



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

---

## Weekly Report - Snowpack / Drought Monitor Update Date: 4 February 2010

### SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

**Snow:** SNOTEL Snow-Water Equivalent percent of normal values for 4 February 2010 shows surpluses over the Southwest and deficits over the Northern Tier States (Fig. 1). SNOTEL 7-day snow depth change over the past 7-days reveals increases over New Mexico, Bear River Range in Utah, and the Oregon Cascades. Elsewhere depths changed little except for decreases up to a foot over the Sierra near Tahoe, Wasatch in Utah, Colorado Rockies, and Arizona Ranges (fig. 1a).

**Temperature:** SNOTEL and ACIS-day station average weekly temperature were generally up to 5°F above the long-term average across the West although some colder departures occurred over the high valleys of the Great Basin, the Southern High Plains (New Mexico) and the Northern High Plain (Montana) (Fig.2). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures were over parts of Northern Washington (>+9F) and the greatest negative departure occurred over parts of eastern Montana (<-15F) (Fig. 2a).

**Precipitation:** ACIS 7-day average precipitation amounts for the period ending 3 February shows the bulk of the heaviest precipitation fell over parts of the Sierra and eastern New Mexico. Areas with significant deficits occurred over southern California to the Northern High Plains (Fig. 3). In terms of percent of normal, well above normal amounts were spotty across the West with eastern Oregon and most of New Mexico the big winners. Wyoming and much of southern California were clearly the regions that lost out this week (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 most of the West at or below normal values. Areas with the greatest percentages, amounts fell a bit this week (Fig. 3b).

### WESTERN DROUGHT STATUS

The past week can be summarized by noting the active storm track along the southern contiguous United States. A storm system that impacted the desert southwest at the start of the week developed into a vigorous low-pressure system across the southern plains by week's end. Heavy precipitation fell from Texas to the Mid-Atlantic with widespread damage from wintry precipitation felt as far south as Texas. Light precipitation from weak impulses moving onshore across the Pacific Northwest brought rain to the coastal regions but below-average precipitation to the interior portions of the Intermountain West and Sierra Nevada range. By month, another impulse in the southern stream linked up with one of the weak impulses moving across the northern Rockies. As they moved eastward, the systems produced precipitation as snow from Chicago to the Mid-Atlantic and heavy rains down into Florida.

**The Southwest:** Most of the changes to the depiction were made in the Southwest. As a result of a reassessment of the area of extreme drought (D3) in northeast Arizona, this area was removed. Standardized Precipitation Index (SPI) charts generated by the High Plains Regional Climate Center (HPRCC) for 30-days back through 6 months indicate that the worst conditions are representative of severe drought (D2) conditions. Additionally, National Centers for

## Weekly Snowpack and Drought Monitor Update Report

Environmental Prediction-North American Land Data Assimilation System (NCEP-NLDAS) ensemble soil moisture values show conditions ranging between D0 (anomalous dryness) and D1 (moderate drought), while the objective blends also show complete relief of the drought. According to preliminary PRISM rainfall estimates for the month of January, rainfall totals were at least 150 percent of normal for most of the state. The areas with rainfall totals ranging from near normal to 130 percent of normal are where extreme drought conditions are retained. Snowpack values across Navajo, Apache, and northern Coconino Counties in Arizona are well above normal, ranging from 130 to greater than 180 percent of normal).

Across southeastern Arizona, widespread rains (0.5-1.5 inches) allowed for some trimming of the moderate drought coverage across Pima, Pinal, Graham, and Cochise counties. The areas improvement that resulted in the removal of all drought indications included southwest New Mexico and Greenlee County, Arizona, where rains approximately 1.0 inch fell during the period. Additional improvements were made across southern and central New Mexico. Mountain snowpack measurements indicate that much of the area has snowpack well above normal (180 percent of normal). Reports indicate record high snow-water equivalent (SWE) values of 225 percent at the Sierra Blanca SNOTEL site.

Abnormal dryness was also removed from La Paz County in southwestern Arizona to have the depiction in the U.S. Drought Monitor reflect 30-, 60-, 90-day, 12-month SPI charts (all positive which indicated wetness), soil moisture values from NCEP (70th-80th percentile) and 14-day percent of normal precipitation totals (400-800 percent of normal).

**The Northern Rockies and Northwest:** A reassessment of the depiction across north-central Washington resulted in a decrease in the spatial extent of the area of severe drought conditions and a southward shift of the area. The new area better aligns with the areas of below normal precipitation starting 12 months ago. The northern edge of the previously indicated area had received above-normal rainfall for the 2009-2010 water year. Omak, WA reported 5.91 inches compared to a normal of 5.27 inches for the current water year. The reported rainfall at Omak was 66 percent of normal for all of 2009, so the wetness is a rather recent change. Across Douglas and Chelan counties, limited precipitation and warmer temperatures have aided field work, but done nothing to alleviate the drought conditions.

In Montana, a continued lack of major precipitation (0.25 inch or less for most of Montana) resulted in some improvements and some degradation. The area of abnormal dryness was expanded in western Montana where snowpack ranged from 25-69% of normal and SPI values indicated D0-D1 conditions for timeframes from 30 days to 12 months. Drought conditions near Blaine County have been persistent on the same timescales. Near normal stream flows, as reported by the United States Geological Survey, are mitigating the expansion of drought conditions.

Most of Wyoming and Northern Colorado appear to be some of the driest locations across the contiguous 48 states when considering percent of normal precipitation for the past 6 months. Precipitation over the previous week was scattered and light (1.0 inch in the high terrain to 0.0 in the low country), prompting a further expansion of D0 across portions of Wyoming. In Northern Colorado, snowpack and snow water content are ranging from 50 to 70 percent of normal, so borderline for inclusion in the area of abnormal dryness. Reservoir storage in these areas is very good, so that mitigates the overall depiction of drought conditions.

## Weekly Snowpack and Drought Monitor Update Report

A small area of improvement was made across Shasta and Tehama counties in Northern California. Rainfall totals of 1.8 and 1.4 inches came in from two stations in this region. Author: Matthew Rosencrans, NOAA/NWS/NCEP/Climate Prediction Center.

***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 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/cgi-bin/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>.

