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February 2021 Southwest Climate Outlook

Monthly Precipitation and Temperature: January precipitation was average to above average across most of Arizona and below average to above average in most of New Mexico (Fig. 1). January temperatures ranged between average and above average in most of Arizona and New Mexico (Fig. 2). Precipitation ranks for the last two months show most of the Southwest at or below normal (Fig. 2), while temperatures for the same period were mostly at or above normal (Fig. 3)

Drought: Water year precipitation reveals a widespread pattern of below normal and much below normal conditions across the Southwest (Fig. 4). The Feb 9 U.S. Drought Monitor (USDM) for the U.S. Southwest showed some improvement in parts of Arizona after the precipitation activity in January (Fig. 5), but still has a majority of the region classified as experiencing extreme drought (D3) or exceptional drought (D4).

Snowpack and Water Supply: Snow water equivalent (SWE) is well below the 1981-2010 median for much of the region (see the NRCS website for details), and streamflow forecasts are similarly lagging behind (Fig. 6). Many of the reservoirs in the region are at or below the values recorded at this time last year. Most are below their long-term average (see Arizona and New Mexico reservoir storage on p. 5).

ENSO Tracker: La Niña conditions are present and are expected to continue through winter (see ENSO-tracker on p. 3 for details). Despite a run of storms in January, the expectation is for cumulative cool-season totals to be below average for much of the Southwest. This will almost certainly intensify the current drought conditions.

Precipitation and Temperature Forecast: The three-month outlook for Mar through May calls for increased chances for below-normal precipitation across the southwestern U.S. and northern Mexico (Fig. 7, top). The three-month temperature outlook calls for increased chances of above-normal temperatures across much of the southwestern U.S. and northern Mexico (Fig. 7, bottom).

Tweet Feb 2021 SW Climate Outlook

FEB2021 @CLIMAS_UA SW Climate Outlook, La Niña Outlook, Recent SW Temps, AZ & NM Reservoirs, 2020 CLIMAS E&S Fellows, https://bit.ly/37uwhsK #SWclimate #AZWx #NMWx

Feb 2021 SW Climate Outlook

Online Resources

Figures 1-2
West Wide Drought Tracker
wrcc.dri.edu/wwdt

Figure 3
National Centers for Environmental Information
ncdc.noaa.gov/sotc

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

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

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

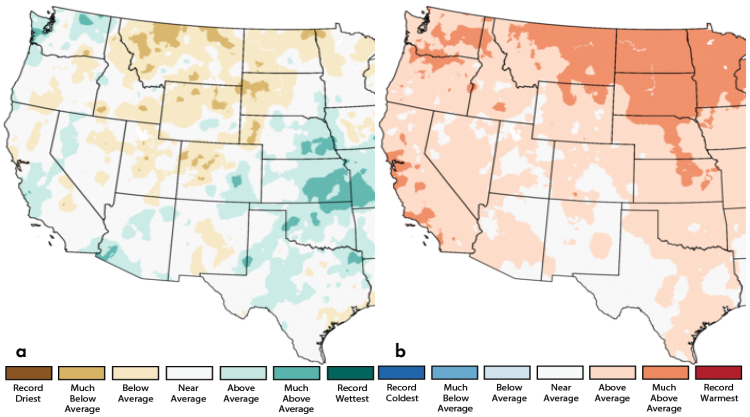


Figure 1: Jan 2021 Precipitation (a) & Temperature Ranks (b)

