

This is an infographic titled “Spirit Lake Outflow Safety Improvement Project – A brief history of managing the aftermath of the 1980 eruption of Mount St. Helens”. The USDA and US Forest Service logos are featured at the top of the infographic.

A timeline is shown that starts with the eruption of Mount St. Helens in 1980 and ends with the present day. The milestones are as follows:

1980: Mount St. Helens erupts, causing the loss of 57 lives and widespread damage. Blast debris blocks the outlet to Spirit Lake, and the lake can no longer drain. An image of Mount St. Helens erupting is shown in black and white. Another image appears immediately below which identifies Spirit Lake and the debris blockage on an aerial image. Mount St. Helens is visible.

1982: Impounded waters of Spirit Lake rise dangerously, and the Federal Emergency Management Agency fears a catastrophic flood from a potential breach of the debris blockage is imminent. The US Army Corps of Engineers (Army Corps) deploys barge-mounted pumps to remove water from the lake. An aerial image of Spirit Lake with the Army Corps pumps visible.

1985: A tunnel is bored through Harry’s Ridge to create a new outlet for Spirit Lake water. This addresses the immediate dangers of the lake overflowing and release of the debris blockage to downstream communities. An image of the archway-shaped tunnel outlet is shown with water rushing out.

1989: The Army Corps builds a sediment retention structure on the North Fork Toutle River to counteract ongoing sedimentation in the area’s rivers by slowing the flow of water to allow debris to settle rather than be carried downstream. An aerial image of the Army Corps sediment retention structure is shown.

1995 and 1996: Major tunnel repairs are required for two consecutive years. During these efforts, Spirit Lake is unable to discharge. Rising water levels approach the maximum safe operating levels where pressure on the natural debris blockage increases and creates concern about potential future tunnel failure and the downstream consequences. An image is shown of two workers in reflective safety gear inspecting the inside of the tunnel.

2016: Major tunnel repairs noted during annual inspections are addressed. As in 1995 and 1996, Spirit Lake water levels approach maximum safe operating levels while repairs are underway. An image is shown of several workers in yellow suits repairing the inside of the tunnel walls.

2021: The U.S. Forest Service (USFS), Gifford Pinchot National Forest is seeking a long-term solution to managing Spirit Lake water levels. As the responsible agency, the Forest Service

must address the consequences of the aging tunnel, and a single lake outlet. An image is shown of the tunnel intake area in the face of the rocky ridge. The tunnel entrance is crowded by floating log debris.

Moving from the end of the timeline and back to the left side of the infographic, a paragraph describing the history of the tunnel is provided. It reads:

“The Spirit Lake Tunnel was built in the wake of the 1980 eruption of Mount St. Helens to address the imminent public safety threat posed by rising water levels in Spirit Lake. The lake’s outlet to the Toutle River system was suddenly completely blocked by debris from the eruption. The lake began to fill, putting pressure on the unstable debris blockage and threatening to release another catastrophic flow of water, mud, and ash downstream to vulnerable communities still recovering from the eruption. The solution was to create an artificial outlet for the lake: The Spirit Lake Tunnel. The tunnel was built in an urgent situation. In addition, the tunnel passes through a geologically active ridge. Therefore, the tunnel needs more frequent and serious repairs as time wears on and is not expected to remain serviceable without significant repair and upgrade.”

A photo of a lahar is shown. The image shows a house being overtaken by a lahar, which is a fast-moving flow of mud, rock, and debris released following a volcanic eruption.

The final component of the infographic is a timeline describing research that has been conducted for the area. It is subtitled “Extensive Research of the Project Area” and includes a paragraph as follows: “The Spirit Lake and Mount St. Helens area has been the subject of extensive research efforts focusing on understanding the unique geological and ecological aspects of the region as well as identifying and collaborating with a diverse array of stakeholders whose interests and communities are impacted by tunnel management decisions.” The timeline features images representing each of the publication milestones starting in 2017 and ending at present day. The content is as follows:

2017: The USFS Pacific Northwest Research Station publishes a semiquantitative risk assessment that explores the three principal regional hazards (floods, earthquakes, and eruptions) as they relate to the Spirit Lake debris blockage and potential tunnel solutions. An image of the cover of the risk assessment is shown. The cover is green with white text and an image of the pumice plain.

2018: Inspections of the outflow tunnel indicate a need for millions of dollars in repairs to avoid failure. The National Academies of Sciences, Engineering, and Medicine (NASEM) publishes a comprehensive report proposing decision-making processes to address the long-term safety and management issues related to the Spirit Lake tunnel and the Toutle

River system. An image of the NASEM report is shown. The cover is blue with white writing and features an aerial image of Mount St. Helens and Spirit Lake.

2019: The USFS commissions the William D. Ruckelshaus Center to draft a Situation Assessment for the “Long-Term Management of the Spirit Lake/Toutle-Cowlitz River System”. Interviews are conducted with stakeholders from public, private, tribal, and nonprofit entities. Common themes and sub-themes are identified in values and preferences for how to manage the challenging system. An image of the report cover is shown. The cover is white with black text.

2020: USFS completes the NEPA process for the Spirit Lake Tunnel Intake Gate Replacement and Geotechnical Drilling Project. This Project is separate from the Spirit Lake Outflow Safety Project. The Tunnel and Gate replacement project is a maintenance and safety project and includes repairing the tunnel inlet, building temporary roads to the work area, and conducting geotechnical drilling. This work is currently underway and scheduled for completion in 2027. An image of the cover of the report is shown. The cover is white with black text and features a grid of images of the mountain, tunnel, field workers, and Spirit Lake.

2021-2024: USFS conducts stakeholder engagement in parallel with engineering feasibility analysis of potential outflow options prior to beginning the NEPA compliance process. Based on the NASEM Report recommendations, the Spirit Lake, Toutle/Cowlitz River Collaborative was created as a system-level entity to lead a collaborative multi-agency, multi-jurisdictional effort with the goal of addressing sediment management and risks associated with catastrophic flood in the Spirit Lake and Toutle/Cowlitz River system. An image is shown of Mount St. Helens with clouds.

This is the end of the infographic.