



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

Weekly Report - Snowpack / Drought Monitor Update

Date: 10 March 2011

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Snow: SNOTEL Snow-Water Equivalent percent of normal values for 10 March 2011 shows several river basins across the Pacific Northwest and Great Basin have improved by one category during the past week (noted by blue circles) (Fig. 1). SNOTEL Snow-Water Equivalent percent of Normal peak shows slow recovery across parts of the West (we are about 88% through the snow accumulation season for the Northern Tier States; climatologically speaking, the peak for the Southwest has been reached). Parts of the Uinta, Wasatch, and Sierra have reached peak values as of this week. Northern sites usually peaks between 1 and 15 April (Fig.1a). SNOTEL 7-day snow depth changes show significant gains over Utah, and parts of Colorado and Wyoming, and the Northern Cascades. Significant decreases are noted over the Central Cascades, Sierra Nevada, and the Panhandle of Idaho (Fig. 1b).

Temperature: Average SNOTEL temperatures were within $\pm 5^{\circ}\text{F}$ of the long term average for this time of year (Fig. 2). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures over southern New Mexico ($>+5^{\circ}\text{F}$) and the greatest negative departures over northern Montana ($<-25^{\circ}\text{F}$). This has been a persistent pattern to for the past three week (Fig. 2a).

Precipitation: ACIS 7-day average precipitation amounts for the period ending 9 March shows the bulk of the heaviest precipitation confined to southwest coast of Oregon (Fig. 3). In terms of percent of normal, the precipitation was highest across the mid-section of the West (Fig. 3a). The Southern Cascades, the Northern Great Basin, and parts of Colorado and Wyoming were easily the winners this week with abundant moisture. The extreme southern region of the Southwest continues to see large deficits (courtesy of La Niña). 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 the Northern and Central Rockies. One-category deterioration is noted by the red circles; blue circles reflect a marginal one-category improvement (Fig. 3b).

West: Two new areas of abnormal dryness have developed during the typical wet season in California and Nevada. D0 is introduced in northern California, around Tehama, Trinity and Shasta counties. Over the last two months, precipitation deficits have been building in this region, with just 25-50 percent of normal. Similarly, a region encompassing part of Inyo County, CA, and Esmeralda and Nye counties, NV, are depicted as abnormally dry. Precipitation for the water year to date is above normal, yet over the last 2 months dry conditions have prevailed, leading to the introduction of D0.

In the southeastern Arizona county of Cochise, D3, or extreme drought, is now evident. Douglas, AZ, has measured just 5 percent of normal precipitation since October 1. Conditions in this area are similar to those of 2006. Warmer temperatures have also exacerbated drought in southeastern Arizona.

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A new impact line is drawn around the area of Agricultural/Hydrological (AH) impacts in eastern Colorado. Elsewhere in the western states conditions remain basically unchanged.

Author: [Laura Edwards, Western Regional Climate 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, 4a, and 4b).

