



Natural Resources Conservation Service
P.O. Box 2890
Washington, D.C. 20013

Weekly Report - Snowpack / Drought Monitor Update Date: 20 November 2009

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Snow: SNOTEL Snow-Water Equivalent percent of normal values for 20 November 2009 shows higher amounts over the Cascades and Montana Rockies and lesser amounts over the remainder of the West (Fig. 1). Although we are still pretty earlier into the snow accumulation season, the SNOTEL snow depths show high amounts across the Northern Cascades (Fig. 1a).

Temperature: SNOTEL and ACIS-day station average weekly temperature anomalies show below normal temperatures across much of the West; exception being over the northern most High Plains (Fig.2). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures was scattered across northern Montana (>+9F) and the greatest negative departures occurred over the north central Colorado (<-12F) (Fig. 2a).

Precipitation: ACIS 7-day average precipitation amounts for the period ending 19 November shows the bulk of the heaviest precipitation fell over the Northern Cascades and Washington Coast Mountains. In terms of percent of normal, much of the Washington and Colorado had the greatest amounts (Fig 3 and 3a). Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2010 Water Year that began on October 1, 2009 shows the pockets of surplus conditions across the Northern Tier States with marked deficits across Utah, Arizona, and southwest New Mexico (Fig 3c).

WESTERN DROUGHT STATUS

The West: Cold, wet weather in western portions of Washington and Oregon provided additional relief from Abnormal Dryness. Meanwhile, additional reassessment of the situation in Montana from experts in the field resulted in some modifications to the current drought depiction: D0 was removed from western portions of the state, while a small area of D0 was added along the U.S.-Canadian border. Farther south, negative Standardized Precipitation Indices on multiple timescales in southeastern Nevada led to an expansion to D1. The remainder of the West was unchanged from last week. Author: Eric Luebehusen, United States Department of Agriculture.

A comprehensive narrative describing drought conditions for the nation can be found at the end of this document.

DROUGHT IMPACTS DEFINITIONS (<http://drought.unl.edu/dm/classify.htm>)

The possible impacts associated with **D4 (H, A)** drought include widespread crop/pasture losses and shortages of water in reservoirs, streams, and wells creating water emergencies. The possible impacts associated with **D3 (H, A)** drought include major crop/pasture losses and widespread water shortages or restrictions. Possible impacts from **D2 (H, A)** drought are focused on water shortages common and water restrictions imposed and crop or pasture losses likely. The possible impacts associated with **D1 (H, A)** drought are focused

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on water shortages developing in streams, reservoirs, or wells, and some damage to crops and pastures (Figs. 4, 4a, and 4b).

SOIL MOISTURE

Soil moisture (Figs. 5a and 5b), is simulated by the [VIC macroscale hydrologic model](#). The detailed, physically-based VIC model is driven by observed daily precipitation and temperature maxima and minima from approximately 2130 stations, selected for reporting reliably in real-time and for having records of longer than 45 years (and various other criteria). Another good resource can be found at: <http://www.emc.ncep.noaa.gov/mmb/nldas/drought/>.

OBSERVED FIRE DANGER CLASS

The [adjective class rating](#) is a method of normalizing rating classes across different fuel models, indexes, and station locations. It is based on the primary fuel model cataloged for the station, the fire danger index selected to reflect staffing levels, and climatological class breakpoints. This information is provided by local station managers. About 90% use the Burning Index (BI); others use Energy Release Component (ERC). Staffing class breakpoints are set by local managers from historical fire weather climatology (Figs. 6).

U.S. HISTORICAL STREAMFLOW

http://water.usgs.gov/cgi-bin/waterwatch?state=us&map_type=dryw&web_type=map.

This map, (Fig. 7) shows the 7-day average streamflow conditions in hydrologic units of the United States and Puerto Rico for the day of year. The colors represent 7-day average streamflow percentiles based on historical streamflow for the day of the year. Thus, the map shows conditions adjusted for this time of the year. Only stations having at least 30 years of record are used. Sub-regions shaded gray indicate that insufficient data were available to compute a reliable 7-day average streamflow value. During winter months, this situation frequently arises due to ice effects. The data used to produce this map are provisional and have not been reviewed or edited. They may be subject to significant change.

STATE ACTIVITIES

State government drought activities can be tracked at the following URL: <http://drought.unl.edu/mitigate/mitigate.htm>. NRCS SS/WSF State Office personnel are participating in state drought committee meetings and providing the committees and media with appropriate SS/WSF information - <http://www.wcc.nrcs.usda.gov/cgibin/bor.pl>. Additional information describing the products available from the Drought Monitor can be found at the following URL: <http://drought.unl.edu/dm/> and <http://drought.gov>.

FOR MORE INFORMATION

The National Water and Climate Center Homepage provide the latest available snowpack and water supply information. Please visit us at <http://www.wcc.nrcs.usda.gov>. This document is available from the following location on the NWCC homepage - <http://www.wcc.nrcs.usda.gov/water/drought/wdr.pl>

This report uses data and products provided by the Interagency Drought Monitor Consortium members and the National Interagency Fire Center.

/s/ NOLLER HERBERT
Director, Conservation Engineering Division

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SNOTEL Current Snow Water Equivalent (SWE) Percent of Normal
Nov 20, 2009

