Author/Editor

Ben McMahan
Assistant Research Professor, UArizona

Contributors

Mike Crimmins
UArizona Extension Specialist

Dave Dubois
New Mexico State Climatologist

Gregg Garfin
Founding Editor

Zack Guido
Arizona Institutes for Resilience

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January 2022 Southwest Climate Outlook

Precipitation and Temperature: December precipitation ranks were between average and record wettest in Arizona, and between record driest and much above average in New Mexico (Fig. 1a). December temperature ranks were between above average and record warmest in both Arizona and New Mexico (Fig. 1b).

Annual/Seasonal Precipitation and Temperature: Annual precipitation ranks were between below average and above average in most of Arizona, and between much below average and average in most of New Mexico (Fig. 2a). 2021 temperature ranks were generally much above average across the western U.S. (Fig. 2b). Three-month Oct-Dec precipitation ranks are on a gradient that transitions from much below normal to much above normal with pockets of record wettest, as you move from southeast to northwest, in the U.S. Southwest (Fig. 3).

Drought: The U.S. Drought Monitor (USDM) showed widespread reductions in drought categorizations, but drought conditions are still found across the western United States (Fig. 4). A move out of "extreme" and "exceptional" drought (D3 and D4) is an improvement. Some regional categorizations remain in the "severe" (D2) or "moderate" (D1) drought categories, although, notably, much of Arizona has moved out of official drought and into "abnormally dry" (D0).

Snowpack & Streamflow: As of Dec 31, snow water equivalent (SWE) has increased across the Southwest (Fig. 5), and the Jan 1 streamflow forecast paints a relatively optimistic picture for much of the Colorado River basin (less so the Rio Grande) (Fig. 6). These normally peak around Mar 1 in the Southwest, so this is an important metric to track regarding the impact of La Niña this winter.

Water Supply: As of Jan 1, most of the reservoirs in Arizona and New Mexico are at or below the values recorded at this time last year, and nearly all of them are below their long-term average (see reservoir storage for Arizona and New Mexico on p. 5).

ENSO Tracker: ENSO is at La Niña status, based on observed and forecast SSTs, emergent atmospheric conditions, and oceanic/atmospheric coupling indicative of La Niña. ENSO outlooks and forecasts generally call for a weak-to-moderate event to persist this winter with a transition to ENSO-neutral by spring or early summer (see ENSO-tracker on p. 4 for details).

Tweet Jan 2022 SW Climate Outlook

JAN2022 @CLIMAS_UA SW Climate Outlook, Seasonal Forecasts, ENSO Tracker, AZ & NM Reservoirs, SW Climate Podcast, https://bit.ly/3rqvS3q #SWclimate #AZWx #NMWx

Online Resources

Figures 1-2
National Centers for Environmental Information
ncdc.noaa.gov/sotc

Figure 3
West Wide Drought Tracker
wwdt.dri.edu

Figure 4
U.S. Drought Monitor
droughtmonitor.unl.edu

Figures 5-6
National Resource Conservation Service (NRCS)
nrcs.usda.gov

January 2022 - Climate Summary

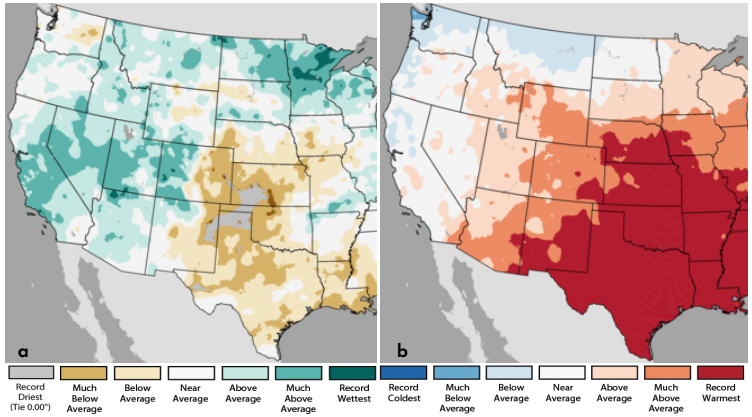


Figure 1: Dec 2021 Precipitation (a) & Temperature Ranks (b)

