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How Did El Niño Do? by Miguel Miller

How did El Niño perform for the 2023-2024 winter precipitation outlook?

The graphics below tell the story.

We looked at two seasonal outlooks issued by the Climate Prediction Center (CPC) back in October 2023: the outlook for December 2023 through February 2024 and the outlook for January through March 2024.

Essentially, El Niño factored heavily in the outlook for December through February.

The typical wetter-than-normal El Niño

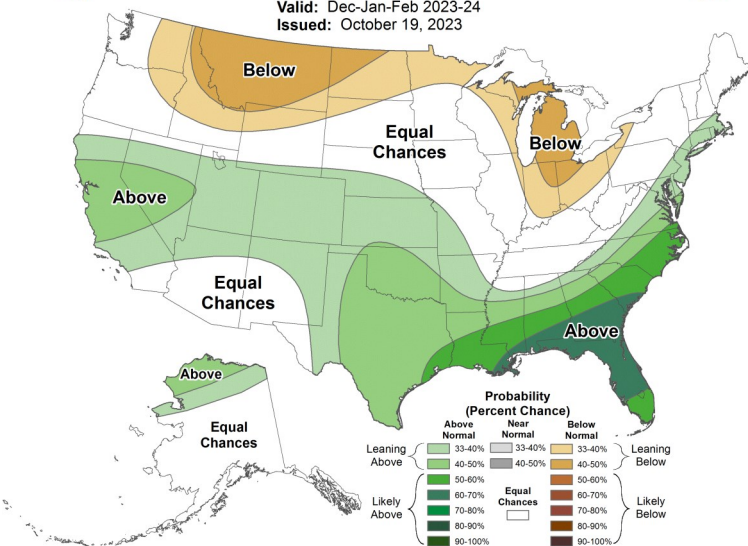
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Seasonal Precipitation Outlook

Valid: Dec-Jan-Feb 2023-24
Issued: October 19, 2023



signature across the southern U.S. was apparent (above).

The results were mixed nationwide, but on the whole not too bad for California (right), as much of the state received above normal precipitation, and only a tiny percentage came up short.

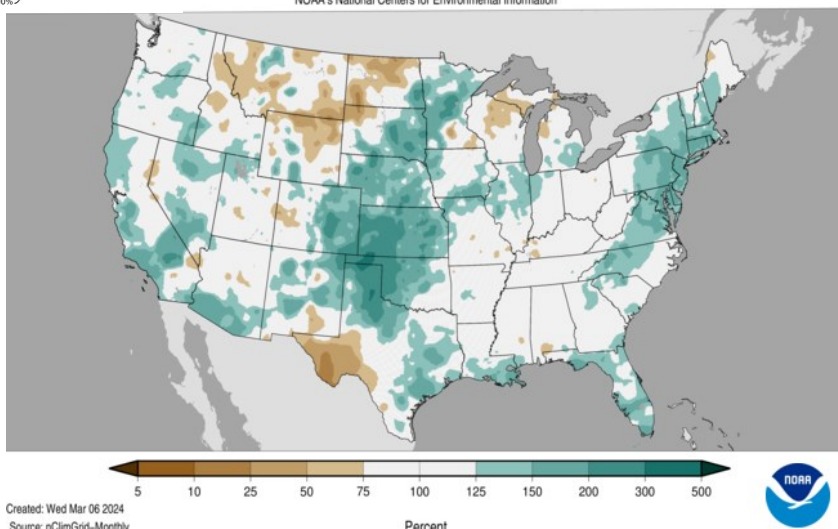
Across the rest of the country, the outlook verified quite well in the northern Rockies and northern plains, but not so great in the southeast or the northern Midwest.

