CALIFORNIA HYDROLOGY UPDATE

CONDITIONS AS OF DECEMBER 31, 2024

The California Hydrology Update is a regular summary of current weather conditions in the State of California and serves as a supplement to the data on the California Water Watch website. It is produced by the California Department of Water Resources Hydrology Section and Sustainable Groundwater Management Office teams. For tips and resources on how to make water conservation a way of life, please visit saveourwater.com.

PRECIPITATION

Water year 2025 continues to have above average accumulated precipitation when considering the state's average. The statewide accumulated precipitation through the end of December 2024 was 9.4 inches, which is 115% of average. Several rounds of storms and cold fronts resulted in significant precipitation for Northern California, modest precipitation for Central California, and trace to dry amounts for Southern California during December. The main accumulation of precipitation occurred generally during the periods of December 12-16, 21-24, and 26-29 (shown in Figure 1).

December 2024 started with high pressure dominating over the region, which resulted in mainly dry conditions and above normal temperatures for California. During December 12-16, a series of storms impacted mainly Northern California and along the Sierra Nevada, with a gradual decline of precipitation amounts for Central California, and mostly dry for Southern California. The first storm on December 12

was from a cold front that traveled across Northern California, down the Sierra Nevada, and then southwest

toward the Central Coast. A strong storm followed during December 13-14, from a cold front and a strong shortwave moving down the backside of an upper-level trough off the coast of California. Once the cold front reached the state on December 13, it generated higher amounts of precipitation for Northern California (about 3-6 inches) and the Northern Sierra (about 0.5-3 inches). During December 14, the combination of the cold front weakening as it moved south towards the Central Coast and the Southern Sierra and the shortwave trough reaching California resulted in additional showers over Northern California. The following storm on December 16 produced light to moderate amounts of precipitation over Northern and Central California. Southern California remained dry. After December 17, high pressure dominated the area.

