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Published by the Climate Assessment for the Southwest (CLIMAS), with support from University of Arizona Cooperative Extension, the Arizona State Climate Office, and the New Mexico State Climate office.

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May 2021 Southwest Climate Outlook

Precipitation and Temperature: April precipitation was between record driest and average in most of Arizona and between much below average and above average in most of New Mexico (Fig. 1a). April temperatures were above average to much above average in Arizona and average to much above average in most of New Mexico (Fig. 1b, SW Temps on p. 5), with similar patterns for 2021 so far (Fig. 2).

Drought: Water year precipitation to date is between below normal and much below normal across most of the Southwest, with record driest conditions in parts of CA/NV/AZ (Fig. 3). The U.S. Drought Monitor (USDM) is mostly unchanged from last month in the U.S. Southwest (Fig. 4), although California did see some expanded drought designations. This is partly because much of the region is at the highest drought category (D4, Exceptional Drought) and the scale simply does not go any drier. In Arizona and New Mexico, over 50-percent of the region is in D4, and 80-85 percent is in at least D3 (Extreme Drought).

Snowpack and Water Supply: Snow water equivalent (SWE) is well below the 1981-2010 median for the higher elevation regions that feed into streams over summer (see the NRCS website for details). Streamflow forecasts are below median across the Southwest, and are below fifty percent of the median in many of the upper sub-basins for the Colorado and Rio Grande rivers (Fig. 5). Most 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. 4).

Wildfire: Wildfire season is already underway in Arizona. The National Interagency Fire Center (NIFC) maps of significant fire potential call for above-normal wildfire risk across all of Arizona and New Mexico in May and June (Fig. 6). Wildfire risk in the Southwest will see increased ignition sources with the onset of the monsoon and the potential for dry lightning, especially before monsoon precipitation begins in earnest.

ENSO Tracker: La Niña conditions have ended for now, and the outlooks and forecasts have reverted to ENSO-neutral. The long-term forecasts see a possible return to La Niña conditions this winter, but it will be a wait-and-see situation over much of summer given the uncertainty (see ENSO-tracker on p. 3 for details).

Precipitation and Temperature Forecast: The three-month outlook for June through August calls for increased chances for below-normal precipitation across much of the southwestern U.S., particularly in a swath extending from New Mexico into 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 portions of northern Mexico (Fig. 7, bottom).



Tweet May 2021 SW Climate Outlook

MAY2021 @CLIMAS_UA SW Climate Outlook, ENSO Tracker, Recent SW Temps, AZ & NM Reservoirs, <https://bit.ly/3hH23sr> #SWclimate #AZWx #NMWx



Online Resources

Figure 1
National Centers for Environmental Information
ncdc.noaa.gov/sotc

Figures 2,3
West Wide Drought Tracker
wwdt.dri.edu

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

Figure 5
National Resource Conservation Service
nrms.usda.gov

Figure 6
National Interagency Fire Center
nifc.gov

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

May 2021 SW Climate Outlook

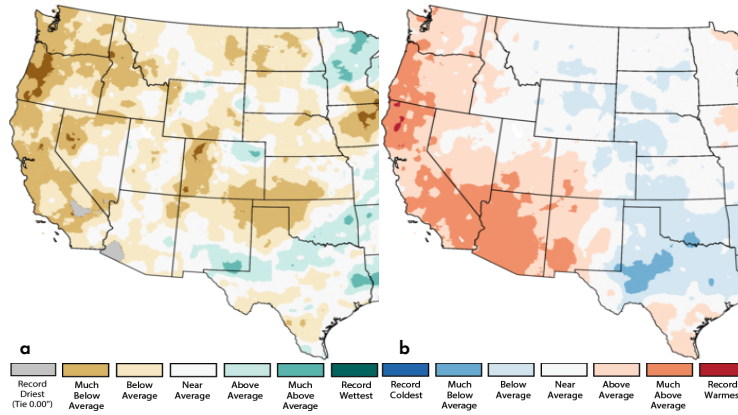


Figure 1: Apr 2021 Precipitation (a) & Temperature Ranks (b)

