Contributors

Ben McMahan
SWCO Editor; Research, Outreach & Assessment Specialist (CLIMAS)

Mike Crimmins
UA Extension Specialist

Stephanie Doster
Institute of the Environment Editor

Dave Dubois
New Mexico State Climatologist

Gregg Garfin
Founding Editor and Deputy Director of Outreach, Institute of the Environment

Paulina Jenney
Institute of the Environment, Communications Assistant

Nancy J. Selover
Arizona State Climatologist

Published by the Climate Assessment for the Southwest (CLIMAS), with support from University of Arizona Cooperative Extension, the Arizona State Climate Office, and the New Mexico State Climate office.

February Southwest Climate Outlook

Precipitation: Over the past 30 days, precipitation totals were mostly below average for most of Arizona and much of New Mexico (Fig. 1). Since early January, we have seen persistent warm and dry conditions, linked in part to a ridge of high pressure. Similarly, over the last 90 days, precipitation has been average to below average across much of the Southwest (Fig. 2). However, if we shift our focus to the water year (since Oct. 1), we see precipitation totals much closer to average, and even above average across much of New Mexico (see El Niño Tracker, below, and pages 3–4, for more details).

Temperature: Temperatures in January were near average for most of Arizona and New Mexico, but much warmer in February, with much of the region recording above-average temperatures (Fig. 3). The same high-pressure ridge that limited our opportunity for incursions of moisture has facilitated these above-average temperatures, including record-warm days across the region in early February.

Snowpack and Water Supply: Warmer temperatures and below-average precipitation have reduced our previously impressive snow water equivalent (SWE) values back to near average (90–110 percent of normal) across much of the Southwest, with values dipping as low as 50–75 percent of normal across portions of southern Arizona and New Mexico (Fig. 4). This warm-up and dry-out is likely to taper at some point this season, but it remains to be seen how much additional winter precipitation will fall. Given past strong El Niño events, it is reasonable to expect at least some additional precipitation from now into spring.

Drought: Long-term drought conditions persist across much of central and eastern Arizona and the western edge of central New Mexico (Fig. 5). We saw a few runs of average to above-average precipitation, which helped mitigate some of the short-term drought conditions, but multi-year droughts, such as those we experienced during much of the 21st century, will require more sustained above-average precipitation over multi-year periods to fully recover.

El Niño Tracker: We are in the middle of a strong El Niño event, forecast to remain in place through spring 2016. Outside of El Niño's influence, winter conditions for the Southwest are relatively dry, but the extended hiatus in winter storm activity over the last month is longer than expected. The forecast models for the remainder of February look warm and dry, but this pattern should break eventually, resulting in more winter precipitation events and likely a higher than average cumulative precipitation total by the end of our cool season (see El Niño Tracker on pages 3–4).

Precipitation & Temperature Forecast: The February 18 NOAA-Climate Prediction Center three-month seasonal outlook continues to predict above-average precipitation for most of the Southwest this winter, centered on Arizona, New Mexico, and West Texas (Fig. 6, top). Temperature forecasts are split, with elevated chances for above-average temperatures along the West Coast and the Pacific Northwest and increased chances for below-average temperatures centered over Texas and into New Mexico (Fig. 6, bottom).

Tweet Feb SW Climate Outlook

CLICK TO TWEET

FEB2016 @CLIMAS_UA SW Climate Outlook- Climate Summary, El NIño Tracker, and Introducing Rio Grande-Bravo Outlook http://bit.ly/1Ub7pJy

February Southwest Climate Outlook

Online Resources

Figures 1-2
National Weather Service - AHPS
http://water.weather.gov/precip

Figure 3
High Plains Regional Climate Center - HPRCC
http://www.hprcc.unl.edu/

Figure 4
Western Regional Climate Center
http://www.wrcc.dri.edu/

Figure 5
U.S. Drought Monitor
http://droughtmonitor.unl.edu/

Figure 6
NWS Climate Prediction Center
http://www.cpc.ncep.noaa.gov/

CLIMAS YouTube Channel

Visit our YouTube channel for videos of content pulled from the podcast.

