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July 2022 Southwest Climate Outlook

Monthly/Seasonal Precipitation and Temperature: June precipitation was between average and much above average in Arizona and between average and record wet in most of New Mexico (Fig. 1a). June temperatures were above average to much above average in Arizona and New Mexico (Fig. 1b). Water year precipitation is mostly below average or drier in most of Arizona and New Mexico with some early monsoon activity (Fig. 1a) helping boost water year totals (Fig. 2).

Drought: The Jul 5 U.S. Drought Monitor (USDM) shows decreases in categorical severity of drought characterizations in New Mexico following early monsoon activity (Fig. 4). Despite the local improvement, drought conditions are still found across the entire southwestern United States. Long term accumulated precipitation deficits are a factor in these designations. The early start to the monsoon in June helped with local conditions, but the region is yet to see sustained above average monsoon activity, which even if it occurs is unlikely to reverse long term drought conditions.

Water Supply: Most of the reservoirs in Arizona and New Mexico are at or below the values recorded at this time last year. Most are also below their long-term average (see reservoir storage for Arizona and New Mexico). The tier one shortage declaration for the Colorado River in 2022 and low water levels in the Rio Grande highlight ongoing concerns about the intersection of long-term drought and water resource management.

Wildfire: Fire season to date has been well above average in New Mexico, and closer to average in Arizona (Fig.4). The onset of the monsoon tends to tamp down (but not eliminate) wildfire risk, and the NIFC fire outlooks for August reflect this shift back to 'normal' fire risk for Arizona and most of New Mexico (Fig. 5).

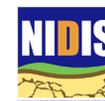
ENSO Tracker: ENSO remains at La Niña status according to most outlooks. Previously, the forecast consensus was on a transition to ENSO-neutral conditions by summer, but there are now indications of the potential for La Nina to persist into fall and winter (see ENSO-tracker for details).

Monsoon: Early storms in June boosted totals (Fig. 6) and percent of normal to above average levels, especially in New Mexico and pockets of central Arizona (see Monsoon Tracker for details). Favorable atmospheric patterns suggest activity could pick up over the next few weeks, especially in Arizona, but there are no guarantees, and the persistence of La Niña would suggest fewer opportunities for Eastern Pacific Tropical Storms to supplement late season monsoon totals.



Tweet July 2022 SW Climate Outlook

JUL2022 @CLIMAS_UA SW Climate Outlook, Forecasts, ENSO Tracker, Wildfire Outlook, AZ & NM Reservoirs, bit.ly/3zp2u2U #SWclimate #AZWx #NMWx



Online Resources

Figure 1
National Centers for Environmental Information
[ncdc.noaa.gov/sotc](https://www.ncdc.noaa.gov/sotc)

Figure 2
West Wide Drought Tracker
[wwdt.dri.edu](https://www.wwdt.dri.edu)

Figure 3
U.S. Drought Monitor
droughtmonitor.unl.edu

Figure 4
CLIMAS using SWCC data
gacc.nifc.gov/swcc

Figure 5
National Interagency Fire Center
[nifc.gov](https://www.nifc.gov)

Figure 6
Climate Science Applications Program/CLIMAS
cals.arizona.edu/climate
data: PRISM

July 2022 - Climate Summary

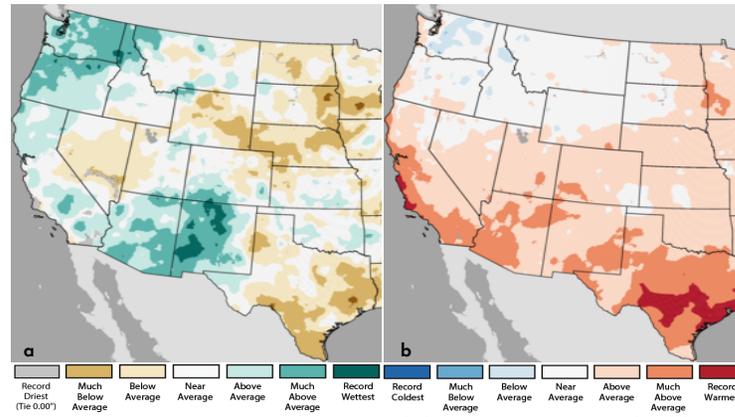


Figure 1: June 2022 Precipitation (a) & Temperature Ranks (b)

