

California needs more rain, any way you count it

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Dec 4,
2014

LOCALCALIFORNIA



Storm clouds linger in Newport Beach after two days of rain. Scientists differ on exact measurements, but agree that the state has a long way to go to get out of the drought. (Mark Boster / Los Angeles Times)

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Measuring California's drought recovery is a tricky business. And two key agencies do it in different ways.

So how many more storms like the ones California experienced this week would it take to end the drought?

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The easy answer is: a lot. But the more complex answer involves looking at historic rain patterns and reservoir levels in different parts of the state, and making a series of calculations.

The National Oceanic and Atmospheric Administration says 18 to 21 more inches of rain over six months would do the trick for most of the state.

Infographic

[How much precipitation do we need to end the drought?](#)

[Matt Stevens, Raoul Rañoa](#)

That's a tall order since the state's average rainfall for the year is about 23 inches. The latest storm dumped only about 1.5 inches in downtown L.A. but more than three inches in wetter parts of Northern California that feed the State Water Project.

Measuring drought recovery is a tricky business. And two key agencies — NOAA and the California Department of Water Resources — do it in significantly different ways.

Is it 21 inches or 75 inches?

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State water resources officials said this week that it would take 150% of the average rainfall for California to recover from the current drought. The DWR measures rainfall at eight stations in the northern Sierra because water from those areas feeds the State Water Project. The water project, in turn, delivers water to farmland in the Central Valley and urban Southern California through a vast network of reservoirs and canals.

An average of 50 inches of rain fell at those stations annually between 1922 and 1998. Using that average, officials said 75 inches of rain would need to fall in those Northern California spots by the end of the year to end the drought.

Since Oct. 1, only about 11 inches of rain has fallen at those eight stations.

Counting the drops across California

NOAA does its measurements by calculating rainfall across the state — both in areas where it rains a lot and places where it rains relatively little. Federal scientists say 18 to 21 inches of rain is needed to end the drought for all of Northern California and coastal Southern California. It would take only 6 to 9 inches of rain to end the drought in inland and desert sections of Southern California, which typically get less rain.

To determine the level of the drought, NOAA uses models that rely mostly on the moisture levels of soil.

The state has a different — and more strenuous — approach to determining when the drought is over.

State climatologists take into account how much rain would be necessary to bring reservoir storage and runoff back to normal levels. That means the state's bar for declaring victory requires more rain.

Are we there yet?

No. If there's one thing state and federal experts agree on, it is that California will need several more significant storms to even approach ending the drought.

"It takes a long time to get in a drought this severe, and it takes a long time to get out of a drought this severe," said Deke Arndt, a climatologist with NOAA's National Climatic Data Center. "Any precipitation is welcome, but ... it will take at least months of above-normal rain to reset things."

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