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March Southwest Climate Outlook

Precipitation: In the past 30 days, precipitation was below average in much of southern Arizona, above average in portions of northern Arizona and southern New Mexico, and near normal across much of the rest of the region (Fig. 1). Precipitation totals for the water year (since Oct. 1) are below average across all of Arizona and most of New Mexico and are even worse in other western areas; California, the Pacific Northwest, and the Intermountain West are recording significantly below-average winter precipitation (Fig. 2).

Temperature: In the past 30 days, temperatures in nearly all of Arizona ranged from 0 to 6 degrees F above average. The western half of New Mexico was warmer than average, while the eastern half was cooler (Fig. 3). Regionally, winter 2014-2015 has seen a continuation of well above-average temperatures across much of the western U.S.

Snowpack & Water Supply: Snow water equivalent (SWE) is very low in most of Arizona (ranging from 2 to 74 percent of average) and much of New Mexico (ranging from 11 to 111 percent of average), although California and the Pacific Northwest are at even lower levels (Fig. 4). Well above-average temperatures continue to have a significant effect on snowpack, pushing the snowline higher and driving early snowmelt runoff. In January, total reservoir storage was 45 percent in Arizona (compared to 46 percent last year) and 24 percent in New Mexico (compared to 23 percent last year) (see reservoir storage on page 4, for details).

Drought: Long-term drought conditions persist across the West, and the U.S. Drought Monitor continues to document long-term drought conditions across much of Arizona and New Mexico (Fig. 5).

Plant Ecology & Human Health: Above-average temperatures and winter rains jumpstarted plant activity across the region, and the Southwest is experiencing a banner year for wildflowers. This beauty comes at a cost; pollen levels are high enough to affect most allergy sufferers and are expected to remain that way through the spring.

El Niño: El Niño finally arrived, and will likely remain a weak event this spring and into summer. Forecasts suggest El Niño could escalate to a moderate to strong event in 2015-2016 (see ENSO Tracker on page 3).

Precipitation & Temperature Forecasts: The Mar. 19 NOAA-Climate Prediction Center seasonal outlook continues to predict above-average precipitation this spring for most of the Southwest. Temperature forecasts remain split across the region, with elevated chances for above-average temperatures along the West Coast and eastward into Arizona (and the western U.S.) and increased chances for below-average temperatures across Texas and into New Mexico (Fig. 6).

Streamflow Forecasts: The Mar. 1 forecast for the Colorado, Rio Grande, and Arkansas river basins projects well below-average streamflow for most of Arizona and New Mexico, with the exception of north-central New Mexico and a few isolated locations in Arizona (Fig. 7).

Tweet March SW Climate Outlook

CLICK TO TWEET

Mar 2015 @CLIMAS_UA SW Climate Outlook - El Niño finally arrives, Drought, Snowpack, Water Supply, Spring Outlook http://bit.ly/1OaN9UT

March Southwest Climate Outlook

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&7
Natural Resources Conservation Service
http://www.wcc.nrcs.usda.gov/gis/snow.html

Figure 5
National Drought Mitigation Center
http://droughtmonitor.unl.edu/

Figure 6
NOAA - Climate Prediction Center
http://www.cpc.ncep.noaa.gov/products/forecasts/