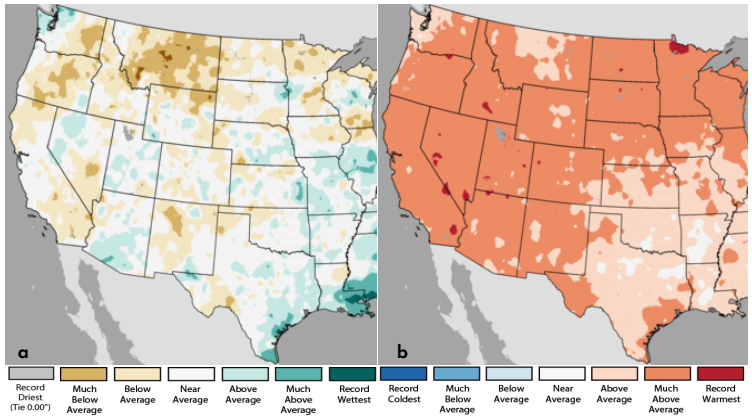


Figure 2: Jan-Dec 2021 Precipitation (a) & Temperature Ranks (b)

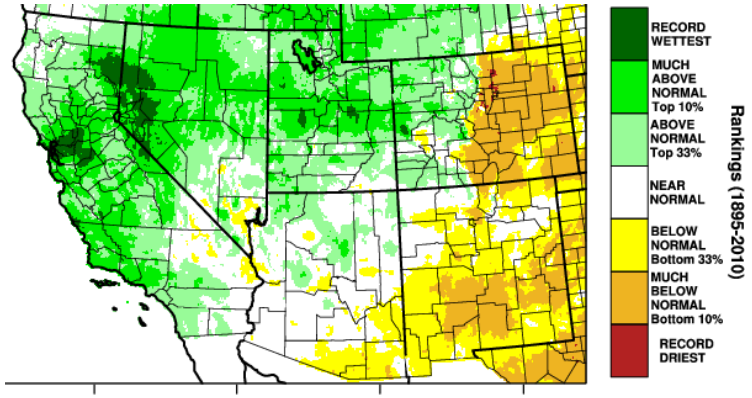


Figure 3: Three month (Oct 2021 - Dec 2021) Precip Rankings

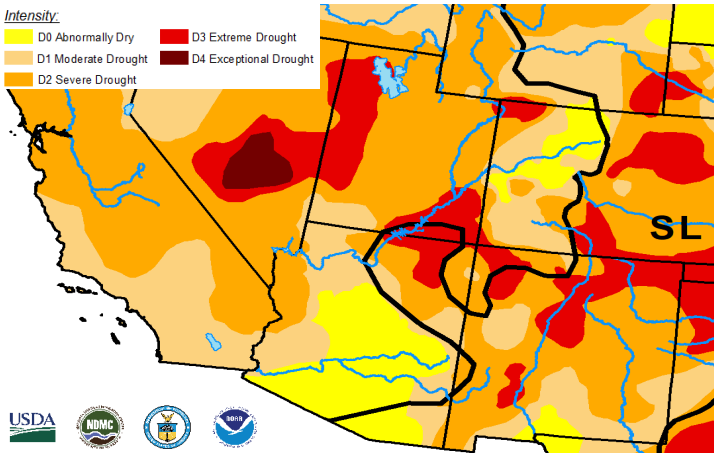


Figure 4: US Drought Monitor - Jan 11, 2022

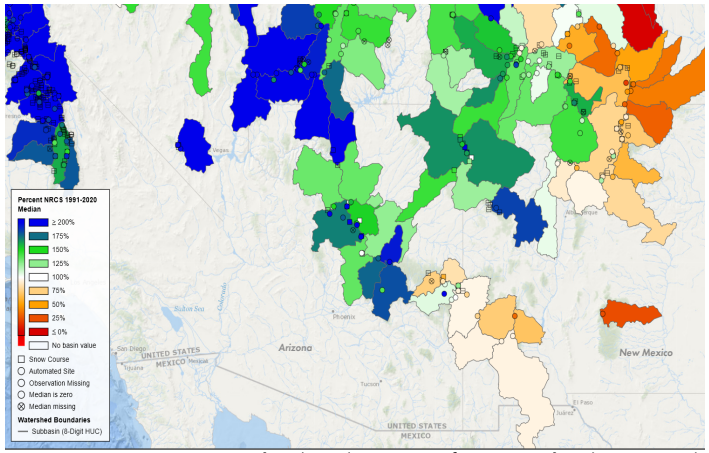


Figure 5: Snow Water Equivalent (SWE) - Percent of NRCS Median (1991-2020)