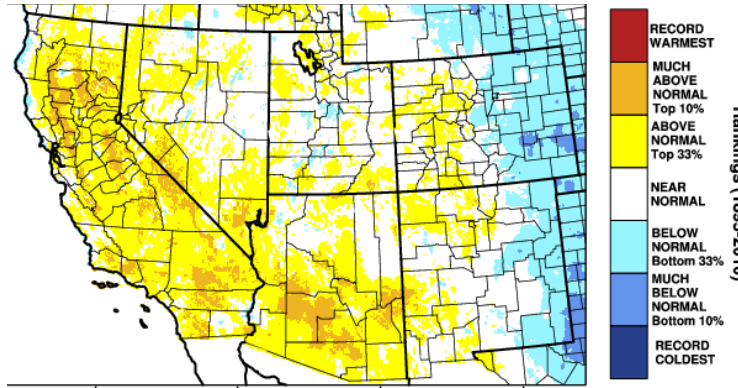


Figure 2: 2021 (Jan - Apr) Temperature Rankings

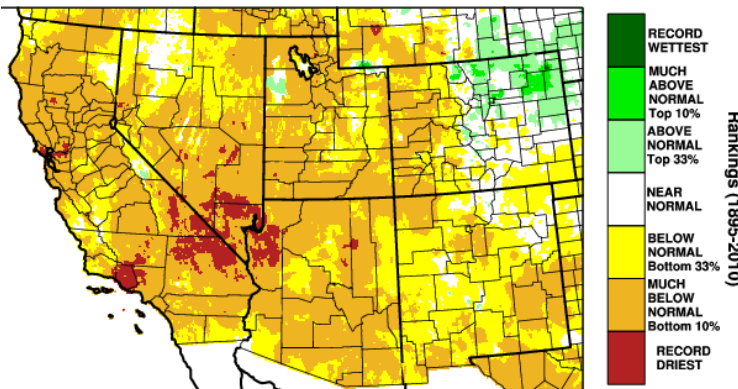


Figure 3: Water Year (Oct 2020 - Apr 2021) Precip Rankings

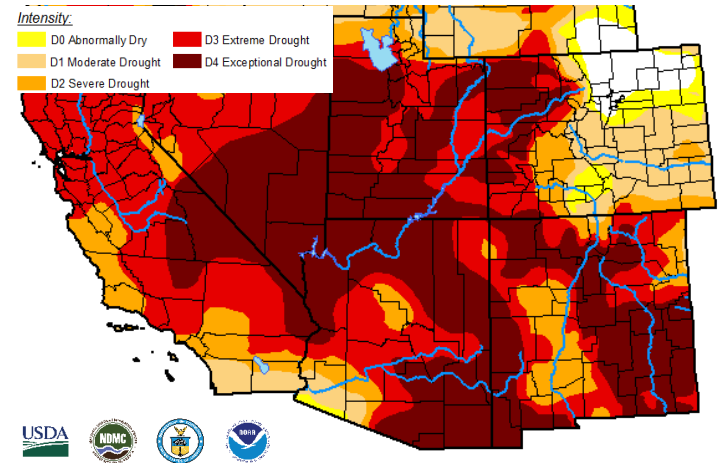


Figure 4: US Drought Monitor - May 11, 2021

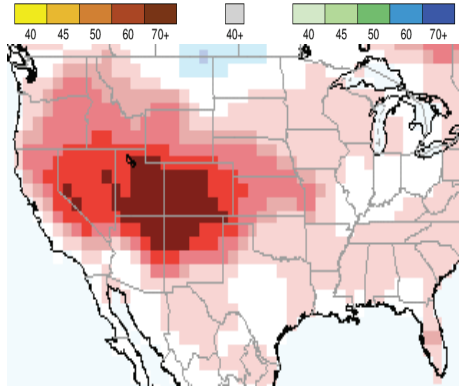
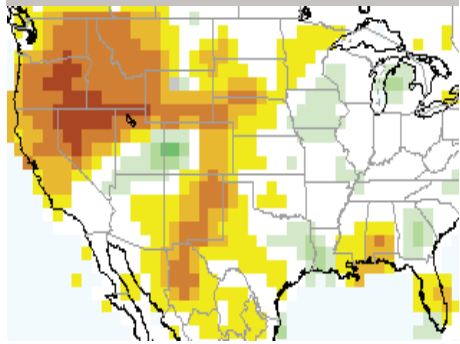


Figure 7: Three-Month (Jun-Aug) Forecast for Precip (top) and Temps (bottom)

