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June 2021 Southwest Climate Outlook

Precipitation and Temperature: May precipitation was between record driest and near average in most of Arizona and between below average and above average in most of New Mexico (Fig. 1a). May temperatures were above average in Arizona and between average and much above average in most of New Mexico (Fig. 1b). Spring precipitation ranks (Mar-May) were below average to record driest across most of the Southwest, with a few pockets of average to above-average (Fig. 2a). Temperature ranks for the same period were above average across most of the Southwest (Fig. 2b). 2021 (Jan - May) temperature averages and precipitation reveal a similar pattern (Fig. 3a-b).

Drought: Water year precipitation (as of May 31, 2021) is between below normal and record driest across most of the Southwest (Fig. 4). The U.S. Drought Monitor (USDM) intensified drought categorizations across the Southwest since the May climate outlook (Fig. 5). Most of the region was already characterized as experiencing drought, but these changes expanded the areas under D3 (Extreme Drought) and D4 (Exceptional Drought), and the scale simply does not go any drier.

Water Supply: Snowpack is dwindling, and the latest streamflow forecasts were generally below the 1981-2010 median for the higher elevation regions that feed into streams over summer (see the NRCS website for details). 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 saw a rapid surge of activity, particularly in Arizona (Fig. 6). The Telegraph/Mescal complex fire is notable in size and duration, with waves of closures and evacuations. The National Interagency Fire Center (NIFC) significant wildland fire potential outlooks call for normal wildfire risk across Arizona and New Mexico in July. This leans on monsoon precipitation tamping down risk. Until those rains begin, there are increased opportunities for ignition in the Southwest with the potential for dry lightning.

ENSO Tracker: La Niña conditions are over, with outlooks and forecasts reverting to ENSO-neutral (for now). 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 (see ENSO-tracker on p. 3 for details).

Precipitation and Temperature Forecast: The three-month outlook for July through September calls for increased chances for above-normal precipitation across much of the Arizona, and a large swath of increased chances for below-normal precipitation in New Mexico (Fig. 7, top). The three-month temperature outlook calls for equal chances of above- or below-normal temperatures across much of the southwestern U.S. and portions of northern Mexico (Fig. 7, bottom).

Tweet June 2021 SW Climate Outlook

JUN2021 @CLIMAS_UA SW Climate Outlook, ENSO Tracker, AZ & NM Reservoirs, https://bit.ly/3h79N51 #SWclimate #AZWx #NMWx

June 2021 SW Climate Outlook

Online Resources

Figures 1-3
National Centers for Environmental Information
ncdc.noaa.gov/sotc

Figure 4
West Wide Drought Tracker
wwdt.dri.edu

Figure 5
U.S. Drought Monitor
droughtmonitor.unl.edu

Figure 6
CLIMAS: Climate Assessment for the Southwest
climas.arizona.edu

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

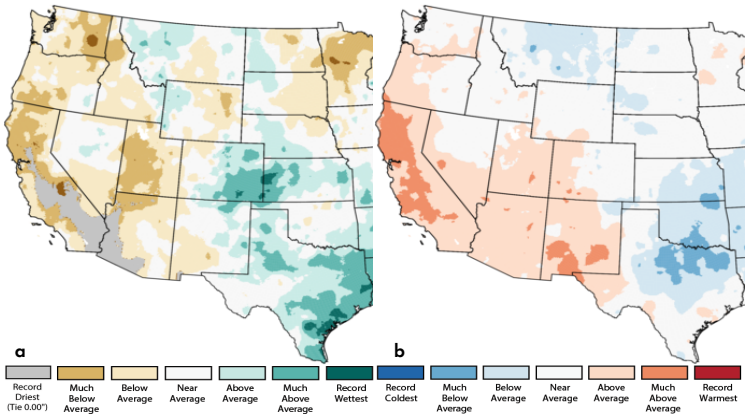


Figure 1: May 2021 Precipitation (a) & Temperature Ranks (b)