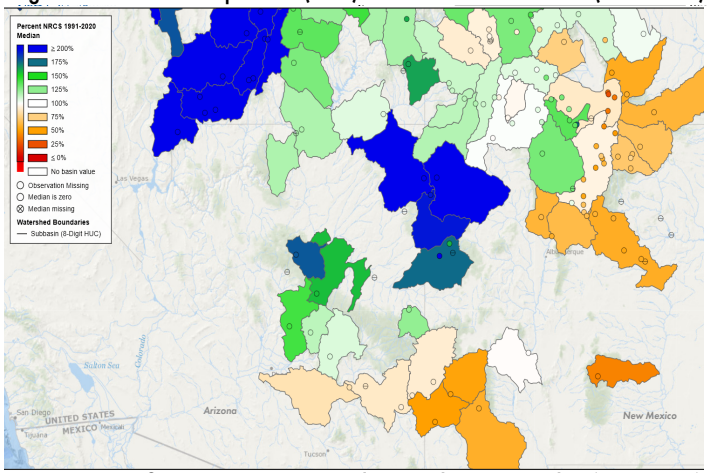


Figure 6: Streamflow Forecast 50% Exceedence Prob., NRCS Median (1991-2020)

Online Resources

Figure 7
Intl. Research Institute for Climate and Society
iri.columbia.edu

Figure 8
NOAA Climate Prediction Center
cpc.ncep.noaa.gov

January 2022 - Seasonal Forecasts

Precipitation

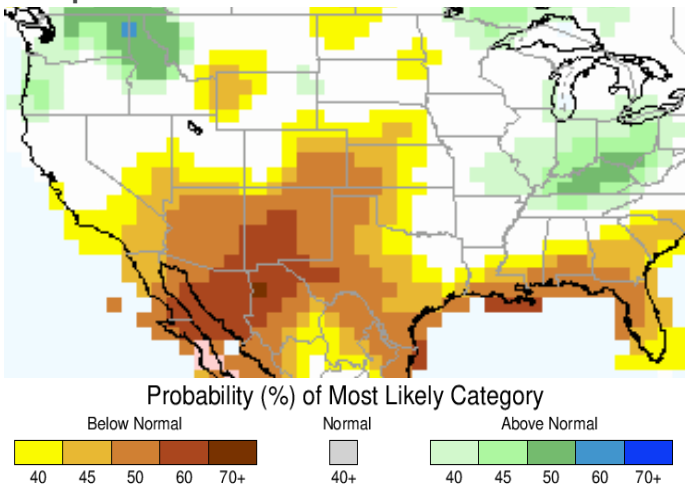


Figure 7A: Three-Month (Feb-Apr) Forecast for Precipitation

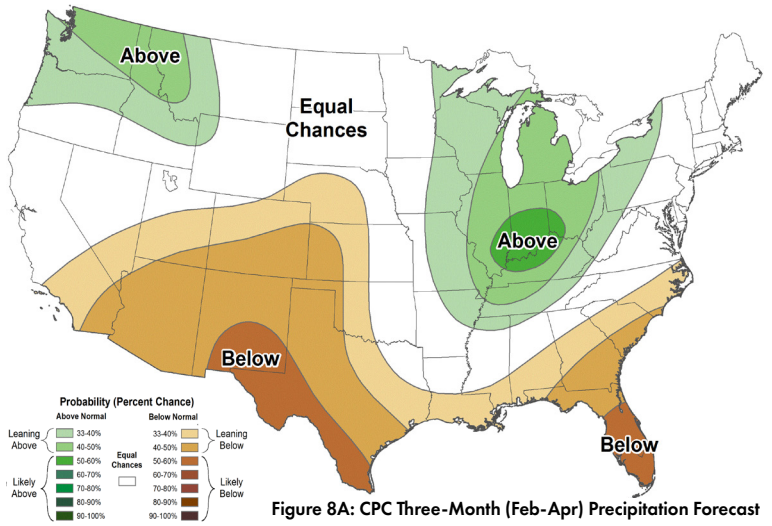


Figure 8A: CPC Three-Month (Feb-Apr) Precipitation Forecast

Temperature

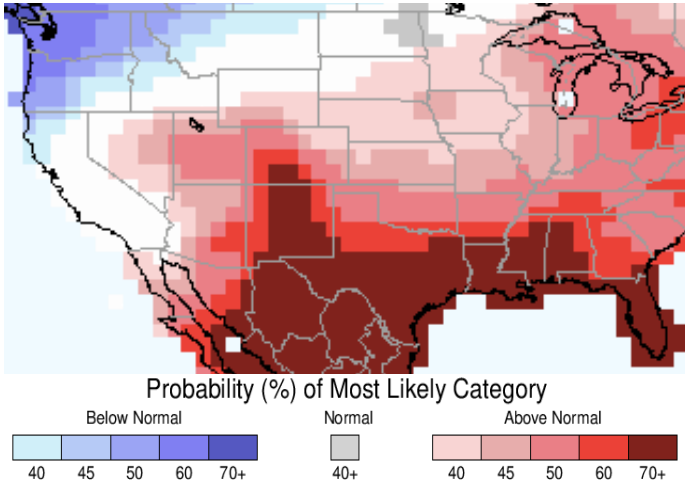


Figure 7B: Three-Month (Feb-Apr) Forecast for Temperature

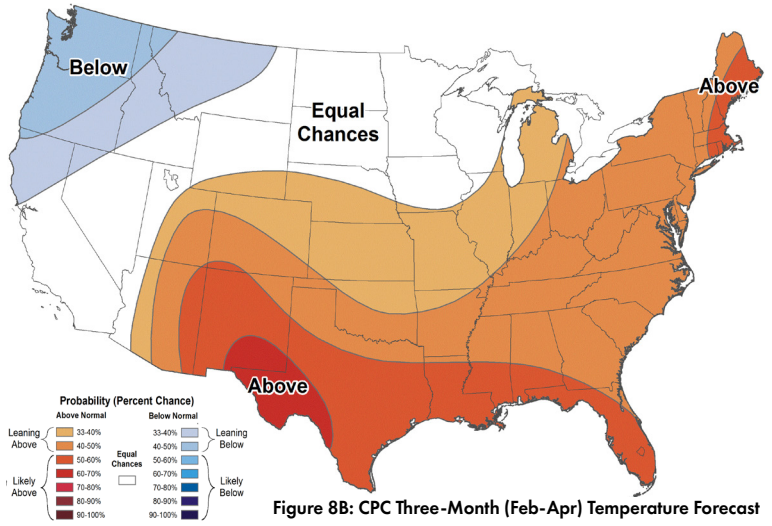


Figure 8B: CPC Three-Month (Feb-Apr) Temperature Forecast

Precipitation Forecasts: The IRI outlook calls for increased chances of below-normal precipitation across most of the southwestern U.S. and northern Mexico, (Fig. 7a). The CPC outlook calls for increased chances of below-normal precipitation across the Southwest (Fig. 8a).