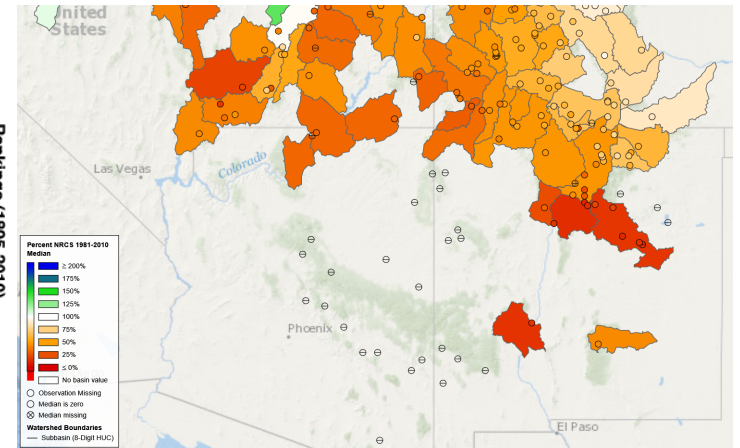


Figure 5: May 1 Streamflow Forecast Percent of Median (50% Exceedence Prob.)

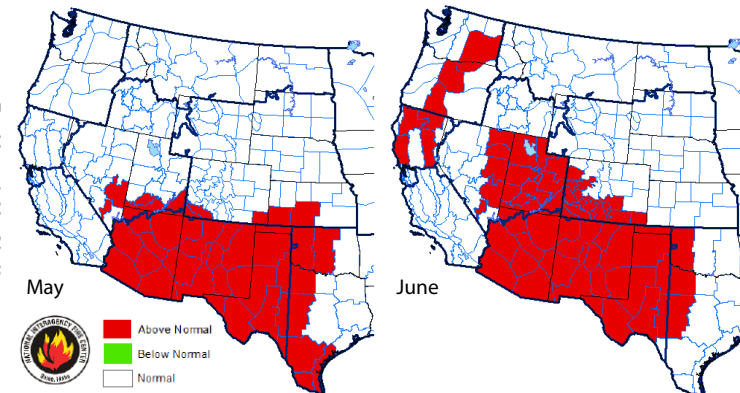


Figure 6: Significant Wildfire Potential - April and May 2021 (NIFC.gov)

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

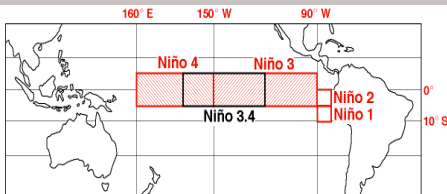
Figure 4
NOAA - Climate Prediction Center
cpc.ncep.noaa.gov

El Niño / La Niña

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

[climas.arizona.edu/sw-climate/
el-niño-southern-oscillation](http://climas.arizona.edu/sw-climate/el-niño-southern-oscillation)

Equatorial Niño Regions



For more information: [ncdc.noaa.gov/
teleconnections/enso/indicators/sst/](http://ncdc.noaa.gov/teleconnections/enso/indicators/sst/)

Image source: aoml.noaa.gov/

ENSO Tracker

Sea surface temperature (SST) forecasts for June – Aug 2021 call for normal conditions across the equatorial Pacific (Fig. 1). The current Niño 3.4/4 anomalies have returned to the range of neutral (Fig. 2), with further movement expected given the (warm) sub-surface waters. The ENSO outlooks note the end of the most recent La Niña event, with oceanic and atmospheric conditions decoupling and returning to normal (ENSO neutral).

Forecast Roundup: On May 11, the Australian Bureau of Meteorology ENSO tracker was fully shifted to neutral/inactive, stating “ENSO is neutral with no indication that El Niño or La Niña will develop in the coming months.” On May 12, the Japanese Meteorological Agency (JMA) observed that La Niña “is coming close to its end”, with a 70-percent chance of neutral conditions over summer and autumn. On May 13, the NOAA Climate Prediction Center (CPC) ENSO status was the “Final La Niña Advisory”, and they called for a 67-percent chance of ENSO-neutral during June-August 2021. On May 19, the International Research Institute (IRI) issued an ENSO Quick Look (Fig. 3), noting ENSO-neutral SSTs and “the evolution of most key atmospheric variables are consistent with the end of La Niña conditions.” The North American Multi-Model Ensemble (solid and dashed black line, Fig. 4) are back to ENSO-neutral, and are expected to remain neutral through summer.

