



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

Weekly Report - Snowpack / Drought Monitor Update

Date: 10 February 2011

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Snow: SNOTEL Snow-Water Equivalent percent of Normal values for 10 February 2011 shows several basins west of the Continental Divide have deteriorated by one category during the past week (noted by red circles). Blue circles show one category improvement east of the Continental Divide (Fig. 1). SNOTEL snow-water equivalent percent of Normal peak shows that many basins with surpluses in Fig. 1 aren't necessarily heading to average snowpack in late winter if the current drying trend continues. Most basins have 50% or less of peak values at this point (we are now more than half way through the snow accumulation season). Notable exceptions include parts of the Uinta and Wasatch which are at peak values as of this week. However, most SNOTEL sites will need much more snow this season in order to finish with near normal SWE (especially over the Cascades and Sierra) (Fig. 1a). SNOTEL 7-day snow depth changes show significant gains in accumulation across the Rockies, lesser so over the Wasatch, and are down over the Sierra (Fig. 1b).

Temperature: Although not quite as cold as last week across the West, there are still several SNOTEL stations breaking new record minimum temperatures this morning (Fig. 2). Average SNOTEL temperatures were much below normal over the Central and Southern Rockies but generally above normal for the week over the Cascades and Sierra (Fig. 2a). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures over parts of the Great Basin and Northern California ($>+5^{\circ}\text{F}$) and the greatest negative departures over central New Mexico ($<-25^{\circ}\text{F}$) (Fig. 2b).

Precipitation: ACIS 7-day average precipitation amounts for the period ending 9 February shows the bulk of the heaviest precipitation confined western Washington (Fig. 3). In terms of percent of normal, the precipitation pattern was extremely wet over the Rockies and Western High Plains (Fig. 3a). For the 2011 Water-Year that began on 1 October 2010, the greatest deficits are found over the extreme southern reaches of the Southwest. Areas with the highest values are found over the Great Basin and northern Colorado. A rather dry week was the rule over much of the Pacific Northwest and Great Basin which resulted in one category deterioration as noted by the red circles. Some basins over Colorado (blue circles) have increased by one category (Fig. 3b).

Rockies and West: SPI-3 and SPI-6 both indicate D1-D2 conditions across New Mexico and Arizona. Snowpack levels are below normal across eastern Arizona (50-89 percent of normal) but not as far below normal as in southern New Mexico (25-49 percent of normal) and southern Colorado (50-69 percent of normal), so D1 was expanded but D2 was not.

An area of abnormal dryness was introduced in northern California as SPI-3 and 30-day SPI values are indicating conditions as dry as moderate drought. SPI-6 and 60-day SPI values are indicated near normal values, showing that both the longer-term conditions and intermittent rains have kept dryness to low-levels so far this water year. Drought blends also indicated dryness across much of northwestern California.

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Recent precipitation and a bit of a reassessment across Wyoming led to some improvements across eastern Wyoming. The latest 30-, 60- and 90-day SPI as well as drought blend values were driving factors in the reassessment. Author: Matthew Rosencrans, NOAA/NWS/NCEP/CPC

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 estimated by a one-layer hydrological model ([Huang et al., 1996](#), [van den Dool et al., 2003](#)). The model takes observed precipitation and temperature and calculates soil moisture, evaporation and runoff. The potential evaporation is estimated from observed temperature.

http://www.cpc.ncep.noaa.gov/soilmst/index_jh.html

U.S. HISTORICAL STREAMFLOW

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 -

Weekly Snowpack and Drought Monitor Update Report

<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/ JEFF GOEBEL
Acting Director, Resource Inventory Division

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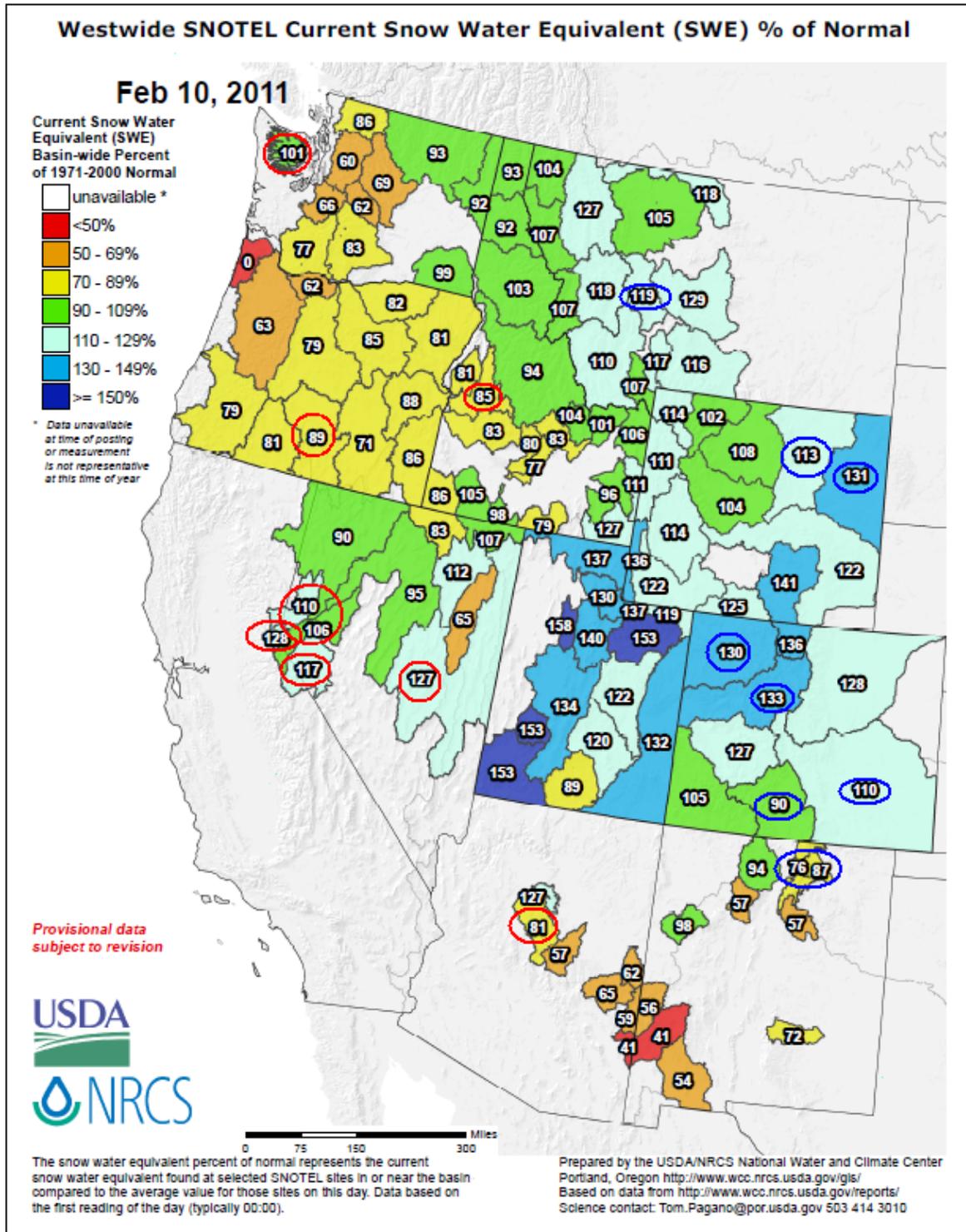