Temperature Forecasts: The IRI outlook calls for mostly increased chances of above-normal temperatures in most of the southwestern U.S. and northern Mexico (Fig. 7b). The CPC outlook calls for increased chances of above-normal temperatures across much of the Southwest (Fig. 8b).

Online Resources

Figure 1
Australian Bureau of Meteorology
bom.gov.au/climate/enso

Figure 2
NOAA - Climate Prediction Center
cpc.ncep.noaa.gov

Figure 3
International Research Institute for Climate and Society
iri.columbia.edu

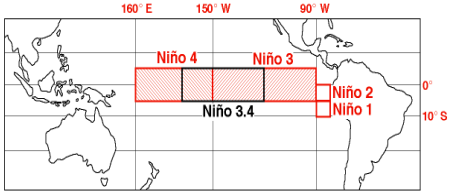
Figure 4
NOAA - Climate Prediction Center
cpc.ncep.noaa.gov

El Niño / La Niña

Information on this page is also found on the CLIMAS website:

climas.arizona.edu/sw-climate/el-niño-southern-oscillation

Equatorial Niño Regions



For more information: ncdc.noaa.gov/teleconnections/enso/indicators/sst/

Image source: aoml.noaa.gov/

ENSO Tracker

Sea surface temperature (SST) forecasts for Feb – Apr 2022 indicate cool conditions across the equatorial Pacific (Fig. 1). SST anomalies have reached the La Niña threshold (Fig. 2), and ENSO outlooks generally call for La Niña conditions to last through winter 2021-2022 and return to neutral conditions in spring/summer 2022.

