

Key Takeaways

Global Conditions

A weak-to-moderate La Niña is forecast to develop by late 2024 and persist into early 2025, which increases the chances for below-average precipitation in southern California.

Regional Conditions

Drought increased in the Southwest U.S. and southern California in summer 2024 due to historically low precipitation and high temperatures. Reservoir levels remain near- and above average, though groundwater generally remains low due to decades of pumping.

Water Utilities Sector-Specific Drought Outlook

Reservoir storage is generally near average in Southern California, but is expected to be lower in October 2025 compared to October 2024 (medium confidence).

Agriculture Sector-Specific Drought Outlook

Crop stress, which may reduce agricultural productivity, is expected through spring 2025 in Southern California due to forecast below-average precipitation and the possibility of below-freezing temperatures (medium confidence).

Public Health Sector-Specific Drought Outlook

Intermittent poor air quality is expected during fall 2024 and spring 2025 in Southern California (high confidence).

About the Outlook

This outlook disseminates sector-specific drought scenarios that are based on tailored monitoring and forecasting information available as of 10 a.m. PT, October 24, 2024, which will enable users to make proactive decisions ahead of drought. The focus sectors include water utilities, agriculture, and public health in Southern California.

The next outlook will be released on Thursday, December 5, 2024.

Interpreting Scenarios

A confidence level for each scenario is provided based on guidance from the [IPCC AR5](#):

- Low confidence indicates little agreement among several sources of evidence.
- Medium confidence indicates modest agreement among several robust sources of evidence.
- High confidence indicates close agreement among several robust sources of evidence.

Global Perspective

- The El Niño-Southern Oscillation, composed of El Niño, La Niña, and neutral phases, is related to weather anomalies that are used to predict conditions months to seasons in the future (Figure 1).
- La Niña increases the chances of below-average precipitation in Southern California and the Southwest United States during its October–April wet season (Figure 1).
- A weak-to-moderate La Niña is forecast to develop by late 2024 and persist into early 2025 (Figure 2).

