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August Southwest Climate Outlook

Precipitation: In the past 30 days, much of southern Arizona and New Mexico received below-average precipitation, with portions of northern Arizona and New Mexico recording above-average precipitation (Fig. 1). In August, below-average precipitation has been punctuated by a few intense storm systems, mostly in Arizona. For New Mexico, July was the 10th wettest month on record. In general, the precipitation events that have occurred have been more localized storm systems, resulting in highly variable precipitation across the region (see Monsoon Tracker, pages 5-6).

Temperature: After a record warm start to 2015, much of the Southwest cooled off in July, especially in Arizona (Fig. 2). This respite was short-lived however, as temperature anomalies in the past 30 days were between 0 and 6 degrees F above normal across most of New Mexico and most of Arizona (Fig. 3). Globally, 2015 likely will challenge 2014 for warmest year on record, a trend that could affect temperature trends in the Southwest.

Monsoon: The highly variable nature of the monsoon in terms of when and where rain falls poses a serious challenge to anyone attempting to characterize the monsoon. That said, summer 2015 has been relatively typical, with average to above-average rainfall across much of Arizona and more consistent and sustained above-average precipitation in New Mexico. We also have seen expected breaks in storm activity as the monsoon ridge moves, affecting regional patterns of precipitation—or lack thereof—across the region (see Monsoon Tracker, pages 5–6 for a more detailed discussion).

Drought & Water Supply: The U.S. Drought Monitor continues to emphasize drought conditions across the West, with particularly severe conditions in California and Nevada (Fig. 4). Arizona and New Mexico continue to grapple with years of accumulated drought and water deficits, but recent sustained and widespread precipitation has helped slightly scale back drought conditions, particularly in New Mexico (see Reservoir Volumes, page 7).

Wildfire: As of July 31, wildland fires had burned approximately 120,000 acres in Arizona and about 40,000 acres in New Mexico. One notable blaze was the Finger Rock fire, which ignited in the Santa Catalina Mountains in southern Arizona and was visible from Tucson for a number of days. Favorable weather conditions allowed fire managers to let the fire burn out naturally, despite proximity to residential areas. This fire season, well above-average precipitation in Arizona in June and in New Mexico in July tamped down fire risk across the region, resulting in limited regional fire and fire suppression activity, and favorable weather conditions permitted a number of fires to be left to burn, benefitting forest health.

Precipitation & Temperature Forecasts: The Aug. 20 NOAA-Climate Prediction Center seasonal outlook predicts above-average precipitation for most of the Southwest and Intermountain West this summer (Fig. 5, top). Notable exceptions are northern California and far northwestern Nevada. Temperature forecasts are split, with elevated chances for above-average temperatures along the West Coast and into western Arizona (and most of the western U.S.), and increased chances for below-average temperatures centered over Oklahoma and Texas and extending across New Mexico (Fig. 5, bottom). It remains to be seen what effect eastern Pacific tropical storms and El Niño will have on these patterns.

Tweet August SW Climate Outlook CLICK TO TWEET

Aug2015 @CLIMAS_UA SW Climate Outlook -Monsoon Recap, El NIño Summary, Southwestern Climate Summary and Forecasts http://bit.ly/1UW1PJM

August Southwest Climate Outlook

Online Resources

Figure 1
High Plains Regional Climate Center
http://www.hprcc.unl.edu/

Figure 2
NOAA - National Center for Environmental Information
https://www.ncdc.noaa.gov/

