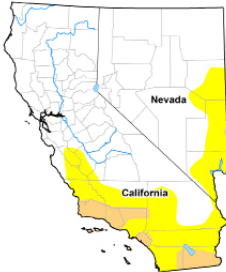


NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM CALIFORNIA-NEVADA DROUGHT OUTLOOK NOVEMBER 2017

Photo: UC Davis

CURRENT DROUGHT CONDITIONS

U.S. DROUGHT MONITOR FOR NOVEMBER 30



Drought intensity

- Yellow: D0: Abnormally dry
- Orange: D1: Moderate drought

<http://droughtmonitor.unl.edu/>

The start to the 2018 water year (October 1) has been both dry and wet throughout California-Nevada, with a large disparity between the wetter northern and drier southern parts of the region. As of November 30, lingering areas of long-term moderate drought (D1) remain in southern portions of California, while Nevada remains drought free, with recent slight expansion of abnormally dry (D0) conditions in both states, according to U.S. Drought Monitor. Drought conditions have greatly improved in the region compared to one year ago, when 73% of California and 34% of Nevada were in moderate to severe drought.

REGIONAL CLIMATE UPDATE

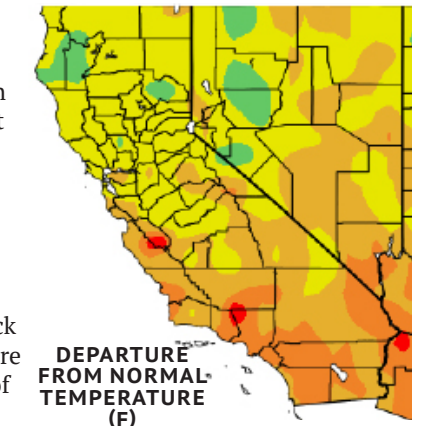
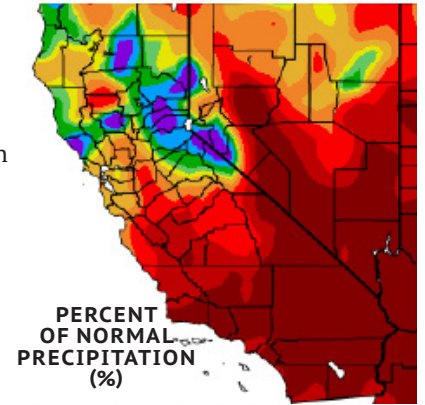
October was very dry in California and Nevada, with record driest conditions in southern portions of the region (some areas receiving less than 5% of normal precipitation) and below normal precipitation in the north. October temperatures were warmer than normal in the region, with the exception of California's Central Valley and northern Nevada.

The water year continued to be warm into November, with record warm temperatures with record warm temperature mid-month. The northern and central Sierra are on a positive

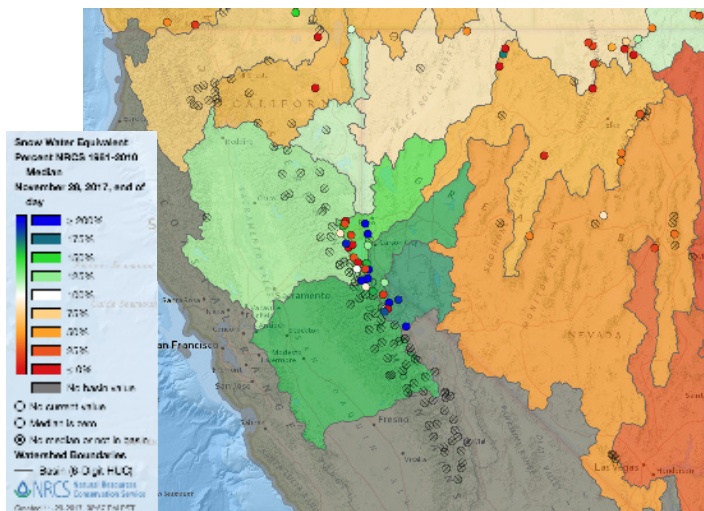
start to the water year as precipitation conditions improved in northern California-Nevada with a mid-November atmospheric river. Storms thus far have missed much of southern California-Nevada, including the southern Sierras. CA DWR measurements in the northern and central Sierras are showing near average precipitation accumulation. However, the Sierra storms thus far have had high snow levels. NRCS SNOTEL measurements show large variation with elevation in the snow water equivalent (SWE), where higher elevation Sierra Nevada sites are reporting 100-200% of median for this time of year and lower elevation stations are reporting 0-25%. Snowpack levels in eastern Nevada are also low, currently <50% of normal SWE.

Typically, Sierra stations begin accumulating their snowpack in mid-to-late November. This year's conditions suggest an early season warm snow drought at mid-to-lower elevations. It is still very early in the season to make any definitive statements on snowpack. Tracking temperature as well as precipitation will be important throughout winter to understand how much precipitation falls as rain rather than accumulating snowpack, as well as to understand pre-April 1 snowpack melting. Reservoir conditions in California currently are generally above their historical averages, as is Lake Tahoe.

OCT 1-NOV 29



<https://hprcc.unl.edu/>



WHAT IS SNOW DROUGHT?