www.youtube.com/user/UACLIMAS/

Podcasts

Visit our website or iTunes to subscribe to our podcast feed.

www.climas.arizona.edu/media/podcasts

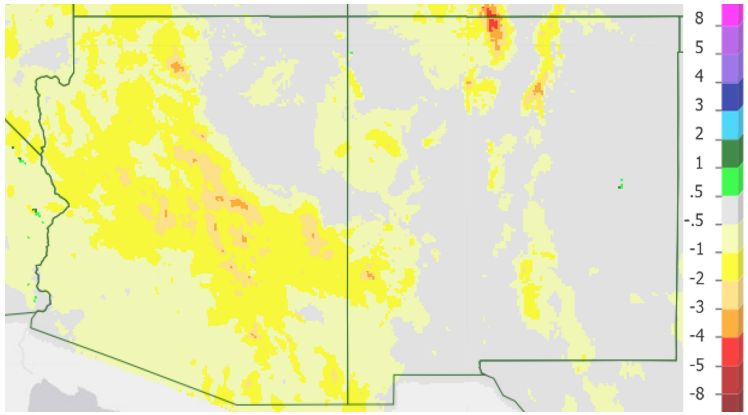


Figure 1: Departure from Normal Precipitation - Past 30 Days

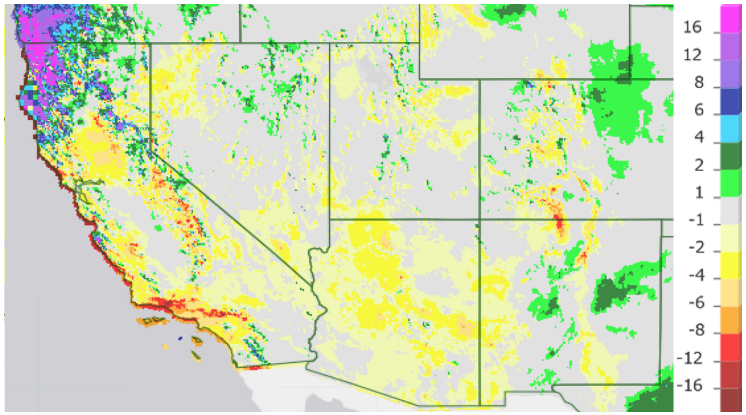


Figure 2: Departure from Normal Precipitation - Past 90 Days

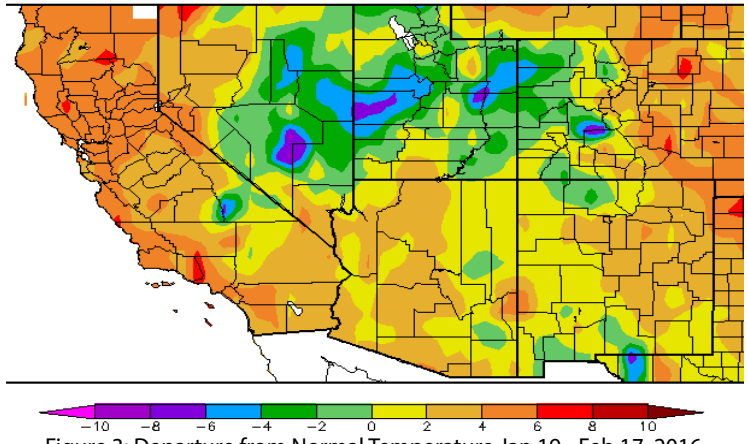


Figure 3: Departure from Normal Temperature Jan 19 - Feb 17, 2016

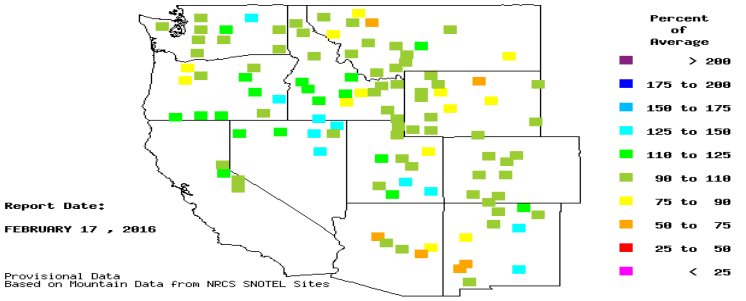