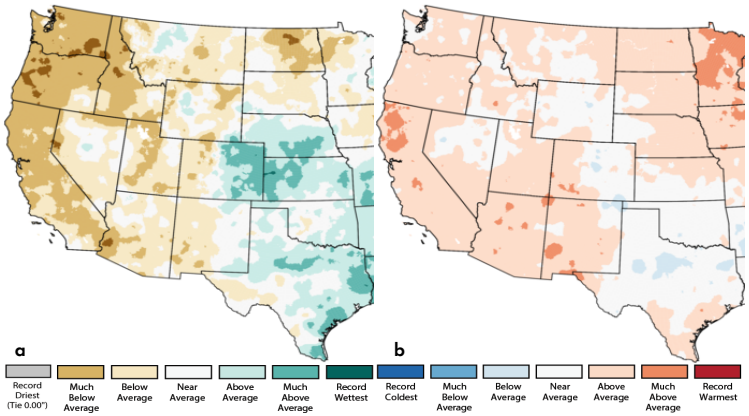


Figure 2: Mar-May 2021 Precipitation (a) & Temperature Ranks (b)

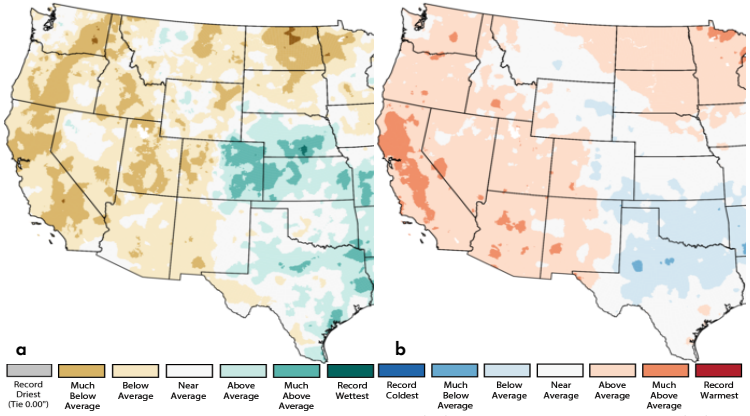


Figure 3: Jan-May 2021 Precipitation (a) & Temperature Ranks (b)

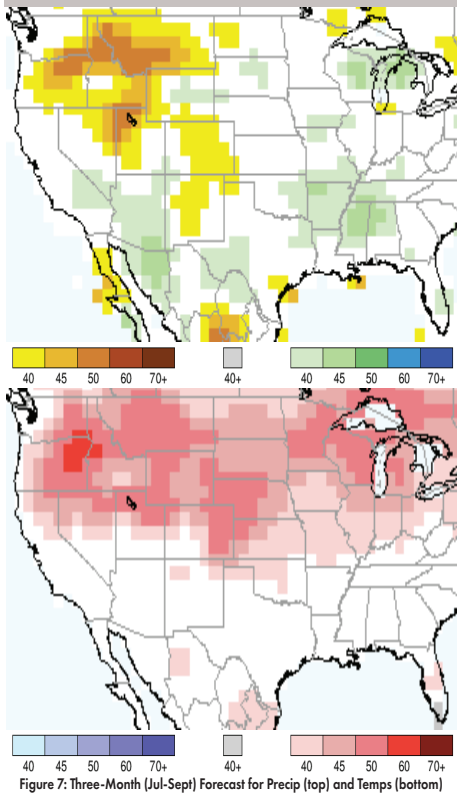


Figure 7: Three-Month (Jul-Sept) Forecast for Precip (top) and Temps (bottom)