SOIL MOISTURE

Soil moisture (Figs. 5) 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 -

<http://www.wcc.nrcs.usda.gov/water/drought/wdr.pl>

Weekly Snowpack and Drought Monitor Update Report

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

Weekly Snowpack and Drought Monitor Update Report

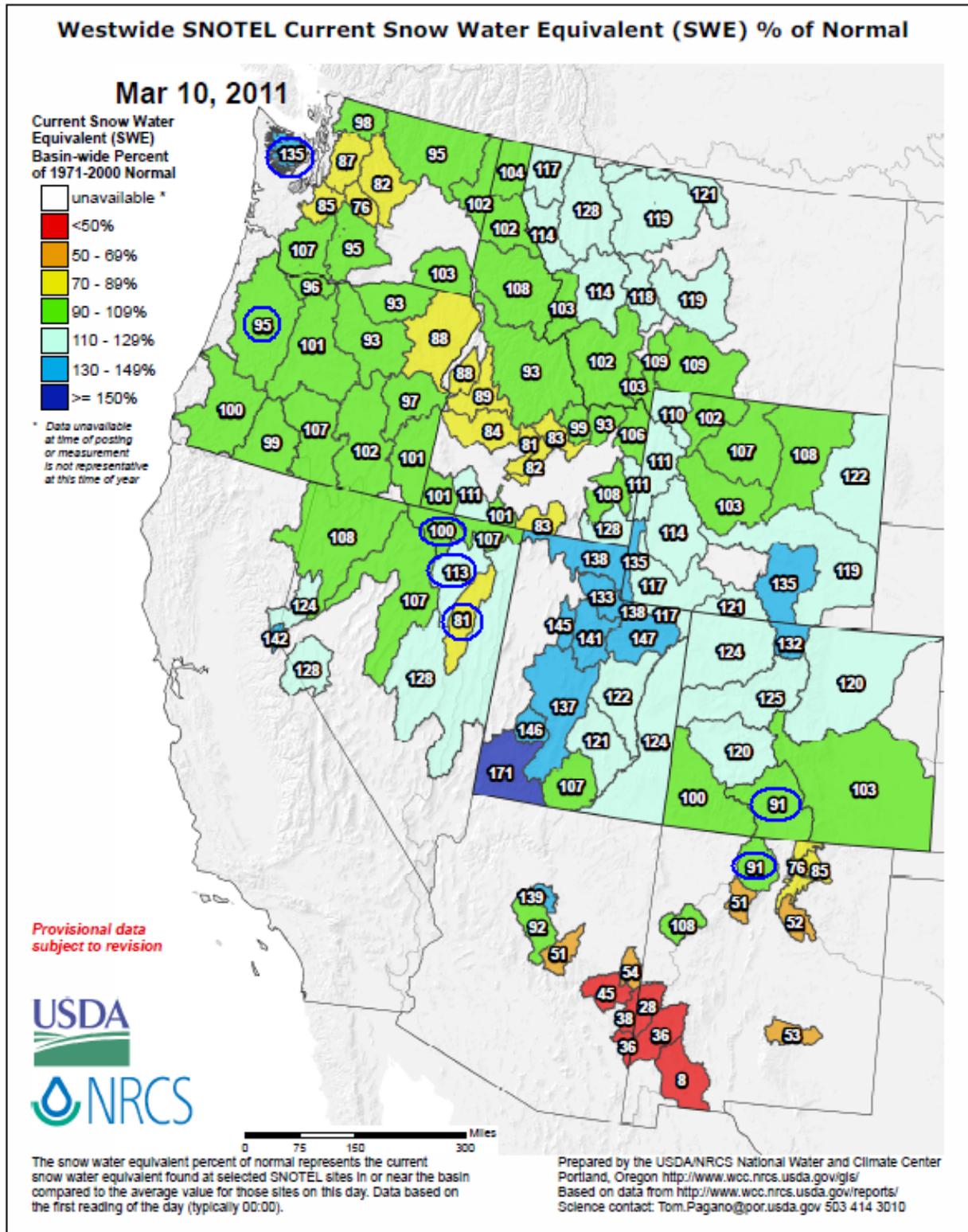
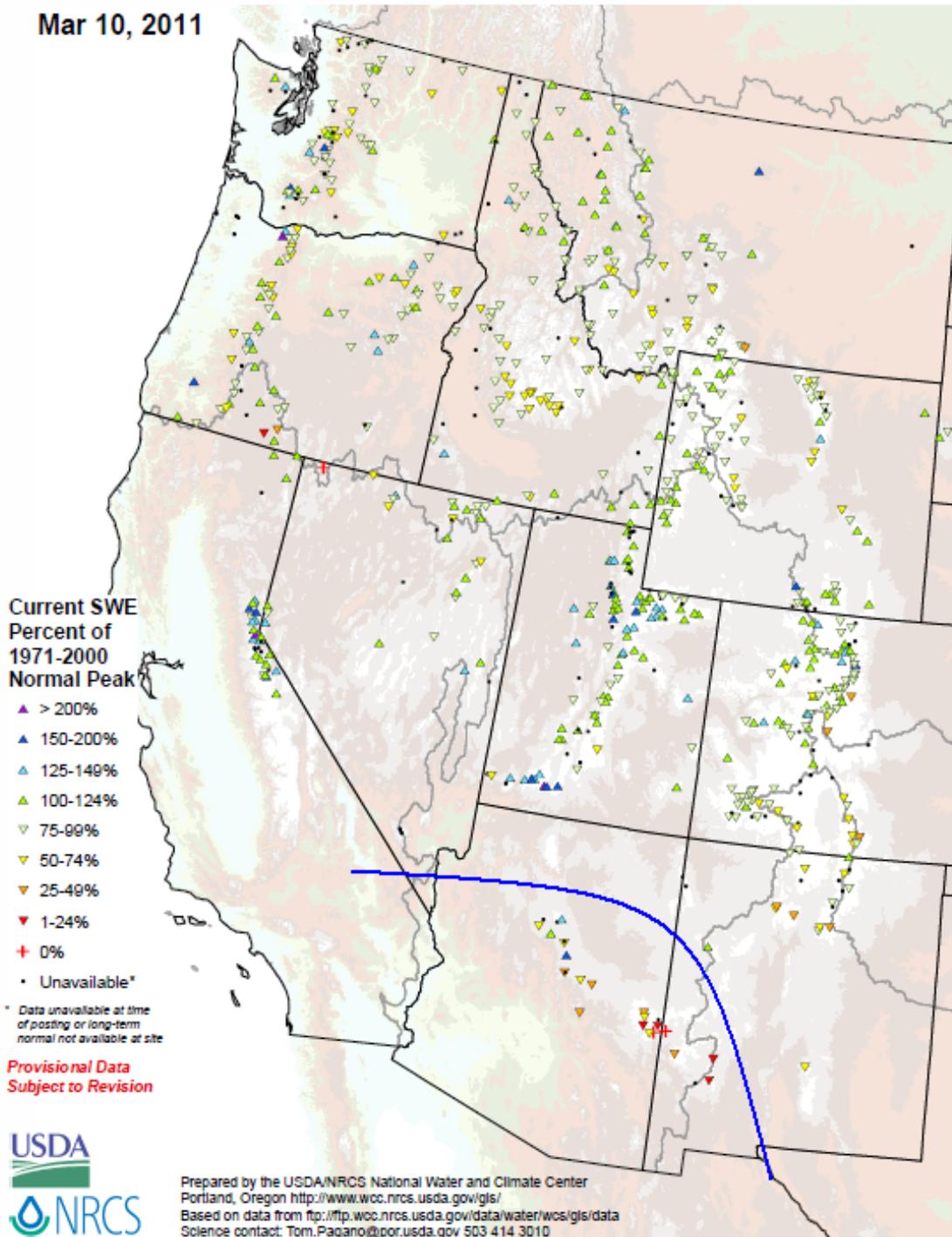


Fig. 1: SNOTEL Snow-Water Equivalent percent of normal values for 10 March 2011 shows several basins across the Pacific Northwest and Great Basin have improved by one category during the past week (noted by blue circles).

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 Mar 10, 2011



Peak for season south of line

Fig. 1a: SNOTEL Snow-Water Equivalent percent of Normal peak shows slow recovery across parts of the West (we are about 88% through the snow accumulation season; climatologically speaking, peak for the Southwest has been reached). Parts of the Uinta, Wasatch, and Sierra are at peak values as of this week. Northern sites usually peaks between 1 and 15 April.

