

Dry Winter Escalates Need for Wet Monsoon

By Zack Guido

Wilting crops. Dry irrigation channels. Rampant fires. These are the results of a drought that is only seen about once in every 50 years, but one that has gained a purchase in New Mexico since the beginning of the winter.

The landscape is so dry that a blown tire on a highway in the southeastern part of the state ignited a fire that ravaged rangelands. Southern Arizona is only slightly less parched, and impacts in both states likely will continue to mount as the historically hot and dry spring provides little relief. The onus is now squarely on the monsoon season to reverse drought expansion and intensification—but it is going to take a wet summer to substantially improve short-term drought conditions, experts say.

Dry Conditions Across the Southwest

Nearly all of Arizona and New Mexico are classified as at least abnormally dry. Abnormally dry conditions are considered precursors to drought and

happen about once in every three years. As dry conditions persist, a resource called the U.S. Drought Monitor relies on climate and landscape indicators like precipitation and streamflow and expert assessments to determine which areas fall within one of four progressively severe drought categories: moderate, severe, extreme, and exceptional drought (*Figure 1*). Impacts associated with these conditions range from lower crop yields for dry land crops to widespread water shortages in reservoirs, streams, and wells.

The Drought Monitor informs regional decision makers of current conditions and is part of an interactive system that highlights impacts and provides early warning about emerging and anticipated droughts. The Drought Monitor is not just descriptive; it enables ranchers to qualify for a one-time lump payment from the federal government to ease the economic burdens of drought

through programs like the Livestock Forage Program.

“The Livestock Forage Program provides a short-term sum of \$20 to \$60 per head of cattle, depending on the drought severity,” said Salomon Ramirez, state executive director for the Farm Service Agency in New Mexico. Currently, ranchers from across the region are taking advantage of this program.

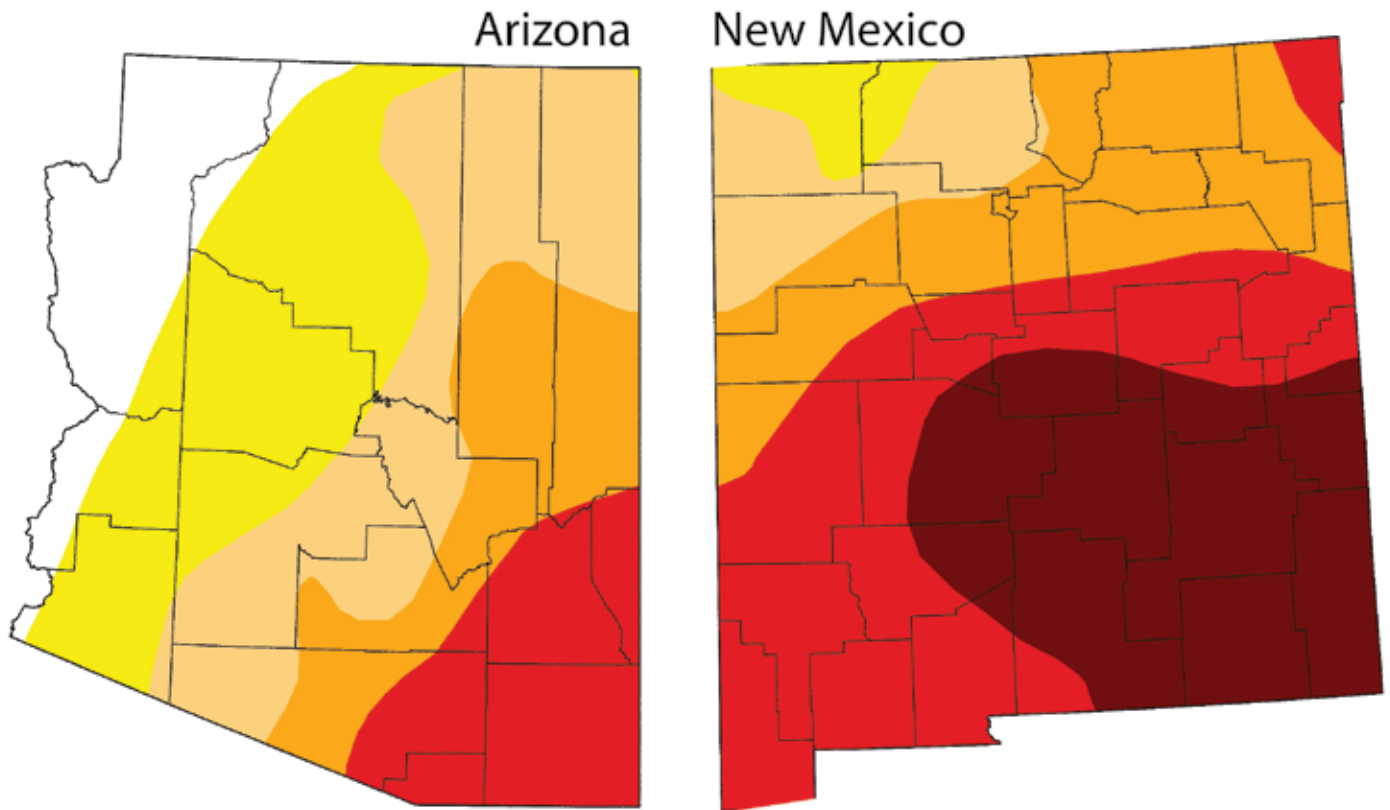
An average monsoon season in 2010 that followed on the heels of a wet winter had wiped short-term drought categories off the U.S. Drought Monitor maps. However, by May 17, about 16 and 33 percent of Arizona and New Mexico, respectively, was classified with extreme drought, while about 32 percent of New Mexico was pegged with exceptional drought (*Figure 2*). The dry winter began to take its toll in the spring.