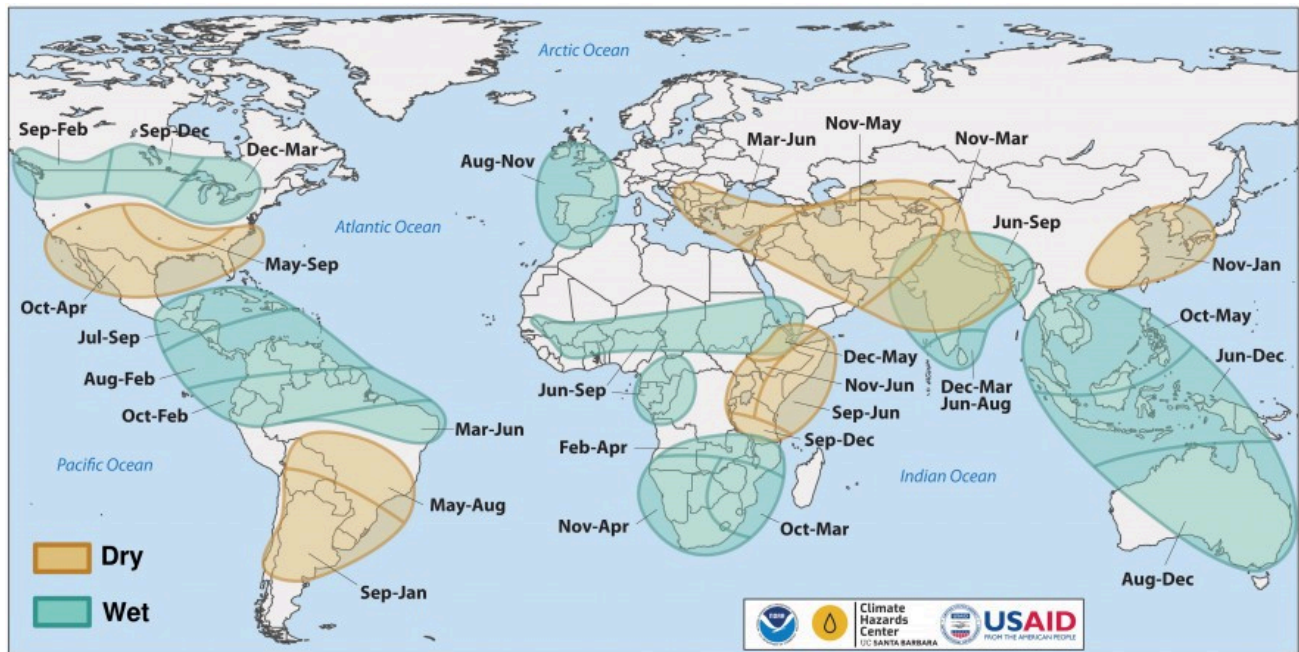


Figure 1: Timing of dry (*brown*) and wet (*blue*) conditions related to La Niña. Image courtesy of the [Famine Early Warning Systems Network](#).

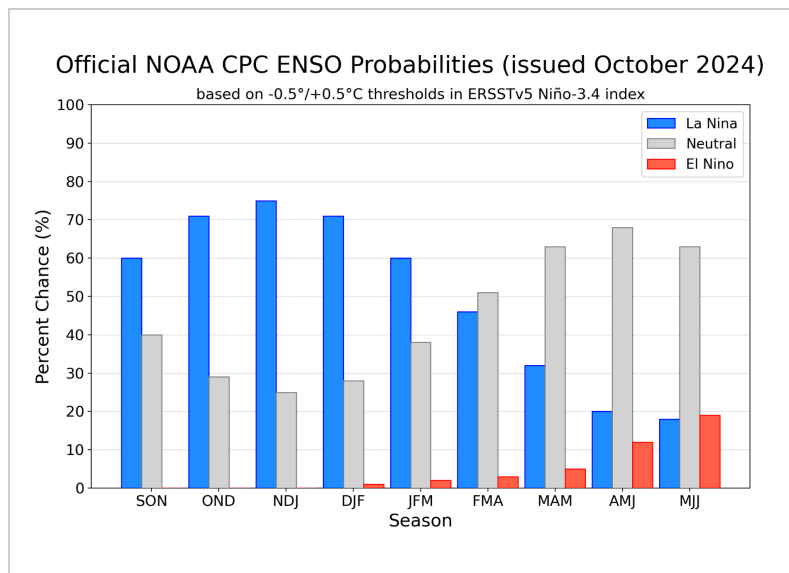


Figure 2, at left: Chances of El Niño, La Niña, and neutral El Niño-Southern Oscillation (ENSO) phases for three-month seasons spanning September–November (SON) 2024 to May–July (MJJ) 2025 from the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) Climate Prediction Center (CPC) [October 10, 2024 ENSO Diagnostic Discussion](#). These chances peak with a >70% chance of La Niña development over the winter months.

Regional Perspective

- The Southwest U.S. area in drought is expected to increase by the end of January 2025 according to the National Weather Service (NWS) Climate Prediction Center (Figure 3).
- Forecasts indicate increased chances of below-average precipitation through March 2025 in the Southwest United States (Figure 4).
- Forecasts indicate that above-average temperatures are most likely across the Southwest U.S., with an up to 70% chance of such an occurrence (Figure 4).

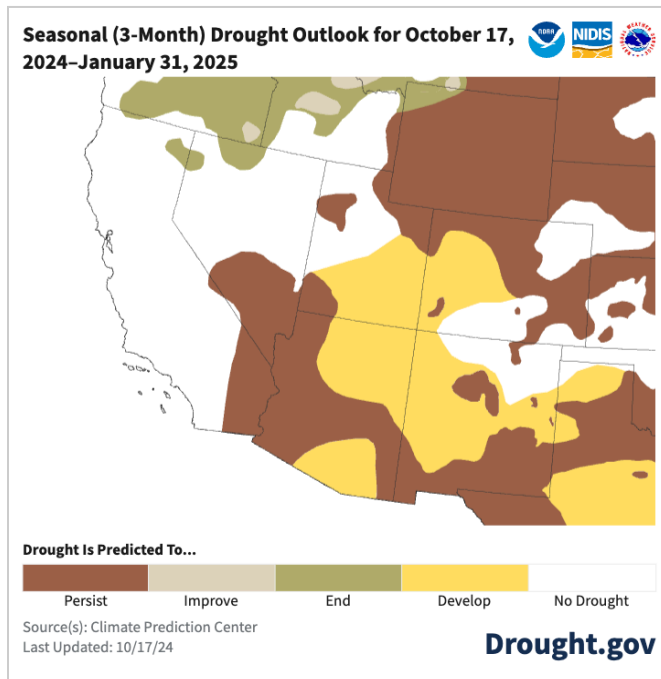


Figure 3, at left: U.S. Seasonal Drought Outlook valid for October 17, 2024–January 31, 2025, issued on October 17, 2024 by the [NOAA Climate Prediction Center](https://www.noaa.gov/climate-prediction-center).

