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# April Southwest Climate Outlook

**Precipitation:** In the past 30 days, most of the southwestern U.S. received below-average precipitation (Fig. 1). The winter wet season is wrapping up, and instead of above-average precipitation (as many of the El Niño influenced seasonal forecasts suggested), water year observations since October 1 show below-average precipitation across much of Arizona and portions of New Mexico. The situation is direr in other western regions, with California, the Pacific Northwest, and the Intermountain West recording significantly below-average winter precipitation (Fig. 2).

**Temperature:** In the past 30 days, temperatures were above-average across Arizona and New Mexico, with anomalies between 4 to 8 degrees F above average across most of the region (Fig 3). In the six months since the water year began on October 1, Arizona, California, Nevada, Oregon, and Washington saw record-warm average temperatures (Fig. 4).

**Snowpack:** High temperatures and below-average precipitation led to limited snowpack across the western U.S. As of April 16, snow water equivalent (SWE) is below average in every basin in the West (Fig. 5). In our region, SWE ranged from 0 to 32 percent of average in Arizona and 0 to 50 percent of average in New Mexico.

**Drought & Water Supply:** The U.S. Drought Monitor highlights persistent drought conditions across the West and identifies both short- and long-term drought conditions in Arizona and New Mexico. Total reservoir storage in March was 45 percent in Arizona (same value as last year) and 26 percent in New Mexico (compared to 24 percent last year) (see reservoir storage on page 5 for details).

**Wildfire:** There is potential for wildfire in any month of the year, but March through June is the windiest time of year (see page 4), which increases likelihood of red flag warning days. This is also one of the driest times of the year, so all eyes are on fire risk potential from now through the onset of the monsoon.

**El Niño:** Despite a relatively late start, El Niño continued for a second consecutive month, with potential for a stronger event as we look forward towards summer and fall of this year (see page 3 for details).

**Precipitation & Temperature Forecasts:** The April 16 NOAA-Climate Prediction Center seasonal outlook predicts above-average precipitation this spring into summer for most of the Southwest and Intermountain West, although California and southern Arizona are notable exceptions. Temperature forecasts remain split across the region, with elevated chances for above-average temperatures along the West Coast and eastward into Arizona (and most of the western U.S.), and increased chances for below-average temperatures in western Texas and into eastern New Mexico.

**Streamflow Forecasts:** The April 1 forecast for the Colorado, Rio Grande, and Arkansas river basins project well below-average streamflow for Arizona and New Mexico. This pattern is repeated across much of the western U.S., especially in Utah, Nevada, California, New Mexico, and Arizona (Fig. 6), following the unusually warm and dry conditions in March.

## Tweet April SW Climate Outlook

CLICK TO TWEET

Apr 2015 @CLIMAS_UA SW Climate Outlook - El Niño Sticks Around, Snowpack, Drought, Streamflow, and Wildfire http://bit.ly/1DNxUNI