“A lot of ranchers and farmers are saying this is the worst year in a long time,”

Category	Definition
Abnormally Dry (D0)	Abnormally dry conditions signal the possible onset of drought. Crops that are not irrigated may grow slowly under these conditions, and there is above-average risk for wildland fires. Abnormally dry conditions occur about every three years.
Moderate (D1)	Moderate drought conditions are characterized by some damage to crops and pastures, high risk of wildland fires, and generally low levels in streams and reservoirs that may cause water shortages and voluntary water restrictions. They occur about every five years.
Severe (D2)	Severe drought conditions cause some losses to crops and damage to pastures. Fire risk is very high and water shortages occur and restrictions are imposed. They occur about every 10 years.
Extreme (D3)	Extreme drought conditions cause significant losses in crops and damage to pastures, extreme risk of fire danger, and widespread water shortages and restrictions. They occur about every 20 years.
Exceptional (D4)	Exceptional drought conditions cause widespread losses to crops and pastures, exceptional risk of wildland fires, and exceptional water shortages in reservoirs, streams, and wells, producing water emergencies. They occur about every 50 years or more.

Figure 1. The U.S. Drought Monitor has four drought categories in addition to abnormally dry. Categories are defined by a combination of climate indices, including precipitation, expert assessments, and impacts, such as damage to crops and water scarcity.

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Drought Conditions in the Southwest on May 17 (Percent Area)

	None	D0–D4	D1–D4	D2–D4	D3–D4	D4
Arizona	13.83	86.17	58.25	31.54	15.59	0.00
New Mexico	0.00	100.00	96.66	87.36	64.59	31.67

Figure 2. Nearly all of Arizona and New Mexico fell into an abnormally dry or more severe drought category in the May 17 U.S. Drought Monitor.

Ramirez said. “I’ve been part of the Farm Service for 30 years and never have I heard as many drought impact reports.”

These include the decision by many farmers in the Rio Grande Valley to grow cotton instead of onions or other staples in the region because the Elephant Butte Irrigation District is only doling out about three inches of water per acre. It takes three feet of water per acre to grow onions, for example.

There is also concern that dry conditions will spark a vicious cycle.