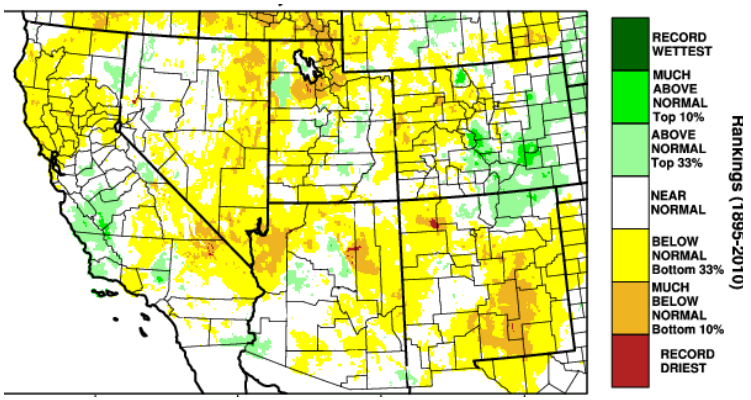


Figure 2: Dec 2020 - Jan 2021 Precip Rankings

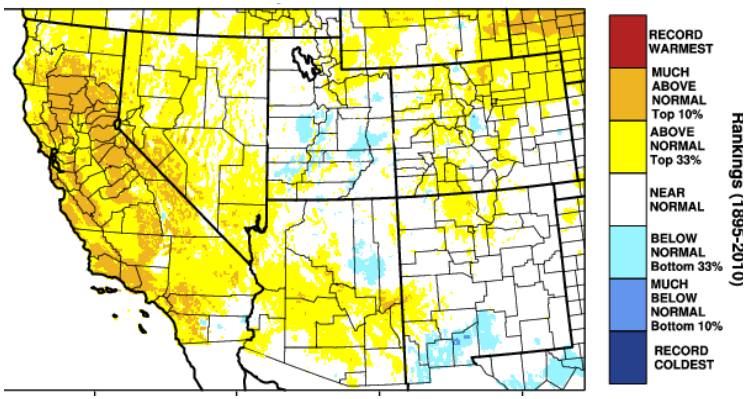


Figure 3: Dec 2020 - Jan 2021 Temperature Rankings

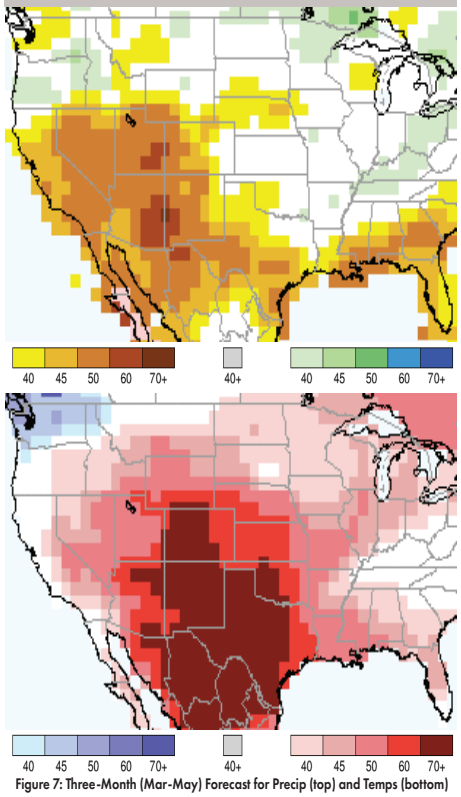


Figure 7: Three-Month (Mar-May) Forecast for Precip (top) and Temps (bottom)