Fig. 1: SNOTEL Snow-Water Equivalent percent of normal values for 10 February 2011 shows several basins west of the Continental Divide have deteriorated by one category during the past week (noted by red circles). Blue circles show one category improvement east of the Continental Divide.

Ref: http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/west_swepctnormal_update.pdf

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SNOTEL Current Snow Water Equivalent (SWE) Percent of Normal Peak Feb 10, 2011

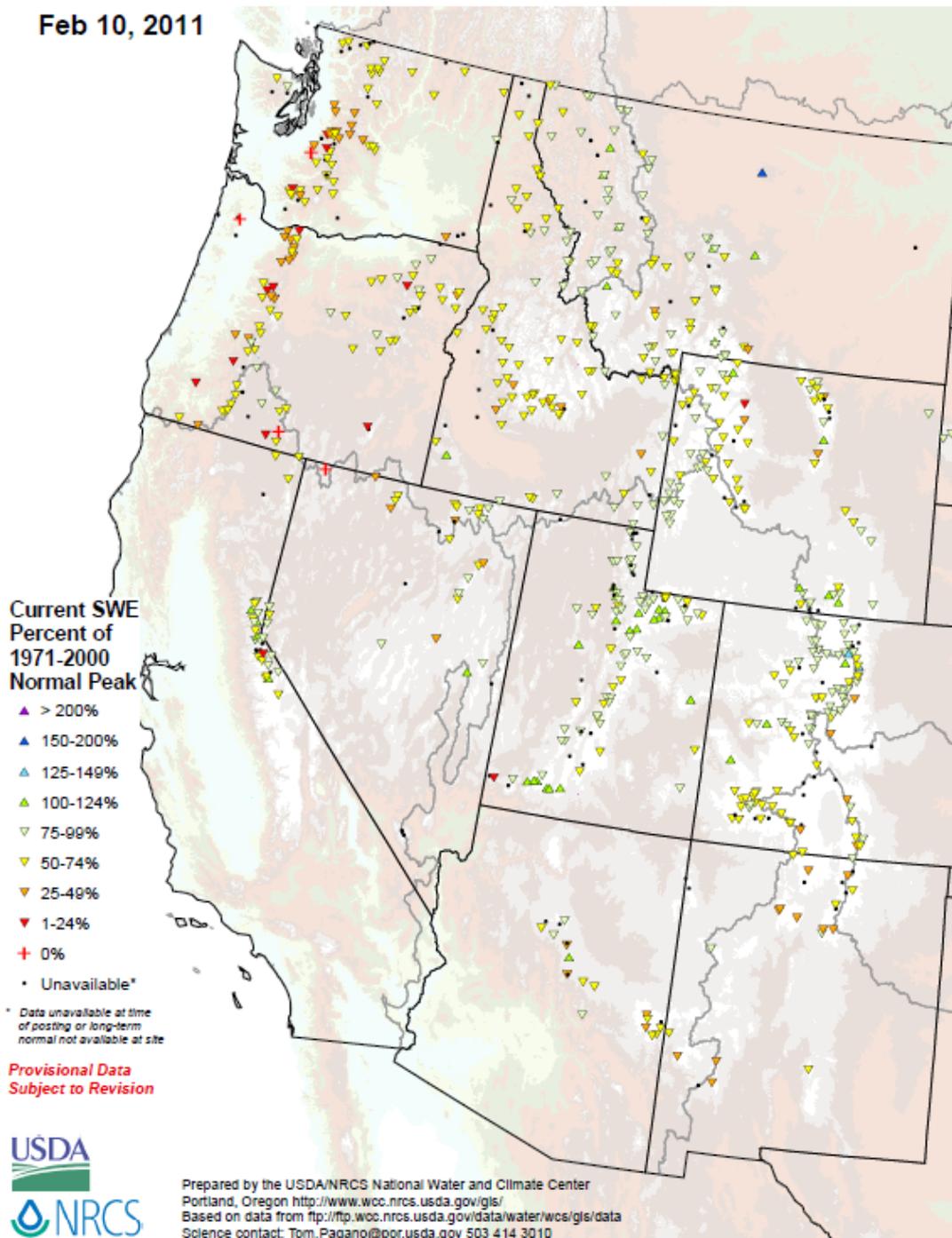


Fig. 1a: SNOTEL Snow-Water Equivalent percent of Normal peak shows that surpluses in Figure 1 aren't heading to average snowpack in late winter if the current drying trend continues. Most basins have 50% or less of peak values at this point (we are now more than half way through the snow accumulation season). Parts of the Uinta and Wasatch are at peak values as of this week. However, most SNOTEL sites will need much more snow this season in order to finish with near normal SWE (especially over the Cascades and Sierra). Ref: <http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/WestwideSWEPercentPeak.pdf>

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SNOTEL 7-Day Snow Depth Change (Inches)