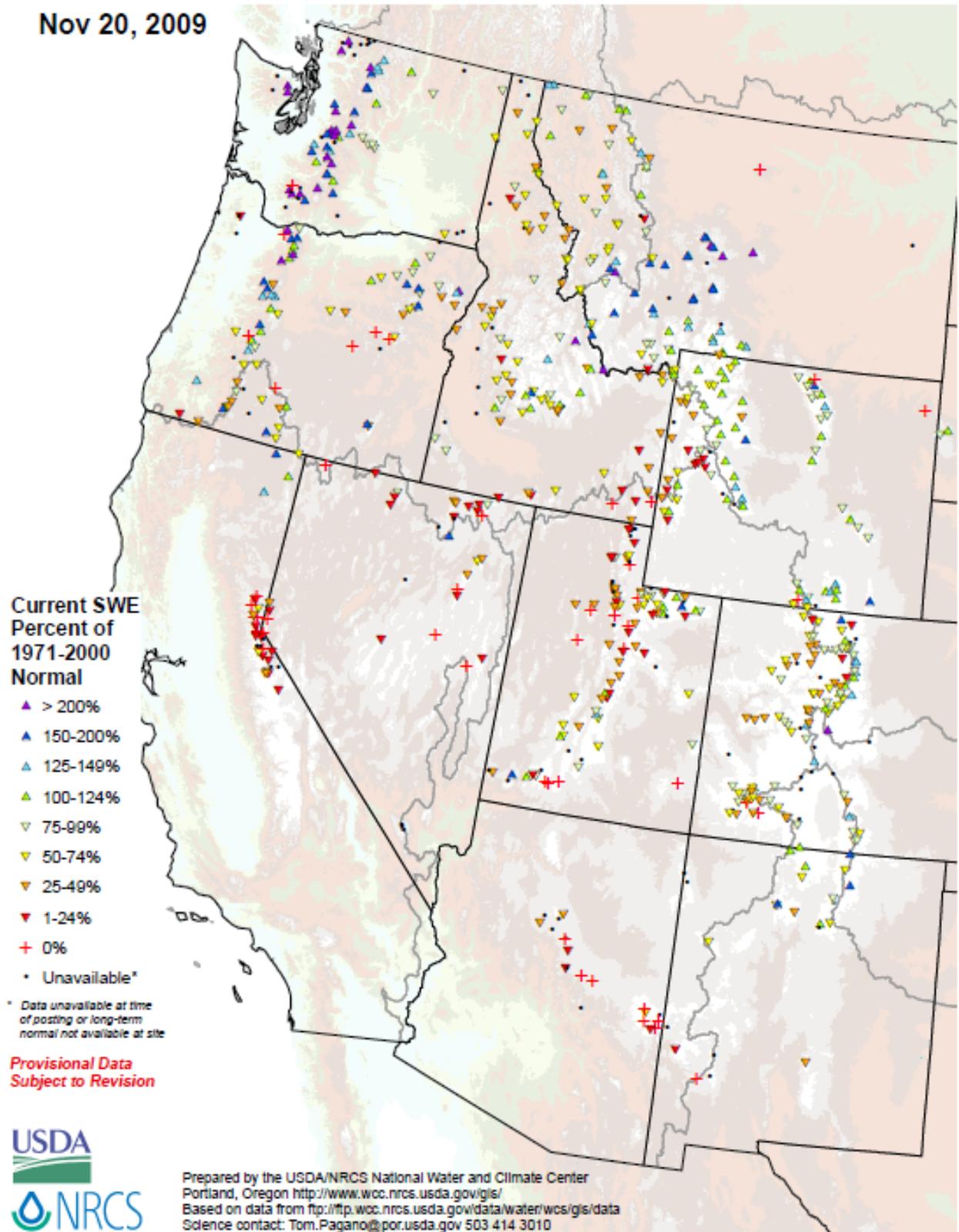


Fig 1. SNOTEL Snow-Water Equivalent percent of normal values for 20 November 2009 shows higher amounts over the Cascades and Montana Rockies and lesser amounts over the remainder of the West.

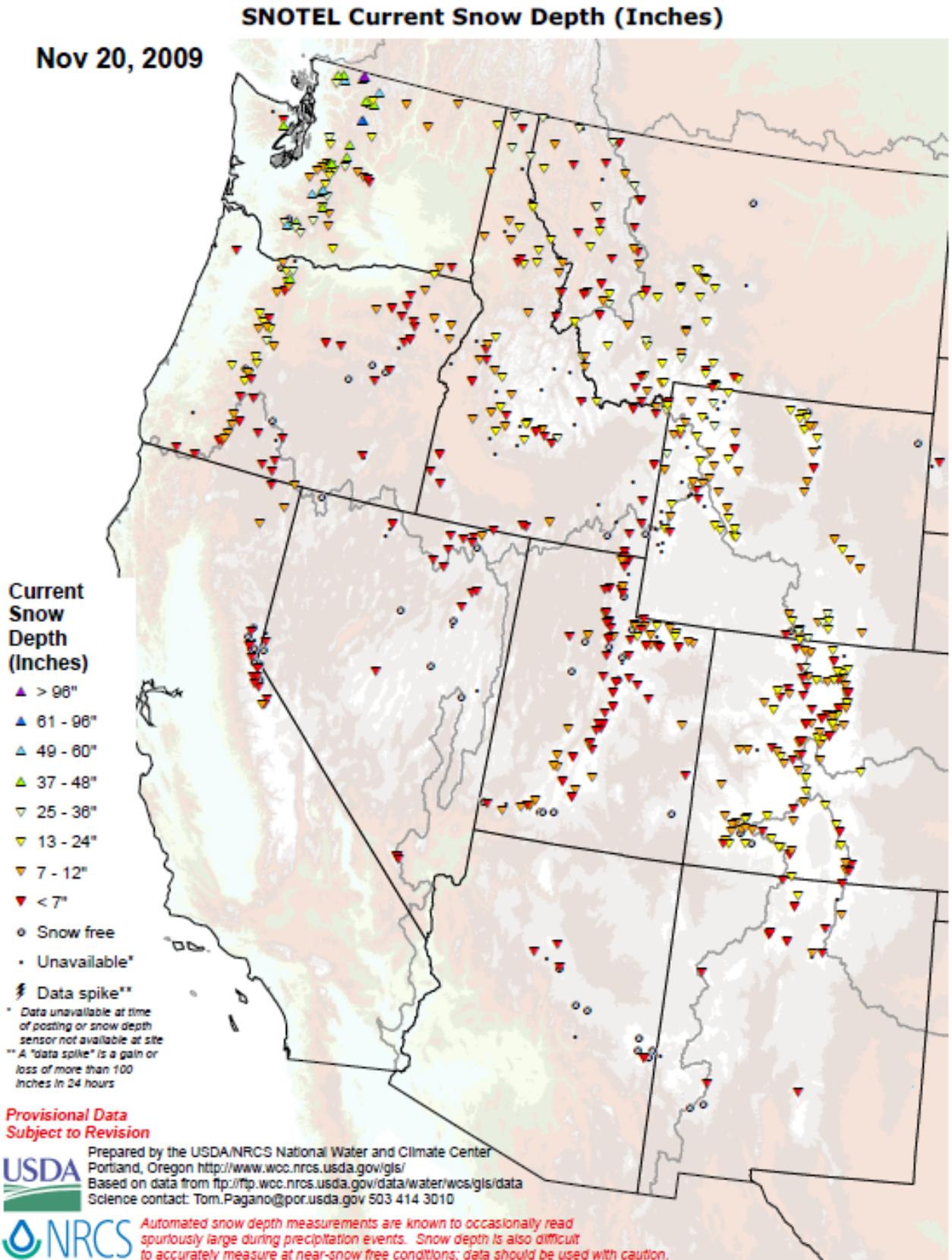


Fig 1a. SNOTEL snow depths as of today show low snowpack across much of the West. We are still pretty earlier into the snow accumulation season.