Summary: La Niña conditions have ended, and ENSO neutral conditions have returned. The seasonal forecasts are bullish these will remain in the range of neutral through at least summer. Longer-term forecasts hint at the potential for a return of La Niña conditions in winter 2021/2022, but there is considerable uncertainty in these forecasts. The picture (and the probability of a return of La Niña) should be clearer by the end of summer.

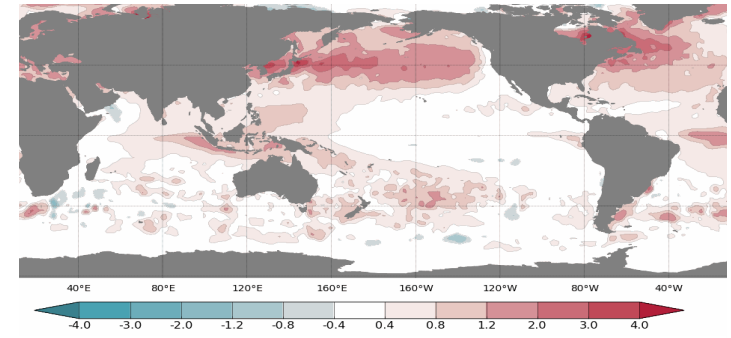


Figure 1: Jun - Aug 2021 Sea Surface Temperature (SST) Anomaly Forecast

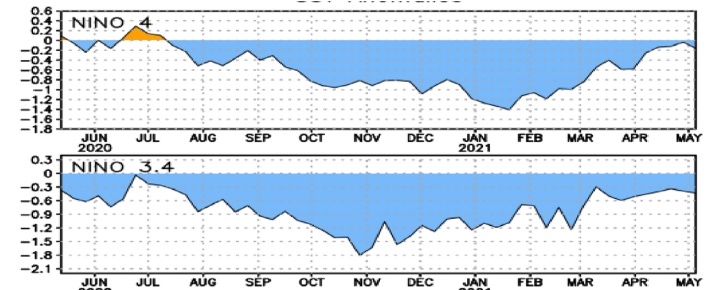


Figure 2: SST Anomalies in Niño Regions 3.4 & 4 (NCDC)

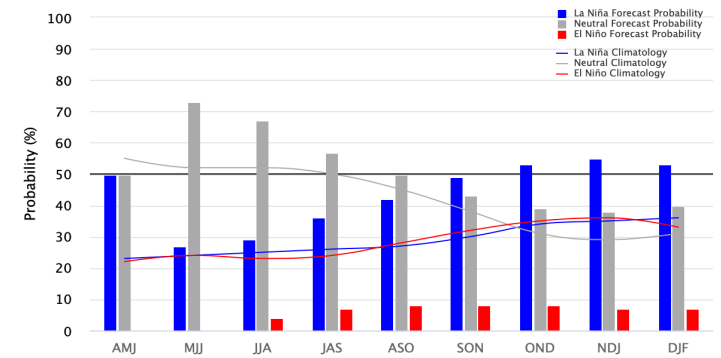


Figure 3: Early-May IRI/CPC Model-Based Probabilistic ENSO Forecast

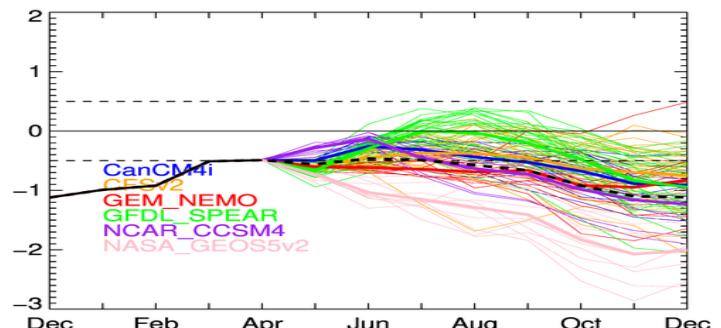


Figure 4: North American Multi-Model Ensemble Forecast for Niño 3.4

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.

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).