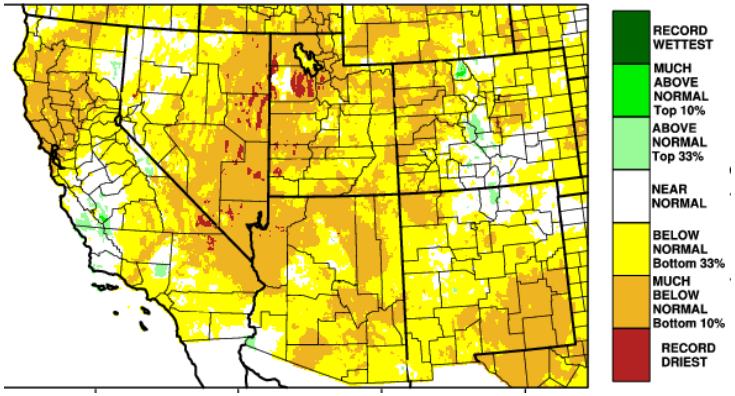


Figure 4: Water Year (Oct 2020 - Jan 2021) Precip Rankings

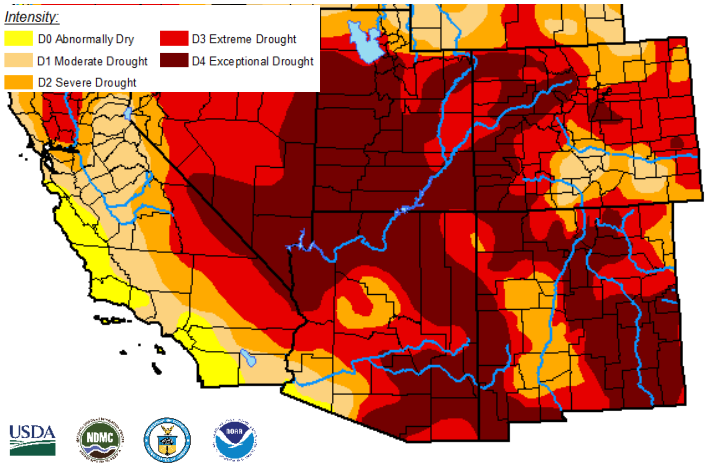


Figure 5: US Drought Monitor - Feb 9, 2021

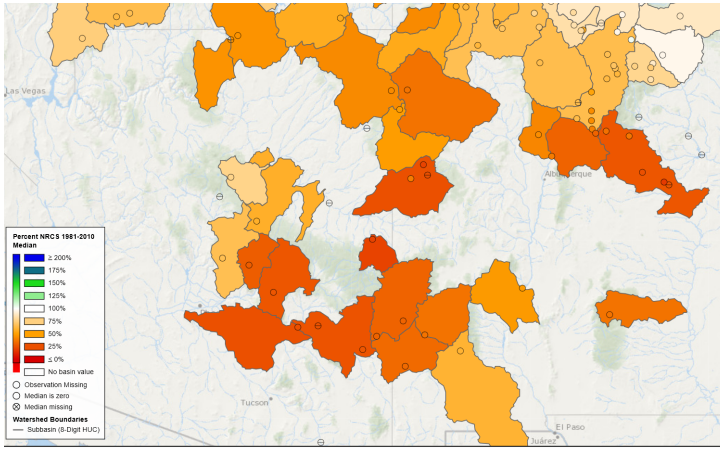


Figure 6: Feb 1 Streamflow Forecast Percent of Median (50% Exceedence Prob.)

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

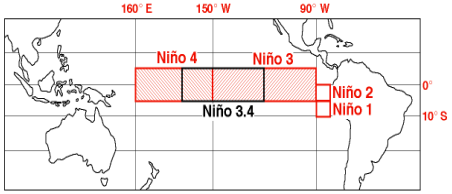
Figure 4
NOAA - Climate Prediction Center
cpc.ncep.noaa.gov

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 February – April 2021 call for below normal conditions across much of the equatorial Pacific (Fig. 1). These forecasts and the current anomalies (Fig. 2) are pointing towards a gradual return to neutral conditions. International climate outlooks generally reflect this trend, and see La Niña conditions persisting through winter 2020-2021 before returning to normal conditions over spring 2021.

Forecast Roundup: On Feb 10, the Japanese Meteorological Agency (JMA) maintained its observation of an ongoing La Niña event, and with an 80-percent chance that these conditions "will fade into ENSO-neutral" by spring. On Feb 11, the NOAA Climate Prediction Center (CPC) ENSO status was at La Niña Advisory. The CPC called for a 60-percent chance of transition to ENSO-neutral during late spring or early summer. On Feb 11, the International Research Institute (IRI) issued an ENSO Quick Look (Fig. 3), noting a "majority of the model forecasts predict SSTs to be cooler than the threshold of La Niña SST conditions through the winter, dissipating during spring". On Feb 16, the Australian Bureau of Meteorology was at official La Niña status and highlighted persistent La Niña conditions that were likely to return to neutral over the spring. The North American Multi-Model Ensemble (solid and dashed black line, Fig. 4) indicates La Niña conditions are expected to return towards ENSO-neutral conditions over the next few months.

Summary: La Niña conditions are present and should remain in place through winter and into early spring. Not unexpectedly given the La Niña status, the monthly and seasonal climate outlooks continue to forecast drier than normal conditions in the Southwest over the same period. La Niña does not mean zero precipitation, but does typically mean less frequent precipitation events and lower seasonal totals. There are exceptions to this pattern, but it is one of the more robust and predictable outcomes in the U.S. Southwest.