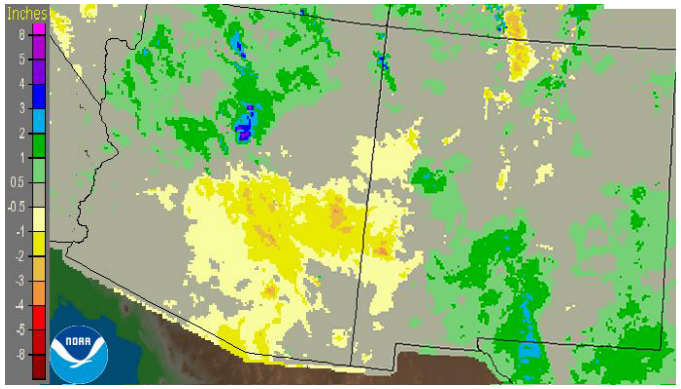


Figure 1: Departure from Normal Precipitation - Past 30 Days

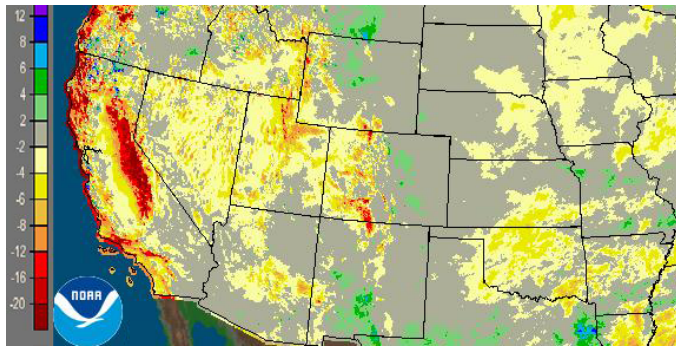


Figure 2: Departure from Normal Precipitation - Since Oct 1

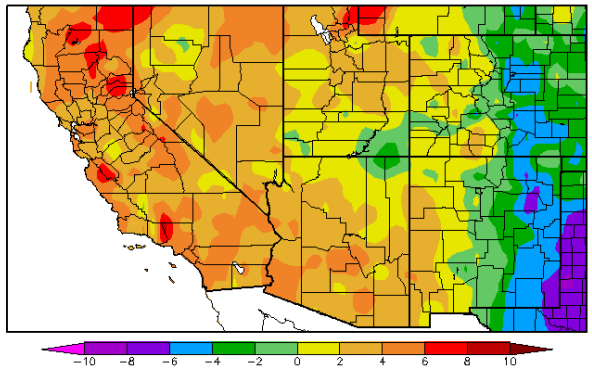


Figure 3: Departure from Normal Temp (F) - Feb 17 - Mar 18, 2015

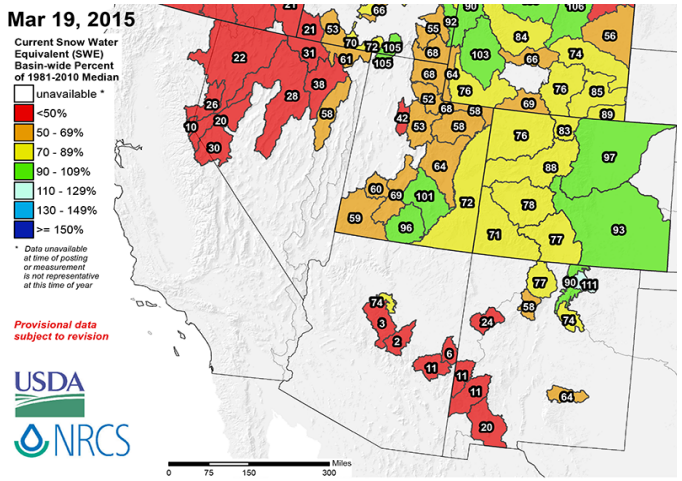


Figure 4: Percent of Snow Water Equivalent (SWE) by Basin

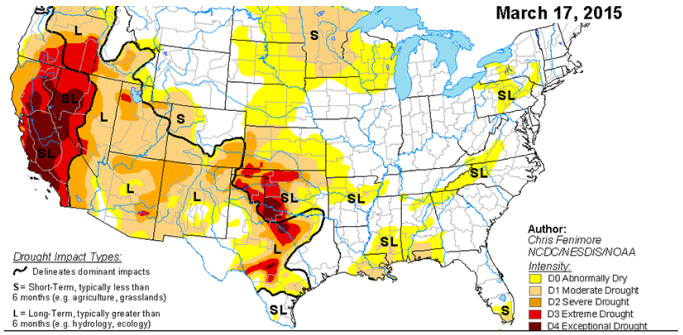


Figure 5: U.S. Drought Monitor - Feb 10, 2015

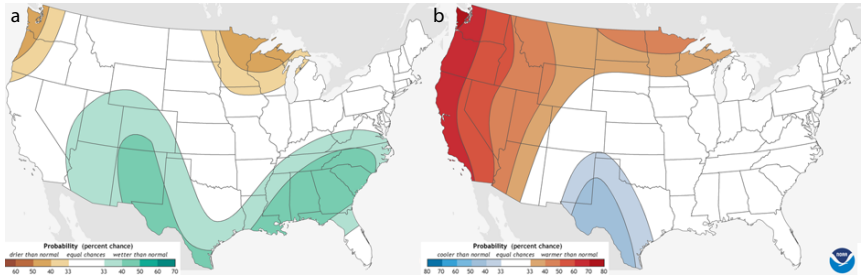


Figure 6a-b: Three-Month Seasonal Outlook for Precipitation (a) & Temperature (b)