Feb 10, 2011

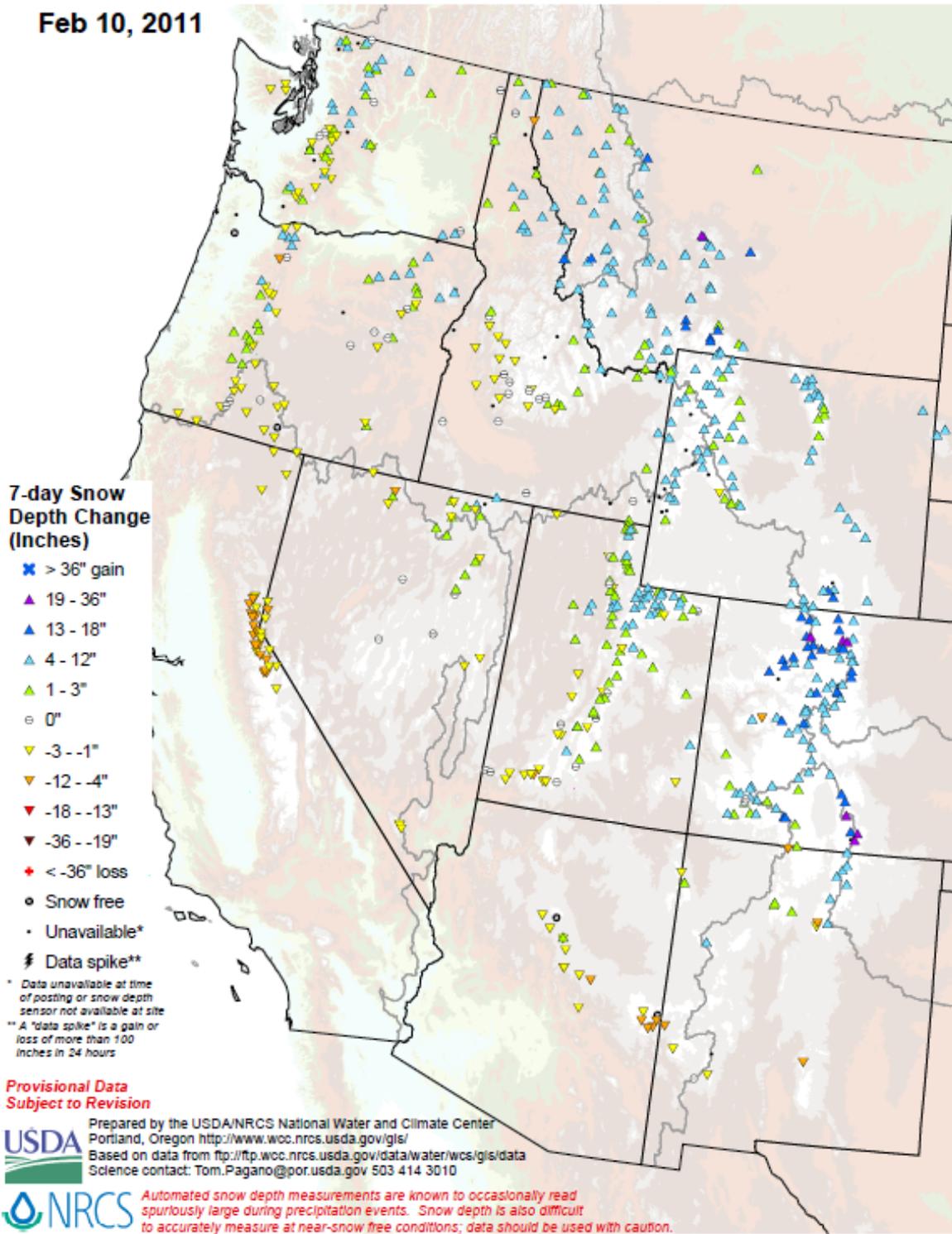


Fig. 1b: SNOTEL 7-day snow depth changes show significant gains in accumulation across the Rockies, lesser so over the Wasatch, and are down over the Sierra.

Ref: http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/west_snowdepth_7ddelta.pdf