## Online Resources

**Figure 1&2**
**NOAA/NWS - Advanced Hydrologic Prediction Service**
http://water.weather.gov/precip/

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

**Figure 4**
**National Climate Data Center**
https://www.ncdc.noaa.gov/

**Figure 5&6**
**Natural Resources Conservation Service**
http://www.wcc.nrcs.usda.gov/gis/snow.html

# March Southwest Climate Outlook

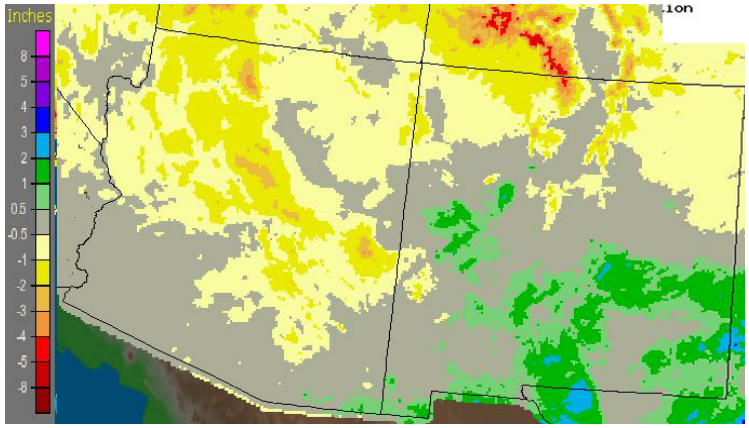



Figure 1: Departure from Normal Precipitation - Past 30 Days

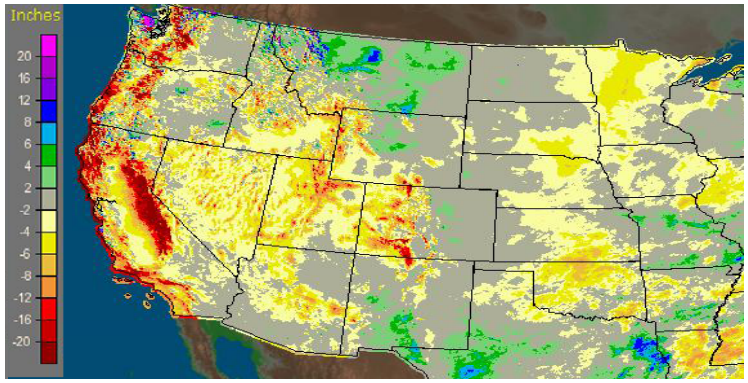



Figure 2: Departure from Normal Precipitation - Since Oct 1

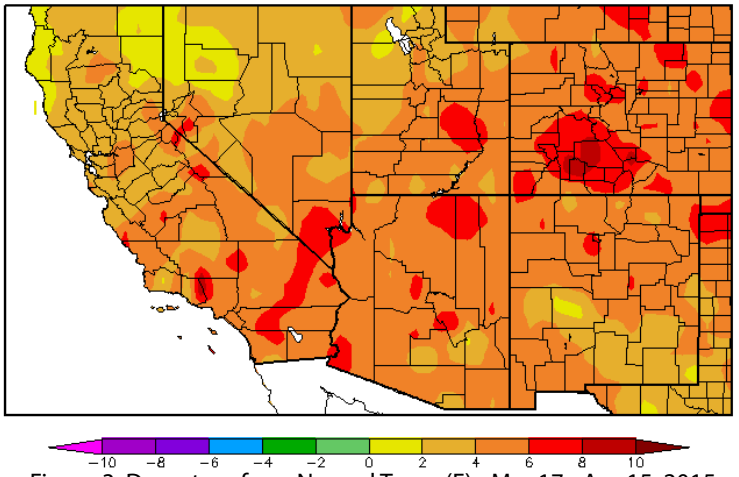



Figure 3: Departure from Normal Temp (F) - Mar 17 - Apr 15, 2015

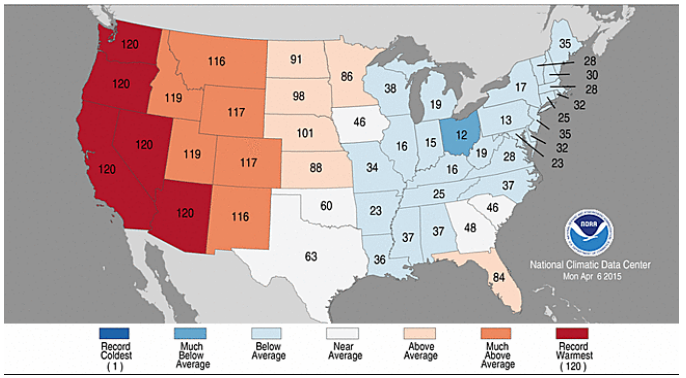



Figure 4: Statewide Average Temperature Ranks - Oct 2014 - Mar 2015

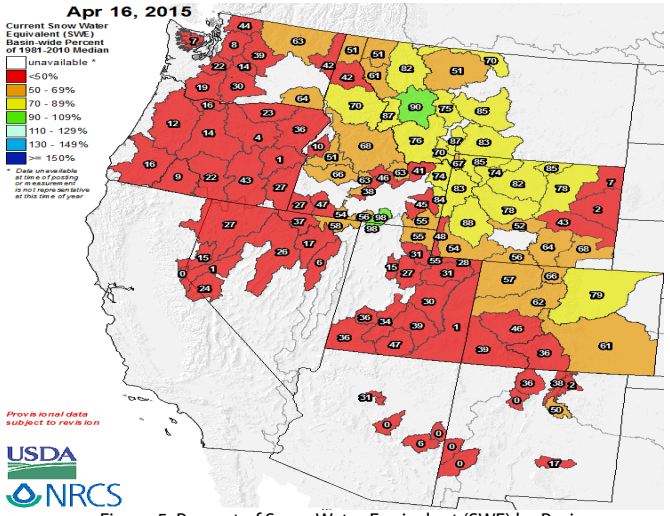



Figure 5: Percent of Snow Water Equivalent (SWE) by Basin

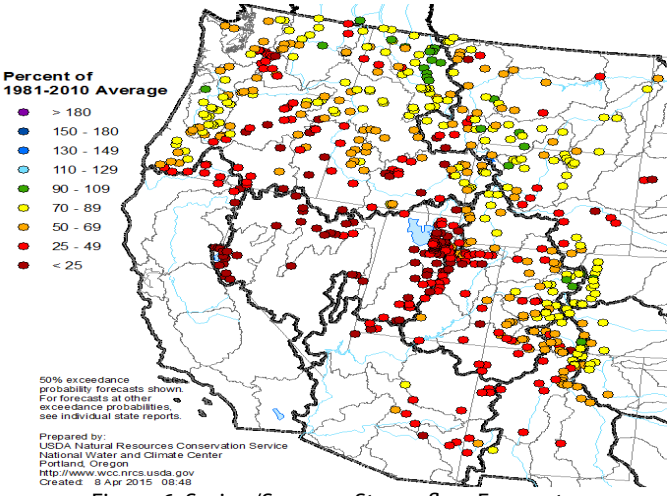



Figure 6: Spring/Summer Streamflow Forecasts

## 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/

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

# 2014-15 El Niño Tracker

Strong signals in early 2014 stalled, delaying El Niño's onset until last month, when ocean-atmosphere coupling and an additional Kelvin wave indicated more favorable conditions. Despite this late start, El Niño continued for a second consecutive month. Recent increases in sea surface temperature (SST) anomalies (Fig.1 - 2) and ongoing convective activity associated with El Niño-favorable conditions indicate we might be witnessing a two-year El Niño event. These forecasts rely on projections during a time of increasing uncertainty, and the so-called "spring predictability barrier" continues to make it difficult to anticipate how seasonal changes will help or hinder El Niño.