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

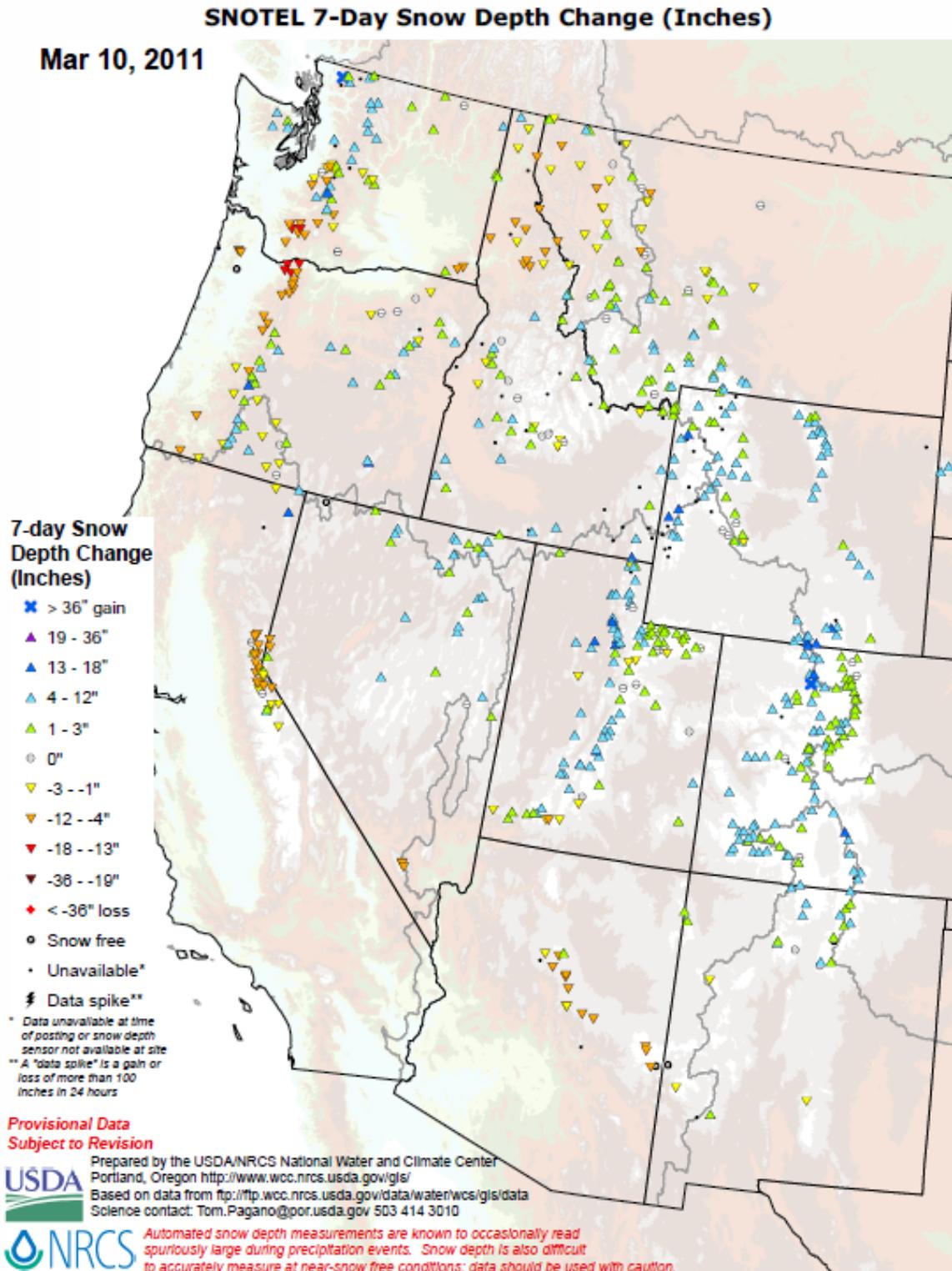


Fig. 1b: SNOTEL 7-day snow depth changes show significant gains over Utah, and parts of Colorado and Wyoming, and the Northern Cascades. Significant decreases are noted over the Central Cascades, Sierra Nevada, and the Panhandle of Idaho.

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

Weekly Snowpack and Drought Monitor Update Report

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

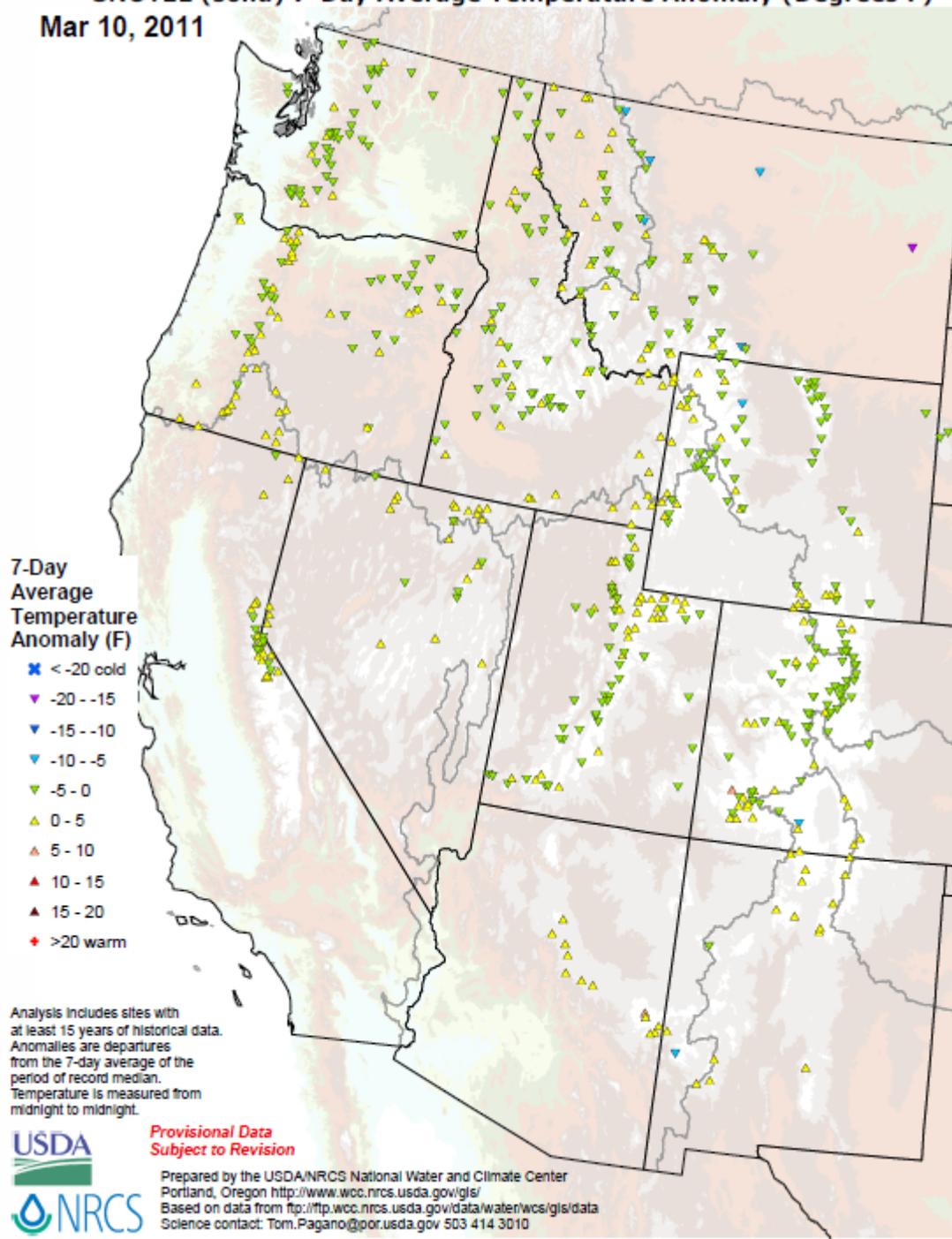
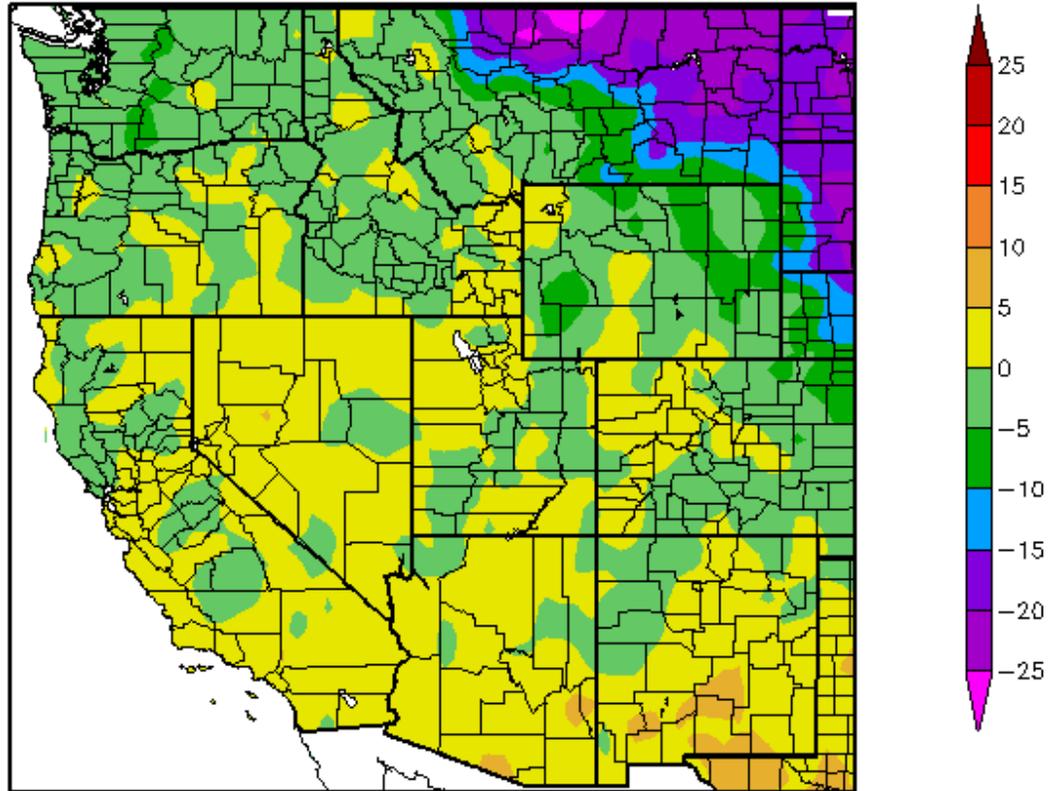