## Weekly Snowpack and Drought Monitor Update Report

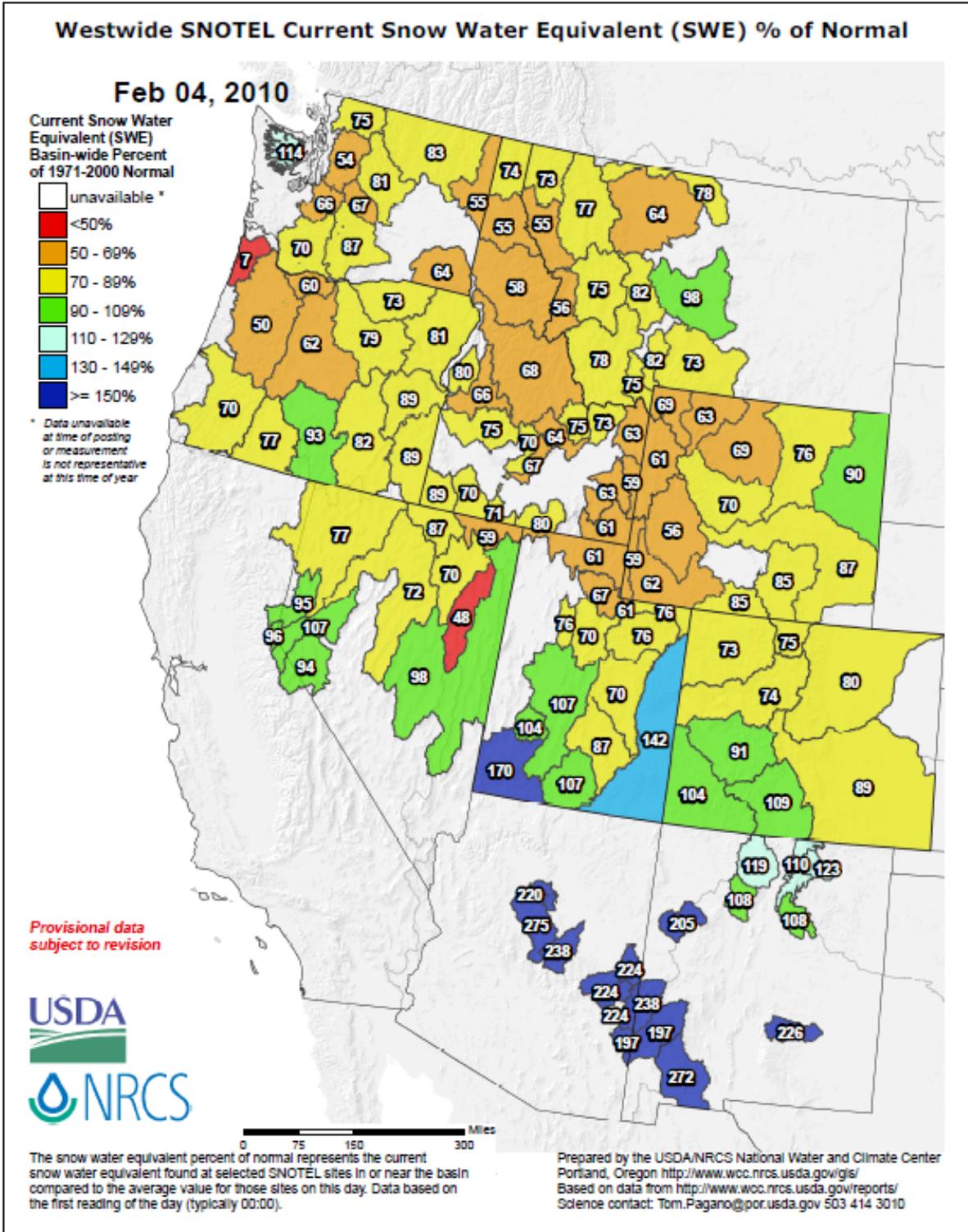
### FOR MORE INFORMATION

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

# Weekly Snowpack and Drought Monitor Update Report



**Fig 1. SNOTEL Snow-Water Equivalent percent of normal values for 4 February 2010 shows surpluses over the Southwest and deficits over the Northern Tier States.**

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)

