United States Department of Agriculture

NRCS

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

Weekly Report - Snowpack / Drought Monitor Update Date: 8 April 2010

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Snow: SNOTEL Snow-Water Equivalent percent of normal values for 8 April 2010 shows surpluses over the Southwest and deficits over the Northern Tier States. Several areas across the West had a one category improvement since last week (Fig. 1). SNOTEL 7 day snow depth change reveals significant increases across most of the North-Central Rockies, Wasatch, and Cascades. Significant decreases are also noted over the Front Ranges of southern Colorado and Northern Mexico as well as the Southwestern Mountains (Fig. 1a).

Temperature: ACIS 7-day average temperature anomalies show that the greatest positive temperature departures were over parts of southwestern High Plains (>+6°F) and the greatest negative departure occurred over the Central Great Basin (<-15°F) (Fig. 2).

Precipitation: ACIS 7-day average precipitation amounts for the period ending 7 April shows the bulk of the heaviest precipitation fell over the higher terrain of the West Coast States and Central Rockies. In terms of percent of normal, the West Coast and Central Interior Western States dominated (Fig. 3). In terms of percent of normal, the West Coast and Central Interior Western States dominated with significant precipitation. Areas with significant deficits occurred over Arizona, New Mexico and much of Montana (Fig 3a). For the 2010 Water-Year that began on 1 October 2009, Arizona and New Mexico have the largest surpluses while the northern interior Western States have the greatest deficits. A one category improvement occurred north of Reno, Nevada this week (Fig. 3b).

WESTERN DROUGHT STATUS

The West: Once again, most of the precipitation that fell across the Western states during the past 7-days did not fall over areas that needed it; however, there were some notable exceptions. Liquid equivalent precipitation amounts of 2.0 inches or more were reported over western Wyoming, northwestern parts of Colorado, northern Utah, and a few scattered locations in Idaho. In northwestern Colorado, April 6 snow pack and WYTD (since October 1, 2009) percent of normal precipitation were boosted, resulting in a slight improvement for far northern portions of both Routt and Jackson Counties. Not surprisingly, with the current El Nino winding down, seasonal mountain snow water content (SWC) (as of April 1, 2010) has generally been below to well below average across the Pacific Northwest and northern Rockies, and near to well above average in the higher terrain of California and Arizona. The interior Pacific Northwest had considerable differences in its mountain SWC, and was dominated by a fairly variable SWC pattern, with prevailing values ranging from 50 to 75 percent of normal. In parts of northern Idaho and northwestern Montana, SWC values ranged from only 25 to 50 percent of normal. Some improvements were made in southeastern Oregon, based on recently received heavy precipitation and basin-averaged SWC, ranging from 90 to 110 percent of average.

Across California and the interior Southwest, seasonal mountain SWC was generally near to above average. The recent, beneficial precipitation that fell in northern California keeps the region on pace for achieving a median April to July runoff. Unfortunately, near average precipitation and SWC for the winter season will not be enough to make up for storage deficits in the mountain block, reservoirs, and valley groundwater basins. In addition, the winter storm tracks tended to favor certain reservoirs and

not others. Across the Mogollon Rim of central Arizona, snow pack values of 180 percent or more of normal were reported. SWE values in central Arizona were considerably in excess of 180 percent of average. No changes have been made to the drought depictions in California or the interior Southwest this week. **Author:** Anthony Artusa, 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 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.