Fig. 2: Average SNOTEL temperatures were within $\pm 5^{\circ}\text{F}$ of the long term average for this time of year. Ref: <http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/WestwideTavg7dAnomaly.pdf>

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



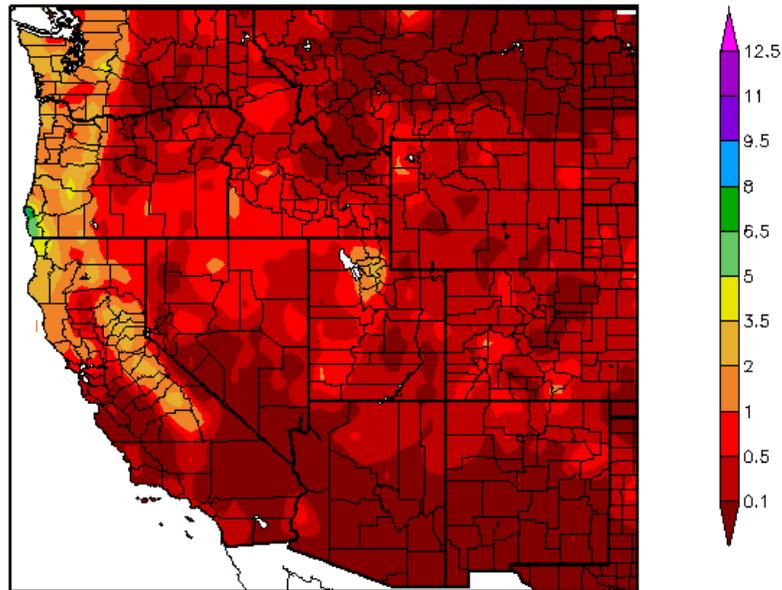
Generated 3/10/2011 at HPRCC using provisional data.

Regional Climate Centers

Fig. 2a: ACIS 7-day average temperature anomalies show that the greatest positive temperature departures over southern New Mexico (>+5°F) and the greatest negative departures over northern Montana (<-25°F). This has been a persistent pattern to for the past three week. Ref: http://www.hprcc.unl.edu/maps/current/index.php?action=update_daterange&daterange=7d

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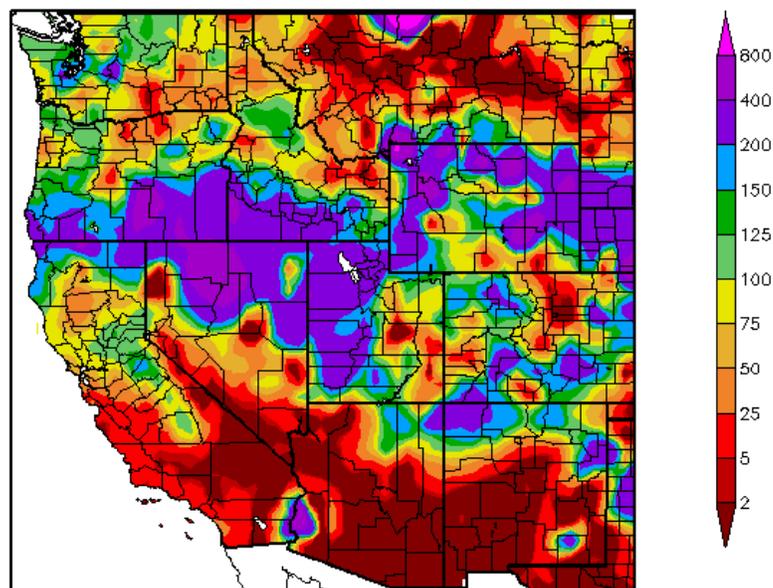
Precipitation (in)
3/3/2011 – 3/9/2011



Generated 3/10/2011 at HPRCC using provisional data.

Regional Climate Centers

Percent of Normal Precipitation (%)
3/3/2011 – 3/9/2011



Generated 3/10/2011 at HPRCC using provisional data.