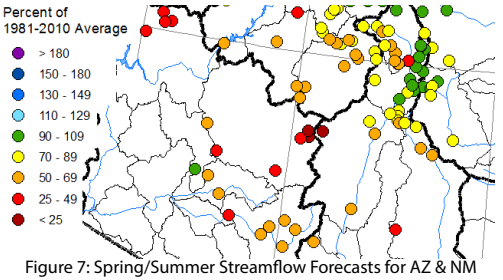


Figure 7: Spring/Summer Streamflow Forecasts for AZ & NM

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

After months of vacillating sea surface temperature (SST) anomalies, limited coordination between oceanic and atmospheric conditions favorable to El Niño formation, and ongoing confusion regarding the strength of the various diagnostic signals, El Niño has "officially" arrived in North America. This is late in the season to declare an El Niño, and the so-called spring predictability barrier makes it difficult to anticipate how seasonal changes, particularly westerly wind bursts, will help or hinder the ongoing conditions favorable to El Niño. This has been a strange season. Strong signals in early 2014 stalled in summer and into fall, delaying the event's onset until this month, when ocean-atmosphere coupling and an additional Kelvin wave again indicated more favorable conditions for an El Niño event.

The most recent forecasts offer mixed signals regarding El Niño. On Mar. 5, the NOAA-Climate Prediction Center (CPC) issued an El Niño advisory, maintaining a 50–60 percent probability of a weak El Niño event developing and extending through the summer. On Mar. 10, the Japan Meteorological Agency declared the El Niño event likely to have ended, with greater likelihood of a return to El Niño than ENSO neutral conditions in the summer. On Mar. 17, the Australian Bureau of Meteorology elevated its El Niño tracker from neutral back to watch status, noting the "unusual conditions" in the tropical Pacific, including warmer-than-average SST anomalies (Fig. 1-2). On Mar. 19, the International Research Institute for Climate and Society (IRI) and CPC reasserted a 50–60 percent probability of this El Niño event extending into summer 2015 (Fig. 3), similarly noting atypical (or even strange) conditions that have made characterizing this particular event difficult. The North American multi-model ensemble shows a weak event extending into summer (Fig. 4), and corroborates the forecast discussion that suggests an increased possibility of a stronger El Niño signal extending into 2016. While the models are bullish on the possibility of a moderate to strong event, this will depend on how ocean and atmospheric conditions progress from summer into fall.

With a seemingly definitive El Niño declaration, we are finally out of "El Limbo". While forecasting or characterizing this event has been difficult for all involved, the complexity of this El Niño will be of interest to climatologists for years to come. Looking forward, seasonal forecasts still indicate an increased chance of above-average precipitation through much of the Southwest for late winter and spring. Despite numerous storm events, we have yet to see widespread and sustained above-average winter precipitation in the Southwest, which would help considerably in mitigating longer-term drought conditions.

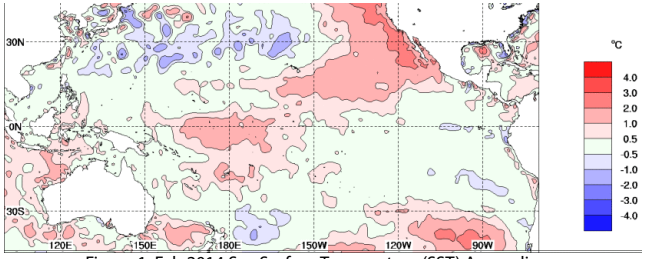


Figure 1: Feb 2014 Sea Surface Temperature (SST) Anomalies

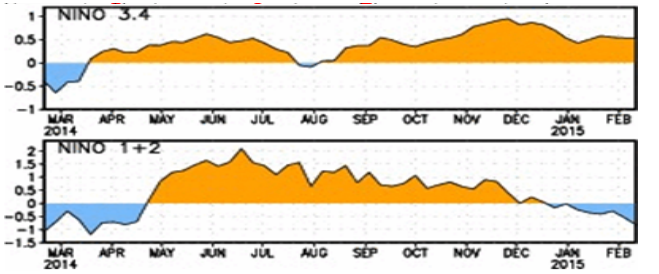


Figure 2: SST Anomalies in Niño 1-2 & 3.4 Regions (NCDC)