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

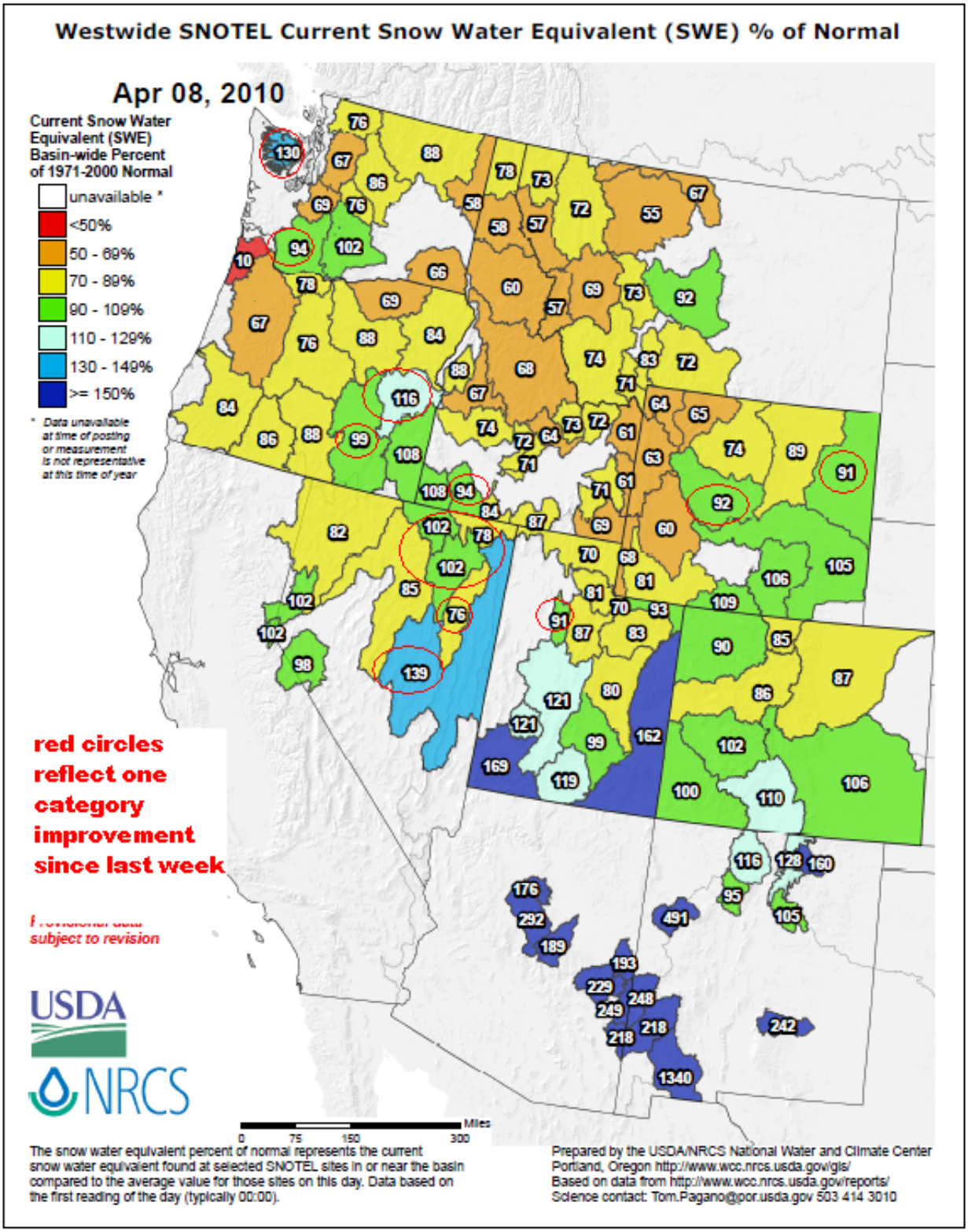


Fig. 1: SNOTEL Snow-Water Equivalent percent of normal values for 8 April 2010 shows surpluses over the Southwest and deficits over the Northern Tier States. Red circles reflect a one category improvement since last week.

Ref: ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west_swepctnormal_update.pdf