Regional Climate Centers

Fig. 3 and 3a: ACIS 7-day average precipitation amounts for the period ending 9 March shows the bulk of the heaviest precipitation confined to southwest coast of Oregon (Fig. 3). In terms of percent of normal, the precipitation was highest across the mid-section of the West (Fig. 3a). The Southern Cascades, the Northern Great Basin, and parts of Colorado and Wyoming were easily the winners this week with abundant moisture. The extreme southern region of the Southwest continues to see large deficits (courtesy of La Niña). Ref: <http://www.hprcc.unl.edu/maps/current/>

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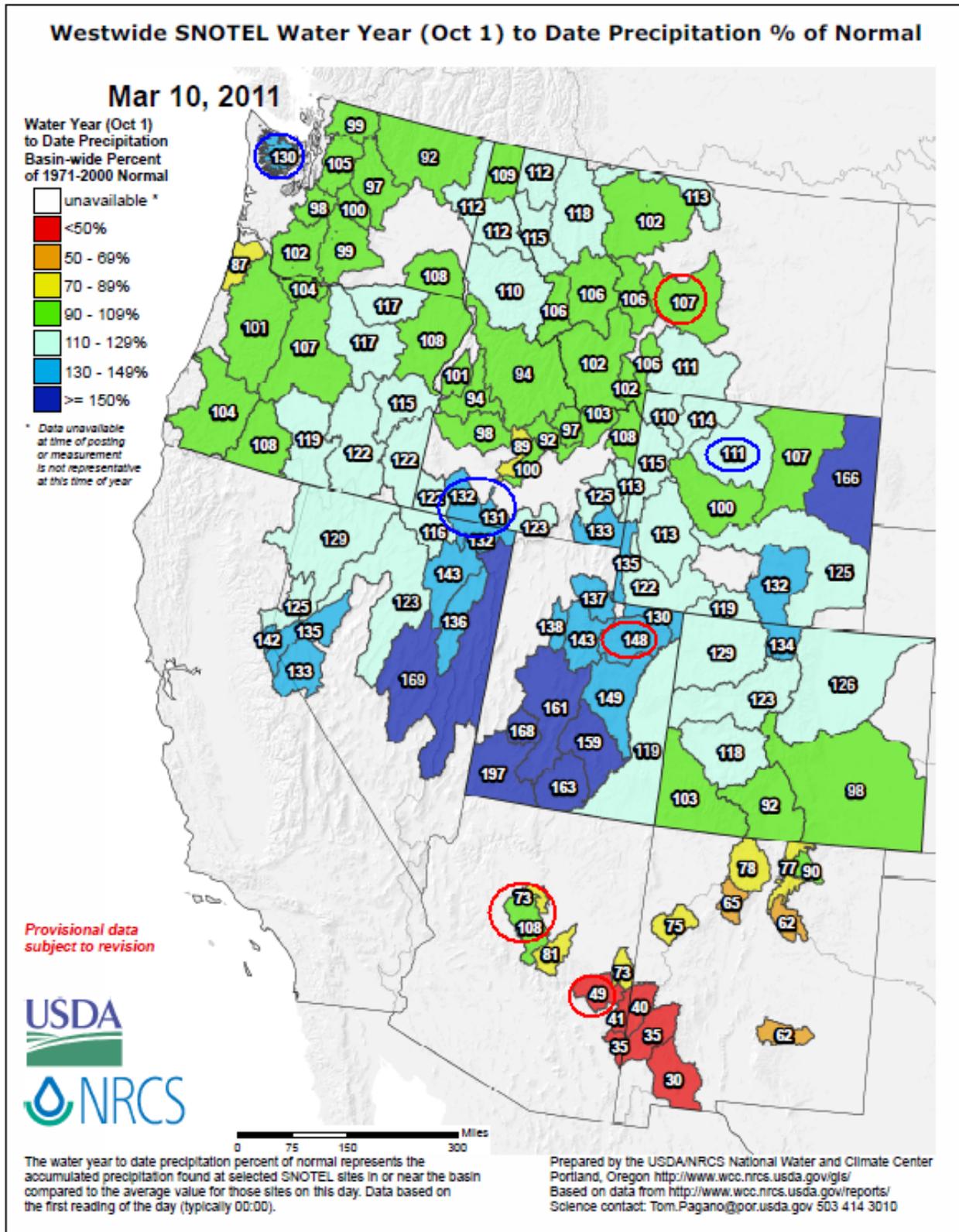


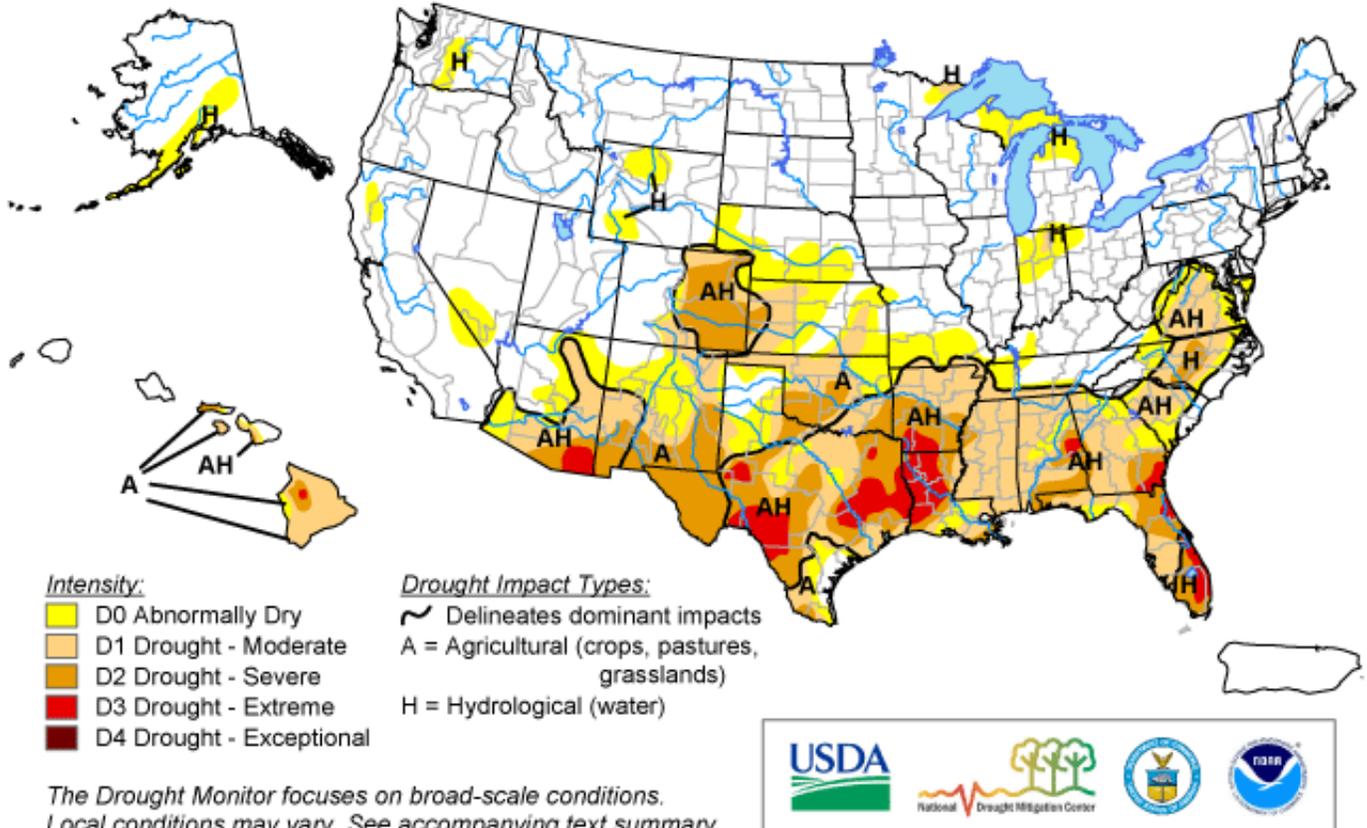
Fig 3b: For the 2011 Water-Year that began on 1 October 2010, the greatest deficits are found over the extreme southern reaches of the Southwest. Areas with the highest values are found over the Great Basin, and the Northern and Central Rockies. One-category deterioration is noted by the red circles; blue circles reflect a marginal one-category improvement.

