# Effects of Global Climate Change On the Pacific Northwest: Part 2

By Deborah Smeltzer
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**Big changes ahead of us**

Now let's look at the impact of global climate change on the Pacific Northwest and the Puget Sound area. The U.S. EPA and the University of Washington Climate Impacts Group at the College of the Environment have each contributed to our understanding of how the PNW will be affected in the future despite the fact that current effects are significantly less than elsewhere.

**Water Resources.** Much of the Northwest's water is stored naturally in winter snowpack in the mountains. Climate change threatens this natural storage by changing the timing of snowmelt and the amount of water available in streams and rivers (streamflow) throughout the year. With warmer air and land temperatures, a greater proportion of winter precipitation will fall as rain instead of snow, thus reducing snowpack, increasing spring peak in streamflow and decreasing summer streamflow and water availability. These changes in rainfall, snowpack, and streamflow could also impact risk of landslides and erosion, especially when combined with human driven development patterns and forest management. Flooding risk is projected to increase in all Puget Sound watersheds.

"In the Cascade Mountains, measurements of snowpack taken on April 1 (when snowpack is usually at its peak) have decreased by about 20 percent since the 1950s."

"Forty percent of the nation's hydropower is generated in the Northwest. Lower stream flows will likely reduce hydroelectric supply and could lead to large economic losses in the region. Reduced stream flows combined with rising temperatures and a growing population are raising concerns about the ability to meet increased air conditioning and other electricity demands."

**Coastal Resources**. Climate change that results in sea level rise in Puget Sound is projected to increase salt marshes, decrease fresh-water marshes, and accelerate the eroding effect of waves and surge. These changes will affect habitats of coastal species including shorebirds, small forage fish and others. Higher water temperatures are expected to increase the frequency, duration, and toxicity of harmful algal blooms that could result in beach closures and declines in recreational shellfish harvests. Ocean acidification is expected to negatively impact important economic species including Pacific salmon and oysters. Climate-related stressors are expected to affect marine ecosystems in unknown ways.

**Ecosystems & Agriculture.** Warmer streams, ocean acidification, lower summer stream flows, and higher winter stream flows are projected to negatively affect salmon and their habitat. These affects are in addition to other human activities, such as dam building, logging, pollution and

overfishing that already threaten salmon habitat. Climatic warming is expected to alter the timing of biological events such as leaf emergence, plankton blooms in lakes, and spawning runs for salmon. Many species will experience either expansion or contraction in their expected ranges.

Over the long-term, climate change is expected to alter the abundance and distribution of certain tree species (such as Douglas fir and western hemlock), increasing the risk of large wildfires and altering the ranges and timing of insect and fungal pathogens. Warming is expected to increase the length of the growing season and the production of some crops. However, higher temperatures that increase heat stress, decrease summer water availability, increase risk of flooding and change range and timing of pest infestations may negatively affect crops and livestock. These changes are also expected to have a negative impact on local timber and bioenergy markets.

Athabasca Glacier at Columbia Icefield along the Continental Divide between British Columbia and Alberta, Canada. In the past 125 years, the Athabasca Glacier has lost half of its volume and receded more than 1.5 kilometers (0.93 miles), leaving hills of rock in its place, the lateral and terminal glacial moraines. *Photo by Deborah Smeltzer / WSU Skagit County Master Gardeners.*

Clifford F. Mass, Professor of Atmospheric Science at Univ. Washington, hosts a weather and climate blog and has written in-depth about the impact of human actions on climate in the Pacific Northwest.

A key point made by Mass is that, at present, the Pacific Northwest has been much less affected by global warming than most other regions (like the Arctic and continental interiors) as a result of the huge buffering effect of the vast North Pacific Ocean. The Pacific has warmed less rapidly

than other global waters in the past 50 years; however, that is expected to equilibrate in the coming decades based on the currently accelerating rate of carbon dioxide emissions. He predicts that PNW will need additional reservoir capacity to manage heavier winter/spring rainfall for use during drier summer water requirements since snowpack will no longer be available. Mass emphasizes "the big changes due to human-caused global warming in the Northwest are AHEAD of us" (think 2050 and beyond). So timing is key, both with respect to what actions we choose to reduce global warming and its impact on us.

Lodgepole pines decimated by mountain pine beetles in Glacier National Park, Montana. The combination of milder temperatures and low precipitation has aided a vast outbreak of beetles. *Photo by Deborah Smeltzer / WSU Skagit County Master Gardeners.*

**RESOURCES:**

- https://climate.nasa.gov/climate_resources/24/
- https://climate.nasa.gov/evidence/
- https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-northwest_.html
- https://cig.uw.edu/resources/special-reports/ps-sok/
- https://cliffmass.blogspot.com/
- http://www.nationalgeographic.com/environment/global-warming/global-warming-effects/

Note: some hyperlinks in this article have been updated since its initial publication.