

Arizona drought conditions could deepen

by [Shaun McKinnon](#) - Sept. 25, 2011 12:00 AM
The Arizona Republic

A dry winter and a weak monsoon fueled record wildfires, record heat and a succession of dust storms that played like a broken record, pushing Arizona deeper into a drought that has persisted since 1999.

Now, forecasters say La Niña, the ocean force responsible for the scant snowfall in Arizona's high country last year, has returned for an encore and could set the stage for even drier conditions next year.



Drought at San Carlos Lake I



Waterblogged

The latest weekly survey by the National Drought Mitigation Center in Lincoln, Neb., shows all of Arizona in some degree of drought, from abnormally dry conditions in the state's western third to pockets of extreme drought on the Navajo Reservation and extreme and exceptional drought in the southeastern corner of the state.

A winter forecast, meanwhile, by the Climate Prediction Center suggests little will change on the survey's drought map in the coming months. The odds favor drier, warmer weather over most of Arizona through December.

Dry conditions have forced some ranchers

decimated by more than a decade of poor range conditions. Brittle forests contributed to a record wildfire season this year that has charred more than 1 million acres and lingered into September. San Carlos Lake near Coolidge is nearly empty, leaving less water for farmers in Pinal and Gila counties.

In Phoenix, the immediate effects of the drought are less apparent. The lack of cooling rain pushed August temperatures to record levels and fed an unusual number of later-season dust storms. But water supplies remain unaffected, insulated by in-state reservoirs that filled in 2010 and runoff from above-average snowfall this year on the upper reaches of the Colorado River, raising water levels in reservoirs that provide water for most Valley cities.

As winter approaches, forecasters say the declining water temperatures in the Pacific Ocean could steer storms away from Arizona for a second year in a row, leaving below-average runoff next year. Such a "double dip" La Niña - a weathermaker that typically brings warmer, drier winters to the Southwest every three to six years - would raise new concerns about fire danger, rangeland health and water supplies for

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to continue reducing livestock herds already

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towns that rely on wells.

Many climate experts say Arizona never emerged from a drought that began in the late 1990s, even though depleted in-state reservoirs refilled during occasional wet winters. Now, some climatologists suggest there could be a link between this dry cycle and other extreme weather events.

"We're seeing drought from Arizona to Georgia, unprecedented drought, but the thing that's made it the worst ever in places like Texas, New Mexico and Oklahoma hasn't been the rainfall deficit," said Jonathan Overpeck, founding co-director of the University of Arizona's Institute for the Environment. "It's been the heat. We just haven't had the clouds or the rain to cool the heat."

Big contributor

Arizona gets most of its precipitation during two wet seasons. Winter, when snow accumulates in the mountains before melting into rivers and streams, is by far the most important contributor to water resources and range health. The summer monsoon can help refill aquifers and green up the rangelands until winter returns.

This year, both seasons underperformed. After an encouraging start, winter snow runoff was below average in Arizona's high country, muted by La Niña, and the monsoon has been spotty at best.

Now, another wintertime bust appears possible.

"It's bad enough when you lose two seasons, but we're looking to the winter and

we could be losing three wet seasons," said Michael Crimmins, who monitors drought and climate for the University of Arizona's Cooperative Extension. "That doesn't happen all that often in Arizona, so we're concerned."

La Niña is blamed for the lack of snow last winter. Cooler water temperatures in the Pacific Ocean influence weather patterns in North America, steering storms away from the southern tier of states. The most recent La Niña helped produce record droughts in New Mexico and, across a wider area, in Texas, where wildfires have burned more than 3.7 million acres this year.

Although La Niña conditions faded this spring, scientists found earlier this month that the phenomenon had begun to redevelop and would strengthen and continue through the winter, creating a rare climate double dip. La Niña has produced winters with above-average snowfall in Arizona, but drier seasons are more common.

The monsoon has proved troublesome for weather forecasters and climate experts because of its uneven behavior. Storms have

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it looks like there's going to be a La Niña, so

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skipped across the state with spotty results, in part because the high-pressure system that controls the direction of storms settled farther east than usual.

"It hasn't helped recharge the aquifers, and it hasn't helped the rangelands," said Nancy Selover, an Arizona State University geography professor and the state climatologist. "It makes the accumulation of moisture deficits worse. It's going to be a tough year if it gets drier."

Never really ended

The dry conditions have taken their steepest toll this year on ranchers and farmers who depend on rain or rain-fed creeks or aquifers. Many still feel the effects of the longer drought, which forced ranchers to sell livestock and, in some cases, produce fewer crops. For them, the drought never really ended.

Along the San Pedro River near Redington in Pima County, Stefanie Smallhouse helps run a ranch with her husband, Andy. Since the start of the current dry period a decade ago, they have reduced their cattle herds by about one-half as grass and other feed dried up on the range.

"We've been waiting out the drought for about 10 years now," she said. "You just don't know when it will break. You hope it doesn't break you."