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

U.S. Drought Monitor

March 8, 2011

Valid 7 a.m. EST



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

Released Thursday, March 10, 2011
Author: Laura Edwards, Western Regional Climate Center

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 Arizona, Texas, Louisiana, Arkansas, Alabama, Georgia, and Florida. Ref: <http://www.drought.unl.edu/dm/monitor.html>

U.S. Drought Monitor

West

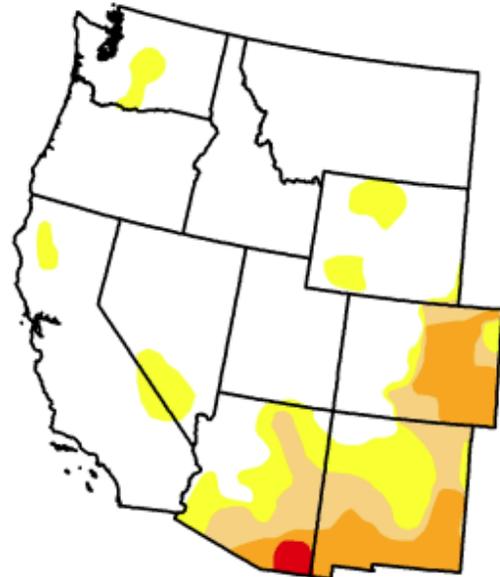
March 8, 2011
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	74.46	25.54	14.96	7.72	0.56	0.00
Last Week (03/01/2011 map)	76.15	23.85	15.15	7.72	0.00	0.00
3 Months Ago (12/07/2010 map)	64.91	35.09	6.39	0.87	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 (03/02/2010 map)	34.92	65.08	21.09	3.76	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, March 10, 2011
L. Edwards, Western Regional Climate Center

Fig. 4a: Drought Monitor for the Western States with statistics over various time periods. Regionally there was some deterioration in the D0-D1 categories during the past week. Ref: http://www.drought.unl.edu/dm/DM_west.htm