A period of abnormally little snowpack for the time of year, reflecting either below-normal cold-season precipitation (dry snow drought) or a lack of snow accumulation despite near-normal precipitation, usually when warm temperatures prevent precipitation from falling as snow or result in unusually early snowmelt (warm snow drought). http://glossary.ametsoc.org/wiki/Snow_drought

DROUGHT & CLIMATE OUTLOOK

NOAA's Climate Prediction Center (CPC) seasonal outlooks as of November 16 show equal chances of above, below, or normal precipitation for northern California and Nevada for December-January-February (DJF), January-February-March (JFM) and February-March-April (FMA), while the southern portion of the region show increased odds of below normal precipitation (33-45%). There is a 33-60% chance of above-normal temperatures throughout winter, with the greatest chances centered in

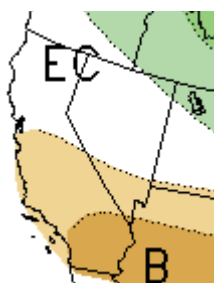
southern Nevada and southern California through this time period. Through February, drought is expected to persist in the southern central California coast as well as near the southern California-Arizona border, with potential drought development in southernmost California. The precipitation outlooks reflect the typical wintertime La Niña-related circulation patterns (i.e. northern displaced polar jet stream and mean storm track) and favor drought persistence and/or intensification across this area this winter.

ENSO-neutral conditions persisted through summer and early fall of 2017, but October brought weak La Niña conditions with below-average equatorial sea surface temperatures (SSTs) across the central and eastern Pacific Ocean. La Niña conditions are present, and the NOAA's ENSO alert system status is a La Niña advisory with conditions favored to continue at least through the Northern Hemisphere winter 2017-2018. The official probabilistic ENSO forecast as of early-November, combining observational and predictive information with human judgement, shows La Niña conditions have an elevated chance of occurring through JFM (~65-70%) relative to the long-term average (35%), while the chances of neutral conditions are lower (<30%). The multi-model averages also predict La Niña to persist into early 2018.

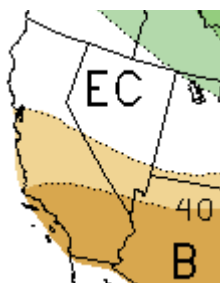
With La Niña, certain patterns of temperature and precipitation are favored across the United States, but not all La Niña events are the same. Last year's winter conditions were also a weak La Niña, but there has been a fair amount of variability in the winter temperature and precipitation patterns during La Niña events since 1950. La Niña is associated with a northward shift of the jet stream, which can result in more blocking high pressure systems that reduce storm activity across the southern tier of the U.S. CPC's recent analysis of snowfall shows some areas of northernmost California and Nevada receive greater than average snowfall in La Niña years, while the rest of the region historically has seen smaller differences from average. How much snow

OUTLOOK: PRECIPITATION

DEC-JAN-FEB

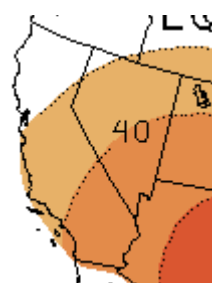


JAN-FEB-MAR

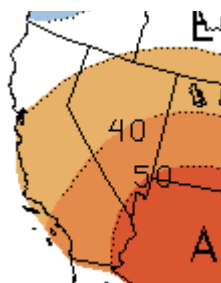


OUTLOOK: TEMPERATURE

DEC-JAN-FEB



JAN-FEB-MAR



A = chances of above-normal, B = chances of below-normal
EC= equal chances of above, below, normal

<http://www.cpc.ncep.noaa.gov>

Click here for a description of these graphics.

California-Nevada receives this year will depend on how La Niña impacts the storm track as well temperatures impact on snow levels.

ABOUT THIS OUTLOOK

On November 27, 2017, NIDIS and its partners held a California-Nevada Drought Early Warning System (DEWS) Drought & Climate Outlook Webinar as part of a series of regular drought and climate outlook webinars designed to provide stakeholders and other interested parties in the region with timely information on current drought status and impacts, as well as a preview of current and developing climatic events like La Niña.

A video of and presentations from this webinar can be accessed here: <https://www.drought.gov/drought/calendar/events/california-nevada-drought-climate-outlook-webinar-nov-27>

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USEFUL RESOURCES FOR THIS WINTER

<https://www.drought.gov/drought/data-maps-tools>: Data, Maps, & Tools from current conditions, outlooks and forecast, impacts, by sector, and more.

<http://cnap.ucsd.edu>: The NOAA RISA California Nevada Applications Program (CNAP) mission is to improve resilience in California and Nevada by providing decision makers usable climate information through integrating cutting edge physical and social science. Check out their observational tools for tracking water storage and precipitation in the region.

<http://cw3e.ucsd.edu/>: The Center for Western Weather and Water Extremes (CW3E) mission is to provide 21st century water cycle science, technology, and outreach to support effective policies and practices that address the impacts of extreme weather and water events in the environment, people and the economy of Western North America. Check out their suite of Atmospheric River forecast products.

<http://www.cnrfc.noaa.gov/>: The California Nevada River Forecast Center (CNRFC) is a field office of the National Weather Service (NWS) located in Sacramento, California. One of 12 RFCs, their basic functions are:

- Continuous hydrometeorological data assimilation, river basin modeling, and hydrologic forecast preparation.
- Technical support and interaction with supported and supporting NWS offices.
- Technical support and interaction with outside water management agencies and users.
- Applied research, development, and technological implementation to facilitate and support the above functions.

<https://wrcc.dri.edu/>: The mission of the Western Regional Climate Center is to act as a repository of historical climate data and information, disseminate high quality climate data and information pertaining to the western United States, engage in applied research related to climate issues, and improve the coordination of climate-related activities at state, regional and national scales. Check out their suite of climate monitoring data and tools including the WestWide Drought Tracker and their look at precipitation during El Niño and La Niña years.

<http://climateengine.org/>: Analyze, visualize, and interact with climate and earth observations quickly for decision support related to drought, water use, agricultural, wildfire, and ecology through on-demand cloud computing.

<https://cdec.water.ca.gov/>: CDEC installs, maintains and operates an extensive hydrologic data collection network including automatic snow reporting gauges for the Cooperative Snow survey program and precipitation and river stage sensors for flood forecasting.