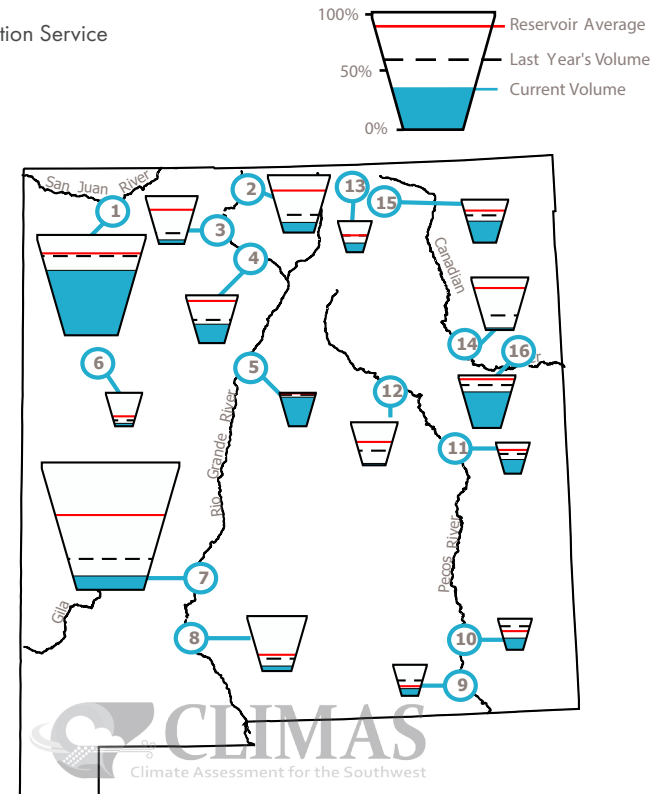
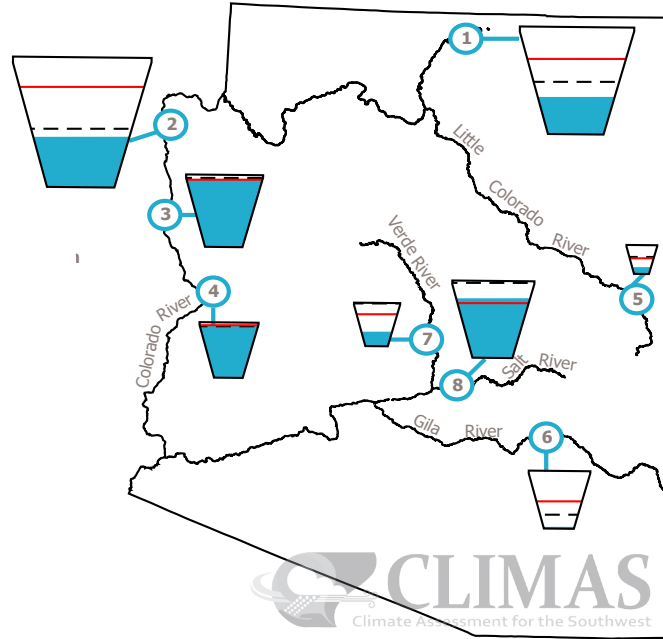
The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons). 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 MAY 1, 2021

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	35%	8,504.5	24,322.0	-339.3
2. Lake Mead	38%	9,934.0	26,159.0	-454.0
3. Lake Mohave	93%	1,689.0	1,810.0	0.0
4. Lake Havasu	94%	583.2	619.0	14.4
5. Lyman	23%	6.8	30.0	-0.4
6. San Carlos	0%	0.1	875.0	-3.6
7. Verde River System	33%	93.6	287.4	1.4
8. Salt River System	78%	1,590.0	2,025.8	-63.6

*KAF: thousands of acre-feet

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	62%	1,044.6	1,696.0	2.4
2. Heron	16%	65.7	400.0	10.9
3. El Vado	8%	14.3	190.3	4.0
4. Abiquiu	38%	70.5	186.8	-5.9
5. Cochiti	85%	42.3	50.0	-0.4
6. Bluewater	8%	2.9	38.5	-0.2
7. Elephant Butte	10%	225.0	2,195.0	14.5
8. Caballo	9%	29.6	332.0	-0.7
9. Lake Avalon	22%	1.0	4.5	1.0
10. Brantley	36%	15.0	42.2	-0.2
11. Sumner	44%	15.8	35.9	-1.6
12. Santa Rosa	3%	3.7	105.9	-0.2
13. Costilla	29%	4.6	16.0	1.0
14. Conchas	4%	11.0	254.2	-1.5
15. Eagle Nest	48%	37.6	79.0	0.9
16. Ute Reservoir	67%	133	200	-2.0