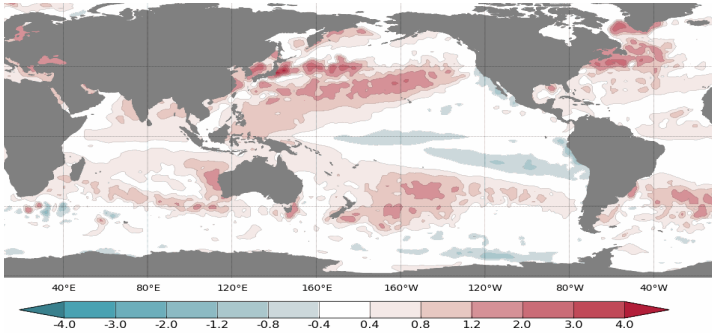


Figure 1: Feb - Apr 2021 Sea Surface Temperature (SST) Anomaly Forecast

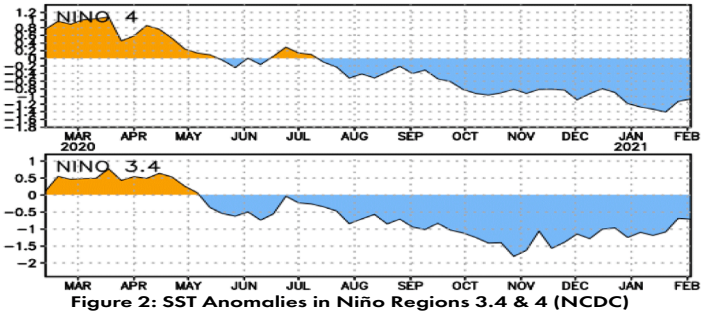


Figure 2: SST Anomalies in Niño Regions 3.4 & 4 (NCDC)