SNOTEL Yesterday's Minimum Temperature Records

Feb 10, 2011

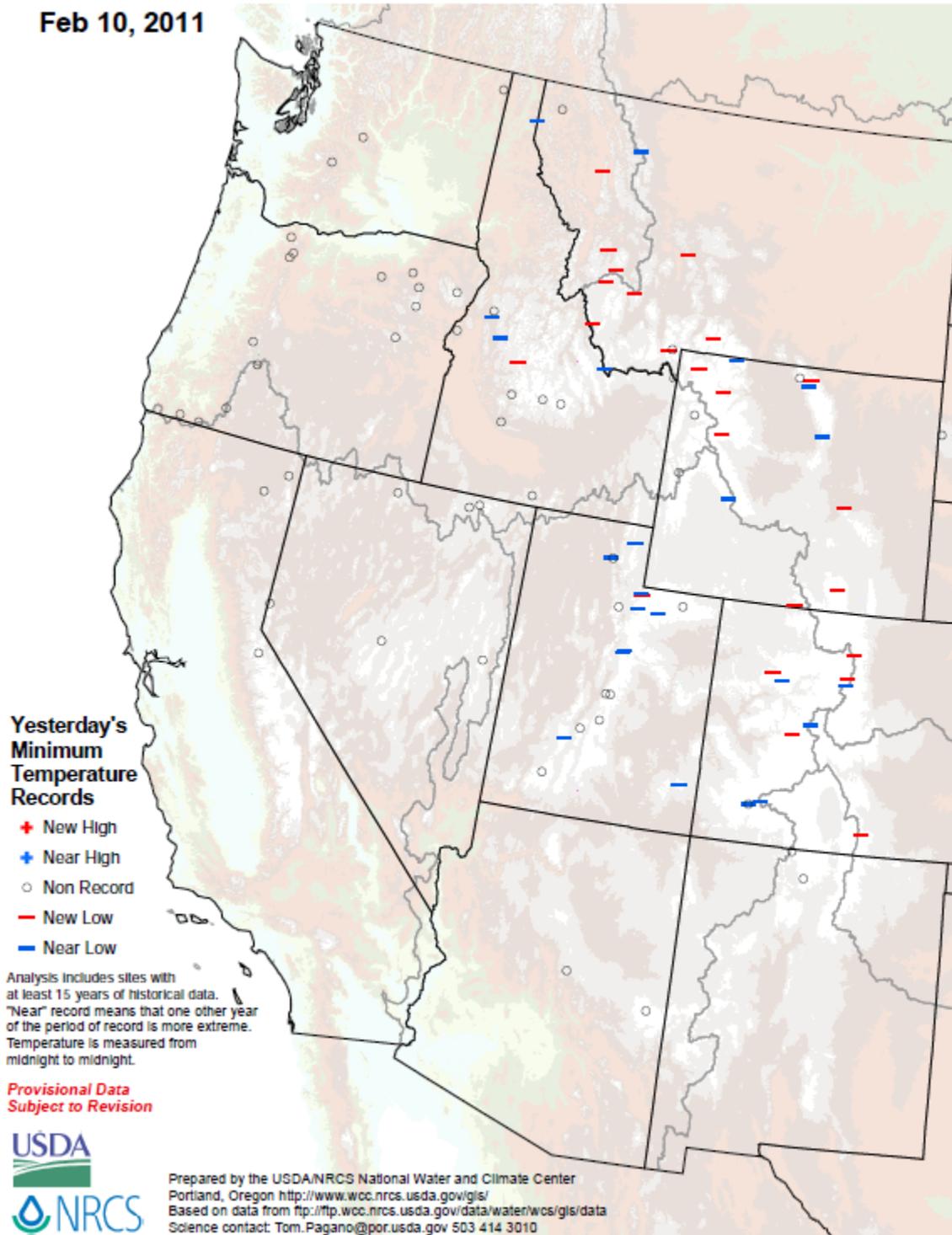


Fig. 2: Although not quite as cold as last week across the West, there are still several SNOTEL stations breaking new record minimum temperatures this morning. Ref: <http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/WestwideTminRecord.pdf>

Weekly Snowpack and Drought Monitor Update Report

SNOTEL (solid) 7-Day Average Temperature Anomaly (Degrees F) Feb 10, 2011

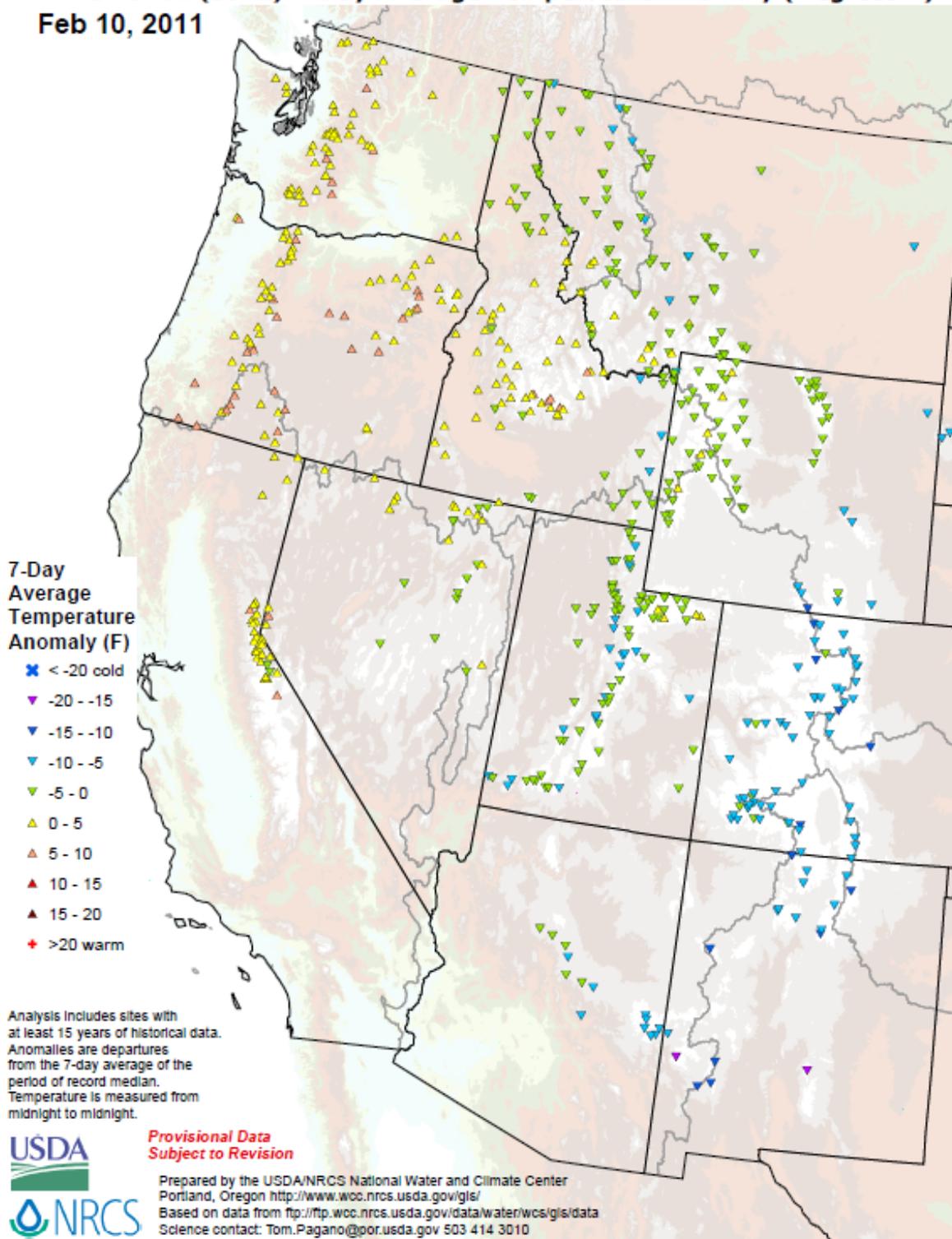
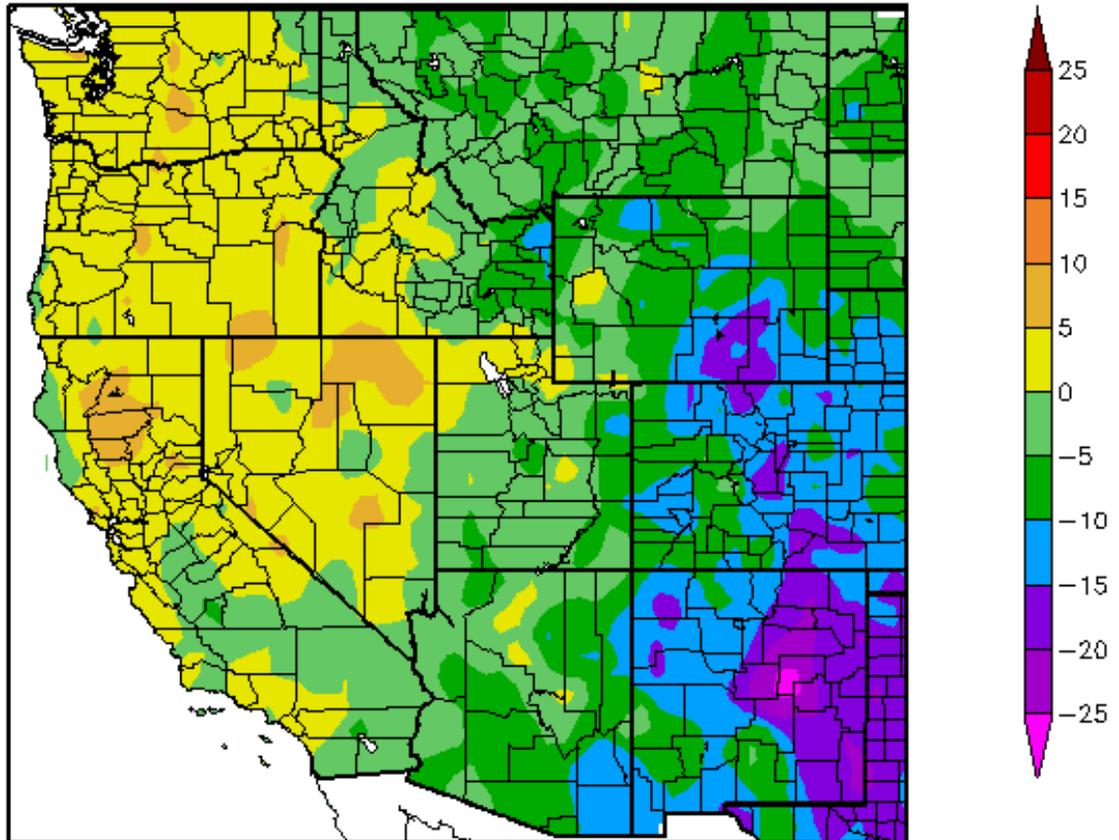


