



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

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**Weekly Report - Snowpack / Drought Monitor Update Date: 10 December 2009**

## **SNOTEL SNOWPACK AND PRECIPITATION SUMMARY**

**Snow:** SNOTEL Snow-Water Equivalent percent of normal values for 10 December 2009 shows amounts have increased significantly over the Arizona and New Mexico but have fallen significantly over the Cascades during the past week (Fig. 1). As would be expected, SNOTEL snow depths change over the past week shows a marked increase from the Sierras to the 4-Corner States as a major winter storm moved across the area (Fig. 1a).

**Temperature:** SNOTEL and ACIS-day station average weekly temperature anomalies show the impact of the first large Arctic Outbreak to hit the West this Water-Year (Fig.2). At the height of this week's cold wave (9-10 December), nearly all northern SNOTEL sites set new record minimum temperatures while several stations in the southern half of the West experienced near record low temperatures (Fig. 2a). ACIS 7-day average temperature anomalies show that the greatest positive temperature departure was an isolated region over the southern Central Valley in California (>+1F) and the greatest negative departure occurred over western Montana (<-25F) (Fig. 2b).

**Precipitation:** ACIS 7-day average precipitation amounts for the period ending 9 December shows the bulk of the heaviest precipitation fell over Arizona (Fig. 3). In terms of percent of normal, much of southern half of the West and Northern Rockies experienced exceptionally high weekly percentages (Fig. 3a). Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2010 Water Year that began on October 1, 2009 shows a vast improvement over the 4-Corner States and worsening conditions over the Great Basin during the week (Fig. 3b).

## **WESTERN DROUGHT STATUS**

The West: Precipitation fell from coastal California into Nevada, mostly covering the central part of the state. Nine plus inches of snow fell near Reno, NV and 10-30 inches in the Sierras was reported. The snow varied in water content with reports from 10:1 to 30:1. This precipitation missed the areas of severe drought (D2) in northern California. There was no change in drought status there this week.

Areas of abnormal dryness (D0) were extended in northern Wyoming and western Montana and eastern Idaho. Longer-term deficits and generally low snowpack for this time of year contributed to the conditions. Author: Michael Brewer, National Climatic Data Center, NOAA

***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

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

### 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/>.

### U.S. HISTORICAL STREAMFLOW

[http://water.usgs.gov/cgi-bin/waterwatch?state=us&map\\_type=dryw&web\\_type=map](http://water.usgs.gov/cgi-bin/waterwatch?state=us&map_type=dryw&web_type=map).