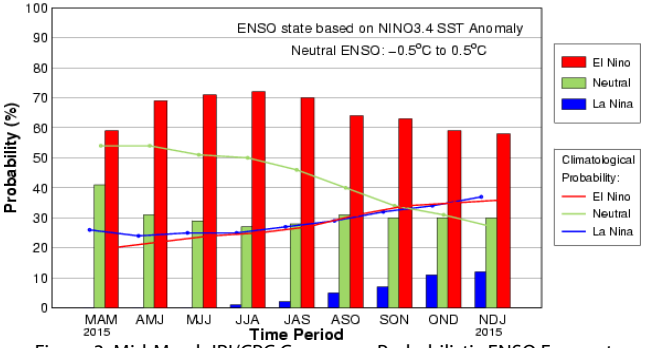


Figure 3: Mid-March IRI/CPC Consensus Probabilistic ENSO Forecast

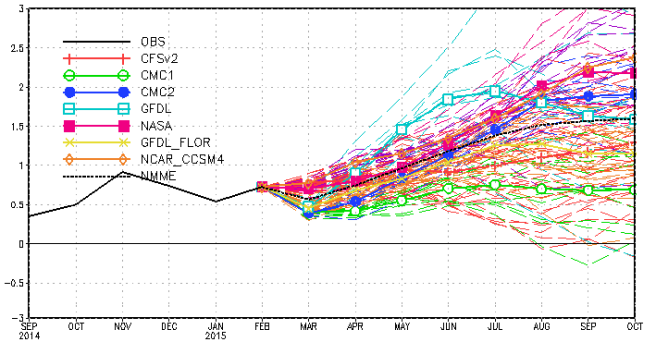


Figure 4: North American Multi-Model Ensemble Forecast for Niño 3.4

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).

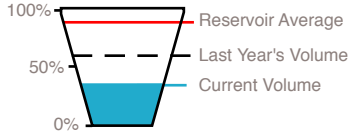
The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons).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

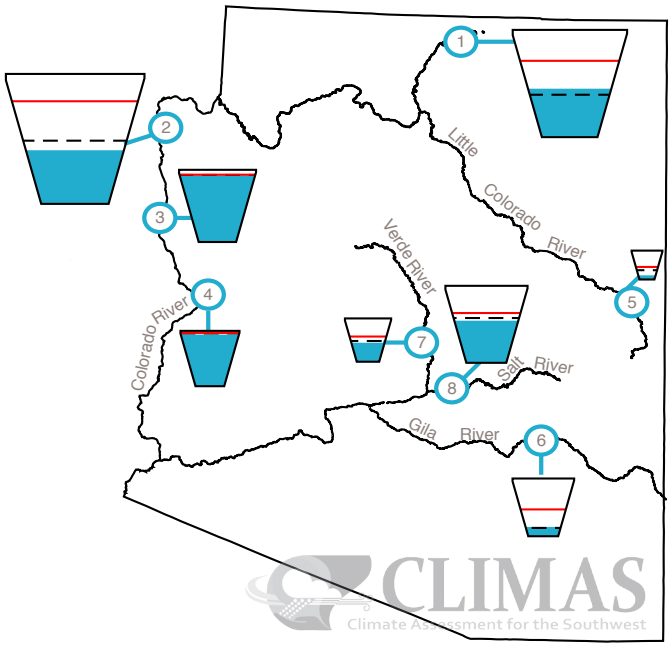
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

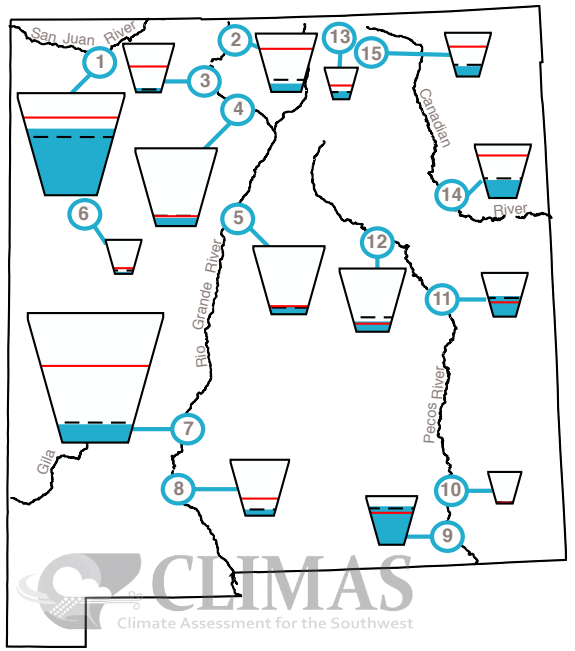
Reservoir Volumes

DATA THROUGH FEB 28, 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%	11,024.0	24,322.0	-122.0
2. Lake Mead	41%	10,768.0	26,159.0	29.0
3. Lake Mohave	92%	1,658.0	1,810.0	-39.0
4. Lake Havasu	93%	578.0	619.0	-7.2
5. Lyman	14%	4.2	30.0	0.1
6. San Carlos	16%	141.7	875.0	53.0
7. Verde River System	44%	126.1	287.4	10.6
8. Salt River System	54%	1,103.3	2,025.8	48.7