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

Figure 4
U.S. Drought Monitor
http://www.droughtmonitor.unl.edu

Figure 5
NOAA/NWS - Climate Prediction Center
http://www.cpc.ncep.noaa.gov/

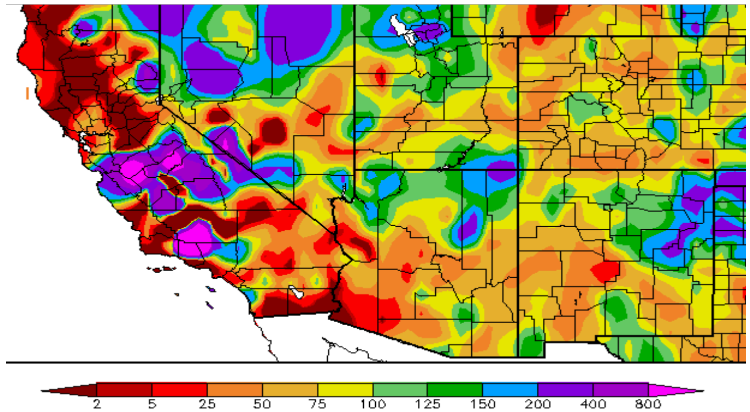

Figure 1: Percent of Normal Precipitation - Past 30 Days

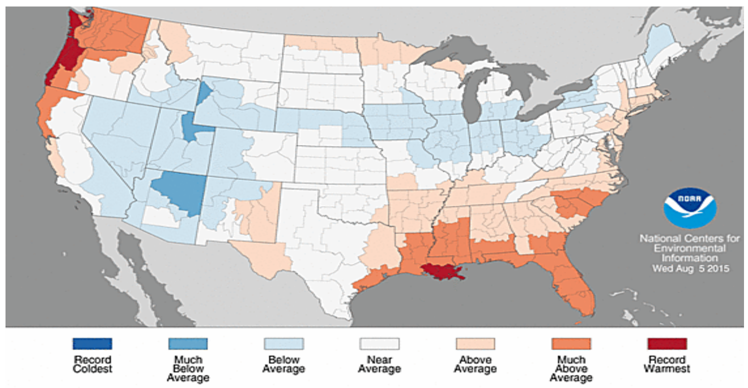

Figure 2: Division Average Temperature Ranks - July 2015

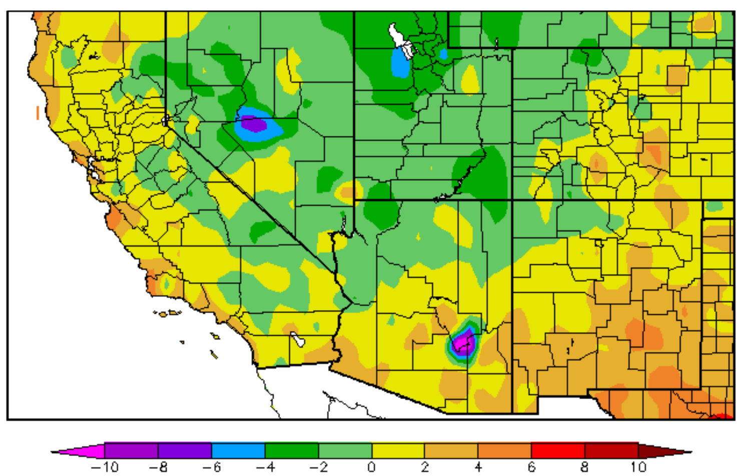

Figure 3: Departure from Normal Temp (F) - Jul 21 - Aug 19, 2015

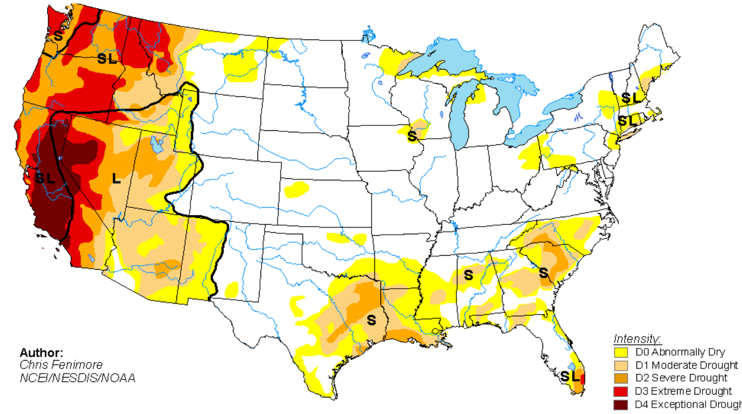

Figure 4: US Drought Monitor - August 18, 2015

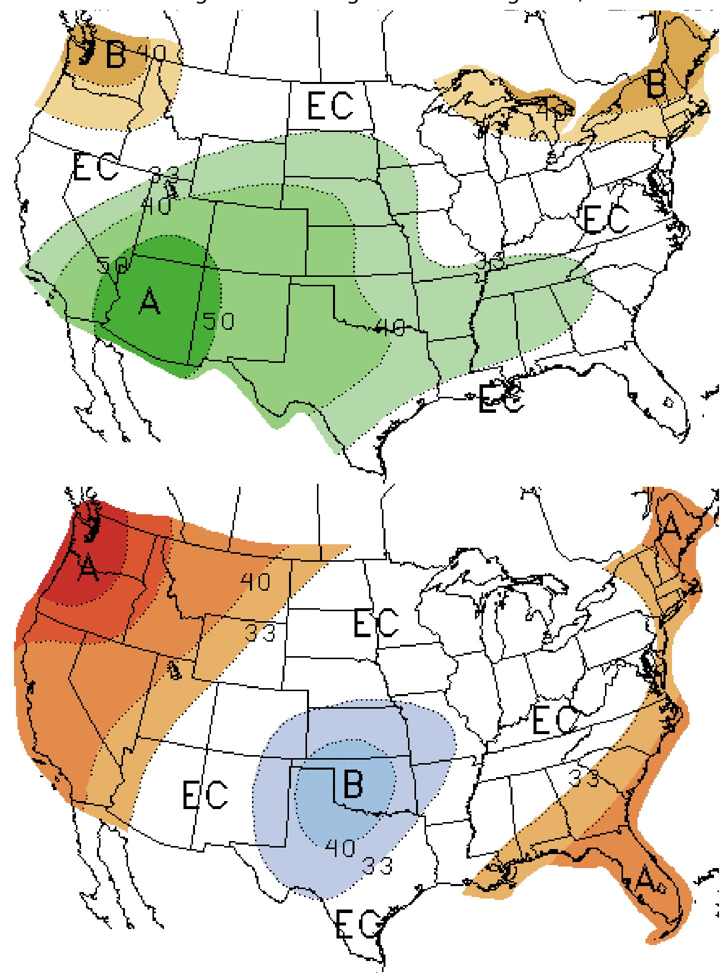

Figure 5: Three-Month Precipitation & Temperature Outlook - Aug 20, 2015

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

2015 El Niño Tracker

El Niño conditions continued for a sixth straight month and forecasts and the most recent outlooks offer a consistent cluster of forecasts calling for a clear El Niño signal similar to past strong events, lasting into early 2016. Forecasts focused on the persistence of sea-surface temperature (SST) anomalies (Figs.1–2) and on weakened trade winds, ongoing convective activity in the central and eastern Pacific, and El Niño-related ocean-atmosphere coupling.

On August 10, the Japan Meteorological Agency identified persistent El Niño conditions in the equatorial Pacific, especially SST anomalies and convective activity, and forecast that the current El Niño conditions were likely to persist until winter. On August 13, the NOAA-Climate Prediction Center (CPC) extended its El Niño advisory, predicting more than a 90-percent chance that El Niño will continue through winter 2015–2016 and an 85-percent chance it will last into early spring 2016 (Fig. 3). The