This map, (Fig. 6) 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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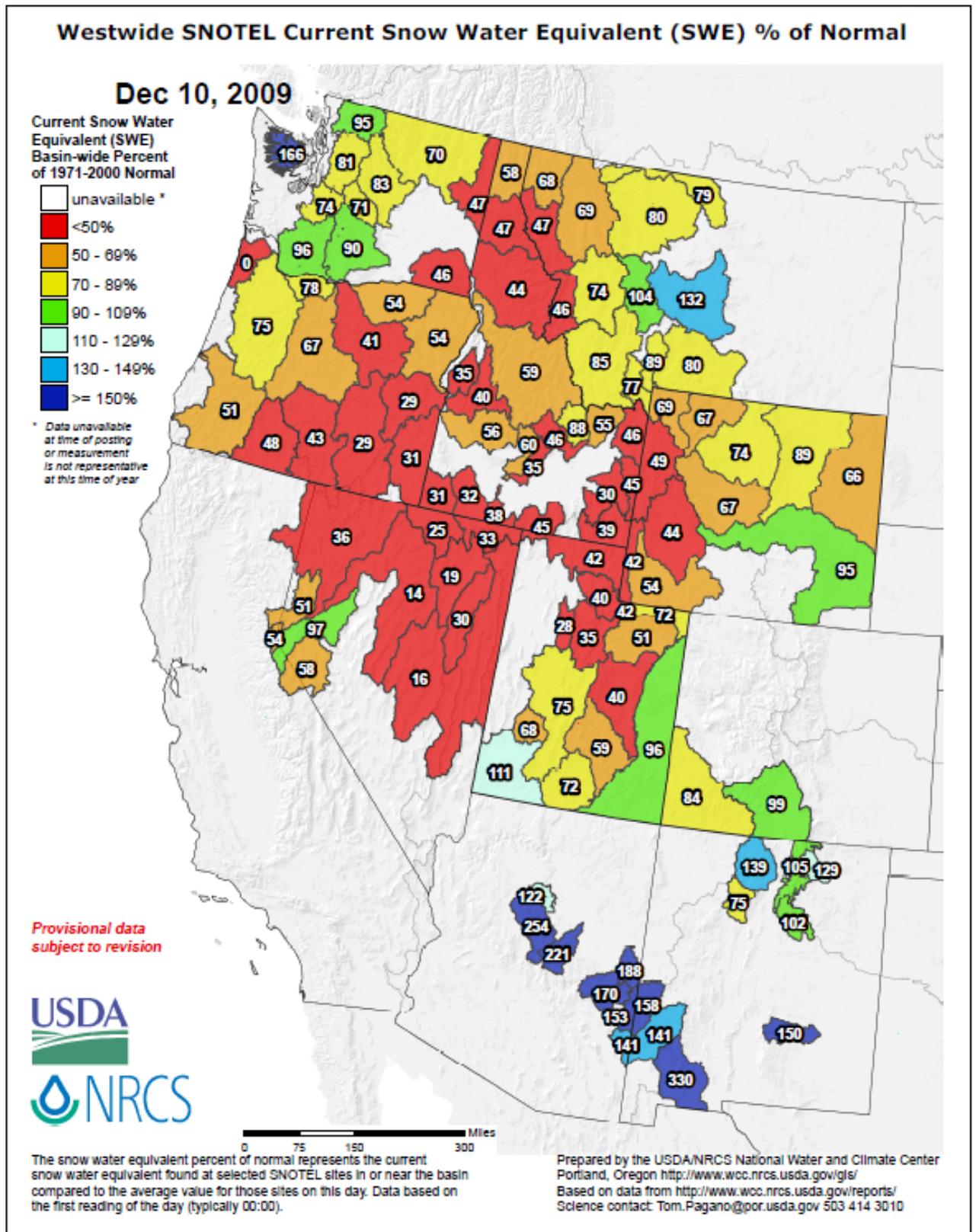
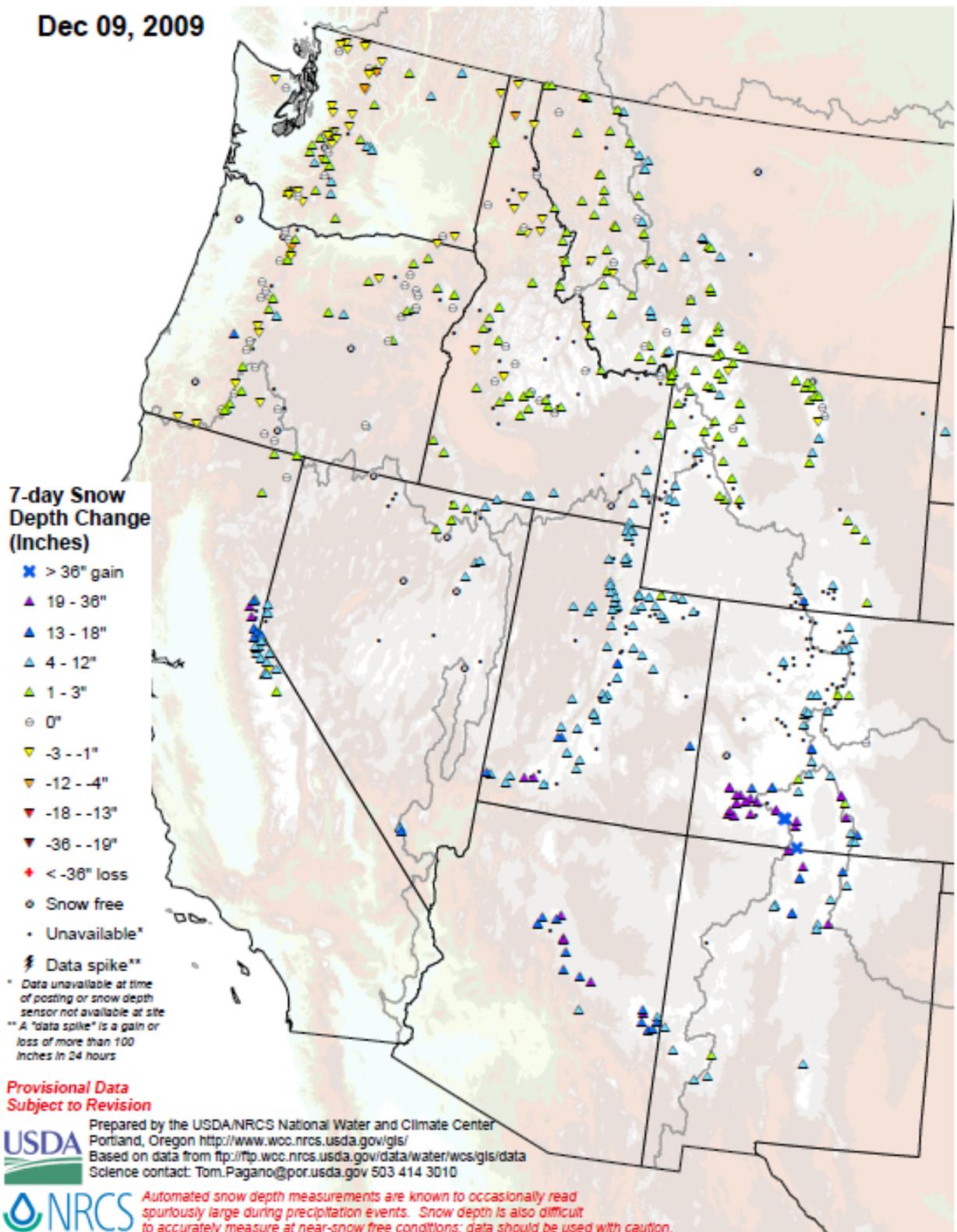


Fig 1. SNOTEL Snow-Water Equivalent percent of normal values for 10 December 2009 shows amounts have increased significantly over the Arizona and New Mexico but have fallen significantly over the Cascades during the past week.