Like many ranchers in Arizona, the Smallhouses graze cattle on grasslands that rely on rain and snowmelt. When the clouds dry up, so does the grass and the other vegetation the cattle eat. That means either selling off cattle or shipping some of the

feed is available.

"We don't know any ranchers in Arizona that haven't had to downsize their herds because of the drought," said Smallhouse, who hears from other agricultural producers in her role as a board member for the Arizona Farm Bureau. "It's a hard decision to decrease the herd, but if you don't have the feed, you have to do it."

Conditions are bleakest in the state's southeastern corner, where range conditions have declined steadily. The monsoon has left only spotty moisture, and it often arrives in short, intense bursts. That means more water runs off than sinks into the ground.

"When they get rain and then go two or three weeks without, that's not as good as getting consistent rainfall every few days," said UA's Crimmins. In some areas, rainfall totals have posted near-average numbers, but the land remains dry, the vegetation weakened.

Poor winter snowfall left forests tinder-dry by early summer, setting the stage for the state's worst wildfire on record, the Wallow

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herd elsewhere, often out of state, where

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Fire in eastern Arizona, and the worst overall year for fires. Lightning-caused fires continued to smolder into September, and the toll on the landscape is nearing 1.1 million acres burned.

Water supply at risk

So far, the effects of the resurgent drought are most obvious on the rangelands and in the forests, but another poor winter-runoff season could begin to draw down water supplies.

The situation at San Carlos Lake, an agricultural reservoir near Coolidge, is already dire. The lake has shrunk to its lowest level in more than 20 years and, with less than 4,000 acre-feet in storage, it is precariously close to the minimum level needed to avoid massive fish deaths.

Water deliveries were cut off earlier this month, forcing farmers to dip into wells or to try to buy water from other sources, such as the Central Arizona Project, which delivers Colorado River water.

The reservoir's original capacity was 1.2 million acre-feet, though it has rarely reached that level. An acre-foot is 325,851 gallons, enough to cover a football field with one foot of water.

As recently as the end of 2010, the reservoir held 109,000 acre-feet, Gila Water Commissioner Jon Allred said, but runoff from snowpack was light on the Gila and San Francisco rivers - two water sources for the reservoir - and the demand for water this year far outpaced what the rivers could deliver, draining what had been stored.

hardly any runoff at all this year, hardly anything down the Gila (River). What water has come down was down the Frisco."

Across the state last winter, sparse snowpack produced below-average runoff into creeks and rivers, with streamflow levels as low as one-third of the long-term average, according to the Natural Resources Conservation Service.

Runoff on the Salt and Verde rivers, two important water sources for metro Phoenix, was about one-third the long-term median based on more than a century of records. Runoff on the Salt was the 13th-driest on record, according to Salt River Project, which manages the two rivers and distributes water to cities and farmers.

SRP's reservoirs had filled in 2010 and remain at 69 percent capacity, which means they are working as designed, said Tim Skarupa, a senior hydrologist for SRP.

"The reservoirs help get us through," he said. "We plan for drought regardless of whether it's La Niña or any other phenomena. If we get another dry year, it's what we've planned for."

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"It's dropped a lot," he said. "We haven't had

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Hotter summer

In Phoenix, the dry conditions raised summer's misery level more than anything. Lack of rainfall here has little effect on water supplies, which are largely imported from other places, such as the Colorado River, though a dry summer can force homeowners to use more water to keep lawns and trees alive.

But a dry monsoon can make the summer hotter, and this year, it did. Just 0.17 of an inch of rain fell in August, and it was no coincidence that temperatures set a string of records, ASU's Selover said.

Summer rain often falls in the evening and overnight in Phoenix, she said, which drops nighttime temperatures. That, in turn, can temper daytime highs. With no rain at night, temperatures remained high and climbed higher when the sun rose.

Worse for many people were the dust storms, which continued to sweep across the Valley well into September. The big dust walls typically blow through during the early part of the monsoon, then stop once the rain seeps into the ground. This year, there wasn't enough rain.

"Without rain early on, there was nothing to hold the dust down," Selover said. "In August, we had a day or so of rain and 30 days of heat. The dust was just sitting there, waiting to be picked up every time a storm comes through."

So did the drought cause the dust storms? Did the heat worsen the drought? Are back-to-back La Niñas a sign of broader climate change? Scientists are studying those

"We're learning a lot more about what makes drought tick," said Randy Cerveny, a climate researcher and professor at ASU. "There's not a simple black-and-white answer to what influences it. Lots of things influence it. There are possibly changes going on in the overall climate."

Scientists in recent years coined the term "megadrought" to describe dry periods that could be measured in decades rather than years, and some say the Southwest could experience such a long drought if temperatures keep rising.

"Arizona is on the front end of climate change," UA's Overpeck said. "In no other part of the country outside of Alaska are we seeing it more clearly. It's going to get hotter, and we're going to get less moisture."

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