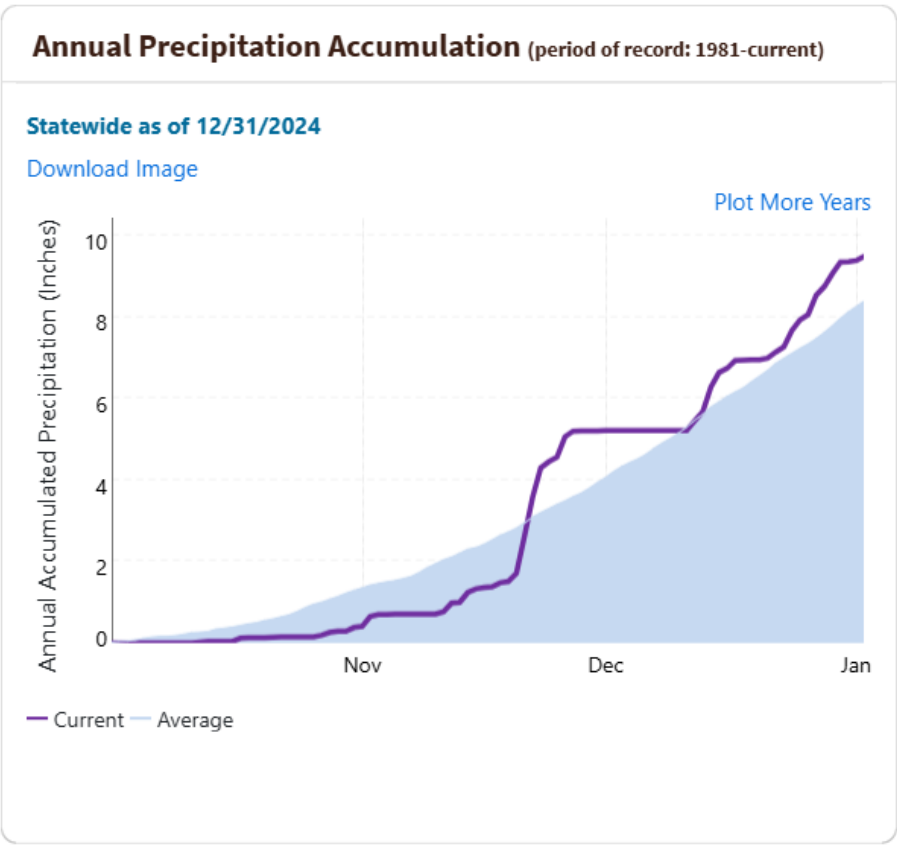

Figure 1. Statewide average accumulated precipitation from October 1, 2024 to December 31, 2024 (purple line) and historical average (shaded blue).

During December 21-24, another series of storms resulted in moderate precipitation for Northern California (with highest amounts on December 23). Widespread precipitation resulted on December 24, with higher precipitation amounts in Northern California and the Northern Sierra (up to 3 inches) with a gradual decline in precipitation accumulation moving south of the state. A timely break in weather occurred on December 25 (due to a weak upper ridge), but late into December 26, another series of storms developed resulting in prolonged precipitation for Northern California and lower precipitation amounts for Central California from about December 26-29. Southern California remained mostly dry during this period. During December 30-31, high pressure materialized off the coast and dry conditions set in for California to conclude December 2024.

As shown in Figure 2, for the water year to end of December 2024, Northern California received well above average accumulated precipitation, Central California received below to near average

accumulated precipitation, and Southern California received well below average accumulated precipitation with many areas receiving no precipitation. The North Coast has accumulated about 31 inches of precipitation for the water year through end of December, which is 151% of average. The Sacramento River region has accumulated about 18.4 inches of precipitation for the water year through end of December, which is 142% of average. The San Joaquin River region has accumulated about 7 inches of precipitation for the water year through the end of December, which is 78% of average. The Central Coast has accumulated about 3.7 inches of precipitation for the water year through the end of December, which is 58% of average. The Tulare Lake region has accumulated about 3.6 inches of precipitation for the water year through the end of December, which is 78% of average. As shown in Figure 2, all areas along the South Coast and the Inland Empire desert regions have water year to date precipitation accumulations of less than 20% of average through the end of December with some localized areas having no precipitation accumulation this water year.

The Climate Prediction Center (CPC) monthly outlook issued on December 31, 2024 indicates equal chances of below, near, or above normal precipitation for Northern California, below normal precipitation with up to 40% chance for Central California, and 33-50% chance of below normal precipitation for Southern California during the month of January 2025. The CPC seasonal outlook covering the period of January 2025 through end of March 2025 indicates up to 40% chance of above normal precipitation for Northern California and equal chances of below, near, or above normal precipitation for Central California, and up to 40% chance of below normal precipitation for Southern California.

