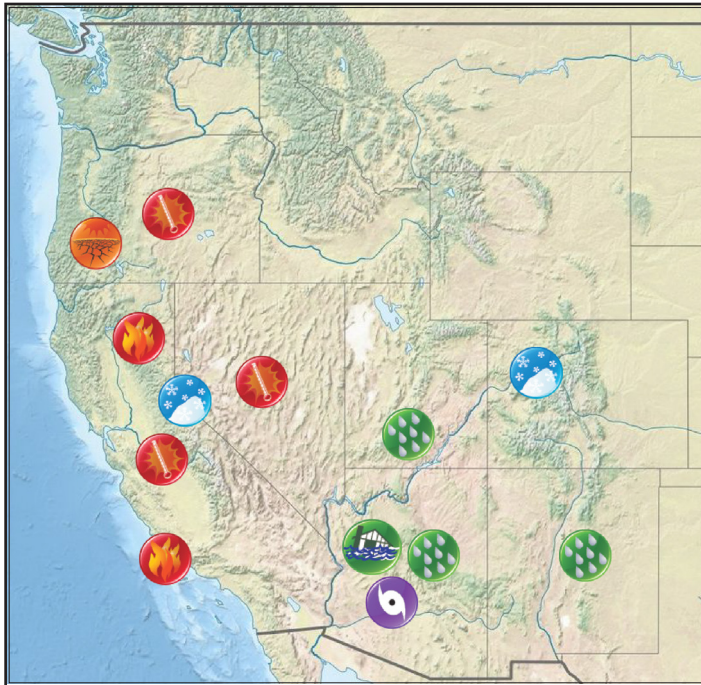




Significant Events for September-November 2018

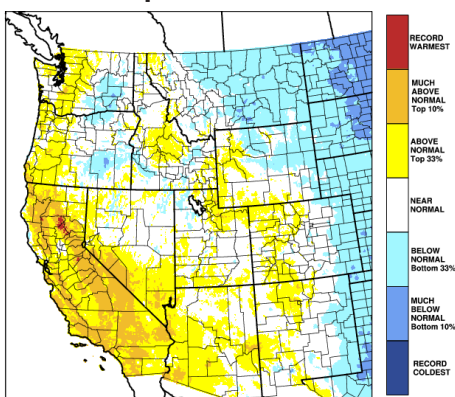
Sep-Oct-Nov Highlights



-  Above normal minimum temperatures observed in CA, NV, OR. Average autumn temperatures in CA 9th warmest in a 124-year record
-  Near to well above normal precipitation across much of Southwest (AZ, NM, southern UT); improvement of drought conditions in this area
-  Remnants of tropical storms in October caused flood impacts in Southwest
-  Drier than normal conditions in Pacific Northwest; OR 12th driest autumn in 124-year record
-  Wildfires destroyed thousands of homes in CA; associated smoke caused severe and persistent impacts to air quality in major metro areas
-  Early season snowpack in Sierra Nevada, Rockies helped many ski resorts to open by late November
-  90% chance of El Niño conditions developing in winter; at present, coupled ocean-atmosphere system reflects ENSO-neutral conditions

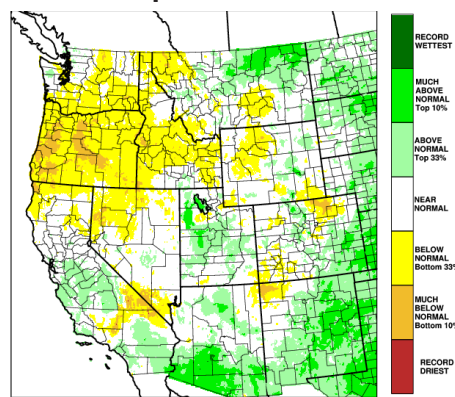
Regional Overview for September-November 2018

**Mean Temperature Percentile
Sep-Oct-Nov 2018**



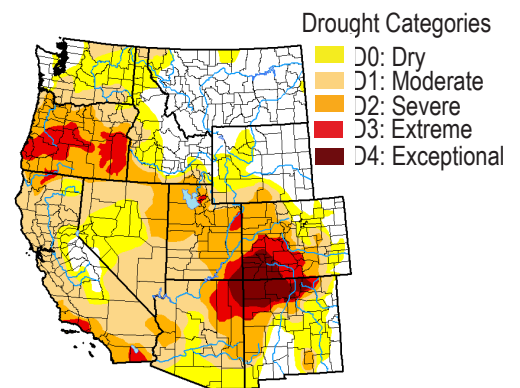
Autumn temperatures were well above normal in much of California; this was driven largely by November temperatures. East of the Sierra Nevada and Cascades, temperatures were generally near normal, with some areas slightly warmer or cooler than normal. September was notably warmer than normal in the Southwest; Las Vegas, NV, observed its warmest September on record.

**Precipitation Percentile
Sep-Oct-Nov 2018**



The Pacific Northwest was drier than normal this autumn; some areas of the Southwest reported above normal precipitation. In Sept, monsoon rainfall benefitted southern AZ and NM. In Oct, remnant moisture from hurricanes Rosa and Sergio brought well above normal precipitation to the Southwest. A late November atmospheric river resulted in above normal precipitation in central CA.