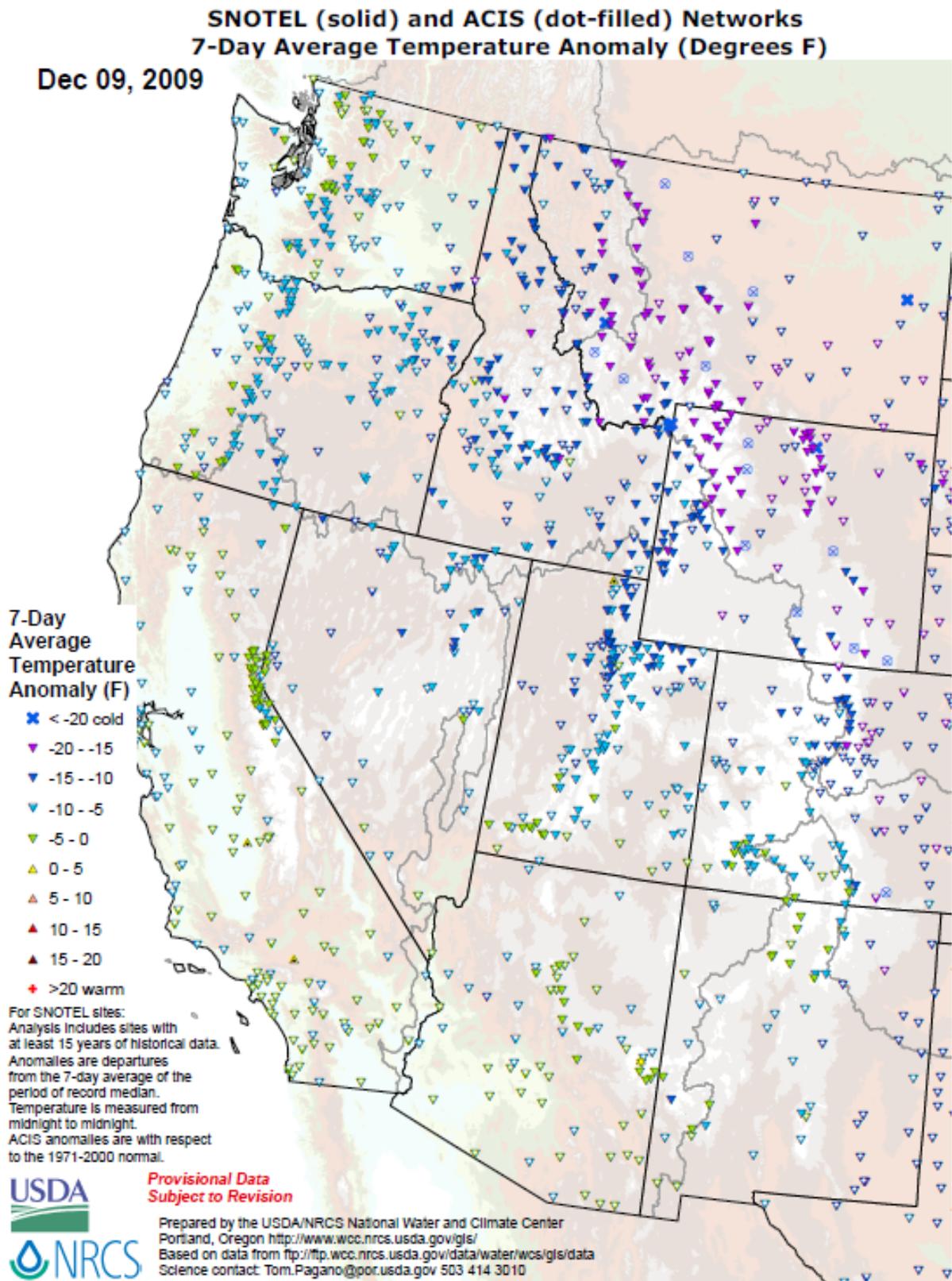
Ref: [ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west\\_swepctnormal\\_update.pdf](ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west_swepctnormal_update.pdf)