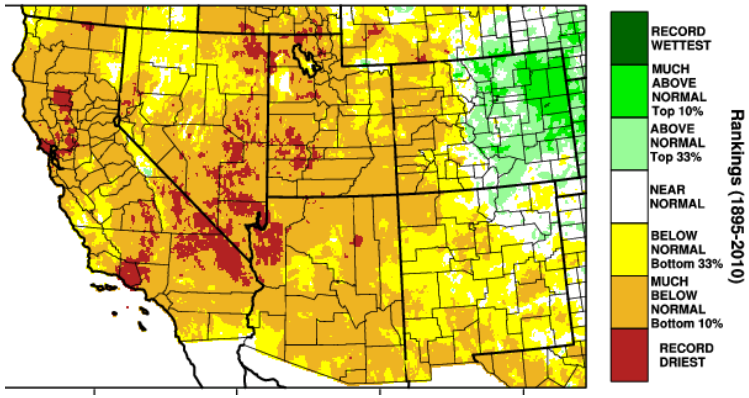


Figure 4: Water Year (Oct 2020 - May 2021) Precip Rankings

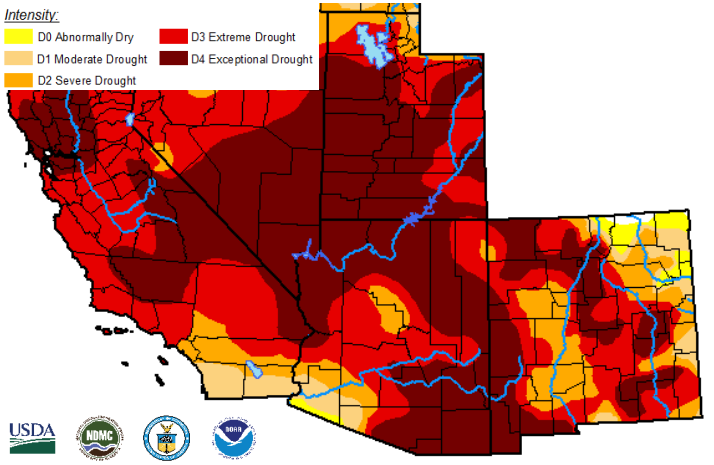


Figure 5: US Drought Monitor - Jun 22, 2021

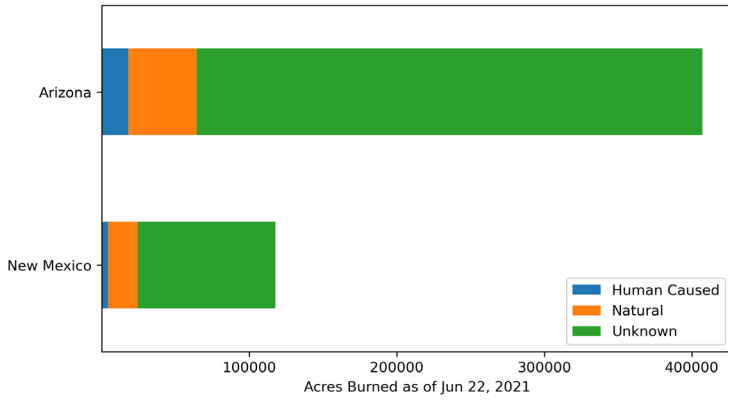


Figure 6: Wildfire Fire Acres burned - AZ and NM (as of Jun 22, 2021)

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

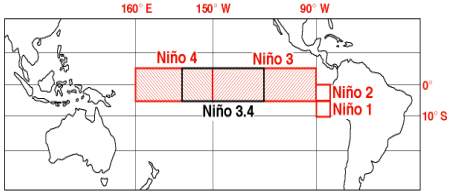
Figure 4
NOAA - Climate Prediction Center
cpc.ncep.noaa.gov

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 July – Sept 2021 call for cooling conditions across the equatorial Pacific (Fig. 1). The current Nino 3.4/4 anomalies have returned to the range of neutral (Fig. 2). The ENSO outlooks note the persistence of neutral conditions in the short term, along with the potential return of La Niña conditions in winter 2021-2022.

Forecast Roundup: On June 10, the NOAA Climate Prediction Center (CPC) ENSO status was "not active", and they called for an 78-percent chance of ENSO-neutral during June-August 2021. On June 10, the Japanese Meteorological Agency (JMA) observed that "the La Niña that started in summer 2020 has terminated", with a 60-percent chance of neutral conditions continuing to autumn. On June 18, the International Research Institute (IRI) issued an ENSO Quick Look (Fig. 3), noting "A large majority of the model forecasts predict SSTs to remain near-normal through boreal summer." On Jun 22, the Australian Bureau of Meteorology ENSO tracker was neutral/inactive, stating ENSO "remains neutral with all oceanic and atmospheric indicators within the neutral range." 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, but show the potential for another round of La Niña in 2021-2022.