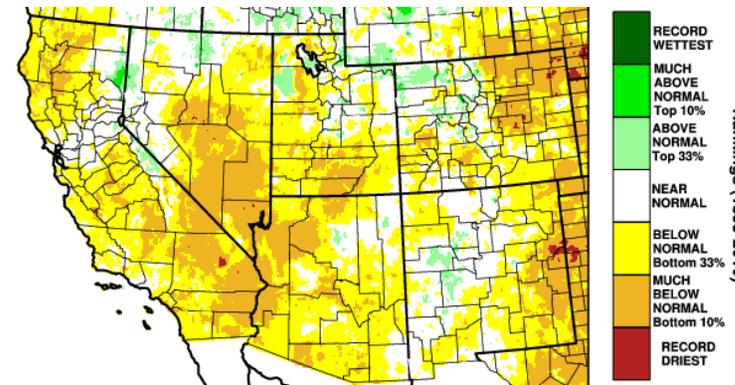


Figure 2: Water Year (Oct 2021 - Jun 2022) Precip Rankings

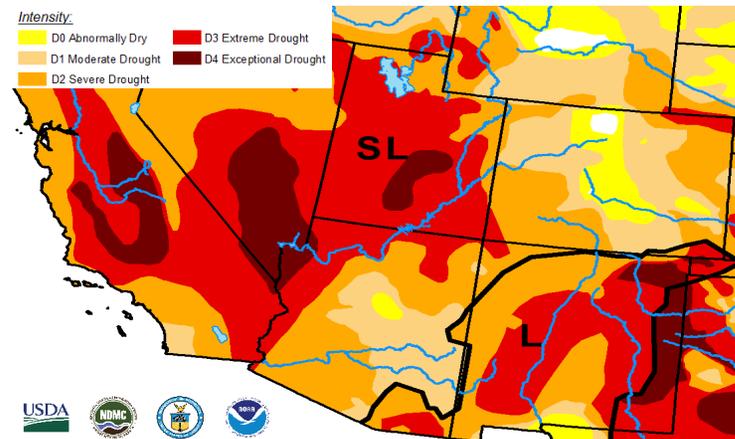


Figure 3: US Drought Monitor - Jul 5, 2022

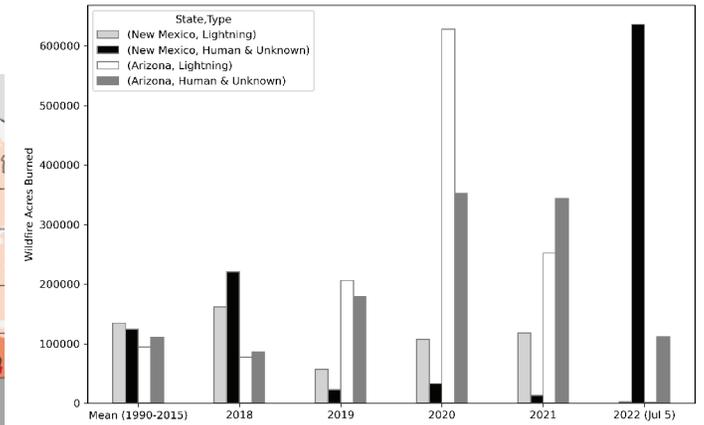


Figure 4: SWCC Southwest Region Wildfire Statistics

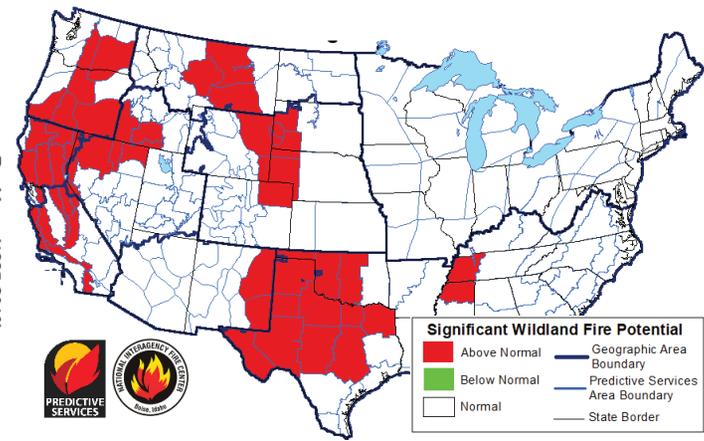


Figure 5: NIFC Significant Wildland Fire Potential Outlook - Aug 2022

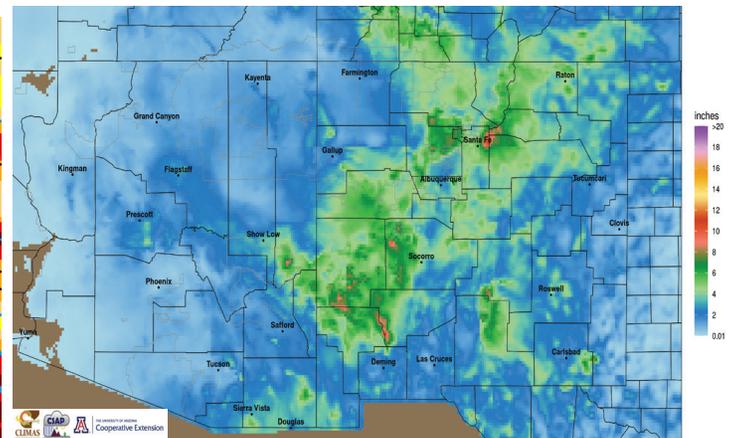


Figure 6: Monsoon Total Precipitation (Jun 15 - Jul 18, 2022)