**SNOTEL 7-Day Snow Depth Change (Inches)**

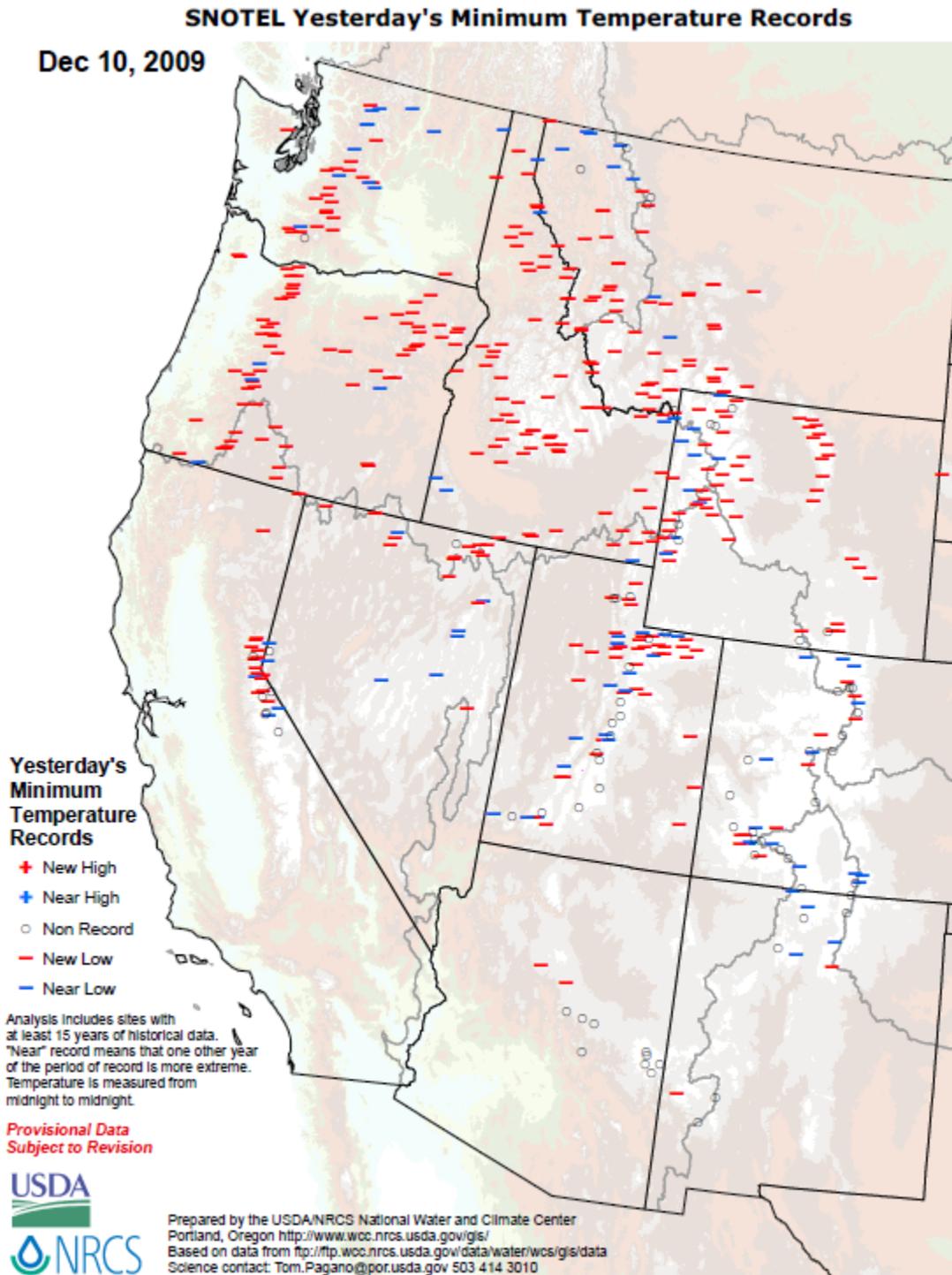
Dec 09, 2009



**Fig 1a. SNOTEL snow depths change over the past week shows a marked increase from the Sierras to the 4-Corner States as a major winter storm moved across the area.**  
 Ref: [ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west\\_snowdepth\\_7ddelta.pdf](ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west_snowdepth_7ddelta.pdf)

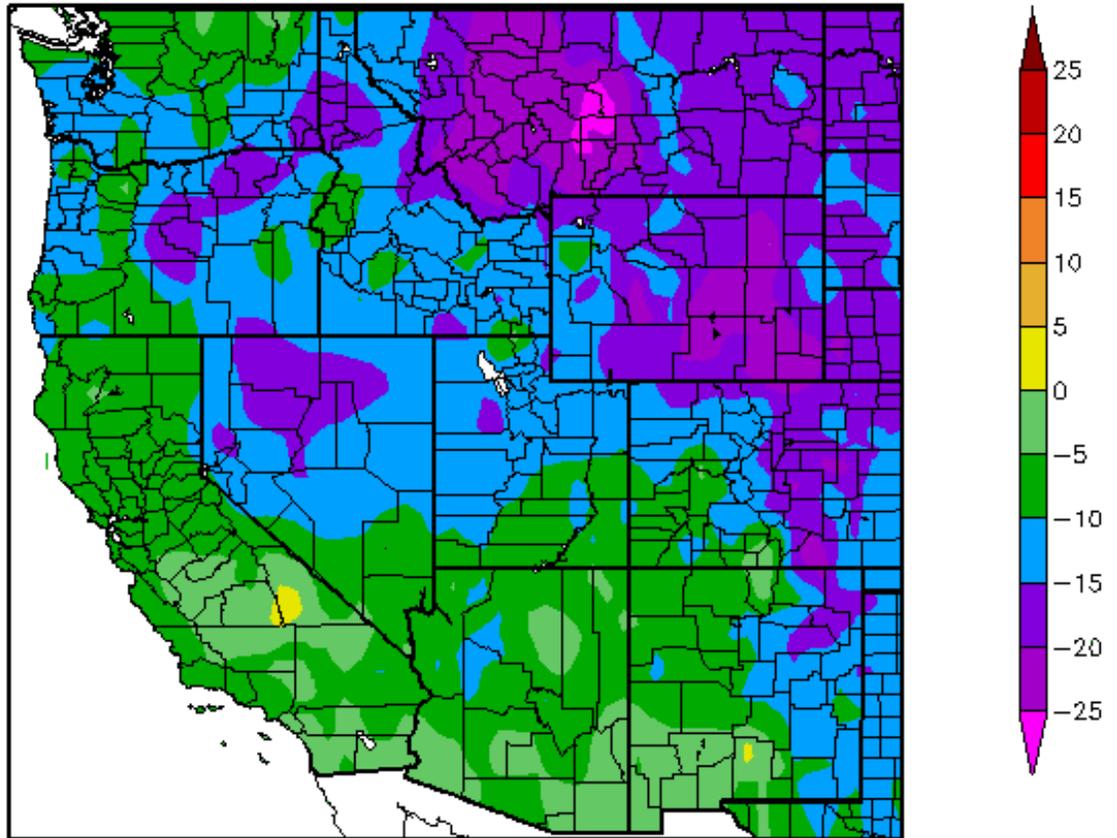


**Fig. 2. SNOTEL and ACIS-day station average weekly temperature anomalies show the impact of the first large Arctic Outbreak to hit the West this Water-Year. Ref: <ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/WestwideTavg7dAnomalyAcis.pdf>**



**Fig. 2a. At the height of this week's cold wave (9-10 December), nearly all northern SNOTEL sites set new record minimum temperatures while several stations in the southern half of the West experienced near record low temperatures.**

Departure from Normal Temperature (F)  
12/3/2009 – 12/9/2009



Generated 12/10/2009 at HPRCC using provisional data.

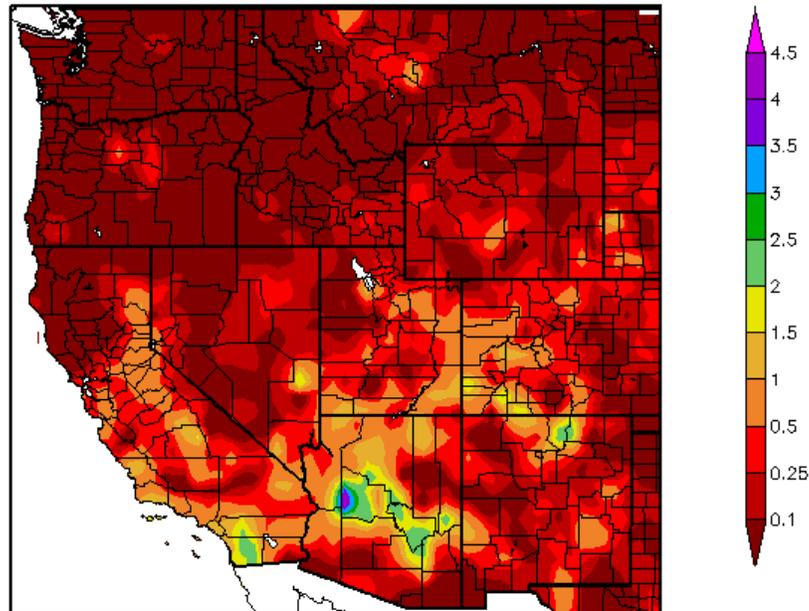
NOAA Regional Climate Centers

**Fig. 2b. ACIS 7-day average temperature anomalies show that the greatest positive temperature departure was an isolated region over the southern Central Valley in California (>+1F) and the greatest negative departure occurred over western Montana (<-25F).**