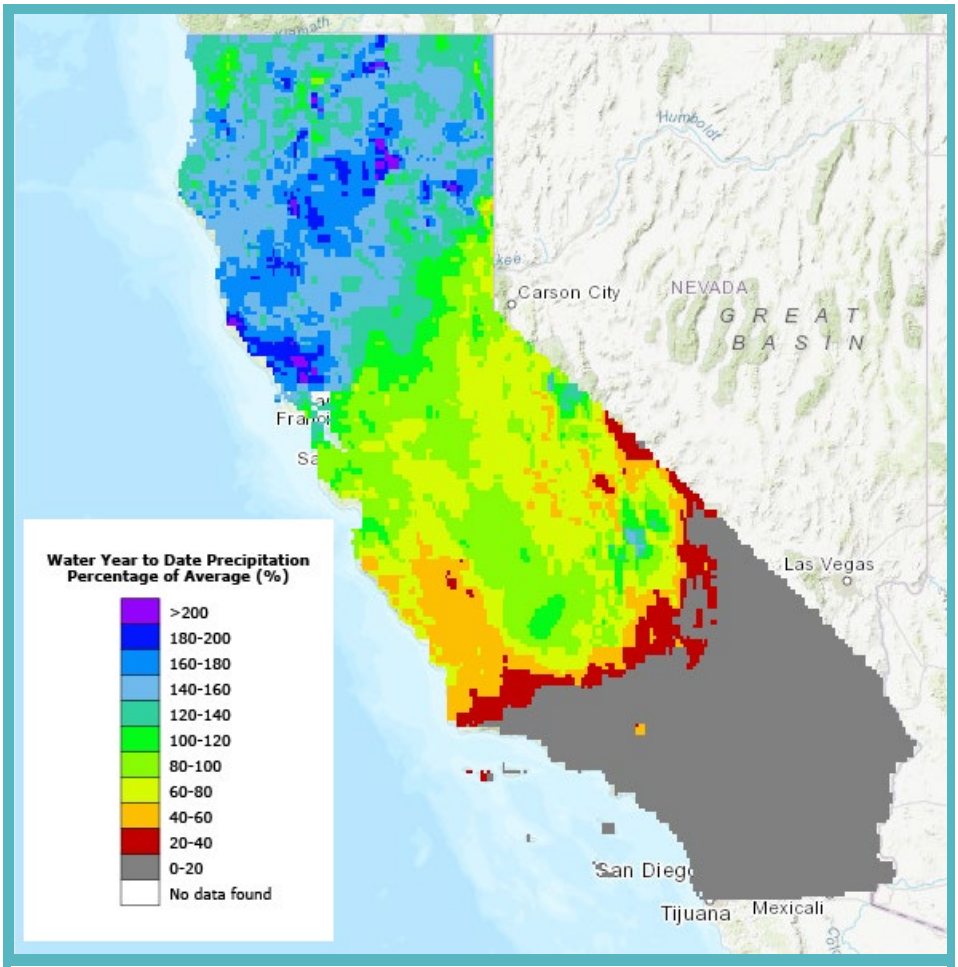

Figure 2. Percent of average for the accumulated precipitation from October 1, 2024 to December 31, 2024.

Sources: Statewide Hydroclimate and Water Supply Conditions, Forecast Information, Center for Western Weather Water Extremes (CW3E) Summaries, California Nevada River Forecast Center (CNRFC) Data Archive

TEMPERATURE

The statewide average temperature for the end of December was about 44.1°F, which is about 1.5 degrees above the historical average for this time of year. The statewide average temperature was near average during December 10-16, otherwise it was above average during the month of December. The two graphs in Figure 3 show the statewide mean temperatures for the water year through December 31 (on the left) and the month of December 2024 (on the right). The statewide average temperature reached the historical maximum mean temperature during December 19, 28, and 29. The periods of high pressure during the month resulted in California higher than normal temperatures (and extremely dry conditions for the southern regions of the state), while the rolling cold fronts influenced periods of lower temperatures (to ultimately reach temperatures that are more typical for December).