Fig. 2a: Average SNOTEL temperatures were much below normal over the Central and Southern Rockies but generally above normal for the week over the Cascades and Sierra.
Ref: <http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/WestwideTavg7dAnomaly.pdf>

Departure from Normal Temperature (F)
2/3/2011 – 2/9/2011



Generated 2/10/2011 at HPRCC using provisional data.

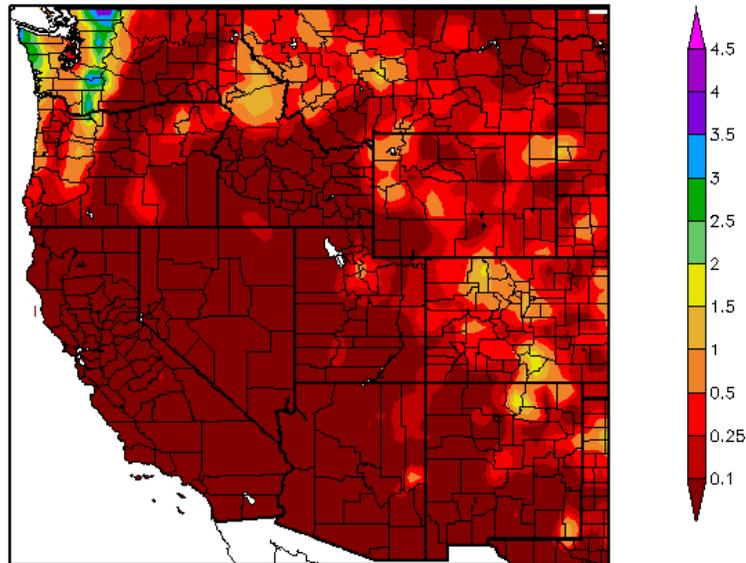
Regional Climate Centers

Fig. 2b: ACIS 7-day average temperature anomalies show that the greatest positive temperature departures over parts of the Great Basin and Northern California (>+5°F) and the greatest negative departures over central New Mexico (<-25°F).

Ref: http://www.hprcc.unl.edu/maps/current/index.php?action=update_daterange&daterange=7d

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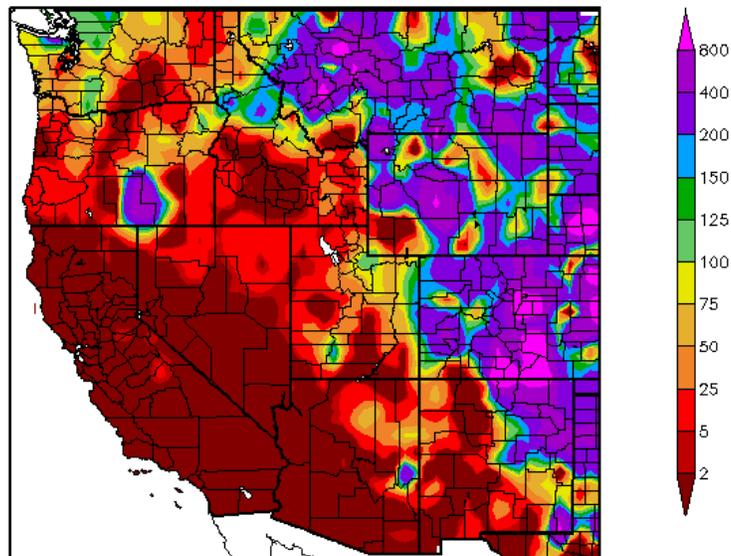
Precipitation (in)
2/3/2011 - 2/9/2011



Generated 2/10/2011 at HPRCC using provisional data.

