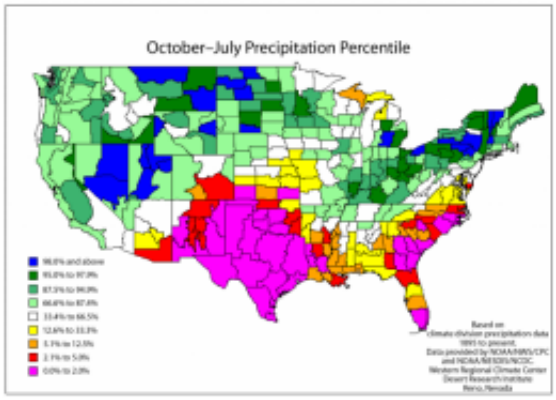
Evidence suggests La Nina will return this winter

August 24 2011, By Zack Guido and Mike Crimmins



Less than 2 percent of the October-July periods since 1895 have been drier than they are currently for all of Texas and many parts of New Mexico. These areas experienced either their driest or second driest October-July periods in the last 117 years. Less than 6 percent of the October-July periods have been drier than current conditions in southeastern Arizona. Credit: Western Regional Climate Center

(PhysOrg.com) -- A return of La Nina, which historically delivers dry conditions, is increasingly likely.

Blame it on La Niña.

Pushing the jet stream and the storms it carried north of the region, La Niña played a starring role in a record-dry winter in the Southwest this past year.

The lack of rain and snow led to extensive fires in Arizona and New Mexico, skimpy irrigation allotments and withered vegetation in the spring. Now mounting evidence suggests that after a brief summer hiatus La Niña may be back.

This would not be welcome news for most of the Southwest, and especially those areas mired in extreme and exceptional drought, particularly since the second year in back-to-back La Niña eventsis often drier than the first.

During the 20 winters since 1950 in which La Niña was present, precipitation has been, on average, below-average across the region. Last winter upheld this dry pattern, as a moderate to strong La Niña event developed in June 2010 and dissipated in April.

At the onset of winter, in the beginning of November, only about 3 percent of Arizona was classified with moderate drought conditions; New Mexico was drought-free. By the beginning of the 2011 monsoon season in mid-June, however, 56 and 99 percent of Arizona and New Mexico, respectively, were in the grips of moderate, if not more severe, drought.

Drought also intensified in nearly every region. By mid-June, nearly 6 and 45 percent of Arizona and New Mexico, respectively, were pegged with the most severe drought category – exceptional drought, which occurs once in every 50 years; about another 13 and 23 percent were classified with extreme drought, which occurs once in every 20 years.

With the region desiccated in the lead-up to the summer rains, climatologists at the University of Arizona and National Drought Mitigation Center at the University of Nebraska stated that an average monsoon season would be insufficient to significantly improve drought conditions.

The region needed constant and copious moisture. In most of New Mexico and all of Texas, the October-July period was either the first or second driest in the last 117 years, while southeast Arizona ranked in the top six.

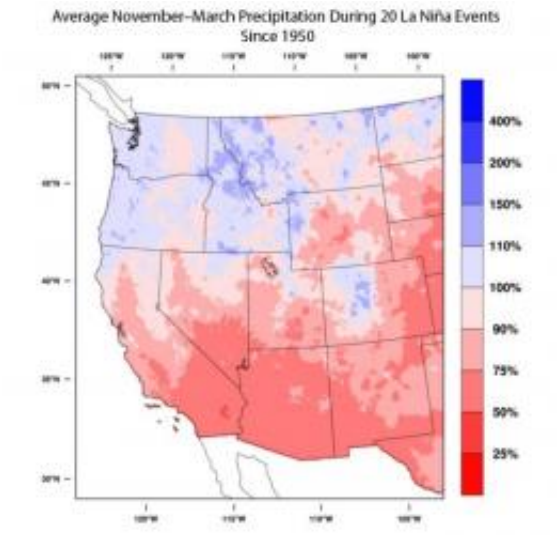
To date, however, the thunderous storms have been inconsistent and spottier than usual, and most of the region continues to accumulate rainfall deficits. It is unlikely that summer rains will provide widespread drought relief this late in the season.