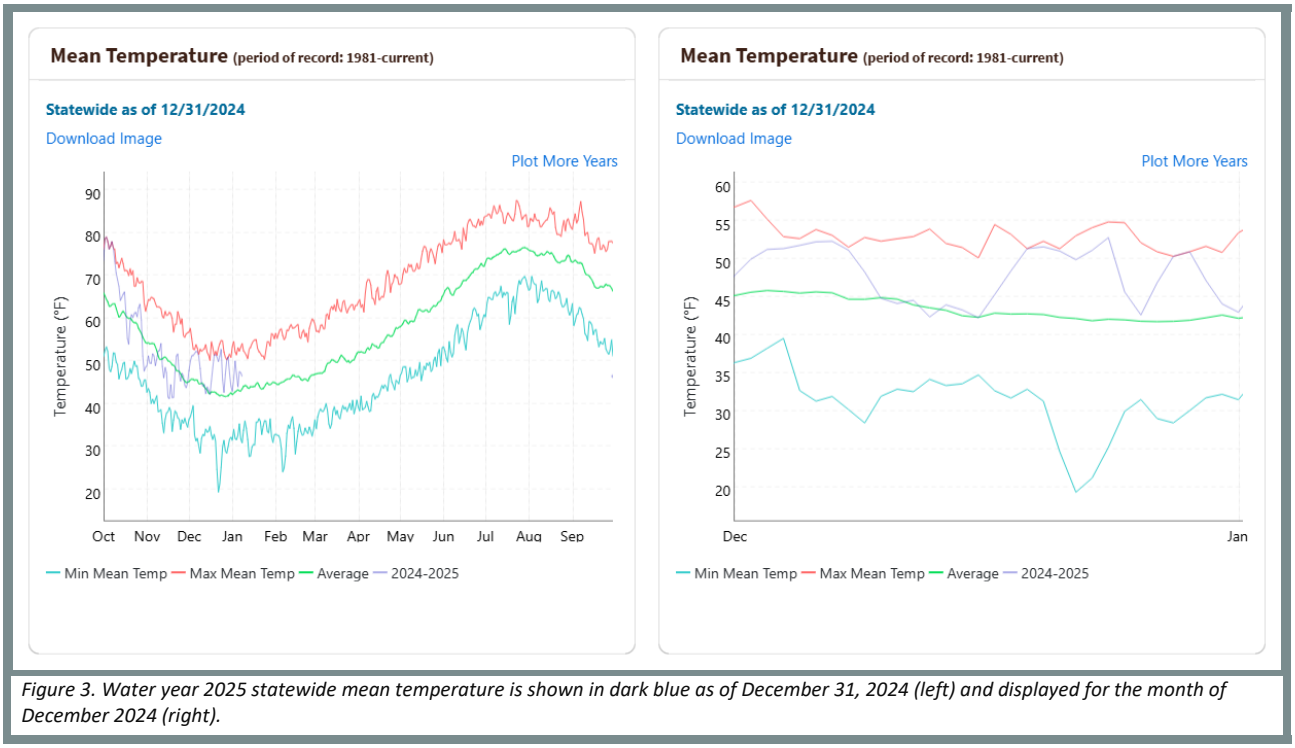

Figure 3. Water year 2025 statewide mean temperature is shown in dark blue as of December 31, 2024 (left) and displayed for the month of December 2024 (right).

According to CPC, La Niña conditions began during December 2024 with observed below-average sea surface temperatures (SST) across the central and east-central equatorial Pacific Ocean. CPC predicts with a 59% chance that La Niña conditions will continue through February-April 2025 and 60% chance will transition back to El Niño Southern Oscillation (ENSO) neutral conditions during March-May 2025. The CPC temperature outlook issued on December 31, 2024 indicates above normal temperatures with 50-60% chance across California during the month of January 2025. The CPC seasonal outlook covering the period of January 2025 through end of March 2025 indicates equal chances of below, near, or above normal temperatures for Northern and Central California and up to 40% chance of above normal temperatures for Southern California.

Sources: Statewide Hydroclimate and Water Supply Conditions, CPC 30-Day Forecasts

RESERVOIRS

Statewide reservoir storage at the end of December was 122% of average. As shown in Figure 4, most reservoirs have near or above average storage for this time of year. Reservoir storage in the Central Coast region remained well above average (with 143%) at the end of December.