Precipitation Percent of Average

December 2023-February 2024

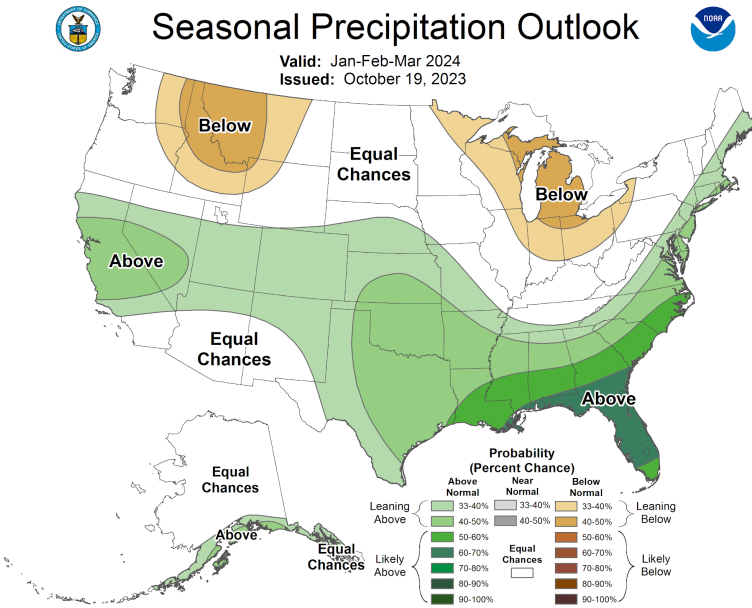
Average Period: 1901-2000

NOAA's National Centers for Environmental Information



El Niño Did—continued

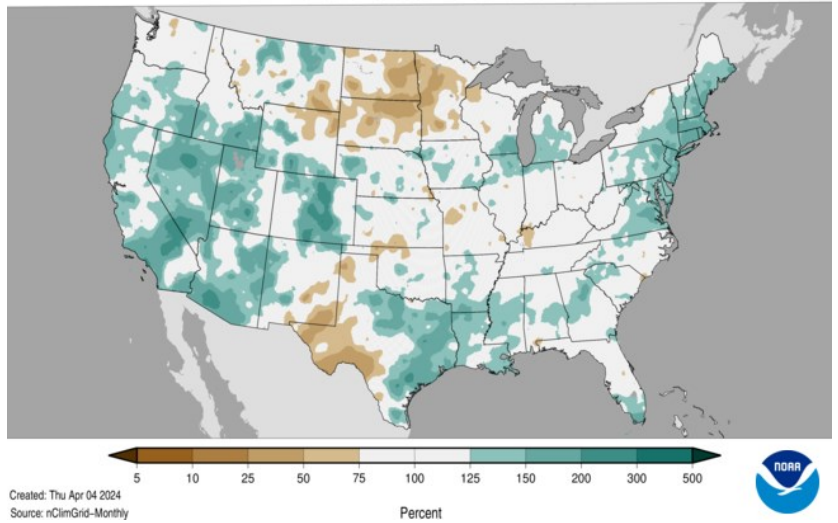
Coming as no surprise, El Niño also factored heavily in the outlook for January through March. A wet tilt in the odds was shown for California, particularly the central portion of the state (below left), nearly identical to the Dec-Feb outlook.



The actual precipitation verified a little better for this three-month period (below right). Above normal rainfall resulted for most of California.

Across the rest of the country, much of the West was wetter than anticipated, while northern plains were drier. Florida and the far southeast failed to live up to the wet prognosis, while west Texas and New Mexico remained drier than predicted.

Precipitation Percent of Average
January–March 2024
Average Period: 1901–2000
NOAA's National Centers for Environmental Information



