

# An ominous mudslide on a depleted Mount Shasta

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Jonathan Dove was patrolling Mount Shasta on a clear, warm afternoon when a group of backpackers asked him if Mud Creek Canyon on the Northern California peak always flowed so heavily.

The U.S. Forest Service climbing ranger scrambled up a ridge to investigate. He peered into the canyon below and found a small creek flowing like a brown river. There was a loud roar, and then a wave of boulders, mud and [water](#) 4 feet high.

"It sounded like a freight train barreling down the canyon," he said, and at times "like a thunder rumble. In my 10 years as a ranger on Mount Shasta, I've never witnessed anything of this magnitude."

Government scientists say exceptionally hot, dry conditions and a lack of insulating snowpack primed Mount Shasta for the massive mudslide that rumbled down over the weekend after a pulse of water burst out from under an alpine glacier.

That a severe drought could cause flooding is the latest expression of a three-year dry spell that is afflicting California with increased wildfires, crop losses, water shortages and spikes in air pollution.

The U.S. Forest Service is still investigating exactly what caused the thick slurry of mud, boulders and debris to pour through Shasta-Trinity National Forest Saturday afternoon, damaging roads below. Their working theory is that water from melting ice pooled up underneath a

glacier along the mountain's southeastern side, then flushed out all at once into Mud Creek about 2:30 p.m.

When water from melting ice becomes trapped beneath a glacier, "it's almost like a cork in a bottle popping out suddenly," said Steve Bachmann, a hydrologist with U.S. Forest Service.

He has made several helicopter trips to search for clues to the mudslide's origin but has seen nothing unusual on the glacier's surface. "The release must have been very rapid based on the conditions we saw below," Bachmann said.

While debris flows can occur any time, he said, the heat and lack of precipitation have raised the odds considerably. With the drought, snow that usually acts to insulate Mount Shasta's glaciers has been heavily depleted.

"In a year like this, all the snow is gone and it's just the glacialized ice exposed to the sun day after day," Bachmann said.

Such dry-weather events, known as "outburst floods," are a common occurrence on Mount Shasta that happen whenever rapid melting causes water to pool behind glacier ice, said Jeffrey Mount, a retired University of California, Davis geologist who is now a senior fellow at the Public Policy Institute of California, a nonprofit think tank.

Glaciers respond slowly to temperature and precipitation changes, he said, so it takes a prolonged period of warming, dryness and low snowfall for such strains to build up.

"If you were going to get a rapid melting of a glacier, this is the year," Mount said. "To the uninitiated, it would not make much sense to have a mud slurry coming down when it isn't really raining, but it's consistent

with a pulse of very rapid melting associated with this unusually dry and warm year. That's when glaciers are really feeling the heat, rapidly melting and causing these mud flows."

The mudslide that began Saturday gathered vast amounts of sediment and debris as it moved swiftly downhill. It slid through the night before starting to recede Sunday morning, the Forest Service said. Because the slide ran through a remote area of Siskiyou County, there were no injuries or major damage reported.

U.S. Forest Service scientists say they believe the mudslide was triggered by water released from the Konwakiton Glacier, the fifth-largest of seven glaciers that sit high up on Mount Shasta, a 14,163-foot dormant volcano that towers over California's northernmost counties.

California has about 100 [glaciers](#), most of them high in the Sierra Nevada. But their retreat has been so dramatic in just the last 20 years that the number is falling, experts said.

Glaciers on Shasta have unleashed similar dry-weather deluges before.

In 1924, a mudflow triggered by glacial melt covered an area five miles long, a mile wide and 10 feet deep, threatening the nearby town of McCloud and generating front-page headlines in San Francisco for weeks. Outburst floods occurred in 1926 and 1931, relatively dry years.

Bachmann said a debris flow also occurred on Mount Shasta during California's [severe drought](#) of 1976-77.

The last major mudslide on Mount Shasta happened in 1997 when a storm laden with tropical moisture dumped heavy rain on its northern side.

Dove, the climbing ranger who reported the debris flow, has seen two previous incidents over the summer in which glacial meltwater triggered unusual flooding on Mount Shasta.

In July, he said, he got out of his truck to find that a creek, swollen with water from another glacier, had jumped its normal channel and sent silt across a logging road in the middle of the forest where he knew there was no creek before.

"All it really takes is a really dry, hot period of weather to destabilize conditions on the glacier," Bachmann said.

But a short snap of cold weather could have the opposite effect, he said, adding: "It could shut this whole process down, and we'd be OK again going into this next winter."

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