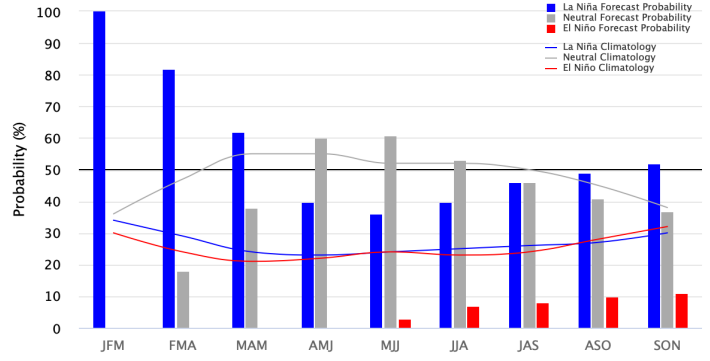


Figure 3: Early-Feb IRI/CPC Model-Based Probabilistic ENSO Forecast

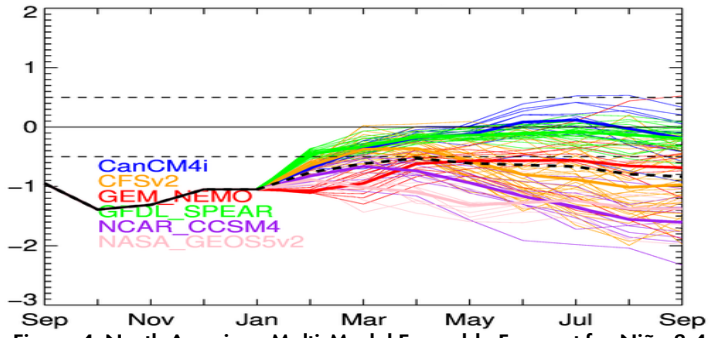


Figure 4: North American Multi-Model Ensemble Forecast for Niño 3.4

Online Resources

Figure 1
CLIMAS: Climate Assessment for the Southwest
climas.arizona.edu

data: RCC-ACIS

Recent Temperatures Around the Southwest

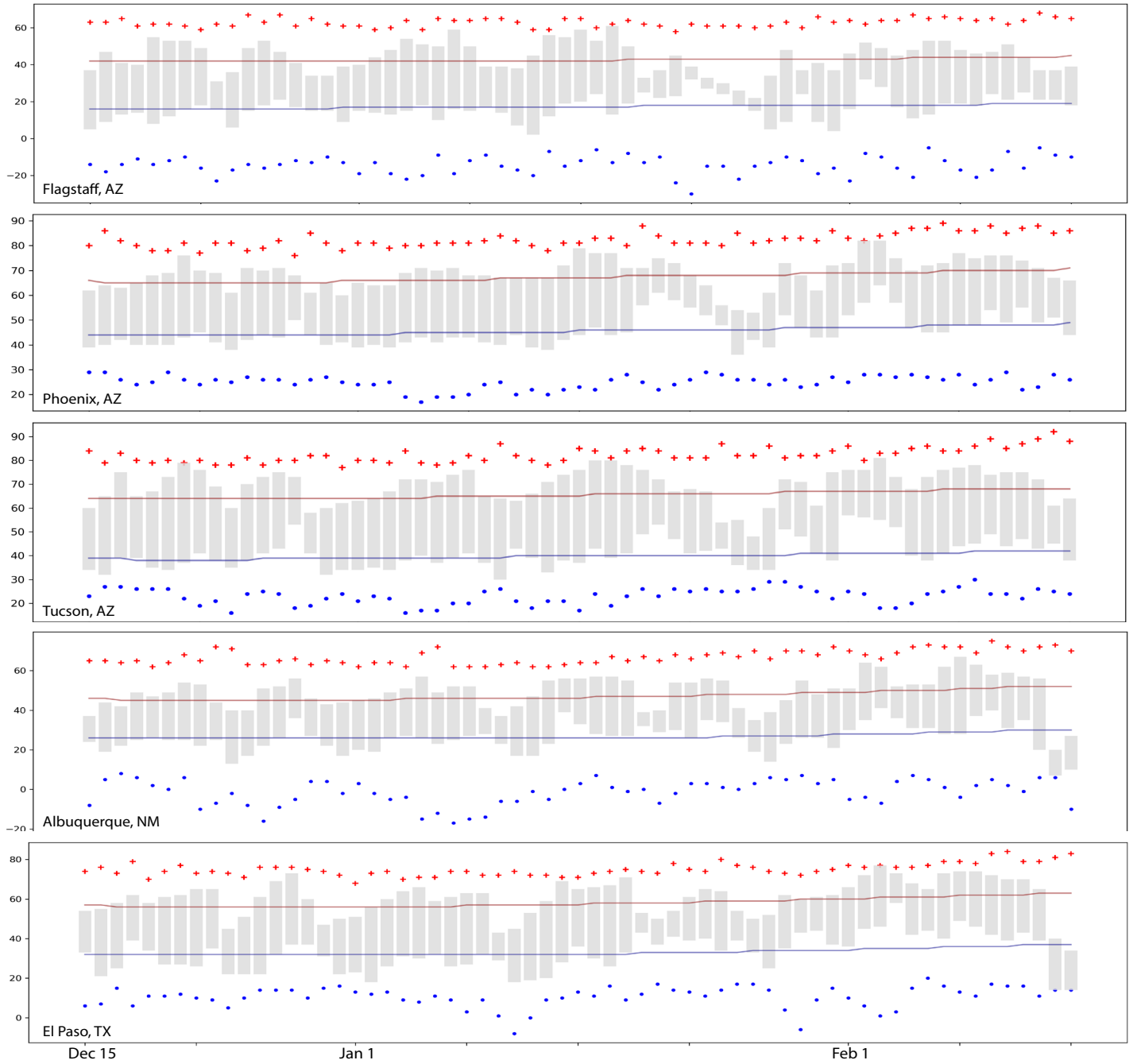


Figure 1: Daily Average, Normal, and Record High/Low Temperatures, Dec 15, 2020 - Feb 15, 2021

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.

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).

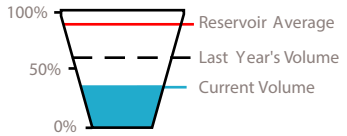
The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons).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

