January 23, 2013

Southwest Climate Outlook

Vol. 12 Issue 1

Several winter storms have already battered Southern Arizona's Sky Islands in snow and rim-ice. The steep elevation gradient on Mt. Wrightson contrasts the alpine winter conditions against a backdrop of rain-soaked Sonoran desert. Photo taken on December 16, 2012. Image courtesy of Zack Guido

Would you like to have your favorite photograph featured on the cover of the Southwest Climate Outlook? For consideration send a photo representing Southwest climate and a detailed caption to: zguido@email.arizona.edu

In this issue...

January Climate Summary

Drought: Nearly all of Arizona and New Mexico are experiencing moderate drought or a more severe drought category.

Temperature: Most regions in Arizona and New Mexico experienced temperatures 4 to 8 degrees F below average in the last 30 days as a result of incursions of cold Arctic air.

Precipitation: Most of Arizona and New Mexico experienced less than 50 percent of average precipitation between mid-December and mid-January.

ENSO: Sea surface temperatures are expected to remain characteristic of ENSO-neutral conditions into the spring.

Climate Forecasts: February–April forecasts call for above-average temperatures and below-average precipitation.

The Bottom Line: The winter has been dry thus far. Precipitation across Arizona and New Mexico has generally measured less than 50 percent of average in the last 30 days and since the water year began on October 1. The water contained in snowpacks, or snow-water equivalent (SWE), is also below average across the Southwest, most notably in the upper Rio Grande headwaters and Upper Colorado River Basin where SWE is mostly less than 70 percent of average. Consequently, drought is still widespread and intense in the Southwest. Moderate drought or a more severe drought category covers nearly all of Arizona and New Mexico, with about 9 and 32 percent of Arizona and New Mexico, respectively, experiencing extreme drought. These conditions are not expected to change in coming months, according to the seasonal drought forecast. They may also deteriorate. There is some indication that the February–March period will deliver below-average rain and snow. This in part reflects the historical tendency for the West to experience below-average precipitation when ENSO-neutral conditions occur during the negative phase of the Pacific Decadal Oscillation, which is the current situation. ENSO-neutral conditions also leave room for more variable weather for the western U.S., which makes seasonal forecasting for Arizona and New Mexico more difficult. Nonetheless, if another dry winter does emerge, water stored in many of the region's reservoirs will continue to decline, posing serious water supply challenges for those reservoirs teetering on the brink of emptiness. This includes San Carlos reservoir in Arizona, currently less than 1 percent full, and Elephant Butte Reservoir in New Mexico, which is currently only 7 percent full and provides irrigation water to New Mexico's most productive agricultural region.

Adapting to Expected Colorado River Shortfalls

A new, two-year study by the U.S. Bureau of Reclamation quantifies expected shortfalls caused by over-allocated Colorado River water and assesses how to mitigate and adapt to these deficits.

Results of the study include a 9 percent decrease in streamflow measured at Lees Ferry over the next 50 years, taking into account climate changes. This decline is accompanied by increases in water demand, which is projected to range between 18.1 and 20.4 million acre-feet (maf) by 2060; consumptive use in the last 10 years has averaged 15.3 maf. The net result is that the Colorado River may experience an annual deficit of about 3.2 maf by 2060.

The ways in which the region adapts to and minimizes the deficit will be critical, and the study assessed more than 150 proposals to resolve the imbalance. These strategies included increasing water supply with reuse and desalinization and reducing demand through conservation and efficiency improvements. While the confluence of population growth and climate change in an arid region inevitably challenges water management, the report highlights that diligent planning and diverse strategies can reduce vulnerability to shortages while meeting increasing water demands.

To read more about the report, visit: http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/index.html

This work is published by the Climate Assessment for the Southwest (CLIMAS) project, the University of Arizona Cooperative Extension, and the Arizona State Climate Office.

Table of Contents:

SWCO Staff:

Increased health woes among climate change impacts

By Melanie Lenart

This article is the first in a two-part series considering the findings of a new climate assessment for the Southwest. This part explores health issues and vulnerable populations, with an emphasis on tribes.

A correction was made to the article on Jan. 24

An increase in respiratory problems from raging wildfires and dust, more heat-related deaths in an aging population, and shifts in the range of diseases—these are some of the human health-related impacts the Southwest region will face as a result of climate change. The effects, detailed in an upcoming report focused on six western states including Arizona and New Mexico, go far beyond the well-known challenge to regional water supplies.

The report, Assessment of Climate Change in the Southwest United States, is part of an ongoing national effort to synthesize the state-of-the-art science of climate-related change and its impacts. The full Southwest assessment will be posted in coming weeks, but the summary for decision makers is currently available (*see links below*). In the meantime, the Southwest chapter of the National Climate Assessment —which was informed by an earlier draft of the Southwest report—is available for viewing and public comment (*see related story on p. 4*)*.

More heat-related woes

Arizona tops the list of states contributing to the 400 heat-related deaths that already occur across the nation in an average year, and that number is expected to rise as temperature does, noted Heidi Brown, lead author of the regional assessment's health chapter. For the six states in the region—Arizona, New Mexico, Colorado, Utah, Nevada and California—the Southwest's average annual temperature is projected to climb by an average of 2°F to 6°F by mid-century. What's more, the biggest increases are expected to occur in summer (*Figure 1*).

"As we look to the future, heat waves are expected to become more humid, with higher overnight temperatures," Brown explained in one of several webinars about the report findings. Higher humidity translates into less opportunity for nighttime cooling.

Vulnerable populations

People living without air conditioning in inner city neighborhoods are more vulnerable to heat-related illnesses than people in climate-controlled homes surrounded by shade trees. At the same time, as the draft Southwest chapter points out, the 92.7 percent of the region's people who live in cities can expect to lose their cooling power

continued on page 4

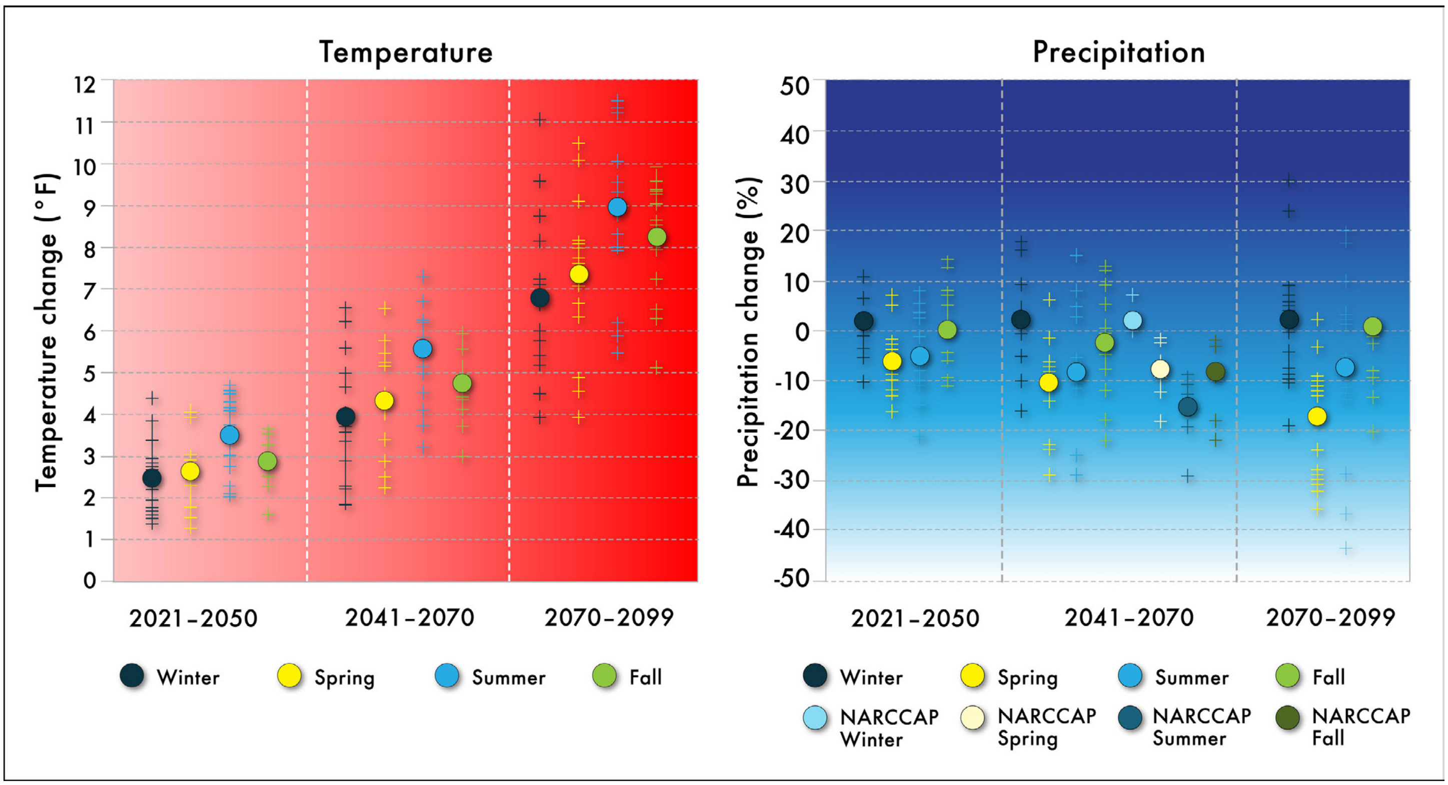


Figure 1. Projected changes in average seasonal temperatures (left, in degrees Fahrenheit) and precipitation (right, in percent) for the scenario involving high emissions of greenhouse gases. The change is relative to the 1971—2000 time frame. Colored dots represent an average from 15 climate models, while the plus signs represent the individual models. The NARCCAP results show the average from four models dynamically downscaled to the region. Seasons are: winter, December-February; spring, March-May; summer, June-August; and fall, September-November. This figure is from the Summary for Decision Makers version of the Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment, which was posted online in June 2012.

Increased health woes, continued

from time to time, as all that electricity draw for AC can "trigger cascading energy system failures, resulting in blackouts or brownouts."

The general lack of air-conditioning, among many other reasons, makes the nearly 1 million people belonging to the 182 tribes in the six southwestern states among the more vulnerable of the region's residents to changing climate.

For instance, about 40 percent of Navajo Nation residents lack electricity and plumbing, said Margaret Hiza Redsteer, lead author of the regional assessment chapter on tribes. So they don't even have the option of cooling off with a cold drink or refreshing shower, much less with air-conditioning.

"We have conducted surveys of tribal elders on the Navajo Nation," said Redsteer, a hydrologist with U.S. Geological Survey. She learned that, in the past decade, "they have had a few elderly people die during the really hot months."