center cited persistent positive SST anomalies in the central and eastern Pacific and ongoing ocean-atmospheric coupling and convection activity as indicators of an ongoing and strengthening event. On August 18, the Australian Bureau of Meteorology maintained its tracker at official El Niño status, identifying a strengthening El Niño with strong ocean-atmosphere coupling and projecting the event is likely to persist into 2016. On August 20, the International Research Institute for Climate and Society (IRI) and CPC forecasts indicated the persistence of strong El Niño conditions, with possible further strengthening during fall 2015, and extending well into spring 2016. The North American multi-model ensemble currently shows a strong event extending into 2016 (Fig. 4).

Given that the current and projected strength of the El Niño is strong with no sign of weakening, emergent questions have centered on how this event compares to other strong events such as those in 1982–83 and 1997–98. Limited data makes comparisons and statistical analyses more difficult, and each event has a unique context that affects its impact. If El Niño remains on this trajectory, it most likely will be one of the top three or four strongest events on record since 1950, with implications for both Southwest and global communities. Sensationalistic media coverage already has begun (see recent coverage of "Godzilla" El Niño), but it will be important to temper expectations without minimizing possible impacts.

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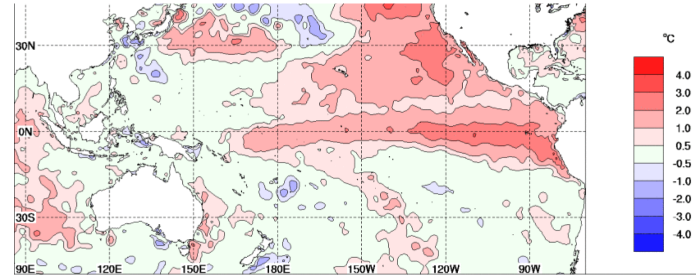

Figure 1: July 2015 Sea Surface Temperature (SST) Anomalies

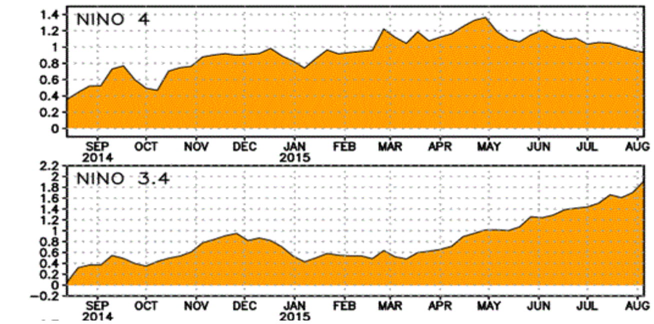

Figure 2: SST Anomalies in Niño Regions 3.4 & 4 (NCDC)