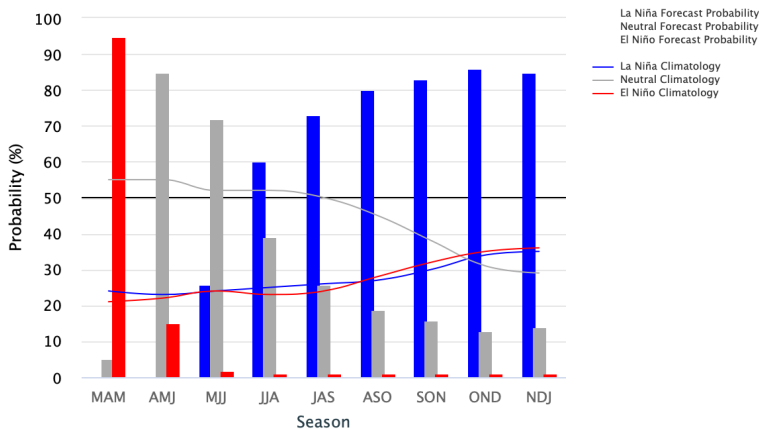
Goodbye El Niño and Hello La Niña

In early May, the combination La Niña Watch/El Niño Advisory continues. A transition from El Niño conditions to ENSO-neutral is 85% likely by June, with a 60% chance of La Niña developing by June-August.

El Niño conditions within the tropical Pacific atmosphere appear to have dissipated in April. Low-level wind anomalies were easterly over the west-

Early-April 2024 CPC Official Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly
Neutral ENSO: -0.5 °C to 0.5 °C

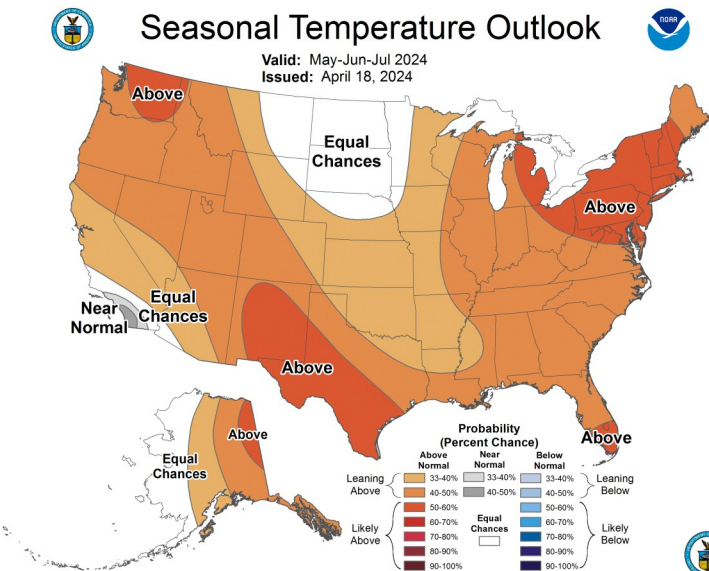


central equatorial Pacific, while upper-level wind anomalies were mostly near average. Equatorial convection was slightly suppressed around the Date Line and was near average around Indonesia.

The forecast this month largely relies on the IRI prognosis (left), showing the La Niña signature overtaking the El Niño by June and La Niña developing in the June-August season and continuing through November 2024 -January 2025 (85% chance).

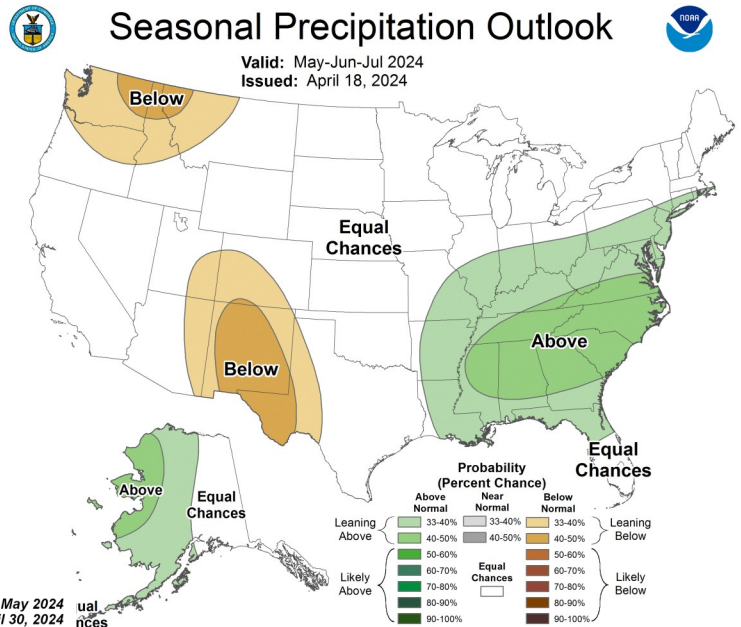
Seasonal Outlook

On April 18, the Climate Prediction Center (CPC) released their seasonal (three-month) outlook for May, June and July. The Temperature Outlook features an interesting idea for Southern California.