Age also influences susceptibility to heat, Brown said. She noted that some of the chapter's projected rise in heat-related deaths relates to the aging population, as more Baby Boomers reach their mid-60s—the age when vulnerability generally increases. Children under 4 years old also face higher risks. That doesn't mean, though, that older children and young adults have no worries.

"We see these things across the board, not just in the elderly," Brown said. Young, seemingly healthy athletes can also fall ill or worse to heat, she noted.

More wildfires, more pollution

The health effects of wildfires are a growing concern given the recent ramping up of large fires, noted Gregg Garfin, lead editor of the regional assessment. As reported in its chapter on natural resources, efforts to suppress wildfires have been failing more often in recent years in the six southwestern states. Researchers found that more than three times greater area burned from 1987 to 2003 (excluding prescribed burns) compared to the period 1970 -1986.

Future precipitation remains challenging to predict, but the report's detailed evaluations of climate models (*Figure 1*) found they generally agree on a likely precipitation decline during the spring season—right when diminishing snowpack in much of the Southwest is setting the stage for wildfires. Between existing forest conditions and projected climatic changes, researchers expect the number of acres burned to continue to increase—perhaps doubling in the southern Rockies.

The threat from these wildfires goes far beyond forest boundaries, as the smoke contains particles of a size that aggravates lungs. Garfin recalled witnessing the extent of the polluting haze from two record-breaking fires that burned simultaneously in the summer of 2011: a 156,000-acre fire in New Mexico's Jemez Mountains, and a 538,000-acre fire in Arizona's White Mountains.

"I remember I flew to Denver. It was a clear day, aside from that smoke. No clouds. And when you arrived in Denver," Garfin said, "you couldn't see the Rocky Mountains, there was so much smoke from those fires."

Dust also harms lungs

Along with lung-damaging smoke from wildfires, particles from dust storms are expected to taint southwestern air more often. As temperatures and evaporation rates rise, soils are projected to lose moisture overall, making soil particles more prone to becoming airborne dust. Soil disturbance, such as by farming or construction activity, also helps kick up dust.

Add a bit of wind to the mix, and driving conditions can lead to fatal accidents, as has been the case on numerous occasions in recent years on Interstate-10 between Tucson and Phoenix. Dust also darkens snow, making it less reflective and so quicker to melt, thus exacerbating droughts. Some researchers have likened conditions in the future Southwest to those of the 1930s Dust Bowl.

The Navajo Nation is already experiencing the impacts of excess dust caused by aridity.

continued on page 5

The National Climate Assessment: climate science in the decision-making context

The National Climate Assessment, which was released for public review on January 14, notes that the nation can expect more heat stress, wildfires, floods and electrical brownouts as temperatures climb a projected 2 to 4 degrees Fahrenheit in most regions within the next few decades. The National Climate Assessment receives input from regional assessments, like the one in the Southwest chronicled above.

As in the Southwest, the extra heat and wildfires are expected to take a toll on the health of Americans throughout the country. Nationally, these and other stressors relating to climate change are expected to lead to more than 1,000 premature deaths a year for every 2-degree temperature rise, if no actions are taken to adapt or reduce vulnerabilities to them.

Like the national and regional assessments, the national assessment includes background chapters devoted to the underlying science as well as the likely impacts of climate change on a variety of sectors. These include energy, transportation, natural resources, water, agriculture, tribes, urban areas and, of course, human health. While the national report has more than 240 authors, thousands of people contributed to the underlying documents produced for it, noted Katharine Jacobs, director of the National Climate Assessment.

continued on page 5

Increased health woes, continued

The reservation, located in northern Arizona, already was on the driest third of the tribe's traditional homeland, Redsteer said—and it's gotten drier since the 1950s.

Residents on the Navajo and neighboring Hopi reservations are finding it increasingly challenging to continue their ancient traditions of growing corn, and to support the sheep and cattle that have allowed them to be self-sufficient in more recent times. Formerly stable sand dunes have been mobilizing and, in some cases, creeping up to people's doorsteps, Redsteer explained. The shifting sands and drought are chasing young families off the Navajo reservation, as documented by the last census, she said. Meanwhile, the abundance of airborne dust has been prompting health warnings.

"During the Dust Bowl, when the conditions got severe, a lot of people died because of the particulate concentration of dust in their lungs. They would get pneumonia," Redsteer said. "There's no way of tracking those kinds of things on the reservation, but I do know that the Indian Health Service in Chinle has been very concerned about the dust level on windy days."

Climate and disease

Besides being unhealthy overall, dust particles can transport the fungus that causes Valley Fever, a lung infection that can be debilitating.

Shifts in diseases are challenging to predict but likely to occur. Even the bubonic plague might alter its range, according to the regional assessment's health chapter. Physicians reported about 40 cases of plague in the U.S. between 2005 and 2009—almost all in the six states covered by the regional assessment. The good news is the flea-carried bacteria Yersinia pestis, which killed off roughly a third of the population of Europe during Black Death epidemics, stops in its tracks once temperatures rise above 80 degrees, Brown said.

Unfortunately, the same cannot be said for West Nile virus. The mosquitoes that carry it generally can develop faster and survive longer as temperatures warm. As the report states, mosquitoes are likely to expand geographically, such as into the foothills of the Rocky Mountains, and in time, with longer seasons for potential outbreaks. Predicting overall incidence, though, remains challenging.

"Mosquitoes aren't flying syringes," Brown said. It takes time for the virus to build up enough to be passed along. West Nile virus tends to incubate in birds as well, so four different life forms – virus, mosquito, bird and human, all with their own responses to climate—can be involved in its spread.

Behavior and health

Individual behavior can also affect a person's likelihood of having health trouble as climate shifts. For instance, a study of health problems during the 2003 wildfires in southern California found asthmatic children actually suffered fewer respiratory problems than non-asthmatic children. The researchers found that the kids with asthma generally heeded the health warnings and wore masks or stayed inside, limiting their exposure to the smoke pollution.

People can limit their exposure to mosquitoes, to some extent, which can affect their chances of contracting West Nile disease and other mosquito-borne illnesses. And, as Brown pointed out, an improvement in personal hygiene and public sanitation since the Dark Ages has so far helped keep the plague in check.

"I think it's because we've changed the way we live," Brown said, when asked why the Black Death was no longer reaching epidemic proportions. Tongue-in-cheek, she added, "How many fleas do you have on you right now?"

Additional Information

View the Southwest Climate Assessment's Summary for Decision Makers: http://www.southwestclimatealliance.org/announcements/southwest-climate-assessment-summary-decision-makers-now-available

View summary webinars that cover six topics, including climate projects and energy impacts: http://www.southwestclimatealliance.org/media

Part Two of this series will be published in the February issue. It will consider some of the report's suggestions for adapting to climate change in the context of its impacts.

The National Climate Assessment, continued

"Clearly this is a major contribution to understanding what actually is changing both in the physical climate and in terms of impacts," Jacobs explained. "One of the most important aspects of this assessment is that people working on adaptation planning have an opportunity to understand what the future might look like."

"A scientific assessment is a critical evaluation of information for the purposes of informing decisions on a complex issue," explained Gregg Garfin, one of two lead convening authors on the Southwest chapter in the national assessment, and lead editor of the Southwest assessment. "So, again, the idea is to be relevant to policy without any policy prescription."

The report will be the first major government document delivered as an "e-book," according to Jacobs, who added that the electronic format will help make the roughly 1,000-page document more useful to decision-makers. Comments will be accepted online until April 12.

You can view the National Climate Assessment report, including the Southwest chapter and a forum for public comments at: http://ncadac.globalchange.gov/

Temperature (through 1/16/13)

Data Source: High Plains Regional Climate Center

Since the Water Year began on October 1, temperatures have generally ranged between 55 and 65 degrees Fahrenheit for the southwestern deserts of Arizona, 35–45 degrees F on the Colorado Plateau of northern Arizona and New Mexico, and 45–55 degrees F in southern New Mexico (*Figure 1a*). The coldest regions have been in north-central New Mexico's Sangre de Cristo Mountains where temperatures have dipped to as much as 4 degrees F below average. Elsewhere in Arizona and New Mexico, temperatures have been within 2 degrees F of average (*Figure 1b*). Near-average conditions seem surprising given that October through mid-December 2012 was an extremely warm period. However, in recent weeks, temperatures have nosedived. Starting in mid-December, a series of cold low-pressure systems moved through the western U.S., with several bringing cold air to the Southwest. Most notably, in the second week of January a looping jet stream delivered Arctic air to the Southwest, and freeze warnings were issued by the National Weather Service for four mornings in a row in the Phoenix area and other regions across the Southwest. This was the longest cold snap since December 1978. Record low daytime and nighttime temperatures were recorded in the southwestern deserts. As a result, temperatures over most areas of both states during this four-day period beginning on January 11 were 4 to 12 degrees F below average, with only southeastern New Mexico escaping the bitter cold at a mere 0 to 4 degrees colder than average (*Figures 1c–d*).

Notes:

The water year begins on October 1 and ends on September 30 of the following year. As of October 1, 2012, we are in the 2013 water year. Water year is more commonly used in association with precipitation; water year temperature can be used to measure the temperatures associated with the hydrological activity during the water year.

Average refers to the arithmetic mean of annual data from 1971–2000. Departure from average temperature is calculated by subtracting current data from the average. The result can be positive or negative.

The continuous color maps (Figures 1a, 1b, 1c) are derived by taking measurements at individual meteorological stations and mathematically interpolating (estimating) values between known data points. The dots in Figure 1d show data values for individual stations. Interpolation procedures can cause aberrant values in data-sparse regions.

These are experimental products from the High Plains Regional Climate Center.

On the Web:

For these and other temperature maps, visit
http://www.hprcc.unl.edu/maps/current/

For information on temperature and precipitation trends, visit
http://www.cpc.ncep.noaa.gov/trndtext.shtml

Figure 1a. Water year 2013 (October 1 through January 16) average temperature.

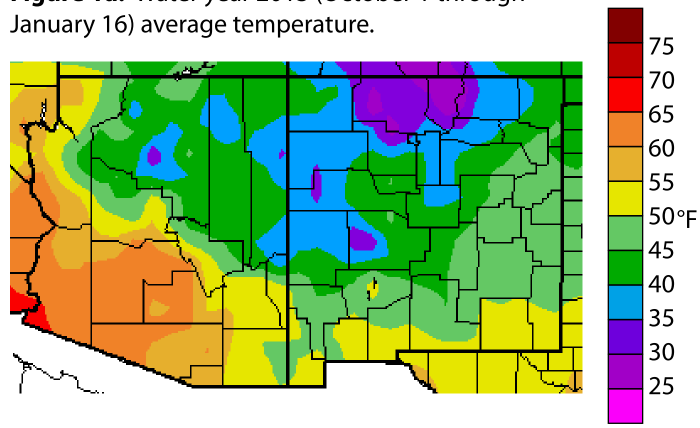


Figure 1b. Water year 2013 (October 1 through January 16) departure from average temperature.