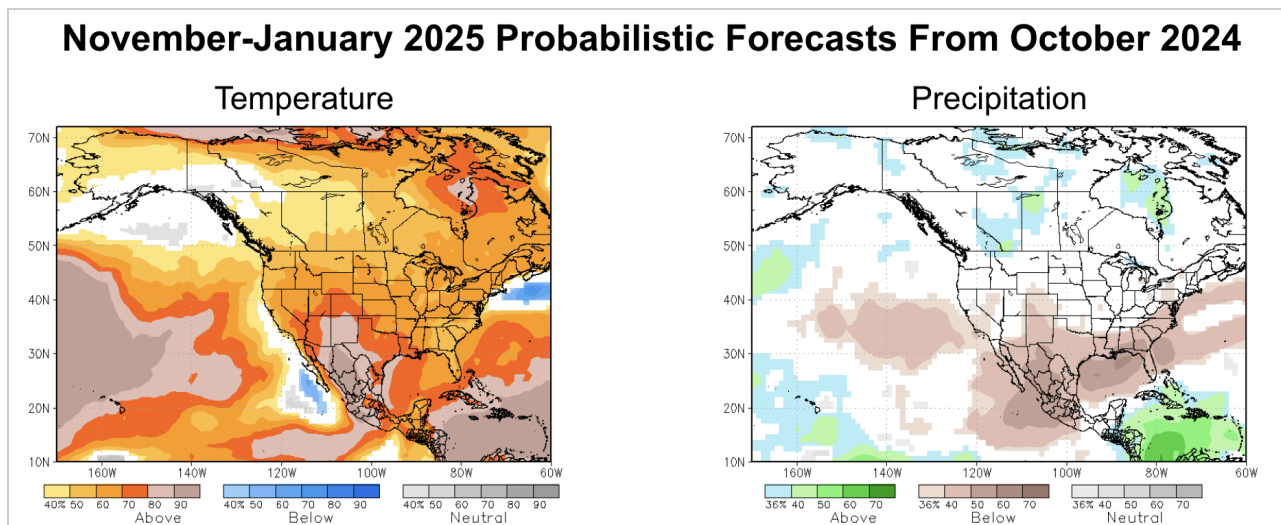


Figure 4: Chances of above- (orange), below- (blue), and near- (gray) average temperatures (left) and chances of above- (green), below- (brown), and near- (gray) average precipitation (right) valid for January 2025–March 2025. Issued in October 2024 from the [North American Multi-Model Ensemble](https://www.nam-ensemble.org/).

Water Utilities Sector-Specific Drought Outlook

Reservoir storage is generally near average in southern California, but is expected to be lower in October 2025 compared to October 2024 (medium confidence).

Supporting evidence:

- Reservoir storage is generally near average due to above-average precipitation and snowmelt-induced runoff in the prior two wet seasons.
- Groundwater storage is generally below average as of October 2024 in California due to prevalent drought in the prior two decades and continued pumping.
- There is an increased risk of below-average precipitation due to La Niña during October 2024 to March 2025 in the Southwest United States, including Southern California. This increases the chances for below-average snowpack development, lower springtime runoff, and lower reservoir levels in October 2025 than October 2024 (Figure 5).