The NOAA-Climate Prediction Center, or CPC, assigns less than a 3 percent chance that moisture in the upcoming four months will be sufficient to erase drought conditions in southern Arizona and New Mexico where drought conditions are most severe.

This doesn't bode well for the region.

"The bigger the droughts are, the longer they last," said Klaus Wolter, research scientist at the Climate Diagnostics Center at the University of Colorado. "I think when you have a big drought it can perpetuate itself."

Another La Niña would only exacerbate the situation.



Average November-March precipitation during the 20 winters since 1950 in which a La Niña event was present. Map is from WestMap and utilizes PRISM (Parameter-elevation Regressions on Independent Slopes Model) data

In July, the CPC issued a La Niña Watch, indicating favorable conditions for the development of another La Niña event in the next six months. With colder-than-average waters once again upwelling in the tropical Pacific Ocean, La Niña appears to be re-forming.

"Temperatures below the sea surface have decreased quite markedly in the last few months," said David Unger, meteorologist at the CPC.

In addition, he said, the Climate Forecast System model – a state-of-the-art climate model that integrates interactions between the Earth's oceans, land, and atmosphere – has been impressive in its prediction capabilities in the last few years and has been increasingly more confident in the development of a La Niña this winter.

"It's close to even odds right now that La Niña or neutral conditions will develop," Unger said. "It's pretty trivial chances that El Niño will form."

The International Research Institute for Climate and Society, or IRI, also indicates increasing odds for a return of La Niña. Basted on statistical and dynamicla models and conditions that developed in the last week, there is a 43 percent chance that La Niña will develop during the October-December period, an increase from 25 percent assigned last month to this period.

Historically speaking, back-to-back La Niña events are not surprising. The climate system tends to have a more difficult time shedding a moderate or strong La Niña event than a weaker one. An intense La Niña tends to persist for multiple years; one even lasted for 34 consecutive months between 1954 and 1957.

A La Niña event may return the following fall season even if it weakened or disappeared during the summer, as was the case this summer, Wolter said.

His insight, detailed in his experimental forecast discussion, lies in looking at past La Niña events that, like last winter's event, had rapid onsets and were associated with very cold sea surface temperatures anomalies. Dynamical and statistical climate models are now starting to agree with Wolter, but he thinks this event will be less intense than last winter's.

"My expectation is that this winter's (La Niña) will be weaker," Wolter said. "Last winter was the third strongest event, and it will be hard to beat that; it's an opinion based purely on statistics."

A weaker event doesn't necessarily bring wetter conditions than a stronger event, however. Wolter recreated the MEI back to 1870 and found that for the 10 historical cases in which La Niña lasted at least two consecutive years, eight generated lower flows in the Colorado River Basin in the second year.

Lower flows are very likely to happen this year because record snows packed the Upper Colorado River Basin last winter.

Last winter "was the first time since 1917 that the Colorado River had a big runoff year-with more than 20 million acre-feet-in a La Niña event," Wolter said.

La Niña's re-emergence isn't a done deal, however. Forecast models are still mixed despite a growing number suggesting a double-dip, and forecasters are waiting for additional data before increasing the odds of a return to La Niña.

"I'll continue to look at the subsurface temperatures, which are a leading indicator of La Niña events, and I'll keep an eye on the models," Unger said. "In my experience, the best indicator is coherence in models."

In the next few months, forecasters should have a better idea of the final call: La Niña or neutral conditions. Regardless of which wins out, eastern New Mexico likely will experience a dry winter. Neutral events in this area, along with West Texas, often bring slightly drier conditions, Unger said.

For the rest of the region, southwesterners are crossing their fingers for a neutral event. In the past these events have brought either a wet or a dry winter.

"You don't have to have a severe dry period to make an existing drought worse," Wolter said. "I'm concerned about an increased probability of this winter being drier than average."

Provided by University of Arizona