

What would a super El Niño mean for the American West?

The weather event follows Earth's two hottest years on record

BY GLORIA DICKIE

The last major El Niño to hit California was catastrophic: Throughout the winter of 1997 and 1998, rain, snow and powerful winds battered the state's interior, while towering waves hammered the coast. In the wake of the storms, mudslides lurched down slick mountainsides and floodwaters rampaged through homes. Clear Lake, in Northern California's Lake County, saw its highest water level since 1909, flooding portions of Lakeport, 90 miles north of San Francisco. That El Niño brought one of the wettest winters in state history, caused more than \$550 million in damages, and claimed 17 lives. This year's El Niño may very well follow in its footsteps.

"The 2015 El Niño has quickly built up its strength," says Jeff Lukas, a researcher with the Western Water Assessment arm of the Cooperative Institute for Research in Environmental Sciences. Overall, "this year looks like the third strongest since 1950."

An intermittent weather event that begins in the Pacific Ocean's warm equatorial waters, El Niño tends to skew weather patterns across the West whenever it hits. And even though this year's is predicted to be one of the most severe in the last century, each El Niño manifests differently, Lukas says.

The National Oceanic and Atmospheric Administration released its winter weather outlook in mid-October, providing a glimpse of what's to come. Southern California may see torrential rains, while the Pacific Northwest's drought could worsen, if warm and dry conditions persist there. The Southwest may see a wetter, cooler winter, and the Rocky Mountain region may see a bit of everything, depending on topography.

"California is on pins and needles," says Klaus Wolter, a scientist with NOAA's Earth System Research Laboratory. While above-average precipitation could help ease the four-year drought, the anticipated rainfall will likely only affect Southern California. But the state relies on the northern Sierra Nevada snowpack for more than 60 percent of its water supply. "There's the question of how they're

going to get most of their moisture," Wolter says. All the region really needs is one or two big precipitation events. "There is the potential this could make a positive difference," he says. "Except for the people who have to deal with mudslides."

Across the Golden State, projects are already underway to clear debris from basins and flood-control channels. But public works personnel haven't been able to adequately address some of the piles left after the devastating 2015 wildfire season. Steven Frasher, a spokesman for the Los Angeles County Public Works Department, says that while the county is preparing as best it can, some damage is inevitable. There's no stopping the rain, changing the area's steep mountains and deep canyons, or reversing fire destruction.

"In burned areas, the rainwater won't soak into the ground because the topsoil has been crystallized by the flames, and there's no vegetation left to hold the soil back," Frasher says.

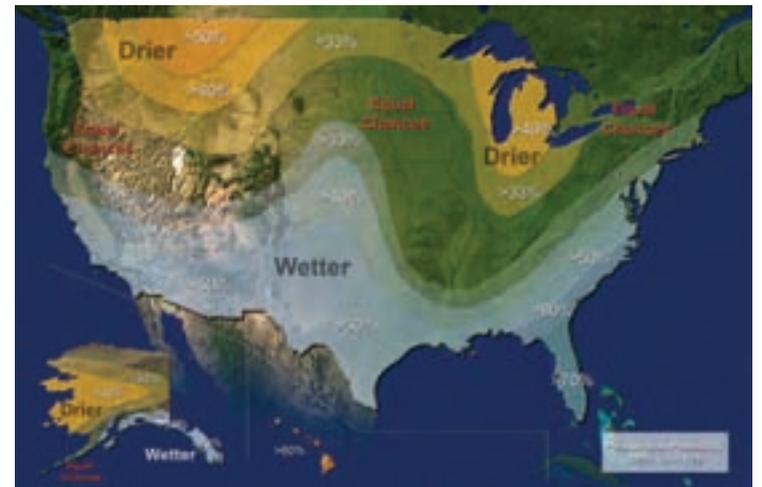
Emergency managers in the Southwest face similar challenges. Past El Niño events have brought nearly three feet more snow than average to areas like Flagstaff. On the Navajo Nation, people can become stranded when mucky roads become impassable during storms.

Meanwhile, in the Pacific Northwest, rivers are running dry, mountain snowpack is at a record low, and more than a million acres of forest have burned away. Here, El Niño could be devastating as well.

"It's not very good news at all," says Karin Bumbaco, the assistant Washington State climatologist. Going into the winter, the Pacific Northwest's reservoirs are already a little lower than normal, and less precipitation means states won't catch up in time for spring.

As a result, agencies are working to reduce water consumption and updating drought contingency plans. If there's less snowpack to cool and moisten the ground, the region's forests will be especially vulnerable to fire next summer. "Rain is nice," says Kathie Dello, deputy director of the Oregon Climate Service. "But ultimately what we really want is snow."

Then there's the matter of what role climate change will play.



The National Oceanic and Atmospheric Administration's 2015-'16 winter outlook for moisture, top, and temperatures, bottom. NOAA

"This El Niño is immersed in the warmest phase of our planet since (recordkeeping began) in the 19th century," Martin Hoerling, a NOAA meteorologist, says. "The last big El Niño was almost 20 years ago, and the planet has warmed a fair amount since then." Scientists have struggled to determine how climate change will influence El Niño; last year, a *Nature Climate Change* study found that global warming could double the frequency of "super El Niño" events, though the overall number was unlikely to increase.

The current hurricane season in the eastern Pacific is "classic El Niño," Wolter says, but powerful hurricanes like Patricia, which hit Mexico in late October, mean that storms can hold onto their intensity as they move north and east, bringing torrential rains into the American Southwest.

All of this, Wolter says, is simply part of the "flavor" of El Niño. And that's to say nothing of La Niña, El Niño's sister event, which can follow with equally wonky weather. At this point, climatologists can't predict what will happen late next year, but Wolter notes there's about a 50-50 chance we could see conditions flip, ushering in a whole new set of problems. □

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