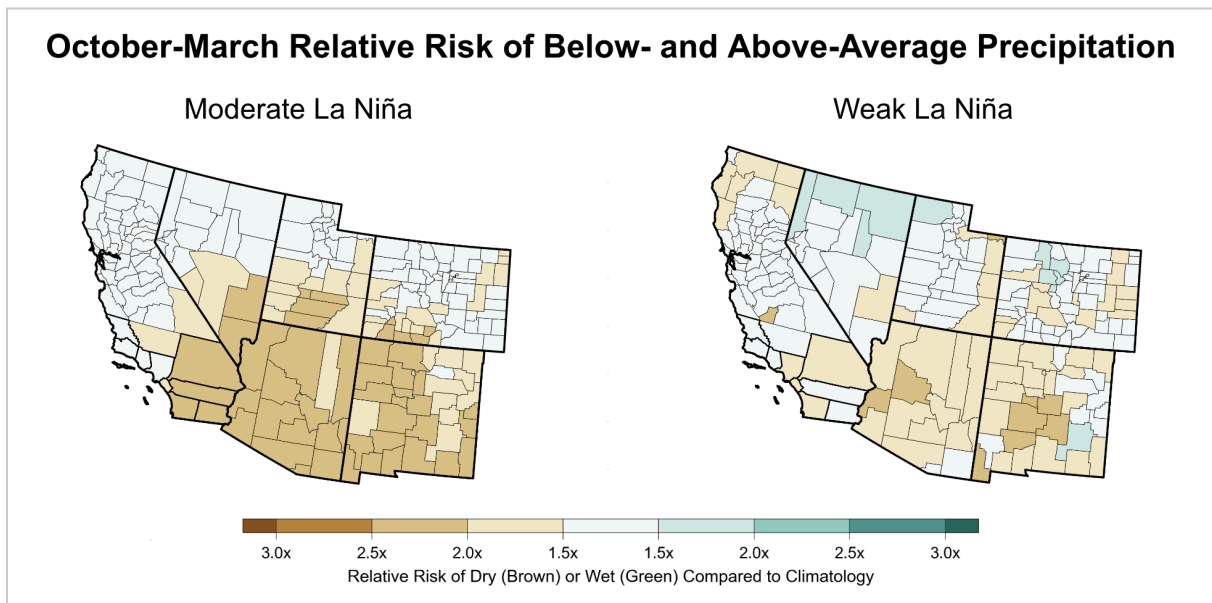


Figure 5: Relative risk of dry (*brown*) and wet (*green*) conditions in October–March related to moderate La Niña (*left*) and weak La Niña (*right*) events since 1950. Dry and wet are defined by precipitation falling in lower and upper thirds of all potential outcomes. Source: NOAA Physical Science Laboratory using data from the [NOAA Monthly U.S. Climate Gridded Dataset](#).

Agriculture Sector-Specific Drought Outlook

Crop stress, which may reduce agricultural productivity, is expected through spring 2025 in southern California due to forecast below-average precipitation and the possibility of below-freezing temperatures (medium confidence).

Supporting evidence:

- Crop stress is expected in Southern California through spring 2025 due to below-average precipitation and below-freezing minimum temperatures.
- Below-average precipitation related to La Niña, due to fewer heavy precipitation days than average, is expected to result in below-normal soil moisture in Southern California by March 2025 (Figures 6 and 7).
- Below-freezing temperatures in Southern California from mid-November through early March occur on average 5 times each year, and may occur more frequently during La Niña events due to cold air outbreaks in North America (Figures 8 and 9).

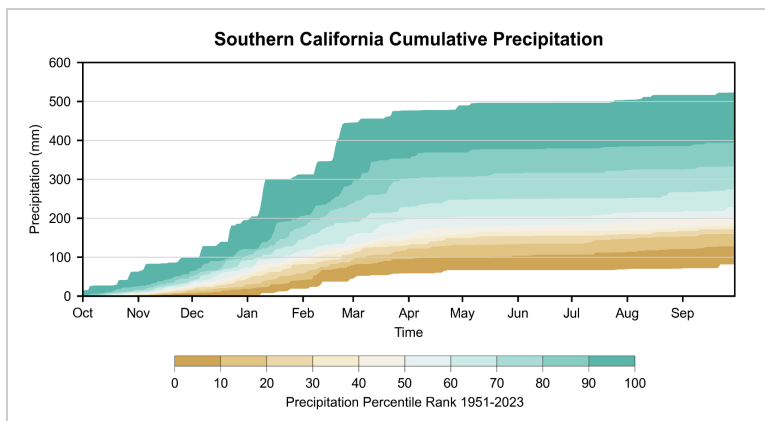


Figure 6, at left: October 1 to September 30 Southern California daily precipitation accumulation during 1951–2023 expressed in terms of percentile ranks. Source: NOAA Physical Sciences Laboratory using data from the [NOAA Monthly U.S. Climate Gridded Dataset](#).

