Sierra snowpack bleakest in 500 years, scientists say

David Perlman, San Francisco Chronicle, 9-14-15

The abysmal winter snowpack in the High Sierra this year was the worst in the past 500 years, and the water content in what little snow remained was also at historic lows, researchers say.

In the fourth year of California's drought, the snow's water content was only 5 percent of its historical average over the same five-century period, the scientists report.

"Snowpack conditions in the Sierra Nevada mountains present an ominous sign of the severity of this drought," said Valerie Trouet, a tree-ring specialist at the University of Arizona and lead scientist on the study. "We were expecting that 2015 would be extreme, but nothing like this."

The melting Sierra snowpack is important to the state's water supply because it traditionally provides at least one-third of California's water each year through the state's network of reservoirs, and also replenishes the groundwater in its deep aquifers.

Trouet and her team of scientists examined the evidence of past snows and rainfall year after year as they are reflected in the varying widths of California tree rings over the centuries, using thousands of details kept in an international tree-ring data bank maintained in Boulder, Colo., by the National Oceanic and Atmospheric Administration.

Trouet's survey involved counting and measuring the annual rings in more than 1,500 blue oak trees acquired at varying levels in the Sierra and coastal ranges, some from core samples taken from living trees, and others that were measured across stumps left from trees killed in storms. During wet years, those rings, which indicate a tree's annual growth rate, are typically wider. In dry years, they are narrower.

The promise of a wet fall and winter appears to be increasing as forecasters see El Niño conditions strengthening across the Pacific with tropical ocean temperatures rising toward record highs, said Daniel Swain, a Stanford graduate student who maintains the highly regarded California Weather Blog.

No guarantee

But that promise is speculative, and it doesn't necessarily mean this winter's Sierra snowpack will be any better than last year's, said Swain, who is not a part of the study.

Swain, a member of Stanford's Climate and Earth System Dynamics Science Group whose scientists have tied the drought to the increased pace of global warming, noted that while the future impact on California of the strengthening El Niño conditions in the tropical Pacific are uncertain, the evidence that the Pacific Ocean's water temperatures are rising is clear.

"El Niño conditions tend to shift the odds away from a dry winter," Swain said. "And water temperatures should be higher than normal."

Rain, not snow

It means, he said, that while precipitation in the highest peaks of the Sierra this winter may fall as snow, at lower elevations, where most of the snowpack normally lies, the precipitation could be falling as rain.

Whatever happens with El Niño this year, Swain noted, even the wettest winter on record can’t make California recover from this historic drought. It could help refill the state’s reservoirs, he said, but a single wet winter can’t refill the state’s major underground aquifers like those beneath the Sacramento and San Joaquin valleys on which so much of California’s agriculture depends.