Ref: [http://www.hprcc.unl.edu/maps/current/index.php?action=update\\_product&product=TDdept](http://www.hprcc.unl.edu/maps/current/index.php?action=update_product&product=TDdept)

## Weekly Snowpack and Drought Monitor Update Report

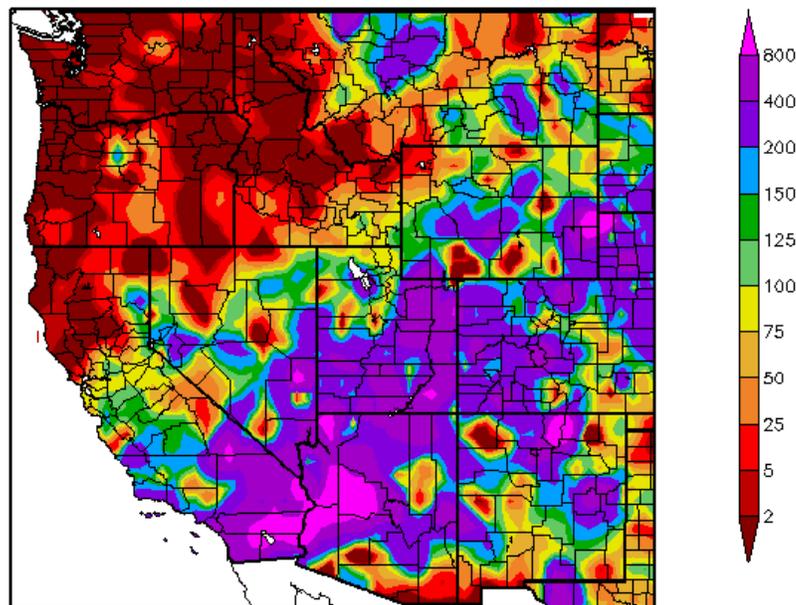
Precipitation (in)  
12/3/2009 - 12/9/2009



Generated 12/10/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

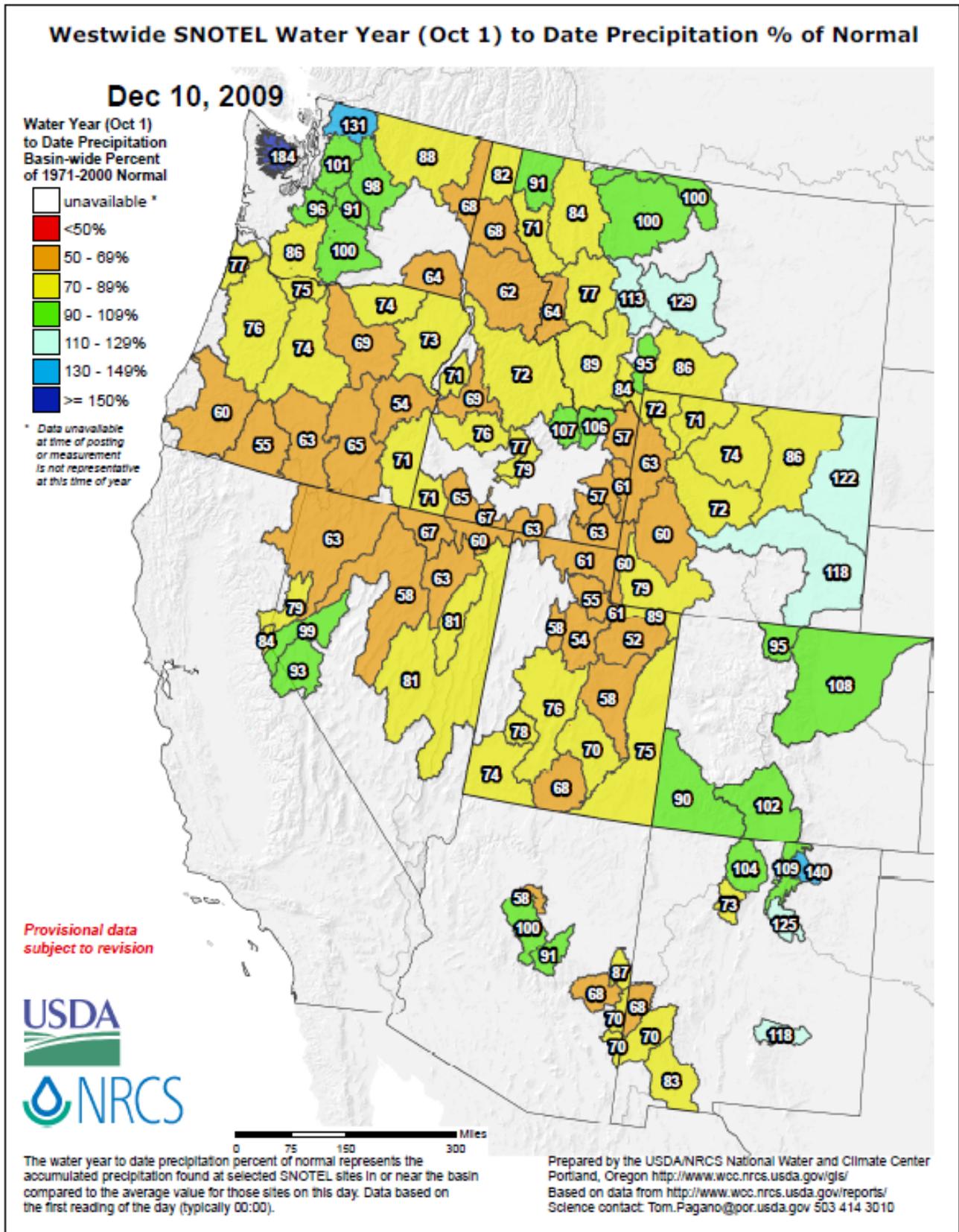
Percent of Normal Precipitation (%)  
12/3/2009 - 12/9/2009



