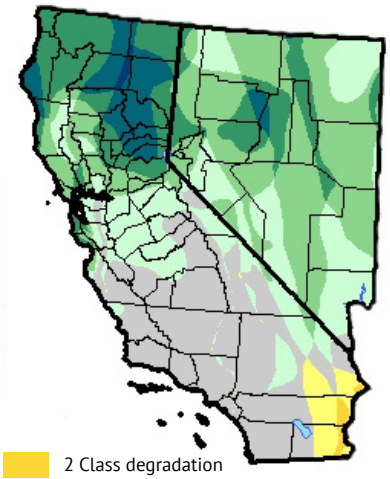
NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

CALIFORNIA-NEVADA DROUGHT OUTLOOK DECEMBER 2016

U.S. DROUGHT MONITOR CLASS CHANGE

DEC. 1, 2015 - NOV. 29, 2016



- 2 Class degradation
- 1 Class degradation
- No change
- 1 Class improvement
- 2 Class improvement
- 3 Class improvement
- 4 Class improvement
- 5 Class improvement

http://droughtmonitor.unl.edu/

CURRENT CONDITIONS

Drought conditions in parts of Northern California and much of Nevada have improved since this time last year, and especially since Jan. 1, 2016, with as many as four levels of U.S. Drought Monitor (USDM) category improvements (see map at left). Nevada has seen more improvement than California in the last year while much of Central and Southern California including the Southern Sierra remain in drought. **As of Nov. 29, 73% of California and 34% of Nevada are in moderate to exceptional drought, compared to 97% and 93% at this time last year, respectively.**

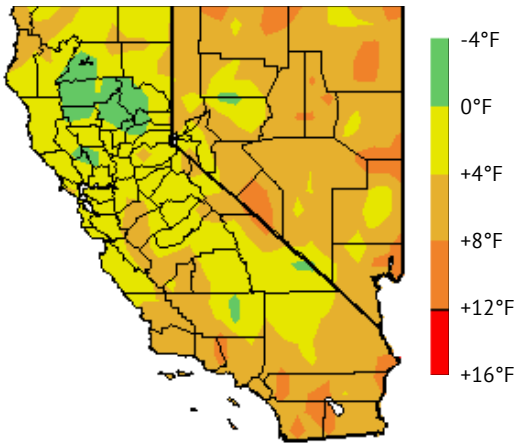
According to NOAA's National Centers for Environment Information (NCEI), the period from October 2014 to October 2016 was the warmest and eighth driest period in California, and second warmest and 53rd driest period in Nevada. The improved USDM categories in some locations were due to near- to above-normal precipitation last winter, when California and Nevada saw their 35th and 30th wettest years, respectively. However, after years of prolonged drought, this has only put a dent in the deficits and longer term hydrologic impacts have persisted in both states.

Since the start of the 2017 water year (Oct. 1), the West has been warmer than average overall. Above-normal temps have been recorded across most of California and Nevada with the exception of northern portions of the Central Valley and the Trinity Mountains. Several large precipitation events, including atmospheric rivers in October, have done the "heavy lifting" to start the water year.

Atmospheric rivers, or ARs, are narrow corridors of high water vapor transport in the lowest 2 km of the atmosphere and are responsible for most of the horizontal transport of water vapor outside of the tropics. ARs can produce abundant and often intense rainfall, and are especially important in California because they can boost rainfall storage, but can also result in natural hazards such as flooding, intense runoff and landslides. While they tend to primarily impact California, they can sometimes spill over into Nevada, which was the case in mid-October, when two ARs brought rain to far northwestern California, the Sierra Nevada, and northwestern Nevada. November saw less

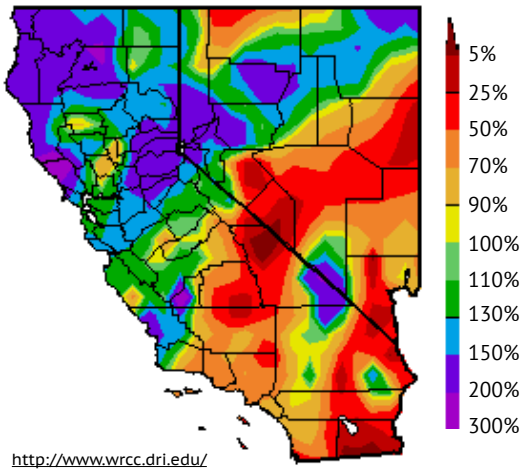
AVERAGE TEMPERATURE DEPARTURE FROM AVERAGE - WATER YEAR SO FAR

OCT. 1 - DEC. 5 2016



PERCENT OF AVERAGE PRECIPITATION - WATER YEAR SO FAR

OCT. 1 - DEC. 5, 2016



http://www.wrcc.dri.edu/

IMPACTS & UPDATES

-- California remains under a state-declared drought emergency.

-- Cachuma Reservoir (Santa -- Barbara County) is currently 10% of normal. The reservoir supplies drinking water for Santa Barbara and communities in the Santa Ynez Valley.

-- Five years of drought have led to a very significant rise in bark beetle infestation and historic levels of tree die-off.

-- Based on aerial detection surveys conducted throughout 2016, the Forest Service estimates the number of dead trees on California's forested lands grew to a cumulative total of 102 million on 7.7 million acres since 2010.