Regional Climate Centers

Percent of Normal Precipitation (%)
2/3/2011 - 2/9/2011



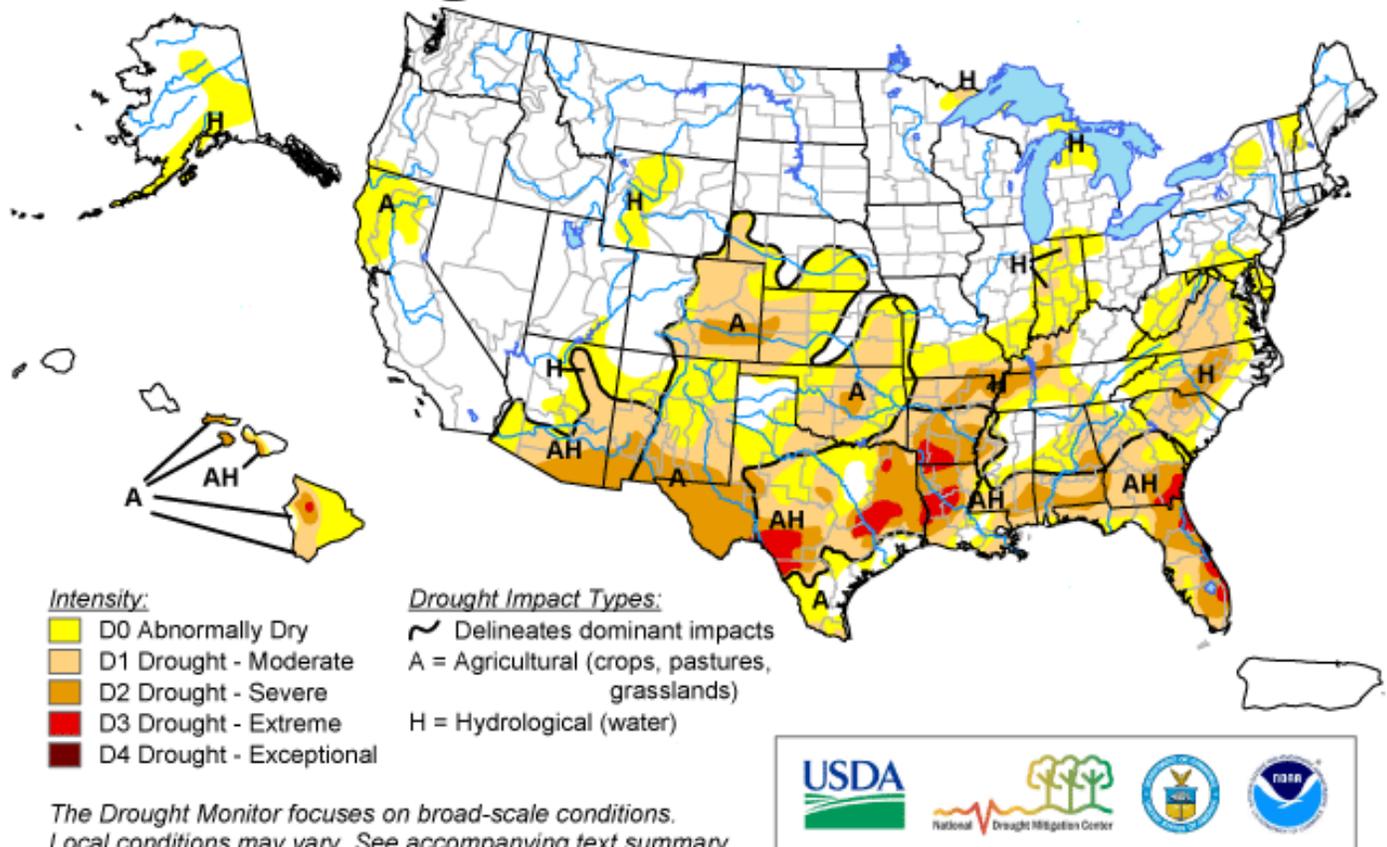
Generated 2/10/2011 at HPRCC using provisional data.

Regional Climate Centers

Fig. 3 and 3a: ACIS 7-day average precipitation amounts for the period ending 9 February shows the bulk of the heaviest precipitation confined western Washington (Fig. 3). In terms of percent of normal, the precipitation pattern was extremely wet over the Rockies and Western High Plains (Fig. 3a). Ref: <http://www.hprcc.unl.edu/maps/current/>

U.S. Drought Monitor

February 8, 2011
Valid 7 a.m. EST



Released Thursday, February 10, 2011
Author: Matthew Rosencrans, NOAA/NWS/NCEP/CPC

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

Fig. 4: Current Drought Monitor weekly summary. The severest D3 levels of drought are found on the Big Island of Hawaii and is scattered across Texas, Louisiana, Arkansas, Georgia, and Florida.

Ref: <http://www.drought.unl.edu/dm/monitor.html>

U.S. Drought Monitor

West

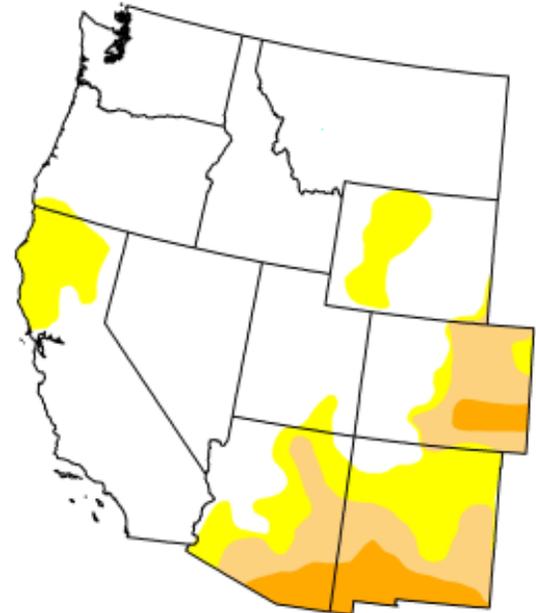
February 8, 2011
Valid 7 a.m. EST

Drought Conditions (Percent Area)

| | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|-------|-------|-------|-------|-------|------|
| Current | 72.75 | 27.25 | 13.79 | 4.44 | 0.00 | 0.00 |
| Last Week (02/01/2011 map) | 75.68 | 24.32 | 12.70 | 4.44 | 0.00 | 0.00 |
| 3 Months Ago (11/09/2010 map) | 68.55 | 31.45 | 6.34 | 0.19 | 0.00 | 0.00 |
| Start of Calendar Year (12/28/2010 map) | 73.26 | 26.74 | 11.98 | 0.89 | 0.00 | 0.00 |
| Start of Water Year (09/28/2010 map) | 62.50 | 37.50 | 8.14 | 0.56 | 0.00 | 0.00 |
| One Year Ago (02/02/2010 map) | 38.72 | 61.29 | 19.22 | 3.26 | 0.00 | 0.00 |