# Weekly Snowpack and Drought Monitor Update Report

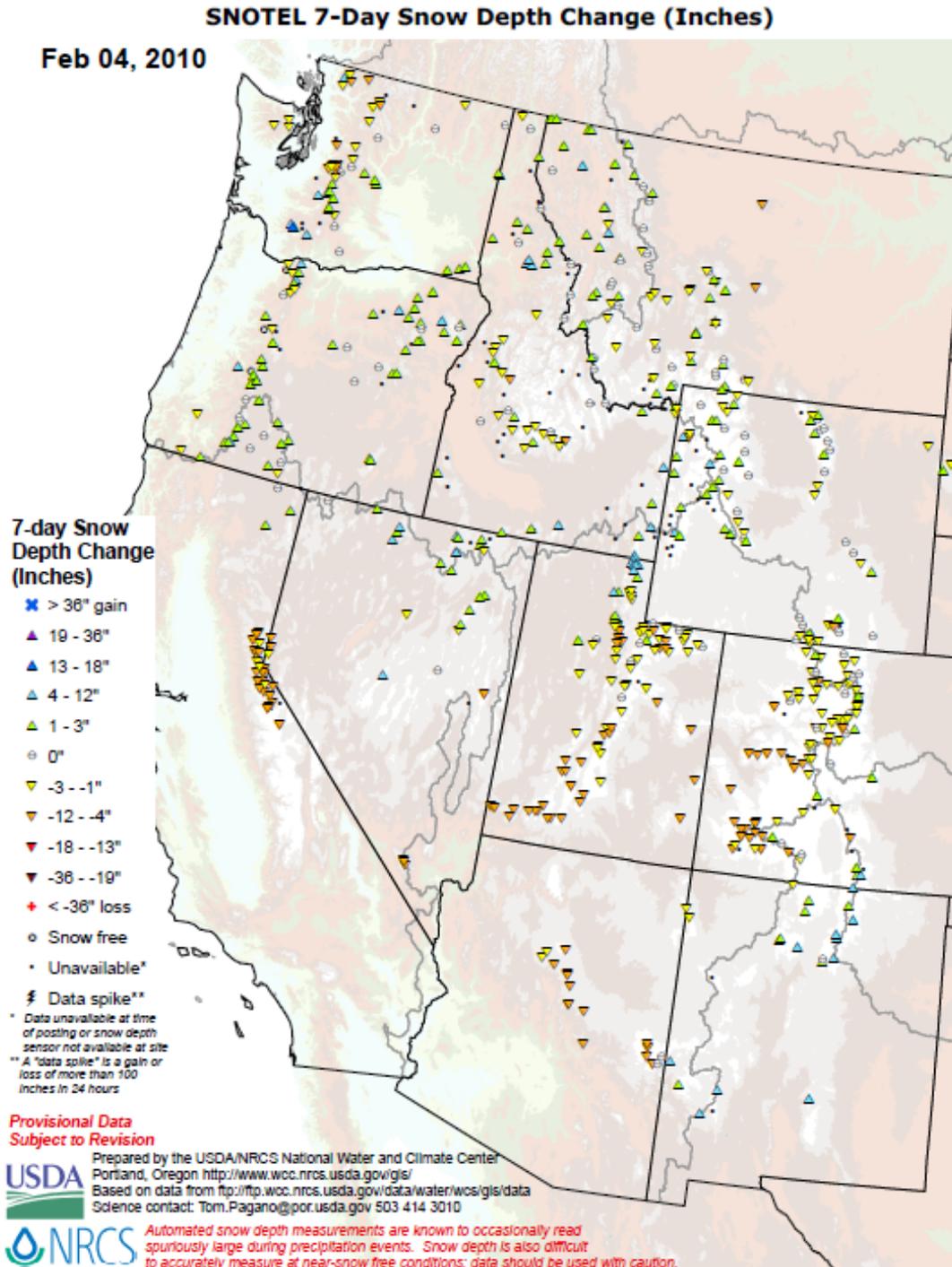
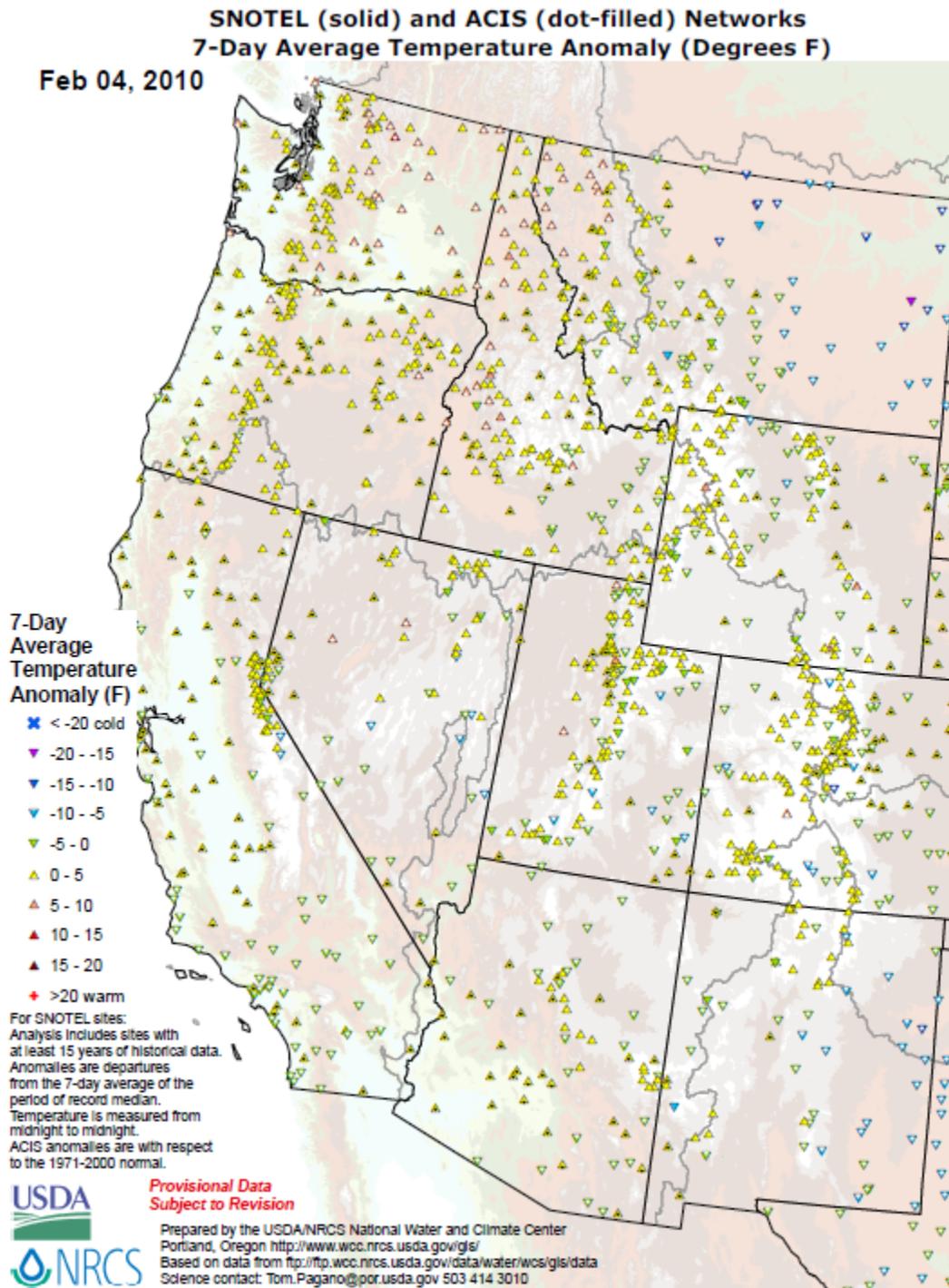


Fig. 1a. SNOTEL 7-day snow depth change over the past 7-days reveals increases over New Mexico, Bear River Range in Utah, and the Oregon Cascades. Elsewhere depths changed little except for decreases up to a foot over the Sierra near Tahoe, Wasatch in Utah, Colorado Rockies, and Arizona Ranges.