DOES A WET OCTOBER INDICATE A WET NOVEMBER TO MARCH?

By examining past October precipitation totals versus November-March precipitation totals since 1895, NOAA's Western Regional Climate Center (WRCC) has found no significant relationship between a wet October and a wet winter in California or Nevada. However, the number of very wet Octobers is small and it is difficult to draw conclusions from this sample size.

precipitation in the region than October, but in late November a weak AR finally brought some much-needed precipitation to southern and central coastal California. Nearly an inch fell in some areas that are experiencing some of the most intense drought impacts, however that rainfall won't make a significant dent in prolonged drought conditions.

Precipitation in the northern and central Sierra is on a positive start to the water year and on track for a record year, with the southern Sierra still below normal. **However, it is very early in the season to make any definitive statements on snowpack, especially considering much of the precipitation this season has fallen as rain rather than accumulating snowpack due to above-average temperatures.**

Soil moisture conditions have seen improvements across the northern portions of both states but very dry conditions in Southern California and Nevada still persist.

Overall, streamflows are running normal to above normal across both states, with some areas in northeastern California, the Salinas River, and the Southern Sierra still below normal. Compared to this time last year, reservoir levels have increased. However, many reservoirs are still below average, with some at levels far below normal where drought has been the most intense.

Groundwater levels remain low in both California and Nevada; for example, near Santa Barbara and San Joaquin Valley in California and the Carson Valley and Amargosa Valley in Nevada. It is also important to note that reservoir levels are not always a clear indicator of drought conditions because they are contingent on necessary reservoir operations and available precipitation.

CLIMATE OUTLOOK

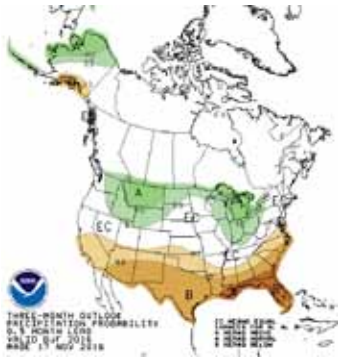
Over this past summer, observed El Niño conditions, or cooler than normal sea surface temperatures (SST), lessened and reached neutral or weak La Niña conditions in the tropical Pacific Ocean. Currently, La Niña conditions are present. This means that equatorial (Niño 3.4 region) SSTs during the last four weeks were below average in the central and east-central Pacific Ocean. As of Dec. 2, NOAA's Climate Prediction Center (CPC) has issued a **La Niña Advisory.** Most multi-model averages indicate weak La Niña conditions through the Northern Hemisphere in early winter 2016-17 (December-January-February) with La Niña slightly favored to persist (~55% chance) with an above-normal climatological probability of a return to neutral conditions favored in the new year.

Looking at typical La Niña patterns, conditions tend to be wetter in the Pacific Northwest and can sometimes extend into northern California and northwest Nevada. The effect of La Niña on winter precipitation is strongest in Southern California, where drier than normal conditions tend to develop. This region has been one of the slowest to recover from the current drought and a La Niña could potentially exacerbate those conditions. Historically, past weak La Niña conditions have favored near-normal or dry winter months with ENSO-neutral events yielding more dry winter seasons than normal or wet ones. However, past conditions do not guarantee future outcomes.

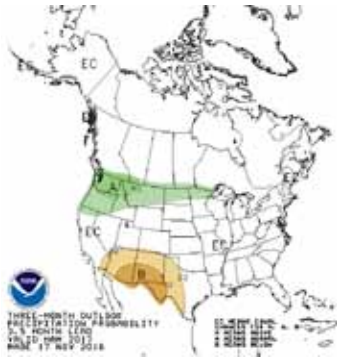
The CPC Seasonal Outlooks as of November 17th (above) show higher probabilities of warmer than average temperatures and slight favoring in the odds of below-normal precipitation in Southern California and Southern Nevada through April. High uncertainty remains for the remainder of the region with equal chances of above, below, and normal precipitation and temperature forecasted. Hence, drought is expected to persist in the southern and central portions of California and southwestern Nevada, with possible improvements in northeast California and northwest Nevada.

OUTLOOK: PRECIPITATION

DEC-JAN-FEB

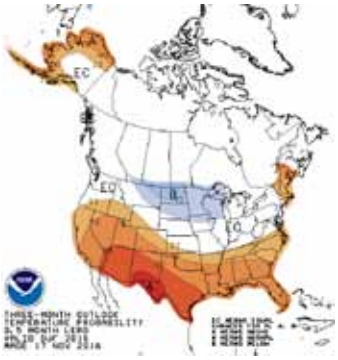


MAR-APR-MAY

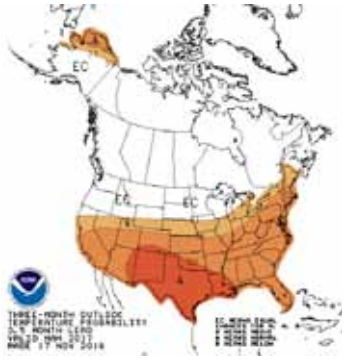


OUTLOOK: TEMPERATURE

DEC-JAN-FEB



MAR-APR-MAY



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

ABOUT THIS OUTLOOK

On December 2, 2016 NIDIS and its partners held a California-Nevada 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.

The presentations from this webinar can be accessed here: http://bit.ly/2fFwtbC

CONTRIBUTORS

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