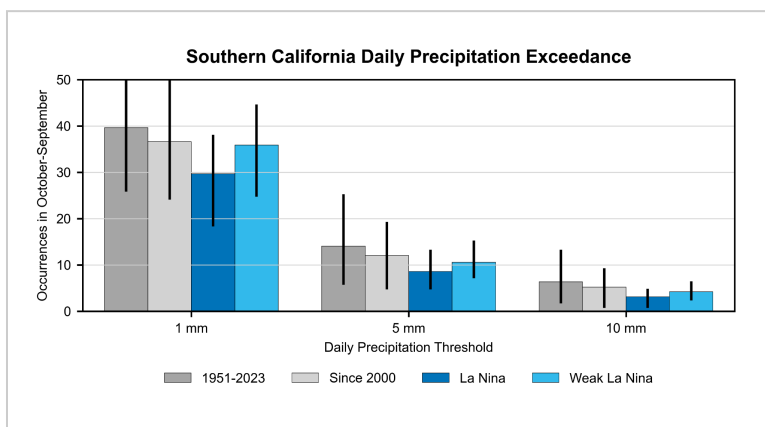


Figure 7, at left: October–September Southern California daily precipitation exceedance of 1 mm, 5 mm, and 10 mm for 1951–2023 (*dark gray*), since 2000 (*light gray*), during La Niña years (*dark blue*), and during weak La Niña years (*light blue*). Bars indicate the average number of days that meet the conditions across the years. Lines indicate the range of the number of days that meet the conditions across the years. Source: NOAA Physical Sciences Laboratory using data from the [NOAA Monthly U.S. Climate Gridded Dataset](#).

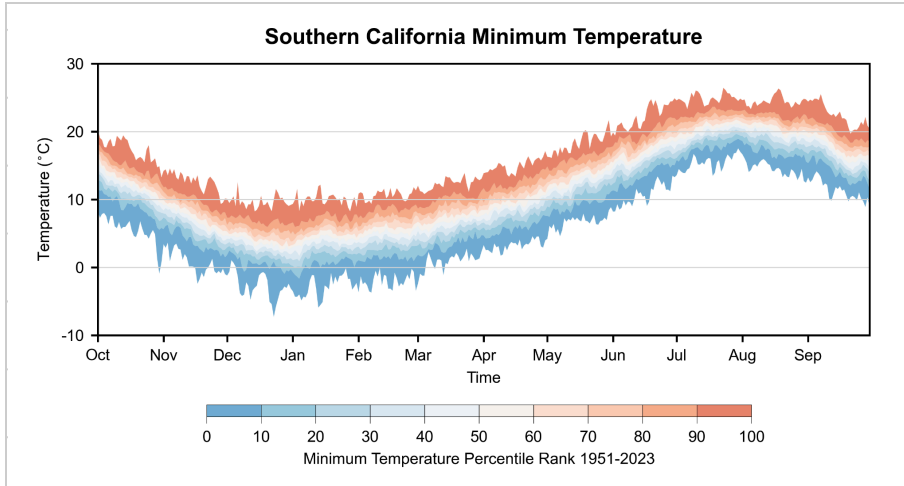


Figure 8, at left: October 1 to September 30 Southern California minimum daily temperatures during 1951–2023 expressed in terms of percentile ranks. Source: NOAA Physical Sciences Laboratory using data from the [NOAA Monthly U.S. Climate Gridded Dataset](#)