**US Drought Monitor
Dec 4 2018**



At the end of the autumn season, 54% of the West was experiencing drought conditions. Roughly 3% of the region (mostly in CO, NM) was designated as having exceptional drought conditions. Large areas of improvement were observed in the Four Corners states, ID, MT, and western WA. Expansion and worsening drought conditions were observed in northern parts of CA, NV.

Regional Impacts for September-November 2018

Flooding, Water Resources

In early Oct., thunderstorms associated with remnants of Hurricane Rosa caused flash flooding; at least 2 people died and a 30-ft section of highway collapsed near Cameron, AZ, cutting off rural communities.

Phoenix, AZ, recorded its wettest Oct. on record at 5.35 in; this was also its second wettest month of all time. End-of-Nov. snow water equivalent 160-190% of median in Sierra Nevada, 100-140% of median in Upper Colorado Basin, and near median to well below median in the Pacific Northwest.

Agriculture and Drought

Warm and dry conditions over the summer and autumn seasons have stressed conifers in Oregon.

In mid-October, UT's governor made a drought disaster declaration; many farmers in southern UT have run out of surface water and a majority of grazable land was in poor to very poor condition.

Low streamflow in western OR has impacted fisheries and recreation; the Chetco R. was flowing too slowly in Nov. for salmon to spawn, prompting fishing regulations.

Wildfire

November's Woolsey Fire burned over 96,000 acres and 1500 structures in southern CA, caused 3 deaths.

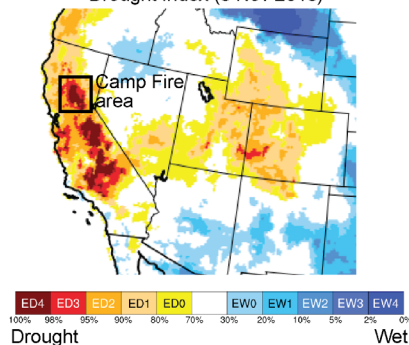
Devastating Camp Fire (November) in northern California

The Camp Fire was ignited on Nov 8 and spread rapidly during high winds, devastating the community of Paradise in Butte County, CA (right).

The fire burned over 153,000 acres, destroyed 13,696 residences, and resulted in 85 deaths, becoming California's most devastating wildfire on record. Above normal temperatures and dry conditions in September and October primed the area for wildfire. The



3-month Evaporative Demand Drought Index (8 Nov 2018)

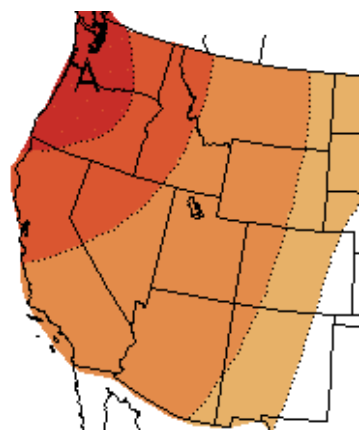


Evaporative Demand Drought Index (EDDI, above) shows much higher than normal evaporative demand (or "atmospheric thirst") in the Camp Fire area, an indicator that vegetation was very dry. The combination of dry conditions, extreme winds, abundant vegetation, an ignition, and a populated area resulted in a devastating outcome.

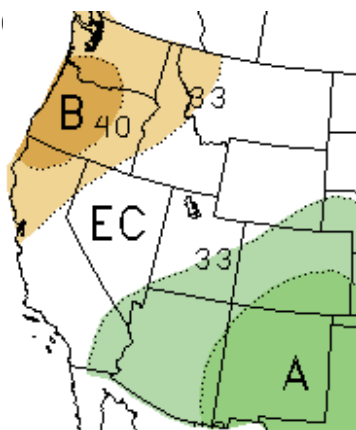
Regional Outlook for Jan-Feb-Mar 2019

CPC Temperature Outlook

CPC Precipitation Outlook



Dec. 2018



A = Above normal B = Below normal EC = Equal chances. Numbers indicate percent chance of temperatures in warmest/coolest one-third and precipitation in wettest/driest one-third.

Above normal temperatures are the most likely outcome for the Jan-Mar period across the West, with the highest odds of above normal temperatures (50-70%) in the Pacific Northwest. Enhanced odds (33-50% chance) of below normal precipitation are given for the Pacific Northwest. Equal chances of near, below, or above normal precipitation are given for a broad swath extending from CA to MT. For the Southwest, the outlooks suggest enhanced odds of above normal precipitation, with a 33-50% chance across the region. In addition to information from forecast models, outlooks are considering temperature and precipitation patterns from past El Niño events.

Western Region Partners

Western Regional Climate Center
wrcclimate.org

National Integrated Drought Information System (NIDIS) - drought.gov

Western Governors' Association
westgov.org

Western States Water Council
westgov.org/wswc

NOAA/ESRL Physical Sciences Division
esrl.noaa.gov/psd

NOAA Climate Prediction Center
www.cpc.ncep.noaa.gov

National Centers for Envir. Info. (NCEI)
www.ncdc.noaa.gov

USDA/NRCS National Water and Climate Center - www.wcc.nrcs.usda.gov

National Interagency Fire Center
www.nifc.gov

Western Water Assessment
wwa.colorado.edu

Climate Assessment for the Southwest
climas.arizona.edu

California Nevada Applications Program
cnap.ucsd.edu

Climate Impacts Research Consortium
pnwclimate.org/resources

NWS Western Region Forecast Offices
www.wrfo.noaa.gov/