Online Resources

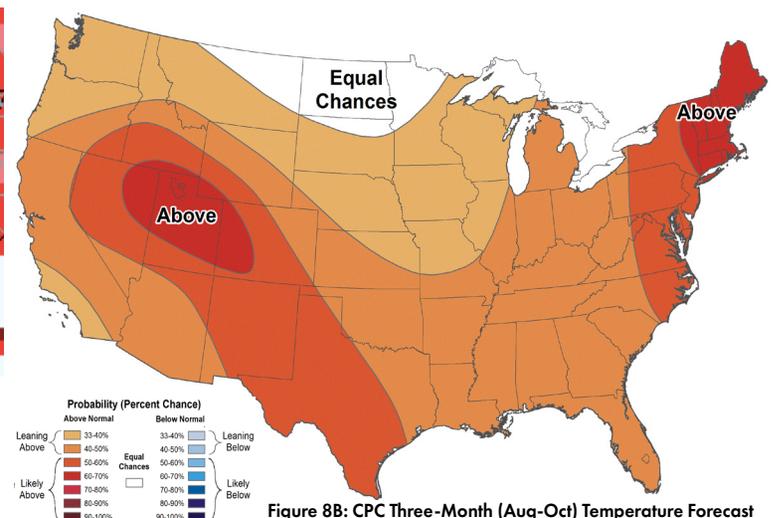
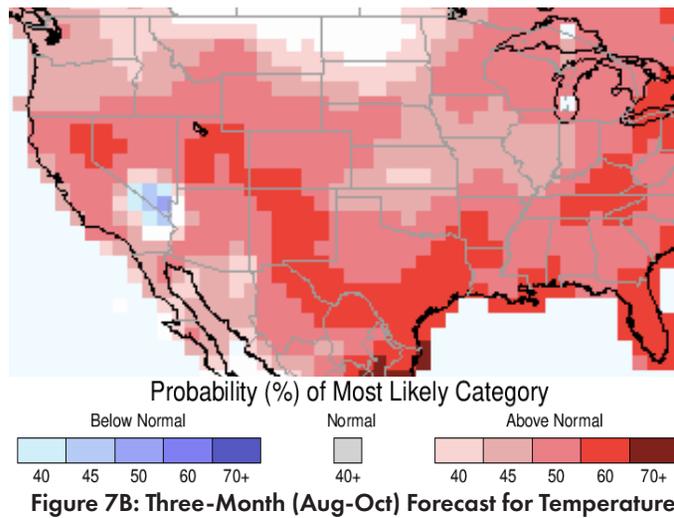
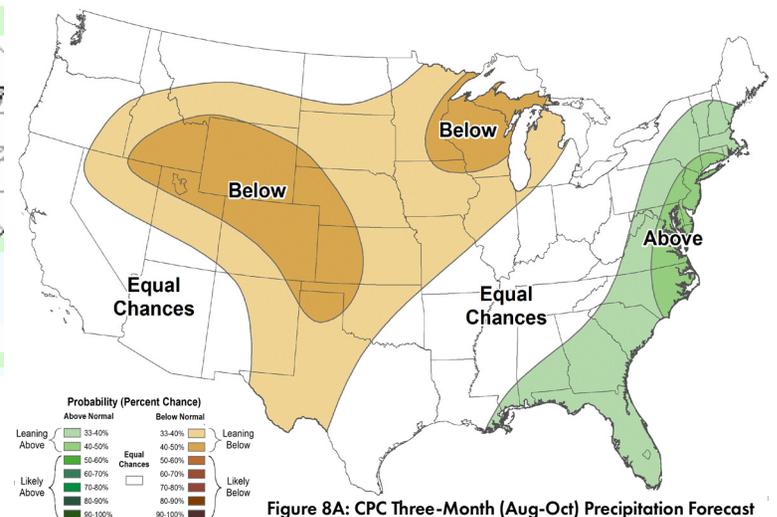
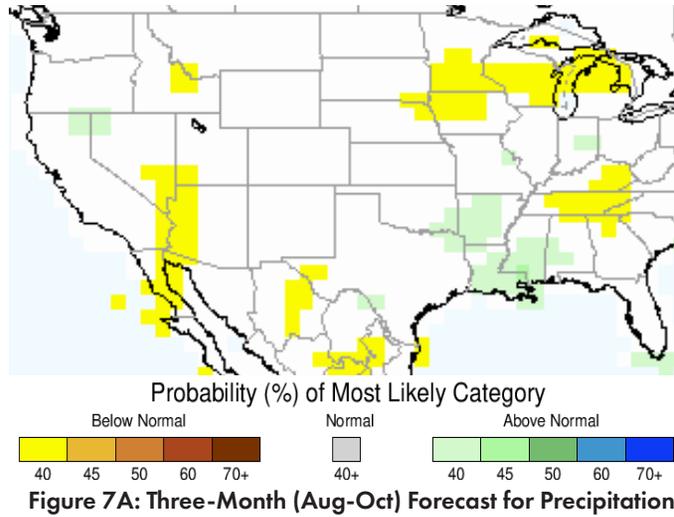
Figure 7

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

Figure 8

NOAA Climate Prediction Center
cpc.ncep.noaa.gov

July 2022 - Seasonal Forecasts



Precipitation Forecasts: The IRI outlook for Aug-Oct calls for equal chances of above or below average precipitation in New Mexico and most of Arizona (Fig. 7a). The CPC outlook for Aug-Oct calls for increased chances of below normal precipitation in eastern New Mexico, with equal chances of above, below, or average precipitation in Arizona much of the rest of the Southwest (Fig. 8a).

Temperature Forecasts: The IRI outlook for Aug-Oct calls for increased chance of above average temperatures across most of the Southwest (Fig. 7b). The CPC outlook for Aug-Oct calls for increased chances of above average temperatures across 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

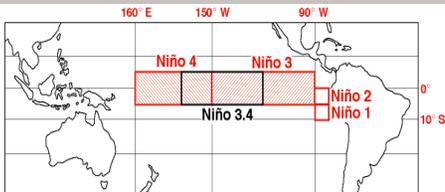
NOAA - Climate Prediction Center
cpc.ncep.noaa.gov