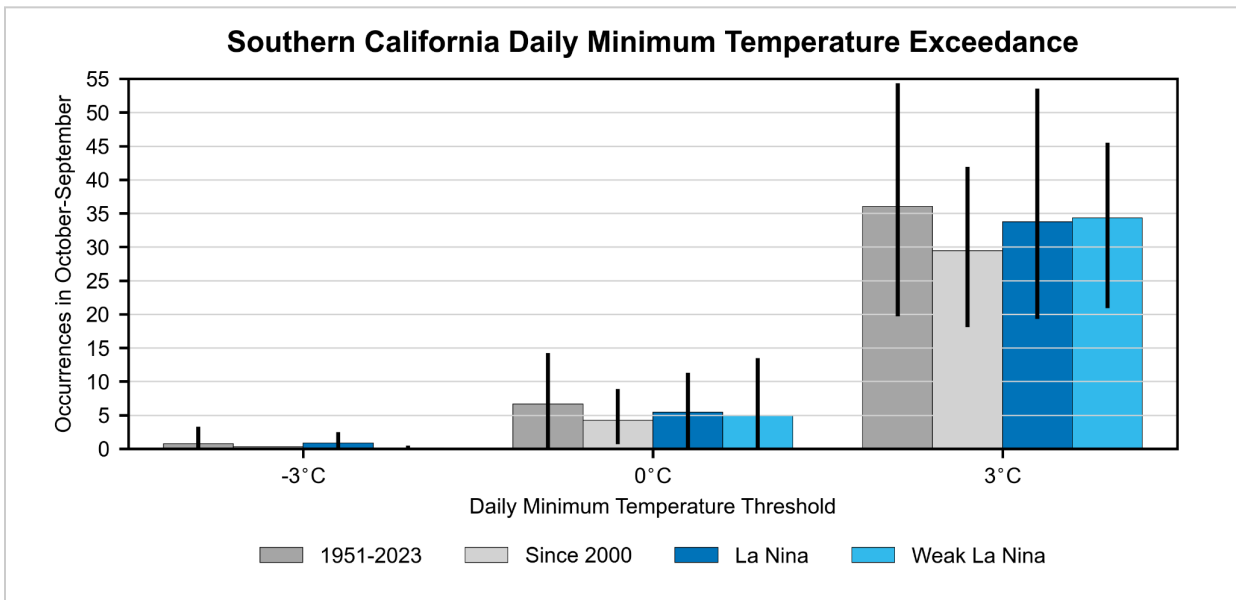


Figure 9: October 1 to September 30 Southern California minimum daily temperatures during 1951–2023 expressed in terms of percentile ranks. October–September Southern California daily minimum temperature falling below 3°C, 0°C, and -3°C for 1951–2023 (*dark gray*), since 2000 (*light gray*), during La Niña years (*dark blue*), and during weak La Niña years (*light blue*). Bars indicate the average number of days that meet the conditions across the years while lines indicate the range of the number of days that meet the conditions across the years. Source: NOAA Physical Sciences Laboratory using data from the [NOAA Monthly U.S. Climate Gridded Dataset](#)

Public Health Sector-Specific Drought Outlook

Intermittent poor air quality is expected during fall 2024 and spring 2025 in southern California (high confidence).

Supporting evidence:

- Smoke from active wildland fires has led to moderate and unhealthy air quality in Southern California.
- Increased chances of airborne particulates due to dust are expected in spring 2025 due to below-normal soil moisture from below-average 2024–2025 wet season precipitation (Figures 10 and 11).
- Intermittent strong winds from the north and west in spring 2025 are expected to increase the chances for poor air quality to the south and east of dust sources (Figure 12).

