Climate Change Projections for the Northwest United States

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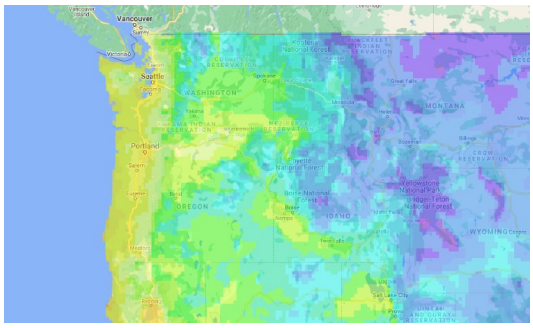
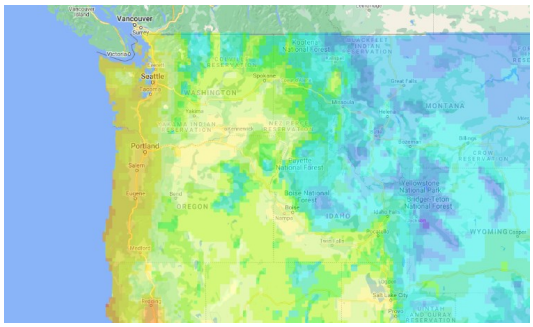
Image from Fourth National Climate Assessment

The Davey Climate Change Fact Sheet Series projects the future impacts of climate change in our industry over the next 30-70 years, with emphasis on changes in temperature, precipitation, storm intensity, tree health, pest pressure, wildfire, and worker stress. Temperatures across the U.S. are expected to increase between 3-11°F by the end of this century, with future patterns of greenhouse gas emissions providing the largest source of uncertainty. The Intergovernmental Panel on Climate Change (IPCC) predicts future climates based on modeling for different emissions scenarios, called "Representative Concentration Pathways (RCP)." This fact sheet focuses on changes expected to occur in the Northwest U.S. based on lower (RCP4.5) and higher (RCP8.5) emissions scenarios. Currently, global patterns of fossil fuel consumption correspond most closely with the high emission scenario, while the lower emission scenario will require significant mitigation measures yet to be implemented.

The climate is warming. The average annual temperature in the Northwest U.S. has warmed approximately 2°F since 1900. In recent years, the Northwest has experienced record setting episodes of heat, drought, and loss of snowpack. Warming of all seasons is predicted to increase throughout the Northwest. In the extreme year of 2015, annual average temperatures in the Northwest were 3.4°F above the 1970–1999 average, with winter temperatures 6.2°F above normal. These conditions are projected to be "normal" by 2050 under the high emissions scenario, or 2100 under the lower emission scenario. The plant hardiness zone for Seattle is predicted to transition from zone 8 to zone 9 by mid-century under high and low emission scenarios, which will change the palette of planting options.



Current winter hardiness zones



Winter hardiness zones projected for end of century under the lower emission scenario

Precipitation patterns are highly variable

Average precipitation is projected to increase throughout the Northwest in winter and spring and decrease in summer as the climate warms. However, patterns of rain and snowfall are projected to remain highly variable, as natural climatic variation associated with ocean currents results in periods of prolonged drought punctuated by years with above average rainfall. Much of the Northwest depends on water that originates from mountain snowpacks that melt gradually in spring and summer. As the climate has warmed, the proportion of precipitation falling as snow has decreased, which has decreased the snowpack, increased winter runoff, and decreased available water in summer. In the Cascades, warmer temperatures have decreased seasonal snowpack by 20% over the past 50 years and caused the retreat of alpine glaciers. This trend is projected to intensify as a greater proportion of precipitation falls as rain and less as snow in the mountains, leading to less water stored in the snowpack.

Trees and forests are susceptible

Some forests in the region may increase in productivity due to a longer growing season and increased atmospheric CO_2, particularly those west of the Cascade Mountains where precipitation is greatest.

In other areas of the region, higher temperatures and decreasing summer precipitation have already increased tree susceptibility to insect pests and disease. Tree mortality caused by bark beetles, wildfire, and drought has increased substantially throughout the region in recent decades, a trend that is projected to intensify as temperatures continue to increase and periods of summer aridity become prolonged.

Idaho experiences more forest fires than any other state, and the area burned is projected to double by the end of the century, as it is throughout the Northwest. Forests east of the Cascade Mountains are more vulnerable to wildfire than those on the west side due to much lower rainfall east of the mountains. Efforts to conserve forests can help mitigate climate change via carbon sequestration. Old-growth coastal rainforests of the Pacific Northwest store especially large quantities of carbon.

Human health The Northwest has experienced an increase in arthropod vectored disease in recent years. Incidence of Lyme disease has increased as a warming climate has increased tick habitat. Cases of West Nile virus have also increased, linked to earlier seasonal emergence of mosquitos that vector the disease.

Poor air quality caused by smoke associated with more frequent wildfires has increased the incidence of respiratory illnesses. During extreme heat events in King County, Washington, from 1990 to 2010, heat-related hospital admissions were 2% higher and deaths 10% higher than the average for that period, with an increased demand for emergency medical services for children, outdoor laborers, and the elderly These trends are all expected to amplify as the climate continues to warm, with extreme heat days projected to double by mid-century.

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