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/

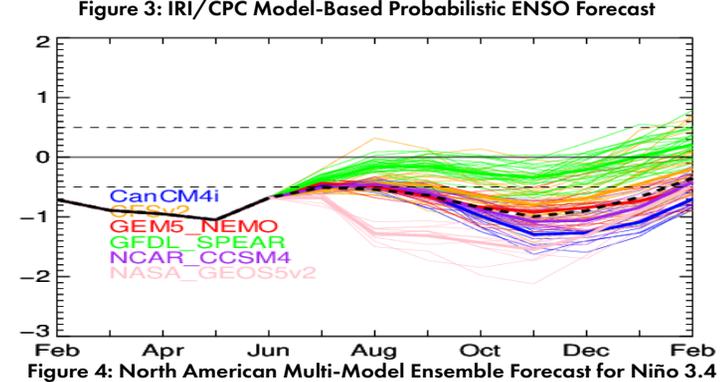
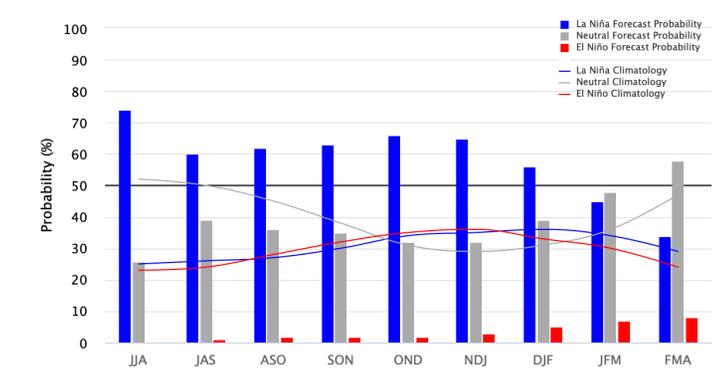
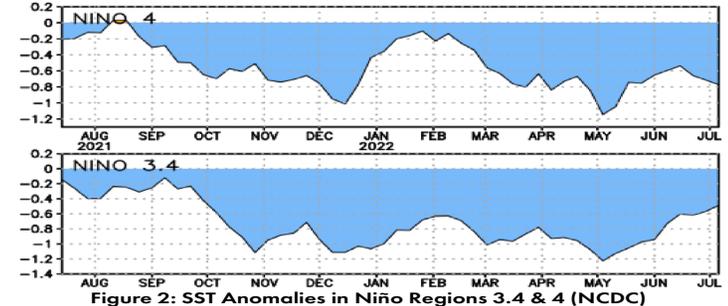
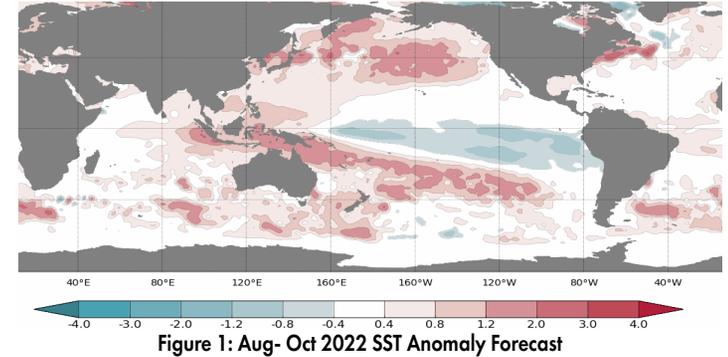
Image source: aoml.noaa.gov/

ENSO Tracker

Sea surface temperature (SST) forecasts for Aug – Oct 2022 still indicate cool conditions across most of the equatorial Pacific (Fig. 1). Current 3.4/4 anomalies remain below the La Niña threshold but have moved closer to neutral in the last few months (Fig. 2). ENSO outlooks generally see La Niña lasting through summer and into fall.

Forecast Roundup: On Jul 7 the Australian Bureau of Meteorology ENSO outlook continued on a La Niña watch, noting an increased chances of La Niña compared to normal, with a mix of neutral and La Niña indicators in the ocean and atmosphere, respectively. On Jul 11 the Japanese Meteorological Agency (JMA) observed La Niña conditions had a 60-percent chance of continuing through autumn, and a 40-percent chance of returning to ENSO-neutral during summer. On Jul 14 the NOAA Climate Prediction Center (CPC) maintained their “La Niña Advisory” noting “the coupled ocean-atmosphere system was consistent with La Niña conditions” and called for a 60-percent chance of La Niña in the short term (Jul-Sept), and a 62- to 66-percent chance of La Niña in fall and early winter. On Jul 19, the International Research Institute (IRI) issued an ENSO Quick Look (Fig. 3), noting below-average SSTs, with most models indicating they will remain in La Niña territory into fall and early winter. The North American Multi-Model Ensemble (solid and dashed black line, Fig. 4) is currently forecast to remain under the La Niña temperature threshold through fall and into winter.

Summary: The outlooks are slightly more certain in the possibility of La Niña extending through summer and into fall and winter, with each month providing a clearer picture of the short term forecast. Assuming La Niña does persist through summer, the influence on the monsoon is not well understood, partly due to the inherent variability and volatility of the monsoon, and limited sample size of ENSO events that persist over the summer period. The signal is more clear in winter, and if La Niña stick around that long, the Southwest can anticipate seasonal outlooks that call for below average winter precipitation.



Online Resources

Figures 1-4

Climate Science Applications Program/CLIMAS
cals.arizona.edu/climate
 data: PRISM

