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# June Southwest Climate Outlook

**Precipitation:** May and June historically are the driest months in the Southwest, and in the last 30 days rainfall in most of Arizona was nil. However, a storm wafting in from the Gulf of Mexico delivered copious rain in parts of eastern New Mexico. Since mid-December, precipitation in most of Arizona and New Mexico has been less than 50 percent of average.

**Temperature:** In the last 30 days, temperatures were above average in nearly all of Arizona and New Mexico. Anomalies were highest in southern Arizona and New Mexico. In southern Arizona, temperatures were 4–8 degrees F warmer than average. Temperature anomalies at night (i.e., the daily low temperature) were slightly higher than day anomalies, likely because of increases in humidity in recent weeks.

**Water Supply:** Total water stored in Arizona and New Mexico reservoirs increased in May. In Arizona, storage in Lake Powell increased by about 1.1 million acre-feet (AF), while Lake Mead declined by about 600,000 AF. In New Mexico, total reservoir storage is at about 25 percent of capacity, and storage in Elephant Butte is at 17 percent of capacity. Due to the low levels, water allocated to irrigators in the Elephant Butte Irrigation District will receive only 6 inches of water per acre, 30 inches below a full allocation.

**Drought:** About 76 and 85 percent of Arizona and New Mexico, respectively, are experiencing at least severe drought. In the last four weeks, drought largely remained the same in Arizona but improved in northeastern New Mexico. Drought intensity remains relatively unchanged in Arizona and less intense in New Mexico compared to one year ago.

**ENSO:** Although ENSO-neutral conditions continue, there is a 70 percent chance an El Niño event will develop during the summer. The ultimate strength of the event is still uncertain, but several indicators of an El Niño have weakened in recent weeks, suggesting that a strong event may not materialize.

**Precipitation Forecasts:** Numerous climate models forecast an increased chance for wetter-than-average conditions during the monsoon for Arizona and New Mexico. This forecast may reflect increased chances for East Pacific tropical storm activity, which can inject moisture into the Southwest.

**Temperature Forecasts:** Precipitation in the summer can suppress temperatures by increasing evaporative cooling and cloud cover. With elevated chances for above-average precipitation, forecasts call for equal probabilities for above-, below-, and near-average temperatures.

**Fire Forecasts:** The number of acres burned this year has been above average in Arizona and below average in New Mexico. For the next month, fire risk is above normal in most of both states; fire activity in the Southwest is highest in June and July.

## Tweet June's SW Climate Snapshot

CLICK TO TWEET

El Niño being fickle but likely to emerge during monsoon. SW could use summer and/or winter rain. More climate @ http://bit.ly/1ypoRyv

## Online Resources

**Figure 1.**
**International Research Institute for Climate and Society**
http://iridl.ldeo.columbia.edu/maproom/ENSO/#tabs-4

**Figure 2.**
**International Research Institute for Climate and Society**
http://iri.columbia.edu/wp-content/uploads/2014/06/quick_look_composite_jun141.pdf

**Figure 3.**
**Data from Climate Predication Center; image created by CLIMAS**
http://www.esrl.noaa.gov/psd/data/gridded/data.unified.daily.conus.html

# El Niño Watch

Chances are high that an El Niño event will take hold in coming months, according to the June ENSO forecast issued by the NOAA Climate Prediction Center (CPC) and International Research Institute for Climate and Society (IRI; Figure 1). Most models suggest a moderate event will materialize, which is a slight downgrade in intensity from forecasts made last month. One reason for this change is that subsurface temperatures in the eastern Pacific Ocean, while still well above average (Figure 2), have cooled slightly in the past month. The initial subsurface warming was triggered by a wave that traversed the equatorial Pacific in the spring and has been slowly delivering warm water to the surface over the last two months. The surfacing of this warm water, however, has also led to subsurface cooling that may, in turn, lower sea surface temperatures (SSTs) in upcoming months.

Even though SSTs likely will cross the El Niño threshold, reaching moderate or stronger levels will require the atmosphere to act in concert, which it has yet to do. The strength of easterly winds along the equator and the Southern Oscillation Index are near average, both indicating that the atmosphere is paying little attention to the warm SST pattern. For the nascent El Niño to gain steam, convection normally in the western Pacific Ocean will need to move east towards the emerging warm SSTs in the central Pacific. Convection in the central Pacific Ocean will then weaken the easterly winds along the equator, helping to stall the upwelling of cool water in the far eastern Pacific Ocean and further reinforcing unusually warm SSTs across the eastern and central parts of the Pacific basin. This coupling between atmospheric winds and SSTs is the hallmark of a mature El Niño event.

For those rooting for El Niño, a jumpstart to the atmosphere may be forthcoming if a forecasted Madden Julian Oscillation (MJO) appears. An MJO is a flare-up of convection in the Indian Ocean that moves headstrong into the easterly winds in the tropics and therefore reduces their strength. The fate of ENSO likely will become clearer next month.

