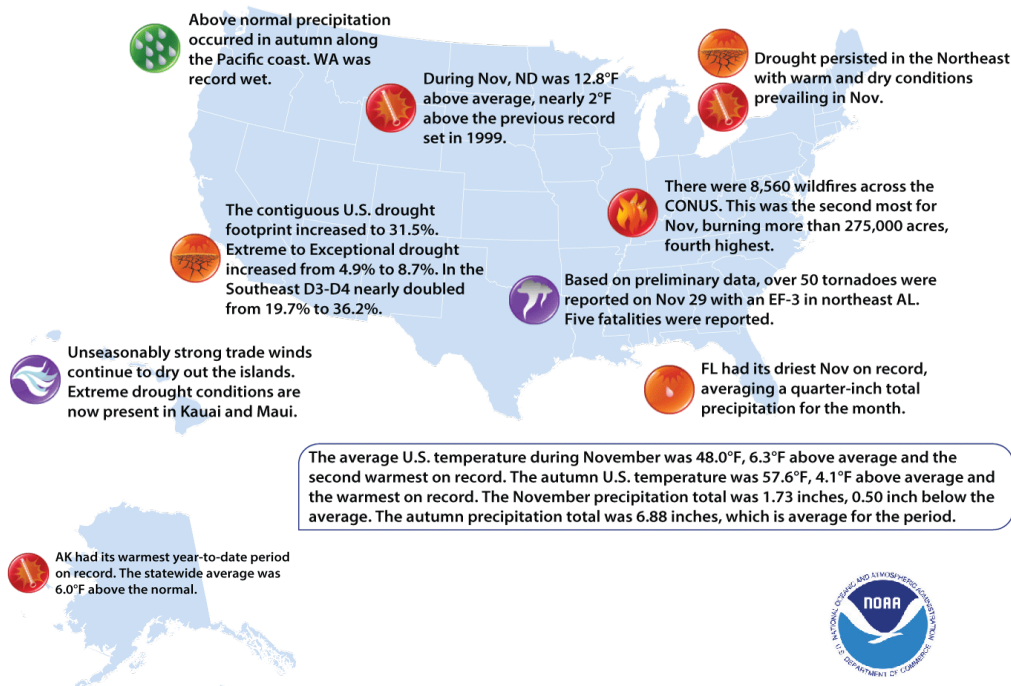


Significant Events for September - November 2016

NCEP // www.ncep.noaa.gov/sotc/national



Sept-Nov Highlights for the West

Well above normal temperatures across most of West, especially east of Sierra Nevada/Cascades

Record warm autumn for CO, NM; one of top-5 warmest for WY, UT, MT

Wetter than normal autumn across northern tier of West; WA wettest on record

Early season snowpack near normal (>75%) in northern Sierra, Cascades; below normal (<75%) throughout Rocky Mountains, southern Sierra

Large areas of drought improvement across Northwest, extreme to exceptional drought persists in S. CA

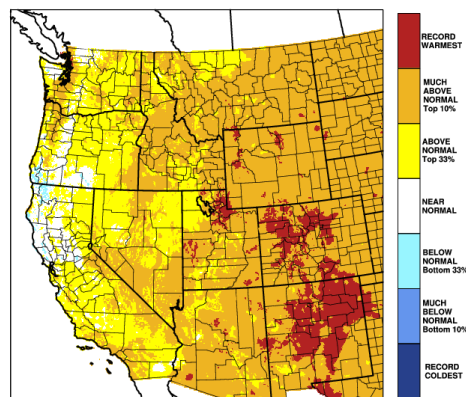
Transition from persistent above normal to below normal sea surface temperature in northeast Pacific in Nov

Weak La Niña conditions present, neutral conditions favored to develop in early 2017