Forecast Roundup: On Jan 11 the Japanese Meteorological Agency (JMA) called for an 80-percent chance of La Niña conditions to last through winter and an 80-percent chance they would move to ENSO-neutral by the end of spring. On Jan 13 the NOAA Climate Prediction Center (CPC) maintained their La Niña Advisory noting "the coupled ocean-atmosphere system reflected a mature La Niña", and called for a 67-percent chance of La Niña lasting through the Mar-May period, and a 51-percent chance of neutral conditions during Apr-Jun. On Jan 13 the International Research Institute (IRI) issued an ENSO Quick Look (Fig. 3), noting "Sea Surface Temperatures remain well below normal in the central-eastern equatorial Pacific", and "the evolution of key oceanic and atmospheric variables is consistent with weak La Niña conditions". On Jan 18 the Australian Bureau of Meteorology outlook stated "the 2021-22 La Niña is near or at its peak" and noted warming sub-surface waters as an early indicator of the gradual shift back to neutral. The North American Multi-Model Ensemble (solid and dashed black line, Fig. 4) is well into La Niña territory, but similarly forecasts a gradual transition back to neutral conditions by mid-2022.

Summary: The expert/forecast consensus is on La Niña, with expectations the event will last through winter and to move back to ENSO-neutral in spring or early summer. To date, winter conditions are not exactly canonical for La Niña (i.e. wetter and at times cooler than anticipated, given La Niña), but La Niña's impact will be assessed in monthly, seasonal, water-year, and annual totals, not based on weather events at daily or weekly timescales.

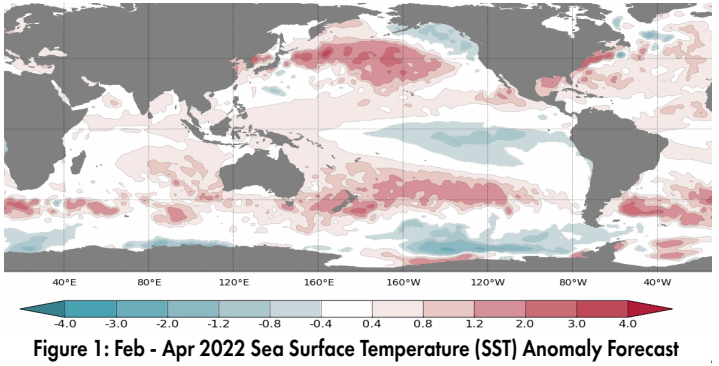


Figure 1: Feb - Apr 2022 Sea Surface Temperature (SST) Anomaly Forecast

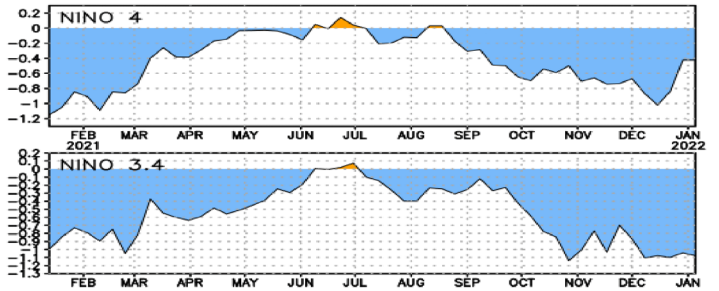


Figure 2: SST Anomalies in Niño Regions 3.4 & 4 (NCDC)