Online Resources

Figure 1
CLIMAS: Climate Assessment for the Southwest

climas.arizona.edu

data: RCC-ACIS

- High Temperature (Normal)
- Low Temperature (Normal)
- + High Temperature (Record)
- Low Temperature (Record)
- Daily Temperature Range

Recent Temperatures Around the Southwest

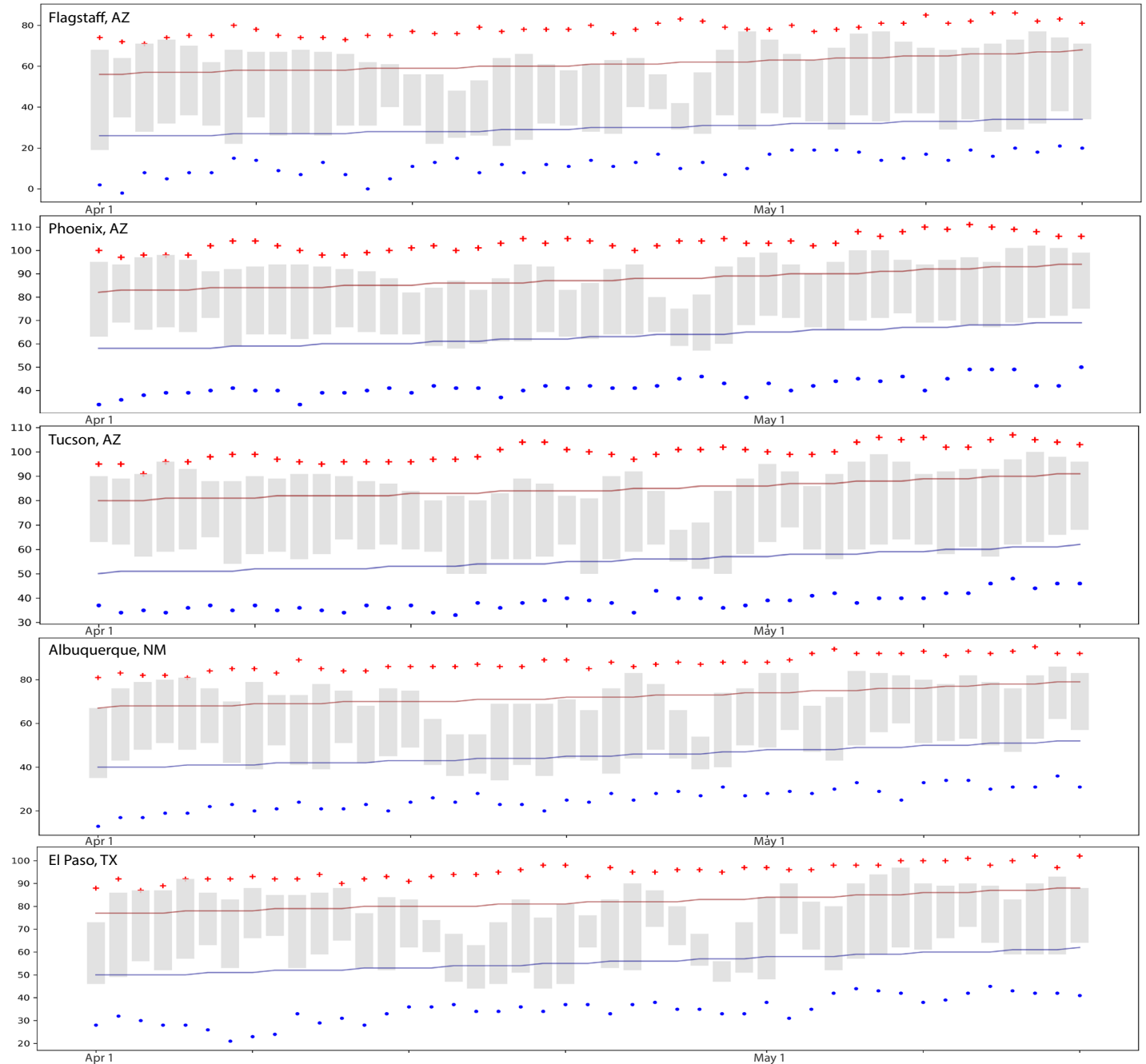


Figure 1: Daily Average, Normal, and Record High/Low Temperatures, Apr 1, 2021 - May 15, 2021