The most recent forecasts continue to offer mixed signals regarding El Niño, but are more bullish this spring than last year. On April 9, the NOAA-Climate Prediction Center (CPC) issued an El Niño advisory with a 70 percent chance that El Niño will continue through summer 2015 and more than a 60 percent chance the event would last through fall. They pointed to the large Kelvin wave, along with ongoing ocean-atmospheric coupling, as an indication a weak El Niño event would linger, with potential for further development in the long term. On April 10, the Japan Meteorological Agency declared the El Niño event likely to have ended in winter 2015, with current conditions being ENSO-neutral, but also projected El Niño conditions could return by summer. On April 14, the Australian Bureau of Meteorology upgraded their tracker to "alert" status (one below an official El Niño designation), with warming in the tropical Pacific, weak trade winds, and projected additional ocean warming listed as contributing factors. On April 16, the International Research Institute for Climate and Society (IRI) and CPC forecasts highlighted increasingly favorable oceanic and atmospheric conditions, with an 80 percent probability of El Niño extending from summer into fall, and a 70 percent probability of El Niño extending into next winter (Fig. 3). The North American multi-model ensemble shows a weak event extending through the spring, with potential for a moderate or even strong event by summer or early fall (Fig. 4).

This El Niño event continues to defy expectations, with some models indicating conditions are strengthening rather than weakening during the spring transition. Forecasting or characterizing this event remains difficult given the lack of analog events in the historical record, and the complexity of this El Niño guarantees it will be of interest to climatologists for years to come. Seasonal forecasts continue to indicate an increased chance of above-average precipitation through much of the Southwest, likely tied to the presence of El Niño favorable conditions. Perhaps more interesting is the possibility of a repeat of 2014's tropical storm season, when conditions favorable to El Niño were thought to have been driving increased storm activity in the Southwest.