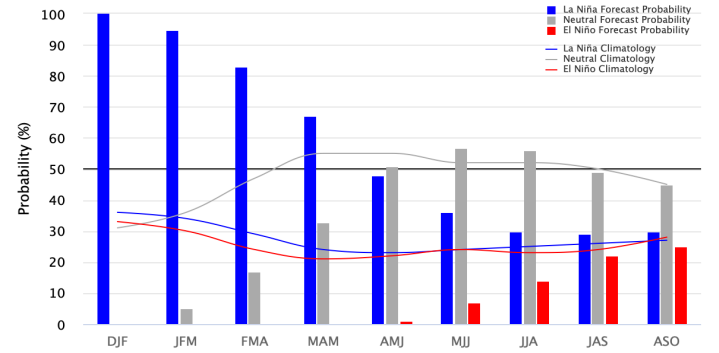


Figure 3: Early-Jan IRI/CPC Model-Based Probabilistic ENSO Forecast

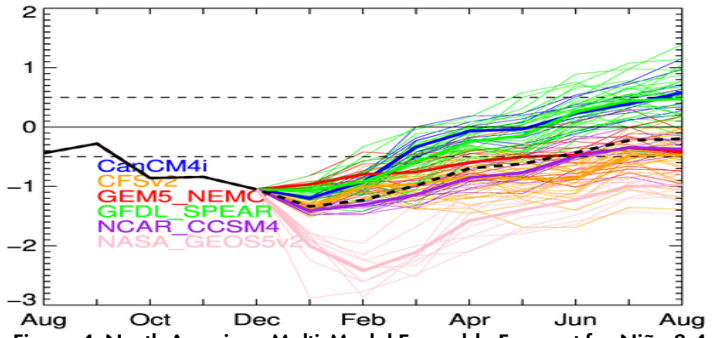


Figure 4: North American Multi-Model Ensemble Forecast for Niño 3.4

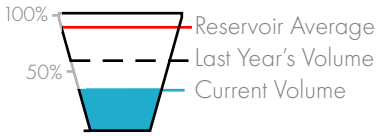
Online Resources

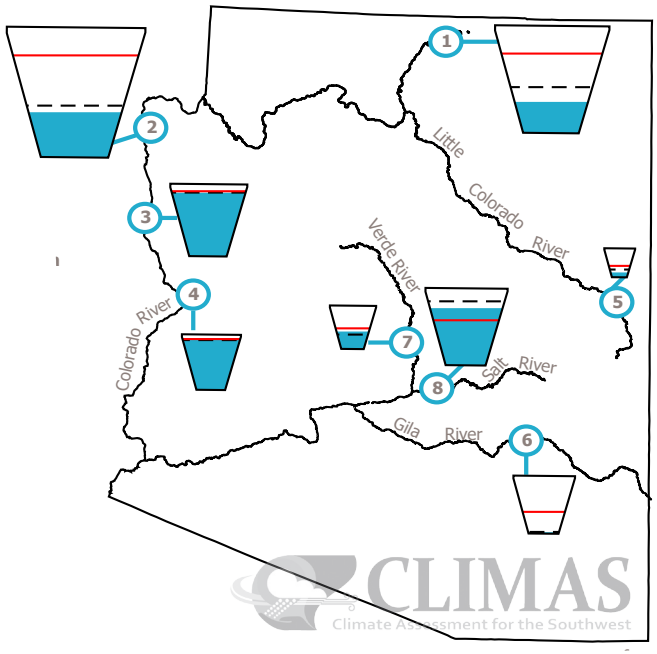
Portions of the information provided in this figure is available at the Natural Resources Conservation Service
www.wcc.nrcs.usda.gov/BOR/basin.html

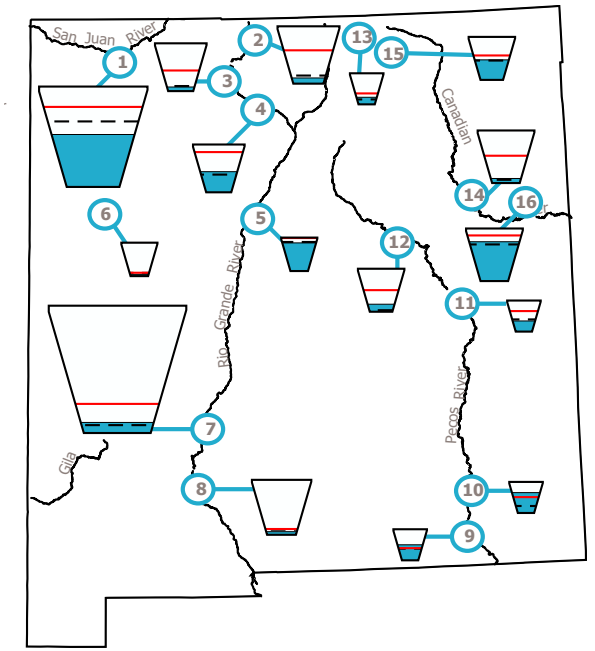
Contact Ben McMahan with questions/comments.