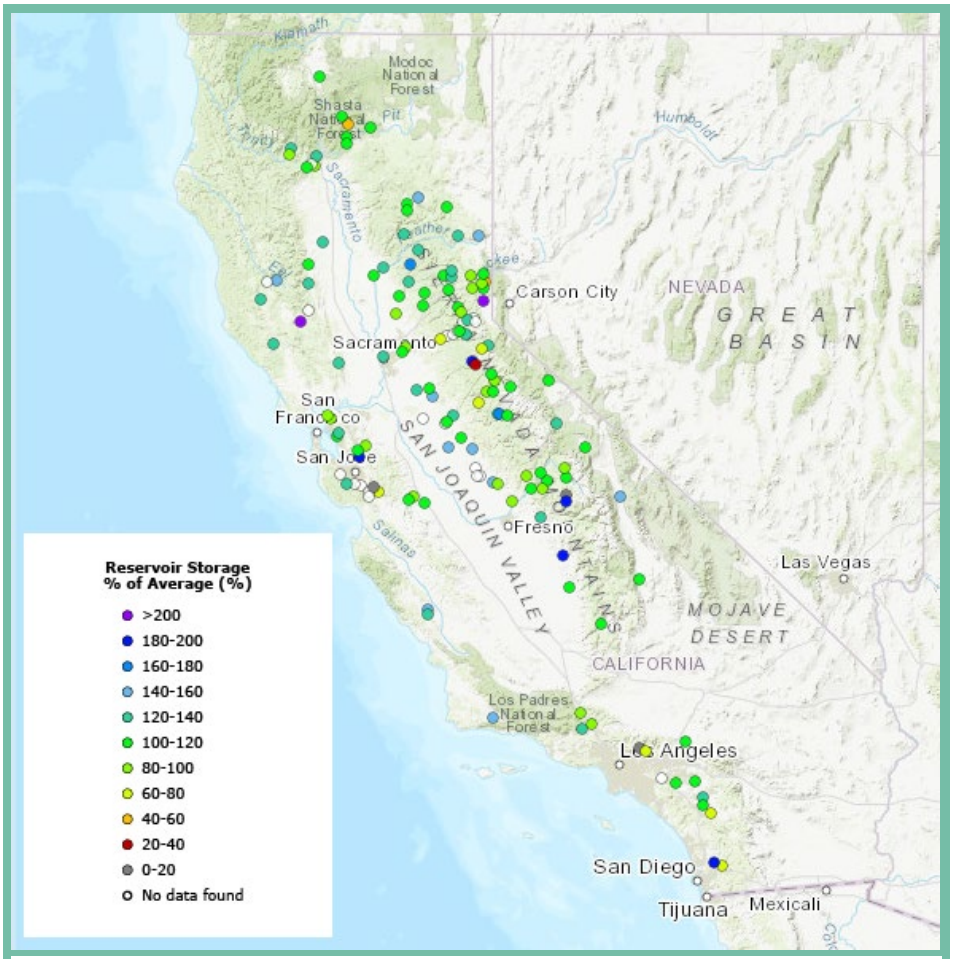

Figure 4. Reservoir storage percent of average for December 31, 2024.

In general, the reservoirs that were already near their top of conservation levels, made necessary releases to maintain this storage level. With the dry conditions at the end of December, most reservoirs have reduced the amount of water released to retain or reach their respective top of conservation level.

At the end of December, most flood control reservoirs are near their respective top of conservation levels, with a few slightly encroached. The major flood control reservoirs that were slightly encroached at the end of December include: Lake Shasta, Black Butte Lake, Camanche Reservoir, New Hogan Lake, Terminus Reservoir, Success Lake, Lake Mendocino, and Lake Sonoma.

The few major flood control reservoirs notably below their respective top of conservation storage at the end of December include: Lake Oroville (by about 387 TAF), Folsom Lake (by about 212 TAF), New Don Pedro Reservoir (by about 289 TAF), Eastman Lake (by about 37 TAF), Millerton Lake (by about 210 TAF), and Pine Flat Reservoir (by about 213 TAF).

Sources: California Water Watch , California Data Exchange Center Reservoirs Flood Control, CNRFC Observed Date of Peak Flow