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)

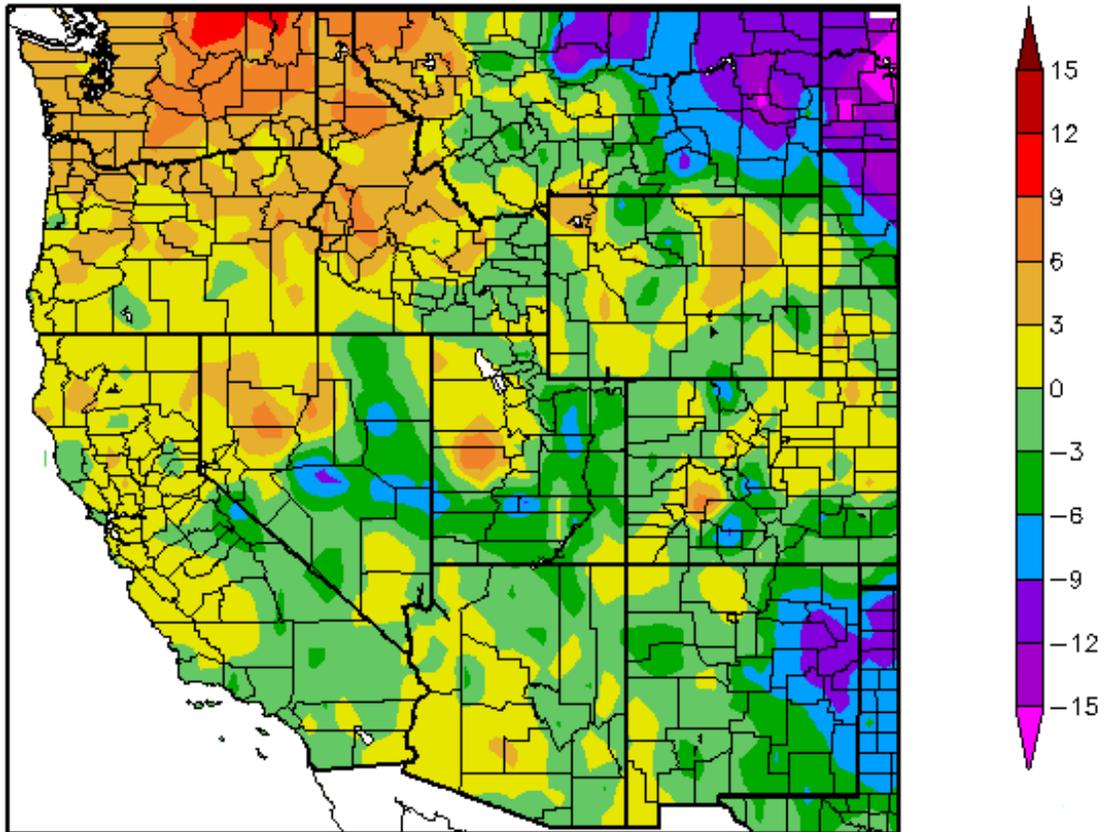
# Weekly Snowpack and Drought Monitor Update Report



**Fig. 2. SNOTEL and ACIS-day station average weekly temperature were generally up to 5F above the long-term average across the West although some colder departures occurred over the high valleys over the Great Basin, Southern High Plains (New Mexico) and Northern High Plain (Montana).**

Ref: <ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/WestwideTavg7dAnomalyAcis.pdf>

Departure from Normal Temperature (F)  
1/28/2010 – 2/3/2010



Generated 2/4/2010 at HPRCC using provisional data.

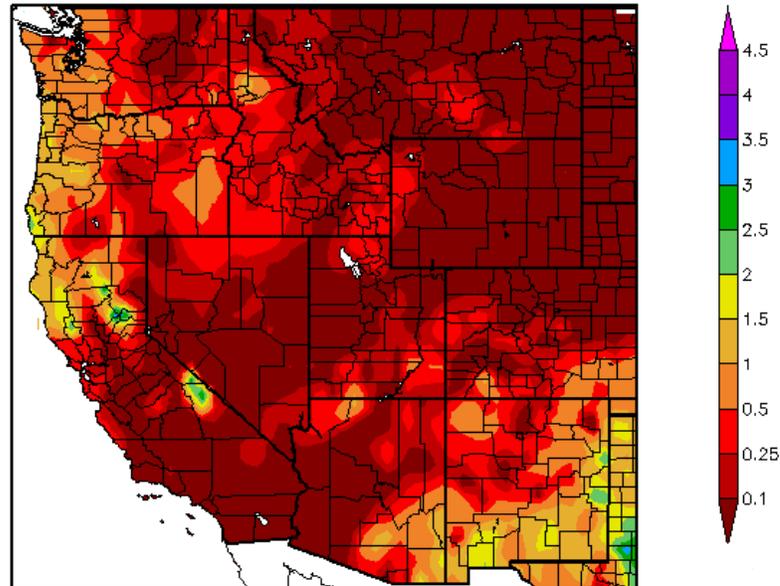
NOAA Regional Climate Centers

**Fig. 2a. ACIS 7-day average temperature anomalies show that the greatest positive temperature departures were over parts of Northern Washington (>+9F) and the greatest negative departure occurred over parts of eastern Montana (<-15F).**

Ref: [http://www.hprcc.unl.edu/maps/current/index.php?action=update\\_daterange&daterange=7d](http://www.hprcc.unl.edu/maps/current/index.php?action=update_daterange&daterange=7d)

## Weekly Snowpack and Drought Monitor Update Report

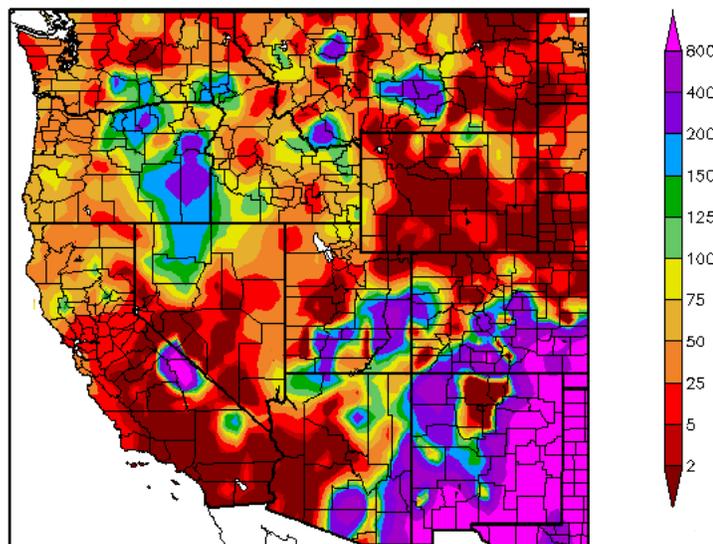
Precipitation (in)  
1/28/2010 - 2/3/2010



Generated 2/4/2010 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)  
1/28/2010 - 2/3/2010



Generated 2/4/2010 at HPRCC using provisional data.