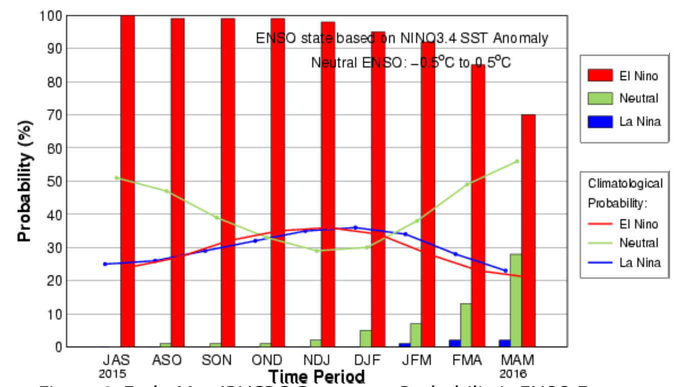

Figure 3: Early-May IRI/CPC Consensus Probabilistic ENSO Forecast

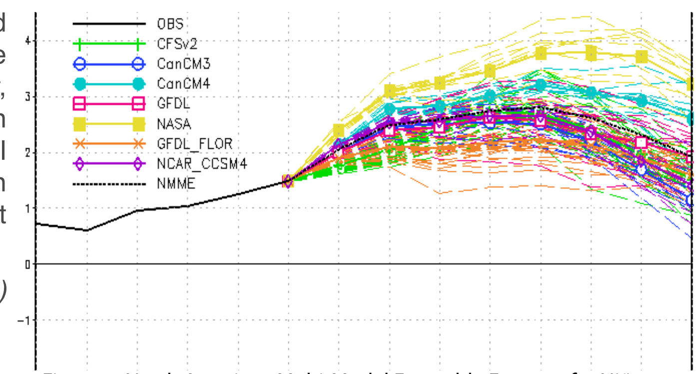

Figure 4: North American Multi-Model Ensemble Forecast for Niño 3.4

Online Resources

Figure 5
NOAA Climate.gov
https://www.climate.gov/

https://www.climate.gov/news-features/blogs/enso/united-states-el-ni%C3%B1o-impacts-0

CLIMAS YouTube Channel

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www.youtube.com/user/UACLIMAS/

Podcasts

Visit our website or iTunes to subscribe to our podcast feed

www.climas.arizona.edu/media/podcasts

2015 El Niño Tracker (cont.)

The general consensus is that a strong El Niño extending into winter 2015–2016 would likely bring above-average winter precipitation in the Southwest (Fig. 5), particularly later in the season. It is important to note that this relationship suggests that a strong El Niño event gives the Southwest a much better chance at increased precipitation totals by March or April, but it is far from a guarantee of increased precipitation. Current CPC forecsts do indicate increased an chance of precipitation in late fall and early winter, but the region could very well see a relatively dry period through early 2016 following the close of the eastern Pacific tropical storm season; this would not necessarily mean that El Niño was a "bust." In the more immediate future, El Niño conditions could lead to a repeat of 2014's above-average eastern Pacific tropical storm season, when conditions favorable to El Niño were thought to be driving increased tropical storm activity in the Southwest in September and October.