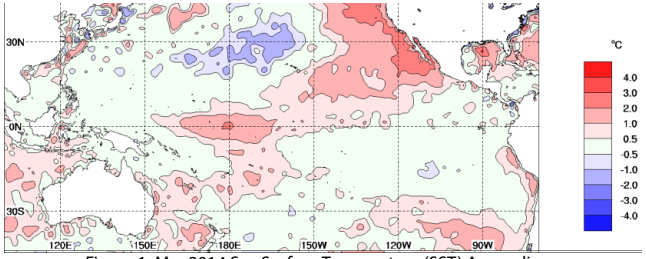


Figure 1: Mar 2014 Sea Surface Temperature (SST) Anomalies

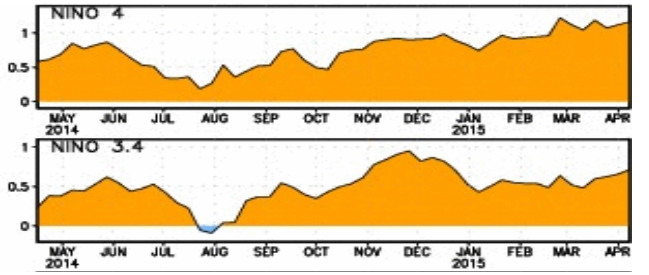


Figure 2: SST Anomalies in Niño 3.4 & 4 Regions (NCDC)

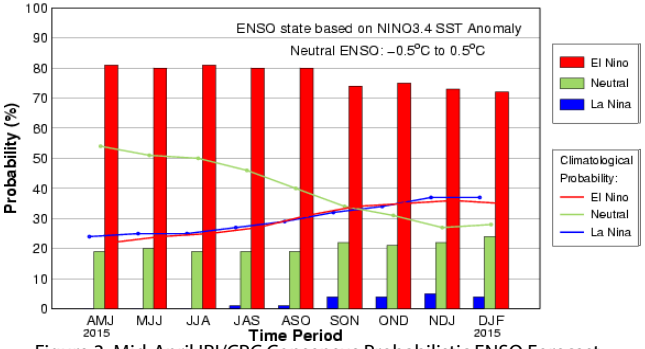


Figure 3: Mid-April IRI/CPC Consensus Probabilistic ENSO Forecast

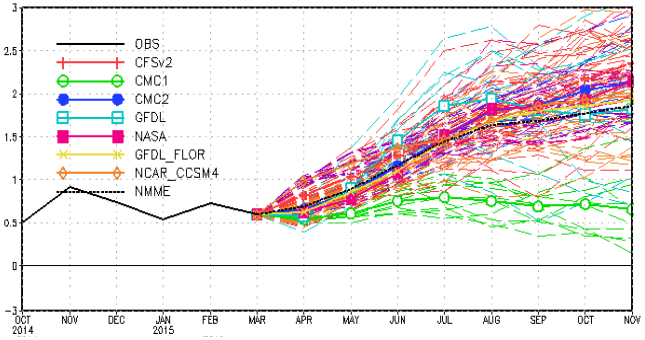


Figure 4: North American Multi-Model Ensemble Forecast for Niño 3.4

## Online Resources

**Figure 1&2**
**National Interagency Coordination Center**
http://www.predictiveservices.nifc.gov/outlooks/outlooks.htm

# Spring Signals the Start of Wildfire Season for the Southwest

Flowers are blooming and trees have sprouted green leaves, signs that spring is in full swing across the Southwest and that, despite a verdant desert, wildfire season is upon us. The outlook for this wildfire season forecasts near-average wildfire activity for much of Arizona and New Mexico.

Several factors, including gradually increasing temperatures, a decreasing probability of precipitation, and increasing wind, create perfect climatological conditions for wildfire. From a climate perspective, spring is also a transition season, when the winter storm track lifts north and the sub-tropical high pressure system to the south starts to build north, both in response to an increasing sun angle and increased heating of the Northern Hemisphere. The retreat of the winter storm track and advancement of the sub-tropical ridge is generally not a clean transition, but a battle of cool and warm air masses that plays out over weeks, if not months. In this battle, the atmospheric pressure gradient tightens and wind speeds increase in response, creating conditions that can cause wildfires to grow quickly. In Arizona and New Mexico, hot, dry, and windy conditions are often the norm in late spring, and not surprisingly, this forms the heart of wildfire season for this part of the Southwest.