NOAA Regional Climate Centers

**Fig. 3. and 3a. ACIS 7-day average precipitation amounts for the period ending 3 February shows the bulk of the heaviest precipitation fell over parts of the Sierra and eastern New Mexico. Areas with significant deficits occurred over southern California to the Northern High Plains. In terms of percent of normal, well above normal amounts were spotty across the West with eastern Oregon and most of New Mexico the big winners. Wyoming and much of southern California were clearly the regions that lost out this week. Ref: <http://www.hprcc.unl.edu/maps/current/>**

Weekly Snowpack and Drought Monitor Update Report

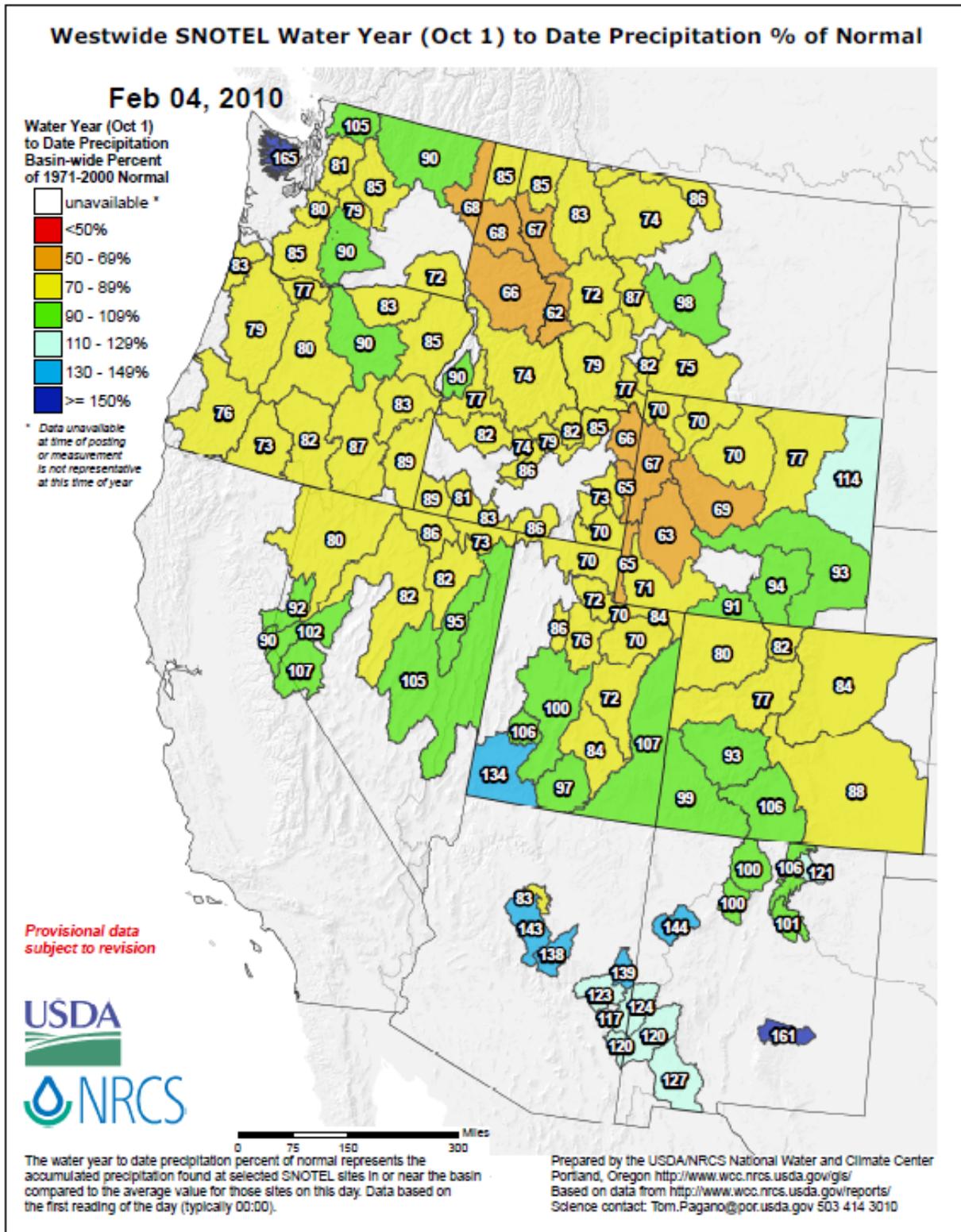


Fig 3b. Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2010 Water Year that began on October 1, 2009 shows most of the West at or below normal values. Areas with the greatest percentages, amounts fell a bit this week.

