

## Earth Log: Those trillion-gallon stories on storms, drought last week were confusing

By Mark Grossi



Sandi and Barney Barnhill of Tulare walk down the main drag in Shaver Lake as snow falls from a passing autumn storm.

MARK CROSSE — Fresno Bee Staff Photo [Buy Photo](#)

I shared your confusion briefly last week. Readers called and emailed, wondering if the drought had ended after two separate news stories featuring the numbers 10 and 11 – each followed by 12 zeroes. We're talking trillions of gallons of water.

Sorry, that's already confusing. I'll straighten it out:

A meteorologist in Florida had estimated storms in early December had dropped 10 trillion gallons of water on California. News outlets from Los Angeles to San Francisco picked up the story.

A few days later, the folks at NASA announced California needs 11 trillion gallons of water to catch up after three years of drought.

People looked at the two numbers and raised a very natural question: Did that big storm wipe out most of the water deficit in California?

I knew the three-year drought deficit hadn't ended in a few December downpours, but I had no ready answer to the trillion-gallon question until I read the NASA statement a little closer.

NASA was talking about the lack of snowpack and the overdraft groundwater basins. The Florida meteorologist was

just talking about a precipitation estimate. There's no way to funnel all the rain directly into the underground, and the Sierra snowpack is still half the size it should be for this time in December. The storms didn't even make much of a dent in the drought deficit.

The groundwater is a big concern. It can take years for groundwater levels to come back after a drought as intense as this one. On some parts of the San Joaquin Valley's west side, the underground water table has dipped a couple of hundred feet.

The Florida meteorologist's estimate drew some flak from readers. Several challenged the 10 trillion-gallon rainfall estimate, making the case that it was overstated.

Reader David A. Goldhamer emailed:

"Got to disagree with your story on 10 trillion gallons. The problem is the assumption that 3-5 inches fell, on average, over the entire state. Most places received less than 1 inch; deserts received almost nothing. Bishop, representing eastern sierra, got 0.1 inch. Barstow, southern desert, got the same, 0.1 inches. San Jose, near where the most rain fell, got about 4 inches; same for Redding. Thus, assuming 3-5 inches fell, on average, over the entire state is ludicrous. Makes me wonder about the competence of those at NOAA you contacted."

A few NOAA meteorologists have told me the estimate is legitimate, but there's no way of knowing how close it is to the truth. You are right to be skeptical.

The NASA number is a different story. The measurement is done via satellite with precision, says scientist Jay Famiglietti of NASA's Jet Propulsion Laboratory in Pasadena.

"Space-borne and airborne measurements of Earth's changing shape, surface height and gravity field now allow us to measure and analyze key features of droughts better than ever before, including determining precisely when they begin and end and what their magnitude is at any moment in time," he said in NASA's media release.

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