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>

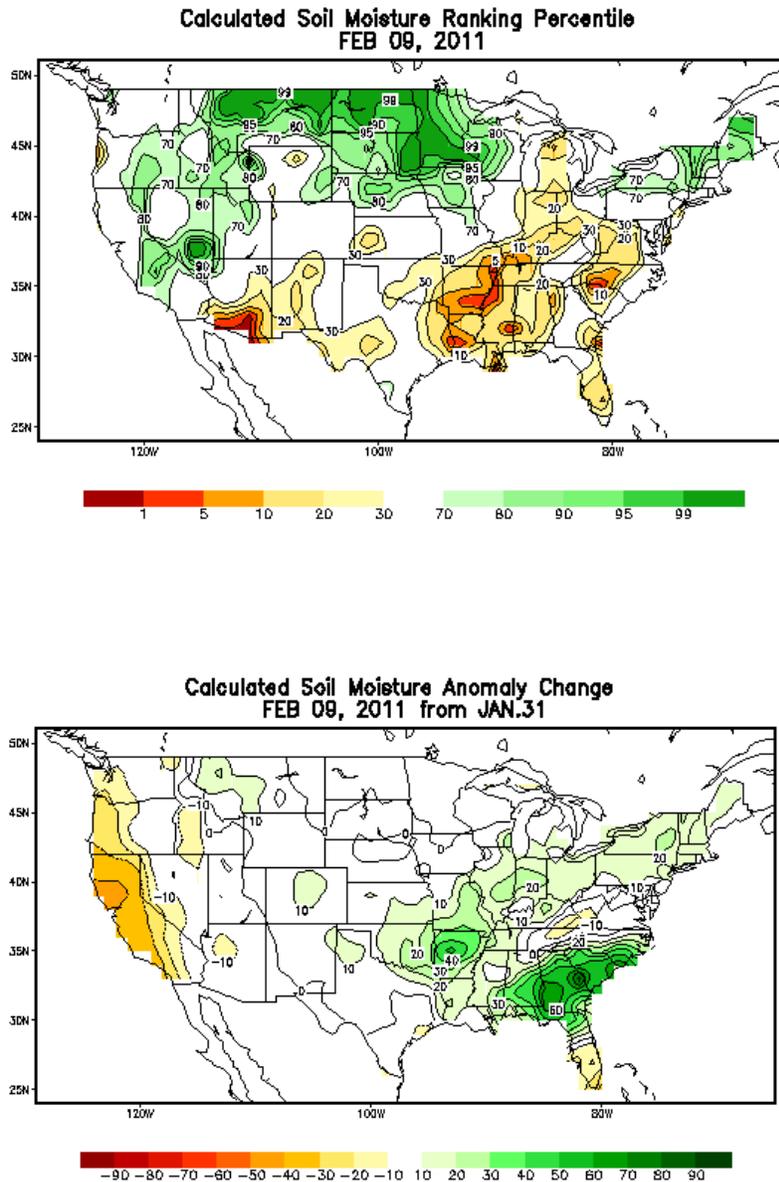


Released Thursday, February 10, 2011
M. Rosencrans, CPC/NOAA

Fig. 4a: Drought Monitor for the Western States with statistics over various time periods. Regionally there was some deterioration during the past week.

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

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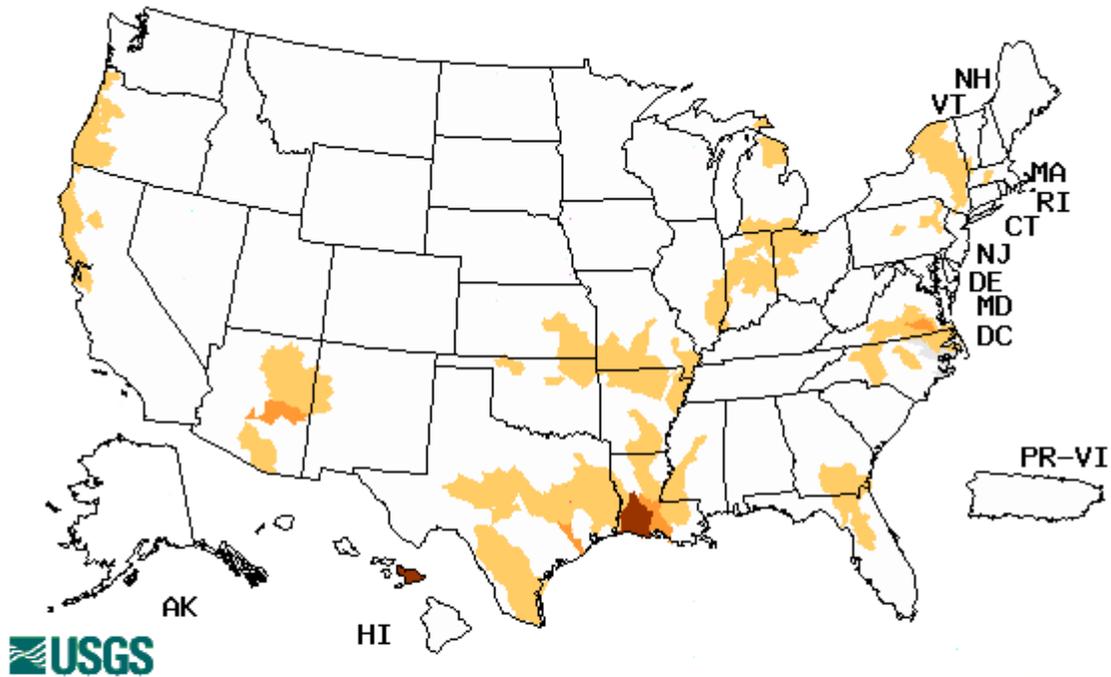


Figs. 5a and 5b: Soil Moisture ranking in percentile as of 9 February (Fig. 5a) shows wet conditions over much of the Northern Tier States with dryness over Arizona and much of the Lower Mississippi River Valley. Since the end of January, much of the Southeast has increased in moisture while dryness increased over the Pacific Coastal States (Fig. 5b).

Ref: http://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml#

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Wednesday, February 09, 2011



| 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. Portions of the Gulf States are reflecting La Niña conditions of dryness. Much of the Southeast improved during the week. Note: northern site gauges are less accurate as rivers and streams freeze. Ref: <http://waterwatch.usgs.gov/?m=dryw&r>

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National Drought Summary -- February 8, 2011

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/>.

Weekly Summary: An active southern stream produced significant rainfall and frozen precipitation across most of the contiguous 48 states east of the Mississippi River. The week began with a storm system over the southern Great Plains. The main low-pressure system and associated fronts brought precipitation to areas from western Texas to New England throughout the day Tuesday and into Wednesday. Significant snows accumulated on the northern flank of this storm system. Behind this storm system, an arctic air mass of cold, high pressure air settled across most of the contiguous 48 states, pushing the remnant cold front off of the gulf coast. The next low-pressure system developed along this boundary and brought significant rains to the southeast and mid-Atlantic before phasing with a northern stream system over New England to produce more snowfall across the northeast during last weekend. The final low-pressure system of the week intensified across the lower Mississippi River valley during Monday, spreading another round of precipitation across the southeast.