Figure 4: Basin Average Snow Water Content - Feb 17, 2016

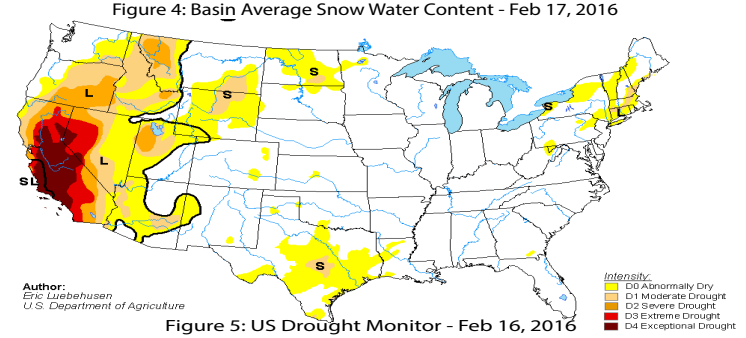


Figure 5: US Drought Monitor - Feb 16, 2016

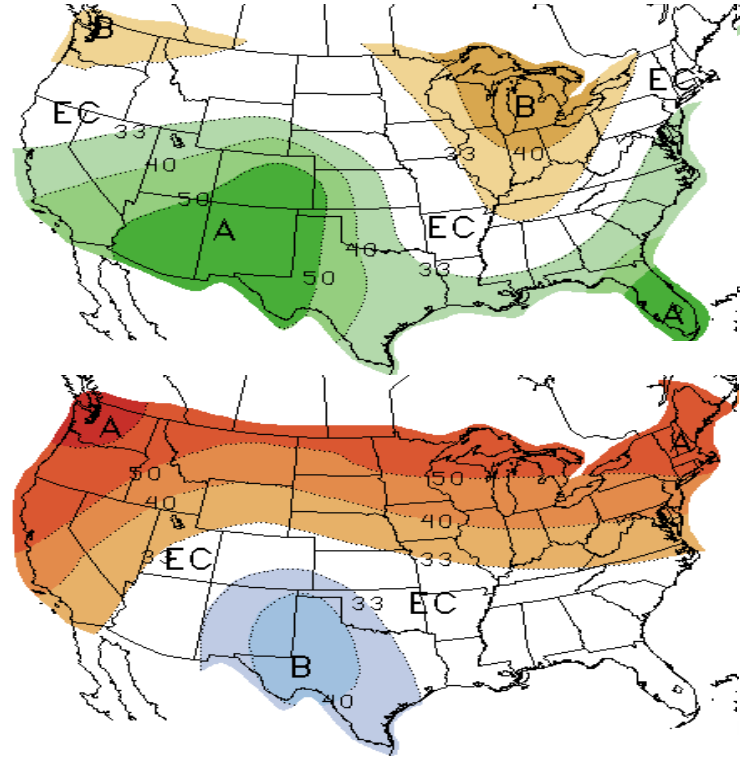


Figure 6: Three-Month Precipitation & Temperature Outlook - Feb 18, 2016

Online Resources

Figure 1
Australian Bureau of Meteorology
http://www.bom.gov.au/climate/enso/index.shtml

Figure 2
NOAA - National Climatic Data Center
http://www.ncdc.noaa.gov/teleconnections/enso/