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SNOTEL (solid) and ACIS (dot-filled) Networks 7-Day Average Temperature Anomaly (Degrees F)

Nov 20, 2009

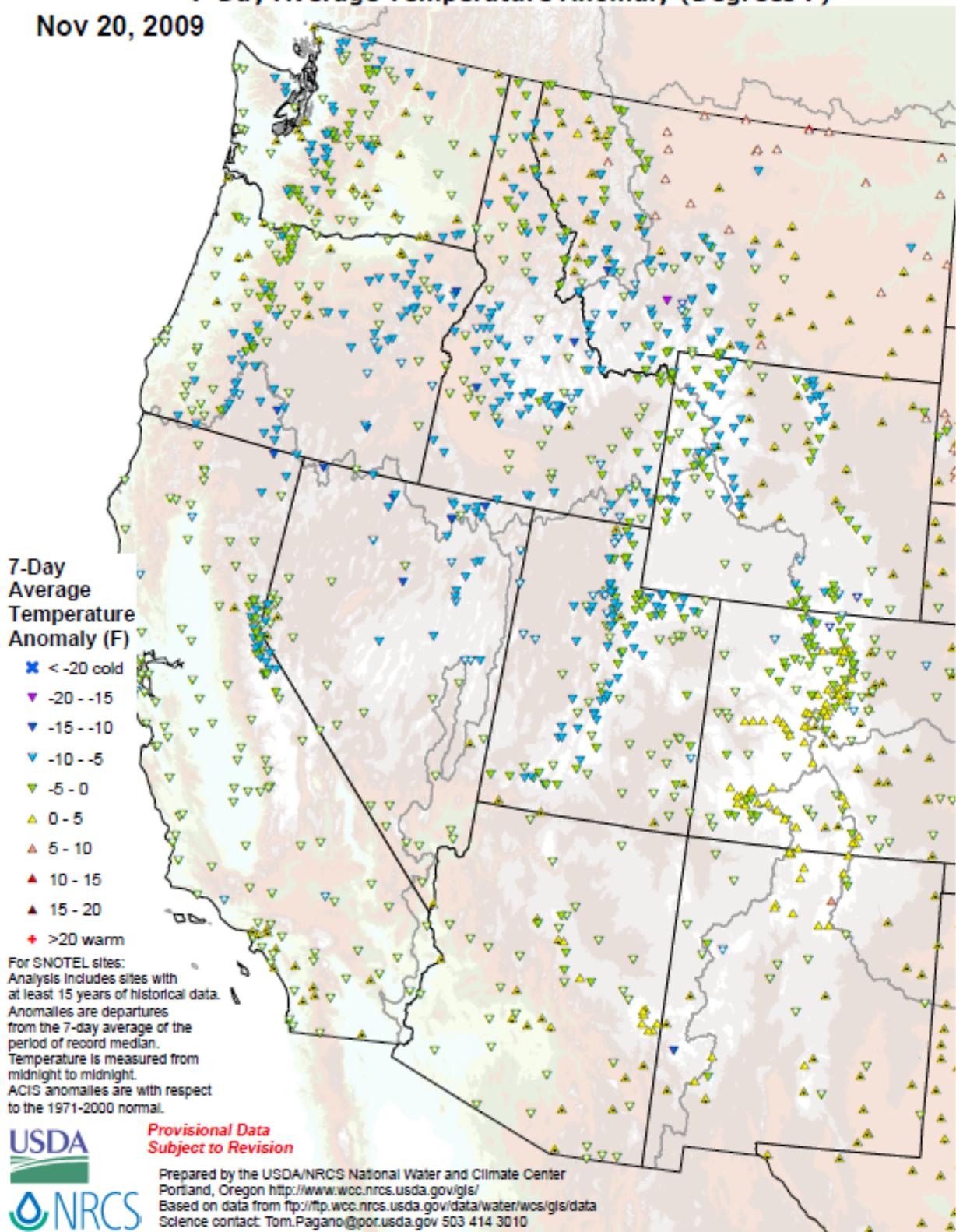
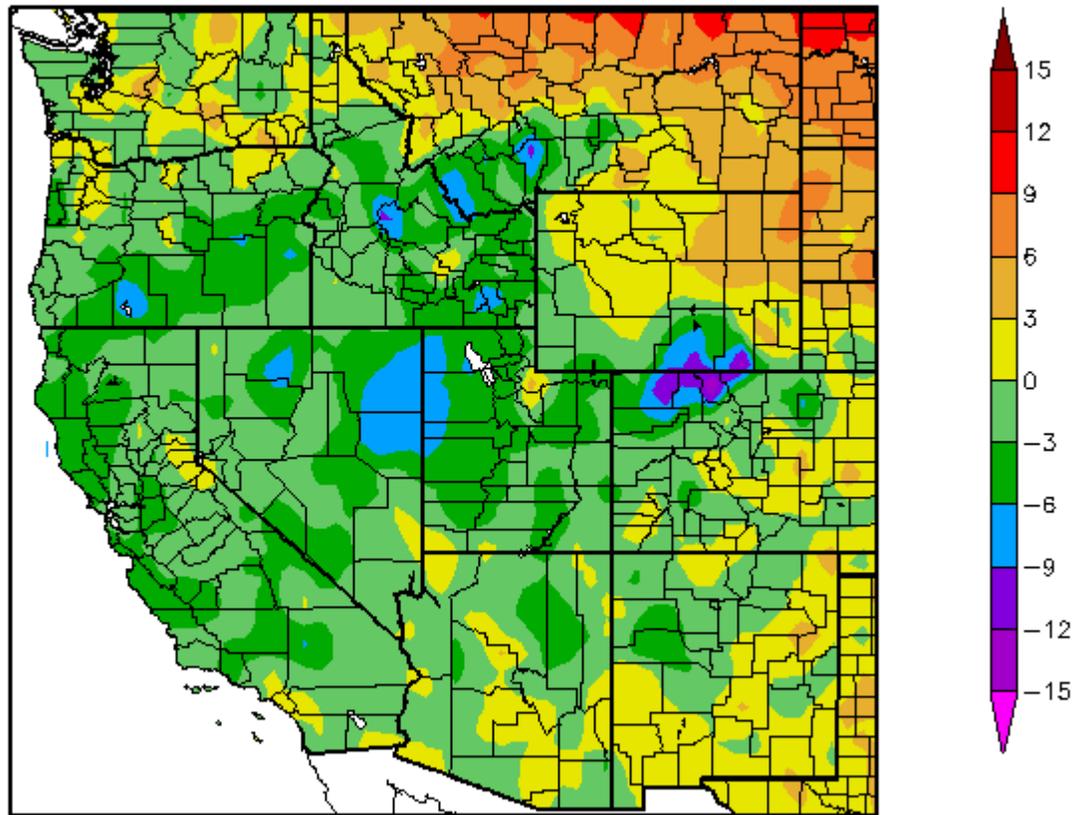


Fig. 2. SNOTEL and ACIS-day station average weekly temperature anomalies show below normal temperatures across much of the West; exception being over northern Montana. Ref: <ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/WestwideTavg7dAnomalyAcis.pdf>

Departure from Normal Temperature (F)
11/13/2009 – 11/19/2009



Generated 11/20/2009 at HPRCC using provisional data.