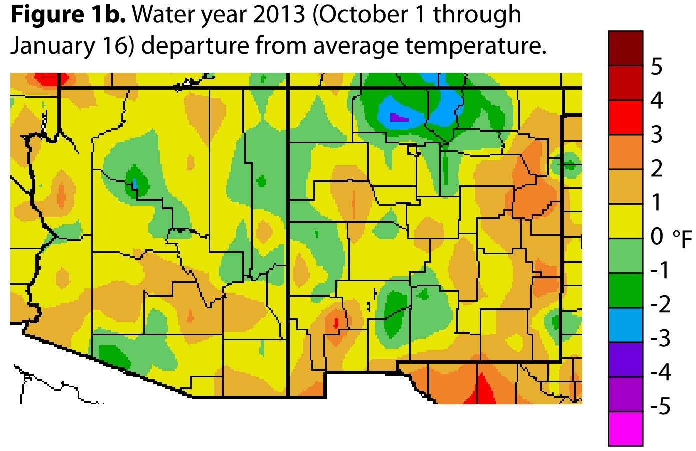


Figure 1c. Previous 30 days (December 18–January 16) departure from average temperature (interpolated).

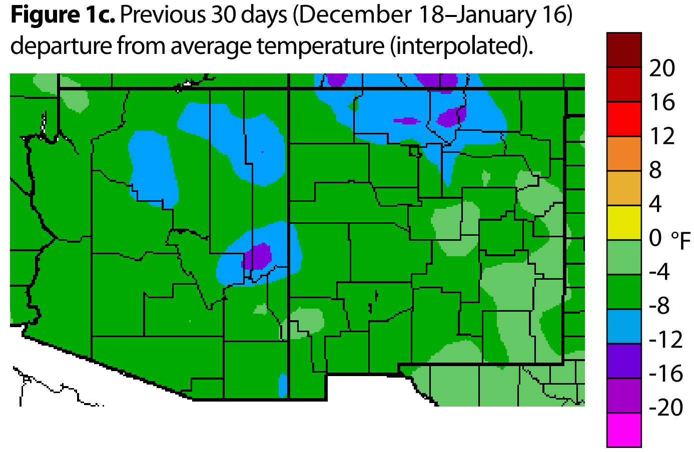
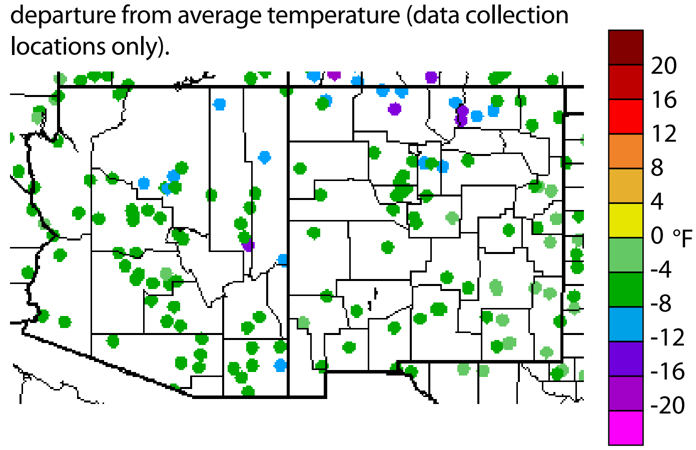


Figure 1d. Previous 30 days (December 18–January 16) departure from average temperature (data collection locations only).



Precipitation (through 1/16/13)

Data Source: High Plains Regional Climate Center

Drier-than-average conditions have characterized the 2013 water year, which began on October 1, 2012 (*Figures 2a–b*). Precipitation in most of the Southwest was below 50 percent of average between October 1 and January 16. Only the far western border of Arizona and a sliver in northeastern New Mexico received above-average precipitation. In early December, however, several storms helped boost snowpack levels to near-average conditions in both states.

In the past 30 days, however, precipitation has essentially shut down in the Southwest. Most of Arizona and New Mexico have experienced less than 50 percent of average rain and snow between mid-December and mid-January (*Figures 2c–d*). Most winter storms with potential to affect the region have either been dry or have tracked to the north. The lone wet storm hit eastern and southeastern New Mexico on January 10 as the system dipped south into Mexico, skirting around most of Arizona before migrating northeast into southeastern New Mexico and Texas.

Notes:

The water year begins on October 1 and ends on September 30 of the following year. As of October 1, 2012, we are in the 2013 water year. The water year is a more hydrologically sound measure of climate and hydrological activity than is the standard calendar year.

Average refers to the arithmetic mean of annual data from 1971–2000. Percent of average precipitation is calculated by taking the ratio of current to average precipitation and multiplying by 100.

The continuous color maps (Figures 2a, 2c) are derived by taking measurements at individual meteorological stations and mathematically interpolating (estimating) values between known data points. Interpolation procedures can cause aberrant values in data-sparse regions.

The dots in Figures 2b and 2d show data values for individual meteorological stations.

On the Web:

For these and other precipitation maps, visit
http://www.hprcc.unl.edu/maps/current/

For National Climatic Data Center monthly precipitation and drought reports for Arizona, New Mexico, and the Southwest region, visit
http://lwf.ncdc.noaa.gov/oa/climate/research/2003/perspectives.html#monthly

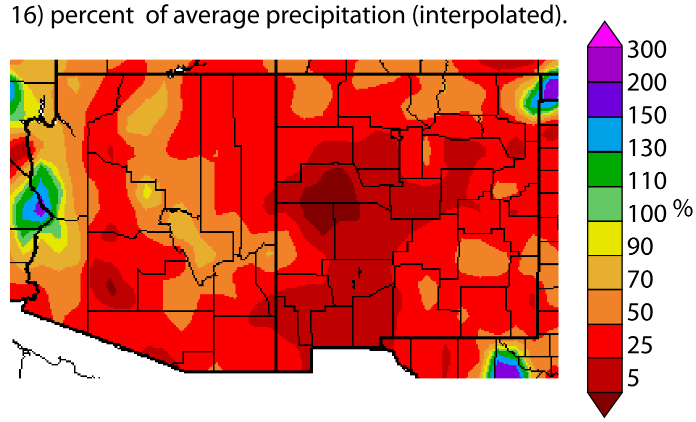


Figure 2a. Water year 2013 (October 1 through January 16) percent of average precipitation (interpolated).

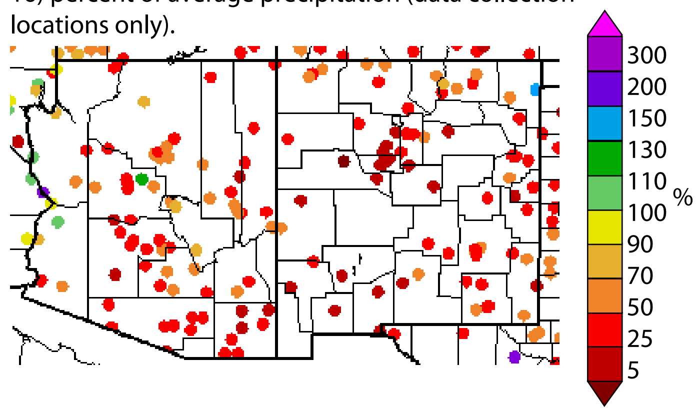


Figure 2b. Water year 2013 (October 1 through January 16) percent of average precipitation (data collection locations only).

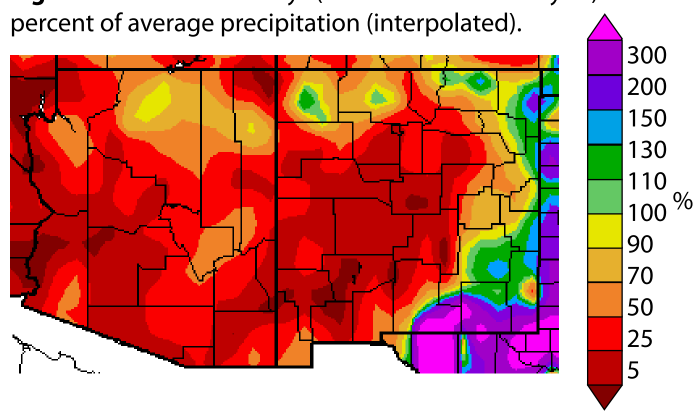


Figure 2c. Previous 30 days (December 18–January 16) percent of average precipitation (interpolated).

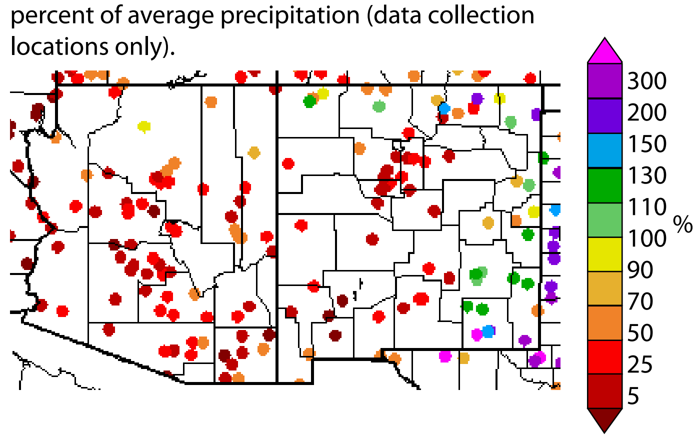


Figure 2d. Previous 30 days (December 18–January 16) percent of average precipitation (data collection locations only).