Figure 3
International Research Institute for Climate and Society
http://iri.columbia.edu/our-expertise/climate/forecasts/enso/

El Niño

Information on this page is also found on the CLIMAS website:
www.climas.arizona.edu/sw-climate/el-niño-southern-oscillation

El Niño 2015-2016

We spent 2014 and the first part of 2015 waiting in anticipation for an El Niño event that was forecast to be one of the strongest events on record. By early 2015, the event in question had not yet materialized, and some questioned whether El Niño would ever arrive. Eventually it did, and has been going strong for months, with most forecasts indicating that it will remain strong through the winter. There are numerous impacts we expect to see across the Southwest over our cool season (approximately October – March). In the coming months, CLIMAS will aggregate news, information, and commentary about the possible and expected impacts of El Niño, from the perspective of what is most relevant and applicable to the Southwest. This will include things we learned from past events and what forecast models can tell us about planning for this event.

For more information, please visit www.climas.arizona.edu/sw-climate/el-niño-southern-oscillation, our repository for El Niño related materials, which we will update with timely and relevant information throughout the winter.

2015-2016 El Niño Tracker

El Niño conditions continued for a 12th straight month, but we have passed the peak intensity of one of the strongest El Niño events on record. This does not mean that El Niño is over, though. Despite the recent warm and dry conditions in the Southwest, we are likely to see more weather events associated with El Niño conditions through spring 2016. In monitoring and forecast discussions, we continue to see persistent sea surface temperature (SST) anomalies (Figs. 1–2) and enhanced convective activity in the central and eastern Pacific, and most models forecast that this El Niño event will continue through spring or early summer. Precipitation and temperature outlooks mirror this forecast, calling for increased probabilities of precipitation across most of the southern U.S.

On Feb. 10, the Japan Meteorological Agency identified ongoing El Niño conditions as having passed their "mature" stage in the equatorial Pacific and predicted that this remarkably strong event would gradually weaken to neutral conditions by summer. On Feb. 11, the NOAA-Climate Prediction Center (CPC) extended its El Niño advisory and identified the current atmospheric and oceanic anomalies as reflecting a strong El Niño that will persist through most of the spring before transitioning to ENSO-neutral conditions in late spring or early summer, with increasing chances of La Niña conditions by early fall. On Feb. 16, the Australian Bureau of Meteorology maintained its tracker at official El Niño status, but noted that deceasing temperature anomalies and building trade winds are indicators of this event's gradual decline. On Feb. 18, the International Research Institute for Climate and Society (IRI) and CPC forecasts indicated a gradual weakening of El Niño from late spring into summer (Fig. 3), and reiterated that this El Niño would likely gradually decline, with lingering effects and impacts through spring 2016.

(cont. on next page)

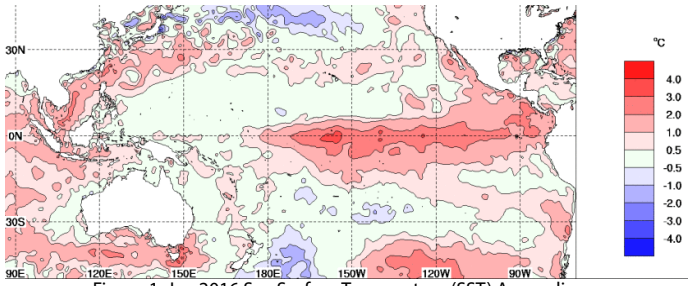


Figure 1: Jan 2016 Sea Surface Temperature (SST) Anomalies

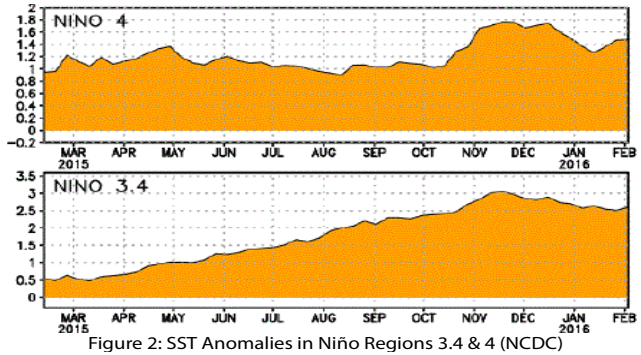


Figure 2: SST Anomalies in Niño Regions 3.4 & 4 (NCDC)