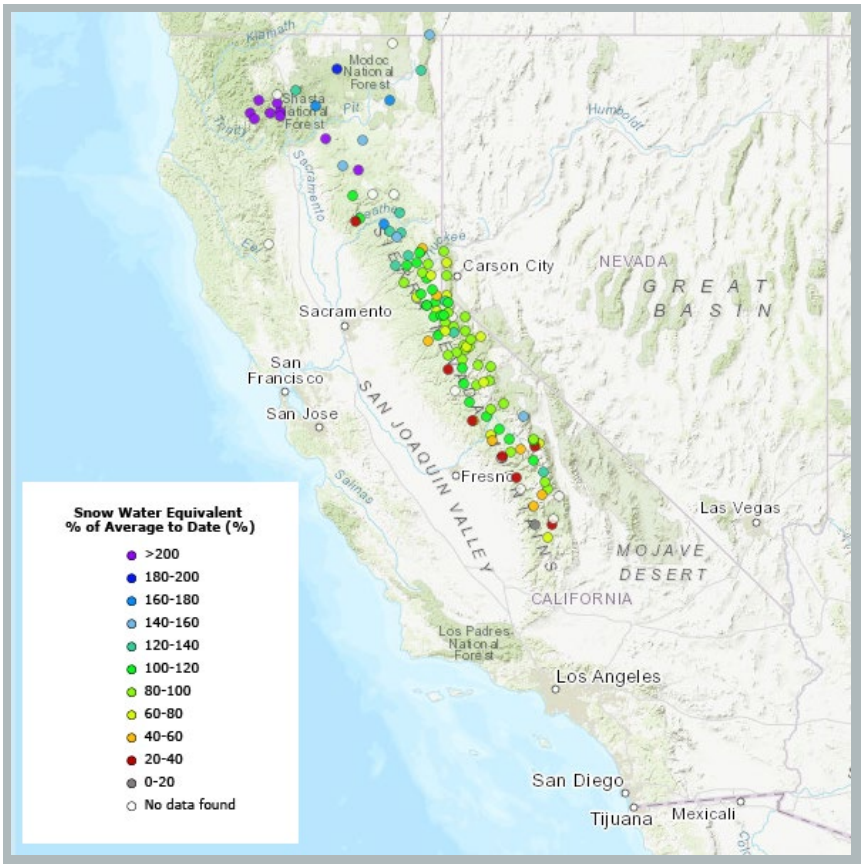

Figure 5. Snow sensor data shown for snow water equivalent (SWE) percent of average for the water year through December 31, 2024.

SNOWPACK

The statewide average snow water equivalent (SWE) was 10.4 inches for December 31, which is 113% percent of normal and 39% of April 1 average. The storm systems that traveled across California during December resulted in higher precipitation for Northern Sierra, moderate amounts for Central Sierra, and minor amounts for Southern Sierra. This gradual trend was reflected in the snowpack accumulated where greater amounts were observed in the northern region and reduced amounts moving south along Sierra Nevada. As shown in Figure 5, snow sensor readings for SWE percent of average for December 31, 2024 was above average for Northern Sierra and Trinity (165% of average), closer to average for Central Sierra (95% of average), and below average for Southern Sierra (76% of average). Figure 6 shows regional SWE conditions at the beginning of December 2024 (left) and end of December 2024 (right) to further show the increase in percent of April 1 average mainly for Northern and Central regions during the month of December.

In general, for the Sierra Nevada, snowpack accumulation begins early December, grows until a peak volume around April 1, and thereafter begins to melt with longer days and longer exposure to solar radiation. Several factors involving the timing, pace, and scale of storms and their temperature characteristics through the end of March can influence the total amount of snowpack and when it will begin to melt.

