

EVENT OVERVIEW

What happened? On Sunday evening, May 14, 2023, around 9 p.m. a saturated deposit of material from the 1980 volcanic eruption of Mount St. Helens gave rise to a gravity-driven debris flow that released thousands of tons of debris into South Coldwater Creek.

The debris flow, referred to as the South Coldwater Slide, caused significant damage to the upper portion of State Route (SR) 504 near milepost 49 leading up to the Johnston Ridge Observatory north of Mount St. Helens. The event followed a recent warming trend and significant snowmelt that had saturated the ground. The debris flow washed out the Spirit Lake Outlet Bridge, an 85-foot structure, damaged the roadway, and severed power to Johnston Ridge Observatory.

What happened (in technical terms)? Groundwater from recent snow melt saturated the subsurface, which consisted unconsolidated sand and gravel from the May 18, 1980 eruption of Mount St. Helens deposited on the floor of the upper South Coldwater Creek valley. The event likely began with a series of small slumps in very wet deposits that quickly mobilized into a debris flow. Events like this have occurred several times over the past 40 years along the upper North Fork Toutle River valley.

What caused the debris flow to occur? While the exact cause of the initial slumping has not been determined, the hot weather and associated rapid snow melt in the days leading up to the event are thought to be a contributing factor.

Landslides and debris flows can have multiple causes. Slope movement occurs when forces acting down-slope (mainly due to gravity) exceed the strength of the earth materials that compose the slope. Causes include factors that increase the effects of down-slope forces and factors that contribute to low or reduced material strength. Landslides can be initiated in slopes already on the verge of movement by rainfall, snowmelt, changes in water level, stream erosion, changes in ground water, earthquakes, volcanic activity, disturbance by human activities, or any combination of these factors if they are sufficiently wet, they can transform rapidly into debris flows *Source:*

<https://www.usgs.gov/faqs/what-landslide-and-what-causes-one>

Was the debris flow a result of seismic activity? No. USGS Cascades Volcano Observatory and Pacific Northwest Seismic Network scientists monitor Mount St. Helens on a continuous basis and indicate there was no significant seismic activity preceding the event that could have triggered the flow. The debris flow itself generated seismic waves that were recorded on seismometers nearest to the event.

What is a landslide and what causes one? A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Landslides are a type of "mass wasting," which denotes any down-slope movement of soil and rock under the direct influence of gravity. The term "landslide" encompasses five modes of slope movement: falls, topples, slides, spreads, and flows. These are further subdivided by the type of geologic material (bedrock, debris, or earth). Debris flows (commonly referred to as mudflows or mudslides) and rock falls are examples of common landslide types. *Source:* <https://www.usgs.gov/faqs/what-landslide-and-what-causes-one>

What is a debris flow? A debris flow is a fast-moving, water-saturated mixture of rock and soil that looks and behaves very much like flowing, wet concrete.

LOCATION

Where is the debris flow located? The debris flow occurred on the upper portion of SR 504 near milepost 49, leading up to the Johnston Ridge Observatory north of Mount St. Helens. It is located near the Spirit Lake Outflow Tunnel.

IMPACTS

What were the impacts of the debris flow on SR 504? The large debris flow had significant impacts on SR 504, covering the road with mud, rocks, trees, ice, and debris, and washing out the Spirit Lake Outlet Bridge, an 85-foot structure. This event also caused a severance of power and fiber optic lines as well as access leading up to Johnston Ridge Observatory. The highway itself also sustained damage, although the extent is still not fully known.

Was anyone injured because of the debris flow? Fortunately, no one was physically injured by the debris flow. However, twelve individuals and a dog, along with their vehicles, were trapped beyond the slide on SR 504 and forced to stay overnight at the Johnston Ridge Observatory. They were successfully rescued by helicopter the following morning.

RESPONSE

Who has responsibility for managing the response to the debris flow? The USDA Forest Service (the Forest Service) is responsible for managing the resources, facilities, and associated infrastructure within the Mount St. Helens National Volcanic Monument. Washington State Department of Transportation (WSDOT) has responsibility for managing access along SR 504.

What is the name of this incident? This incident is referred to as the South Coldwater Slide.

How are the Forest Service and WSDOT managing the incident? The Forest Service and WSDOT have been working collaboratively with other partner agencies to address the effects of the slide. Partners include US Army Corps of Engineers, US Geological Survey - Cascades Volcano Observatory, Cowlitz and Skamania County Sheriff's Offices and Departments of Emergency Management, and Mount St. Helens Institute. On Friday, May 19 a National Incident Management Organization (NIMO) incident management team was delegated authority by the Forest Service and WSDOT to coordinate incident response. Key partners continue to meet daily to address concerns brought about by the slide.

What is a NIMO team? The NIMO team is one of four permanent, year-round Forest Service Type 1 Incident Management Teams. Learn more about NIMO at <https://www.fs.usda.gov/main/nimo/home>

What is the role of the National Incident Management Organization (NIMO) team? The NIMO team coordinating incident response is utilizing risk-informed decision-making and attention to responder safety (ground and aerial) to develop and implement viable strategies for the incident.