U.S. Drought Monitor (data through 1/15/13)

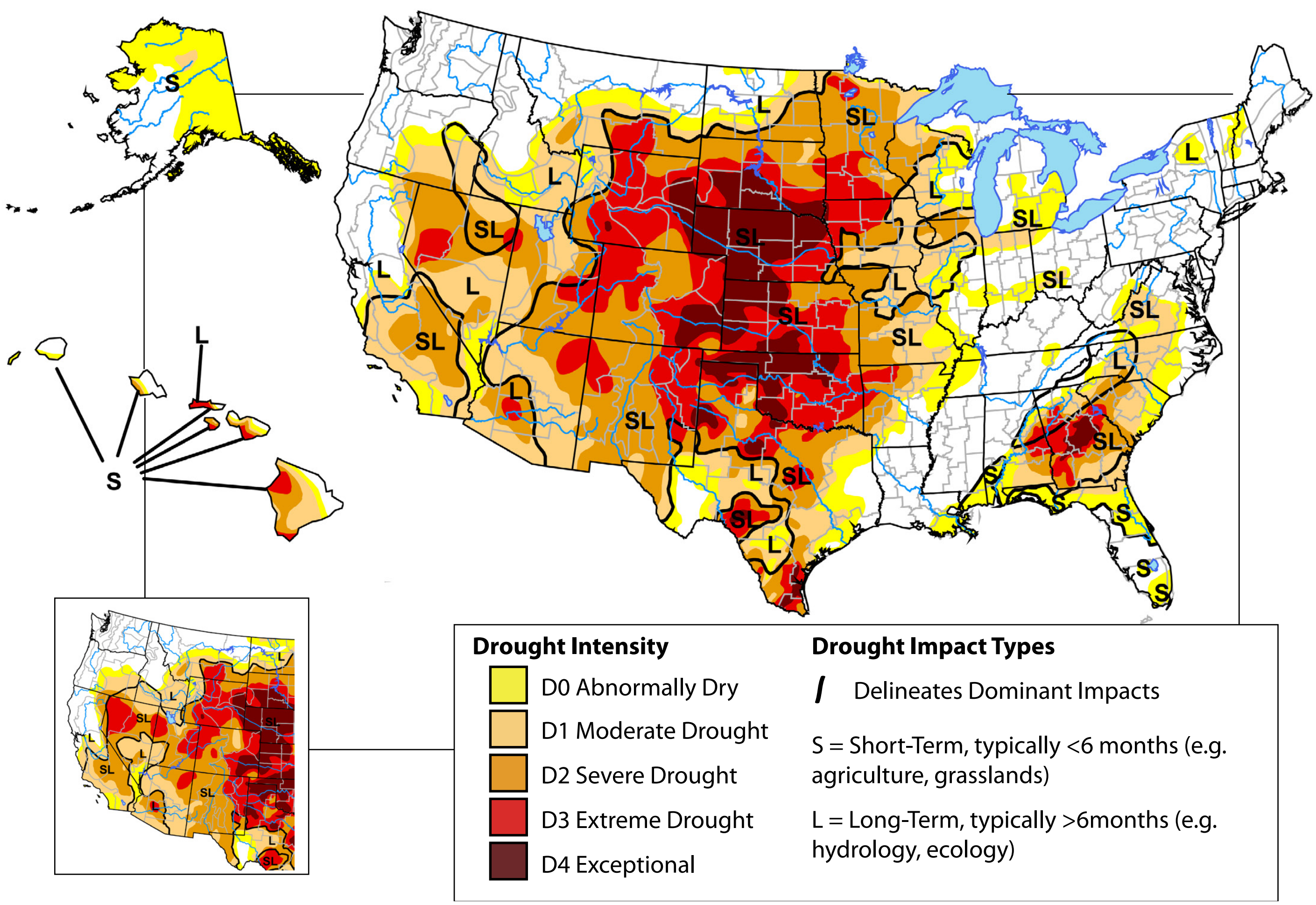
Data Sources: U.S. Department of Agriculture, National Drought Mitigation Center, National Oceanic and Atmospheric Administration

A cold and relatively dry weather pattern characterized the West during the past 30 days. This created few opportunities to improve drought conditions, where present. Overall, more than 75 percent of the western U.S. (the 11 continental states from the Rocky Mountains westward) remains in drought, with over 44 percent at the severe or a more severe drought category. This is almost identical to conditions in mid-December. There were, however, a few isolated areas that saw substantial changes in conditions, including northern Nevada where conditions improved slightly. The Pacific Northwest and parts of the northern Rockies continue to see the bulk of the winter storm activity and precipitation; these areas are currently free of drought.

Notes:

The U.S. Drought Monitor is released weekly (every Thursday) and represents data collected through the previous Tuesday. The inset (lower left) shows the western United States from the previous month's map. The U.S. Drought Monitor maps are based on expert assessment of variables including (but not limited to) the Palmer Drought Severity Index, soil moisture, streamflow, precipitation, and measures of vegetation stress, as well as reports of drought impacts. It is a joint effort of several agencies.

Figure 3. Drought Monitor data through January 15, 2013 (full size), and December 18, 2012 (inset, lower left).



On the Web:

The best way to monitor drought trends is to pay a weekly visit to the U.S. Drought Monitor website: http://www.drought.gov/portal/server.pt/community/current_drought/208

Arizona Drought Status
(data through 1/15/13)
Data Source: U.S. Drought Monitor

Several cold winter storms moved across the Southwest in December but they ferried in little moisture and, consequently, brought little drought relief to the region. Drought conditions remained largely unchanged between mid-December and mid-January, according to the January 15 update of the U.S. Drought Monitor (*Figures 4a–b*). All of the state continues to observe some level of drought with over 97 percent at the moderate level or worse, the same as last month. While the December storms brought little precipitation to lower elevations in central and western Arizona, they did help increase snowpack levels to near average along the Mogollon Rim (see page 13).

In drought-related news, the U.S. Department of Agriculture designated Apache, Maricopa, Navajo, and Pinal counties in Arizona as Primary Natural Disaster Areas due to the persistence of long-term drought conditions across the region. The USDA declaration allows farmers and ranchers to apply for low-interest emergency loans to support operations impacted by drought conditions.

Figure 4a. Arizona drought map based on data through January 15.

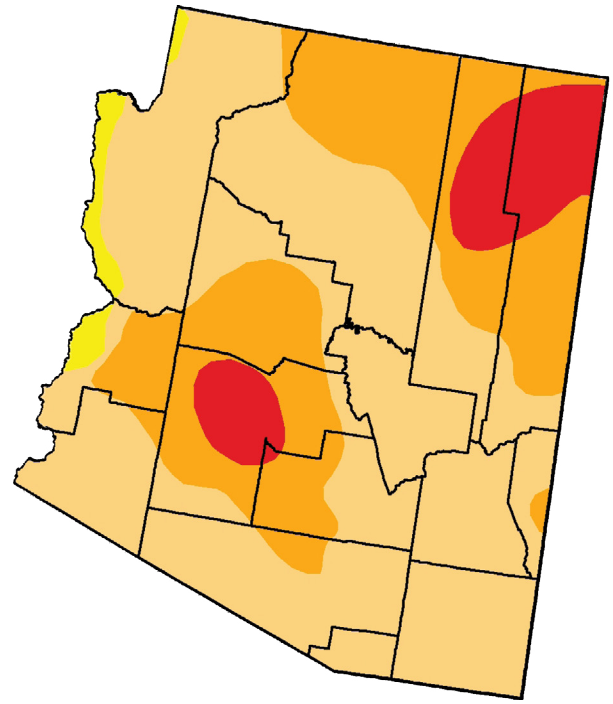


Figure 4b. Percent of Arizona designated with drought conditions based on data through January 15.

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	97.82	37.86	8.84	0.00
Last Week (01/08/2013 map)	0.00	100.00	97.82	37.78	8.68	0.00
3 Months Ago (10/16/2012 map)	0.00	100.00	98.66	31.28	5.67	0.00
Start of Calendar Year (01/01/2013 map)	0.00	100.00	97.91	37.78	8.68	0.00
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	31.93	5.67	0.00
One Year Ago (01/10/2012 map)	16.70	83.30	60.34	36.56	2.78	0.00

Notes:
The Arizona section of the U.S. Drought Monitor is released weekly (every Thursday) and represents data collected through the previous Tuesday. The maps are based on expert assessment of variables including (but not limited to) the Palmer Drought Severity Index, soil moisture, streamflow, precipitation, and measures of vegetation stress, as well as reports of drought impacts. It is a joint effort of several agencies.

On the Web:
For the most current drought status map, visit http://www.drought.unl.edu/dm/DM_state.htm?AZ,W

For monthly short-term and quarterly long-term Arizona drought status maps, visit http://www.azwater.gov/AzDWR/StatewidePlanning/Drought/DroughtStatus.htm

New Mexico Drought Status
(data through 1/15/13)

Data Source: New Mexico State Drought Monitoring Committee, U.S. Drought Monitor

Nearly all of New Mexico is experiencing moderate or a more severe drought category, with about 61 and 32 percent classified as severe or extreme drought, respectively (*Figures 5a–b*). Precipitation events were few and far between in the last month, measuring 70 percent of average for most of the state (see page 7). Consequently, drought conditions have not improved and remain virtually the same as they were in mid-December, with the exception of the northwest corner where conditions deteriorated from severe to extreme drought. The eastern region is the hardest-hit in the state; it continues to experience widespread extreme drought, with a few locations experiencing exceptional drought conditions.

In drought-related news, livestock producers from New Mexico and Texas convened in Lubbock in early January to discuss how to respond to current drought conditions and their impact on ranching across the region (*Lubbock-Avalanche-Journal*, January 16). Many attendees discussed strategies to rebuild herds that had been completely liquidated last year due to lack of forage. The current situation, with beef demand high and livestock numbers low, makes purchasing livestock to replenish herds expensive.

Figure 5a. New Mexico drought map based on data through January 15.

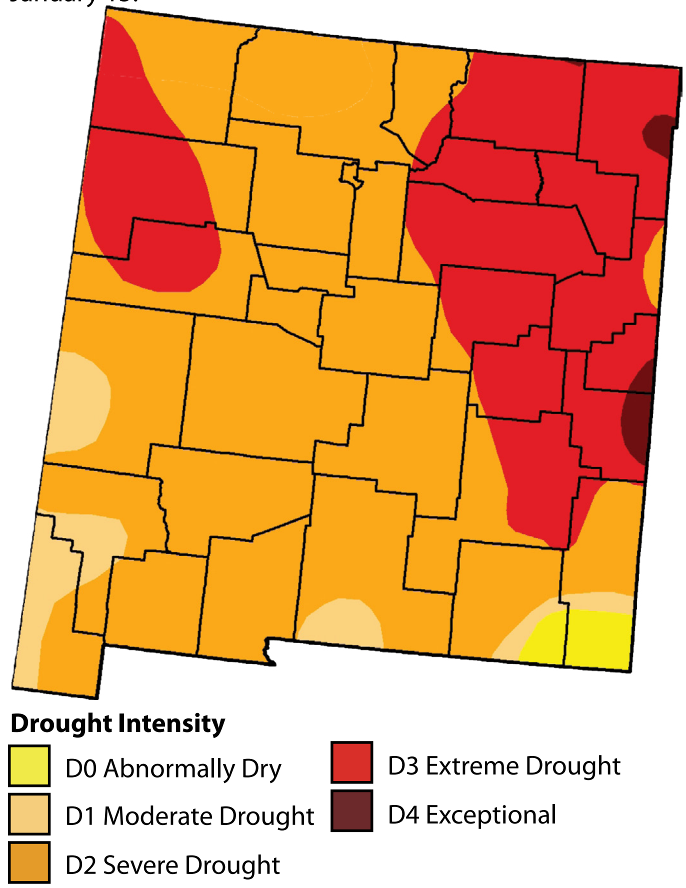


Figure 5b. Percent of New Mexico designated with drought conditions based on data through January 15.

