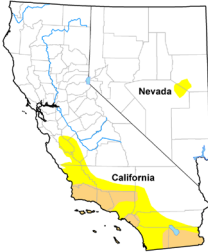


NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM CALIFORNIA-NEVADA DROUGHT OUTLOOK SEPTEMBER 2017

CURRENT DROUGHT CONDITIONS

U.S. DROUGHT MONITOR
FOR SEPTEMBER 26



Drought intensity

- D0: Abnormally dry
- D1: Moderate drought

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

As the 2017 Water Year (October 1 - September 30) comes to a close, lingering areas of long-term moderate drought remains in southern portions of California while Nevada remains drought free. As of September 26th, 8.24% of California and none of Nevada remain in moderate drought (D1) according to the U.S. Drought Monitor. Drought conditions have greatly improved in the region compared to the start of the 2017 Water Year when ~84% of California and ~80% of Nevada were in drought, including 21% of California in severe drought.

SUMMER CLIMATE RETROSPECTIVE

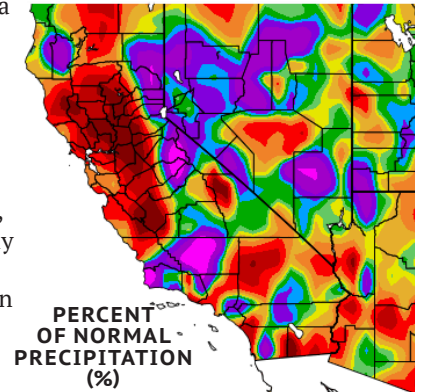
Drying conditions are typical over the summer, and neither states receives much summer precipitation except in the southeastern parts of the region. The effects of the well above-normal winter precipitation are still felt across the region. Streamflows in the region remain normal to above normal, with many reservoirs remaining above their historical averages. However, California and Nevada are experiencing an active wildfire season. To date, CAL FIRE has reported 7,109 fires (742,918 acres burned) while the Great Basin has experienced 3,964 fires (1,986,190 acres burned) in 2017. For California for the same time period, this is more than double the 5-year average number of fires and more than three times the average acres burned.

Southern Nevada was the exception with a near normal

water year. This region well as southern California typically receive summer moisture from the North American Monsoon. The monsoon is a pronounced increase in rainfall over the southwestern U.S. and northwestern Mexico, usually occurring from July through September. This year, southern and western Nevada received some of this summer monsoon moisture, with about normal July-August precipitation.

JULY 30-SEPT 27

as

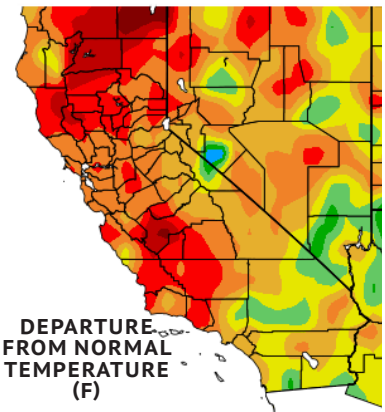


PERCENT OF NORMAL PRECIPITATION (%)



HEAT WAVES 2017

California and Nevada, and the western U.S. as a whole, have experienced exceptionally warm temperatures this summer. This extreme heat was linked to a strong, persistent upper-level ridge. For a second consecutive summer, June through August were the warmest summer on record (both in average and minimum temperatures going back to 1895) in both



DEPARTURE FROM NORMAL TEMPERATURE (F)



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

Drought effects on winter-run Chinook

Year	Shasta Dam	Red Bluff Diversion Dam	Delta
2011	2,048,000 eggs	849,000 juveniles survived to pass Red Bluff	41% survival
2015	9,744,000 eggs	318,000 juveniles survived to pass Red Bluff	3% survival

Drought conditions reduce survival of endangered winter-run salmon. In the summer months, winter-run egg and fry in the upper Sacramento rely on cold-water releases from Shasta Reservoir to keep the river cool enough for them to survive.

In years of high flow, there is plenty of water to cool the river. In 2011, over 41% of the eggs laid in the upper river survived to pass Red Bluff Dam as juveniles.

In 2015, record drought left very little cold water in Shasta to cool the upper Sacramento. Despite the many eggs laid by returning adult salmon, only 3% survived to reach Red Bluff. Those few survivors face further high mortality as they continue through the Delta and into the ocean.

Many decisions about Central Valley and State Water Project operations are designed to help endangered winter-run salmon survive to reach the Delta. NOAA Fisheries is closely monitoring juvenile winter-run as they migrate through the Delta to minimize additional loss.

www.westcoast.fisheries.noaa.gov/central_valley/water_operations/



California and Nevada. Cities broke records for the warmest July on record, including Bakersfield and Reno. Several record heat waves impacted the region. For example, San Francisco Airport airport in early September hit 104°F for two consecutive days, 30° above the normal high temperature. For more information on this summer's heat waves, check out a [recent feature](#) by CNAP.

