ADAPTING TO CLIMATE CHANGE
NORTHWEST

EPA United States Environmental Protection Agency

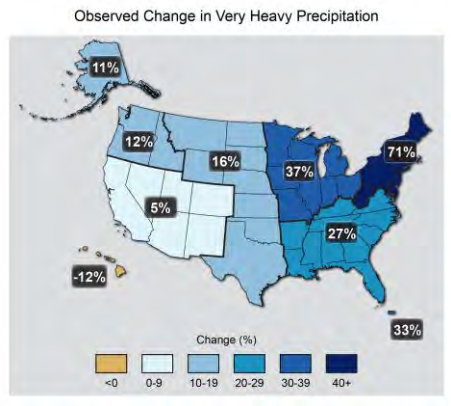
In the Northwest, projected higher temperatures, increased precipitation, and more frequent and intense storms pose challenges to communities as they protect water and sewer treatment plants, maintain air quality, and protect ecosystems like the Puget Sound and the Olympic Peninsula. Many communities are building resilience to the risks they face under current climatic conditions. This fact sheet provides examples of communities that are going beyond resilience to anticipate and prepare for future impacts.

Moving Beyond Resilience to Adaptation

Climate change adaptation goes beyond resilience by taking actions to address future risks. Adaptation refers to how communities anticipate, plan, and prepare for a changing climate.

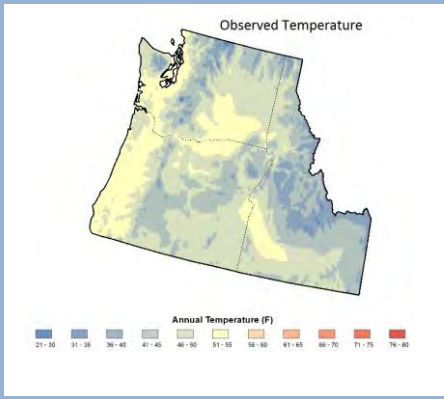
Observed and Projected Changes in the Northwest

Intense storms have increased



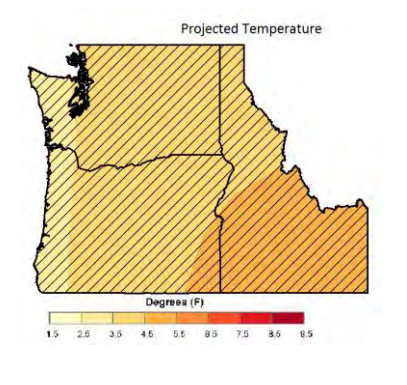
The Northwest experienced a 12% increase in the amount of precipitation falling in very heavy events (the heaviest 1%) from 1958 to 2012.

Average Annual Temperature



This map shows the average annual temperature (°F) from 1981 to 2010 in the Northwest.

Average Annual Temperature Increases



The Northwest is projected to experience an increase in the average annual temperature (°F) for 2041 to 2070 compared to 1971 to 1999 under a high emissions scenario.

Protecting Water Infrastructure

Higher temperatures due to climate change mean that less water will likely be available in the summer. Projections call for less annual rainfall, less snowpack in the mountains, and earlier snowmelt. Water managers will therefore face difficulty meeting water demands throughout the year. Fresh water resources are also at risk from climate-induced drought. Saltwater is more likely to move into freshwater areas as sea levels rise. Key vulnerabilities include:

- Sea level rise and increased storm events may overwhelm operations and service capacity of water and wastewater systems, which could threaten drinking water availability, and lead to more sewer system overflows.
- Sea level rise and storm surge may submerge and damage critical facilities.
- More drought and less source water threatens the operations of water infrastructure, potentially leading to the need for different methods of treating water, and changes in operating procedures at water treatment facilities.