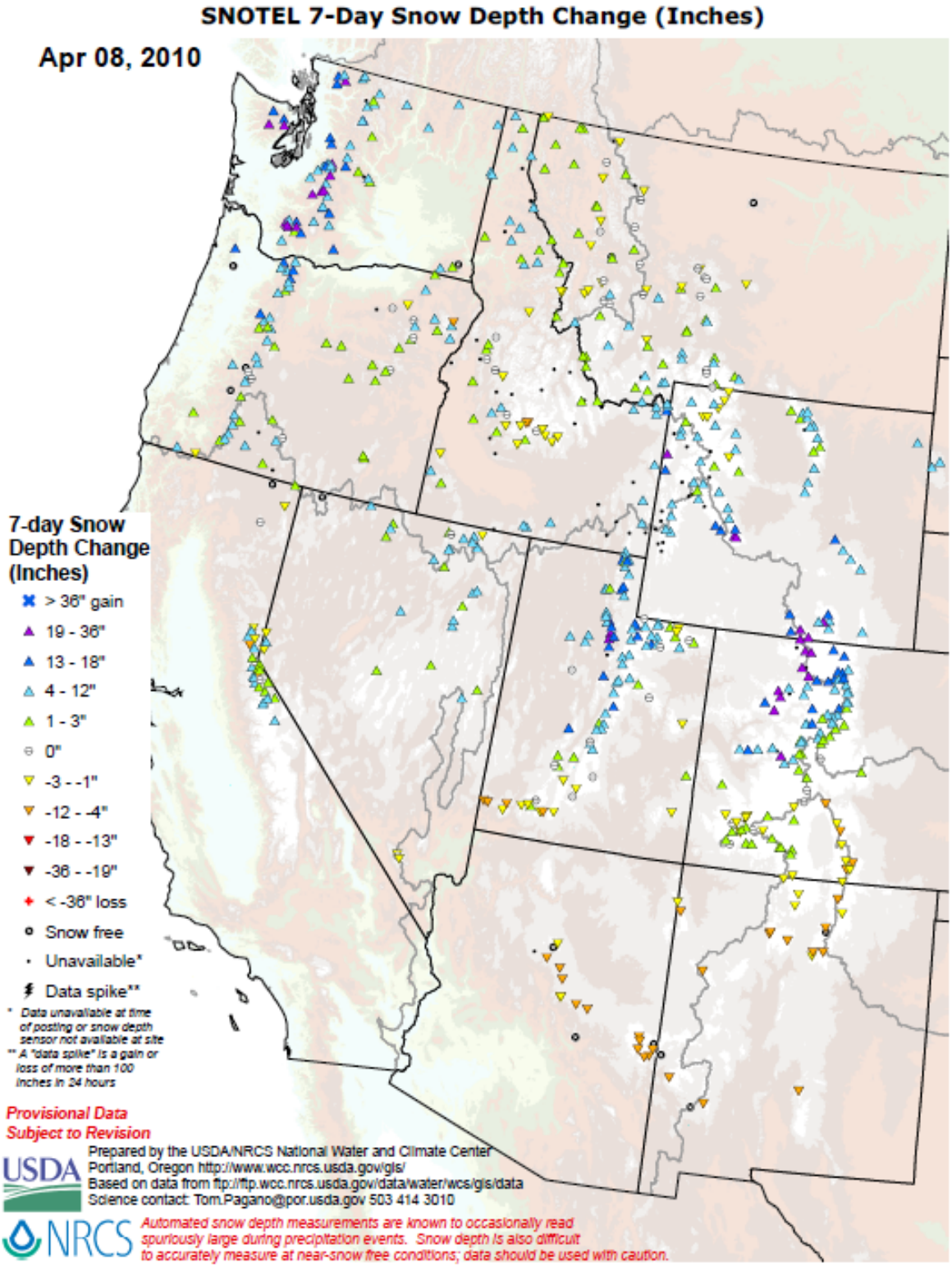


Fig. 1a: SNOTEL 7 day snow depth change reveals significant increases across most of the North-Central Rockies, Wasatch, and Cascades. Significant decreases are also noted over the Front Ranges of southern Colorado and Northern Mexico as well as the Southwestern Mountains.

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

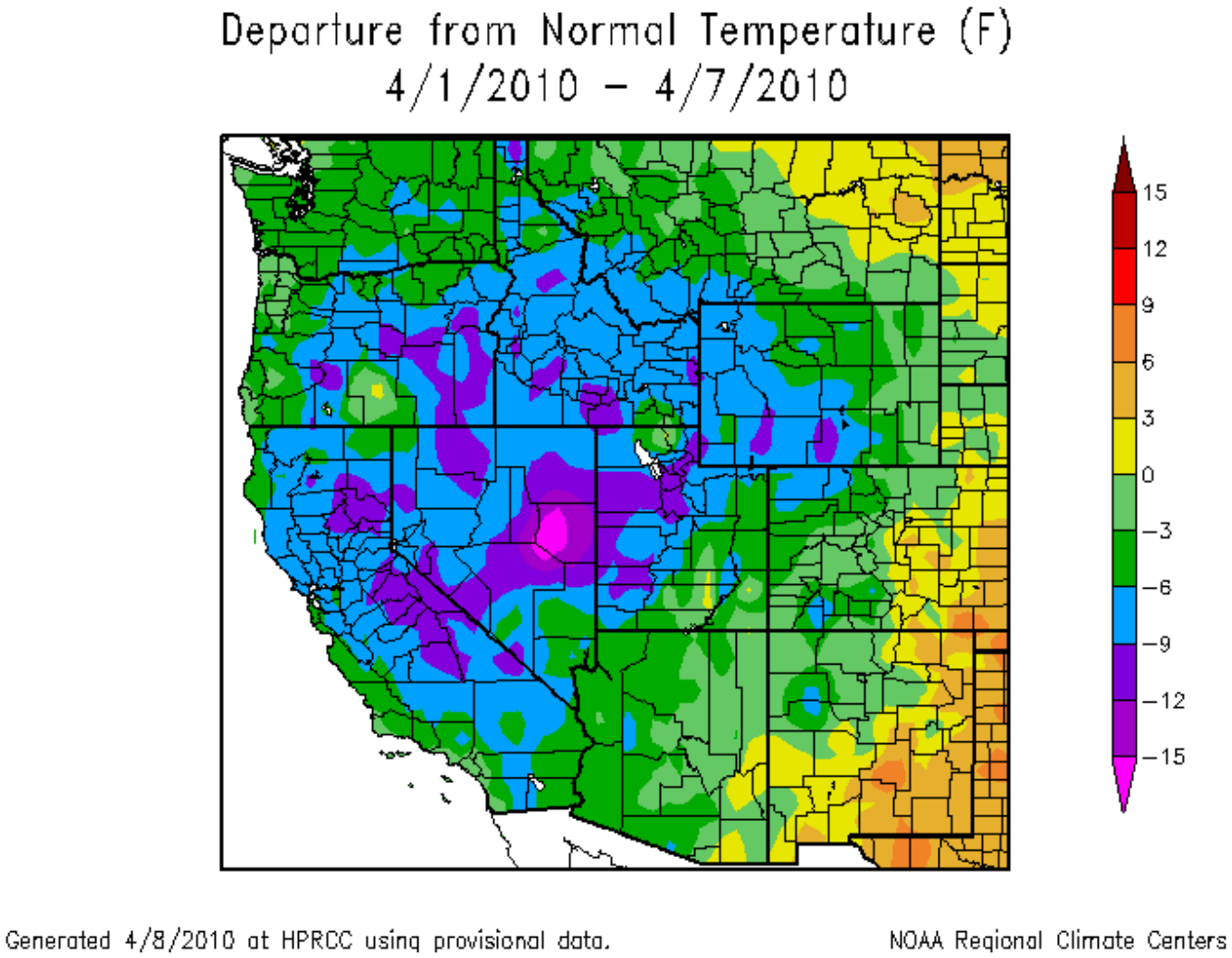
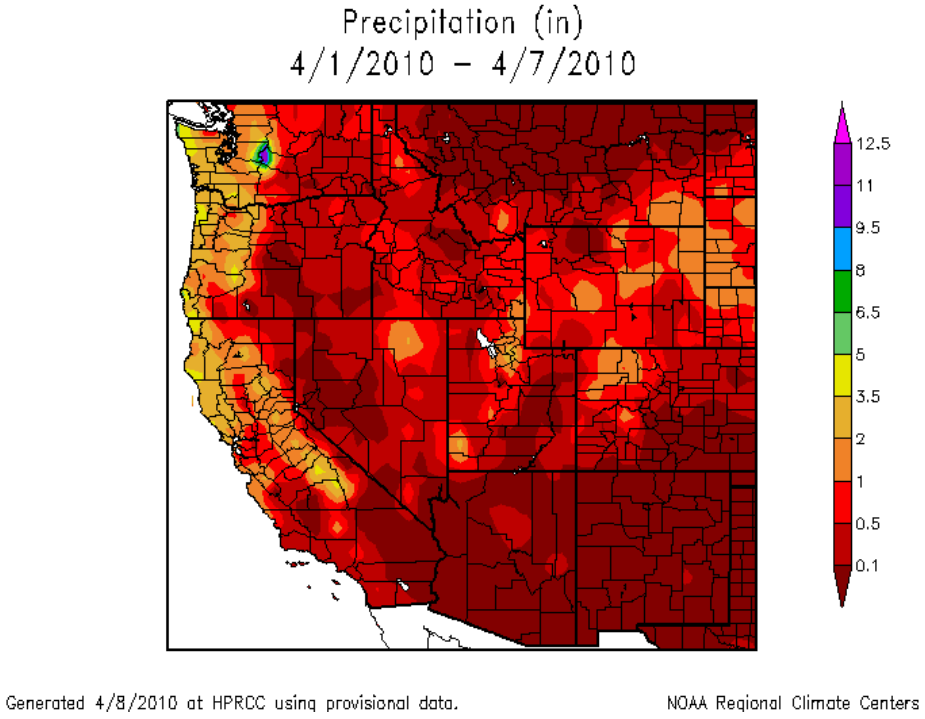