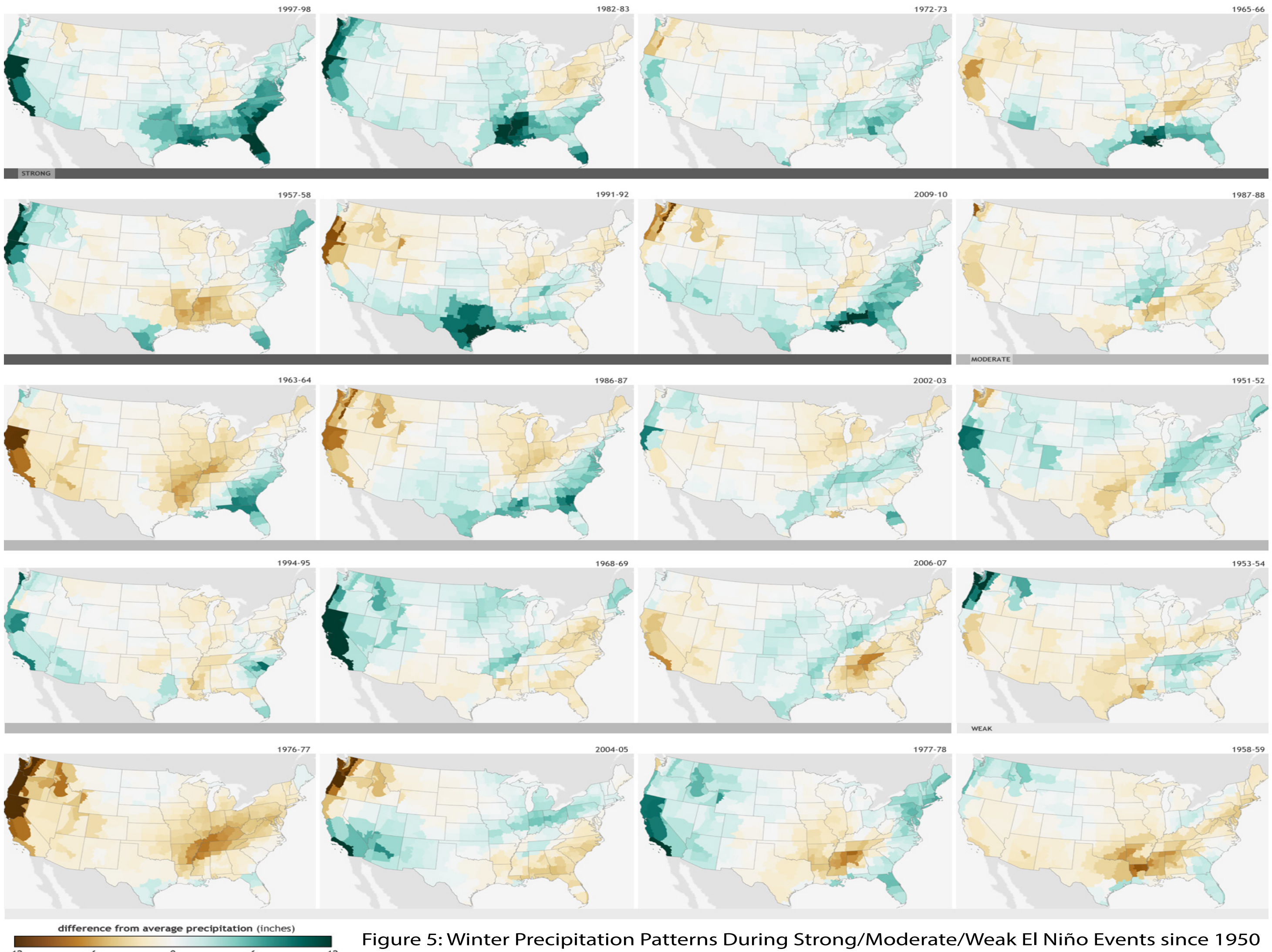

Figure 5: Winter Precipitation Patterns During Strong/Moderate/Weak El Niño Events since 1950

Online Resources

Figure 1
National Center for Environmental Information
https://www.ncdc.noaa.gov

Figure 2
NOAA - National Weather Service
http://www.wrh.noaa.gov/twc/monsoon/dewpoint_tracker.php

Monsoon Summary (June 15 - August 20)

The monsoon started off early and strong with several widespread thunderstorms in late June and early July, especially in Arizona, which recorded its second wettest June on record. Precipitation tapered to some extent in July in Arizona but continued to be frequent and widespread in New Mexico, which recorded its 10th wettest July on record (Figs. 1a-2a).

Overall monsoon activity has taken a break thus far in August, although a few powerful and localized storms brought significant precipitation to portions of Arizona. This pattern is a defining characteristic of the 2015 monsoon, particularly in Arizona, where many of the monsoon storms have been highly localized, dropping heavy precipitation in smaller areas and often on high elevation peaks instead of more widespread and systematic monsoon activity. Portions of southern Arizona and the Four Corners region—areas that saw considerable precipitation deficits in the past few years—have been the beneficiaries of this variable coverage, especially in the past few weeks. This pattern may change if the monsoon ridge sets up further east, allowing for more organized storm activity to flow in from the south in the coming weeks, or if later-season eastern Pacific tropical storm activity ramps up and helps drive moisture into the region.

We also have seen some weakening of the monsoon ridge since July 5, likely due to El Niño convection picking back up, but it remains to be seen what the overall impact of El Niño will be on this year's monsoon. Regional dewpoint readings also illustrate the variability of monsoon activity, particularly in July and into August (Fig. 2).

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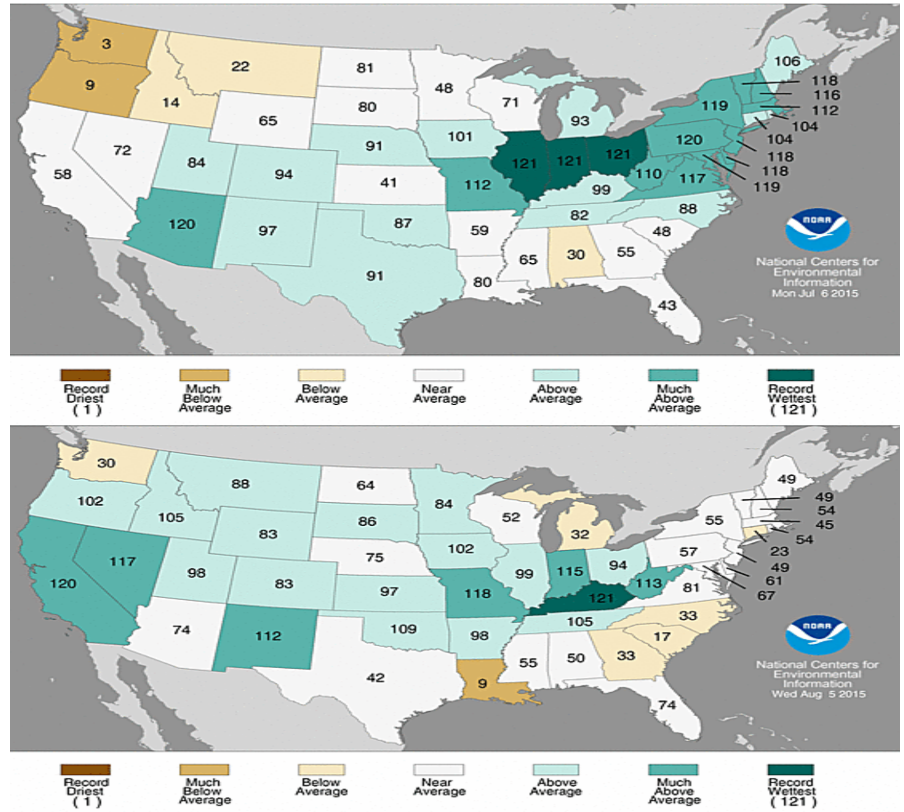