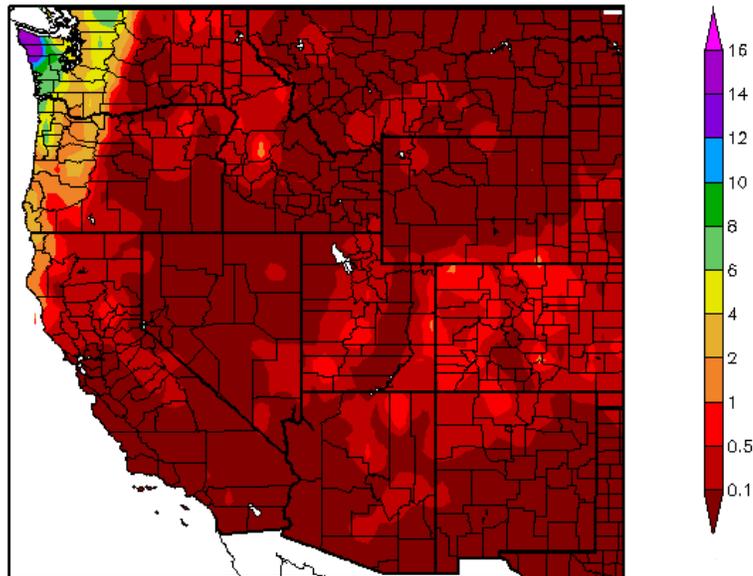
NOAA Regional Climate Centers

Fig. 2a. ACIS 7-day average temperature anomalies show that the greatest positive temperature departures was scattered across northern Montana (>+9F) and the greatest negative departures occurred over the north central Colorado (<-12F).

Ref: http://www.hprcc.unl.edu/maps/current/index.php?action=update_product&product=TDept

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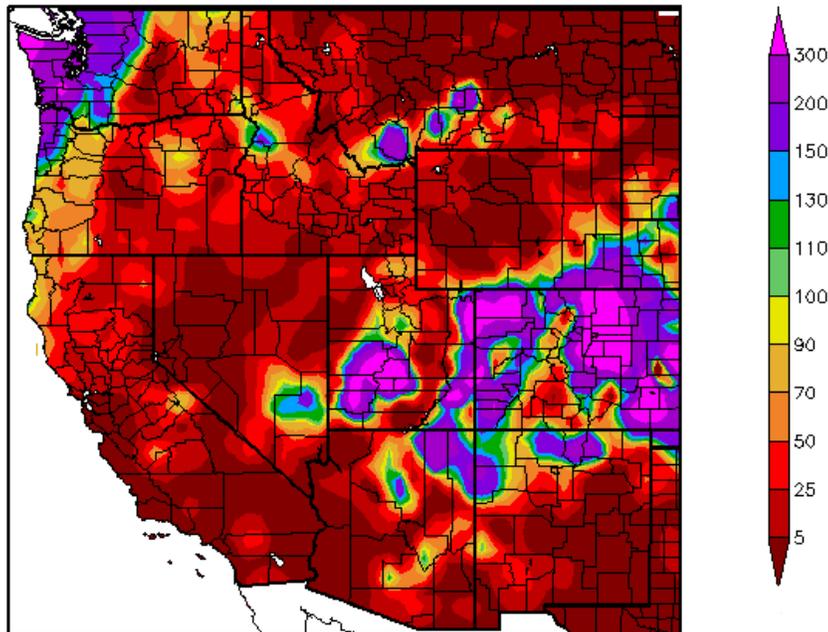
Precipitation (in)
11/13/2009 - 11/19/2009



Generated 11/20/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
11/13/2009 - 11/19/2009



Generated 11/20/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Fig. 3. and 3a. ACIS 7-day average precipitation amounts for the period ending 19 November shows the bulk of the heaviest precipitation fell over the Northern Cascades and Washington Coast Mountains. In terms of percent of normal, much of the Washington and Colorado had the greatest amounts. Ref: <http://www.hprcc.unl.edu/maps/current/>.

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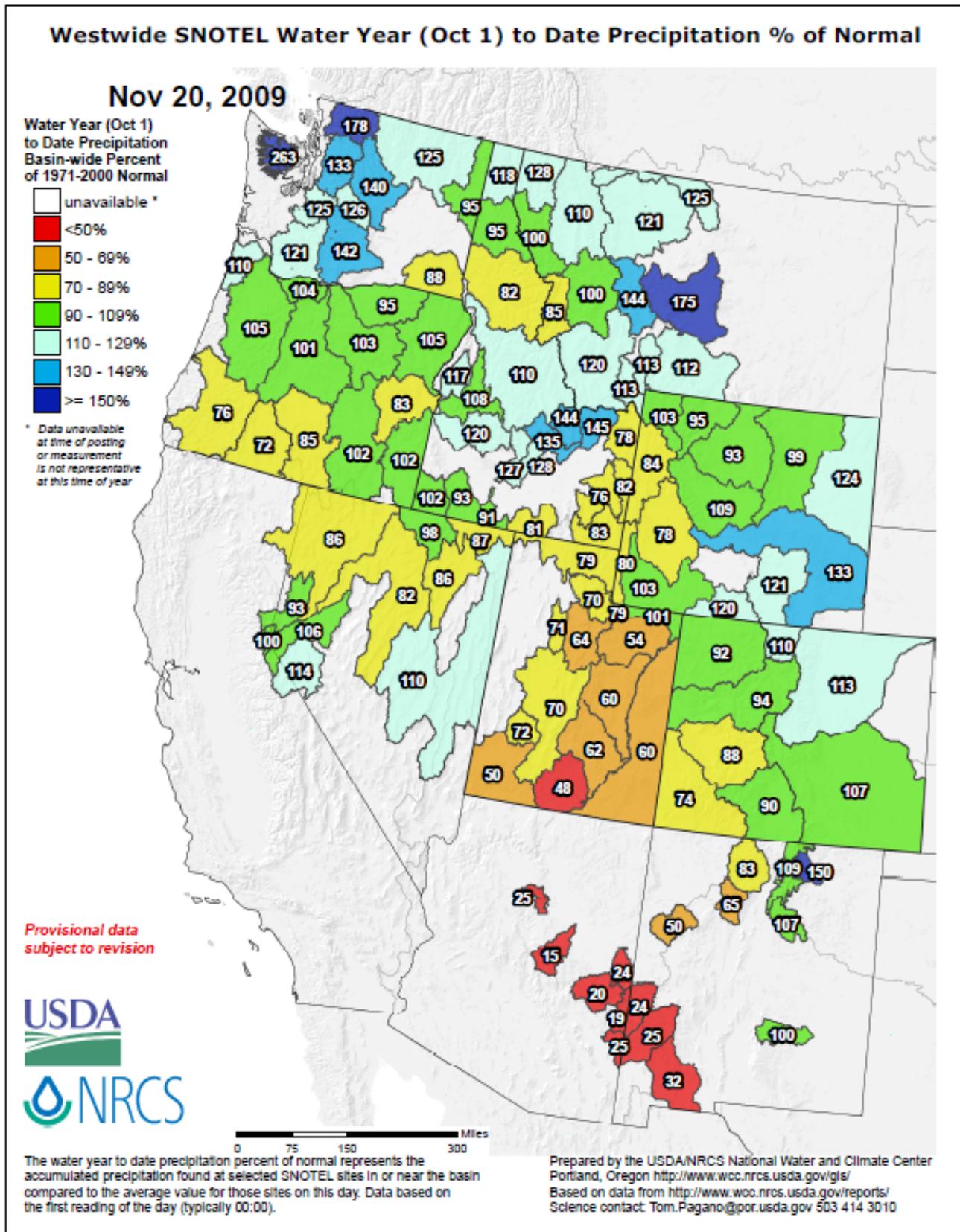