Regional Overview for September - November 2016

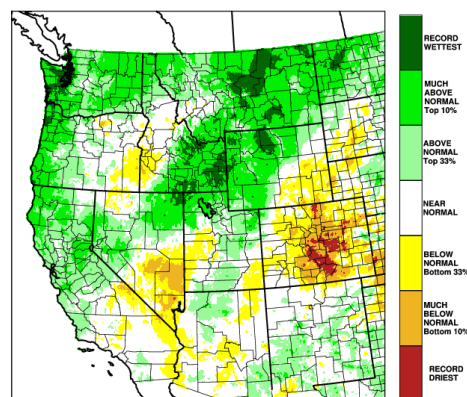
Mean Temperature Percentile

Sep-Nov 2016



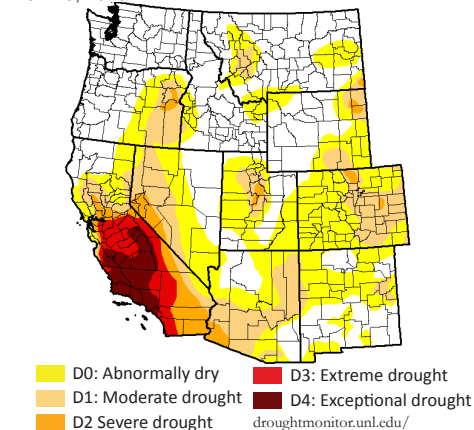
Precipitation Percentile

Sep-Nov 2016



U.S. Drought Monitor

Nov. 29, 2016



Above normal autumn temperatures were observed in most locations across the West. Sep was anomalously warm in CO and NM, and Oct was much warmer than normal across the Four Corners states. Combined with Nov temperatures slightly above normal, record autumn temperatures at several locations in this area including Salt Lake City, UT; Eagle, CO; and tied in Clayton, NM. Nov was much warmer than normal across the northern tier of the West. Storminess during Oct moderated temperatures along the northern CA and southern OR coast, keeping them near normal for the autumn period.

The autumn season began with above normal Sep precipitation across the eastern Great Basin and northern Rockies, as well as along the US-Mex border. Oct brought record-breaking precipitation to the Northwest; Spokane, WA had its all-time wettest month in Oct. Other locations such as Lewistown, MT, Stanley, ID, and Seattle, WA had their wettest Oct on record. Nov was drier than normal for much of West, though above normal precipitation was observed in large area of NM. For the season, WA, ID, and MT all saw a top-10 wettest autumn on record. In contrast, CO saw one of its bottom-10 driest autumns.

At the end of autumn, 26% of the West was experiencing moderate or worse drought, compared with 35% at the beginning of the season. Large areas of improvement were observed in the Pacific Northwest and along the ID-MT and MT-WY borders. Improvements were also made in the western Great Basin and large areas of the Southwest. In CA, 43% of the state remains in extreme to exceptional drought due to long-term ecological and hydrologic impacts as well as near to below normal autumn precipitation. CO and bordering areas saw expansion of drought and abnormally dry conditions this season.

Regional Impacts for September - November 2016

Weather

Rare tornado outbreak along Oregon Coast in Oct, over 100 structures damaged near Manzanita, OR

Two large storms impacted West Coast in Oct, related to remnants of a west Pacific typhoon and an east Pacific hurricane

Safford, AZ, experienced intense hailstorm on Oct 8/9, with stones >2 in diameter damaging homes, vehicles, vegetation

Drought, Flooding and Water Resources

Initial 2017 allocations for CA's State Water Project at 20%; this is double initial 2016 allocation

After autumn rains, conditions primed for landsliding in Pacific Northwest due to high soil moisture

Heavy precipitation Oct 16-18 produced rockfalls in CA's Yosemite Nat'l Park; temporarily closed Tioga Pass

Fire

Windstorm in Reno, NV, area Oct 14 helped ignite and spread several fires, including Little Valley Fire, which destroyed 23 homes

Recreation

Sierra Nevada ski resorts enjoyed Nov snowfall that allowed for late Nov openings, while Colorado resorts struggled to open before the Thanksgiving holiday

62 Million New Dead Trees in California in 2016

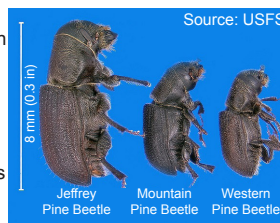
Over five years of drought has stressed trees in California's forests, making them susceptible to bark beetle attacks. Drought affects the tree's ability to generate pitch, which it uses to defend itself against beetle attacks. Healthy trees with adequate water supply are rarely killed. Since May 2016, USFS has identified 36M new dead trees, bringing 2016 total to 62M. This is more than 100% increase from 2015. The presence of the dead trees creates

significant wildfire risk as well as risk of falling trees. Removal of the trees can be costly and challenging. Confronting the massive tree die-off requires complex decisions with many factors and has raised many questions on forest management in a changing climate. CA's Tree Mortality Task Force has been removing dead trees, building partnerships and strategies, and educating on hazards and mitigation.