Figure 1: Statewide Precipitation Ranks June (A) & July (B) 2015

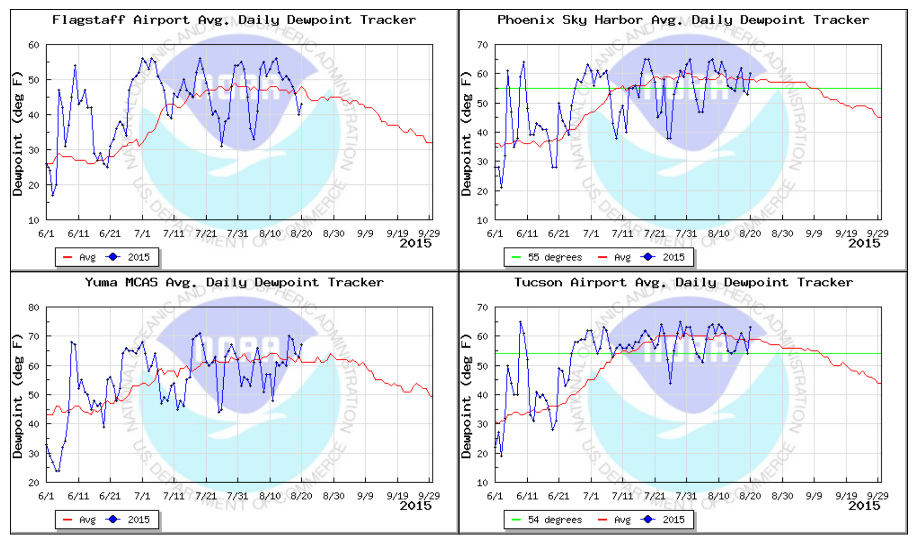


Figure 2: Average Daily Dewpoint Tracker - Flagstaff - Phoenix - Yuma - Tucson

Online Resources

Figures 3-6
Climate Science Applications Program
http://cals.arizona.edu/climate/

Monsoon Summary (June 15 - July 16)

In the first two months of the monsoon, most of northern Arizona and nearly all of New Mexico recorded above-average precipitation (Figs. 3a–b), albeit with a wide range of precipitation totals across the region (Figs. 4a–b). Southwestern Arizona, particularly the southwest and northwest corners, are notable exceptions to this pattern, although these areas typically receive far less monsoon precipitation overall. The percent of days with rain highlights the regularity of monsoon precipitation thus far, with much of eastern Arizona and nearly all of New Mexico recording rain events (greater than 0.01 inch) on 35 to 50 percent of days since June 15 (Figs. 5a–b). The daily intensity index (Figs. 6a–b) further illustrates the steady nature of most of this monsoon precipitation; higher values indicate much of the rain fell in a single event and lower values indicate more frequent and less intense events.