Reservoir Volumes

DATA THROUGH JAN 1, 2022
Data Source: National Water and Climate Center, Natural Resources Conservation Service







* in KAF = thousands of acre-feet

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Lake Powell	28%	6,713	24,322.0	-303
2. Lake Mead	34%	8,918	26,159.0	+116
3. Lake Mohave	87%	1,573	1,810.0	+25
4. Lake Havasu	92%	570	619.0	+5
5. Lyman	16%	4.8	30.0	0
6. San Carlos	2%	19.7	875.0	-10.2
7. Verde River System	39%	111.3	287.4	+1.1
8. Salt River System	73%	1,472	2,025.8	+30

*KAF: thousands of acre-feet

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	51%	871.8	1,696.0	-6.9
2. Heron	10%	40.2	400.0	-1.3
3. El Vado	8%	14.6	190.3	-7.6
4. Abiquiu	42%	77.9	186.8	-5.8
5. Cochiti	83%	41.6	50.0	+0.5
6. Bluewater	5%	2.0	38.5	0.0
7. Elephant Butte	8%	167.8	2,195.0	+32.6
8. Caballo	5%	15.1	332.0	+0.4
9. Lake Avalon	49%	2.2	4.5	+0.4
10. Brantley	64%	26.8	42.2	+0.6
11. Sumner	33%	11.8	35.9	+3.3
12. Santa Rosa	17%	18.4	105.9	-0.4
13. Costilla	22%	3.6	16.0	+0.3
14. Conchas	8%	20.1	254.2	-0.8
15. Eagle Nest	45%	35.5	79.0	+0.3
16. Ute Reservoir	73%	145	200	-2.0

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).

Southwest Climate Podcast

climas.arizona.edu/media/podcasts

iTunes

https://apple.co/3kHh8bf

Spotify

https://spoti.fi/3zZIvWu

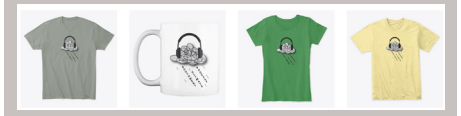
Android

https://bit.ly/2ILYHos

Stitcher

https://bit.ly/3nEWhHd

We also finally have podcast gear (shirts and mugs).



Order at: teespring.com/stores/the-southwest-climate-podcast.

If you are interested in showing your support - or enjoying the (lack of a) monsoon in style, this is one way to do so.

The Southwest Climate Podcast

Dec 2021 Southwest Climate Podcast Holiday 2021 Edition

In the December/Holiday edition of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Zack Guido sit down for a quick look at the weather of the last month or so, some recent events bringing winter storms to the region, and what a La Nina might bring in the rest of 2021 and through the rest of winter 2022. They also reflect on 2021 and memorable events in the Southwest, and not surprisingly, this brings them both back to monsoon 2021.

https://bit.ly/3qq0z9P

Nov 2021 Southwest Climate Podcast Monsoon 2021 Roundup

In the November edition of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Zack Guido look back to monsoon 2021 to do a recap of the seasonal totals. They are joined by Paul Iniguez, the Science and Operations Officer for the National Weather Service office in Phoenix, to take a closer look at the 2021 monsoon, how it stacked up around the region, and to hear a bit more about how the NWS offices work across the monsoon. This is a single focus episode - see the Oct 2021 episode for the normal monthly roundup and recap. Watch this space: https://www.weather.gov/psr/eventsummaries for the 2021 monsoon recap from NWS Phoenix, as well as some detailed storm event reports from across the season (and year).

https://bit.ly/3FcjvNH

Online Resources

Figure 1
Climate Program Office
cpo.noaa.gov

RISA Program Homepage

cpo.noaa.gov/Meet-the-Divisions/Climate-and-Societal-Interactions/RISA

New Mexico Climate Center

weather.nmsu.edu

CLIMAS Research & Activities

CLIMAS Research

climas.arizona.edu/research

CLIMAS Outreach

climas.arizona.edu/outreach

Climate Services

climas.arizona.edu/climate-services

CLIMAS
Climate Assessment for the Southwest
A NOAA RISA TEAM

The Climate Assessment for the Southwest (CLIMAS) program was established in 1998 as part of the National Oceanic and Atmospheric Administration's Regional Integrated Sciences and Assessments program. CLIMAS—housed at the University of Arizona's Institute of the Environment—is a collaboration between the University of Arizona and New Mexico State University. The CLIMAS team is made up of experts from a variety of social, physical, and natural sciences who work with partners across the Southwest to develop sustainable answers to regional climate challenges

What does CLIMAS do?