When will SR 504 repair work begin? It is too soon to tell when crews may be able to safely begin repair work or when the highway may reopen. Partner agencies are working to gather and analyze information about the extent of the slide and the stability of the area.

Due to continued ground instability, initial assessments have been conducted by air and the data are currently being analyzed. This information will help inform when on-site access, cleanup, and repair work can begin.

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Partners will continue to work together long term to develop plans to rebuild SR 504 and restore power and fiber optic lines to Johnston Ridge Observatory.

LIDAR

What is LIDAR?

Light Detection and Ranging (LIDAR) is a technology used to create high-resolution models of ground elevation with a vertical accuracy of 10 centimeters (4 inches). Lidar equipment, which includes a laser scanner, a Global Positioning System (GPS), and an Inertial Navigation System (INS), is typically mounted on a small aircraft. The laser scanner transmits brief pulses of light to the ground surface. Those pulses are reflected or scattered back, and their travel time is used to calculate the distance between the laser scanner and the ground. Lidar data is initially collected as a “point cloud” of individual points reflected from everything on the surface, including structures and vegetation. To produce a “bare earth” Digital Elevation Model (DEM), structures and vegetation are stripped away. *Source: <https://www.usgs.gov/faqs/what-lidar-data-and-where-can-i-download-it>*

How is LIDAR imagery used? LIDAR imagery is used to develop a computer model of the ground surface. From the model, statistics about the source area and debris flow are derived (like volume of material) to help inform decisionmakers about what to do next.

WSDOT conducted a fixed wing aircraft LIDAR (Light Detection and Ranging) flight over the area on Friday, May 19 to gather preliminary data. WSDOT Engineering Geologists initiated a site reconnaissance of the slide area Monday, May 22 to collect ground data, which is used to cross reference with the LIDAR information. LIDAR data are received as a set of numbers that need to be processed, the images created from those numbers need to be interpreted so the details of the area can be compared to earlier data. WSDOT Engineering Geologists are processing the data the week of May 22 and beginning analysis the week of May 29.

STRANDED VEHICLES

How will the vehicles stranded at Johnston Ridge Observatory be addressed? This is a unique situation. The Forest Service is currently exploring potential options for moving vehicles. More information will be shared with the public as plans progress.

SAFETY

Is the area around the material that failed susceptible to more debris flows? It is possible that the unconsolidated debris may continue to slump along the edges of the initial area that failed, presenting a very localized hazard. Sediment will continue to be washed downstream.

What are the current impacts from the May 14 debris flow to downstream communities? Minor amounts of fine sediment will continue to be washed downstream, however, pose no direct threat to communities.

Is the Spirit Lake tunnel at risk of failing? The debris flow occurred near the Spirit Lake tunnel outflow portal. Although some debris-flow deposit ended up near the outlet, water is still flowing out of the outlet portal. The flow of water through the Spirit Lake tunnel is being closely monitored. Currently water is flowing through the tunnel at levels expected for this time of year. Additionally, lake levels are being monitored and are currently considered to be at acceptable levels.

ROAD CLOSURE

How far can I drive on SR 504? Travel along SR 504 remains open, with access to multiple scenic viewpoints up to milepost 43 near the Science and Learning Center at Coldwater.

Where is SR 504 closed? Upper SR 504/Spirit Lake Memorial Highway is closed between mileposts (MP) 43 and 51 until further notice.

Can I travel beyond the road closure by foot or bike? For safety reasons, WSDOT and federal agencies strongly advise people not to venture beyond the highway closure location by foot or by bicycle due to the instability of the hillside.

Why is the upper portion of SR 504 closed? The upper portion of SR 504 will remain closed until further notice. The closure is necessary to collect and analyze data about the active slide area, address visitor safety concerns, and repair the road. Decisions about the location of the road closure may change as plans to safely serve visitors are solidified and more information becomes available about the safety of the slide area. Road access to Johnston Ridge Observatory will not be available until repairs to SR 504 are made.

Why is there a 6-mile gap between the SR 504 closure and the slide location? The 6-mile gap between the SR 504 closure and the slide area is currently closed to the public. The Forest Service is working on a plan to safely accommodate an influx of visitors in the area.

When will SR 504 reopen? It is too soon to tell when the highway may reopen. Engineering geologists are assessing preliminary aerial data to help determine when ground access to the slide area can occur. The U.S. Forest Service and Washington State Department of Transportation are actively gathering and analyzing data to help inform next steps.

When will road repairs begin? Due to ongoing activity of the debris flow, WSDOT crews are not able to access the area from the ground. As a result, WSDOT crews are unable to remove debris, fully evaluate the damage, or proceed with repairs until the slide area is deemed safe and further assessments are complete.

RECREATION IMPACTS

Can I drive to Johnston Ridge Observatory? Currently Johnston Ridge Observatory is not accessible by vehicle. The debris flow blocked access to the observatory, located approximately two miles from the debris flow location at the terminus of SR 504. Road access to Johnston Ridge Observatory will only be available once repairs to SR 504 are completed.

