Seventh Oregon Climate Assessment • January 2025
Executive Summary

Established and emerging understanding of observed and projected climate change in Oregon, and knowledge of the opportunities and risks that climate change poses to natural and human systems, may inform actions such as equitable mitigation of climate-related natural hazards and implementation of Oregon's Climate Change Adaptation Framework.

State of Climate Science

Temperature and precipitation. Oregon's annual average temperature increased by 2.2°F per century since 1895. Without considerable reductions in greenhouse gas emissions, annual temperature in Oregon is projected to increase by at least 5°F by 2074 and 7.6°F by 2100, with the greatest seasonal increases in summer. Precipitation is projected to increase during winter and decrease during summer, and the intensity of heavy winter precipitation events is projected to increase. Furthermore, the proportion of precipitation falling as rain rather than snow is expected to increase. Increases in extreme temperatures contributed to recent revisions of the national Plant Hardiness Zone Map.

Effects of the El Niño–Southern Oscillation on Oregon's climate. From 1951–2023, La Niña years, regardless of strength, generally were cooler than El Niño years. Statewide, La Niña years were more likely than most El Niño years to be wetter than average, but precipitation and peak runoff were greatest during years with Very Strong El Niño events. Although seasonal temperature forecasts associated with El Niño–Southern Oscillation events are reasonably accurate for the Pacific Northwest, precipitation forecasts tend to be less reliable.

Climate-Related Natural Hazards

Floods. Models suggest that total annual precipitation will increase by 0–10 percent in Oregon by the middle of the twenty-first century, but with drier summers in western Oregon. Projected extreme wet-day precipitation increases throughout the century, especially in winter and in southeastern Oregon. In western Oregon and the Willamette Valley, the largest projected increases in extreme daily precipitation occur in autumn. Over the period 1950–2100, snowfall is projected to decrease by at least 50 percent across Oregon, with decreases of over 65 percent in the Cascades ecoregion.

Winter storms. Much of the response of freezing rain to climate change can be explained by two factors: a decrease in the frequency of near-surface air temperatures below 32°F and an increase in the frequency of air temperatures above 32°F aloft. The net effect of these factors in a given location depends on the location's initial temperature. In the northern Willamette Basin, the future frequency of freezing rain is projected to increase in initially colder locations and decrease in initially warmer locations. Projections suggest that easterly winds through the Columbia River Gorge may strengthen during winter, even as the Willamette Basin becomes warmer. Therefore, ice accretion on some surfaces in the region may increase during freezing rain events.

Droughts. During 18 of the years from 1999–2023, Oregon's precipitation was below average. The average temperature was warmer than normal in 21 of those years, which contributed to higher rates of evapotranspiration and more-frequent drought. 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. Drought risk during summer is likely to increase statewide.

Adaptation Sectors

Economy. In Oregon, Washington, and California, increasing wildfire exposure reduces timberland prices relative to those that would be applicable without a change in wildfire risk. Such an impact is consistent with landowners' perception that wildfire risk is increasing. A warmer and drier climate also depresses timberland prices due to higher risk of drought stress.

Economic losses from a major smoke event in Oregon are likely to be highly localized and industry-specific given the unequal distribution of wildfire smoke and economic activity and the unequal effects of smoke among industries. Quantitative estimates suggest that a major smoke event will reduce the state's per annum Gross Domestic Product by at least $1 billion, or about one-third of one percent.

Compounded or cascading losses from multiple independent or interacting events within the same year will result in greater economic effects, as will accounting for health effects of smoke.

Natural systems. Oregon's forests have considerable potential for carbon storage. Models suggest that given the carbon sequestration potential of reforestation in Oregon could reach 2.9 million metric tons of CO_2 by 2030 and 15.7 million metric tons by 2050. The latter represents 12 percent of Oregon's statewide 2030 carbon sequestration goal and 7 percent of the 2050 goal. The total modeled reforestation, which accounts for a number of ecological, logistic, and social constraints, would expand tree cover on approximately 940,000 acres, or 0.6 percent of Oregon's land base.

Built environment. Offshore winds on the U.S. West Coast represent one of the most energetic and consistent renewable energy resources in the nation. Harnessing these winds is a possibly viable technological pathway to meet decarbonization goals. Floating offshore wind energy is in a period of rapid global research, development, and deployment. Proposed lease areas in Oregon are in far deeper ocean waters than previously attempted for offshore wind, which leads to uncertainty for many government, community, tribal, and industry parties. Any potential development of floating offshore wind energy is far more likely to succeed with collaborative and capacity-generating engagement among diverse interested and affected parties.

Trees ameliorate urban heat and have other public health benefits. Nevertheless, establishing and maintaining trees in cities is challenged by difficult growing conditions, the partnerships necessary to sustain urban trees, and perceptions that the disadvantages of trees outweigh the benefits. Collaboration between health and environmental professionals on tree planting guidelines may increase the likelihood that urban trees thrive and provide diverse societal goods and services.

Public health. Projections of wildfire smoke and population in Oregon from 2046–2051 suggest that the number of cases of short-term health outcomes attributable to smoke are likely to increase considerably relative to 2005–2009 among all adults, and especially among older adults. The increase in adverse outcomes was associated with substantial increases in economic losses and lost quality-of-life. Drought also is associated with many negative health outcomes, from water and food insecurity to poor air quality. Moreover, drought conditions are correlated with increased rates of mental health issues, including anxiety, depression, and suicide. Promotion of accessible mental health care and support services for impacted populations, particularly in rural and agricultural communities, contributes to effective drought preparedness and mitigation.

Infectious diseases in Oregon's wild and domestic animals continue to evolve as climate changes. Human population growth and expansion into wildlands further increase the risk that the ranges of some vectors will increase and that novel pathogens will be transmitted into humans from species that previously were not in close proximity to people.

Social systems. As the effects of climate change are increasingly felt across Oregon and nationwide, demands on the legal system have increased. Climate change cases address mitigation, adaptation, and impacts. The legal theories pursued by plaintiffs include federal and state constitutional, statutory, regulatory, and common-law claims, often several in a single suit. Oregon's land-use planning system, which encourages dense housing and mass transit, local implementation, and adjudication by the Land Use Board of Appeals, is a potentially useful framework for adapting to climate change and resolving disputes.

Efforts to prevent losses of structures to wildfires often focus on vegetation clearing. However, wind-driven wildfires can spot over substantial distances. The design and maintenance of a structure and the immediate five feet around it can substantially reduce the probability that it will ignite, and may encourage insurance providers to continue coverage or write new policies in areas where wildfire risk is high.

Oregon vineyards are being affected by heat waves, especially early in the growing season, and by smoke exposure. Nevertheless, the increase in temperatures in Oregon over the past 125 years benefited wine grape production. There may be a threshold of climate change beyond which growers are unable to adapt, but so far research is keeping pace with the effects of climate change on vineyards in Oregon.

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