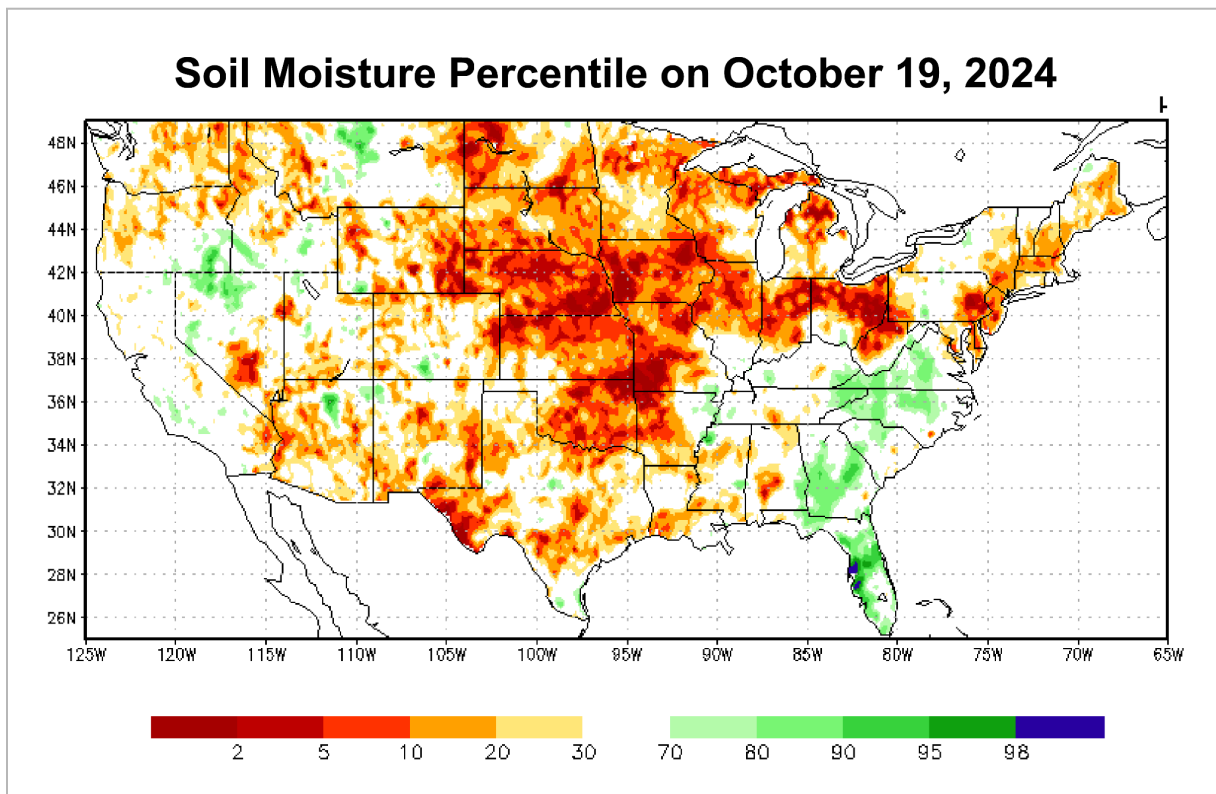


Figure 10: U.S. soil moisture percentiles from the [North American Land Data Assimilation System](#) on October 19 2024. Soil moisture in Southeastern California and portions of the Four Corners states is in the 10-20th percentile indicating below-normal soil moisture conditions in these areas. Source: [NOAA NWS Climate Prediction Center](#).