Adaptation in Action

The city of Anacortes, WA, recognized that its Skagit River water treatment plant, serving 56,000 customers, was vulnerable to floods under current and future climate risks. The city decided to update the facility from 21.4 million gallons of water per day (mgd) to 31.5 mgd. Moving the facility out of the floodplain was deemed too costly, so officials decided to rebuild on the existing site. They sought to protect against greater flood risks by using water-proofing membranes below the 40-foot elevation; building ring dikes for flood protection; and raising critical electrical equipment out of the 100-year flood level. Improvements to the plant's design have better prepared the facility to meet increased service demands and projected changes in climate.

Maintaining Air Quality

Warmer temperatures caused by climate change can lead to increases in ground level ozone. Climate change can also lead to more wildfires. Wildfires destroy homes, transform ecosystems, threaten public health, and damage the economy. A 78 percent increase in forest area burned by the middle of the 21st century is estimated for the Pacific Northwest. In Washington, forests cover half the land mass. In 2014, wildfires burned more than 425,000 acres, including hundreds of homes, causing $180 million in fire suppression costs. Key vulnerabilities include:

- Climate change can increase the impacts of wildfires on humans, such as respiratory illness, smoke inhalation, and burn injuries.
- Climate change can significantly increase summertime ground-level ozone concentrations in many areas.

Adaptation in Action

Oregon's Climate Change Adaptation Framework identified three critical climate factors – earlier snowmelt, higher summer temperatures, longer fire season – as reasons the state is highly vulnerable to more frequent and intense wildfires. In order to prepare for future climate risks from projected wildfires, the state is restoring fire-adapted ecosystems to withstand recurring wildfires, improving development standards to protect the urban-wildland interface, and improving the response capacity of public health agencies for wildfire emergencies. The Oregon Wildfire Response Protocol for Severe Smoke Episodes also sets standards for local, state, tribal, and federal government agency coordination during large and long-duration wildfires, focusing specifically on air quality impacts under changing climatic conditions.

Protecting Puget Sound and the Olympic Peninsula

Climate changes shaping the Puget Sound and Olympic Peninsula include higher temperatures, and more frequent and intense storms. These changes will affect snowpack and streamflow, sea level rise, and, consequently, storm surge reach. Key vulnerabilities include:

- Sea level rise is expected to expand the area of some tidal wetlands in Puget Sound, but reduce the area of others, as water depths increase and new areas become submerged.
- Climate change will likely make harmful algal blooms more severe, and extend the season when they occur.
- Warmer water temperatures, loss of coastal habitat due to sea level rise, and changes in water quality will stress marine organisms and habitats.

Adaptation in Action

The North Cascadia Adaptation Partnership works with local, state, tribal, and federal partners to increase awareness of climate change, assess the vulnerability of cultural and natural resources, and incorporate climate adaptation into the management of federal lands and waters in the North Cascades area, one of the Puget Sound watersheds. It worked with the Port of Bellingham, WA, which is within the Puget Sound watershed, to prepare for future climate risks to a downtown lumber plant. The port authority raised the site grades three to six feet in areas with high-value infrastructure, thus creating a buffer against sea level rise.

In the Nisqually River Delta, in the southern portion of the Puget Sound, a large-scale estuary restoration project removed four miles of dikes, which helped restore the buffering capacity of salt marshes against sea level rise and salt water intrusion from climate change.

On the Olympic Peninsula, the Quinault Indian Nation village of Taholah is particularly vulnerable to sea level rise, storm surge, and river flooding. To better understand its future risks, the Nation conducted a vulnerability assessment with the assistance of a Social and Economic Development Strategies grant from the Administration for Native Americans, a part of the U.S. Department of Health and Human Services. The resulting plan centers on relocating 650 residents and vulnerable community facilities a half-mile away from the existing village. The new village will be in a location well above the flood zones, thus assuring community continuity in the face of a changing climate.

For a comprehensive view of projected climate changes in your region, consult:

- ***Climate Change Impacts in the United States: The Third National Climate Assessment***
- ***EPA's Climate Change Adaptation Resource Center***

JUNE 2016
OFFICE OF POLICY
EPA-230-F-16-018