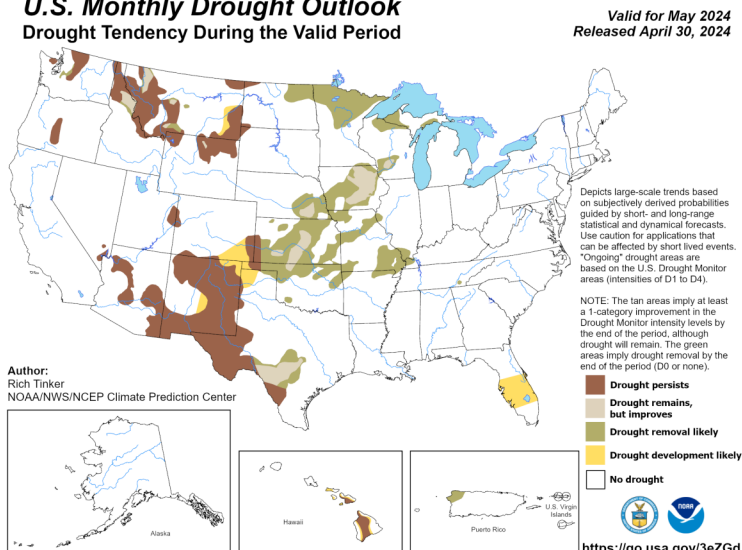
The Temperature Outlook (left) shows the chances of a warmer-than-average **May-July** (orange and red) are higher than any other below or near normal outcome for nearly all of the country during this period. But look closely at Southern California and you'll see the gray area indicating near normal temperatures have the highest odds.

Out of three possible precipitation outcomes—wetter than average, drier than average, or near average—the outlook for **Ma-July** (right) says that odds are leaning toward a drier than average period for parts of the Northwest and Southwest. Odds tilt toward a wetter than average period across the Southeast.



U.S. Monthly Drought Outlook

Drought Tendency During the Valid Period



The Drought Outlook (left) through **May** indicates persisting drought in the Southwest (but not California), and parts of the Northwest. Drought improvement is expected in the central and southern plains.

Quarterly Summary

January

A New Year's Eve storm had just moved out of the region, allowing the new year to start fair.

A quick-moving trough of low pressure moved through the region on the 3rd, bringing rain, mountain snow, thunderstorms, and wind, favoring the mountains of Riverside and San Diego Counties. Some places in the mountains of San Diego County received about 1.25 inches of rain, while Mt. San Jacinto recorded the greatest snowfall of six inches.

Cool and brisk weather followed for several days, including an inside slider that brought strong winds and light precipitation on the 7th, and again on the 11th. Many mountain locations clocked top gusts over 60 mph during both systems.

Fair and warmer weather came for about a day on the 16th through the 18th, when temperatures reached the upper 60s and 70s.

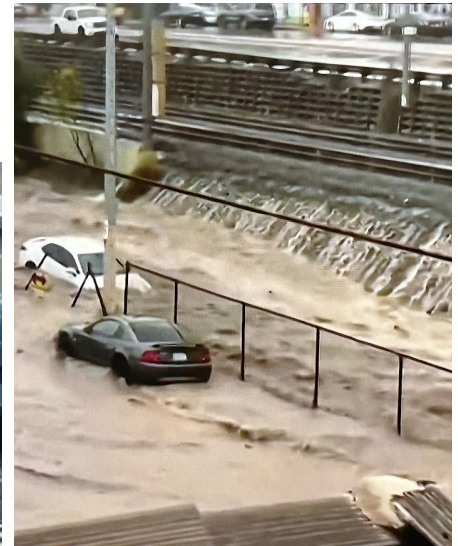
Troughs of low pressure driven by an active jet stream paraded through the region for much of the last two weeks of the month. Rain and mountain snow began falling on the 20th, and continued at times through the 23rd.