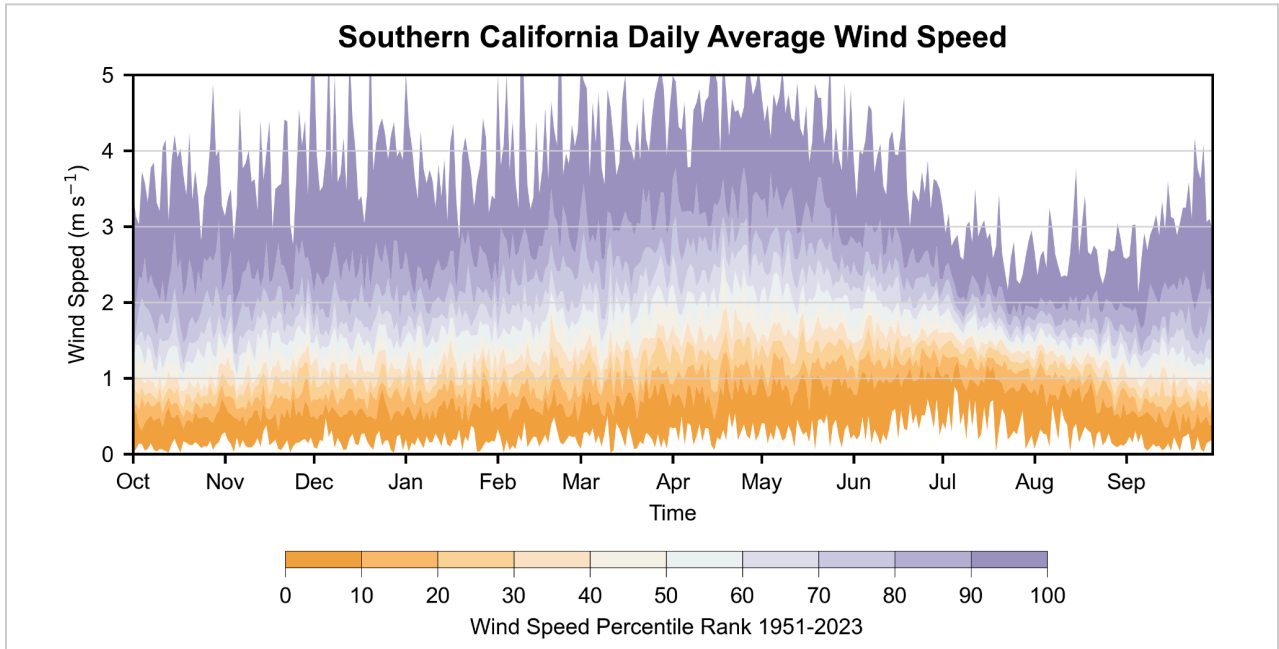


Figure 11: October 1 to September 30 Southern California wind speed during 1951–2023 expressed in terms of percentile ranks. Source: NOAA Physical Sciences Laboratory using data from the [ERA5 reanalysis](#).

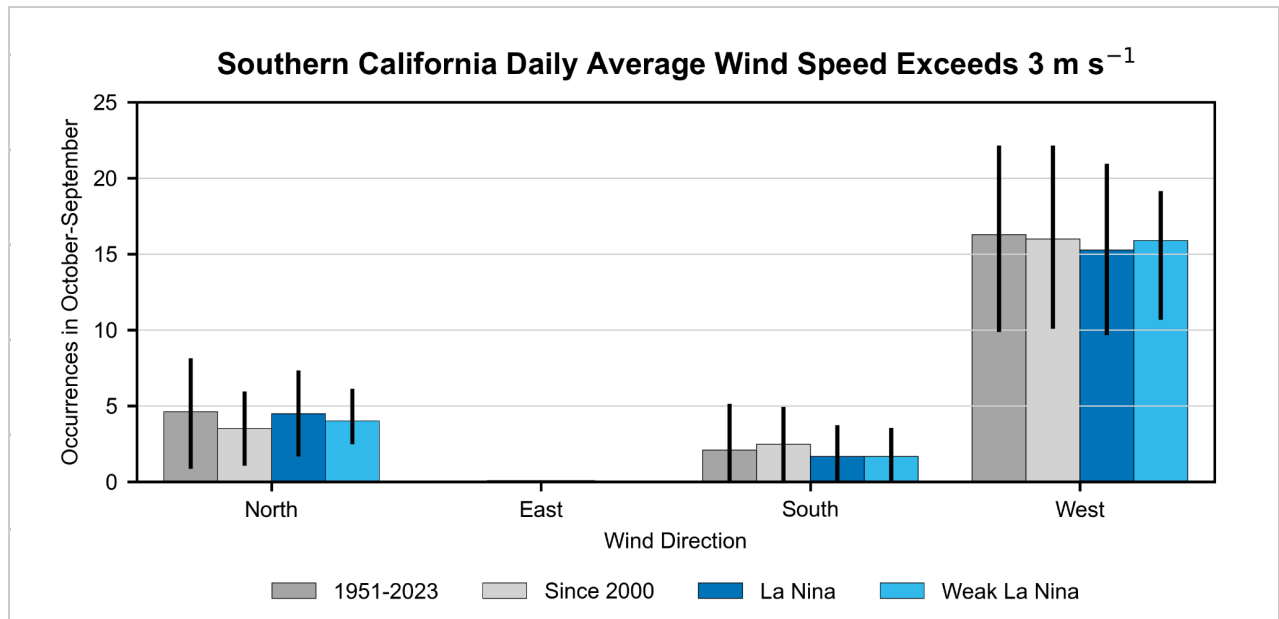


Figure 12: October–September Southern California daily wind speed exceedance of 3 meters per second (ms^{-1}) from the northerly, easterly, southerly, and westerly direction for 1951–2023 (*dark gray*), since 2000 (*light gray*), during La Niña years (*dark blue*), and during weak La Niña years (*light blue*). Bars indicate the average number of days that meet the conditions across the years while lines indicate the range of the number of days that meet the conditions across the years. Source: NOAA Physical Sciences Laboratory using data from the [ERA5 reanalysis](#).