Fig 3b. Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2010 Water Year that began on October 1, 2009 shows the pockets of surplus conditions across the Northern Tier States with marked deficits across Utah, Arizona, and southwest New Mexico. Ref: http://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west_wytdprecptnormal_update.pdf

U.S. Drought Monitor

November 17, 2009
Valid 7 a.m. EST

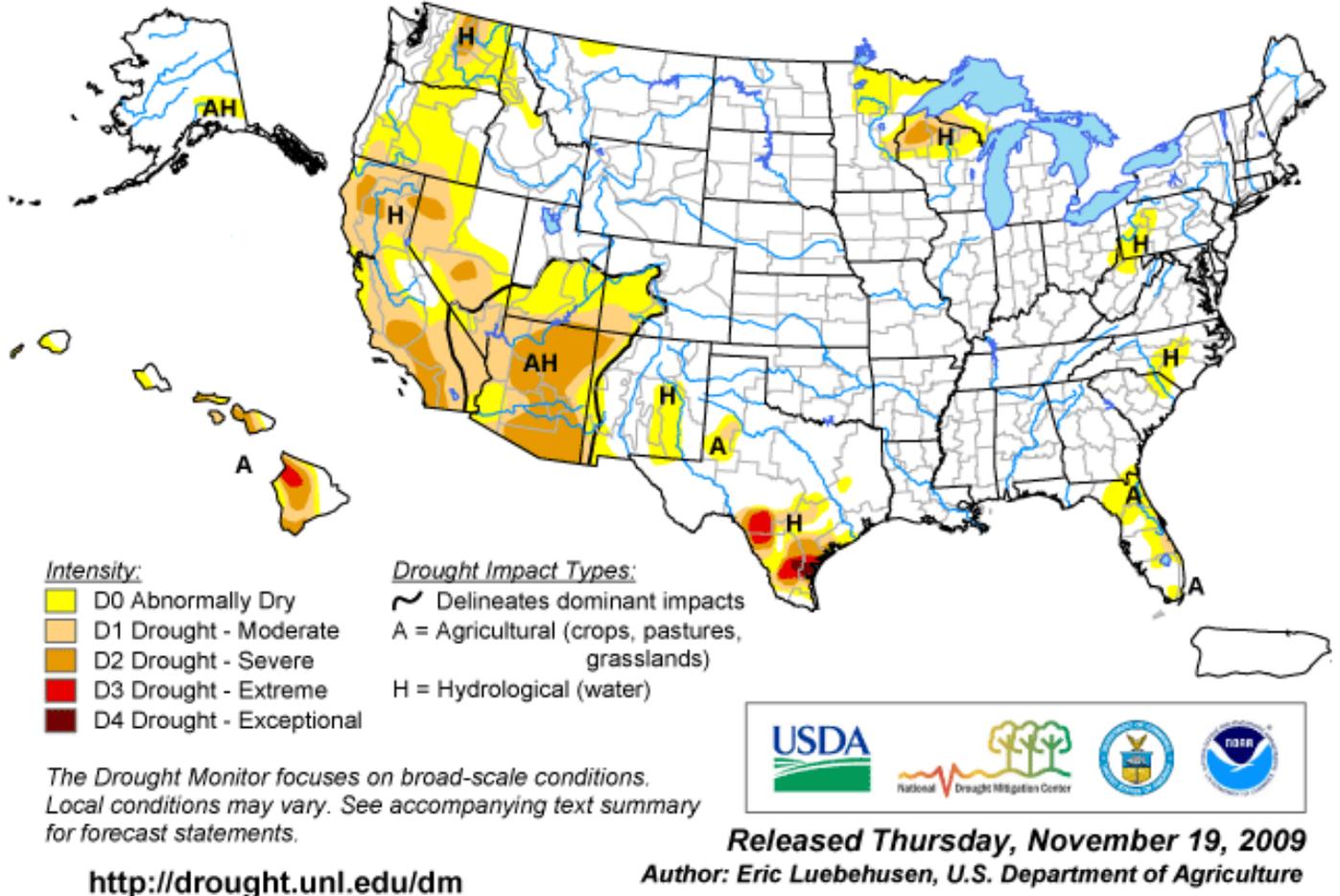


Fig. 4. Current Drought Monitor weekly summary.