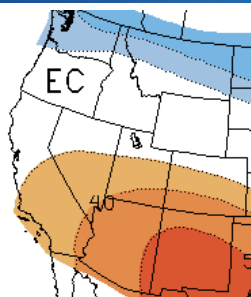
Dead trees in Fresno County, CA, Feb. 2016

There are a variety of bark beetles which favor different types of trees and parts of the tree. Beetles produce a powerful pheromone that attracts other beetles promoting "mass attacks" on a tree.



Regional Outlook for Jan-Feb-Mar 2017

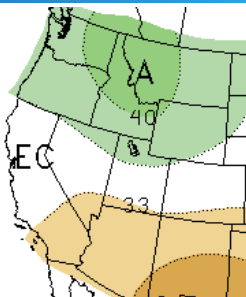
CPC // www.cpc.ncep.noaa.gov/



Jan-Feb-Mar temperature outlook produced by CPC Dec 15 2016

A indicates above normal
B indicates below normal
N indicates normal
EC means equal chances for A, N or B

Numbers indicate percent chance of temperature in warmest/coolest one-third and of precipitation in wettest/driest one-third

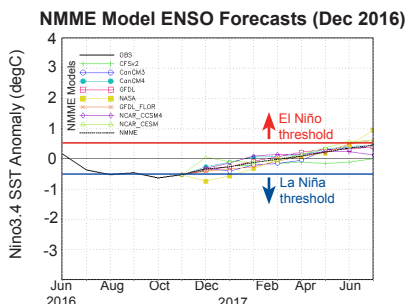


Jan-Feb-Mar precipitation outlook produced by CPC Dec 15 2016

NOAA CPC Jan-Mar Seasonal Outlook

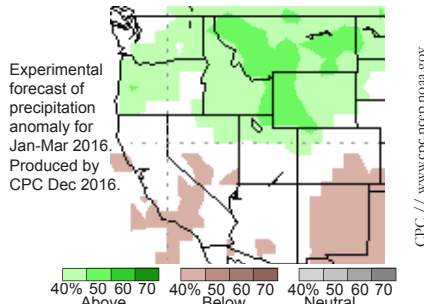
There is a 33-40+% chance of temperatures in the upper tercile (above normal) in the Southwest for Jan-Mar, with greatest likelihood in NM. There is a 33-40% chance of upper tercile (above normal) precipitation across the northern tier of the West, 33-40% chance of below normal precipitation across the Southwest, and equal chances elsewhere.

CPC // cpc.ncep.noaa.gov/products/NMME/



NMME ENSO Outlook

Models suggest weak La Niña conditions to persist through the end of 2016, with a trend toward neutral conditions in early 2017. Colored lines indicate the mean from each model ensemble, black line indicates an average among all model members.



NMME Precipitation Forecast

The National Multi-Model Ensemble combines 7 climate research models. The NMME suggests a chance of above normal precipitation across the northern tier of West and a chance of below normal precipitation in NM and portions of S. CA.

Western Region Partners

- Western Regional Climate Center
wrc.cdm.noaa.gov
- 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
- NOAA's Western Regional Collaboration Team
www.regions.noaa.gov/western/western_region_team.html
- Western Water Assessment
www.colorado.edu
- Climate Assessment for the Southwest
climas.arizona.edu
- California Nevada Applications Program
meteora.ucsd.edu/cnap
- Climate Impacts Research Consortium
pnwclimate.org/resources
- NWS River Forecast Centers
water.weather.gov/ahps/rfc/rfc.php
- NOAA Fisheries Service
www.nmfs.noaa.gov/
- NWS Western Region Forecast Offices
www.wrh.noaa.gov/
- State Climatologists - stateclimate.org