Drought Monitor Classification Changes for Selected Time Periods

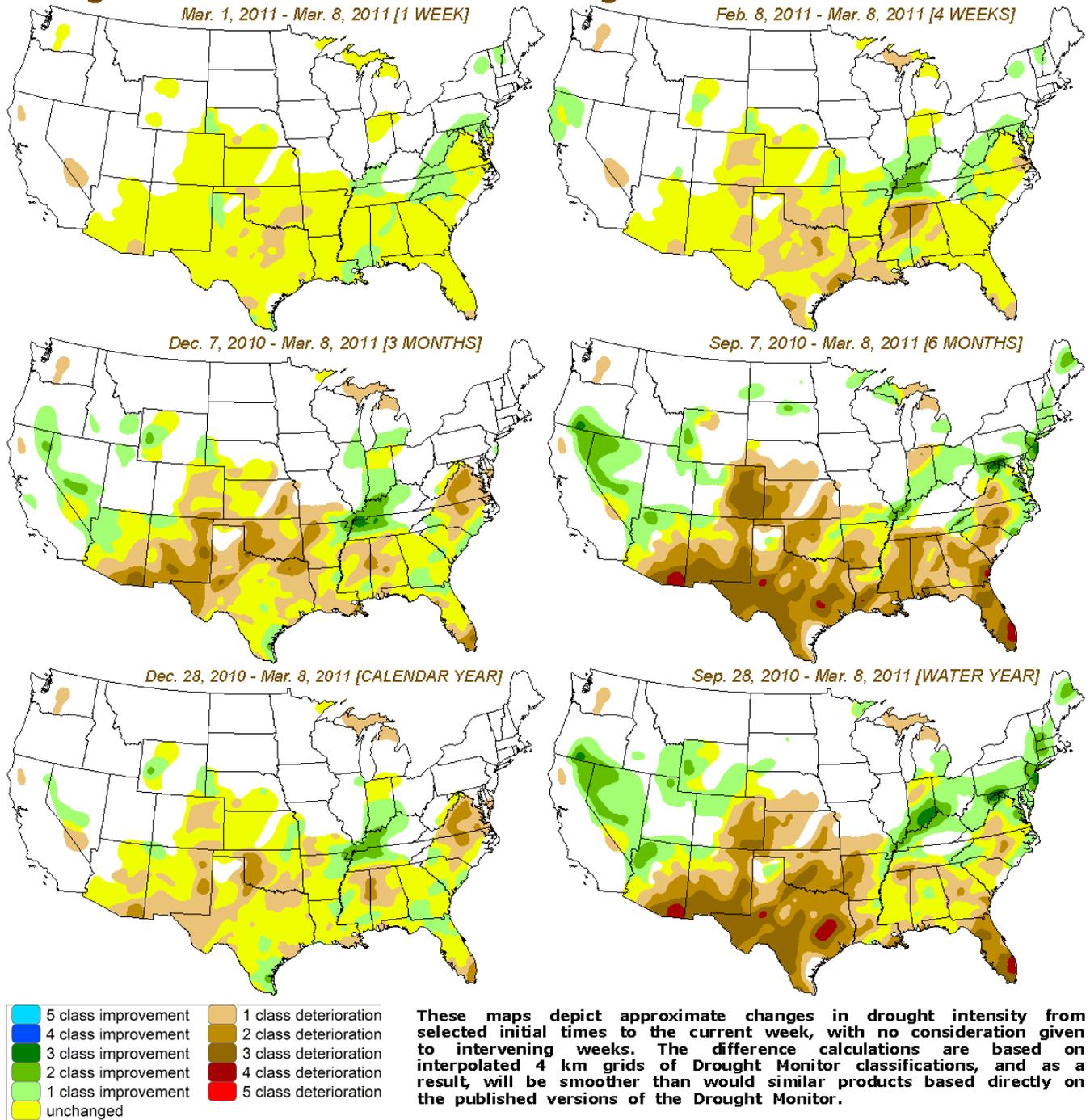
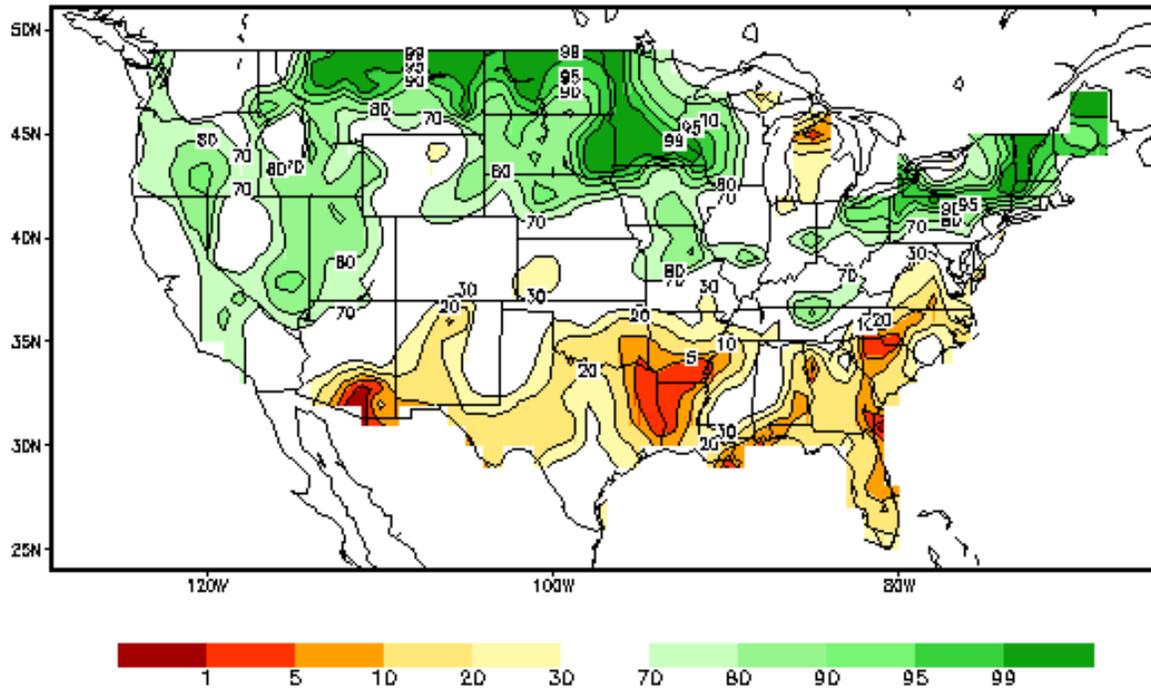


Fig. 4b: Drought Monitor classification changes over various time periods show long term drying over the Southern Tier States but lesser changes over the more recent past.

Weekly Snowpack and Drought Monitor Update Report

Calculated Soil Moisture Ranking Percentile MAR 09, 2011

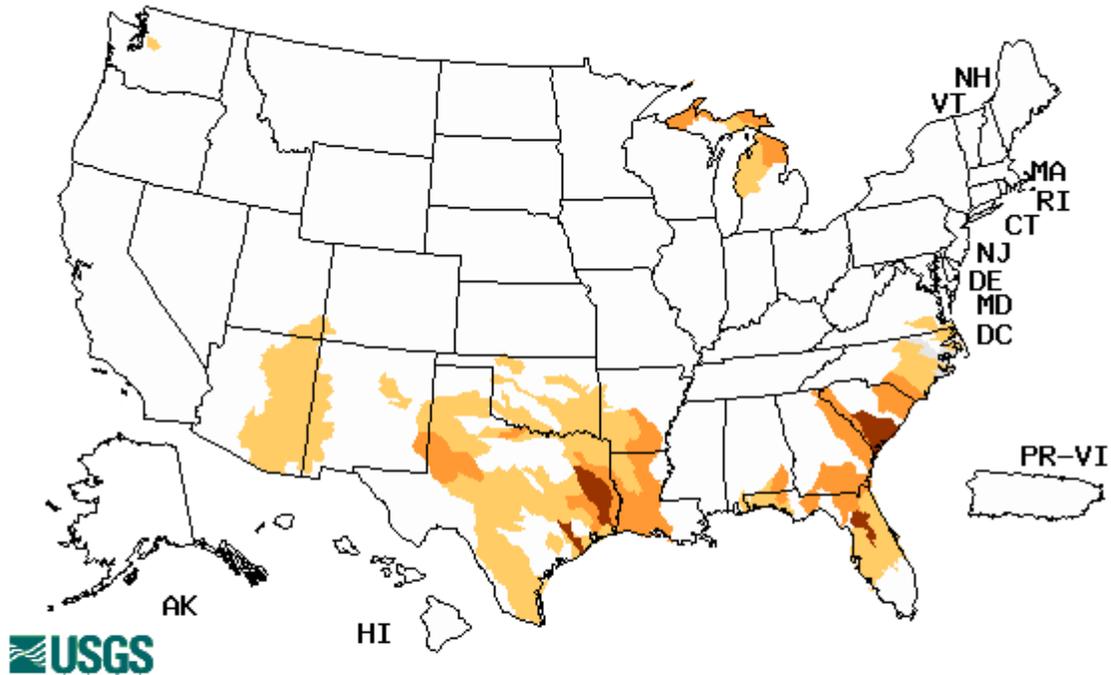


Figs. 5: Soil Moisture ranking in percentile as of 9 March (Fig. 5) shows wet conditions over much of the Northern Tier States with dryness over Arizona and much of the Lower Mississippi River Valley and into the Mid-Atlantic States.