Ref: National Drought Mitigation Center (NDMC) - <http://www.drought.unl.edu/dm/monitor.html>

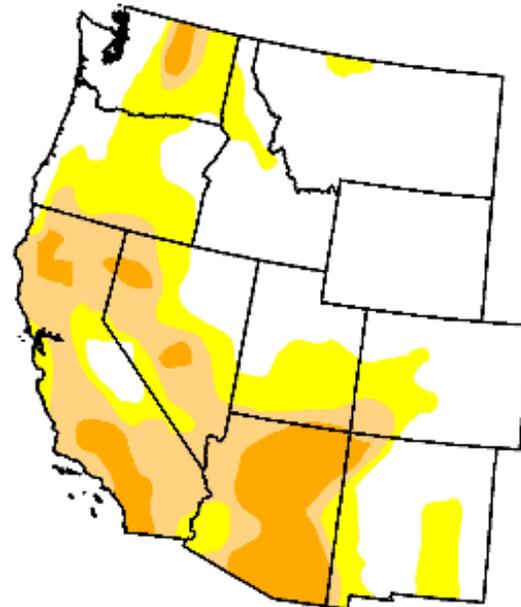
U.S. Drought Monitor

West

November 17, 2009
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	52.0	48.0	27.1	9.9	0.0	0.0
Last Week (11/10/2009 map)	50.6	49.4	26.0	9.0	0.0	0.0
3 Months Ago (08/25/2009 map)	54.9	45.1	22.1	7.6	0.0	0.0
Start of Calendar Year (01/06/2009 map)	37.4	62.6	28.9	8.8	0.4	0.0
Start of Water Year (10/06/2009 map)	42.1	57.9	25.4	8.5	0.0	0.0
One Year Ago (11/18/2008 map)	36.0	64.0	29.3	8.6	0.0	0.0



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

<http://drought.unl.edu/dm>



Released Thursday, November 19, 2009
Author: Eric Luebehusen, U.S. Department of Agriculture

Fig. 4a. Drought Monitor for the Western States with statistics over various time periods. Regionally, there was little change during the past week.

Ref: http://www.drought.unl.edu/dm/DM_west.htm

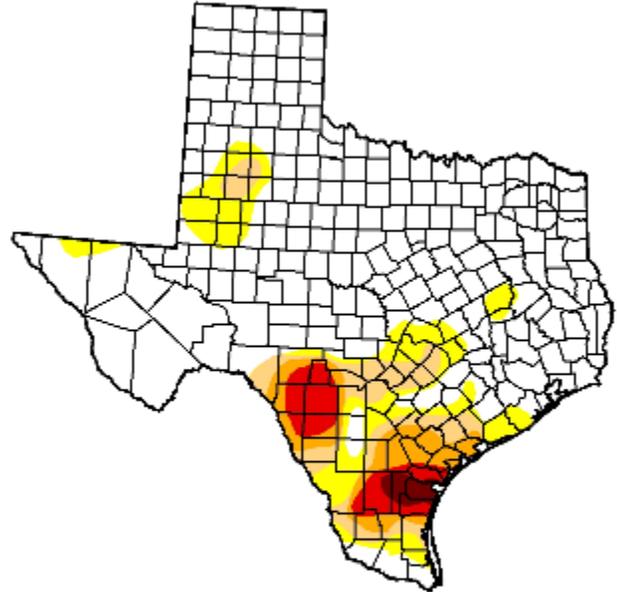
U.S. Drought Monitor

Texas

November 17, 2009
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	75.2	24.8	14.7	8.7	4.3	0.9
Last Week (11/10/2009 map)	75.2	24.8	14.7	8.7	4.3	0.9
3 Months Ago (08/25/2009 map)	47.6	52.4	35.7	28.8	26.5	18.8
Start of Calendar Year (01/06/2009 map)	41.7	58.3	24.5	15.0	9.1	4.2
Start of Water Year (10/06/2009 map)	66.1	33.9	22.4	14.5	6.8	1.5
One Year Ago (11/18/2008 map)	59.5	40.5	22.0	14.0	6.2	0.0



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
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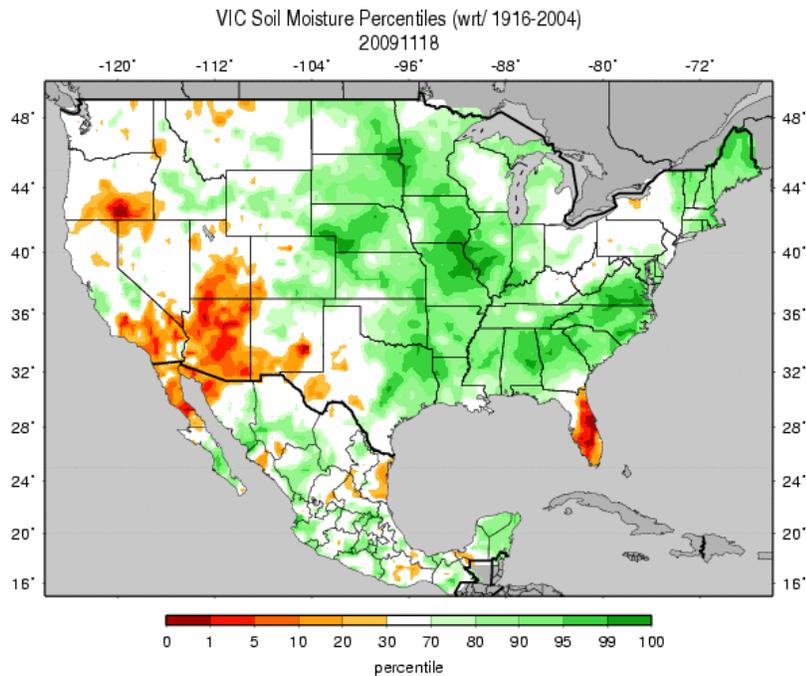
<http://drought.unl.edu/dm>



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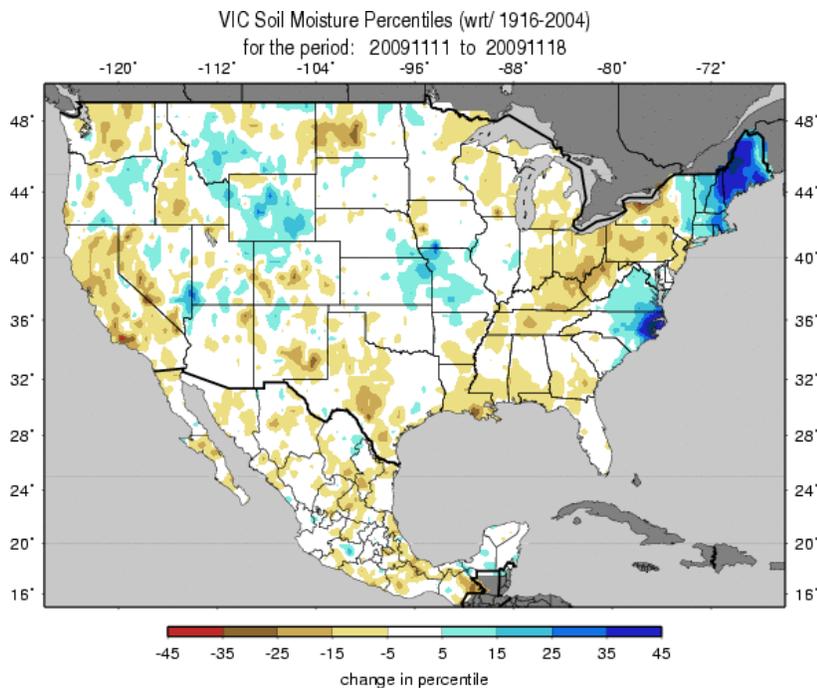
Fig. 4b: Texas is the only state with D4 drought condition in the US, although less than one percent of the total area of the state. No significant category improvements occurred this week.
Ref: http://www.drought.unl.edu/dm/DM_state.htm?TX,S

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Figs. 5a: Soil Moisture ranking in percentile based on 1916-2004 climatology as of 18 November. Southern California, Arizona-Utah, southern Oregon, and Florida continue to be the driest states this week.