Summary: La Niña conditions are over and ENSO neutral conditions have returned. Most seasonal forecasts are bullish neutral conditions will remain through summer. Longer-term forecasts hint at a return of La Niña in winter 2021/2022, despite considerable uncertainty in these forecasts. The picture should be clearer by the end of summer, but if La Niña returns, this does not bode well for accumulated drought, particularly if the Southwest experiences another below normal monsoon.

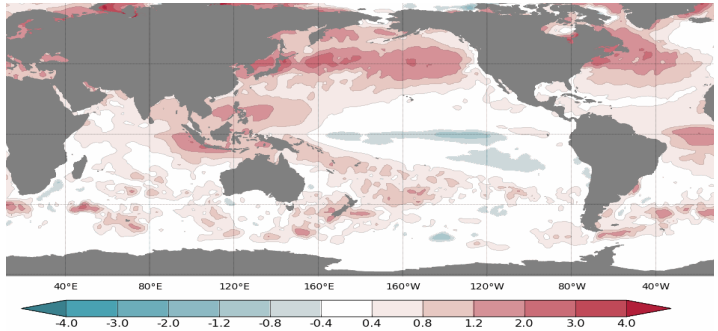


Figure 1: Jul - Sept 2021 Sea Surface Temperature (SST) Anomaly Forecast

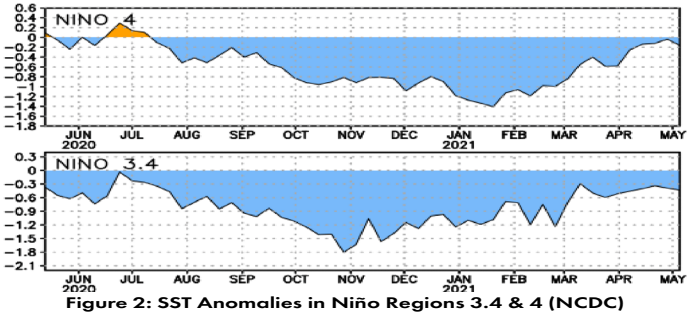


Figure 2: SST Anomalies in Niño Regions 3.4 & 4 (NCDC)