Monsoon Resources

NWS Tucson Monsoon Tracker
weather.gov/twc/Monsoon

NWS Tucson Monsoon Info
weather.gov/twc/MonsoonInfo

CLIMAS Monsoon Info
climas.arizona.edu/sw-climate/monsoon

Monsoon WRF Forecast Discussion
arizonawrf.blogspot.com

Madweather SW Weather Discussion
madweather.blogspot.com

Monsoon 2022

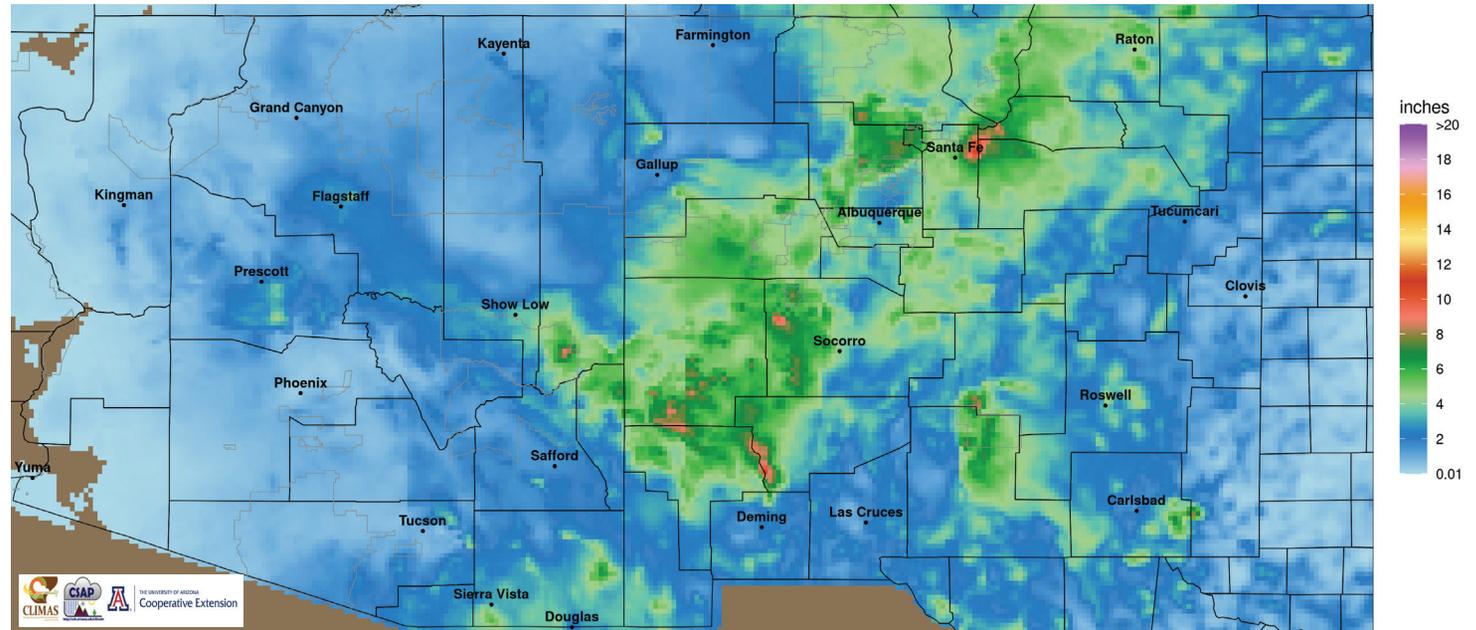


Figure 1: Monsoon Total Precipitation (Jun 15 - Jul 18, 2022)

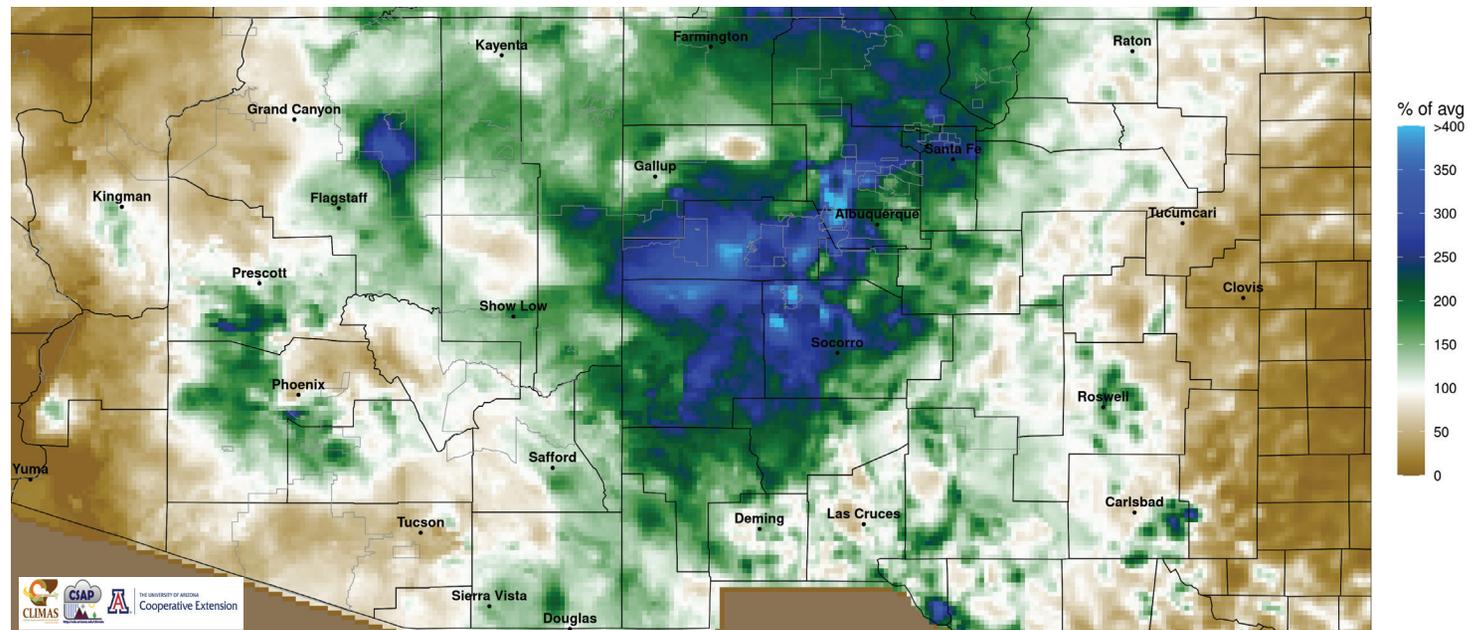


Figure 2: Percent of Average Precipitation (Jun 15 - Jul 18, 2022)