Ref: http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_gnt.gif



Figs. 5b: Soil Moisture change in percentile based on 1916-2004 climatology for this past week. Maine and eastern North Carolina experienced the greatest moistening.

http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_gnt.1wk.gif

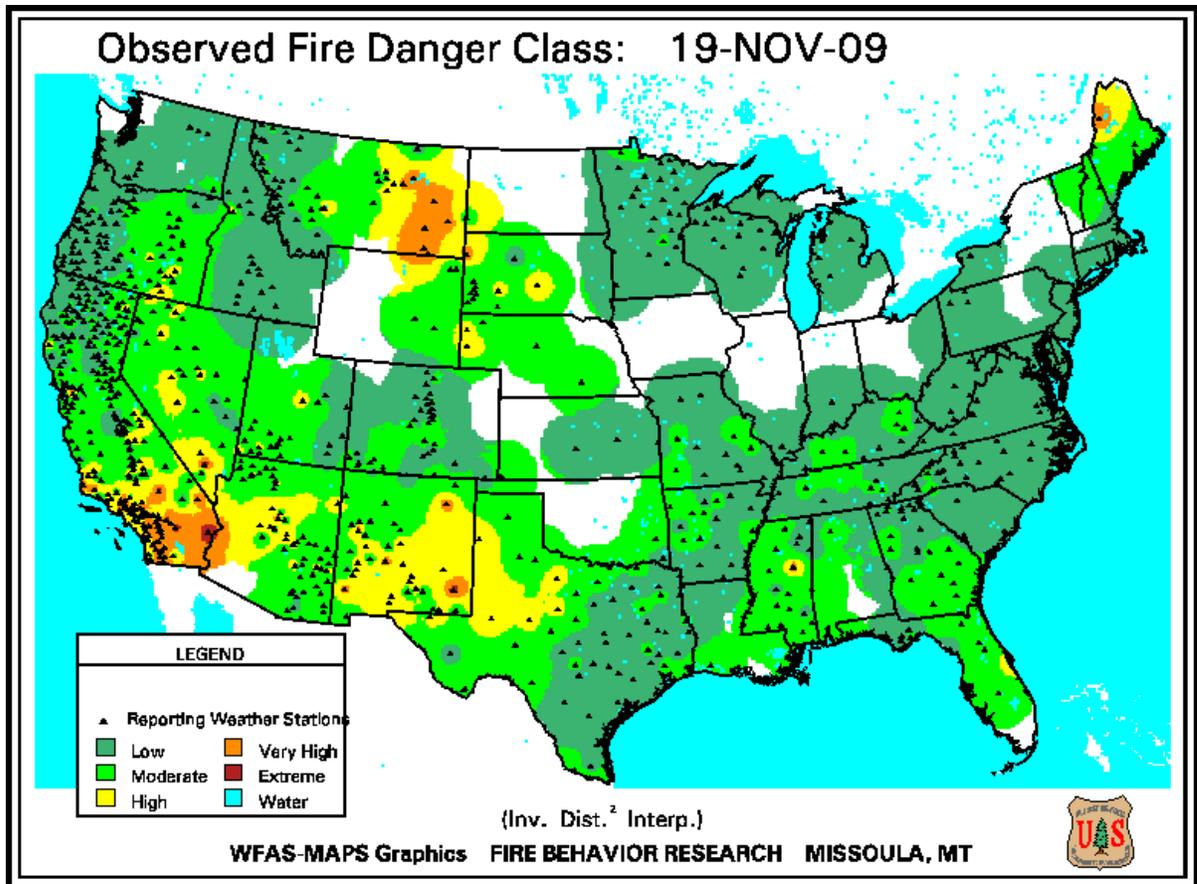
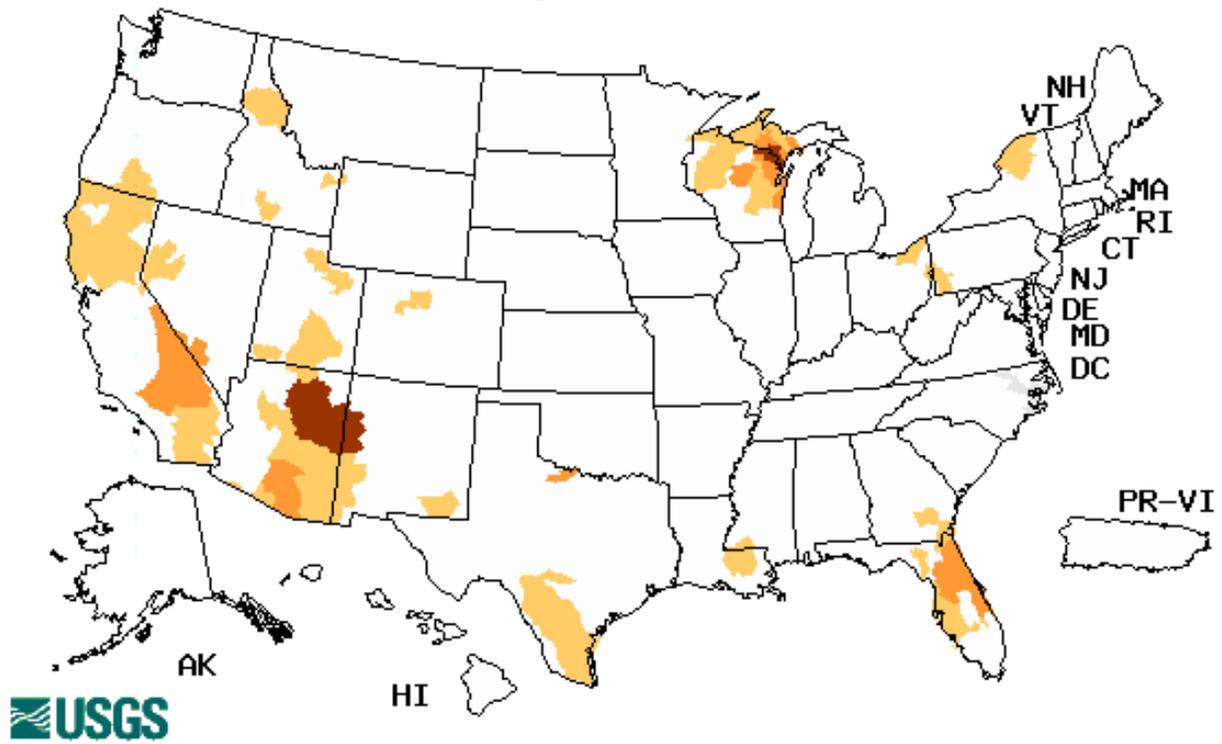


Fig. 6. Observed Fire Danger Class. Conditions have deteriorated across southern California this week.