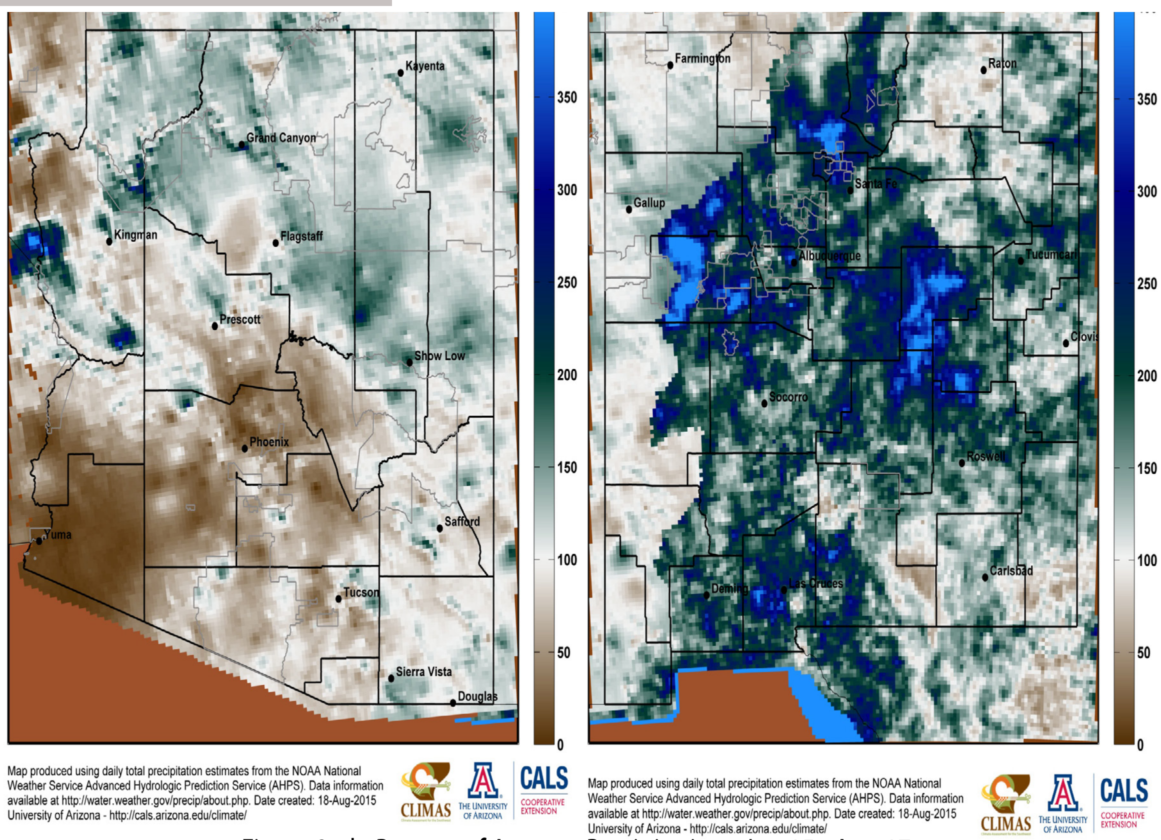


Figure 3a-b: Percent of Average Precipitation - Jun 15 - Aug 17

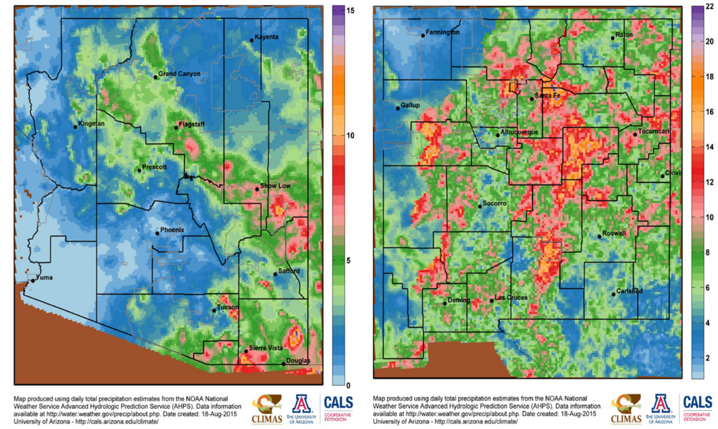


Figure 4a-b: Total Precipitation - Jun 15 - Aug 17

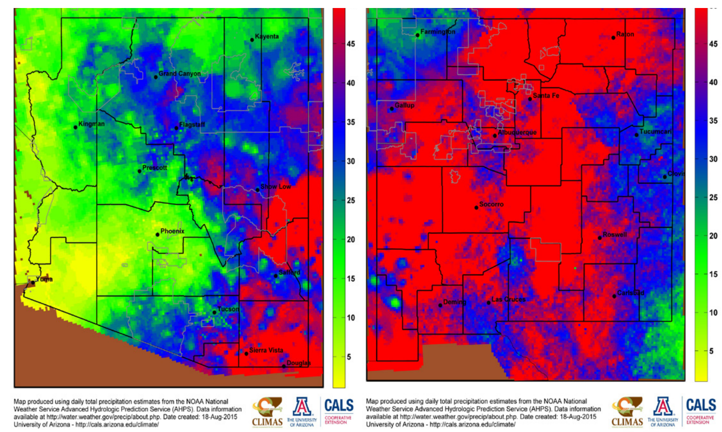


Figure 5a-b: Percent of Days With Rain (>0.01") - Jun 15 - Aug 17

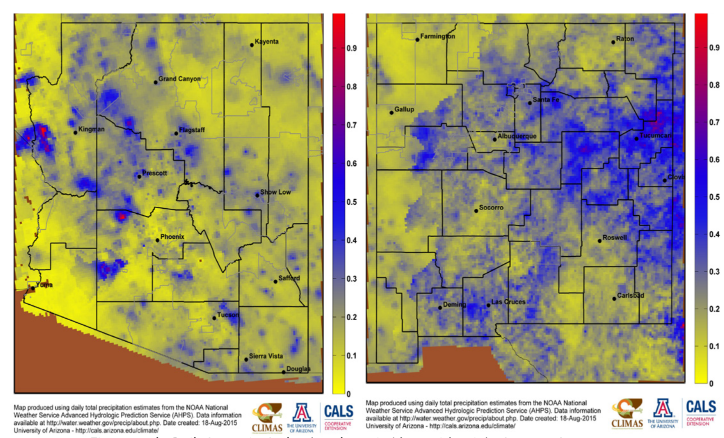


Figure 6a-b: Daily Intensity Index (total precip/days with rain) - Jun 15 - Aug 17

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 recently updated reservoir conservation storage totals for Abiquiu, Brantley, & Cochiti reservoirs, and added Ute Reservoir. All values are subject to change as we update our database

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).