The take-home message is an El Niño is expected but it is uncertain whether the event will blossom into a strong El Niño similar to 1997–98, limp along as a weak event, or be in-between. The best guess (for now) sides with moderate strength. For winter precipitation in the Southwest, the intensity appears to matter. Arizona and New Mexico, particularly southern parts of both states, often receive more precipitation during moderate and strong events than weak ones; the statistical relationship, however, suffers from a small sample size. Nonetheless, El Niño events tend to bring wetter conditions to many parts of the Southwest (Figure 3), a welcome sign after four consecutive winters of below-average precipitation and widespread drought.

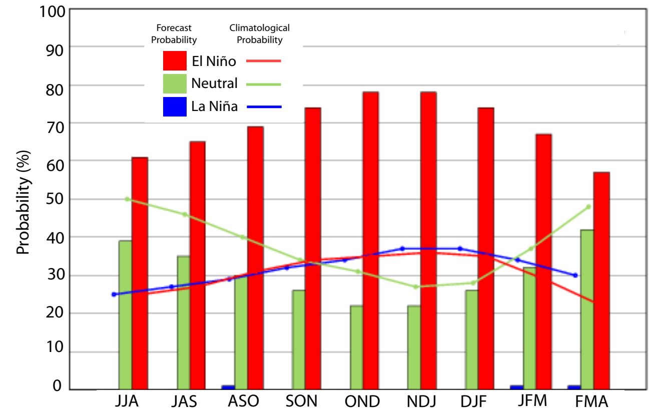



Figure 1. Seasonal probablities for ENSO phases. ENSO states based on sea surface temperature anomalies in the Nino3.4 region. El Niño anomalies are greater than 0.5 C; La Niña anomalies are less than -0.5

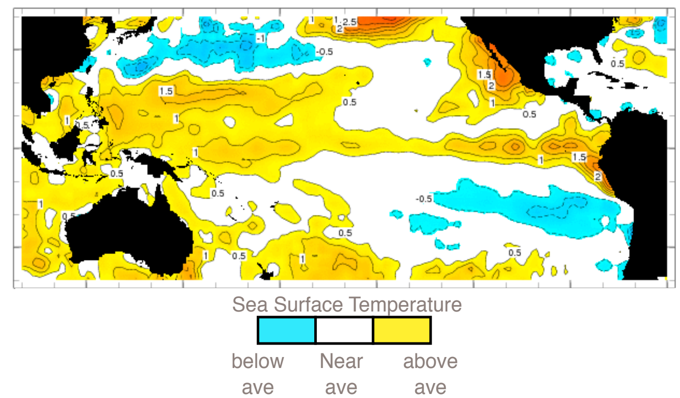



Figure 2. Sea surface temperature anomalies during June 8-14, 2014.

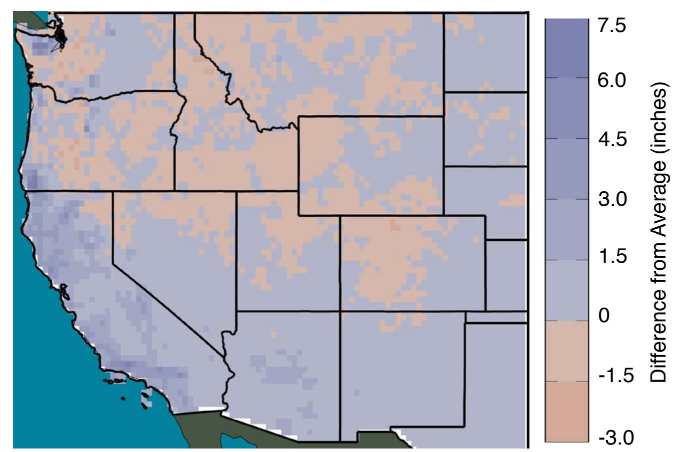



Figure 3. Precipitation anomalies during El Niño events. Anomalies are calculated for all El Niño events between 1950 and 2013.

## Online Resources

**Portions of the information provided in this figure can be accessed at 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).

