Union of Concerned Scientists

FACT SHEET

Confronting Climate Change in Washington

Current Impacts and Future Risks

HIGHLIGHTS

Climate change is being felt in the Evergreen State as shellfish hatcheries fail because of an acidifying ocean, record-breaking wildfires destroy communities and forests, and declining snowpack and earlier snowmelt in the mountains jeopardize summer water supplies.

Climate models project temperatures in the Pacific Northwest to increase between 3°F and 9°F by the end of this century, with the range depending on whether we reduce or continue to raise our global heat-trapping emissions.

Global warming represents a severe challenge to Washington's way of life. But this challenge can be met if residents, businesses, and policy makers act swiftly.

From the Olympic Peninsula to the Palouse hills, Washington is a landscape of powerful rivers, dense evergreen forests, rugged mountains, and farmland. Washington's diverse landscapes sustain the state's economically vital fishing industries, timber trade, and agriculture, as well as a vibrant tourism industry that contributes $17 billion annually to the state's economy (Visit Seattle n.d.). The state's unique ecology nourishes 3,000 miles of marine shoreline, temperate rain forests, and majestic mountain ranges. This thriving economy and complex ecology are also vulnerable to a warming climate.

Washington residents, like people across the country, are seeing impacts from global warming resulting from the buildup of heat-trapping emissions in the atmosphere. With the Pacific Northwest having warmed at least 1.3°F since 1895, climate change is already being felt in the Evergreen State (Dalton, Mote, and Snover 2013). Shellfish hatcheries are failing because of an acidifying ocean, record-breaking wildfires are destroying forests and communities, and declining snowpack and earlier snowmelt in the mountains are jeopardizing summer water supplies.

Unless we make deep and swift cuts in heat-trapping emissions, future changes to our climate could be dramatic. Compared with the end of the twentieth century, climate models project Pacific Northwest temperatures to increase between 3°F and 9°F by the end of this century (Mote et al. 2014). The actual warming will depend on whether we reduce or continue to increase our global emissions of carbon dioxide, methane, and other heat-trapping gases.

Ocean acidification, driven by absorption of carbon dioxide from the burning of fossil fuels, is responsible for declines in the production of Washington's oyster farms, putting the state's $270 million shellfish industry at risk.

Ocean Acidification

The acidity of the coastal ocean has increased, and sea level is rising along most of Washington's coast. These changes, driven by an increase in carbon emissions, pose major threats to the area's habitat and coastal infrastructure as well as to the people and industries that depend on it.

BOX 1.

Washington's Threatened Oyster Farms

Ocean acidification is responsible for declines in hatchery production in Washington's Pacific inlets, posing a major threat to the state's shellfish industry. The problem was first recognized in 2005, when scientists confirmed that greater ocean acidity was to blame for softening oysters' shells. Now Washington oyster farmers are trying to adapt to the corrosive waters by adding large quantities of alkaline chemicals to their oyster hatcheries. At stake is a $270 million shellfish industry that produces one-quarter of the nation's oysters and supports 3,200 jobs. More broadly, climate change will affect Washington's entire seafood industry, which generates more than 42,000 jobs and contributes at least $1.7 billion to Washington's economy (WSDE 2012).

Ocean acidification occurs when the ocean absorbs large amounts of the carbon dioxide released into the atmosphere as a result of the burning of fossil fuels. About one-quarter of the human-produced carbon dioxide released to the atmosphere over the last 250 years is now dissolved in the ocean (Canadell et al. 2007). Faster-than-expected ocean acidification has become a serious Northwest concern (Feely et al. 2012). Increased acidification of ocean surface water will alter the marine food web, threatening culturally and commercially significant marine species such as oysters and Pacific salmon (Mote el al. 2014).

Rising seas increase the likelihood of permanent inundation of low-lying areas, higher tidal and storm surge reach, river flooding, erosion, and loss of wildlife habitat (Snover et al. 2013). Sea level in Seattle has already risen 3.5 inches over the last 50 years (NOAA 2014).

Diminishing and Uncertain Water Supplies

Winter snow accumulation in the mountains is a natural water storage system that Washington relies on during its drier summer months for water supplies as well as the generation of hydroelectricity. Since 1950, the average snowpack on April 1 in the Cascade Mountains has decreased by about 20 percent (Mote 2006). Declines in snowpack are projected to continue as more winter precipitation falls as rain rather than snow throughout much of the Pacific Northwest.

In addition, the timing of the snowmelt will shift and become out of sync with communities' needs. Snow is already melting as many as 30 days earlier than in the mid-twentieth century, reducing summer stream flows in many Northwest

The heavy runoff from the high elevations of the Cascade Range in the late spring and summer makes it possible for Washington to generate vast quantities of hydroelectric power. Even modest changes in winter temperatures reduce opportunities for hydropower generation.

© WA DNR

Scientific evidence shows that climate change is producing hotter, drier conditions that contribute to worsening risks of wildfires in the American West.

snow-fed rivers. This means that less water is available during the hotter months when water demand tends to be highest (Fritze, Stewart, and Pebesma 2011). At the same time, earlier snowmelt and increased precipitation in the form of rain can pose flooding risks in the late winter and early spring.