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

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Wednesday, March 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 Arizona, the Northern Great Lakes, the Gulf States, and the Mid-Atlantic States are reflecting La Niña conditions of dryness. Note: northern site gauges are less accurate as rivers and streams are probably frozen. Ref: <http://waterwatch.usgs.gov/?m=dryw&r>

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National Drought Summary -- March 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/>.

Summary: Significant precipitation fell over the southern states from Louisiana to Alabama, and the Northeast. Flooding concerns continued around the Kentucky and Tennessee region. Dry conditions have returned to some parts of the western U.S. and Florida.

Northeast and Mid-Atlantic: Areas of abnormal dryness are removed in this week's depiction with considerable snowfall across upstate New York and Vermont. In the month of February, many locations measured .75 to 1.5 inches above normal precipitation. From West Virginia to Pennsylvania and northern Maryland, a one-category improvement is made to reflect the same storm. Over one inch of rain fell in locations on March 6 alone. Soil moisture is recovering and streamflows have responded to the recent moisture. Along the border of western Virginia and Tennessee, a one-category improvement is shown in response to rainfall over the last two weeks that has greatly improved conditions, and has brought some local flooding.

Ohio River Valley: Flooding concerns continue at the Ohio River and Mississippi River Valleys around Missouri, Kentucky and Tennessee from heavy rainfall that has occurred over the last two weeks. A one-category improvement was made across this region, resulting in a large drought-free area in the Ohio River Valley.

Southeast: In North Carolina, drought-free conditions returned to the western part of the state after some beneficial moisture during this last Drought Monitor period. Some locations reported three or more inches of rain over the week. Areas of D1 and D2 are also reduced along their western edges in central North Carolina. Drought impacts here are primarily reflected in water resources and water supply, as shown in streamflow gauge data and other water monitoring data. The impact designation is changed to H from AH.

Reports from Florida indicate further degrading conditions, with continued lack of rainfall and dropping lake levels, so extreme drought is expanded to include counties east of Lake Okeechobee. The region of D2, severe drought, is also expanded southward to include more of Monroe and Dade counties. A large wildfire of 16,000 acres in eastern Florida confirmed severe to moderate drought conditions as depicted on the map.

Central and northeastern Alabama received two to four inches of rain over the Drought Monitor period, resulting in improving conditions over most of the state. An area of severe drought was removed in the northeast, and a one-category change to D0 was made in central Alabama. In the southwest along the Mississippi border, the area of D2 was reduced as well. Streamflow and soil moisture has increased in all of these areas in response to the recent rains.

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South: In Louisiana, an area of heavy rainfall occurred northwest of Baton Rouge, resulting in a one-category improvement. This storm system spilled over into Mississippi, and some drought relief is shown in the map this week. Some locations reported around four inches of rain that fell on the worst drought areas.

Texas has several pockets of change depicted on the map to make a more accurate depiction of drought in the Lone Star State. In the south, some improvements and degradations are made to reflect blends of climate indicators pointing to changing conditions. In the southwest, D3 is expanded around Midland and Terrell and Crockett counties. Water restrictions are being put into place, and degrading conditions are warranted with this severe impact. In Midland, TX, only .11 inches of rain has fallen since October 1, the driest water year on record for this date so far. An expansion of moderate drought (D1) is made in the north and north central counties, and D2 is grown in extent to include the area between Abilene and Wichita Falls. In the panhandle of Texas, an area of no drought is larger this week.

Central Plains: Oklahoma is starting to feel some impacts from a long period of below average precipitation. Moderate drought is expanded this week to include the area from the panhandle to central Oklahoma, as well as across the southeast. Long-term dryness has continued over the last 6 to 12 months, and impacts in the agricultural sector are imminent as crops begin to come out of dormancy. Streamflow data are at very low levels, particularly in Beckham and Washita counties.

There has been a reduction in agricultural impacts in the Nebraska panhandle, resulting in removal of D1. The southern part of the state, however, has not been as lucky. Abnormally dry conditions are depicted on this week's map to reflect long-term dryness since the fall season, although there are some pockets of wetter locations. With the spring growing season approaching, agricultural sectors are concerned.

West: Two new areas of abnormal dryness have developed during the typical wet season in California and Nevada. D0 is introduced in northern California, around Tehama, Trinity and Shasta counties. Over the last two months, precipitation deficits have been building in this region, with just 25-50 percent of normal. Similarly, a region encompassing part of Inyo County, CA, and Esmeralda and Nye counties, NV, are depicted as abnormally dry. Precipitation for the water year to date is above normal, yet over the last 2 months dry conditions have prevailed, leading to the introduction of D0.

In the southeastern Arizona county of Cochise, D3, or extreme drought, is now evident. Douglas, AZ, has measured just 5 percent of normal precipitation since October 1. Conditions in this area are similar to those of 2006. Warmer temperatures have also exacerbated drought in southeastern Arizona.

A new impact line is drawn around the area of Agricultural/Hydrological (AH) impacts in eastern Colorado. Elsewhere in the western states conditions are unchanged.

Hawaii, Alaska and Puerto Rico: Areas of Alaska continue to show mixed indicators, with good streamflow for this time of year, yet precipitation deficits remain. Abnormally dry conditions (D0) were retained in southern and east central Alaska. In Hawaii, just enough rainfall was received to maintain the same drought status as last week. Typical dry conditions prevailed in Puerto Rico, during their dry season. No changes are made this week.

Weekly Snowpack and Drought Monitor Update Report

Looking Ahead: It is likely that localized flooding will continue in the Ohio River Valley from Missouri to Ohio. Over the next couple of days, rain and snow will continue across the eastern states in the early part of the next Drought Monitor period. Southern states, such as Alabama, will likely also benefit from some rain. The Four Corners, Front Range and Dakotas will experience a dry period for the next couple of days. Rain and snow showers will impact the Aleutian Islands.

After an early cold spell in the northern tier states, warmer temperatures will return to the Great Lakes region. Southern Arizona will continue to have temperatures in the 80s like southern Texas and Florida, and the Pacific Northwest will be cool.

In the six to ten day outlook, at the end of the next Drought Monitor period, warmer temperatures are expected to prevail over nearly all of the lower 48 states, with the exception of the Pacific Northwest where below normal temperatures are projected. Precipitation for the same period may be scarce in the desert southwest states of Arizona and New Mexico, as well as the southeastern tier. This could exacerbate drought conditions in these already hard-hit regions. Above normal precipitation for the end of the next Drought Monitor period could occur in the Pacific Northwest and from the central Plains to New York.

Author: [Laura Edwards, Western Regional Climate 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 March 9, 2011