

Mount St. Helens Erupts, May 18, 1980

With its catastrophic eruption on May 18, 1980, at 8:32 a.m. Pacific Daylight Savings Time (PDT), Mount St. Helens became the deadliest and most economically destructive volcanic event in the history of the United States.

Prior to the 1980 eruption, Mount St. Helens, a composite or stratovolcano, was known as the Mount Fuji of North America. It was a picturesque representative for southwest Washington's Cascade Range with its symmetric snow- and ice-covered cone. All the volcanoes in the Cascade mountain chain are formed from the subduction of the oceanic Juan de Fuca Plate underneath the less dense continental North American Plate. Similar to most of the other volcanoes in the Cascade Range, Mount St. Helens is a large, highly eruptive cone consisting of alternating layers of lava, ash, and volcanic debris.

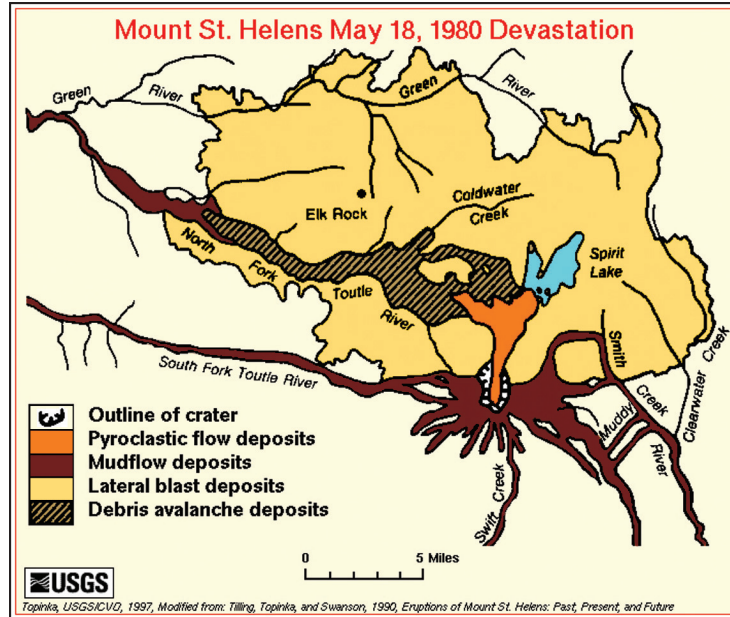


These images were taken from the same location on May 17, 1980 and September 10, 1980. Before the eruption, Mount St. Helens rose 2950 metres. The force of the May 18 eruption reduced the summit elevation to 2549 metres and replaced it with a 1.6-kilometre horseshoe-shaped crater.

May 18, 1980, Eruption—Fire, Ash, and Boiling Rivers

Mount St. Helens' catastrophic eruption produced the deadliest and most economically destructive volcanic event in the history of the United States. Although there was nothing anyone could do to prevent the eruption, there were a number of signs that a significant event was imminent.

- Beginning in March 1980, a series of small earthquakes occurred. By May 17, more than 10 000 small tremors had been recorded.
- The ice cap at the summit was destroyed by steam explosions.
- By May 17, steam explosions and earthquakes had deformed the volcano, particularly the north side, which had grown outward about 140 metres. Such a deformation suggested that magma was rising up into the volcano.



The volcanic eruption caused devastation to the surrounding area in four distinct ways. According to the map, how widespread was each type of devastation?

Recognizing the impending risk, law enforcement agencies assisted dozens of property owners into and out of the danger zone in order to gather possessions.

At 8:32 a.m. PDT, a 5.1-magnitude earthquake about 1.6 kilometres beneath the volcano shook the area. Without a cap of earth to keep the volcano sealed, the built-up pressure triggered a violent northward lateral blast, causing the north flank's collapse. This gravitational collapse resulted in the largest recorded landslide-debris avalanche in history. Earth and ice rushed down the mountain at speeds in excess of 240 kilometres per hour. Less than an hour after the lateral blast, magma erupted from the newly formed crater. The volcano continued to erupt for nine hours.

The eruption caused widespread destruction, killing nearly all exposed life over a 240-square-kilometre area, including 57 people. The main causes of human deaths were asphyxiation from inhaling hot volcanic ash, and thermal and other injuries. More than 250 homes and cabins, 47 bridges, 24 kilometres of railway, and 298 kilometres of highway were extensively damaged or destroyed. Hundreds of kilometres of agricultural land and prime forestry area, equivalent to over 4 billion board-feet of timber, were destroyed. Wildlife and aquatic life were also severely affected. At least 7000 elk, deer, and bear were killed, along with millions of salmon smolts. Fish in rivers near the volcano literally jumped onto shore to escape water temperatures that rose to 90 °C.

Because of the excessive quantity of ash, transportation operations and sewage disposal and water treatment systems faced major problems with removal. Overall, more than 1.8 million cubic metres of ash, which is equivalent to over 800,000 tonnes, were removed from highways and airports in Washington state. Total ash removal costs were \$2.2 million and took 10 weeks in Yakima County. Another major cost was the need to dredge the Toutle, Cowlitz, and Columbia rivers. The channels of the Toutle and Cowlitz were filled with mud and debris, which limited their capacity and

increased the risk of floods. Ocean-going traffic along the Columbia River was stopped for about a week. Total costs estimated for the destruction and damage caused by the eruption were about \$1.1 billion, not including reimbursement for personal property losses, the cost of all ash clean-up, or the loss of tourism in the area immediately after the eruption.

Remarkably, beginning just a few months after the initial blast, vegetation returned to Mount St. Helens. First to appear were small trees and plants that had been protected by snowpack. Gradually, new seeds arrived that were carried by wind and by animals that migrated in from adjacent areas. Twenty years later, significant populations of mammals, birds, insects, and fish had been re-established, and now most of the affected area has again been covered by vegetation. It will take 200 years or more, however, to restore the old-growth forest conditions that preceded the blast.



The plume of ash from the eruption reached 20–25 kilometres above sea level, and moved eastward at speeds of 95 kilometres per hour. Nearby areas were covered with as much as 25 centimetres of ash. It was so dark in the city of Spokane, Washington, some 400 kilometres away, that street lights came on.

Lessons Learned

After the 1980 eruption, US Congress funded the US Geological Survey (USGS) Cascades Volcano Observatory to monitor volcanoes in the Cascade Range. In the United States, the budget for monitoring volcanoes went from about \$2 million in 1980 to about \$21 million today. There are now more than 100 volcanologists on staff at the USGS. Technology for better monitoring has advanced since then from the relatively crude seismometers that could detect only high-frequency noises, such as rock breaking, to broadband seismometers that hear low-frequency rumblings of fluid beneath Earth's surface. Fixed GPS monitors can measure a volcano's growth and movement, preventing scientists from having to risk their lives putting themselves near active volcanoes.

THINK IT THROUGH

- Review the map of destruction on the previous page. Define each of the following terms and briefly describe how it causes damage:
 - Pyroclastic flow
 - Mudflow
 - Lateral blast
 - Debris avalanche
- Visit Volcanoes of Canada, the Natural Resources Canada website at http://gsc.nrcan.gc.ca/volcanoes/cat/volcano_e.php?id=avb_ncn_032. Choose one of Canada's volcanoes and create a poster. Along with a photo or drawing of the volcano, include a description of the volcano, a map showing its location, what is known about its history, and what type of monitoring it receives.
- What is the status of Mount St. Helens today? Visit the USGS Cascades Volcano Observatory website to find out.