Legislative Summary

Burning fossil fuels to run our factories, heat our homes, and drive our cars produces heat-trapping gases that unequivocally warm the planet. Effects of warming are evident on physical, biological, and human and managed systems across the globe, and here in Oregon.

This report presents strengthening evidence that Oregon is already experiencing the effects of climate change.

The key climate risks facing Oregon remain the same as before

Effects of declining snowpack include lower summer streamflow and soil moisture, as illustrated by 2015's record low snowpack. Forest disturbances (wildfires, drought, and insect outbreaks) transform forests. Rising sea levels will exacerbate coastal flooding and erosion hazards, while changes in the ocean will alter its ecosystems. For agriculture, beneficial longer growing seasons may be offset, for some places and crops, by insufficient water and by insect and disease stress.

Key climate risks vary across Oregon

On **the Coast**, sea level rise will increase the risk of coastal erosion and flooding; warming waters and ocean acidification will degrade estuarine habitat crucial for salmon and shellfish and negatively affect nearshore fisheries; and forest vegetation in the Coast Range may shift. In the **Willamette Valley**, declining snowpack, earlier snowmelt, and greater summer water demand may increase summer water scarcity; and wildfire activity is expected to increase. In the **Cascade Range**, diminishing snowpack leads to larger, earlier peak flow events and lower summer low flows; more wildfires and changes in climate suitability may shift forest vegetation types. In **Eastern Oregon**, declining snowpack has similar effects; warming streams will limit ranges for salmon and trout; disturbances and changes in suitability are expected to shift forest vegetation; and rangeland and sagebrush habitat may experience greater invasion of non-native weeds and more frequent fires.

Scientists formally linked climate trends and events to human activity

Human emissions of greenhouse gases dominated the warming trend of average annual temperature in the Pacific Northwest during 1901–2012, contributed an additional 16,000 square miles of wildfire burned area in the western United States during 1984–2015, contributed to the 2014–2015 snow drought in Oregon through warmer temperatures, and made Oregon's coastal waters more acidic in 2013.

The 2015 snow drought foreshadows mid-century normal conditions

Oregon's warmest winter on record, 2015, was so warm that the near-normal amount of precipitation fell as rain in most of the mountains, resulting in record low snowpack and widespread drought declarations. Impacts included insufficient water supply in reservoirs, the most severe wildfire season in the Pacific Northwest's history, warm streams that reduced salmon returns, and agricultural crop losses. With continued warming, this type of drought is expected to occur more often in the future.

Oregon will continue to warm

Under continued increasing greenhouse gas emissions, Oregon's climate is projected to warm on average 3–7°F by the 2050s and 5–11°F by the 2080s. If greenhouse gas emissions level off by mid-century, warming would be limited to 2–5°F by the 2050s and 2–7°F by the 2080s. Annual precipitation is projected to increase slightly, although with a high degree of uncertainty. Summers are expected to warm more than the annual average and are likely to become drier. Extreme heat and precipitation events are expected to become more frequent.

Warming is already changing hydrology

Summer low flows have decreased and streamflow timing has shifted earlier at many sites in the Pacific Northwest. Driven by loss of snowpack and drier summers, these trends are expected to continue in the future, particularly for snow-dominated basins. As snowfall gives way to rainfall, fall and winter flood risk is also expected to increase in most basins, particularly in mixed rain-snow basins with near-freezing winter temperatures. Future changes in water supply and demand are expected to strain the ability of existing infrastructure and operations to meet all the varied water needs of Oregonians.

Oregon's coast will face more flooding and erosion hazards as sea levels rise
At Newport, sea level is projected to rise by 12 to 47 inches under a high emissions pathway by the end of the 21st century. Such sea levels would place thousands of Oregonians and homes, and over 100 miles of roads in Oregon, at risk of inundation from annual flood events reaching 4 feet above high tide.

Changes in the ocean environment will result in substantial ecosystem shifts
Greater ocean acidity, less dissolved oxygen, and warmer water temperatures are expected in Oregon's coastal waters. Ocean acidification is already challenging shell-forming species, such as oysters and crabs, and disruptive conditions are expected to be commonplace in Oregon coastal surface waters by mid-century. These conditions are expected to cause cascading effects throughout the entire marine food web, particularly for shellfish and Pacific salmon, which are of important economic and cultural value.

Forests are changing
Changing climate will shift ideal growing zones for many important tree species and vegetation types, with conifer forests shifting to mixed-forests west of the Cascade Range and subalpine forests shrinking. The observed increase in wildfire activity is partially due to human-caused climate change; increasing wildfire activity is expected under future warming. Mountain pine beetle, western spruce budworm, and Swiss needle cast remain major disturbance agents in Oregon's forests that are expected to expand. Managing forests to reduce wildfire hazards, to promote forests resilient to insects and diseases, and to maintain a suitable habitat for Oregon's wildlife will be critical in the future.

Some crops will benefit, but long-term outcomes for agriculture are complex
Over the next few decades, warming winters, expanding growing seasons, and carbon dioxide enrichment may boost yields for some Oregon crops and create opportunities to grow new crops and varieties. Such benefits hinge on having adequate water supply, which is projected to dwindle, especially in areas that rely on snowpack. For other crops such as tree fruits, warming winters may prevent adequate chilling needed for a healthy crop yield. In the long-term, increased heat and drought stress, water shortage, and pressure from pests and diseases may supersede the positive benefits of increased crop yield. Improved irrigation water management strategies will be necessary to handle heat and drought stress and longer growing seasons. Consideration of alternative crops and varieties and farm management strategies will be important to maintain reliable operations under a changing climate.

The health of Oregonians is threatened
More frequent heat waves are expected to increase heat-related illness and death. More frequent wildfires and poor air quality are expected to increase respiratory illnesses. Warmth and extreme precipitation are expected to increase the risk of exposure to some vector- and waterborne diseases. Access to sufficient, safe, and nutritious food may be jeopardized by climate change. Extreme climate or weather events can diminish mental health. Certain populations will be disproportionately affected by such climate-related health impacts. However, adaptation strategies may reduce the projected adverse health outcomes.

Climate change uniquely affects the culture, sovereignty, health, economies, and ways of life of American Indian tribes
Changes in terrestrial and aquatic ecosystems will affect resources and habitats that are important for the sovereignty, culture, economy, and community health of many American Indian tribes. Tribes that depend upon these ecosystems, both on and off reservation, are among the first to experience the impacts of climate change. Of particular concern are changes in the availability and timing of traditional foods such as salmon, shellfish, and berries, and other plant and animal species important to tribes' traditional way of life.

Climate change will impact Oregon's economy, but more research is needed
Some economic assessments have been done at national and global levels, but more information is needed about the regional, state, and local economic impacts of climate change.

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