Ref: http://www.wfas.net/images/firedanger/fd_class.gif

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Explanation - Percentile classes				
Low	≤5	6-9	10-24	Insufficient data for a hydrologic region
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal	

Fig. 7. Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Conditions are severe over Arizona and northeastern Wisconsin.

Ref: <http://water.usgs.gov/waterwatch/?m=dryw&w=map&r=us>

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National Drought Summary -- November 17, 2009

The discussion in the Looking Ahead section is simply a description of what the official national guidance from the National Weather Service (NWS) National Centers for Environmental Prediction is depicting for current areas of dryness and drought. The NWS forecast products utilized include the HPC 5-day QPF and 5-day Mean Temperature progs, the 6-10 Day Outlooks of Temperature and Precipitation Probability, and the 8-14 Day Outlooks of Temperature and Precipitation Probability, valid as of late Wednesday afternoon of the USDM release week. The NWS forecast web page used for this section is: <http://www.cpc.ncep.noaa.gov/products/forecasts/>.

The Northeast: Dry conditions across interior portions of the region contrasted with periods of heavy rain in southern and eastern locales. Rain bypassed western Pennsylvania's D0 (Abnormal Dryness), where 7-day average streamflows and soil moisture levels remained below the 30th percentile. In addition, areas downwind of the Great Lakes have been drier than normal over the past 90 days, and will need to be monitored for a continuation of drier-than-normal weather.

The Mid-Atlantic and Southeast: The remnants of Hurricane Ida coupled with a slow-moving upper-air low triggered widespread heavy rain (3 inches or more) from southern portions of Maryland and Delaware into central Georgia. Rainfall totals exceeded 6 inches in southern and eastern Virginia as well as northern and eastern sections of North Carolina. Despite causing widespread coastal flooding, the storm provided much-needed drought relief to the Carolinas. Consequently, Severe (D2) and Moderate (D1) Drought were removed, while the coverage of the Abnormally Dry (D0) region was reduced and impacts changed to Hydrological (long-term). Underlying concerns regarding groundwater tables and long-term precipitation deficits (180- and 365-days) remain, especially from northeast South Carolina into central North Carolina. Rain stayed north of Florida, where increasing short-term rainfall deficits are beginning to impact vegetation. D0 was expanded northward in far southern Florida, while a small area of Moderate Drought (D1) was introduced along the east-central Coast.

The Delta: Dry weather was welcomed in the Delta, where the story has not been drought, but flooding and fieldwork delays. 90-day rainfall surpluses are greater than 12 inches over much of the region, and exceed 2 feet over the past 365 days in northern portions of the Delta. Short-term (30-day) deficits of 2 inches or more were noted near the mouth of the Mississippi River, and this area will be monitored over the upcoming weeks for developing dryness.

The Plains: Mostly dry, warmer-than-normal weather prevailed on the Great Plains during the past week, although a small area of rain and snow (0.50 inch or more liquid equivalent) was observed in Kansas and Colorado. No changes were made to drought designations in Texas, but western portions of the state are being monitored for possible expansion of D0 and D1. Short-term dryness (30 and 90-day) is most pronounced from the western Rio Grande northeastward into north-central Texas.

Upper Midwest: Rain and snow showers eased northeastern portions of Minnesota further out of drought, with D1 (Moderate Drought) eliminated from the state. More than an inch of rain along the western shores of Lake Superior helped reduce the coverage of D0 in eastern Minnesota. In contrast, Moderate to Severe Drought areas of northwestern Wisconsin received little if any precipitation. Temperatures for the week averaged more than 10 degrees F above normal from the eastern Dakotas into northern Wisconsin.

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The West: Cold, wet weather in western portions of Washington and Oregon provided additional relief from Abnormal Dryness. Meanwhile, additional reassessment of the situation in Montana from experts in the field resulted in some modifications to the current drought depiction: D0 was removed from western portions of the state, while a small area of D0 was added along the U.S.-Canadian border. Farther south, negative Standardized Precipitation Indices on multiple timescales in southeastern Nevada led to an expansion to D1. The remainder of the West was unchanged from last week.

Hawaii, Alaska and Puerto Rico: While locally heavy rain was reported during the past week in Hawaii, much of the rain missed the primary drought areas. However, some improvement was noted from locally beneficial showers in southern portions of the Big Island as well as the eastern third of Molokai. Windy, cold, unsettled conditions were observed in Alaska, although the heaviest precipitation fell south of the current D0 area. In Puerto Rico, moderate to heavy rain (1-4 inches, locally more) recharged streamflows and alleviated Abnormal Dryness that had developed over the eastern half of the island.

Looking Ahead: A slow-moving upper-air low will generate rain across the Ohio River Valley, while showers accompany a trailing cold front in the Mid-Atlantic and Northeast. Farther south, a developing storm in the Gulf of Mexico will track northeastward, producing moderate to heavy rain from southern Texas into the Southeast. Mostly warm, dry weather is anticipated across the Great Plains and Upper Midwest, although a few showers may develop in the central and northern Corn Belt early next week. Out west, dry, warm conditions across the Southwest and southern Rockies will contrast with stormy weather in northern California and the Northwest.

The CPC 6-10 day forecast (November 24–28) calls for below-normal temperatures across the Southeast, with above-normal temperatures expected in New England and from the Pacific Coast into the northern Plains. Above-normal precipitation is anticipated across the eastern third of the nation, while drier-than-normal conditions are likely west of the Mississippi; the greatest likelihood of below-normal precipitation will be over central and northern portions of the Rockies and High Plains.

Author: [Eric Luebehusen, United States Department of Agriculture](#)

Dryness Categories

D0 ... Abnormally Dry ... used for areas showing dryness but not yet in drought, or for areas recovering from drought.

Drought Intensity Categories

D1 ... Moderate Drought

D2 ... Severe Drought

D3 ... Extreme Drought

D4 ... Exceptional Drought

Drought or Dryness Types

A ... Agricultural

H ... Hydrological

Updated November 18, 2009