Online Resources

Figures 1-4

Climate Science Applications Program/CLIMAS
cals.arizona.edu/climate
data: PRISM

Monsoon Resources

NWS Tucson Monsoon Tracker
weather.gov/twc/Monsoon

NWS Tucson Monsoon Info
weather.gov/twc/MonsoonInfo

CLIMAS Monsoon Info
climas.arizona.edu/sw-climate/monsoon

Monsoon WRF Forecast Discussion
arizonawrf.blogspot.com

Madweather SW Weather Discussion
madweather.blogspot.com

Monsoon 2022

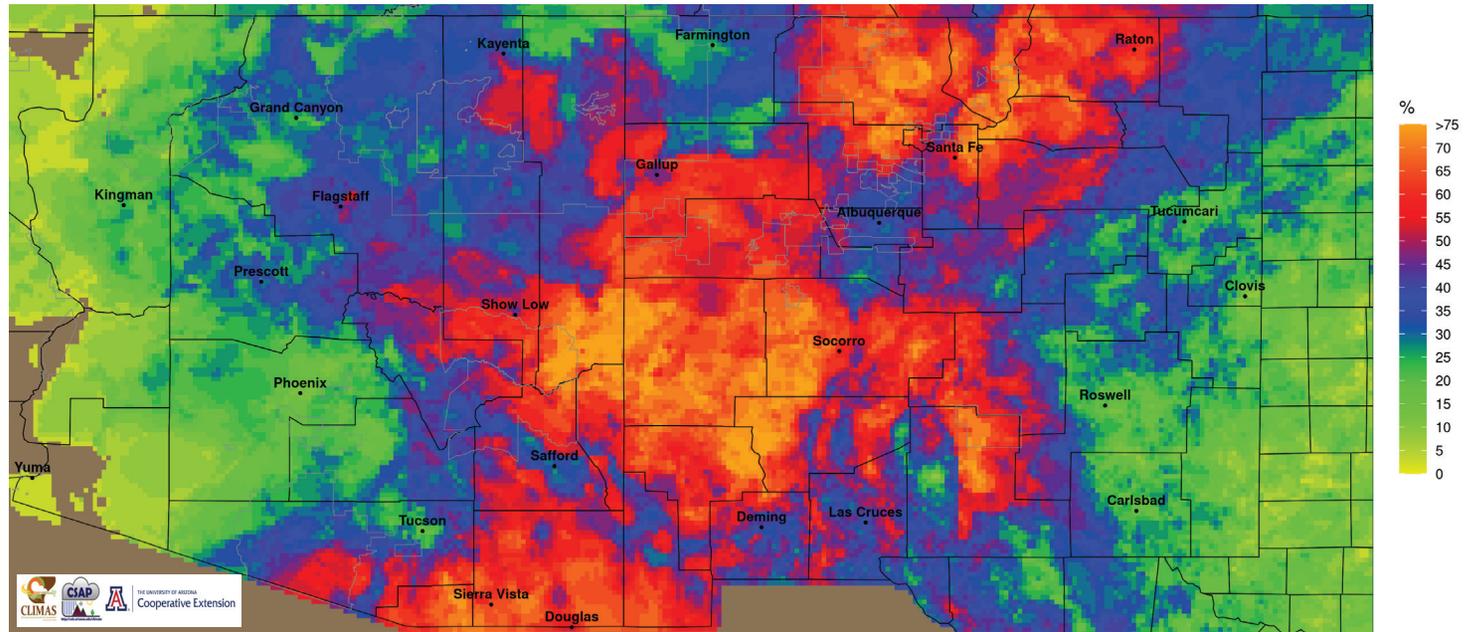


Figure 3: Percent of Days With Rain (>0.01 in) (Jun 15 - Jul 18, 2022)

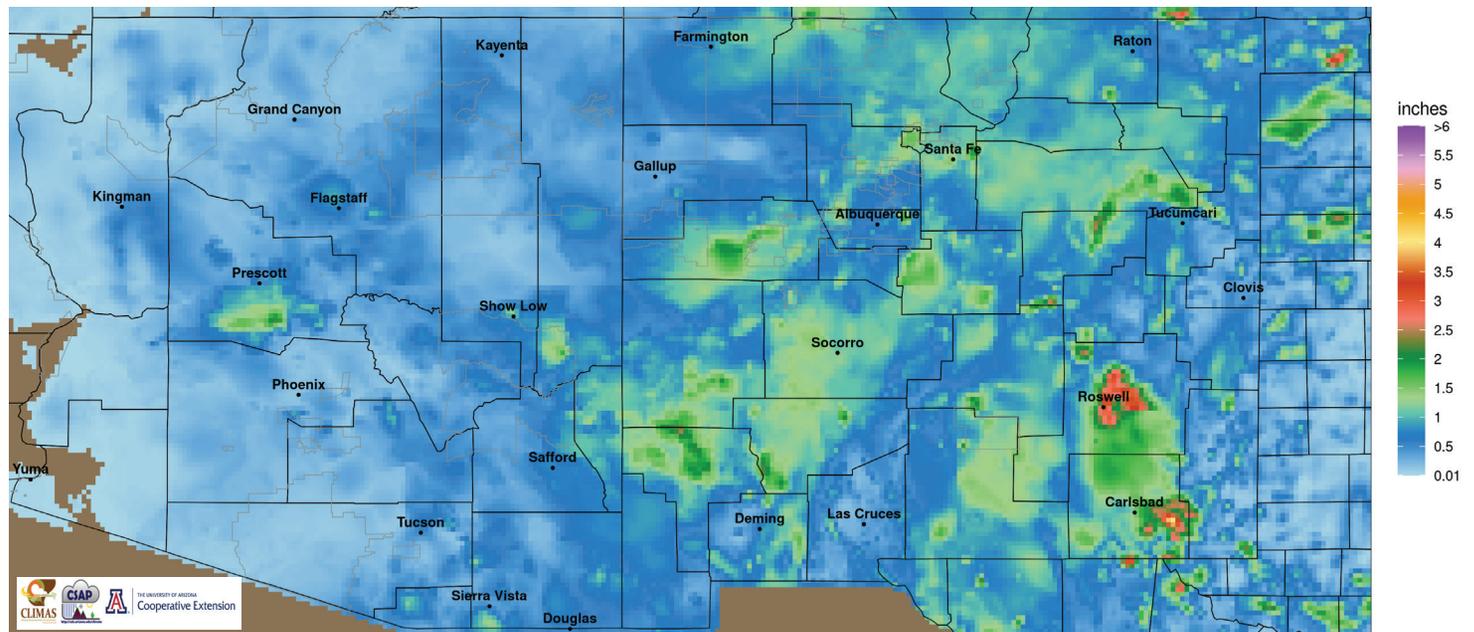


Figure 4: Max 1-Day Precipitation (Jun 15 - Jul 18, 2022)

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).