Ref: [ftp://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

February 2, 2010  
Valid 7 a.m. EST

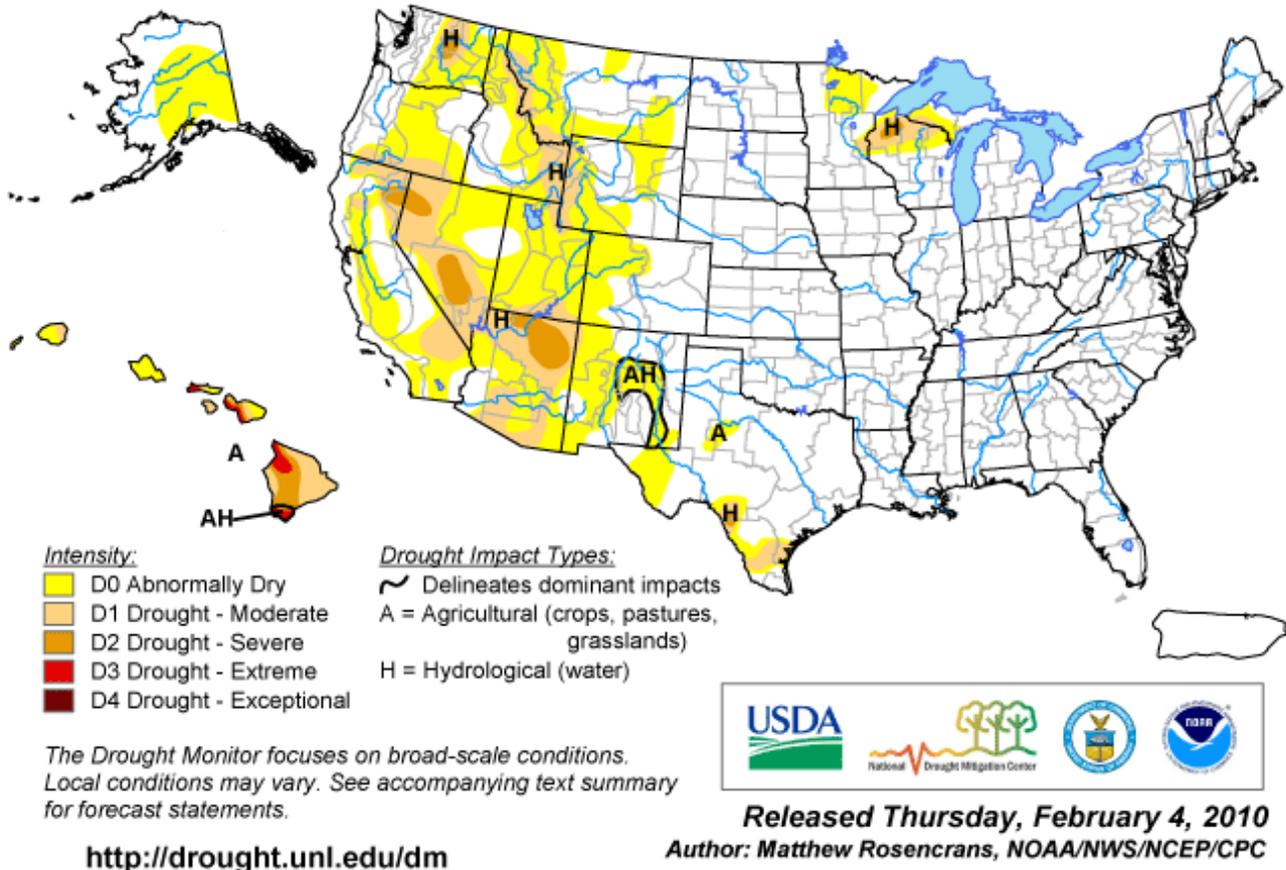


Fig. 4. Current Drought Monitor weekly summary.

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

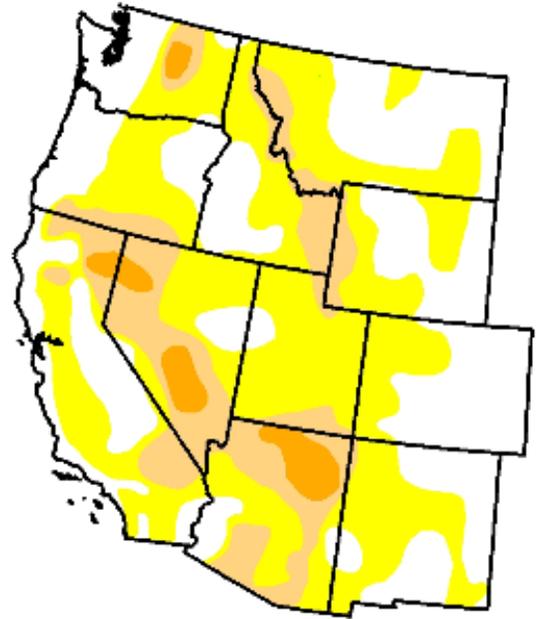
# U.S. Drought Monitor

## West

February 2, 2010  
Valid 7 a.m. EST

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	38.7	61.3	19.2	3.3	0.0	0.0
Last Week (01/26/2010 map)	38.8	61.3	20.6	3.5	0.3	0.0
3 Months Ago (11/10/2009 map)	50.6	49.4	26.0	9.0	0.0	0.0
Start of Calendar Year (01/05/2010 map)	40.1	59.9	30.6	9.9	0.5	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 (02/03/2009 map)	41.1	58.9	28.6	10.7	2.5	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>

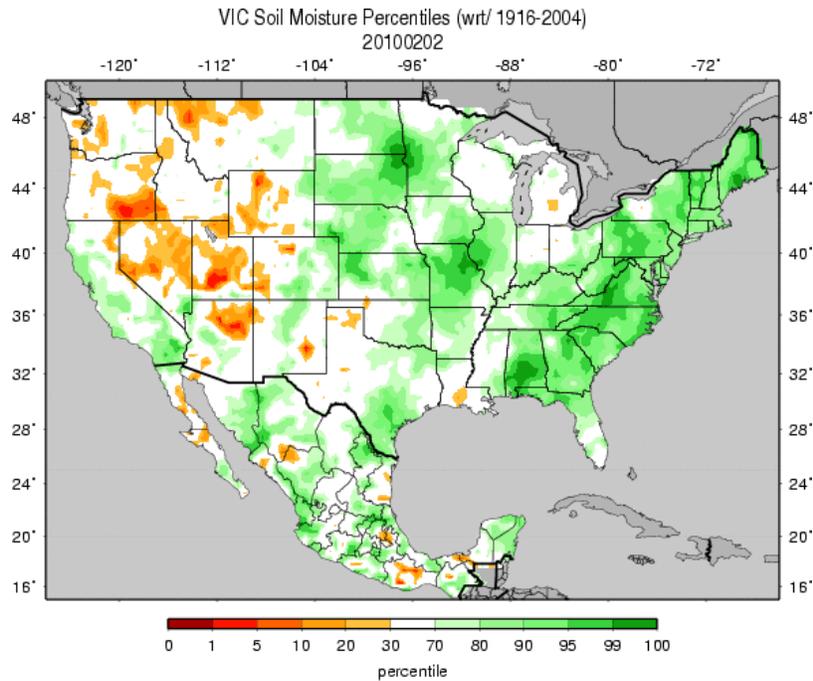


Released Thursday, February 4, 2010  
Author: M. Rosencrans, CPC/NOAA

**Fig. 4a. Drought Monitor for the Western States with statistics over various time periods. Regionally there was significant improvement since last week. Note Extreme drought in Arizona has been removed on this week's depiction.**