Southeast and mid-Atlantic: Multiple storm systems brought significant rains (1.5-6.0 inches) to the southeast, so improvements were made across the Carolinas, Alabama, northern Florida and Georgia. Improvements were minimal in spatial extent as longer term deficits are present in 3-, 6- and 9-month Standardized Precipitation Index (SPI) charts. The core area of the drought in the most recent 3 months appears to have shifted from southern Alabama to the central Carolinas, as measured by SPI. Additional long-term deficits are plaguing this region as Anderson, SC ended 2010 at 11 inches below normal and Greenville, SC was 7 inches below normal. The lakes and ponds are very low and Lake Jocassee is all most 12 ft below normal. Rainfall along coastal North Carolina prompted improvement there as totals were 1-3 inches above normal for the week.

Across Florida, the most significant rains (1.0-5.5 inches) fell across northern Florida, north of the I-4 corridor) while the dry season continued to exacerbate conditions across southern Florida. Six month SPI continues to show severe (D2) to extreme (D3) drought conditions across northeastern Florida despite the recent rains, while the 3-month SPI (SPI-3) and streamflows across south Florida indicate D0-D1 (abnormal dryness through moderate drought) conditions. One-month rainfall deficits are between 2 and 3 inches across south Florida Lake Okeechobee remained about the same last week which is around 12.47 feet compare to the average of 14.63 feet. This is 2.16 feet below normal for this time of year.

Moderate drought (D1) conditions and abnormal dryness were expanded across West Virginia. The storm systems affecting the southeast did not bring precipitation far enough north, while the systems moving in from the west have been unable to bring rain east of the Appalachians. Three and six-month SPI values indicate D2 and D1 conditions, respectively, across eastern West Virginia and Virginia. Streamflow percentile values indicate severe drought (D1) conditions

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as well. 60-day precipitation departures are approaching 6 inches below normal and 30-day departures are near 4 inches in some locations with most locations about 2 inches below normal.

Some improvements were also made across northern Alabama to reflect the recent deluge of rain across the southeast.

Texas and Mississippi River Valley: Degrations to conditions across Texas reflect the continued dryness experienced there. SPI-3 and SPI-6 both indicate widespread D3 conditions from the Big Bend westward. SPI-3 also indicated extreme drought across southeast Texas, slightly removed from the coastal areas. Rainfall totals for the week exceeded 1 inch in only a few isolated spots while many stations reported 0.0 inches of rainfall for the week. 30-day rainfall deficits exceeded 4 inches for many locations in southeastern Texas and only isolated areas of the state were above normal for precipitation totals for the week, which prompted some improvement across the Panhandle. Streamflow measurements indicate continued dryness across most of Texas and the lowest reports align well with where SPI-3 values indicate ongoing dryness. A bit farther north, the low water content and already frozen ground across Oklahoma were helped little by the recent snows.

Across southeast Missouri, weekly rainfall totals from 1.0-2.0 inches prompted some improvement, although the improvement was tempered by the longer-term deficits as evident in the SPI-3 and SPI-6. SPI-6 indicates D4 conditions while SPI-3 indicates no worse than D1 and 30-day precipitation totals are about 2 inches below normal.

Rockies and West: SPI-3 and SPI-6 both indicate D1-D2 conditions across New Mexico and Arizona. Snowpack levels are below normal across eastern Arizona (50-89 percent of normal) but not as far below normal as in southern New Mexico (25-49 percent of normal) and southern Colorado (50-69 percent of normal), so D1 was expanded but D2 was not.

An area of abnormal dryness was introduced in northern California as SPI-3 and 30-day SPI values are indicating conditions as dry as moderate drought. SPI-6 and 60-day SPI values are indicated near normal values, showing that both the longer-term conditions and intermittent rains have kept dryness to low-levels so far this water year. Drought blends also indicated dryness across much of northwestern California.

Recent precipitation and a bit of a reassessment across Wyoming led to some improvements across eastern Wyoming. The latest 30-, 60- and 90-day SPI as well as drought blend values were driving factors in the reassessment.

Northeast and Ohio River Valley: Some improvements were made across central Pennsylvania to reflect the weekly precipitation totals of just over 1.0 inch. Additionally, 30-day ACIS SPI indicates more dryness across the western portions of Pennsylvania. Additional improvements were made across Kentucky to reflect recent precipitation (2.0-3.2 inches). SPI-3 values indicated wetness when compared to SPI-6 values which were much drier.

Hawaii, Alaska, and Puerto Rico: Recent rains (1.2 – 5.6 inches) across southern Alaska prompted some improvement as the storm track finally brought some precipitation to the panhandle of Alaska. Interior and southwestern Alaska continued to experience dry conditions.

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Wet conditions continued across the westernmost islands of Hawaii, but dry conditions dominated the big island. The continued dryness across the big island led to an expansion of D0 conditions to cover the entire windward portion of the island. Across Molokai, Kualapuu Reservoir is still on a mandatory 30% cutback. USDA/FSA also said that pastures have not yet fully recovered. Across Oahu and Kauai, many stations are reporting 104-163 percent of normal rainfall at 30 days and 104-197 percent of normal rainfall, so the gradient from wet to dry is quite sharp.

Dry conditions continued across Puerto Rico with weekly rainfall totals slightly below normal. Should indicators continue to decline, an indication of abnormal dryness might be necessary across the eastern portions of the island.

Looking Ahead: February 9 – February 14, 2011 – An active pattern is expected to bring significant rains to the Pacific Northwest, great lakes and southeast. Remnant frontal boundaries should serve as focal points for rains across the southeast, especially across Florida during the next 3 days. After that, the active weather in the pattern should be restricted to the northern tier of the contiguous states. Into next week, the large-scale pattern should support above-normal rainfall along the entire west coast and from the Canadian border in Minnesota to the Ohio River Valley. Dry conditions are expected to continue from the central Rockies to the gulf coast and along the eastern seaboard.

Author: [Matthew Rosencrans, NOAA/NWS/NCEP/CPC](#)

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 9, 2011