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	98.45	92.97	31.76	0.97
Last Week (01/08/2013 map)	0.00	100.00	98.81	94.05	31.76	0.97
3 Months Ago (10/16/2012 map)	0.00	100.00	99.63	66.52	11.45	0.68
Start of Calendar Year (01/01/2013 map)	0.00	100.00	98.83	94.05	31.88	0.97
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	62.56	12.25	0.66
One Year Ago (01/10/2012 map)	8.63	91.37	87.60	72.13	23.37	7.56

Notes:

The New Mexico section of the U.S. Drought Monitor is released weekly (every Thursday) and represents data collected through the previous Tuesday. The maps are based on expert assessment of variables including (but not limited to) the Palmer Drought Severity Index, soil moisture, streamflow, precipitation, and measures of vegetation stress, as well as reports of drought impacts. It is a joint effort of several agencies.

This summary contains substantial contributions from the New Mexico Drought Working Group.

On the Web:

For the most current drought status map, visit http://www.drought.unl.edu/dm/DM_state.htm?NM,W

For the most current Drought Status Reports, visit http://www.nmdrought.state.nm.us/MonitoringWorkGroup/wk-monitoring.html

Arizona Reservoir Volumes

(through 12/31/12)

Data Source: National Water and Climate Center

Combined storage in Lakes Mead and Powell stood at 52.2 percent of capacity as of December 31, a slight decrease of about 250,000 acre-feet from the previous month (*Figure 6*) and 9 percent lower than it was one year ago. Decreases in reservoir storage during 2012 primarily were due to a La Niña event, which helped push storms north of the Upper Colorado River Basin. Storage in the San Carlos Reservoir increased by 2,000 acre-feet in December, but the reservoir continues to store only about 1 percent of capacity, or 43 percent of average. While the Verde River systems gained about 11,000 acre-feet, storage in the Salt River system dropped by about 12,000 acre-feet. Higher elevation winter snowpacks, which substantially contribute to Arizona's water supply, are off to a good start. Precipitation in December was more than 125 percent of average in many of the higher elevation locations, and water contained in snowpacks measured at snow telemetry sites (SNOTEL) recorded above-average conditions in the Verde watershed, Mogollon Rim, Salt River Basin, and the Lower Colorado River headwaters as of January 1. The first spring streamflow forecast calls for near-average runoff in the Verde River Basin and below-average to well-below-average runoff in the Little Colorado River, Salt River, and San Francisco-Upper Gila river basins (see page 17).

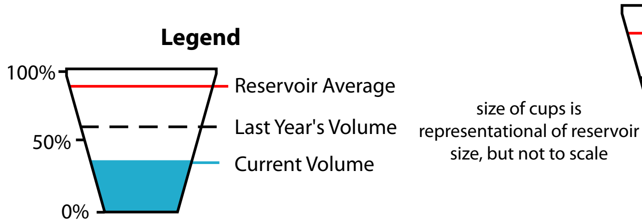
Notes:

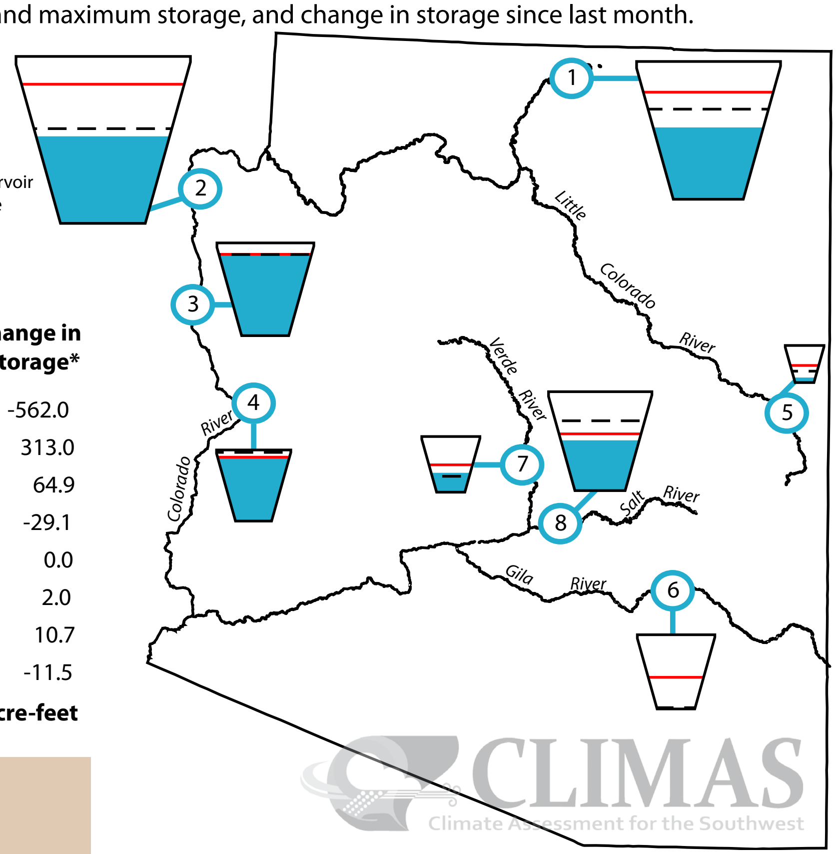
The map gives a representation of current storage for reservoirs in Arizona. Reservoir locations are numbered within the blue circles on the map, corresponding to the reservoirs listed in the table. The cup next to each reservoir shows the current storage (blue fill) as a percent of total capacity. Note that while the size of each cup varies with the size of the reservoir, these are representational and not to scale. Each cup also represents last year's storage (dotted line) and the 1971–2000 reservoir average (red line).

The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons). On average, 1 acre-foot of water is enough to meet the demands of 4 people for a year. The last column of the table list an increase or decrease in storage since last month. A line indicates no change.

These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

Figure 6. Arizona reservoir volumes for December as a percent of capacity. The map depicts the average volume and last year's storage for each reservoir. The table also lists current and maximum storage, and change in storage since last month.





Reservoir Name	Capacity	Current Storage*	Max Storage*	Change in Storage*
1. Lake Powell	52%	12,689.0	24,322.0	-562.0
2. Lake Mead	52%	13,647.0	26,159.0	313.0
3. Lake Mohave	87%	1,571.9	1,810.0	64.9
4. Lake Havasu	89%	552.1	619.0	-29.1
5. Lyman	14%	4.3	30.0	0.0
6. San Carlos	1%	4.4	875.0	2.0
7. Verde River System	35%	101.3	287.4	10.7
8. Salt River System	51%	1,035.5	2,025.8	-11.5

*** thousands of acre-feet**

On the Web:

Portions of the information provided in this figure can be accessed at the NRCS website:
http://www.wcc.nrcs.usda.gov/wsf/reservoir/resv_rpt.html

New Mexico Reservoir Volumes

(through 12/31/12)

Data Source: National Water and Climate Center

Combined water storage in the 15 New Mexican reservoirs reported here was about 19 percent of capacity and only 44 percent of average as of December 31 (*Figure 7*). Total reservoir storage did not change substantially from the previous month, which is common for this time of year. Combined storage on the four reservoirs on the Pecos River continues to stand at about 1 percent of capacity and about 17 percent of average. During December, storage in these reservoirs increased by a combined 4,000 acre-feet. Elephant Butte and Caballo reservoirs, on the Rio Grande, also are extremely low, measuring only 5 percent of capacity combined. However, the reservoirs gained about 40,000 acre-feet, because water flowing into the reservoirs was completely retained, which is typical for this time of year. Snow this winter in the mountains of northern New Mexico and the southern Colorado Rockies will be vital for boosting stock in these reservoirs. So far, however, winter precipitation is not off to a wet start. Between October 1 and January 16, precipitation in northern New Mexico and southern Colorado generally was less than 70 percent of average. Despite these below-average conditions, the winter is just beginning and there is ample time for storms to deliver copious snow and, in turn, boost reservoir storage.

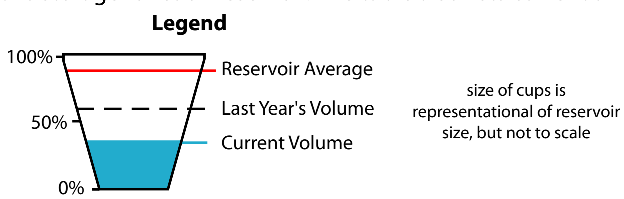
Notes:

The map gives a representation of current storage for reservoirs in New Mexico. Reservoir locations are numbered within the blue circles on the map, corresponding to the reservoirs listed in the table. The cup next to each reservoir shows the current storage (blue fill) as a percent of total capacity. Note that while the size of each cup varies with the size of the reservoir, these are representational and not to scale. Each cup also represents last year's storage (dotted line) and the 1971–2000 reservoir average (red line).

The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons). On average, 1 acre-foot of water is enough to meet the demands of 4 people for a year. The last column of the table list an increase or decrease in storage since last month. A line indicates no change.

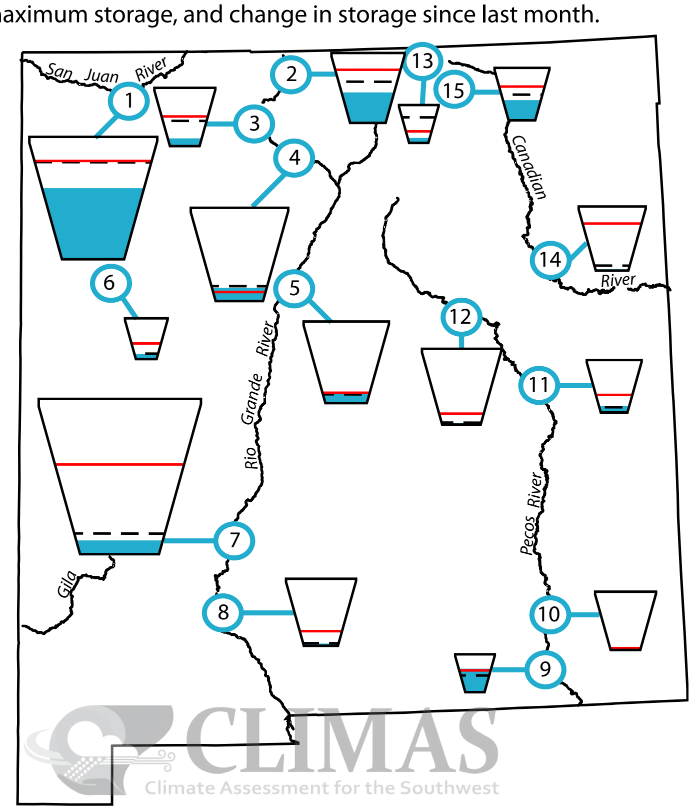
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

Figure 7. New Mexico reservoir volumes for December as a percent of capacity. The map depicts the average volume and last year's storage for each reservoir. The table also lists current and maximum storage, and change in storage since last month.



