts of climate change.
- The region lost employment in many of its manufacturing subsectors from 2010-2024.
- The region lacks a diversity of traded sector industries.

Region 6: Central Oregon

The economic analysis of the region shows the following situations increase the region's level of vulnerability to natural hazard events:

- Many of the region's most concentrated industries are natural resource-based or depend on natural resource industries. These sectors are especially vulnerable to the impacts of climate change.
- Two of the region's most competitive subsectors, Wood Product Manufacturing and Forestry and logging, experienced declining employment from 2010-2024.
- Except for Deschutes and Wheeler Counties, unemployment rates across the region are higher than in the statewide.

Region 7: Northeast Oregon

The economic analysis of the region shows the following situations increase the region's level of vulnerability to natural hazard events:

- The region generally lacks a diversity of traded sector industries. Many of the region's most concentrated industries are natural resource-based or depend on natural resource industries. These sectors are especially vulnerable to the impacts of climate change.

- Unemployment rates across the region are consistently higher than statewide.
- The regional economy has fewer opportunities for highly skilled employees, limiting the income potential of regional residents.

Region 8: Southeast Oregon

The economic analysis of the region shows the following situations increase the region's level of vulnerability to natural hazard events:

- The region generally lacks a diversity of traded sector industries. Many of the region's most concentrated industries are natural resource-based or depend on natural resource industries. These sectors are especially vulnerable to the impacts of climate change.
- Unemployment rates in Harney County are higher than statewide.
- The regional economy has few opportunities for highly skilled employees, limiting the income potential of regional residents.

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