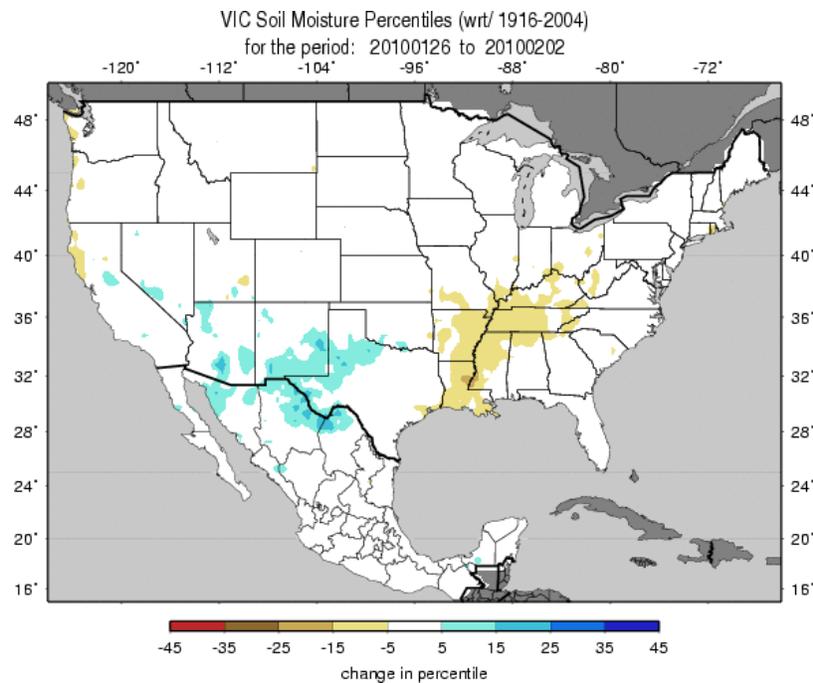
Ref: [http://www.drought.unl.edu/dm/DM\\_west.htm](http://www.drought.unl.edu/dm/DM_west.htm)

## Weekly Snowpack and Drought Monitor Update Report



**Figs. 5a: Soil Moisture ranking in percentile based on 1916-2004 climatology as of 2 February. The same pattern exists this week as last week.**

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)

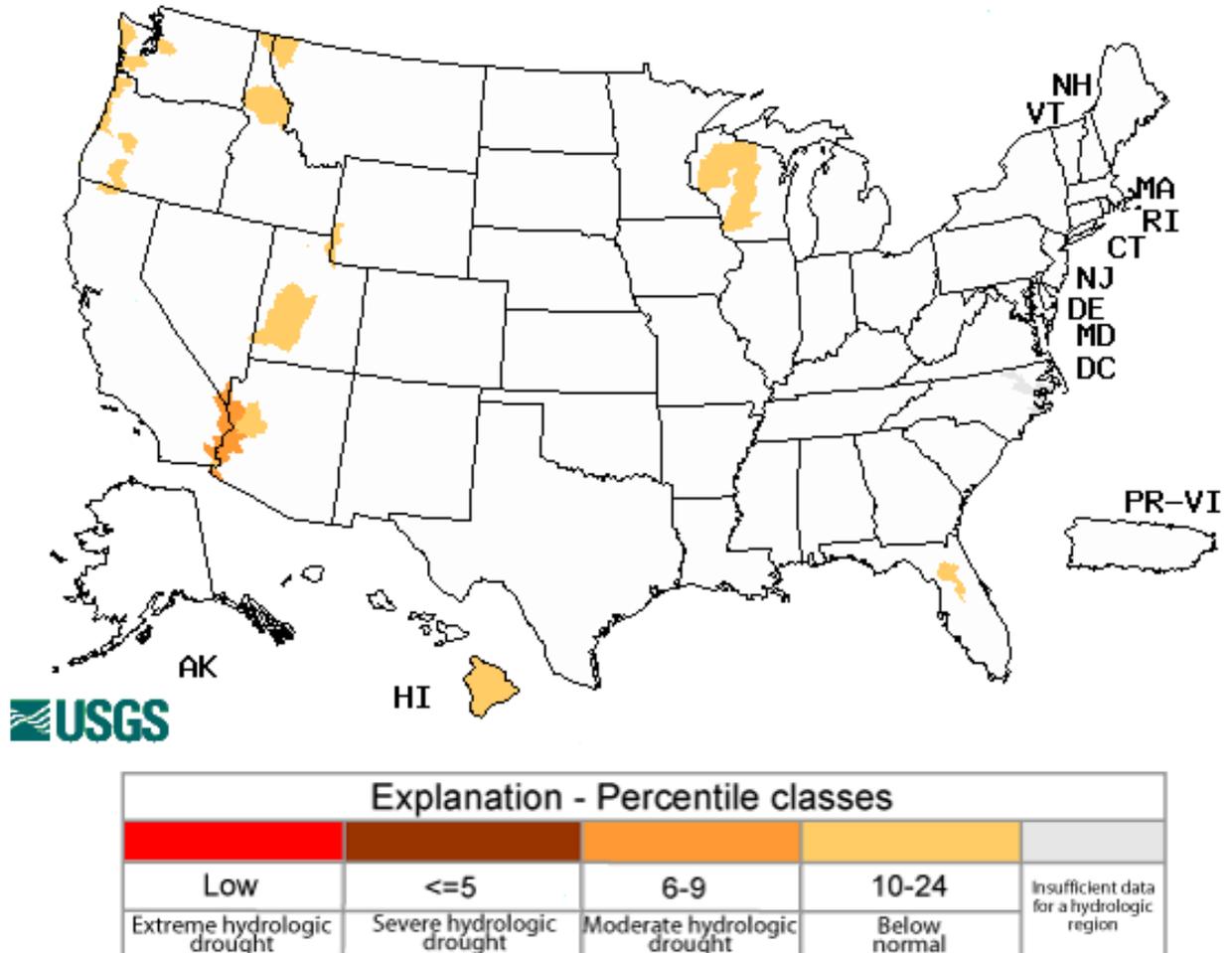


**Figs. 5b: Soil Moisture change in percentile based on 1916-2004 climatology for the week. A fairly quiet week regarding extreme value changes.**

[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, February 03, 2010



**Fig. 6.** Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Note, many streams are frozen and thus the flows become more unreliable during the winter. However, most of the nation is experiencing normal flows for this time of year with the exception of the Lower Colorado River.

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

## Weekly Snowpack and Drought Monitor Update Report

### National Drought Summary -- February 2, 2010

*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 past week can be summarized by noting the active storm track along the southern contiguous United States. A storm system that impacted the desert southwest at the start of the week developed into a vigorous low-pressure system across the southern plains by week's end. Heavy precipitation fell from Texas to the Mid-Atlantic with widespread damage from wintry precipitation felt as far south as Texas. Light precipitation from weak impulses moving onshore across the Pacific Northwest brought rain to the coastal regions but below-average precipitation to the interior portions of the Intermountain West and Sierra Nevada range. By month, another impulse in the southern stream linked up with one of the weak impulses moving across the northern Rockies. As they moved eastward, the systems produced precipitation as snow from Chicago to the Mid-Atlantic and heavy rains down into Florida.