Reservoir Name	Capacity	Current Storage*	Max Storage*	Change in Storage*
1. Navajo	56%	956.3	1,696.0	-13.7
2. Heron	41%	165.9	400.0	-4.0
3. El Vado	5%	10.0	190.3	-13.1
4. Abiquiu	13%	155.9	1,192.8	-3.0
5. Cochiti	11%	52.9	491.0	0.4
6. Bluewater	9%	3.4	38.5	0.0
7. Elephant Butte	7%	162.1	2,195.0	39.1
8. Caballo	2%	7.5	332.0	1.0
9. Lake Avalon	60%	2.4	4.0	0.3
10. Brantley	0%	4.6	1,008.2	0.9
11. Sumner	9%	8.8	102.0	2.8
12. Santa Rosa	1%	4.8	438.3	0.0
13. Costilla	14%	2.3	16.0	0.3
14. Conchas	1%	2.0	254.2	-1.0
15. Eagle Nest	37%	29.0	79.0	0.1

* thousands of acre-feet



On the Web:

Portions of the information provided in this figure can be accessed at the NRCS website:
http://www.wcc.nrcs.usda.gov/wsf/reservoir/resv_rpt.html

Southwest Snowpack
(updated 1/16/13)

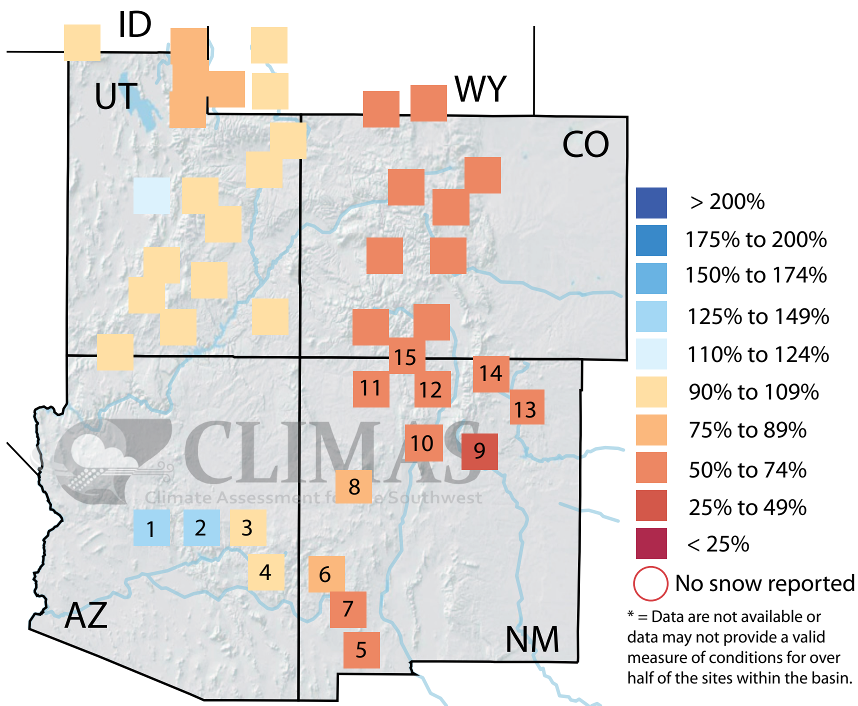
Data Sources: National Water and Climate Center, Western Regional Climate Center

Scant precipitation in most of the Southwest is leaving many mountainous regions with lower than average snowpack, particularly in Colorado and New Mexico watersheds. Since the water year began on October 1, precipitation in in the Rio Grande head waters in southern Colorado has measured 62 percent of average. As of January 17, the water contained in the snowpack, or snow water equivalent (SWE), measured at eight SNOTEL monitoring sites in the Rio Grande headwaters is 64 percent of average. This is discouraging news for the water supply on the Rio Grande, which receives a large fraction of its annual supply from this watershed. Elephant Butte Reservoir, for example, contains less than 7 percent of its full capacity. Elsewhere in New Mexico, all major basins are experiencing below-average SWE (*Figure 8*) with the exception of Rio Hondo in the far north-central part of the state (*not shown*). SWE in most of these basins measures less than 75 percent of average.

Drier-than-average conditions also dominate in the upper Colorado River basin. SWE measured at SNOTEL sites in major watersheds that contribute to the Southwest's most important river all are less than 72 percent of average. Arizona, on the other hand, is experiencing above-average SWE in the Verde River basin, central Mogollon Rim region, Little Colorado River, and upper Salt River despite slightly below-average precipitation in these watersheds since the water year began.

As a large fraction of winter precipitation typically falls between mid-January and the end of March, the next several months will be critical for determining the fate of snowpacks, and consequently, the water supply.

Figure 8. Average snow water equivalent (SWE) in percent of average for available monitoring sites as of January 16, 2013.



Arizona Basins
1 Verde River Basin
2 Central Mogollon Rim
3 Little Colorado - Southern Headwaters
4 Salt River Basin

New Mexico Basins
5 Mimbres River Basin
6 San Francisco River Basin
7 Gila River Basin
8 Zuni/Bluewater River Basin
9 Pecos River
10 Jemez River Basin
11 San Miguel, Dolores, Animas, and San Juan River Basins
12 Rio Chama River Basin
13 Cimarron River Basin
14 Sangre de Cristo Mountain Range Basin
15 San Juan River Headwaters

Notes:

Snowpack telemetry (SNOTEL) sites are automated stations that measure snowpack depth, temperature, precipitation, soil moisture content, and soil saturation. A parameter called snow water equivalent (SWE) is calculated from this information. SWE refers to the depth of water that would result by melting the snowpack at the SNOTEL site and is important in estimating runoff and streamflow. It depends mainly on the density of the snow. Given two snow samples of the same depth, heavy, wet snow will yield a greater SWE than light, powdery snow.

This figure shows the SWE for selected river basins, based on SNOTEL sites in or near the basins, compared to the 1971–2000 average values. The number of SNOTEL sites varies by basin. Basins with more than one site are represented as an average of the sites. Individual sites do not always report data due to lack of snow or instrument error. CLIMAS generates this figure using daily SWE measurements made by the Natural Resources Conservation Service.

On the Web:

For color maps of SNOTEL basin snow water content, visit:
http://www.wrcc.dri.edu/snotelanom/basinswe.html

For NRCS source data, visit:
http://www.wcc.nrcs.usda.gov/snow/

For a list of river basin snow water content and precipitation, visit:
http://www.wrcc.dri.edu/snotelanom/snotelbasin

Temperature Outlook
(February–July 2013)
Data Source: NOAA-Climate Prediction Center (CPC)

The seasonal temperature outlooks issued by the NOAA-Climate Prediction Center (NOAA-CPC) in January call for increased chances that temperatures will be similar to the warmest 10 years in the 1981–2010 period for the three-month seasons spanning February through July (*Figures 9a–d*). If temperatures are above average for the February–April period, the magnitude of the anomaly is expected to be between 0.2 and 0.6 degrees F for most of the Southwest. Reasons for above-average forecasts include El Niño-Southern Oscillation (ENSO) conditions, historical trends, and land-surface feedback. The NOAA-CPC indicates that neutral ENSO conditions will continue to persist through the spring. In the past, ENSO-neutral conditions coupled with a currently negative Pacific Decadal Oscillation (PDO) can bring drier conditions to the Southwest. Recent late winter and spring warming trends have also been figured into these forecasts. In addition, soil moisture conditions may influence temperature in coming months. If dry conditions persist, soils will continue to be dry, which will in turn maximize the probability for above-normal temperatures in the spring.

Notes:

These outlooks predict the likelihood (chance) of above-average, average, and below-average temperature, but not the magnitude of such variation. The numbers on the maps do not refer to degrees of temperature.

The NOAA-CPC outlooks are a three-category forecast. As a starting point, the 1981–2010 climate record is divided into 3 categories, each with a 33.3 percent chance of occurring (i.e., equal chances, EC). The forecast indicates the likelihood of one of the extremes—above-average (A) or below-average (B)—with a corresponding adjustment to the other extreme category; the “average” category is preserved at 33.3 likelihood, unless the forecast is very strong.

Thus, using the NOAA-CPC temperature outlook, areas with light brown shading display a 33.3–39.9 percent chance of above-average, a 33.3 percent chance of average, and a 26.7–33.3 percent chance of below-average temperature. A shade darker brown indicates a 40.0–50.0 percent chance of above-average, a 33.3 percent chance of average, and a 16.7–26.6 percent chance of below-average temperature, and so on.

Equal Chances (EC) indicates areas where no forecast skill has been demonstrated or there is no clear climate signal; areas labeled EC suggest an equal likelihood of above-average, average, and below-average conditions, as a “default option” when forecast skill is poor.

Figure 9a. Long-lead national temperature forecast for February–April 2013.

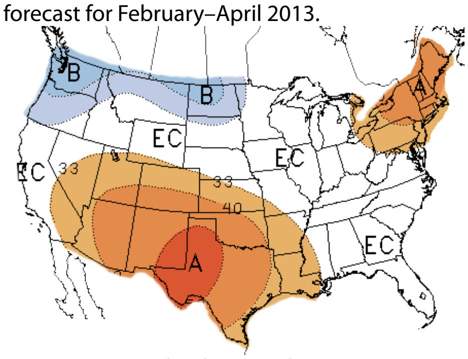


Figure 9b. Long-lead national temperature forecast for March–May 2013.

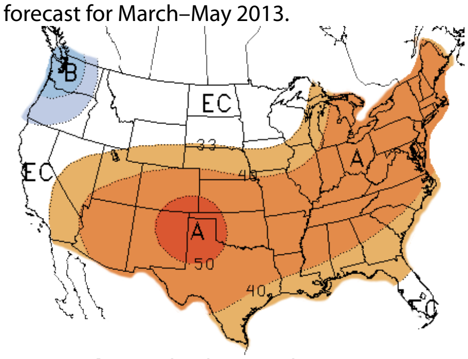


Figure 9c. Long-lead national temperature forecast for April–June 2013.

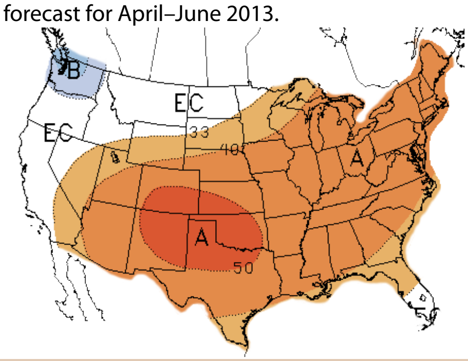
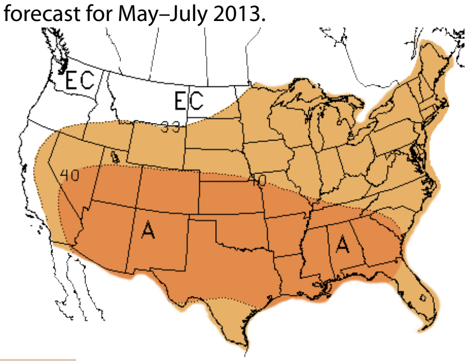


Figure 9d. Long-lead national temperature forecast for May–July 2013.