Generated 12/10/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

**Fig. 3. and 3a. ACIS 7-day average precipitation amounts for the period ending 9 December shows the bulk of the heaviest precipitation fell over Arizona. In terms of percent of normal, much of southern half of the West and Northern Rockies experienced exceptionally high weekly percentages.** Ref: <http://www.hprcc.unl.edu/maps/current/>.



**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 a vast improvement over the 4-Corner States and worsening conditions over the Great Basin during the week.**

Ref: [http://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west\\_wytdprecpcnormal\\_update.pdf](http://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west_wytdprecpcnormal_update.pdf)

# U.S. Drought Monitor

December 8, 2009  
Valid 7 a.m. EST

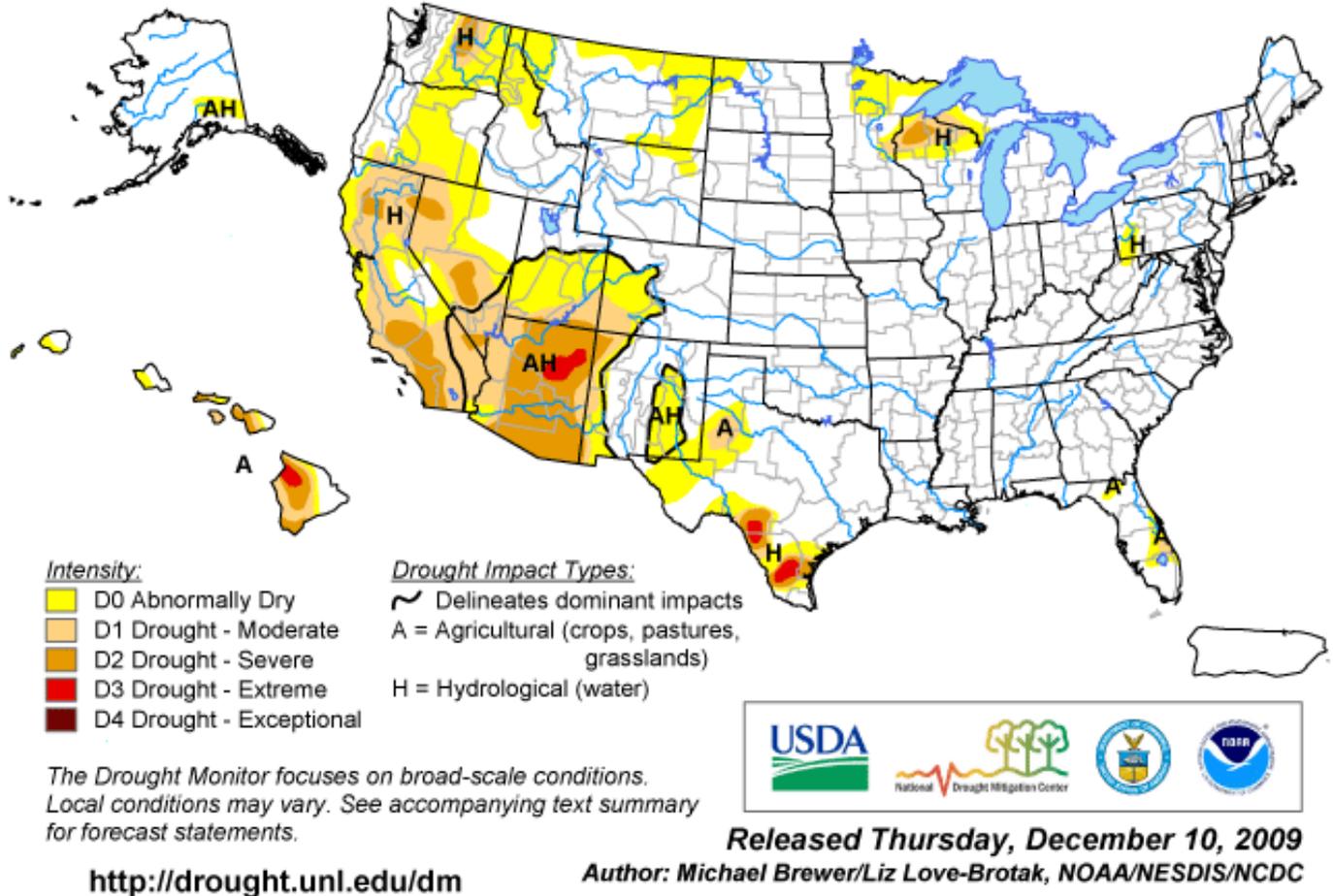


Fig. 4. Current Drought Monitor weekly summary.