**The Southwest:** Most of the changes to the depiction were made in the Southwest. As a result of a reassessment of the area of extreme drought (D3) in northeast Arizona, this area was removed. Standardized Precipitation Index (SPI) charts generated by the High Plains Regional Climate Center (HPRCC) for 30-days back through 6 months indicate that the worst conditions are representative of severe drought (D2) conditions. Additionally, National Centers for Environmental Prediction-North American Land Data Assimilation System (NCEP-NLDAS) ensemble soil moisture values show conditions ranging between D0 (anomalous dryness) and D1 (moderate drought), while the objective blends also show complete relief of the drought. According to preliminary PRISM rainfall estimates for the month of January, rainfall totals were at least 150 percent of normal for most of the state. The areas with rainfall totals ranging from near normal to 130 percent of normal are where extreme drought conditions are retained. Snowpack values across Navajo, Apache, and northern Coconino Counties in Arizona are well above normal, ranging from 130 to greater than 180 percent of normal).

Across southeastern Arizona, widespread rains (0.5-1.5 inches) allowed for some trimming of the moderate drought coverage across Pima, Pinal, Graham, and Cochise counties. The areas improvement that resulted in the removal of all drought indications included southwest New Mexico and Greenlee County, Arizona, where rains approximately 1.0 inch fell during the period. Additional improvements were made across southern and central New Mexico. Mountain snowpack measurements indicate that much of the area has snowpack well above normal (180 percent of normal). Reports indicate record high snow-water equivalent (SWE) values of 225 percent at the Sierra Blanca SNOTEL site.

Abnormal dryness was also removed from La Paz County in southwestern Arizona to have the depiction in the U.S. Drought Monitor reflect 30-, 60-, 90-day, 12-month SPI charts (all positive which indicated wetness), soil moisture values from NCEP (70th-80th percentile) and 14-day percent of normal precipitation totals (400-800 percent of normal).

## Weekly Snowpack and Drought Monitor Update Report

**The Northern Rockies and Northwest:** A reassessment of the depiction across north-central Washington resulted in a decrease in the spatial extent of the area of severe drought conditions and a southward shift of the area. The new area better aligns with the areas of below normal precipitation starting 12 months ago. The northern edge of the previously indicated area had received above-normal rainfall for the 2009-2010 water year. Omak, WA reported 5.91 inches compared to a normal of 5.27 inches for the current water year. The reported rainfall at Omak was 66 percent of normal for all of 2009, so the wetness is a rather recent change. Across Douglas and Chelan counties, limited precipitation and warmer temperatures have aided field work, but done nothing to alleviate the drought conditions.

In Montana, a continued lack of major precipitation (0.25 inch or less for most of Montana) resulted in some improvements and some degradation. The area of abnormal dryness was expanded in western Montana where snowpack ranged from 25-69% of normal and SPI values indicated D0-D1 conditions for timeframes from 30 days to 12 months. Drought conditions near Blaine County have been persistent on the same timescales. Near normal stream flows, as reported by the United States Geological Survey, are mitigating the expansion of drought conditions.

Most of Wyoming and Northern Colorado appear to be some of the driest locations across the contiguous 48 states when considering percent of normal precipitation for the past 6 months. Precipitation over the previous week was scattered and light (1.0 inch in the high terrain to 0.0 in the low country), prompting a further expansion of D0 across portions of Wyoming. In Northern Colorado, snowpack and snow water content are ranging from 50 to 70 percent of normal, so borderline for inclusion in the area of abnormal dryness. Reservoir storage in these areas is very good, so that mitigates the overall depiction of drought conditions.

A small area of improvement was made across Shasta and Tehama counties in Northern California. Rainfall totals of 1.8 and 1.4 inches came in from two stations in this region.

**Texas:** A 1 category improvement, based on rainfall totaling 1.0 to 2.8 inches, was made across southwestern Texas from Terrell County to LaSalle County. The core area of the drought region was maintained as severe drought (D2) but reduced in size. January was the 4th wettest at Del Rio, TX in a record stretching over 100 years while San Antonio logged the 10th wettest January since 1871. The severe drought area was removed from the drought area near Corpus Christi in response to light rains (0.1-0.2 inch), good stream flow (near normal in the area indicated as D2 on previous maps), lack of reported impacts from drought, and reported impacts of too much mud. Across northwestern Texas, rainfall ranging from 0.5 to 1.7 inches prompted the removal of much of the area of abnormal dryness. Two- and six-month weighted SPI values from the Office of the State Climatologist of Texas supported the retention of D0 from Howard County to Stonewall County.

**The Upper Mid-West:** No changes were made in this region. The Lake Effect Snows are falling on frozen ground so soil moisture is not increasing but water demand during the winter is minimal.

**Hawaii and Alaska:** In Hawaii, another mostly dry week, except for rains across Kauai (1.1 to 2.9 inches) and Oahu (0.4 to 4.2 inches). Reports from Maui indicated rains near 0.5 inch while reports on the Big Island showed less than a quarter inch. The continued lack of rainfall this week prompted an additional area of extreme drought across the southern growing areas of the Big Island.

## Weekly Snowpack and Drought Monitor Update Report

In Alaska, little or no precipitation fell across much of the state. Reports from near the southern shore, adjacent islands, and along the panhandle indicate precipitation amounts ranged from 1.4 to 5.1 inches. The frozen ground and dormant vegetation provide minimal demand for ground water, so the depiction was maintained from last week.

**Looking Ahead:** During the next 5 days (February 4-9), an active southern storm track is expected to continue bringing wet weather to the area from New Mexico to the Southeast to the Mid-Atlantic. From Thursday into Saturday, a storm system is expected to move from Texas to the Carolina coast. Precipitation totals are expected to be greater than 1.0 inch from coastal Texas to southern New Jersey, with the northern extent being frozen or freezing precipitation. Another storm system is expected to move on shore across Northern California and Oregon from Friday into Saturday. Moderate precipitation is expected from this system. By next Monday, another low-pressure is expected to develop across northern Mexico and bring precipitation to the southern plains yet again. Little to no precipitation is expected across the Northern Rockies and Northwest, which should be monitored as El Niño conditions typically favor dryness in these regions.

**Author:** [Matthew Rosencrans, NOAA/NWS/NCEP/Climate Prediction Center](#)

### 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 February 3, 2010