Southwest Climate Podcast

climas.arizona.edu/media/podcasts

iTunes

<https://apple.co/3kHh8bf>

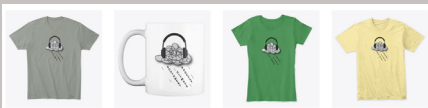
Android

<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

Apr 2021 Southwest Climate Podcast - Winter Weather Scorecard and Diving into Assessments of Seasonal vs. Mega Drought

In the April 2021 episode of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Zack Guido jump into winter weather and assessments of (drought) conditions. First, they look back at winter so far and see how it stacks up to recent historical totals. Next, they take a closer look at the relationship between summer and winter precipitation, and the various phase combinations (wet/dry, dry/wet, wet/wet, dry/dry). They turn to some paleoclimate expertise to help them think about these patterns, as well as how drought has been defined (seasonal drought, megadrought, etc.), and how these terms get used in science communication and the media.

<https://bit.ly/3hFGf00>

Previous Episodes

Mar 2021 Southwest Climate Podcast - Was the SW Winter "La-Niña-y"? Best of the Worst Edition

In the Mar 2021 edition of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Zack Guido sit down to discuss the winter in the Southwest, and whether it lived up to expectations for a La Niña winter. They also go over streamflow, snowpack, and start a deeper dive into reservoirs, based on a listener question from last month (send in your questions if you have them!). They dabble a bit in the seasonal forecasts and talk about some of the key things they will be watching over the next 3-4 months, namely how fire season evolves, and when we can (reasonably) start looking ahead towards monsoon onset. They wrap up with a brief preview of monsoon-game 2.0, and hint at what we have planned.

<https://bit.ly/3snT6pB>

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>



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



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.

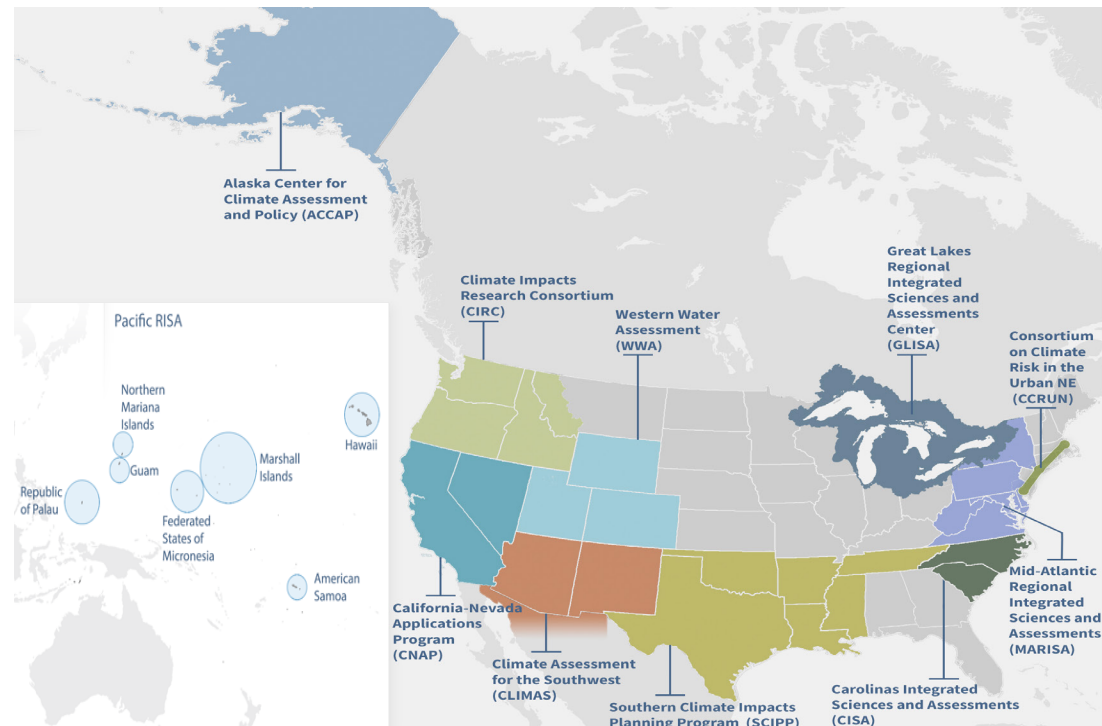


Figure 1: NOAA Regional Integrated Sciences and Assessments Regions