San Diego Data - January				
	Max	Min	Avg	Rain
Actual	64.6	47.6	56.1	3.65
Normal	66.4	50.3	58.4	1.98
Anomaly	-1.8	-2.7	-2.3	1.67
% of normal				184
Max	78	58		2.73
Min	60	38		



A large swath of southeastern San Diego was flooded on 22 January (imagery from NBC News, NBC 7/39, Tik Tok).

On the 22nd, a truly historic band of heavy convective rain struck San Diego from Coronado to Southcrest, Mountain View, Encanto, La Mesa and Spring Valley, heaviest along Chollas Creek. The resultant flooding was catastrophic. Daily rainfall along this stretch exceeded 4 inches in spots, most of that occurring in two to three hours. Rainfall return intervals (NOAA Atlas 14) indicate one-hour rainfall rates of 300 to 1,000 year return intervals as 2 to 3 inches fell in 1 hour between 9 am and 11 am. Nearly 200 swift water rescues were reported in San Diego city. 1,000 homes and businesses reported damage and up to 600 were classified as major damage. The San Diego River flooded much of Mission Valley and flash floods were also observed in Oceanside and Carlsbad.



Quarterly Summary—continued

The 2.73 inches in San Diego made the 22nd the fourth wettest day on record. Severe thunderstorm winds caused tree damage along this same corridor. Less extreme, yet significant rainfall and modest mountain snow occurred across the broader region.

Dry yet cool weather followed on the 24th through 26th as another inside slider passed through the region.

High pressure and offshore flow boosted temperatures into the 70s and 80s across much of the lowlands on the 27th. Top Santa Ana wind gusts in the foothills ranged from 60 to 70 mph. Dry weather finished the month, but it was not as warm or breezy.

February

The month started very wet as an atmospheric river fueled a series of storms brought several days of precipitation to Southern California. On the 1st, heavy rain produced flooding in Seal and Huntington Beaches.

Additional storms produced widespread flooding from the 4th through the 8th across the region. Hard hit was Orange County, where 4 to 10 inches of rain fell. A whopping 10-15 inches of rain fell in the San Gabriel and Santa Ana Mountains.

On the 5th, a swiftwater rescue was conducted near Cajon Wash, where a car drove through a flooded roadway and became submerged in floodwaters. Three occupants were trapped in a tree. Six others were rescued from the Santa Ana River bottom in Jurupa Valley. Mud and water covered roads near Gillman Springs. The San Diego River flooded through Mission Valley. Snowfall was generous, approaching 100 inches in Snow Valley, and most mountains above 6,000 feet elevation received 3 to 6 feet of snow. The snow level dropped below 4,000 feet. This wet period lifted a previously below normal precipitation season above normal for the season to date. By the end of the month, most stations had recorded at least the annual water year average, with seven months remaining.

After a very wet two weeks, a break in precipitation came from the 10th to the 19th as high pressure nestled over the region. Dry and warmer weather would prevail.

Storms on 1 February brought flooding to Seal Beach (below left, Brian Gray). Heavy snowfall piled up in the mountains on 5 February, like Mt. Laguna (below right, San Diego County Instagram).

San Diego Data - February				
	Max	Min	Avg	Rain
Actual	64.1	51.6	57.9	4.58
Normal	66.2	51.8	59.0	2.20
Anomaly	-2.2	-0.2	-1.1	2.38
% of normal				208
Max	75	59		1.04
Min	60	42		



Quarterly Summary—continued

The next storm arrived on the 20th and 21st, and brought heavy rain that favored the L.A. Basin, the Inland Empire and surrounding mountains. 3 to 5 inches of rain hit the mountain foothills, 1.5 to 2.5 inches in Orange County and the northern Inland Empire, and generally less than 1.5 inches elsewhere. Once again, there were areas of urban flooding in these heavier rain bands. 1 to 6 inches of snow fell at mountain communities, while a couple Big Bear area ski resorts reported 12 to 21 inches. The snow level was about 5,500 feet.