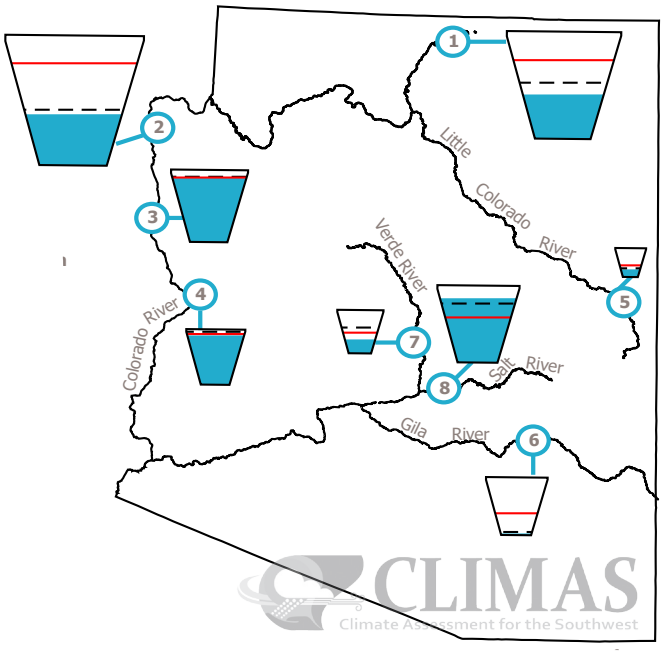
These data are based on reservoir reports updated monthly by the National Water and Climate Center of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS).

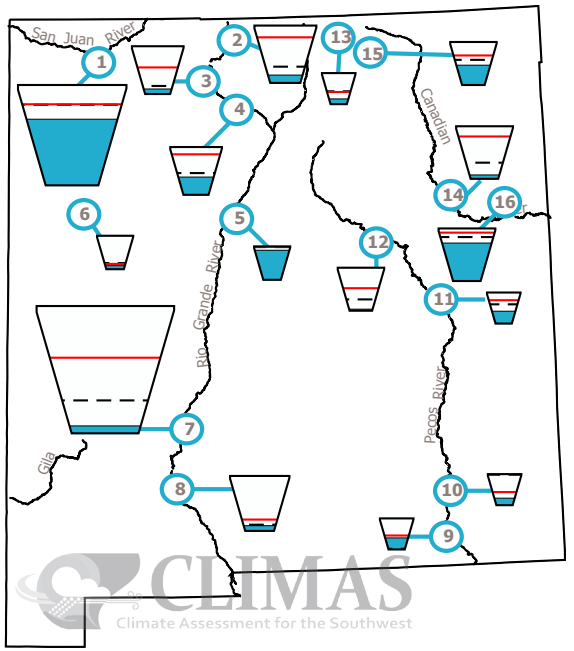
Reservoir Volumes

DATA THROUGH FEB 1, 2021

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	42%	10,130.0	24,322.0	-485.3
2. Lake Mead	39%	10,328.0	26,159.0	228.0
3. Lake Mohave	87%	1,581.0	1,810.0	-30.0
4. Lake Havasu	89%	553.2	619.0	-19.4
5. Lyman	26%	7.7	30.0	-0.1
6. San Carlos	2%	19.6	875.0	-4.7
7. Verde River System	32%	93.4	287.4	-11.8
8. Salt River System	82%	1,666.8	2,025.8	-1.9

*KAF: thousands of acre-feet

* in KAF = thousands of acre-feet

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	64%	1,079.5	1,696.0	-15.0
2. Heron	13%	53.3	400.0	-0.6
3. El Vado	10%	18.6	190.3	-3.0
4. Abiquiu	36%	66.4	186.8	2.6
5. Cochiti	85%	42.4	50.0	-1.1
6. Bluewater	9%	3.3	38.5	-0.1
7. Elephant Butte	6%	127.3	2,195.0	27.1
8. Caballo	9%	29.4	332.0	0.7
9. Lake Avalon	36%	1.6	4.5	0.5
10. Brantley	22%	9.3	42.2	2.7
11. Sumner	38%	13.6	35.9	3.2
12. Santa Rosa	3%	3.7	105.9	0.0
13. Costilla	15%	2.4	16.0	0.3
14. Conchas	6%	15.5	254.2	-1.0
15. Eagle Nest	44%	35.1	79.0	-0.3
16. Ute Reservoir	68%	137	200	-1.0

Environment & Society Graduate Fellows

The Environment & Society Fellowship was created in 2013 as a funding opportunity for graduate students to practice use-inspired research and science communication.