Fig. 2: ACIS 7-day average temperature anomalies show that the greatest positive temperature departures were over parts of southwestern High Plains (>+6°F) and the greatest negative departure occurred over the Central Great Basin (<-15°F).

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



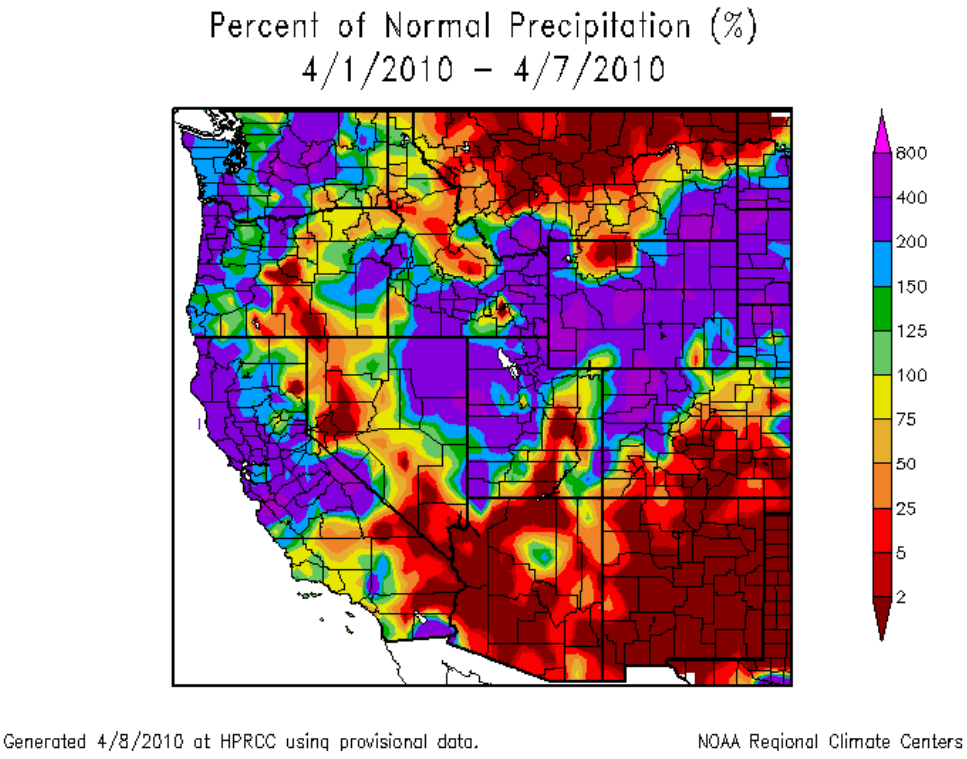


Fig. 3. and 3a: ACIS 7-day average precipitation amounts for the period ending 7 April shows the bulk of the heaviest precipitation fell over the higher terrain of the West Coast States and Central Rockies. In terms of percent of normal, the West Coast and Central Interior Western States dominated with significant precipitation. Areas with significant deficits occurred over Arizona, New Mexico and much of Montana. ***Ref:*** *http://www.hprcc.unl.edu/maps/current/*