Is Johnston Ridge Observatory open? Johnston Ridge Observatory is currently closed to the public due to damage to the road and lack of power due to the debris flow.

When will Johnston Ridge Observatory Open? It is unlikely that Johnston Ridge Observatory will open to the public this season because of road access issues. The debris flow washed out a bridge on SR 504, caused significant damage to the road, and severed power and fiber optic lines leading to the observatory.

Can I hike to the Johnston Ridge Observatory? While Johnston Ridge Observatory remains accessible via Boundary Trail #1, please note that access to the section of this trail leading to Johnston Ridge Observatory is limited due to the current forest closure. Those wishing to hike this

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trail will need to access it from the east from Forest Road 99. The eastern access is a longer route and is currently impeded by snow. Hikers are advised that no services are available at Johnston Ridge Observatory.

Which recreation sites are closed?

Closed under FOREST ORDER NO. 06-03-01-23-06 ([Closure Order](#) & [Map](#))

- Coldwater Lake Picnic and Boating Recreation Site
- Hummocks Trailhead Parking Lot
- South Coldwater Trailhead Parking Lot

Which trails are closed?

Closed under FOREST ORDER NO. 06-03-01-23-06 ([Closure Order](#) & [Map](#))

- Hummocks Trail #229, from Hummocks Trailhead to junction with Boundary Trail #1
- Boundary Trail #1 from the junction with the Hummocks Trail #229 to the Hummocks Trailhead
- Lakes Trail #211 from Trailhead to junction with Coldwater Trail #230
- South Coldwater Trail #230A from Trailhead to junction with Coldwater Trail #230

Why are the sites currently inaccessible or closed? Coldwater Lake Recreation Area, the Hummocks Trailhead, the South Coldwater Trailhead are currently inaccessible while the Forest Service works to provide safe and adequate services for the public in these areas. The Johnston Ridge Observatory is inaccessible due to the debris flow washing out the Spirit Lake Outlet Bridge, an 85-foot structure, and significantly damaging a portion of SR 504 near MP 49.

How long will these sites be closed? Coldwater Lake Picnic and Boating Recreation Site, the Hummocks Trailhead, the South Coldwater Trailhead remain closed until visitor safety concerns can be addressed. The reopening of the Johnston Ridge Observatory is dependent on the repair of the road near MP 49, restoration of power, and resolution of visitor safety issues.

RECREATION OPPORTUNITIES

What recreation opportunities are there on the north side of the monument? Travel along SR 504 remains open to MP 43 near the Science and Learning Center at Coldwater. Multiple scenic viewpoints, including Elk Rock (MP 37) and Castle Lake (MP 40) are still accessible. Several other visitor centers SR 504 remain open to the public, providing opportunities to view Mount St. Helens and learn about the history, eruption, and recovery of the volcano.

The Forest Service is exploring alternative options to accommodate visitors who wish to visit the north side of the Mount St. Helens National Volcanic Monument this summer. They are developing a plan to manage the influx of visitors in a safe manner.

Can I still recreate at the Mount St. Helens National Volcanic Monument? Yes, there are numerous recreational sites open to the public at the Mount St. Helens National Volcanic Monument. The area directly impacted by the debris flow affects only the last eight miles of SR 504 and some associated trailheads and recreation sites. As winter snow melts, sites located on the Monument's south and east sides will be fully accessible. SR 504 still offers several visitor center options

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(including the [Mount St. Helens Forest Learning Center](#) at MP 33 and [Washington State Park Mount St. Helens Visitor Center at Silver Lake](#), off SR 504, near Castle Rock). Additionally, there are numerous developed scenic viewpoints where visitors can learn about the history, eruption, and recovery of Mount St. Helens. As snow melts and Forest Service roads reopen for the season, additional sites on the Monument and in the surrounding communities will gradually open for visitors to explore.

Can I still get views of the volcano from SR 504? If so, where is the best place to view the volcano? Views of the volcano can be enjoyed by visiting Elk Rock (MP 37) and Castle Lake (MP 40) viewpoints and other sites along the SR 504 corridor. Once the snow melts in early summer, nice views of the volcano can be had on the Mount St. Helens National Volcanic Monument's northeast side along Forest Road 99 leading up to Windy Ridge. Forest Road 83 offers views of the south side of the volcano at the Lahar Viewpoint where a large glacier melted during the eruption on May 18, 1980, and created a mudflow that buried the existing forest at the time.

CURRENT INFORMATION

Gifford Pinchot National Forest Information

Website: <http://www.fs.usda.gov/goto/gp/coldwaterslide>

News and Alerts: <https://www.fs.usda.gov/alerts/giffordpinchot/alerts-notice/?aid=80265>

Sign up for news updates: <https://www.fs.usda.gov/detail/giffordpinchot/home/?cid=fseprd998833>

Facebook: <https://www.facebook.com/GiffordPinchot/>

Twitter: <https://twitter.com/gpnf>

Washington State Department of Transportation Information

Website: <https://wsdot.wa.gov/construction-planning/search-projects/sr-504-landslide-bridge-washout>

Sign up for email updates: <https://public.govdelivery.com/accounts/WADOT/subscriber/new>

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