

Severe Weather

Introduction

With a substantial marine influence, the climate of King County is well known for its moderation. Despite this, severe weather in King County can happen at any time of year but usually occurs between October and April. Severe weather can include unseasonable rain, snow, ice, extreme cold, and high winds. (Wind speed itself does not predict damage due to different tempering effects of variable landscapes; 45 mph tends to be the threshold at which damages occur.)

The effects of severe weather in the County can include flooding, power outages, land and mudslides, and road, rail and airport closures. There is little snow removal equipment or budget associated for such service in King County. Vehicles and drivers are often poorly equipped to travel roadways under such conditions. For this reason, impacts from unusually heavy snowfalls and severe winter tend to be dramatic though short-lived.

High Probability Low Impact	High Probability Moderate Impact	High Probability High Impact
Moderate Probability Low Impact	Moderate Probability Moderate Impact	Moderate Probability High Impact
Low Probability Low Impact	Low Probability Moderate Impact	Low Probability High Impact

Severe Weather Probability vs. Severe Weather Impacts

Hazard Identification

Precipitation

The geographical location of northwestern Washington subjects it to several climatic controls: the effects of terrain, the Pacific Ocean, and semi-permanent high and low pressure regions located over the North Pacific Ocean combine to produce significantly different weather conditions within short distances.¹ Accordingly, rainfall in King County varies widely from city to city and area to area. The City of Seattle has an average of 37 inches annually,^{2,3} while Enumclaw has an annual average of 55 inches^{4,5} and Snoqualmie/North Bend has 61 inches^{6,7} of precipitation. The majority of this precipitation occurs as rain in the lowlands between October and early May with substantial snow packs in the Cascades during the same time frames.

Snow accumulations in King County at elevations below 2,000 feet are uncommon. On average, Seattle will have one or two snow storms during a winter season with appreciable accumulations. Snow accumulation rarely remains two days after such a storm. Heavy local snows and associated cold conditions have resulted in power outages, transportation restrictions, and adverse impacts to the regional economy.

Table 5-1: Precipitation in Inches by Month⁸
(Snow and Rain for Seattle)

Month	Average Snowfall	Average Snow Pack	Average Rainfall	Average Precipitation Winter 96/97 ⁹
July	0	0	.95	.77
August	0	0	1.30	1.32
September	0	0	1.61	1.85
October	0	0	3.35	5.54
November	0.7	0	5.63	5.23
December	1.8	0	6.03	11.20
January	1.4	0	5.01	7.02
February	0.7	0	3.92	1.99
March	0.3	0	3.80	8.20
April	0	0	2.81	4.32
May	0	0	1.99	2.88
June	0	0	1.52	1.91

Wind

High wind events in King County are fairly common and are usually experienced as part of a winter weather pattern.

Ice and Extreme Cold

King County's marine climate results in very few extreme cold/ice events. Typically, the area experiences below freezing temperatures for 10-14 consecutive days in January or February.

Flooding

Severe weather is often accompanied by heavy rains and flooding conditions, See Flooding section.

Power Outages

Power outages are commonly experienced in association with high winds, rain and flooding conditions.

History of Events

The table below represents damages to public property from severe weather events since 1972. Damages occurred to roadway, school roofs, reservoirs, vehicles (from falling trees), and public buildings were caused directly or indirectly by wind, rain, snow load, or flying debris.

FEMA No.	Dates	KC Public Damages (FEMA Approved)
328	1972 – Flooding	Prior to FEMA
492	1975 - Flooding	Prior to FEMA
545	1977 – Flooding, landslide	Prior to FEMA
612	1979 – Flooding	Figures not available
757	1986 – Flooding, landslide	Figures not available
784	1986 – Flooding	Figures not available
852	1990, Jan – Flooding	\$5,246,411
883	1990, Nov – Flooding	\$3,694,824
896	1990, Dec – Flooding	\$ 477,737
981	1993, Jan – Wind Storm	\$1,927,837
1079	1996, Jan – Winter Storm	\$3,031,519
1100	1996, Feb - Flooding	\$4,226,719
1159	1997, Jan – Winter Storm	\$3,576,309
1172	1997, April – Flooding	\$1,266,446
Total		\$23,447,802

Hazard Impacts

Precipitation

Heavy local snows and associated cold conditions have resulted in power outages, transportation restrictions, and adverse impacts to the regional economy.