The CLIMAS team and its partners work to improve the ability of the region's social and ecological systems to respond to and thrive in a variable and changing climate. The program promotes collaborative research involving scientists, decision makers, resource managers and users, educators, and others who need more and better information about climate and its impacts. Current CLIMAS work falls into six closely related areas: 1) decision-relevant questions about the physical climate of the region; 2) planning for regional water sustainability in the face of persistent drought and warming; 3) the effects of climate on human health; 4) economic trade-offs and opportunities that arise from the impacts of climate on water security in a warming and drying Southwest; 5) building adaptive capacity in socially vulnerable populations; and 6) regional climate service options to support communities working to adapt to climate change.

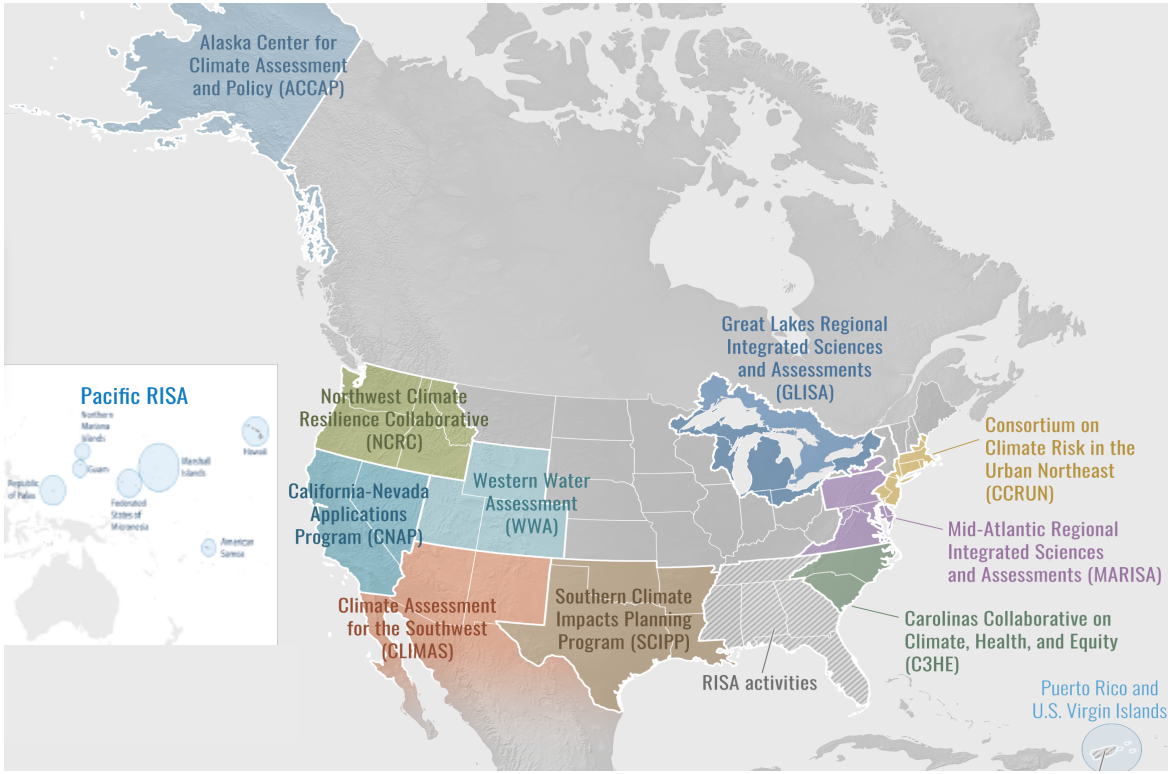


Figure 1: NOAA Regional Integrated Sciences and Assessments Regions