A = Above average: 50.0–59.9%, 40.0–49.9%, 33.3–39.9%

B = Below average: 40.0–49.9%, 33.3–39.9%

EC = Equal chances. No forecasted anomalies.

On the Web:

For more information on CPC forecasts, visit http://www.cpc.ncep.noaa.gov/products/predictions//multi_season/13_seasonal_outlooks/color/churchill.php

For seasonal temperature forecast downscaled to the local scale, visit http://www.weather.gov/climate/l3mto.php

For IRI forecasts, visit http://iri.columbia.edu/climate/forecast/net_asmt/

Precipitation Outlook
(February–July 2013)
Data Source: NOAA-Climate Prediction Center (CPC)

The seasonal precipitation outlooks issued by the NOAA-Climate Prediction Center (CPC) in January call for increased chances that precipitation during the February–June period will be similar to the driest 10 years in the 1981–2010 period across most of the Southwest (*Figures 10a–d*). The highest probabilities for below-average precipitation occur in the February–April period. If below-average precipitation occurs in this period, there is a 50-percent chance that deficits will be between 0.2 and 0.4 inches. The historical tendency for the West to receive below-average precipitation when ENSO neutral conditions occur during a negative Pacific Decadal Oscillation (PDO)—the current state—contributes to these forecasts.

Below-average rain and snow coupled with above-average temperatures (also forecasted, see page 14) has many implications for the coming spring and summer, including dry soil moisture and vegetation, continuing moderate to exceptional drought, and low water supplies.

Notes:

These outlooks predict the likelihood (chance) of above-average, average, and below-average precipitation, but not the magnitude of such variation. The numbers on the maps do not refer to inches of precipitation.

The NOAA-CPC outlooks are a 3-category forecast. As a starting point, the 1981–2010 climate record is divided into 3 categories, each with a 33.3 percent chance of occurring (i.e., equal chances, EC). The forecast indicates the likelihood of one of the extremes—above-average (A) or below-average (B)—with a corresponding adjustment to the other extreme category; the “average” category is preserved at 33.3 likelihood, unless the forecast is very strong.

Thus, using the NOAA-CPC precipitation outlook, areas with light green shading display a 33.3–39.9 percent chance of above-average, a 33.3 percent chance of average, and a 26.7–33.3 percent chance of below-average precipitation. A shade darker green indicates a 40.0–50.0 percent chance of above-average, a 33.3 percent chance of average, and a 16.7–26.6 percent chance of below-average precipitation, and so on.

Equal Chances (EC) indicates areas where no forecast skill has been demonstrated or there is no clear climate signal; areas labeled EC suggest an equal likelihood of above-average, average, and below-average conditions, as a “default option” when forecast skill is poor.

Figure 10a. Long-lead national precipitation forecast for February–April 2013.

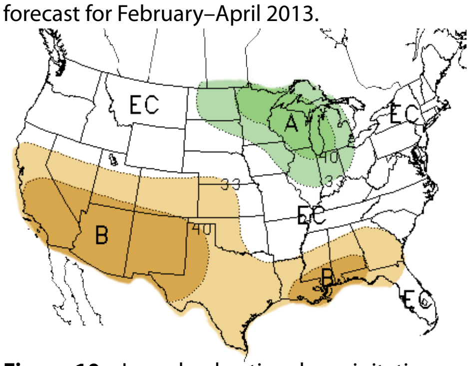


Figure 10b. Long-lead national precipitation forecast for March–May 2013.

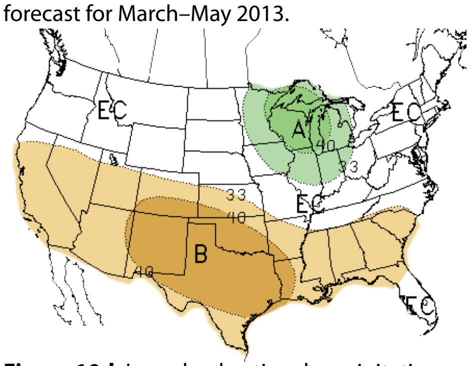


Figure 10c. Long-lead national precipitation forecast for April–June 2013.

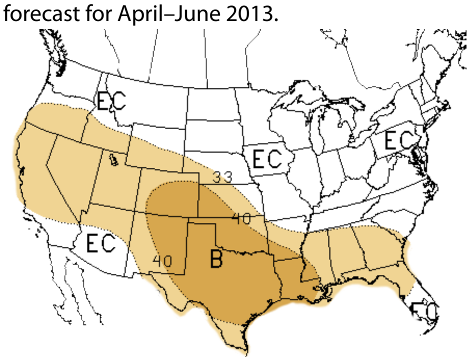
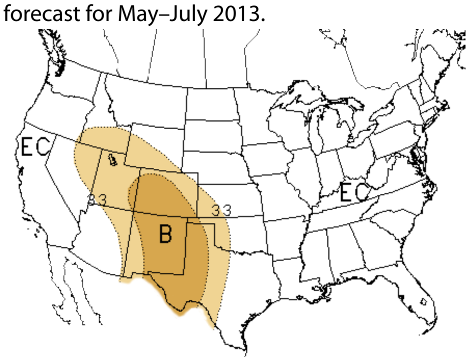


Figure 10d. Long-lead national precipitation forecast for May–July 2013.



A = Above average: 40.0–49.9%; 33.3–39.9%

B = Below average: 60.0–69.9%; 50.0–59.9%; 40.0–49.9%; 33.3–39.9%

EC = Equal chances. No forecasted anomalies.

On the Web:

For more information on CPC forecasts, visit http://www.cpc.ncep.noaa.gov/products/predictions//multi_season/13_seasonal_outlooks/color/churchill.php (note that this website has many graphics and may load slowly on your computer)

For IRI forecasts, visit http://iri.columbia.edu/climate/forecast/net_asmt/

Seasonal Drought Outlook
(through April 2013)

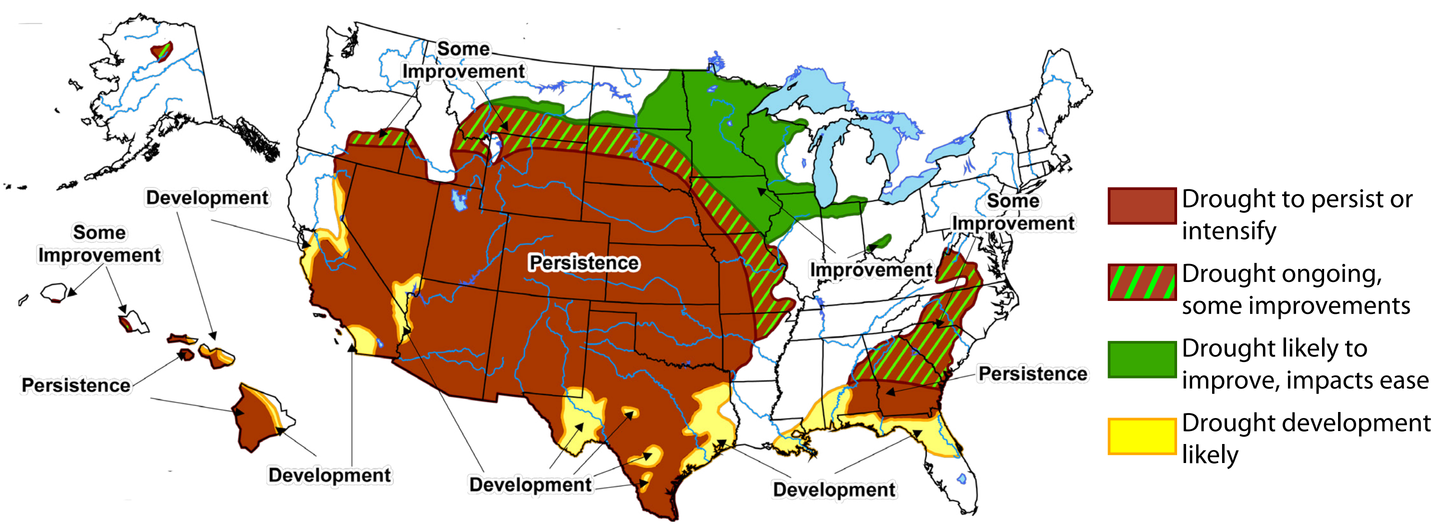
Data Source: NOAA–Climate Prediction Center (CPC)

Nearly all of Arizona and New Mexico is experiencing moderate drought or a more severe drought category (see pages 9 and 10). This picture is unlikely to change in coming months. The Seasonal Drought Outlook, issued by the NOAA-Climate Prediction Center (NOAA-CPC) on January 17, calls for the persistence of drought across the Southwest through at least April (*Figure 11*). Isolated areas in northwest Arizona and southeast New Mexico that experienced improvements in drought conditions over the past several months are expected to slide back into more intense drought in coming months. NOAA-CPC notes that they expect a much drier weather pattern than has been observed since mid-December to set up over the next several months across the southern third of the U.S. Several climate models have picked up on this signal, leading to some confidence in this outlook. This is not encouraging news for Arizona and New Mexico because the next three months is when the region experiences the bulk of its winter rain and snow. After late March, the region normally experiences dry conditions, which will create few opportunities, if any, to make up for precipitation deficits incurred during the winter until the monsoon season begin anew.

Notes:

The delineated areas in the Seasonal Drought Outlook are defined subjectively and are based on expert assessment of numerous indicators, including the official precipitation outlooks, various medium- and short-range forecasts, models such as the 6-10-day and 8-14-day forecasts, soil moisture tools, and climatology.

Figure 11. Seasonal drought outlook through April 2013 (released January 15).