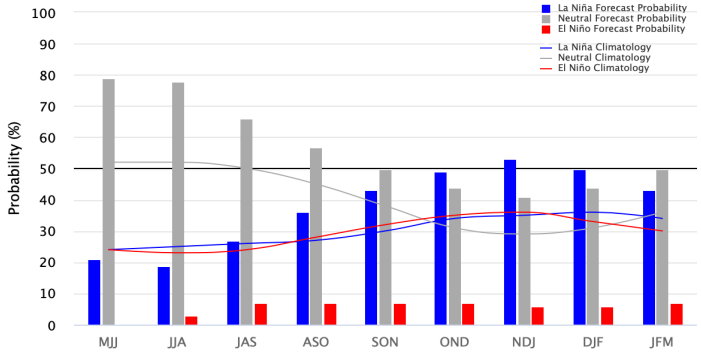


Figure 3: Early-Jun IRI/CPC Model-Based Probabilistic ENSO Forecast

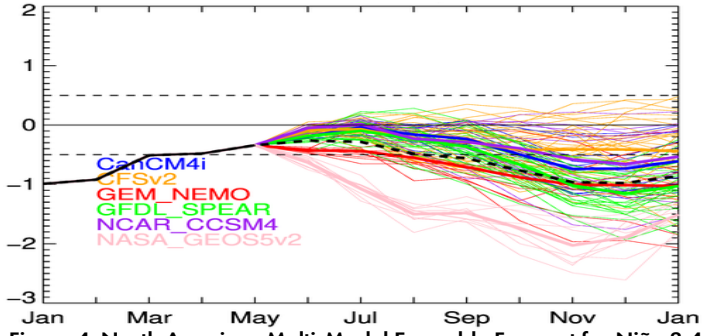


Figure 4: North American Multi-Model Ensemble Forecast for Niño 3.4

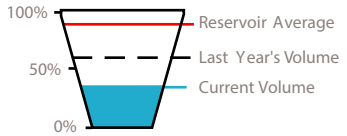
Online Resources

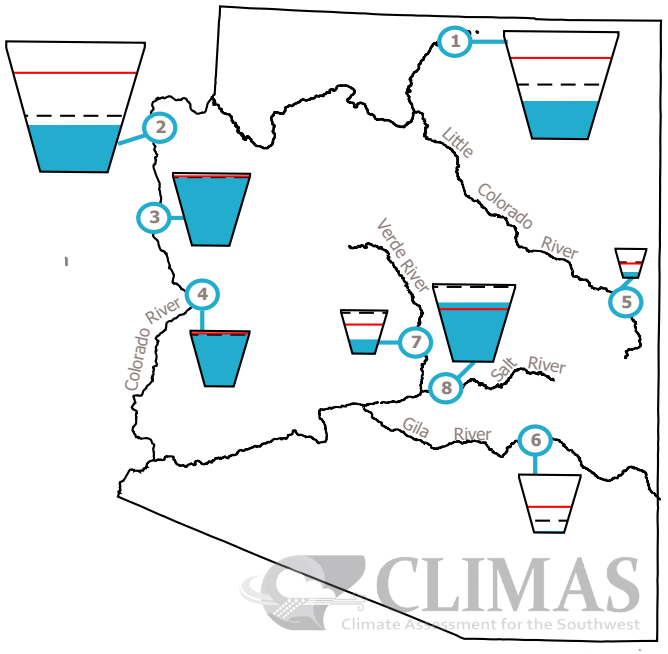
Portions of the information provided in this figure is available at the Natural Resources Conservation Service
www.wcc.nrcs.usda.gov/BOR/basin.html

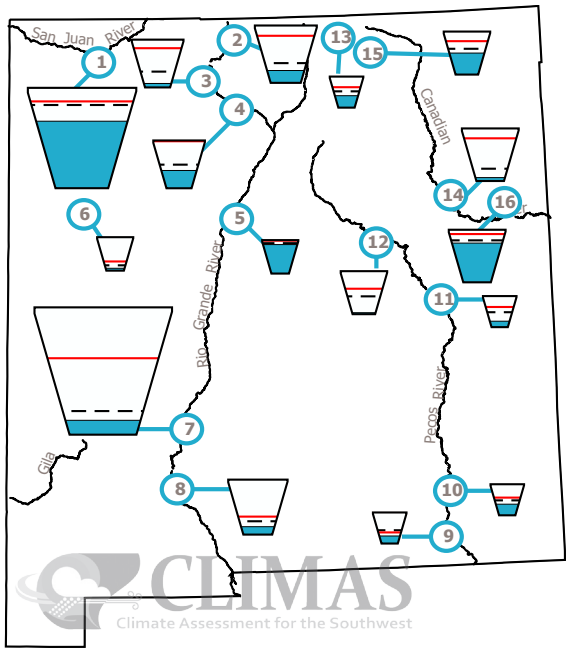
Contact Ben McMahan with questions/comments.

Reservoir Volumes

DATA THROUGH JUNE 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	34%	8,366.4	24,322.0	-138.0
2. Lake Mead	36%	9,480.0	26,159.0	-454.0
3. Lake Mohave	93%	1,683.0	1,810.0	-6.0
4. Lake Havasu	96%	591.7	619.0	8.5
5. Lyman	19%	5.8	30.0	-1.0
6. San Carlos	0%	0.1	875.0	0.0
7. Verde River System	32%	91.0	287.4	-2.6
8. Salt River System	76%	1,529.5	2,025.8	-60.5

*KAF: thousands of acre-feet

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	65%	1,104.9	1,696.0	60.3
2. Heron	22%	89.4	400.0	23.7
3. El Vado	7%	14.0	190.3	-0.3
4. Abiquiu	36%	66.5	186.8	-4.0
5. Cochiti	84%	41.8	50.0	-0.5
6. Bluewater	7%	2.7	38.5	-0.2
7. Elephant Butte	11%	234.4	2,195.0	9.4
8. Caballo	14%	47.4	332.0	17.8
9. Lake Avalon	24%	1.1	4.5	0.1
10. Brantley	35%	14.9	42.2	0.0
11. Sumner	18%	6.4	35.9	-9.4
12. Santa Rosa	3%	3.6	105.9	-0.1
13. Costilla	38%	6.0	16.0	1.5
14. Conchas	5%	12.9	254.2	1.9
15. Eagle Nest	49%	38.7	79.0	1.1
16. Ute Reservoir	73%	145	200	12.0