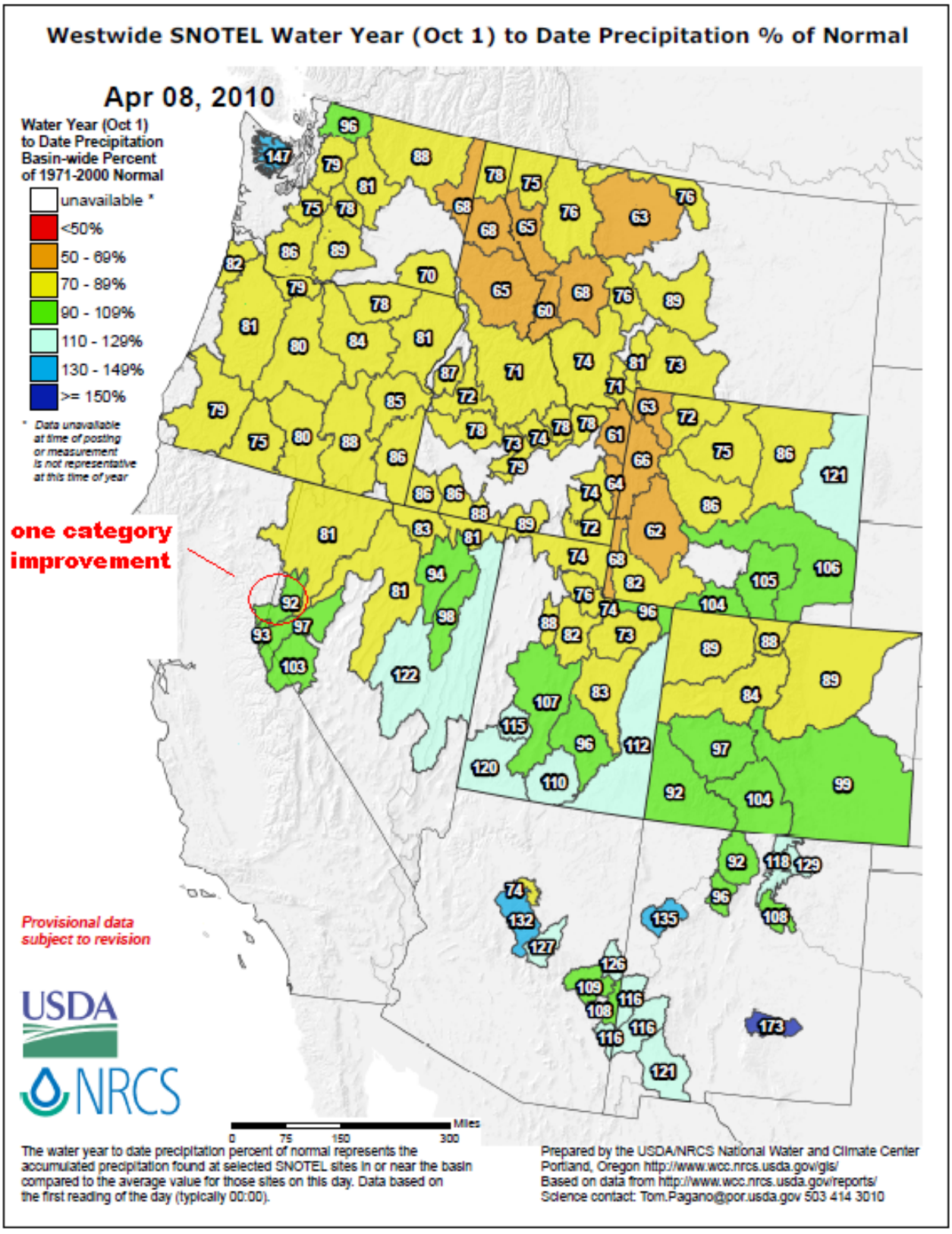


Fig 3b. For the 2010 Water-Year that began on 1 October 2009, Arizona and New Mexico have the largest surpluses while the northern interior Western States have the greatest deficits. A one category improvement occurred north of Reno, Nevada this week.

Ref: ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west_wytdprecpctnormal_update.pdf