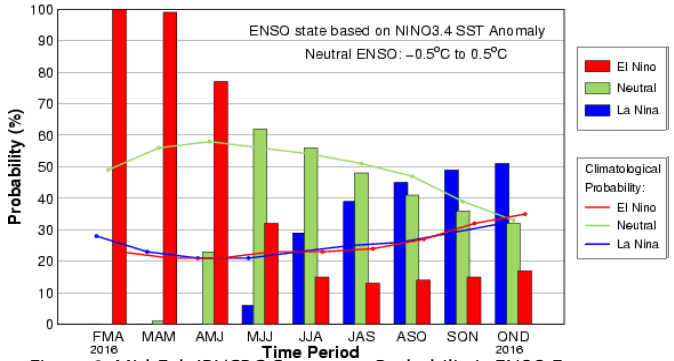


Figure 3: Mid-Feb IRI/CPC Consensus Probabilistic ENSO Forecast

Online Resources

Figure 4
NOAA - Climate Prediction Center
http://www.cpc.ncep.noaa.gov/products/NMME/current/plume.html

Figures 5-8
Westwide Drought Tracker
http://www.wrcc.dri.edu/wwdt/

El Niño

Information on this page is also found on the CLIMAS website:
www.climas.arizona.edu/sw-climate/el-niño-southern-oscillation

2015-2016 El Niño Tracker (continued)

The North American multi-model ensemble currently shows a strong event extending into early spring with gradual weakening to neutral conditions by late spring or early summer (Fig. 4).

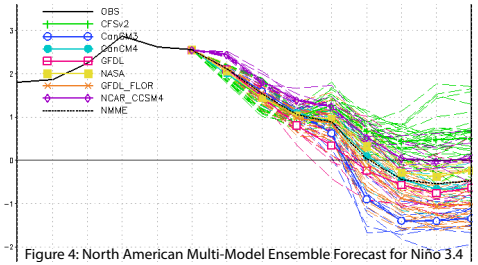


Figure 4: North American Multi-Model Ensemble Forecast for Niño 3.4

In the Southwest, seasonal forecasts and past events suggested we should see well above-average cumulative precipitation totals throughout our cool season (Oct–Mar). However, the past 30–40 days of mostly warm and dry conditions, including numerous record-setting high temperatures combined with the melting of our previously abundant mountain snowpack, makes it hard not to feel like this El Niño is a "bust." Is this a fair assessment, or does this simply reflect the difficulty of interpreting climate events (e.g., El Niño conditions) on a weather timeline? In previous discussions, we've highlighted the fact that we should expect periods of inactivity between storms, but we were hopeful those inactive periods would be on the order of days to a week, not weeks to a month. Even so, the default state for the desert Southwest is dry, so even a strong El Niño event can only alter that system so much, and past events do show periods of extended inactivity. Precipitation during the 1997–1998 El Niño event (strongest on record) was well below average in January 1998 (Fig. 5), with an extended run of dry days before it roared back to life from February through April 1998 (Fig. 6). If we look at cumulative cool-season precipitation during our current El Niño event (October 2015 – January 2016), our precipitation totals are at or above average (Fig. 7), and January 2016 was less dry than it may have seemed thanks to an active first week of the month (Fig. 8).