High pressure amplified to bring much warmer and above normal weather on the 23rd and 24th.

Another, much weaker shortwave brought rain to the region on the 26th and 27th. Mountains got the greatest precipitation of 0.50 to 1 inch, while the lowlands generally received less than 0.33 inch.

The leap year month ended on a dry and seasonal note.

March

A strong jet stream drove an atmospheric river into northern California and weakened as it reached Southern California. It brought epic rain and snow to the northern part of the state and significant precipitation to the south. Most of the precipitation fell in the first two days of the month, but the four-day totals reached over 5 inches on the front range of the San Bernardino Mountains with other foothill and mountain areas across the region exceeding 2 inches. Many valleys received 1 to 2 inches, and coastal areas and some valleys received less than 1 inch. Highway 138 north of Crestline incurred some road damage. This system was also very windy, especially for the desert slopes of the mountains where gusts were clocked up to 97 mph south of Lucerne Valley.

The respite from precipitation lasted only two days as the next wave brought more rain and mountain snow on the 6th and 7th. Foothills as usual racked up the most, with 0.75 to 1.50 inches of precipitation. Huntington Beach got hit by a thunderstorm and got more than 1 inch. Adjacent valleys received 0.25 to 0.75 inch and much of the lowlands received less than 0.10 inch. This was a warmer storm and the ski resorts only managed a few inches of new snow. Thunderstorms in parts of Orange County and the Inland Empire dropped heavy rain and hail which led to localized flooding.

A very weak system brought a glancing blow to the region on the 11th and 12th, with less than 0.10 inch.

Right on its heels came a cold system developing over Canada and

San Diego Data - March				
	Max	Min	Avg	Rain
Actual	65.8	53.3	59.5	2.54
Normal	67.0	54.5	60.7	1.46
Anomaly	-1.2	-1.2	-1.2	1.08
% of normal				174
Max	76	57		
Min	60	50		



This thunderstorm over Mission Viejo had some impressive definition and severe inclinations on 18 March (Michael Porter).

Quarterly Summary—continued

swinging southward on the 14th and 15th and sitting and wobbling over SoCal through the 18th. Moisture was limited with this cold system, but that meant snowfall was impressive on the 16th and 17th. The eastern part of the Big Bear area received 12-16 inches and Julian at 4,200 feet received 2 inches. Precipitation totals ranged from 0.75 to 1.40 inch in the mountains, with lowlands receiving less than 0.50 inch. Much of the Inland Empire received less than 0.10 inch. Widespread thunderstorms erupted on the 18th in eastern portions of Orange and San Diego Counties. Several storms kicked up wind gusts over 40 mph in the eastern valleys of San Diego County.

A few days of welcome dry weather followed, although some dense coastal fog was observed on the 19th through 21st.



Snow piled up in aptly-named Snow Valley on the last couple days of March (Alex Tardy).

The jet stream brought another storm system on the 23rd and 24th. This system favored San Diego County, but thunderstorms occurred in the foothills and mountains on eastern edges of the Inland Empire. Precipitation totals of 1.50 to 2.75 inches (Cuyamaca) were measured in the mountains. Coasts and valleys received around 0.25 to 0.75 inch while the deserts got less than 0.15 inch.

A final cold and wet storm hit the region on the 30th and 31st. Lytle Creek topped the precipitation list with 4.67 inches and other foothill areas logged over 2 inches. Many coast and valley areas received 1 to 2 inches. The high desert managed 0.50 to 1 inch while the low desert got less than 0.25 inch.

Green Valley Lake won the snowfall

crown with 22 inches, while other mountain areas received 14 inches or less. Wynola got a trace at 3,700 feet elevation. There was flooding in many areas, assisted by embedded thunderstorms, in the San Diego metro, Orange County and the Inland Empire.