*KAF: thousands of acre-feet

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	65%	1096.4	1,696.0	5.7
2. Heron	15%	61.3	400.0	-0.6
3. El Vado	9%	17.2	190.3	3.9
4. Abiquiu	11%	133.8	1,192.8	1.6
5. Cochiti	10%	48.9	491.0	0.7
6. Bluewater	6%	2.4	38.5	0.0
7. Elephant Butte	15%	328.7	2,195.0	37.6
8. Caballo	11%	35.3	332.0	1.4
9. Lake Avalon	79%	3.2	4.0	-0.3
10. Brantley	8%	84.5	1,008.2	1.6
11. Sumner	47%	48.3	102.0	3.3
12. Santa Rosa	16%	69.3	438.3	-0.2
13. Costilla	25%	4.0	16.0	0.4
14. Conchas	33%	84.5	254.2	-0.1
15. Eagle Nest	23%	18.3	79.0	0.7

* in KAF = thousands of acre-feet

Southwestern Oscillations

Be sure to visit our blog, Southwestern Oscillations

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

CLIMAS YouTube Channel

Visit our new YouTube channel for mini-videos of content/discussion pulled from the podcast

https://www.youtube.com/user/UACLIMAS/

CLIMAS Podcasts

Visit our website or iTunes to subscribe to our podcast feed

www.climas.arizona.edu/media/podcasts

https://itunes.apple.com/us/itunes-u/climate-in-the-southwest/id413143045

News & Notes

March 2015 Southwest Climate Podcast

In the March Southwest Climate Podcast, Zack Guido is back from his world travels (for work!) and is joined by Mike Crimmins to discuss Southwest climate, including winter precipitation, snowpack, and temperature reports so far.

They also dive into the "warm in the west, cold in the east" pattern, and talk jetstream, polar vortex, and digging troughs as it pertains to Southwest weather patterns. Next up is El Niño, which is a bit late, and a bit weak, but very interesting to consider looking into the next year.

Finally they wrap up by discussing what's left of winter, and what 2015 may have in store.

Speaking of Climate...

(New Podcast Series)

We're trying something new. We're expanding our focus to something a bit broader than just the Southwest to take advantage of the numerous people who are living and breathing work on climate science, communication, outreach, education, and engagement on a daily basis.

The first episode is an interview that Dan Ferguson conducted with Susanne Moser during the time she was visiting Tucson as a CCASS Distinguished Visiting Fellow in early 2015. They discuss the state of climate research, alternative or creative ways to engage people or even to think about climate and society, the power of social change, the challenges/rewards of working in this field, and perspectives on future directions for research, education, and engagement.

CLIMAS
Climate Assessment for the Southwest

CLIMAS Climate & Society Graduate Fellows

The Climate & Society Graduate Fellows Program supports University of Arizona graduate students whose work connects climate research and decision making. Fellows receive $5,000 and guidance from members of the CLIMAS research team for one year. The program's main objective is to train a group of students to cross the traditional boundaries of academic research into use-inspired science and applied research. While CLIMAS research generally occurs in the Southwest U.S., the Fellows program allows students to work anywhere in the world.

Fellows' projects may follow two tracks. Students who want to conduct collaborative research may use their funding for use-inspired projects. Students who have conducted climate research and want to communicate their findings to audiences outside of academia may use their funding for outreach. Fellows may also use their funding for a combination of the two tracks.

The Climate & Society Graduate Fellows Program helps students address the world's climate-related problems by funding projects that engage people outside of the University of Arizona.

2015 CLIMAS Climate & Society Graduate Fellows:

Christina Greene

Eric Magrane

Valerie Rountree

Bhuwan Thapa

2014 Climate & Society Graduate Fellows:

Chris Guiterman

Ling-Yee Huang

Rebecca Lybrand

Sarah Truebe

Program Details: http://www.climas.arizona.edu/education/fellowship-program