Even though the 2015–2016 El Niño event peaked in December 2015, the impacts in the Southwest lag behind this spike in intensity, which means we look to late winter and early spring as the most likely times for increased storm activity associated with the El Niño signal. We won't be able to fully evaluate the 2015–2016 El Niño event until we know how much rain and snow fell over the entire cool season, and given past events, our best bets for seeing above-average precipitation will be in February and March. In the short term, we are left waiting for the jet stream to shift to a favorable pattern that funnels moisture into the Southwest, rather than directing it around us.

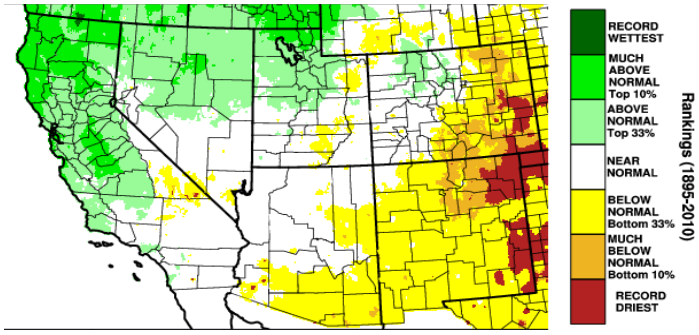


Figure 5: One Month Precipitation Percentile - Jan 1998

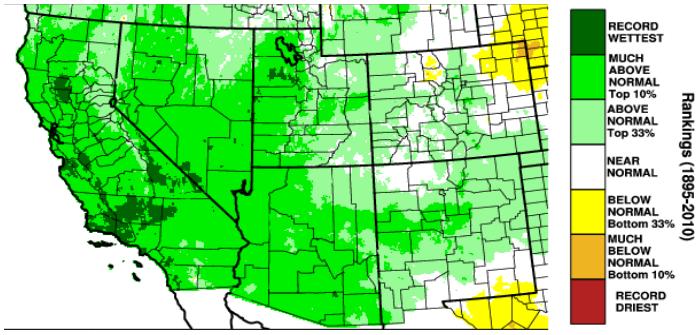


Figure 6: Three Month Precipitation Percentile - Feb - Apr 1998

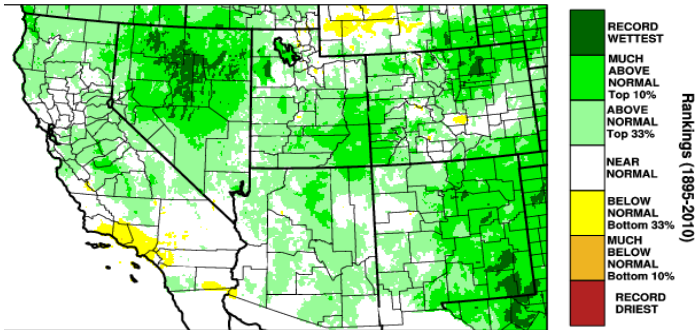


Figure 7: Four Month Precipitation Percentile - Oct 2015 - Jan 2016

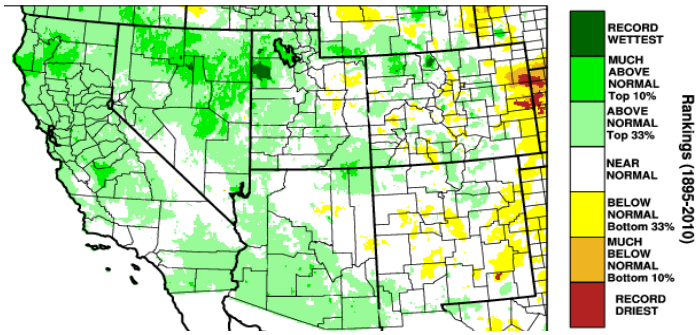


Figure 8: One Month Precipitation Percentile - Jan 2016

Online Resources

Portions of the information provided in this figure can be accessed at the Natural Resources Conservation Service

Arizona: http://1.usa.gov/19e2BdJ

New Mexico: http://www.wcc.nrcs.usda.gov/cgibin/resv_rpt.pl?state=new_mexico

We are updating our 'max storage' values for numerous NM reservoirs based on conservation storage vs. maximum flood capacity. This alters the percent full calculations, even while 'current storage' numbers are unchanged. Contact Ben McMahan with any questions or comments about these or any other suggested revisions.