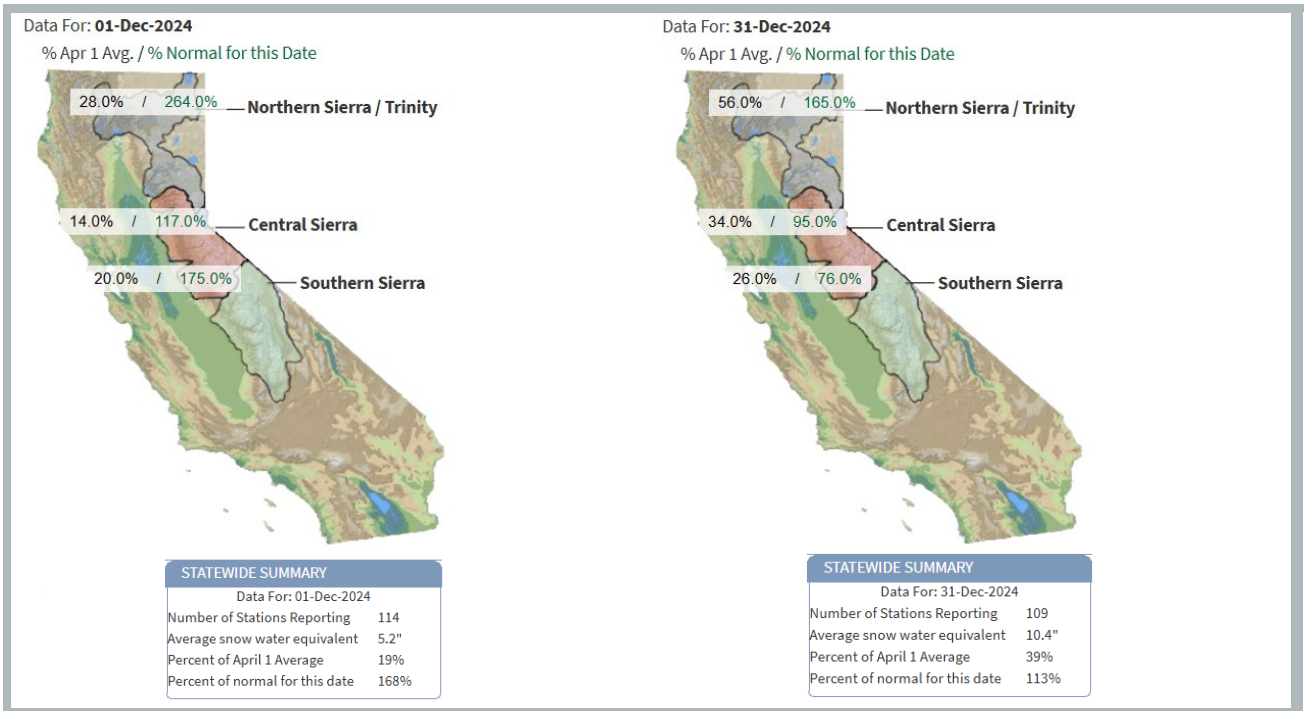

Figure 6. Regional SWE percent of April 1 average (in black text) and percent of normal (in green text) on December 1, 2024 (left) and December 31, 2024 (right).

Sources: California Water Watch, CDEC Snow Water Equivalent Plot

STREAMFLOW

Streamflow for about 50% of locations across California was at a normal flow rate at the end of December according to United States Geologic Survey (USGS) stream gage locations. About 34% of streamflow locations were flowing greater than average for this time of year, while about 16% of streamflow locations were flowing below normal for this time of the year. The storm systems during December resulted in higher amounts of rain throughout Northern and Central California, which caused two California-Nevada River Forecast Center (CNRFC) forecast locations to exceed their respective flood stages (with dates on when it occurred), which included: Navarro River at Navarro (December 14 for minor flood stage) and Russian River at Hopland (December 13-14, 27, and 29 for minor flood stage). As of October 29, 2024, CNRFC has implemented updated flood threshold terminology and associated colors to align with the National Weather Service (NWS), which includes the new stage thresholds as: action/monitor (yellow), minor flood (orange), moderate flood (red), major flood (purple), and danger (black dotted line). The decent rain and routed flow along Sacramento River resulted in weir flow at Colusa Weir (from December 15-17, 25-27, and 28-31) and Tisdale Weir (from December 15-19 and 25-31). Colusa Weir allows overflow to go into the Butte Basin and Tisdale Weir (through the Tisdale Bypass) allows overflow to go into the Sutter Bypass.