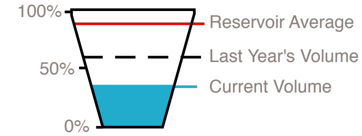
The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons).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

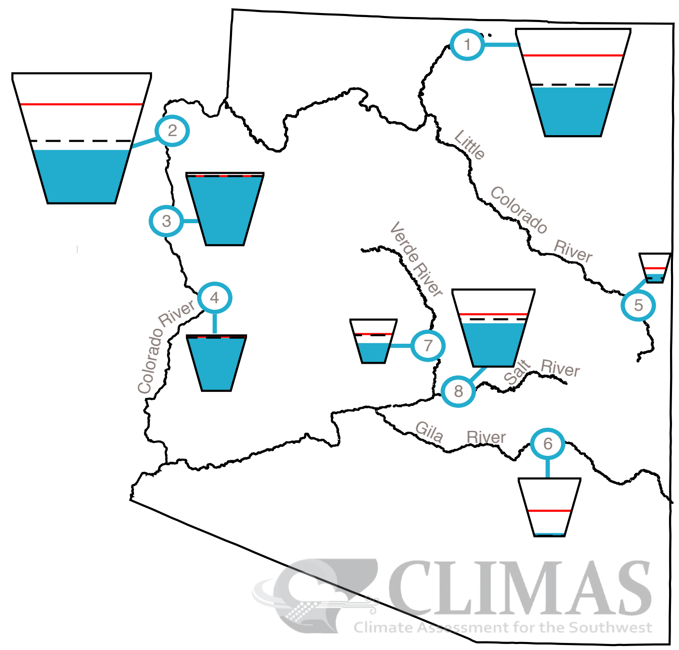
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

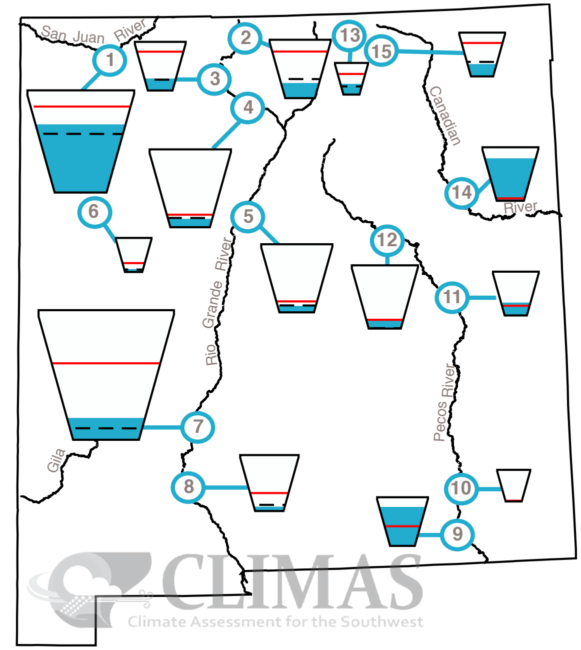
# Reservoir Volumes

DATA THROUGH MAY 31, 2014

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




| Reservoir Name | Capacity | Current Storage* | Max Storage* | One-Month Change in Storage* |
|---|---|---|---|---|
| 1. Lake Powell | 45% | 10,850.0 | 24,322.0 | 1094.0 |
| 2. Lake Mead | 41% | 10,627.0 | 26,159.0 | -613.0 |
| 3. Lake Mohave | 95% | 1,721.8 | 1,810.0 | 26.0 |
| 4. Lake Havasu | 95% | 590.9 | 619.0 | 8.1 |
| 5. Lyman | 29% | 8.7 | 30.0 | -1.4 |
| 6. San Carlos | 5% | 47.7 | 875.0 | -20.9 |
| 7. Verde River System | 46% | 132.0 | 287.4 | 0.5 |
| 8. Salt River System | 56% | 1,127.9 | 2,025.8 | -40.4 |

*thousands of acre-feet

| Reservoir Name | Capacity (% capacity) | Current Storage (KAF)* | Max Storage (KAF)* | Change in Storage (KAF)* |
|---|---|---|---|---|
| 1. Navajo | 67% | 1142.1 | 1,696.0 | 89.4 |
| 2. Heron | 26% | 105.3 | 400.0 | 14.4 |
| 3. El Vado | 25% | 48.2 | 190.3 | 12.5 |
| 4. Abiquiu | 11% | 128.8 | 1,192.8 | -18.1 |
| 5. Cochiti | 10% | 49.2 | 491.0 | -0.7 |
| 6. Bluewater | 9% | 3.3 | 38.5 | -0.2 |
| 7. Elephant Butte | 17% | 363.1 | 2,195.0 | -0.5 |
| 8. Caballo | 8% | 26.8 | 332.0 | -11.9 |
| 9. Lake Avalon | 82% | 3.2** | 4.0 | -1.0 |
| 10. Brantley | 0% | 1.2 | 1,008.2 | -15.5 |
| 11. Sumner | 30% | 30.3 | 102.0 | -8.1 |
| 12. Santa Rosa | 15% | 67.0 | 438.3 | -4.9 |
| 13. Costilla | 34% | 5,5 | 16.0 | 0.9 |
| 14. Conchas | 33% | 83.1 | 254.2 | -2.1 |
| 15. Eagle Nest | 28% | 21.8 | 79.0 | 0.3 |

* KAF = thousands of acre-feet   ** provisional value