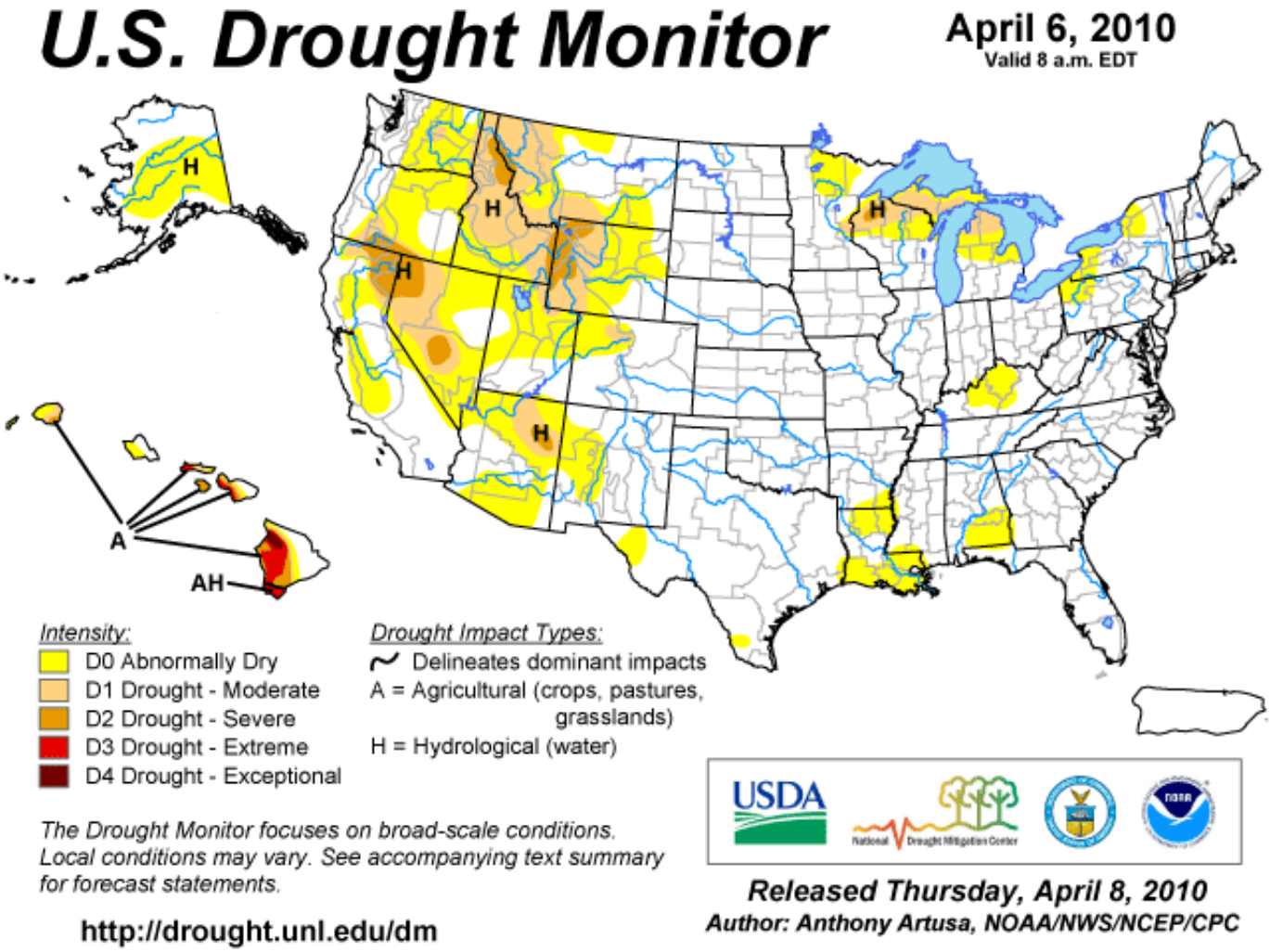


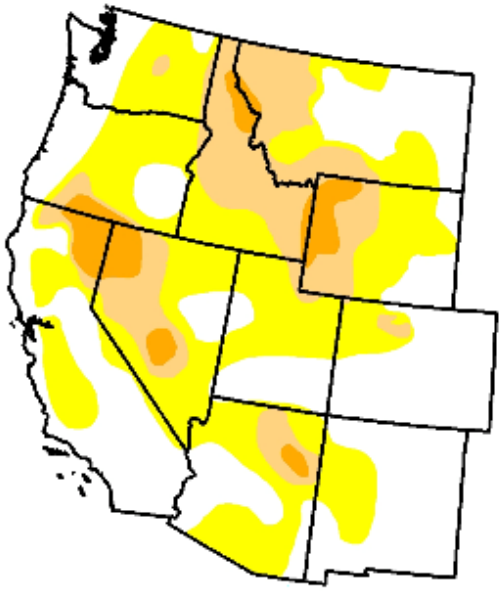
Fig. 4. Current Drought Monitor weekly summary. Note Hawaii is the only state that is in D4 Drought.
Ref: National Drought Mitigation Center (NDMC) - http://www.drought.unl.edu/dm/monitor.html

U.S. Drought Monitor
West

April 6, 2010
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	43.5	56.5	20.6	4.9	0.0	0.0
Last Week (03/30/2010 map)	42.2	57.8	21.4	4.9	0.0	0.0
3 Months Ago (01/12/2010 map)	31.9	68.1	32.0	14.7	0.9	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 (04/07/2009 map)	36.5	63.5	26.3	7.1	0.0	0.0



Intensity:

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

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

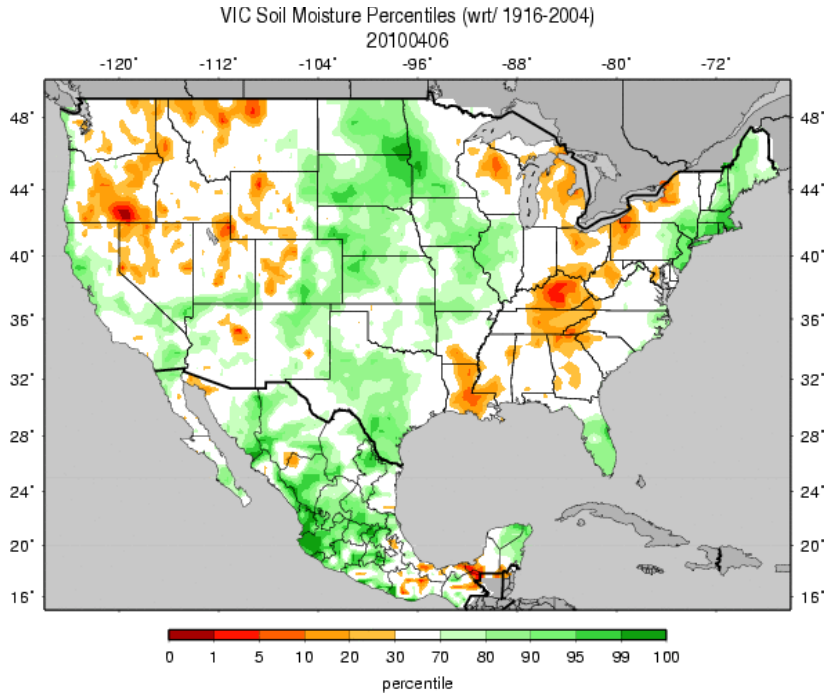
http://drought.unl.edu/dm

USDA National Drought Mitigation Center

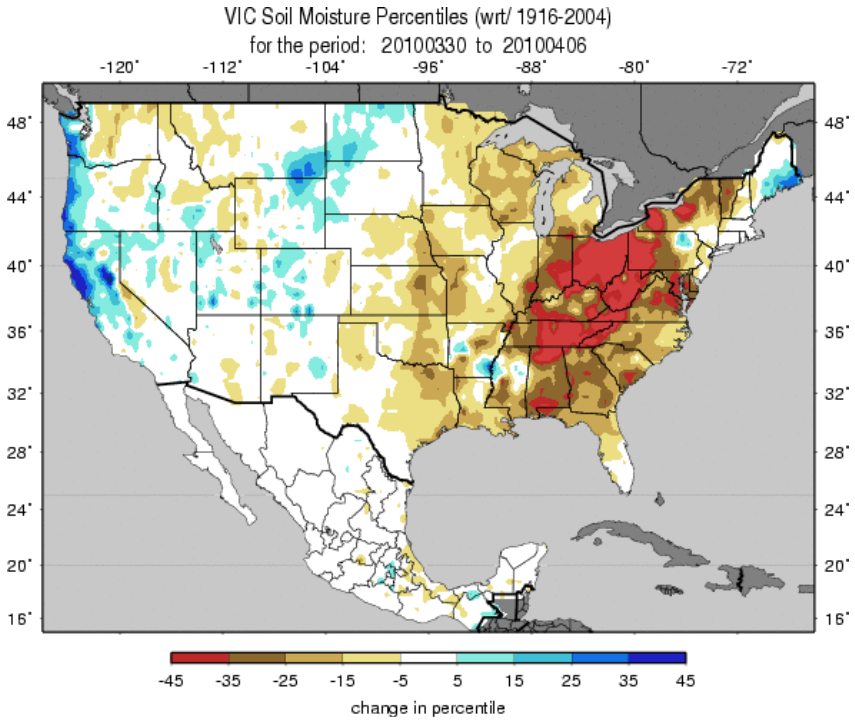
Released Thursday, April 8, 2010
Author: Anthony Artusa, CPC/NOAA

Fig. 4a: **Drought Monitor for the Western States with statistics over various time periods. Regionally there was slight improvement since last week.**

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



Figs. 5a: Soil Moisture ranking in percentile based on 1916-2004 climatology as of 6 April. Record heat over the Mid-West resulted in rapidly drying conditions this week..
Ref: 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 shows a complete reversal of conditions over the Mid-Atlantic and New England area since last week with extreme drying not dominating. The trough over the West Coast has helped bump up the soil moisture there. Ref:
http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_qnt.1wk.gif