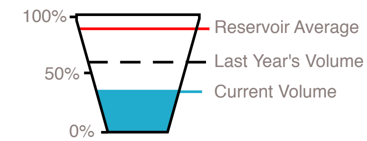
The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons).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

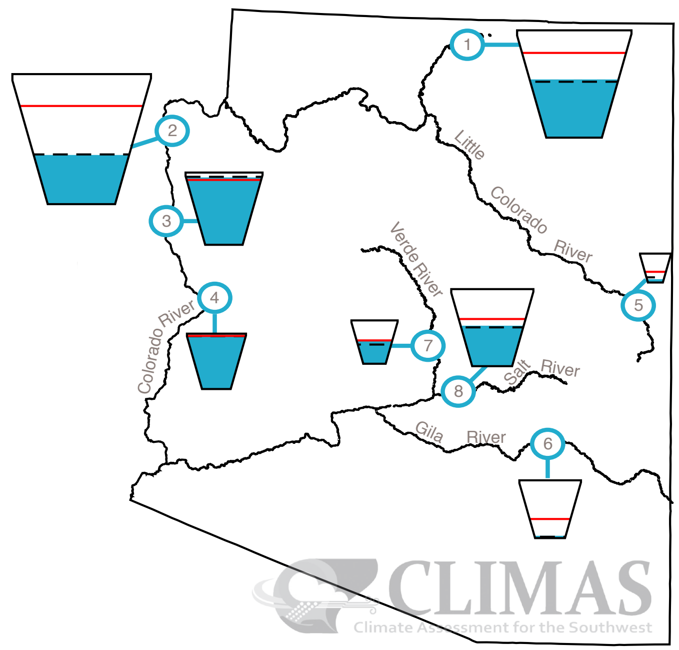
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

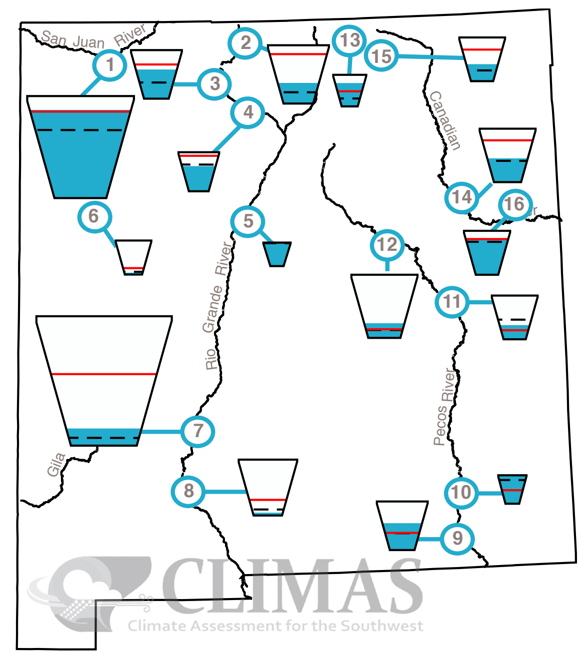
Reservoir Volumes

DATA THROUGH JULY 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	54%	13,033.6	24,322.0	-56.3
2. Lake Mead	38%	9,858.0	26,159.0	251.0
3. Lake Mohave	93%	1,686.9	1,810.0	-34.0
4. Lake Havasu	94%	579.8	619.0	-17.4
5. Lyman	11%	3.4	30.0	-0.7
6. San Carlos	4%	35.9	875.0	-57.4
7. Verde River System	52%	149.6	287.4	-1.8
8. Salt River System	52%	1,043.3	2,025.8	-41.2

*KAF: thousands of acre-feet

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	86%	1,462.4	1,696.0	1.1
2. Heron	35%	139.1	400.0	4.5
3. El Vado	60%	114.6	190.3	-5.7
4. Abiquiu	64%	120.1	186.8**	-1.9
5. Cochiti	97%	48.6	50.0**	0.4
6. Bluewater	6%	2.3	38.5	0.2
7. Elephant Butte	13%	283.5	2,195.0	-58.5
8. Caballo	5%	16.8	332.0	-0.5
9. Lake Avalon	55%	2.2	4.0	-0.8
10. Brantley	100%	71.3	1,008.2	0.8
11. Sumner	33%	33.4	102.0	0.6
12. Santa Rosa	23%	98.9	438.3	7.5
13. Costilla	74%	11.9	16.0	-0.2
14. Conchas	44%	112.1	254.2	3.6
15. Eagle Nest	39%	30.9	79.0	0.8
16. Ute Reservoir	81%	161	200	n/a