

WATER FACTS

Seattle, Washington: Identifying and Becoming More Resilient to Impacts of Climate Change










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Cities across the United States should anticipate significant water-related vulnerabilities based on current carbon emission trends because of climate change, ranging from water shortages to more intense storms and floods to sea level rise. To help cities become more resilient to the rising threats of climate change, NRDC reviewed more than 75 scientific studies and other reports to summarize the water-related vulnerabilities in 12 cities—including Seattle. Although there may still be some uncertainty about what particular impacts threaten cities and how quickly or severely they might occur, action at the local level is the most effective method of reducing, mitigating, and preventing the negative effects of water-related climate change outlined in this fact sheet. NRDC urges cities to prepare for coming challenges relating to water resources. Fortunately, there are steps cities are already taking to become more resilient.

Seattle is on the forefront of climate research, having completed sophisticated analyses examining the vulnerability of all aspects of Washington State to climate change. Based on vulnerability assessment and other research, we know that Seattle is vulnerable to:

Summary of water-related climate changes and impacts in Seattle throughout the 21st century


	Rising sea levels
	Increased flooding
	Increased impacts to fisheries
	Water supply challenges due to early snowmelt
	Increased annual precipitation
	More frequent and intense storm events
	Increased erosion

 Highly likely  Likely  Possible

Source: NRDC



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SEA LEVEL RISE AND FLOODING

Projected sea level rise in Puget Sound ranges from 3 to 22 inches by 2050 and 6 to 50 inches by the end of the century. Seattle has a lot of coastal development that is at risk from sea level rise; approximately 90 percent of Puget Sound’s shoreline has single-family residences or is available for residential development. The Port of Seattle, which sits just slightly above sea level, relies heavily on the area’s road and rail networks to distribute the cargo it receives and is particularly susceptible to flooding from rising seas.

STORM EVENTS, FLOODING, AND EROSION

Overall, annual precipitation in the Puget Sound area is projected to increase throughout the 21st century, although changes are not evenly distributed throughout all seasons. An increase in extreme precipitation events is already evident: what was considered a once-in-50-year storm between 1956 and 1980 became a once-in-8.4-year storm between 1981 and 2005. Seattle’s urban drainage system may face rainfall greater than its designed capacity, leading to increased flooding. Also, bluff erosion and landslides are most likely to occur from wave action during extreme storm events at high tide.

INCREASED TEMPERATURE

Compared with the late 20th-century, annual average temperatures in Washington are expected to increase about 2.0°F by the 2020s, 3.2°F by the 2040s, and 5.3°F by the 2080s. Winter temperature increases for the 2040s are projected to be greater in the north and central Cascades—home to Seattle’s water-supply watershed—than in much of the rest of Washington.

WATER SUPPLY CHALLENGES

Seattle’s water supply is particularly sensitive to climate change because its management has been largely based on the timing of precipitation and snowmelt. Warming winter temperatures are projected to steadily decrease the amount

of precipitation falling as snow over the course of the 21st century, reducing snowpack and springtime runoff. This change poses a challenge to water supply managers balancing the need for summer potable water with adequate supply for the region’s hydroelectric facilities, shipping locks, and valuable wildlife habitats.

IMPACTS TO AQUATIC LIFE

Local salmon populations face threats from rising stream temperatures. Warmer waters could increase the frequency and duration of harmful algal blooms, which can kill fish and produce potent natural toxins that contaminate shellfish and sicken anyone who eats them. Acidification of Puget Sound waters affects the growth and strength of calcium carbonate shells, with impacts to the shellfish harvest.

ACTION

The Washington Climate Change Impacts Assessment takes a detailed look at how Seattle is likely to be impacted by climate change, helping the city to understand the actions it needs to take to become more resilient. Some of those actions include:

- Development of a decision-support tool for new development, which would allow users to input variables about a proposed project, such as the nature of the project, where it will be built, and when it will be built, and learn how projected temperature, precipitation, and sea level rise could impact the effort.
- Updating Seattle’s Climate Action Plan with a new adaptation component.
- A plan by Seattle Public Utilities (SPU) to reduce water usage by 15 million gallons a day by 2030.
- Development by SPU of a RainWatch tool that will allow greater refinement in weather forecasts for the city and allow the utility to better anticipate operational needs, specifically regarding stormwater and drainage.

Projected changes in snow water equivalent (SWE) to watersheds supplying Seattle’s water				
Projected changes in SWE as compared to mean historical SWE 1916–2006	Cedar Watershed		Tolt Watershed	
	A1B: Medium GHG emissions scenario	B1: Low GHG emissions scenario	A1B	B1
2020s	-66%	-64%	-59%	-57%
2040s	-83%	-76%	-79%	-70%
2080s	-97%	-90%	-95%	-87%

Source: Elsner et al., The Washington Climate Change Impacts Assessment, Climate Impacts Group, (2009).