DROUGHT & FISHERIES

The region will continue to see lasting impacts from the most recent drought, including impacts on fisheries such as Central Valley salmon (see figure at left to see drought effects on winter run chinook). In response to the recognized importance of water temperatures on early salmon lifecycles, NOAA's Southwest Fisheries Science Center (SWFSC) has developed new tools to serve as the public interface for modeled and observed water temperature and flow data in the Sacramento River associated with Shasta Reservoir, Shasta Dam operations, and meteorological conditions. In a recent NOAA report, successful temperature management of Shasta Reservoir in 2016 was estimated to reduce temperature-dependent mortality to approximately 2% from

the estimated 77% and 85% in the 2014 and 2015 brood year, respectively. For more information, visit: <http://oceanview.pfeg.noaa.gov/CVTEMP/>

DROUGHT & CLIMATE OUTLOOK

The Climate Prediction Center (CPC) seasonal outlooks for most of California and Nevada as of September 21 show equal chances of above, below, or normal precipitation in October-November-December (OND), November-December-January (NDJ), and December-January-February (DJF). There is a 33-50% chance of above-normal temperatures through fall into winter, with the greatest chances centered in eastern Nevada and southeastern California through this time period. Through December, drought is expected to persist in the southern central California coast as well as near the southern California-Arizona border.

ENSO-neutral conditions have persisted through summer, with August into September bringing decreasing equatorial sea surface temperatures (SSTs) across much of the tropical Pacific Ocean. While conditions are still ENSO-neutral, NOAA's ENSO alert system is currently in a La Niña Watch, with La Niña conditions favored to develop in the Northern Hemisphere winter 2017-2018. Back-to-back La Niña winters are not uncommon, the most recent in 2010-2011 and 2011-2012. Along with cooler SSTs, cooler-than-average water under the ocean surface (~50-100 meters) has developed, likely from the slightly stronger-than-average trade winds, providing physical evidence for potential La Niña conditions. The official probabilistic ENSO forecast as of mid-September, combining observational and predictive information with human judgement, shows La Niña conditions have an elevated chance of occurring (55-60%) relative to the long-term average (35%) while the chances of conditions remaining neutral are lower (~35-40%). Forecasters favor these predictions in part because of the higher degree of forecast skill at this time of year, and will continue to watch conditions closely.

The National Weather Service Climate Prediction Center has recently launched new interactive maps for the U.S. seasonal outlooks. Visit www.cpc.ncep.noaa.gov/ and click the word "interactive" next to any of the outlooks (6-10 day, 8-14 day, One Month, or Three Month).

ABOUT THIS OUTLOOK

On September 25th, 2017 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.

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-sept-25>

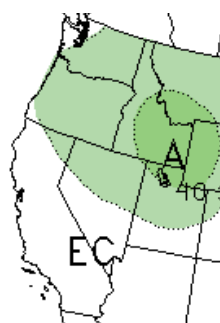
CONTRIBUTORS

David Simeral, WRCC/DRI
Miles Daniels, NOAA SWFSC/UCSC
Ken Nowak, US BOR
Amanda Sheffield, NOAA/NIDIS/SIO/UCSD

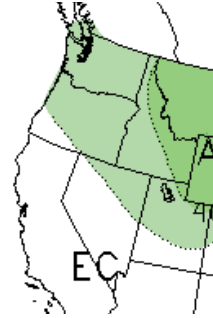
OUTLOOK: PRECIPITATION

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

OCT-NOV-DEC

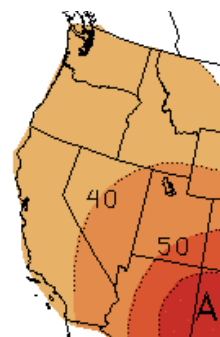


NOV-DEC-JAN

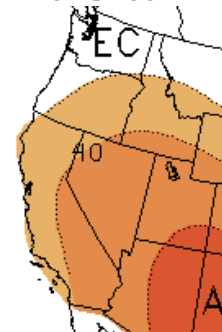


OUTLOOK: TEMPERATURE

OCT-NOV-DEC



NOV-DEC-JAN



<http://www.cpc.ncep.noaa.gov/>
Click here for a description of these graphics.

U.S. BUREAU OF RECLAMATION SUB-SEASONAL CLIMATE FORECAST RODEO

The Rodeo is a year-long, real-time forecasting competition, focused on western U.S. temperature and precipitation for weeks 3&4 and weeks 5&6. Reclamation is sponsoring the competition in partnership with NOAA, USGS, and the U.S. Army Corps of Engineers. Forecasts are issued every other week and evaluated as observed data become available. Winners are anticipated to be announced in September 2018. Check www.drought.gov/drought/sub-seasonal-climate-forecast-rodeo for new scores and other updates over the next year.

During the past eight years, every western state in the the U.S. Bureau of Reclamation's region has experienced drought that has affected the economy, both locally and nationally, through impacts to agricultural production, water supply, and energy. Improved sub-seasonal forecasts for weather and climate conditions (lead-times ranging from 15 to 45 days and beyond) would allow water managers to better prepare for shifts in hydrologic regimes such as the onset of drought or occurrence of wet weather extremes. For example, some of Reclamation's operations that could be enhanced from such forecasts include water allocation, flood management, stakeholder planning, and environmental compliance.

Sub-seasonal forecasting is challenging, as it encompasses the time frame where initial state or condition information and slowly varying long-term states, such as SSTs, soil moisture, and snowpack, become more important to predictions. In addition, the relative importance of the initial state or condition, versus the longer term state, depends on the lead time, region of interest, and time of year.