The Fellowship supports projects that connect social or physical sciences, the environment, and decision-making.

climas.arizona.edu/education/fellowship-program

This cohort has shared results from their research, and reflections on working through the pandemic, in a series of blog posts.

climas.arizona.edu/blog

2020 Environment and Society Fellows

Caring in Crisis: Challenges and Lessons in Practicing Collaborative Research in 2020

My CLIMAS fellowship project was geared towards building a web platform called "Regenerate Hub" that provides data visualization and collaborative tools to enable diverse stakeholders to take action on interconnected social, environmental, and infrastructural problems. I am a doctoral candidate in anthropology and I met my community partners for this project, Recycle Lebanon, through my preliminary dissertation research. This research was investigating how people were intervening in Lebanon's greatest challenges through altering and repairing infrastructural systems such as waste management. Recycle Lebanon is a small Lebanese nonprofit organization that emerged in response to the garbage crisis in Lebanon that peaked in 2015. They began by designing campaigns to clean garbage from coastlines, waterways, and forests, a movement which grew to include establishing the first zero waste shop in the Middle East (the EcoSouk) and innovating ways to reuse waste such as cigarettes through creating the first cigarette recycling initiative in the country.

https://bit.ly/2NF7yec

Reflections on Research on the Little Bighorn River

Nestled in the valleys between Iisaxpúatahchee Isawaxaawúua/The Bighorn Mountains and the rolling plains of the Powder River Basin, Apsáalooke people make their home within the Iisaxpúatahcheeaashe/Big Horn River, Iisaxpúatuahcheeaashiakaate/Little Bighorn River, and Alúutaashe/Arrow Creek watersheds. I do not have a first memory of the Little Bighorn River because it is all I have ever known. I was raised along this river that has taken care of my people for many generations. It flows north from the heart of the Big Horn Mountains which begins in Wyoming – traditional Apsáalooke territory – into the crevices of the Cheétiish/Wolf Mountains eventually joining the Big Horn River at the northern end of our reservation. My people have always relied on our water resources and remained connected to the water as an element and buluksée/water creatures.

https://bit.ly/3pyOADg

Reflections on the Community Cookbook Project

As we near the one-year marker of social distancing in the U.S., I am reflecting on my turbulent feelings and experiences. I spent the majority of the pandemic 3,000 miles away from my family, oscillating between missing them, being scared for them living so close to New York City, and grateful I wasn't cooped up alongside everyone in our small New Jersey apartment. In Tucson, I was able to keep working, keep getting paid, keep spending time outside, and keep my basic needs met. This came with a lot of guilt as I heard from friends and acquaintances all the struggles they faced with unemployment, food insecurity, immigration, being an essential worker, getting sick with COVID-19, and more....In this spirit, food has grounded me. Even though my grand and luscious raised garden bed dreams never came to fruition (not for lack of trying...), I took solace and rejuvenation in the form of cooking, sharing photos of meals in WhatsApp chats, calling distant family members for recipes, and using the kitchen as a space to slow down and intentionally reflect on the world. With all of this in mind, I present a summary of my work with the CLIMAS fellowship program.

https://bit.ly/2ZshnhY

V. parahaemolyticus: a small bacteria with a big name

Rates of illness from Vibrio parahaemolyticus have steadily been increasing as other foodborne illnesses have been decreasing. In California, rates of vibriosis has increased by almost 40% between 2009 and 2012.1 Often, the primary culprit for V. parahaemolyticus exposure is from the consumption of raw oysters. As climate change drives changes in water temperature, salinity, and phytoplankton composition in estuarine environments, there is a growing concern for an increased prevalence of V. parahaemolyticus. Taken together, it is increasingly imperative to understand the prevalence and human health risks of V. parahaemolyticus from both a local and global perspective. My dissertation research, in collaboration with Southern California Coastal Water Research Project (SCCWRP), aimed to do just that.

https://bit.ly/2ORMWjt

Southwest Climate Podcast

climas.arizona.edu/media/podcasts

iTunes

https://apple.co/3kHh8bf

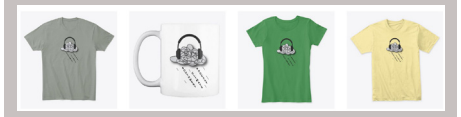
Android

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.