Notes

The map gives a representation of current storage for reservoirs in Arizona and 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 1981–2010 reservoir average (red line).

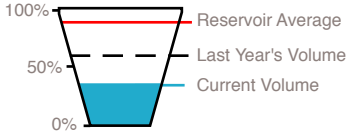
The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons).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

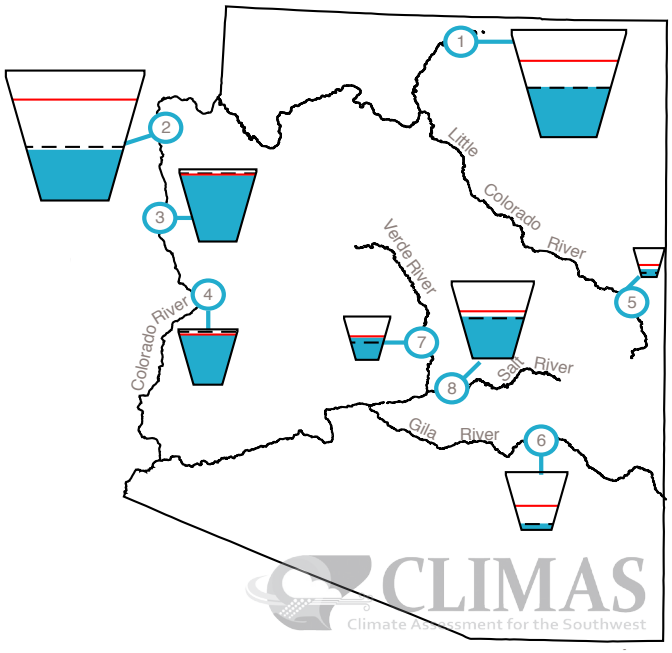
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

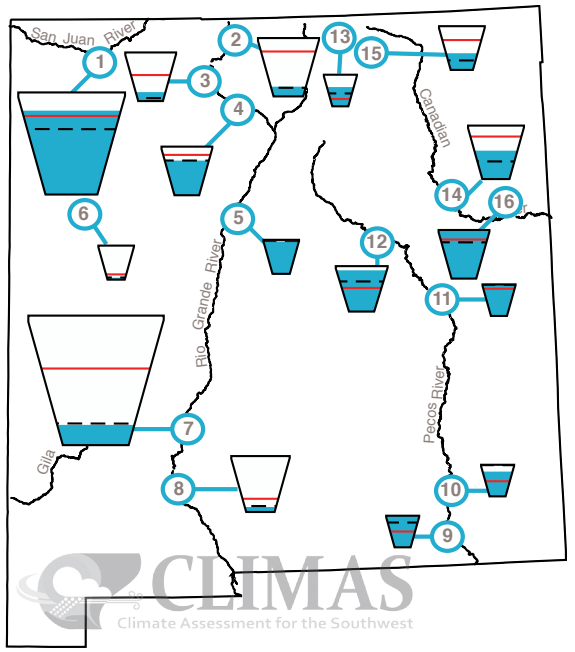
Reservoir Volumes

DATA THROUGH JAN 31, 2015

Data Source: National Water and Climate Center, Natural Resources Conservation Service







Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Lake Powell	47%	11,429.5	24,322.0	-382.5
2. Lake Mead	39%	10,318.0	26,159.0	223.0
3. Lake Mohave	91%	1,647.0	1,810.0	66.7
4. Lake Havasu	90%	554.9	619.0	-7.7
5. Lyman	27%	8.2	30.0	1.1
6. San Carlos	11%	92.1	875.0	34.1
7. Verde River System	51%	147.1	287.4	24.7
8. Salt River System	54%	1096.8	2,025.8	61.9