“Drought can begin to feed itself,” said Mark Svoboda, climatologist for the National Drought Mitigation Center. “Without moisture in the soils,

vegetation growth is low, and when temperatures ramp up there is no moisture to evaporate and cool the environment. This can cause a persistent dome of high pressure that can spread north and intensify the drought.”

The Perfect Fire Storm

Drier and more widespread drought is not what firefighters are hoping for. Already, the 2011 fire season has been active, particularly in New Mexico. About 240,000 acres have burned each year in the state, on average, in the last 20 years. By May 18, fire had enveloped nearly 348,000 acres this year alone.

Arizona landscapes have not burned as frequently or extensively—fires had consumed about 57,000 acres by May 10,

or about one-third of the yearly average. However, these numbers are expected to grow. The National Interagency Fire Center forecasts above-normal significant fire potential in most of southern Arizona and New Mexico through mid-July. Significant fire potential is the likelihood that a wildland fire event will require additional fire management resources from outside the area in which the fire originated.

Parched conditions favor fire, but drought is not the only important variable. Recent research by Michael Crimmins, climate extension specialist at the University of Arizona, analyzed the regional weather patterns that corresponded to days deemed as having

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extreme fire-weather potential. When the climate has primed the region with sustained dry conditions, the perfect fire storm occurs on days with high winds, low moisture wafting in the atmosphere, and warm temperatures.

When winter is transitioning into summer, collisions often occur between storms moving in from the west and developing high pressure in the Southwest, producing strong winds, Crimmins said. These storms often bring little moisture and occur at a time when temperatures are on the rise. If dry conditions are present, the stage is set for high fire risk.

The risk of fire changes daily as a result of weather and longer-term fluctuations in climate. Sea surface temperature patterns in the tropical and north Pacific Ocean can act together to enhance the number of days with extreme fire danger.

During La Niña events and negative phases of the Pacific Decadal Oscillation (PDO)—a sea surface temperature pattern located in the north Pacific Ocean—there are more days with extreme fire potential, Crimmins said.

These patterns also enhance drought conditions.

“Negative PDO conditions and La Niña events favor drought as well as windier conditions, so it’s a double whammy for fire,” he said.

These conditions may help explain why fires in New Mexico already have burned 108,000 acres more than the 20-year historical yearly average.

“We had a strong La Niña event this winter,” Crimmins said. “The PDO is also hovering around in negative values, and current conditions are very similar to years in the past that had many days of extreme fire risk.”

Monsoon Outlook

With a drought that occurs about once in every 50 years in southeast New Mexico and extreme drought conditions in parts of Arizona, relief likely will not come until the monsoon season begins in earnest.

The most current outlook issued by the National Oceanic and Atmospheric Administration’s Climate Prediction Center (NOAA–CPC) for the July–September period is fuzzy. The CPC forecasts an equal chance that the monsoon season will be above-, below- or near-average. This forecast may change as the season approaches, but there is some reason to be optimistic that replenishing rains will come.

Looking back 100 years, dry winters in the Southwest are generally followed by wet monsoons, and vice versa. Researchers have hypothesized that low snowpacks in the winter allow the landscape to heat up sooner because the Sun’s energy does not have to melt as much snow. Warmer conditions increase the temperature difference between the hot landscape and the cooler ocean waters off the coast of Baja California, which in turn causes moisture to waft into the Southwest sooner and more routinely. By this reasoning, the Southwest monsoon may come earlier than average, or before the first week in July, and deliver much needed rains.

Other research also suggests that summer thunderstorms will be plentiful, at least in July. Research published in 2001 by Christopher Castro, assistant professor of atmospheric sciences at the University of Arizona, showed that monsoon seasons during a La Niña event and negative PDO phase—the current climate context—came early and delivered above-average rainfall in the first of the monsoon season.

These are not unwavering relationships. A dry winter has been followed by a dry summer, and there is no guarantee that a wet monsoon will be wet

enough to rid the region of short-term drought conditions.

“The Southwest needs a big precipitation event,” Svoboda said. “An average monsoon season, like the one last year, is not going to be good enough. We don’t want to see damage from tropical storms, but those are the events that will make a dent in the drought.”