On the Web:

For more information, visit http://www.drought.gov/portal/server.pt

For medium- and short-range forecasts, visit http://www.cpc.ncep.noaa.gov/products/forecasts/

For soil moisture tools, visit http://www.cpc.ncep.noaa.gov/soilmst/forecasts.shtml

Streamflow Forecast
(for spring and summer)

Source: National Water and Climate Center

The first spring–summer streamflow forecast for the Southwest, issued on January 1 by the National Resources Conservation Service (NRCS), shows a 50-percent chance that flows in most basins in Arizona and New Mexico will be below average (*Figure 12*). Based on the accumulated precipitation through January 1, there is only a 50-percent likelihood that the Salt River, measured near Roosevelt Lake, and the Gila River, measured at the inflow to San Carlos Reservoir, will exceed 65 and 44 percent of the January–May average, respectively. In these probabilistic forecasts, lower likelihoods are accompanied by higher percent of average streamflows, and vice versa. For example, the Salt River has only a 30 percent likelihood that flows will be near average. The Verde River is the only watershed in Arizona where spring streamflows have an equal chance of being above average. For Lake Powell, there is only a 50-percent chance that spring inflow will be above 56 percent of the 1971–2000 average for April–July, or about 4.0 million acre-feet. The forecast also indicates a 30 and 10 percent chance that Lake Powell inflow will above 72 and 98 percent of average, respectively, providing an indicator that above-average flows are very unlikely.

In New Mexico, there is a 50-percent chance that the March–July flow in the Rio Grande, measured at Otowi Bridge, will be 47 percent of average. If this occurs, irrigators in the Elephant Butte Irrigation District could experience another season with below-average allotments. As of January 1, Elephant Butte Reservoir contains only 7 percent of its full storage. Also, the projected inflow into the El Vado Reservoir, on the Rio Grande north of Otowi Bridge, is only 64 percent of average; El Vado contains only 5 percent of average storage.

The winter is still early and a large fraction of the winter precipitation typically falls during the January–March period. As the season advances, therefore, streamflow forecasts become progressively more accurate.

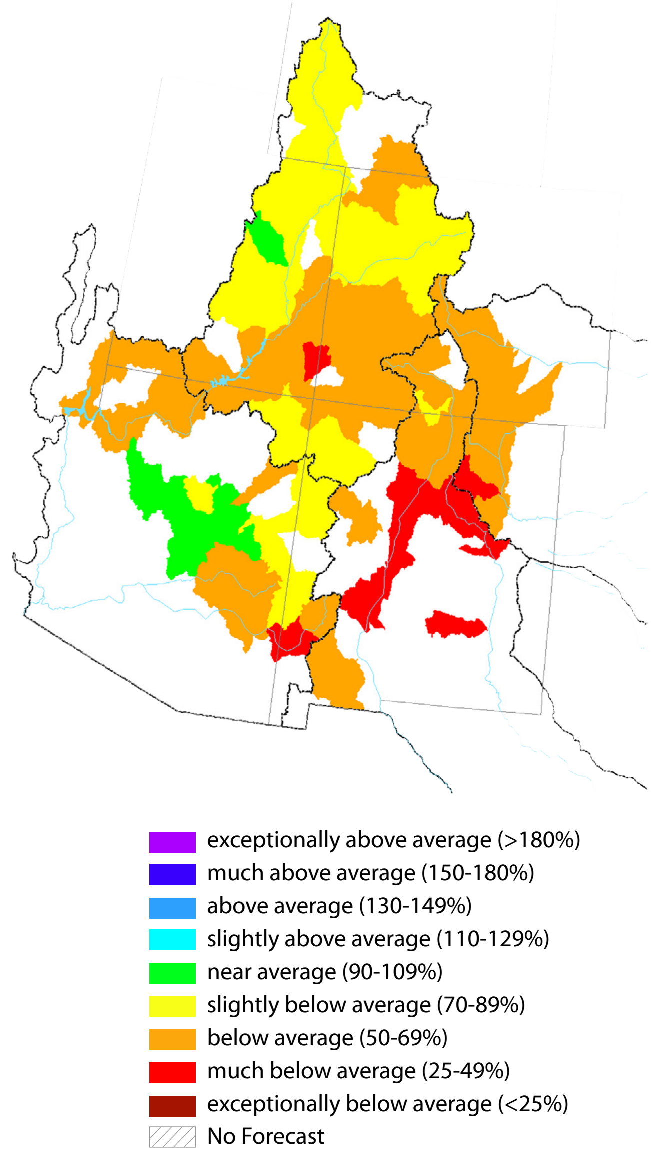
On the Web:

For state river basin streamflow probability charts, visit:
http://www.wcc.nrcs.usda.gov/cgibin/strm_cht.pl

For information on interpreting streamflow forecasts, visit:
http://www.wcc.nrcs.usda.gov/factpub/intrpret.html

For western U.S. water supply outlooks, visit:
http://www.wcc.nrcs.usda.gov/wsf/westwide.html
http://www.cbrfc.noaa.gov

Figure 12. Spring and summer streamflow forecast as of January 1 (percent of average).



Notes:

Water supply forecasts for the Southwest are coordinated between the National Water and Climate Center, part of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), and the Colorado Basin River Forecast Center (CBRFC), part of NOAA. The forecast information provided in Figure 12 is updated monthly by the NWCC. Unless otherwise specified, all streamflow forecasts are for streamflow volumes that would occur naturally without any upstream influences, such as reservoirs and diversions. The coordinated forecasts by NRCS and NOAA are only produced for Arizona between January and May, and for New Mexico between January and May.

The NRCS provides a range of forecasts expressed in terms of percent of average streamflow for various exceedance levels. The forecast presented here is for the 50-percent exceedance level, and is referred to as the most probable streamflow. This means there is at least a 50 percent chance that streamflow will occur at the percent of average shown in Figure 12. The CBRFC provides a range of streamflow forecasts in the Colorado Basin ranging from short fused flood forecasts to longer range water supply forecasts. The water supply forecasts are coordinated monthly with NWCC.

El Niño Status and Forecast

Data Sources: NOAA-Climate Prediction Center (CPC), International Research Institute for Climate and Society (IRI)

After flirting with El Niño conditions in early fall 2012, sea-surface temperatures (SSTs) have trended back to near-average levels across almost all of the equatorial Pacific Ocean in recent months. This indicates that ENSO-neutral conditions have settled in for at least the short term. In addition to SSTs, the NOAA Climate Prediction Center (NOAA-CPC) reports the upper- and lower-level wind patterns are back to average levels, consistent with ENSO-neutral conditions. Moreover, the Southern Oscillation Index between October and December, a measure of sea level pressure, is also average, which signifies that the atmosphere and sea surface are in concert (*Figure 13a*).

ENSO-neutral conditions are expected to remain in place for at least the next several months. Official forecasts issued jointly in mid-January by NOAA-CPC and the International Research Institute for Climate and Society (IRI) indicate a 97 percent probability of ENSO-neutral conditions continuing through the January–March period (*Figure 13b*). The probability for neutral conditions remains greater than 80 percent through May. After May, confidence in ENSO forecasts is lower. However, for longer-term outlooks, neutral conditions still remain most likely.

The absence of strong El Niño or La Niña conditions leaves room for more variable weather patterns across the western U.S., making seasonal forecasting for Arizona and New Mexico more difficult. Nonetheless, current seasonal precipitation forecasts suggest a slight increase in chances for below-average rain and snow (see page 15).

Figure 13a. The standardized values of the Southern Oscillation Index from January 1980–December 2012. La Niña/El Niño occurs when values are greater than 0.5 (blue) or less than -0.5 (red), respectively. Values between these thresholds are relatively neutral (green).

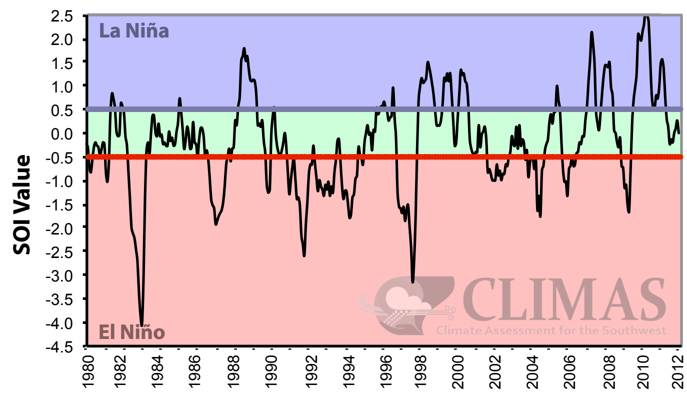
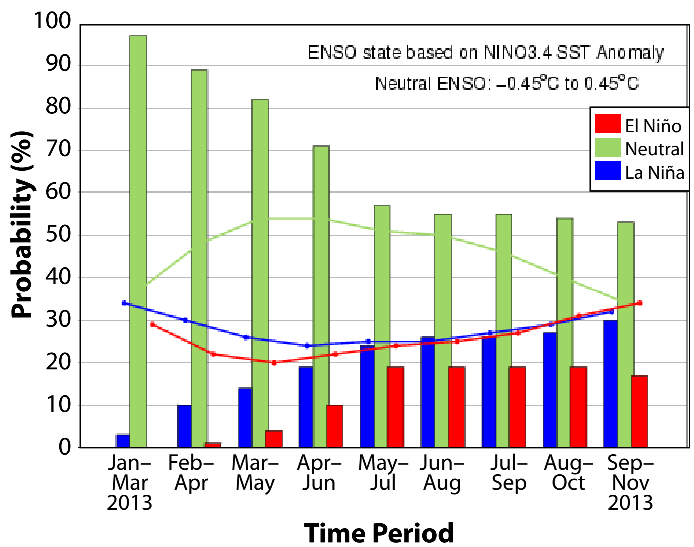


Figure 13b. IRI probabilistic ENSO forecast for the Niño 3.4 monitoring region (released January 17). Colored lines represent average historical probability of El Niño, La Niña, and neutral conditions.



Notes:

The first figure shows the standardized three month running average values of the Southern Oscillation Index (SOI) from January 1980 through December 2012. The SOI measures the atmospheric response to SST changes across the Pacific Ocean basin. The SOI is strongly associated with climate effects in the Southwest. Values greater than 0.5 represent La Niña conditions, which are frequently associated with dry winters and sometimes with wet summers. Values less than -0.5 represent El Niño conditions, which are often associated with wet winters.

The second figure shows the International Research Institute for Climate and Society (IRI) probabilistic El Niño-Southern Oscillation (ENSO) forecast for overlapping three-month seasons. The forecast expresses the probabilities (chances) of the occurrence of three ocean conditions in the ENSO-sensitive Niño 3.4 region, as follows: El Niño, defined as the warmest 25 percent of Niño 3.4 sea-surface temperatures (SSTs) during the three month period in question; La Niña conditions, coolest 25 percent of Niño 3.4 SSTs; and neutral conditions where SSTs fall within the remaining 50 percent of observations. The IRI probabilistic ENSO forecast is a subjective assessment of current model forecasts of Niño 3.4 SSTs that are made monthly. The forecast takes into account the indications of the individual forecast models (including expert knowledge of model skill), an average of the models, and other factors.

On the Web:

For a technical discussion of current El Niño conditions, visit http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/

For more information about El Niño and to access graphics similar to the figures on this page, visit http://iri.columbia.edu/climate/ENSO/