*KAF: thousands of acre-feet

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	82%	1,396.5	1,696.0	-0.5
2. Heron	17%	67.5	400.0	-1.1
3. El Vado	18%	34.6	190.3	-1.9
4. Abiquiu	71%	132.2	186.8**	1.7
5. Cochiti	94%	47.2	50.0**	0.4
6. Bluewater	5%	2.0	38.5	0.0
7. Elephant Butte	16%	361.1	2,195.0	38.6
8. Caballo	9%	29.2	332.0	1.5
9. Lake Avalon	109%	4.9	4.5**	2.2
10. Brantley	78%	33.1	42.2**	-10.5
11. Sumner	129%	46.2	102.0**	2.6
12. Santa Rosa	91%	96.7	105.9**	-0.3
13. Costilla	61%	9.8	16.0	0.4
14. Conchas	54%	138.2	254.2	1.1
15. Eagle Nest	38%	30.3	79.0	0.6
16. Ute Reservoir	98%	195	200	0.0

On the CLIMAS Website

CLIMAS Blog

Visit our blog for news, analysis and commentary related to SW climate.

http://www.climas.arizona.edu/blog

CLIMAS YouTube Channel

Visit our YouTube channel for videos of content pulled from the podcast.

www.youtube.com/user/UACLIMAS/

CLIMAS Podcasts

Visit our website or iTunes to subscribe to our podcast feed.

www.climas.arizona.edu/media/podcasts

Rio Grande|Bravo

CLIMATE IMPACTS & OUTLOOK

The Rio Grande|Bravo Climate Impacts & Outlook is a monthly product that provides timely climate, weather, and impacts information to stakeholders, researchers, and other interested parties in the Rio Grande/Bravo Basin region of New Mexico, Texas, and Mexico. Each edition recaps conditions over the previous months, including notable events, and then shows forecasts for the next three months for temperature, precipitation, and fire conditions.

The Outlook is a product of the North American Climate Services Partnership (NACSP)—an innovative trilateral partnership between the U.S., Mexico and Canada. This partnership was established to respond to an increasing demand for accessible and timely scientific data and information in order to make informed decisions and build resilience in our communities. CLIMAS is an active participant in the NACSP Rio Grande-Rio Bravo Regional Pilot Area. CLIMAS co-produces the Rio Grande|Bravo Climate Impacts & Outlook with NACSP partners, and is one of several partners hosting the Outlook.

Read more at: http://www.climas.arizona.edu/rgbo

CLIMAS Southwest Climate Podcast

Jan 2016 - Great Expectations for El Niño Winters in the SW

In the January 2016 episode of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Ben McMahan recap the transitional weather patterns of the last few months of 2015 as we moved from Fall into Winter, and discuss whether this transitional season matched general expectations, given what is expected in an El Niño year. They also discuss what a characteristic southwestern winter pattern looks like, and conclude the podcast with a conversation about how this El Niño event has stacked up so far this winter, and what they anticipate over the next few months.

Listen: http://climas.arizona.edu/podcast/jan-2016-climas-sw-climate-podcast-great-expectations-el-niño-winters-sw

Dec 2015 - El Niño in Full Swing

In the December episode of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Zack Guido discuss the difficulty of characterizing a climate phenomenon (in this case, El Niño) on a weather time scale, which is made difficult by the highly variable transition season we see in the Southwest in October and November. This difficulty is especially salient as media, the general public, and climate scientists are all hungry for explanations as to whether day to day events fit into larger climate patterns (i.e. is this an El NIño related impact or not!?). They also go over the recent events of October, November, and early December, before looking forward at what the seasonal forecasts suggest is likely in store for this winter (Hint: All signs still point to a wetter than average winter!).

Listen: http://climas.arizona.edu/podcast/dec-2015-climas-sw-climate-podcast-el-niño-full-swing-and-fall-recap