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

# U.S. Drought Monitor

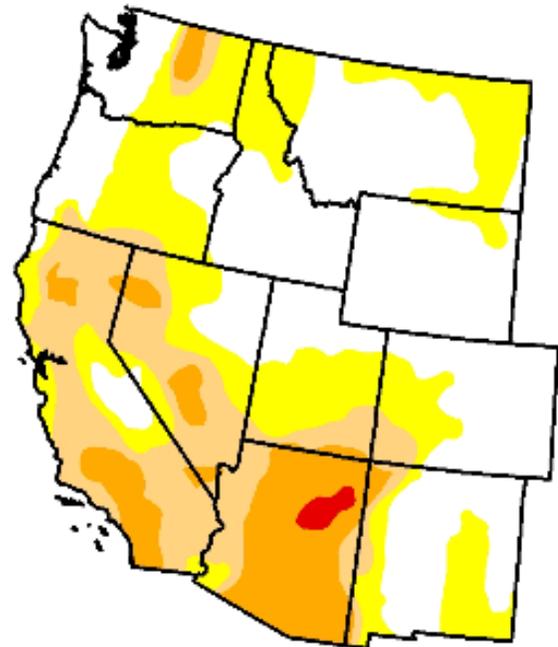
## West

December 8, 2009

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	44.4	55.6	28.7	11.6	0.5	0.0
Last Week (12/01/2009 map)	46.8	53.2	28.7	11.6	0.5	0.0
3 Months Ago (09/15/2009 map)	49.4	50.6	23.7	7.7	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 (12/09/2008 map)	32.8	67.2	29.9	9.8	0.4	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>



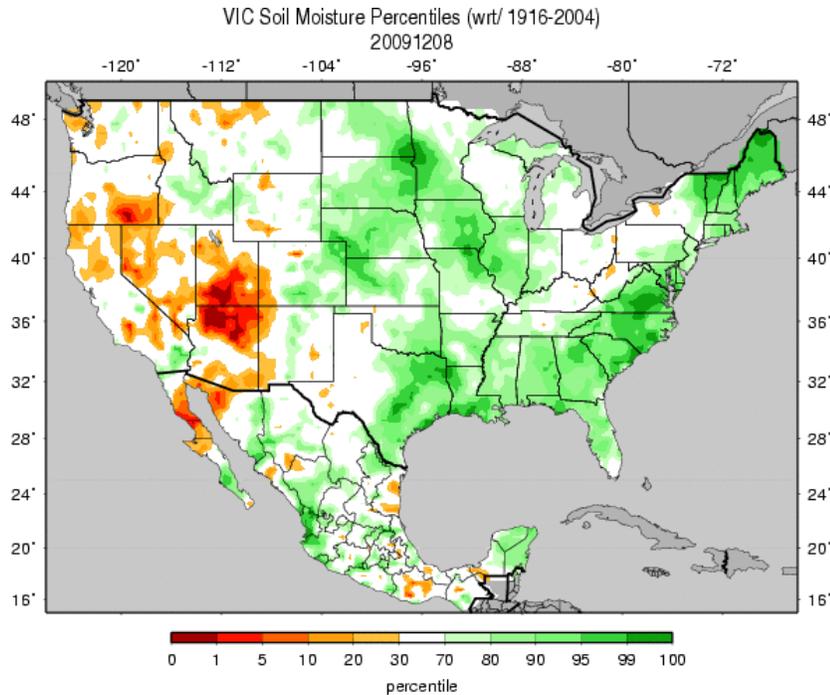
Released Thursday, December 10, 2009

Author: M. Brewer/L. Love-Brotak, NOAA/NESDIS/NCDC

Fig. 4a. Drought Monitor for the Western States with statistics over various time periods. Regionally, there was little change (e.g. mostly an increase in D0) during the past week.

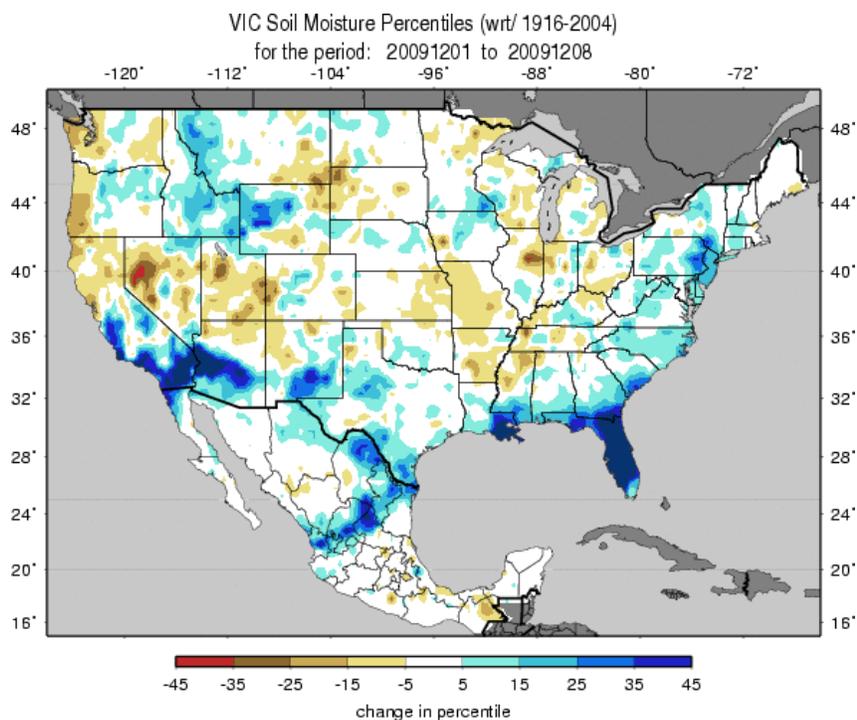
Ref: [http://www.drought.unl.edu/dm/DM\\_west.htm](http://www.drought.unl.edu/dm/DM_west.htm)

## Weekly Snowpack and Drought Monitor Update Report



**Figs. 5a:** Soil Moisture ranking in percentile based on 1916-2004 climatology as of 8 December. Southern California, Arizona-Utah, southern Oregon, and Florida continue to be the driest states this week. Only change noted over Florida (improvement).