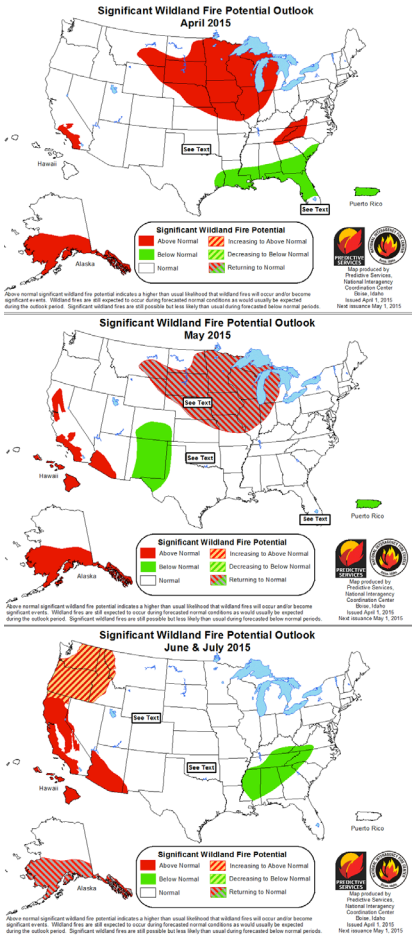


Figure 1: Wildland Fire Potential Outlook Apr - July 2015

Spring wildfire activity can be modulated by conditions from the previous winter, the previous summer, or even several years prior. Long-term drought conditions can stress and kill trees, increasing fire risk, but wet winters and strong monsoons can also drive increased fire risk. Fast-growing vegetation like grasses and annuals grow quickly during wet periods, then dry out and become fine fuels for subsequent wildfire seasons.

The current wildfire outlook for the southwest notes that near-average wildfire activity is expected for much of Arizona and New Mexico, due largely to some improvements in drought conditions across the region, including above average precipitation last summer and into the early winter season. But this precipitation also spurred on new vegetation growth, increasing the risk of wildfires across southern Arizona this spring as this vegetation senesces and becomes flammable. Fire managers will be watching these emergent conditions carefully, especially as dry and windy conditions create short-term windows of elevated fire risk.

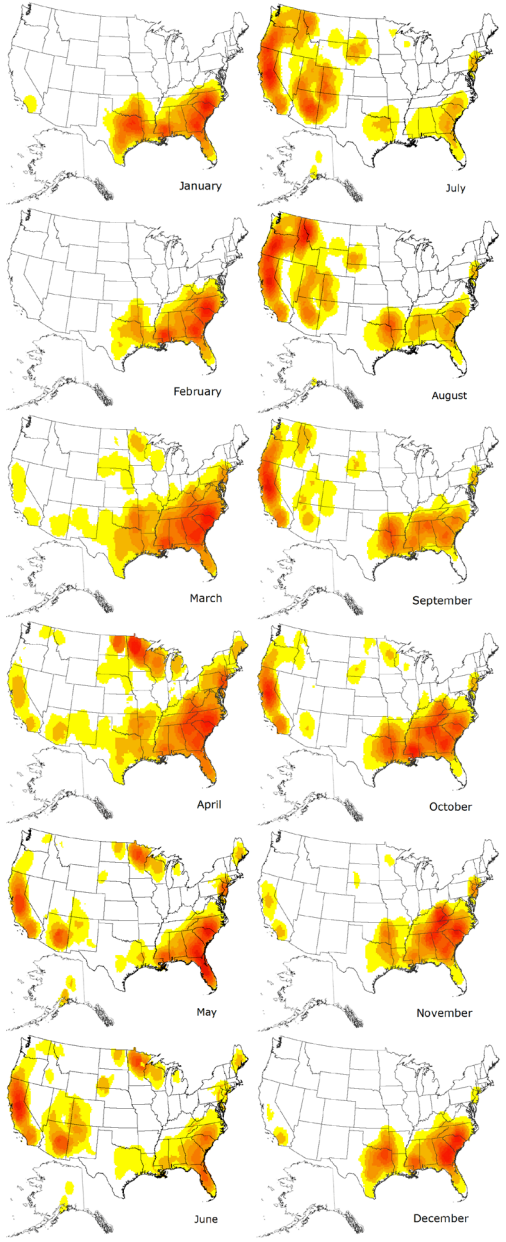


Figure 2: Wildfire Density by Month

## 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

### 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).

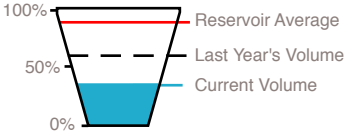
The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons). On average, 1 acre-foot of water is enough to meet the demands of 4 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.