Sources: USGS Water Watch, California Nevada River Forecast Center (CNRFC), CDEC Daily Full Natural Flows

GROUNDWATER

Although rainfall increased in 2023 and precipitation was average in 2024, California continues to face a cumulative precipitation deficit from 2000 to 2024. While recent wet years have helped stabilize groundwater levels, California's future will likely see continued fluctuations between wet and dry periods. Recently measured monitoring wells show groundwater levels in 45% of monitoring wells across California are below normal, 38% are normal, and 17% are above normal. These statistics are based on 1,115 wells where groundwater levels have been collected for at least 10 years and the most recent measurements were collected within the last 90 days. There were zero dry domestic well reported in the last 30 days. Data reported is as of January 6, 2025. Visit DWR's California's Groundwater Live for the latest groundwater conditions across the state.

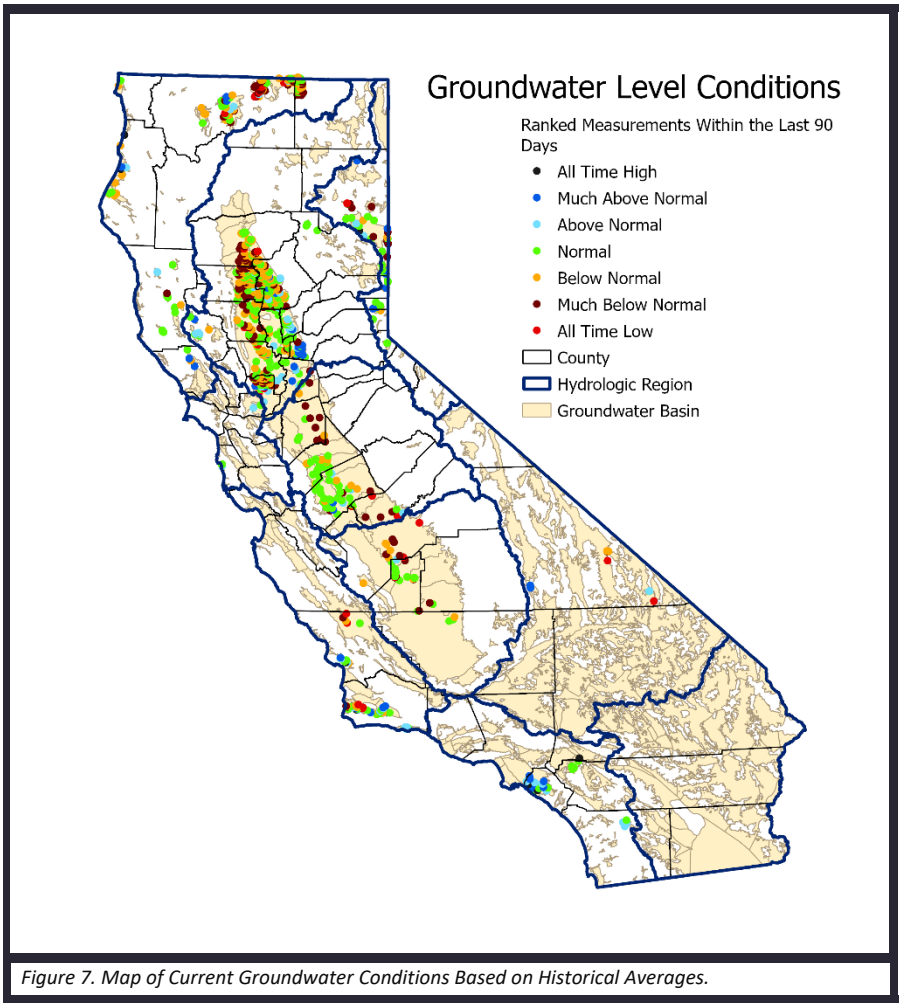

Figure 7. Map of Current Groundwater Conditions Based on Historical Averages.

Source: DWR California's Groundwater Live

Cover page photo: A drone view of Bidwell Canyon Marina at Lake Oroville in Butte County, California. On this date, the water storage was 2,008,215 acre-feet (AF), 59 percent of the total capacity. Photo taken December 20, 2024.