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

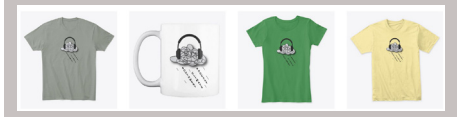
Android

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

May 2021 Southwest Climate Podcast - Late May's Most Common Question - What's The Monsoon Forecast?!

In the May 2021 edition of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Zack Guido sit down to discuss a range of issues related to that most pressing question this time of year - "What's the Monsoon Forecast?!". They run through the last month of weather, what we might expect from June given historical patterns and extremes, and how much faith we can put in forecasts this time of year (hint, it's tough to make a good monsoon forecast). The podcast wraps with a reminder about the Southwest Monsoon Fantasy Forecast game. We piloted the game last year, and this year there's a new and improved interface and some fun prizes. Stay tuned to the end of the podcast (or watch this space) for details on the game (how to play, prizes, etc.).

https://bit.ly/3y4wJsD

Previous Episodes

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

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

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.

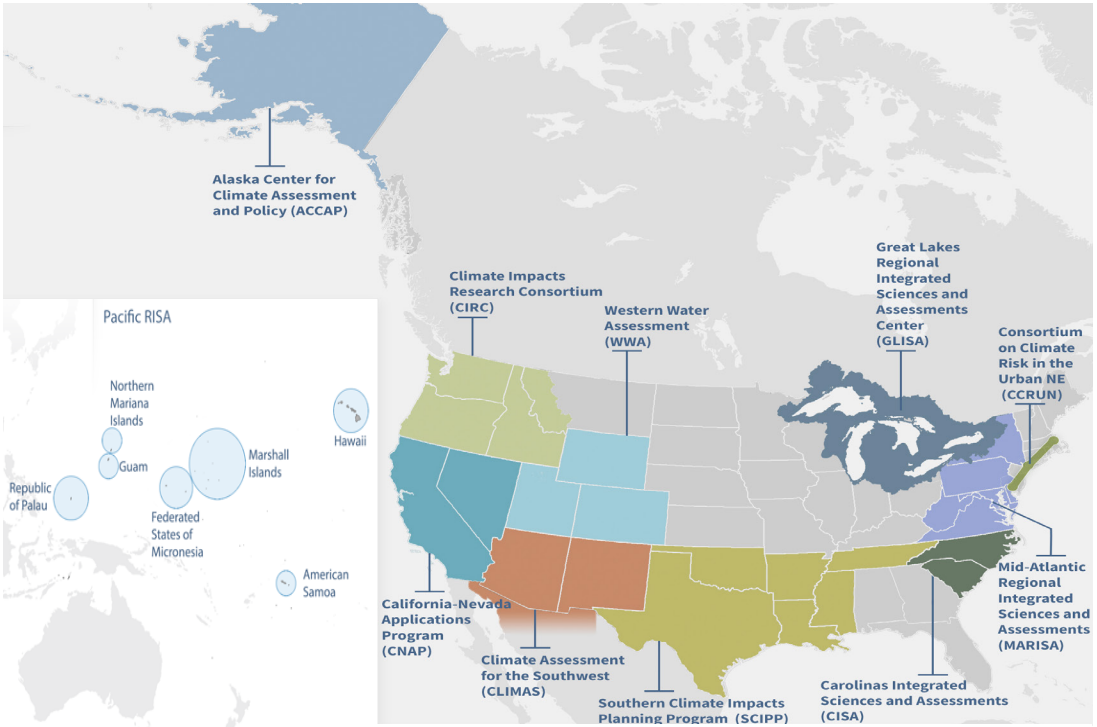


Figure 1: NOAA Regional Integrated Sciences and Assessments Regions