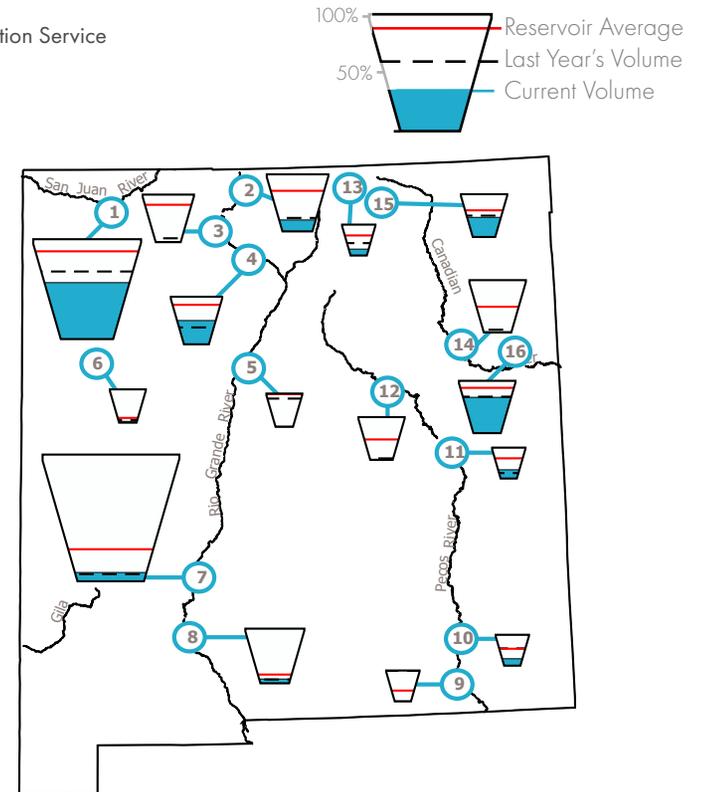
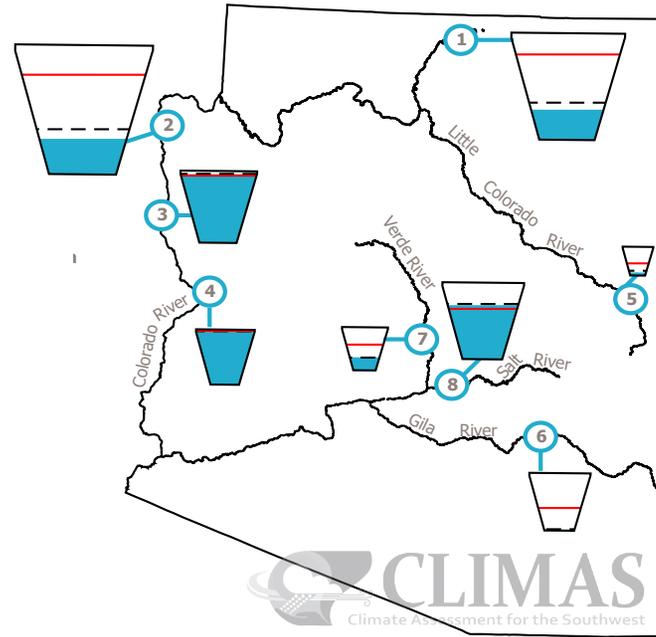
The table details more exactly the current capacity (listed as a percent of maximum storage). Current and maximum storage are given in thousands of acre-feet for each reservoir. One acre-foot is the volume of water sufficient to cover an acre of land to a depth of 1 foot (approximately 325,851 gallons). 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 JULY 1, 2022

Data Source: National Water and Climate Center, Natural Resources Conservation Service



* in KAF = thousands of acre-feet, ** = missing/incomplete data this month

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Lake Powell	28%	6,878	24,322.0	+532
2. Lake Mead	27%	7,187	26,159.0	-330
3. Lake Mohave	95%	1,713	1,810.0	+2
4. Lake Havasu	95%	588	619.0	-7
5. Lyman	10%	3.1	30.0	-0.7
6. San Carlos	0%	0.2	875.0	-0.1
7. Verde River System	30%	87.6	287.4	-4.5
8. Salt River System	70%	1,413	2,025.8	-69

*KAF: thousands of acre-feet

Reservoir	Capacity	Current Storage*	Max Storage*	One-Month Change in Storage*
1. Navajo	55%	939.2	1,696.0	-14.4
2. Heron	20%	78.2	400.0	-6.5
3. El Vado	0%	0.2	190.3	-0.5
4. Abiquiu	48%	88.8	186.8	-2.3
5. Cochiti	**	**	50.0	**
6. Bluewater	4%	1.6	38.5	0.0
7. Elephant Butte	7%	153.8	2,195.0	-99.8
8. Caballo	7%	23.6	332.0	-20.2
9. Lake Avalon	**	**	4.5	**
10. Brantley	22%	9.3	42.2	-5.7
11. Sumner	28%	10.0	35.9	-0.2
12. Santa Rosa	**	**	105.9	**
13. Costilla	20%	3.1	16.0	-1.6
14. Conchas	**	**	254.2	**
15. Eagle Nest	45%	35.7	79.0	35.7
16. Ute Reservoir	67%	134	200	-6.0

Monsoon Fantasy Forecast Game

monsoonfantasy.arizona.edu/home

How it Works

You make forecasts of the total rainfall amount in a one-month period for each of July, August, and September, at five cities in the Southwest. Your score is based on the riskiness and accuracy of your estimates compared to the actual rainfall.

You compete against all other players and the three highest scores receive Amazon gift cards with values of \$400, \$300, and \$200, respectively. You must submit estimates in at least 2 months to qualify for the prizes.