Wind

Winds in excess of 45 miles per hour can cause road closures, significant damages to public and private property, and injuries to public safety, utility workers and private citizens. The most recent and best known of these was the Inaugural Day Windstorm on January 19, 1993.¹⁰ Winds began mid-morning, lasted five hours and reached over 90 miles per hour in downtown Seattle. Widespread power outages resulted from downed trees and many suburban and rural roads were made impassible. Usually, these winds are from the south.

Ice and Extreme Cold

Extended temperatures of less than 20 degrees can burst residential water pipes. The population is vulnerable to the effects of extreme cold and associated power outages. In some cases, shelters are opened for the homeless, senior citizens and people without heat/power.

Power Outages

Downed trees caused by high winds and rain saturated soils damaged transmission lines and cause power outages in local areas for hours to days when multiple occurrences are experienced. Utility crews from Puget Sound Energy, Bonneville Power and Seattle City Light work around the clock to restore services. Outages of 80,000 customers have been experienced. Downed power lines pose an electrocution hazard to motorists, pedestrians and any unsuspecting by-standers.

Transportation Impacts

High winds sometimes result in the closure of the floating bridges (Highway 520 and Interstate 90) over Lake Washington. Wind-driven waves often break over the roadway under those conditions.

Trees uprooted by wind regularly sever power lines and/or block vehicular access. Together, these conditions make roadways impassable.

Past Mitigation Efforts

One of the most common impacts from severe weather is the loss of commercial power. Since many other services rely on power for critical functions, providing backup power capabilities has long been a favored strategy for mitigating damages from winter storms. Many police precincts, fire stations, emergency operations centers, hospitals, service providers and major employers have already introduced this capability.

Severe Weather Endnotes:

¹ *Climate of Washington*. Western Regional Climate Center. 12 Oct. 2003
www.wrcc.dri.edu/narratives/WASHINGTON.htm

² *In Town, Out-of-Doors facts*. Seattle's Convention and Visitors Bureau. 30 Sept. 2003
www.seeseattle.org/visitors/overview/intownmore.asp

³ *Seattle Visitor Information – Weather*. 26 Jul. 2003. GoNorthwest Travel Guide. 30 Sept. 2003
www.gonorthwest.com/Washington/seattle/weather.htm

⁴ *Enumclaw – Climate & Weather*. Key to the City. 30 Sept. 2003

www.pe.net/~rksnow/wacountyenumclaw.htm#climate

⁵ *Enumclaw Area Chamber of Commerce*. 30 Sept. 2003 chamber.enumclaw.wa.us/area_info-demographics.htm

⁶ *Snoqualmie Falls, Washington – Period of Record Monthly Climate Summary*. Western Regional Climate Center. 30 Sept. 2003 www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wasnoq

⁷ *Weather*. Snoqualmie Valley Chamber of Commerce. 30 Sept. 2003

www.snovalley.org/vn_weather.html

⁸ *Western Regional Climate Center - Seattle Urban Site, Washington – Period of Record Monthly Climate Summary*. Western Regional Climate Center. 12 Oct. 2003 www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wasurb

⁹ *Seattle Climate Data Monthly Summary*. Beautiful Seattle. 12 Oct. 2003

www.beautifulseattle.com/clisumm.htm

¹⁰ *“400,000 Lose Power – But Storm Not as Bad as Had Been Feared.”* Seattle Times 13 Dec. 1995: A.1.