

# California needs more big storms to beat drought

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Despite the heavy storm that hit California last week – complete with flooded creeks and mudslides, closed highways and downed trees – it will take a lot more of the same to end the drought. In fact, experts say it may take five or six more storms like it to consider the drought over.

One reason is that, as wet as the storm seemed on Thursday and Friday, it was not so stormy everywhere. California's water supplies are largely reliant on mountain snowpack, and this was a warm "Pineapple Express" storm. The state's reservoirs had capacity to collect nearly all the rainfall runoff that flowed in. But the storm did not deliver a great deal of snow to the Sierra Nevada, which provides the snowmelt that California relies on in summer and fall.

The state needs a lot more storms – and cold ones – to assure there's enough snowmelt to meet water demand next summer.

"It would take five or six more storms to do that," said Alan Haynes, coordination hydrologist at the California-Nevada River Forecast Center, a branch of the National Weather Service in Sacramento. "But if we have a year like last year, and we only get one or two, it's not so good."

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Others are concerned the wet spell will cause Californians to slack off on water conservation. That trend already is occurring, according to data gathered by the State Water Resources Control Board. State residents reduced their water use 6.7 percent in October compared with the year before, the most recent month for which data are available. That compares to reductions of 11.6 percent in August and 10.3 percent in September.

"This was a big storm, but it will not have a big impact on the drought, except perhaps on people's conservation consciousness, which is a concern," said Tim Quinn, executive director of the Association of California Water Agencies, whose members serve 90 percent of the state's water providers. "I'm guessing they will overreact and lighten up on their conservation."

One critical measure of state water supply is snowpack in the northern Sierra-Cascade region. It is crucial because the region holds the state's two largest reservoirs – Shasta and Oroville – and it drains into the Sacramento River, the state's largest supply of freshwater runoff.

Those reservoirs captured a lot of runoff in the storm. But they were so low after three years of drought that it made little difference. Even after the storm, their water levels are well below historical averages.

Shasta increased from 26 percent full on Wednesday to 30 percent on Friday. Oroville increased from 29 percent before the storm to 31 percent on Friday. In the Sacramento metro area, Folsom Reservoir reached 36 percent of



capacity on Friday, up from 33 percent on Wednesday.

They will keep collecting water as runoff from the storm continues, but it won't be enough to fill the reservoirs.

"For this part of December, we're ahead for the season. So we're making up some ground there. Water is pouring into the reservoirs," Haynes said. "But at Shasta, it only refilled the reservoir back up to what it was in September. They still have lots and lots of space to fill."

The snowpack also remains in a deficit situation. Although some of the Sierra's high peaks got 3 feet of snow or more this week, lower elevations got relatively little, and it was merely the first significant snowstorm of the season.

On Friday, the northern Sierra snowpack stood at 35 percent of normal for the date, up from 23 percent on Wednesday. Statewide, the snowpack on Friday was 40 percent of normal for the date, compared to 28 percent Wednesday.

Maury Roos, chief hydrologist at the California Department of Water Resources, noted that one of the things that has made the drought so severe is that December 2013 went almost entirely without storms across the whole state. At least this year, he said, December is feeling more like normal.

"It's obviously a better year than last year – much better," Roos said. "We're getting storm systems that are breaking through in some fashion."

There have been bright spots, especially in some coastal communities that rely entirely on local water supplies. Some received substantial rainfall from recent storms, which has helped ease the hardship of drought.

In Santa Cruz, recent storms allowed the city to end what had been perhaps the strictest mandatory water rationing in the state and switch to voluntary rationing. The city relies on two sources of water: flows from local streams and springs, and water stored in a local reservoir, Loch Lomond.

The storms restored stream flows, allowing Santa Cruz to stop drawing water from the reservoir.

"Now, we're still a long, long way from being out of drought," said Eileen Cross, a spokeswoman for the Santa Cruz Water Department. "But it's done a lot for us to be able to leave our reservoir alone so it can recharge."

There is further sign of hope on the horizon. Additional storms are in the forecast for the week ahead. None is as big as Thursday's storm, but they are expected to be colder and may add to the mountain snowpack.

"I can't assure anyone at this point that we're going to have enough to say it's over," Roos said. "But I'm personally kind of optimistic."

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