Monsoon Fantasy Forecast Game

You make rainfall forecasts at five cities each month. You score points based on the accuracy and riskiness of your forecasts. Here's what is new this year:

- You can make your forecasts for the month until midnight the final day of the previous month. For example, you have until July 31 at 11:59 PM to make your forecasts for August. It's not too late to start guessing for August and September.
- There are Amazon gift card prizes for the top 3 finishers at values of \$400, \$300, and \$200, courtesy of the Arizona Institutes for Resilient Environments and Societies.
- You need to make guesses in at least 2 of the 3 monsoon months to be eligible for prizes.

Mike, Zack, and Ben will be talking about the monsoon and the leaderboard each month on the Southwest Climate Podcast.

For more details or to play: <https://monsoonfantasy.arizona.edu/home>

Southwest Climate Podcast

climas.arizona.edu/media/podcasts

iTunes

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

Spotify

<https://spoti.fi/3zZlvWu>

Android

<https://bit.ly/2ILYHos>

Stitcher

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

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



Order at: the-southwest-climate-podcast.creator-spring.com/

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



Jun 2022 Southwest Climate Podcast Are You Ready for the Monsoon?

In the June 2022 episode of the Southwest Climate Podcast, Mike Crimmins and Zack Guido apologize for the extended (and unintentional) break from podcasting, before diving into to a wide ranging “catch-up” episode that recaps winter and spring conditions, discusses regional hazards we see in spring into summer, and touches on the forecast and outlook for the summer...and the monsoon! They wrap with a discussion of the monsoon, whether this year could ever live up to last year and what led to last year’s conditions, before addressing the excitement that a few outlooks have caused, and the early storms that have been building to the south. They also discuss the return of the Monsoon Fantasy Game and talk about how you can play and test your forecast skills against the “experts”. Happy Monsoon!

Mar 2022 SW Climate Podcast: Cold(ish), Windy, and Dry - Winter Recap

In the Mar 2022 edition of the CLIMAS Southwest Climate Podcast, Mike Crimmins and Zack Guido dive into a recap of winter (so far) in the Southwest. First, recap winter to date, and put it in the context of a double-dip La Niña, including precipitation totals, temperature, and snowpack. Then they take a closer look at the phases of the PNA (Pacific/North American pattern) and how this links to ENSO/La Niña and the weather conditions this winter. Finally, they revisit temperature to consider just how “cold” it has actually been, and preview a closer look at fire outlooks, snowpack, and water supply in upcoming podcasts.

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

2021 CLIMAS Environment & Society Graduate Fellows Interviews

In this special episode, Gigi Owen sits down for one on one conversations with Moriah Bailey Stephenson, Simone Williams, and Lea Schram von Haupt (the 2021 CLIMAS E&S Grad Fellows) to chat with each of them about their reflections and perspectives and their fellowship experience. You can also find more information about their projects in blog posts at climas.arizona.edu/blog.

<https://bit.ly/3Jk5IHw>

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.

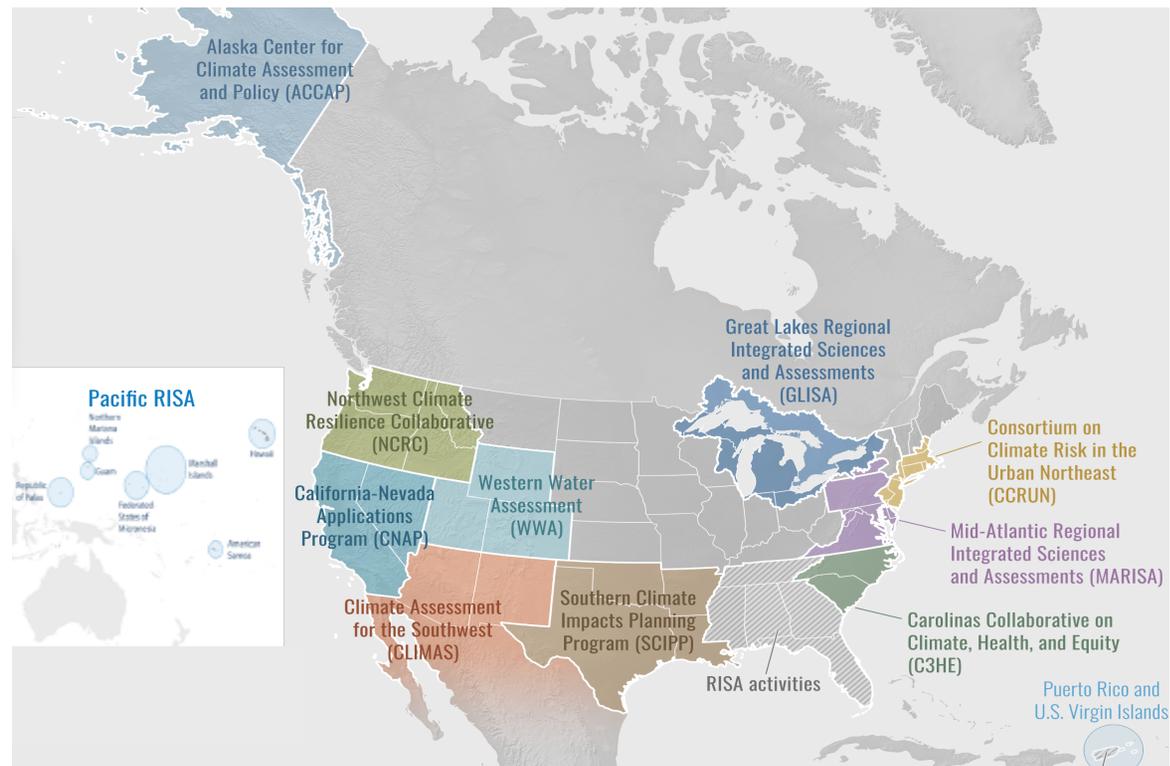


Figure 1: NOAA Regional Integrated Sciences and Assessments Regions