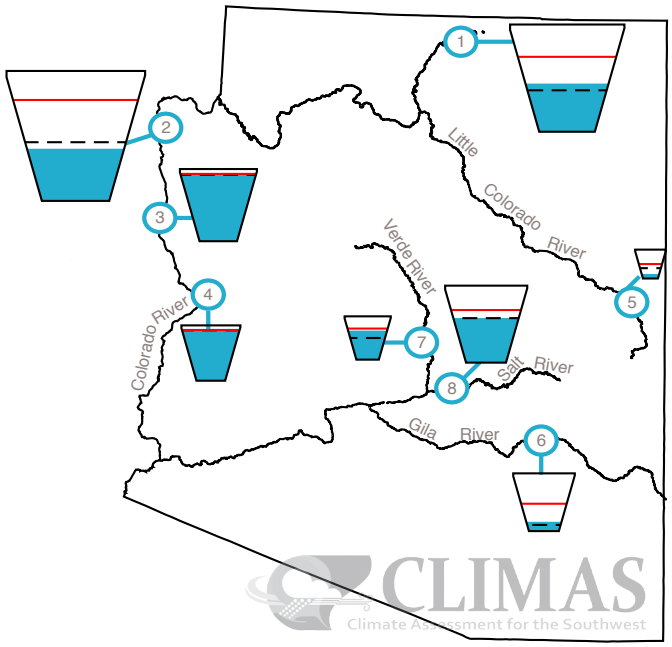
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

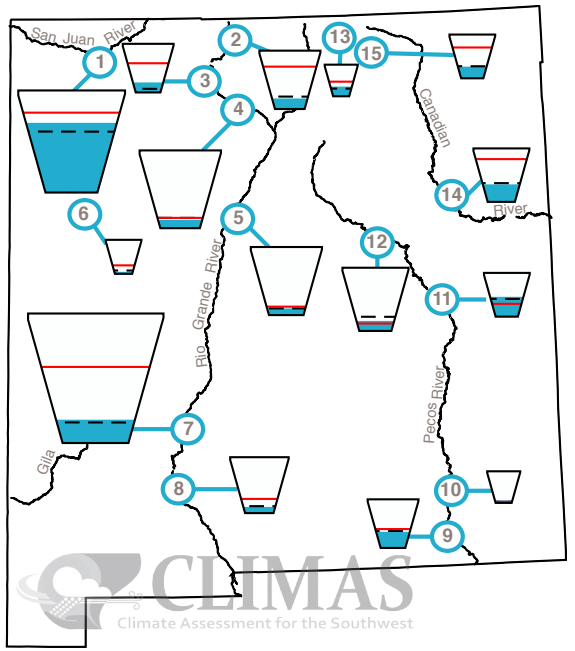
# Reservoir Volumes

DATA THROUGH MAR 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 | 45% | 10,917.0 | 24,322.0 | -107.0 |
| 2. Lake Mead | 40% | 10,419.0 | 26,159.0 | -349.0 |
| 3. Lake Mohave | 94% | 1,692.7 | 1,810.0 | 34.7 |
| 4. Lake Havasu | 93% | 577.9 | 619.0 | -0.1 |
| 5. Lyman | 16% | 4.8 | 30.0 | 0.6 |
| 6. San Carlos | 16% | 138.4 | 875.0 | -3.3 |
| 7. Verde River System | 66% | 188.5 | 287.4 | 62.4 |
| 8. Salt River System | 57% | 1,146.5 | 2,025.8 | 43.2 |

*KAF: thousands of acre-feet

| Reservoir | Capacity | Current Storage* | Max Storage* | One-Month Change in Storage* |
|---|---|---|---|---|
| 1. Navajo | 68% | 1,150.4 | 1,696.0 | 54.0 |
| 2. Heron | 17% | 67.6 | 400.0 | 6.3 |
| 3. El Vado | 20% | 37.3 | 190.3 | 20.1 |
| 4. Abiquiu | 11% | 133.5 | 1,192.8 | -0.3 |
| 5. Cochiti | 10% | 48.7 | 491.0 | -0.2 |
| 6. Bluewater | 6% | 2.4 | 38.5 | 0.0 |
| 7. Elephant Butte | 17% | 368.1 | 2,195.0 | 39.4 |
| 8. Caballo | 11% | 36.1 | 332.0 | 0.8 |
| 9. Lake Avalon | 33% | 1.3 | 4.0 | -1.9 |
| 10. Brantley | 8% | 84.9 | 1,008.2 | 0.4 |
| 11. Sumner | 45% | 45.6 | 102.0 | -2.7 |
| 12. Santa Rosa | 16% | 71.2 | 438.3 | 1.9 |
| 13. Costilla | 30% | 4.8 | 16.0 | 0.8 |
| 14. Conchas | 33% | 84.4 | 254.2 | -0.1 |
| 15. Eagle Nest | 26% | 20.5 | 79.0 | 2.2 |

* in KAF = thousands of acre-feet