Earlier snowmelt also means that Washington's production of hydroelectric power will fail to peak when power demand peaks. Washington is the largest producer of hydroelectric power in the nation, and this abundant resource supplies 70 percent of the state's electricity (WSDC 2013). A change in the timing of water supplies will reduce electricity generation from hydroelectric dams in the late spring and summer when stream flows are reduced (Mote et al. 2014). These changes can also complicate reservoir and irrigation management and stress freshwater fish, particularly salmon and trout (Dalton, Mote, and Snover 2013; Mantua, Tohver, and Hamlet 2010). And, changes to water supply could interfere with recreational activities such as fishing, rafting, and kayaking.

Greater Risk of Wildfires and Forest Damage

Forests are an essential part of Washington; they are what make it the Evergreen State. Forests cover half of the land of Washington state, and the abundance of trees has made the state a leading producer of softwood lumber. Forest industries play a significant role in the state economy, supporting local communities with more than 45,000 jobs and generating approximately $16 billion in gross business income in 2005 (WSDNR 2007).

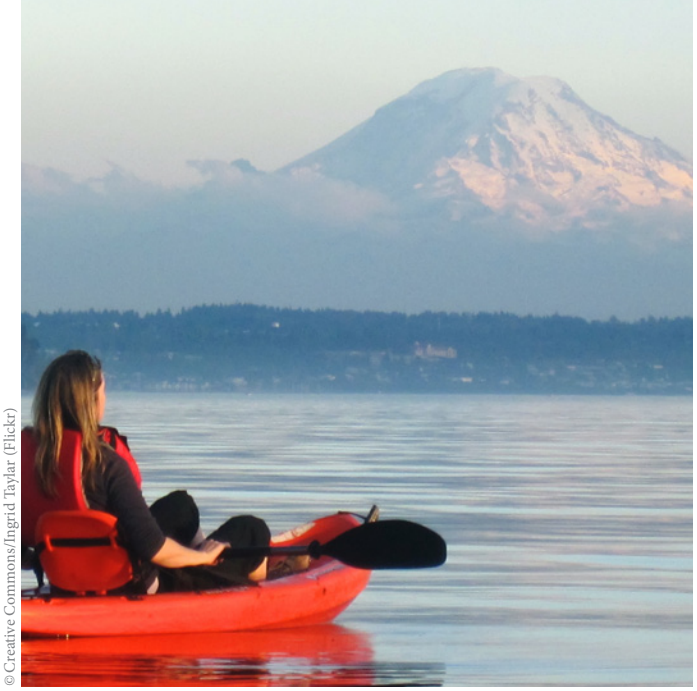
Forest mortality due to fire and insect outbreaks is already rising in Washington. In the coming decades, warmer temperatures, declining snowpack, and changes in soil moisture are expected to lead to a long-term transformation of the state's forest landscapes.

The frequency and intensity of wildfires, as well as the costs to fight them, are growing. In Washington, 2014 was one of the most destructive wildfire seasons in state history, with more than $180 million in suppression costs. Throughout Washington, wildfires burned 425,000 acres—far surpassing

BOX 2.

Destructive Wildfire Destroys Homes

In July 2014, Washington's largest-ever wildfire, the Carlton Complex fire, scorched about 400 square miles in Okanogan and Chelan counties and destroyed more than 320 homes. The rapidly spreading fire, burning in a drought year under conditions of severe fire risk, contributed to making 2014 the most destructive wildfire season in state history. The incidence of highly destructive wildfires such as this is projected to rise steeply in the western United States as temperatures continue to rise.



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Washington's diverse landscapes sustain the state's economically vital fishing industries, timber trade, and agriculture, as well as a vibrant tourism industry that contributes $17 billion annually to the state's economy. Climate change represents a severe challenge to Washington's way of life. But this challenge can be met if residents, businesses, and policy makers act swiftly.

the annual average of 60,000 acres burned in the previous five years (NWCC 2015). Due to warmer and drier summer conditions, the typical annual area burned by fire in the Northwest is projected to double by the 2040s and quadruple by the 2080s relative to the past century (Littell et al. 2010).

Drought stress is also likely to reduce forest productivity in eastern Washington. Climate models show that the area of severely water-limited forests is projected to increase by one-third by the 2020s and an additional 12 percent by mid-century. This will make drought-stressed forests more susceptible to outbreaks of pests such as the highly destructive mountain pine beetle (Littell et al. 2010).

Climate Solutions in Washington

Global warming represents a severe challenge to Washington's way of life, but the challenge can be addressed if policy makers, businesses, and residents take swift action and work together—both in reducing emissions and responding to the changes already occurring.

Efforts are under way by Washington state and local governments and native tribes to identify actions to help communities adapt to a changing climate by becoming more resilient. At the same time, the emissions choices made today—in Washington and throughout the world—will shape the climate our children and grandchildren inherit. Other states and regions have pioneered successful strategies for reducing emissions as their economies grow and new industries are created. Washington has made a start, but must do more to meet this important challenge.

The state has set goals of reducing heat-trapping emissions to 1990 levels by 2020, 25 percent below 1990 levels by 2035, and 50 percent below 1990 levels by 2050. To achieve those goals and contribute to national and global efforts to avoid the worst consequences of climate change, the state should:

- Establish a price on carbon pollution for the companies responsible for a majority of the state's emissions.
- Increase the use of clean fuels, such as biofuels and electricity, to reduce oil use and the carbon emissions associated with transportation fuels.
- Expand the market for electric vehicles by extending consumer purchase incentives and expanding charging infrastructure, and join other states in requiring automakers to produce advanced-technology vehicles.
- Improve energy efficiency in commercial and residential buildings, agriculture, and industry.
- Increase the use of renewable sources of electricity and reduce reliance on polluting sources such as coal and natural gas.

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