Ref: [http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm\\_qnt.gif](http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_qnt.gif)

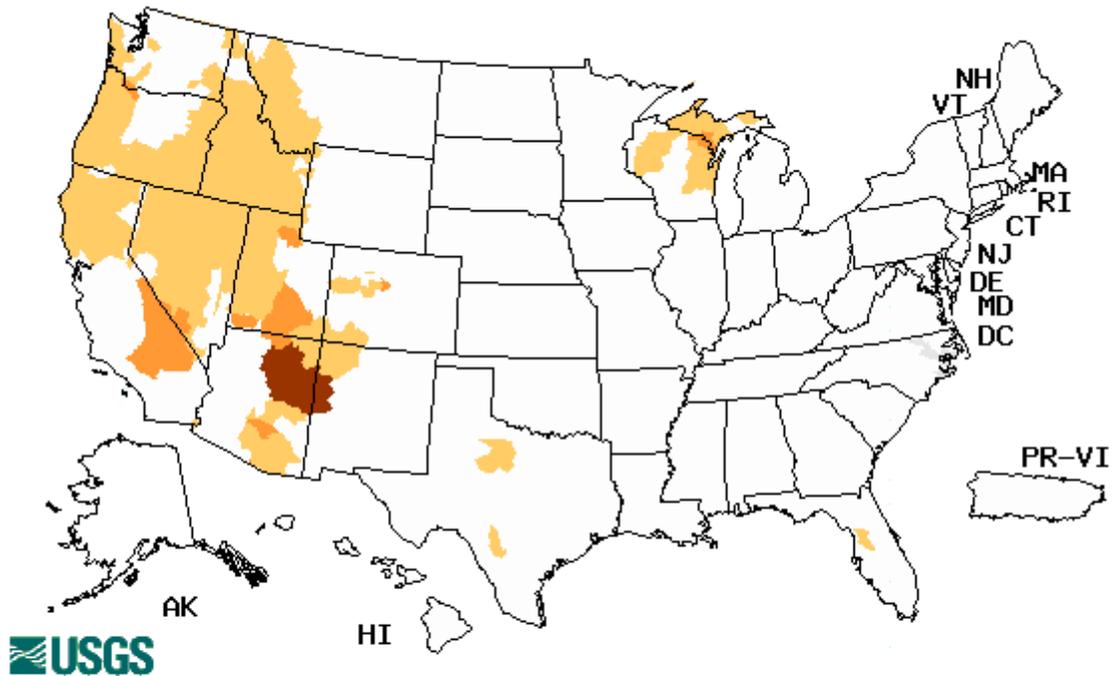


**Figs. 5b:** Soil Moisture change in percentile based on 1916-2004 climatology for this past week. A dominate El Nino pattern of improving moisture is noteworthy over the Southern Tier States.

[http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm\\_qnt.1wk.gif](http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_qnt.1wk.gif)

# Weekly Snowpack and Drought Monitor Update Report

Wednesday, December 09, 2009



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. 6.** Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Conditions surprisingly deteriorated over Arizona this week despite significant snowfall over the area. With any melting in the next few weeks, we should see a marked improvement over the state. Note, streams are freezing and thus the flows become more unreliable as we enter into winter.

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

## Weekly Snowpack and Drought Monitor Update Report

### National Drought Summary -- December 8, 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/>.*

Early in the Drought Monitor period, beneficial precipitation again fell on Texas, helping to ease drought conditions there. The same storm produced precipitation all along the East Coast and was followed by a second storm dropping precipitation along a similar path. Late this period, a storm brought beneficial rain and snow to areas of drought-stricken California and western Nevada.

**The East:** Two storms affected the East Coast this week. They reduced the areas of moderate drought and abnormal dryness from Florida up to Pennsylvania and eradicated the abnormal dryness in the Carolinas. Remaining abnormal dryness and moderate drought is a reflection of longer-term hydrological impacts.

**The Great Lakes Region:** Most of the drought-affected areas of the region saw little to no precipitation this week. Continued long-term deficits resulted in unchanged drought classification in this region.

**The Plains and Mississippi River Delta:** In Texas, another week of beneficial precipitation continued to improve extreme (D3), severe (D2), and moderate drought conditions (D1), as well as abnormal dryness (D0) in the southern part of the state. Areas of 3 plus inches of precipitation fell while Dallas-Fort Worth experienced some snowfall. Long-term impacts are still being felt and a few smaller streams are just now beginning to see flowing water. This same storm dumped rainfall estimated at five plus inches in southwestern Louisiana.

**The West:** Precipitation fell from coastal California into Nevada, mostly covering the central part of the state. Nine plus inches of snow fell near Reno, NV and 10-30 inches in the Sierras was reported. The snow varied in water content with reports from 10:1 to 30:1. This precipitation missed the areas of severe drought (D2) in northern California. There was no change in drought status there this week.

Areas of abnormal dryness (D0) were extended in northern Wyoming and western Montana and eastern Idaho. Longer-term deficits and generally low snowpack for this time of year contributed to the conditions.

**Hawaii, Alaska and Puerto Rico:** Drought conditions remained unchanged across the Hawaiian Islands. Recent rains in windward locations elevated streamflow but were not significant enough to change the drought depiction. Conditions remain unchanged in Alaska and Puerto Rico. If precipitation remains absent in eastern Puerto Rico, conditions will soon be abnormally dry.

**Looking Ahead:** The majority of the country will start the December 10 – December 14, 2009 period well below normal. This will slowly give way to some normal to above normal temperatures along the Gulf of Mexico coast and up the Eastern Seaboard. Precipitation is expected along the East Coast and in the Southwest, with higher totals there in California.

## Weekly Snowpack and Drought Monitor Update Report

Areas in the Northern Rockies, the upper Midwest, and New England may see snow accumulations as well.

For the ensuing 5 days (December 15 – 19, 2009), the odds favor cooler-than-normal conditions over most of the eastern US and across the states around the eastern portion of the Gulf of Mexico. The majority of the US, from the High Plains to the west coast, is likely to see normal to above normal temperatures. Normal to below normal precipitation is in the central US while above normal precipitation is expected in the Northwest, the Gulf of Mexico Region, and along the East Coast. Odds favor cool conditions for Alaska.

**Author:** [Michael Brewer, National Climatic Data Center, NOAA](#)

### **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 December 9, 2009