Prices are the wholesale cost, so we don't make any money, but 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

Feb 2021 Southwest Climate Podcast - Recent Storms and Dry Forecasts - Diving into La Niña and 2021

In the February 2021 episode of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Zack Guido jump back into discussing winter conditions in the Southwest. This includes what happened so far in 2021 with a few runs of storms that affected parts of Arizona and New Mexico. This also includes the role that La Niña may be playing this winter (snowpack, streamflow forecasts, rain/snow events, etc.), and how this compares to previous winters and La Niña events. They also discuss what we might expect over the rest of the winter and into early spring (Feb-Mar).

https://bit.ly/3prODAt

Previous Episodes

Dec 2020 - Tracking Drought Conditions, La Niña Forecasts, and What 2021 Might Bring

In the December edition of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Zack Guido sit down to discuss drought, La Nina, and what to expect (or at least hope for) in 2021. First, they recap the event that swept through on Dec 9-11, to talk through how different locations in the region fared in terms of precip. Next, they transition into the drought situation, which is currently looking pretty dire for the region - and discuss 'just how much worse can it get' - given much of the region is at Exceptional Drought (D4, the highest category on the US Drought Monitor), looking to some past events for comparison. They wrap things up with some 2021 predictions - things they think could (or hope might) happen in 2021.

https://bit.ly/2IV7Awl

Nov 2020 - Unprecedented or Uncommon, A La Niña Winter after a Failed Monsoon

In the November episode of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Zack Guido sit down to discuss weather and climate in the Southwest, including what we might expect over the next few months. They discuss La Niña and what this might mean for the Southwest, including implications of La Niña following a much drier than average monsoon and what the historical record says about just how unprecedented this pattern might be (dry monsoon, dry winter). Finally, they take a closer look at fire, and how the season has progressed in the Southwest, given the lack of rain, and what we might watch for going into next year's fire season.

https://bit.ly/35HCMYI

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.

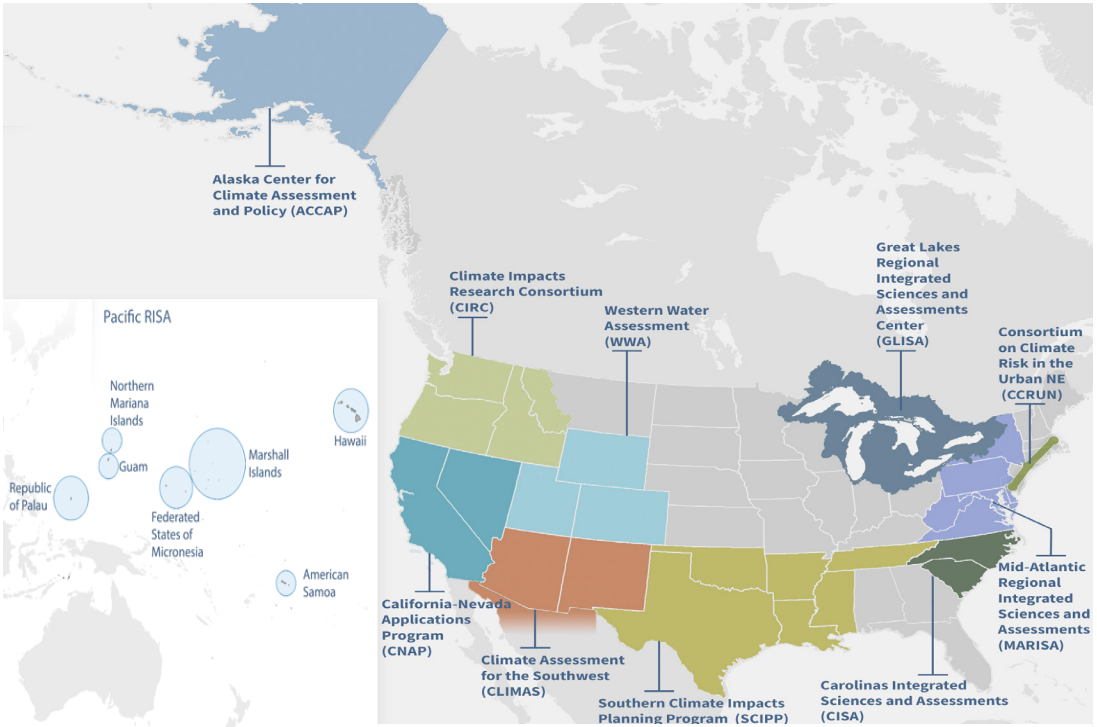


Figure 1: NOAA Regional Integrated Sciences and Assessments Regions