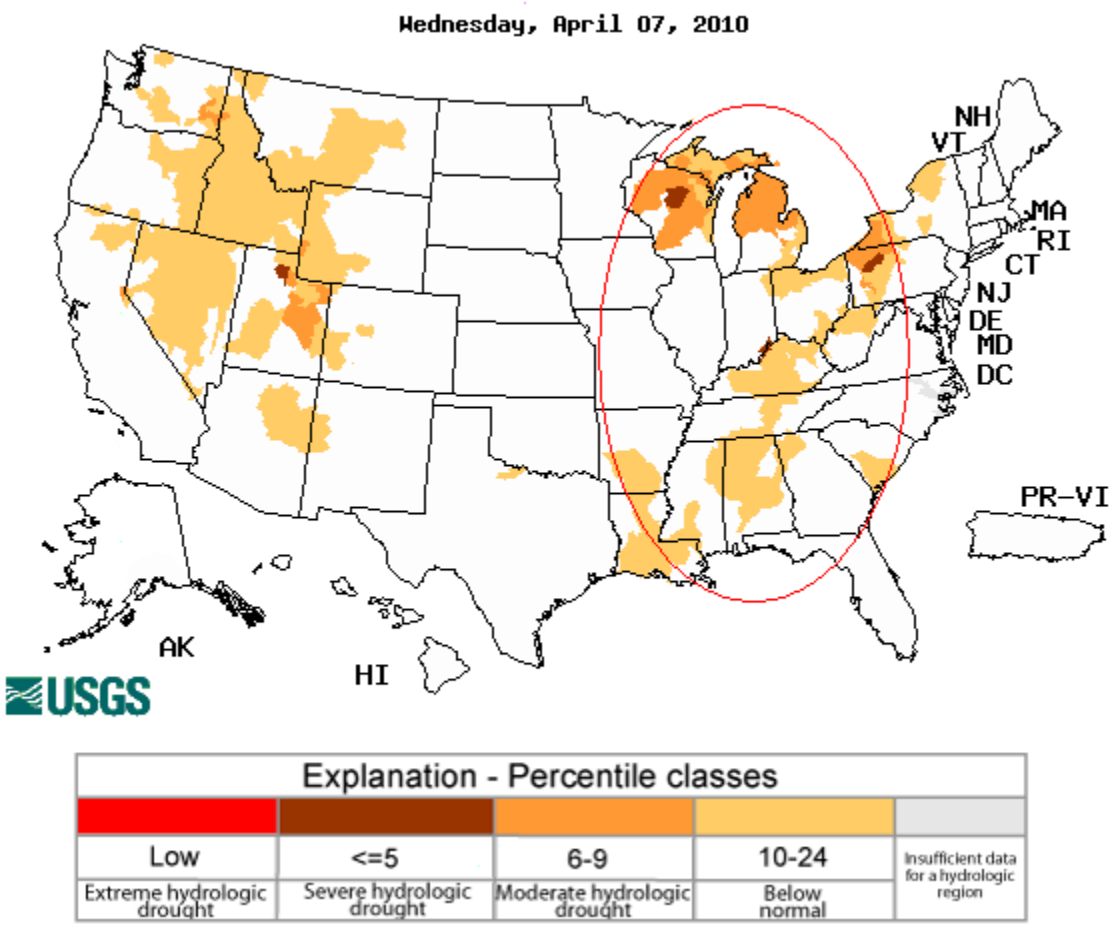


Fig. 6. Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Significant worsening of conditions is noted over the Great Lakes and Mid-West (red circle) this week.

Ref: http://water.usg s.gov/waterwatch/?m=dryw&w=map&r=us

National Drought Summary -- April 6, 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/.

During the past 7 days, above-median precipitation fell across western portions of Washington and Oregon, central portions of North Dakota and Florida, and across portions of the middle and northern Atlantic states. Below-median rainfall was reported across the Gulf Coast States from Louisiana to western Georgia. Temperatures were 10 to 20 degrees F warmer than normal across much of the East, and 6 to 10 degrees F cooler than normal across much of the West. Low pressure and associated fronts along the Northeast coast brought significant rains and severe flooding during the first several days of this period. As this storm system moved out over the western Atlantic Ocean, another frontal system became better organized over the Nation's midsection, accompanied by showers and thunderstorms. Concurrently, deep low pressure and associated fronts moved ashore in the Western states, bringing heavy precipitation to much of this region. By the end of the period, three individual weather systems were affecting the contiguous U.S.

Great Lakes and Ohio Valley: Rainfall amounts were light (0.25 inch or less) during the past week across northern Minnesota, most of northern Wisconsin, upper Michigan, north-central Kentucky, northwestern Pennsylvania and western New York. Somewhat greater amounts (0.25 - 0.50 inch) of rain were reported across northern New York and northern portions of Lower Michigan. Areas of abnormal dryness (D0) were introduced to both northwestern Pennsylvania, and western and northern New York, based on the recent lack of rain and unusually low stream flows. Very recent rainfall totals have been significant to the lee of the lower Great Lakes, but most of this fell past the data cut-off time of 8am EDT, April 6th and was not included in this week's Drought Monitor. For the areas of dryness or drought depicted on the map, USGS stream flow values for the past 7- and 14- days rank within the lowest quartile of their respective historical distributions. In the northern half of Lower Michigan, for example, stream flows are within the lowest ten percent for their periods of record, which is a minimum of 30 years. In addition, the January - March 2010 season will go down as the driest on record at Alpena, Traverse City, Sault Sainte Marie, and Gaylord. At Traverse City, only 1.18 inches of liquid equivalent precipitation fell during the period, which breaks the old record of 1.98 inches set nearly a century ago (1912). In upper Michigan, the area of moderate hydrologic drought (D1(H)) conditions was expanded, based largely on the very dry weather in recent weeks, as well as precipitation deficits over the past 1,3,6, and 12 months. The drought expansion was also based on early snowmelt, with several river sites at or approaching record low stream flow values for this time of year. At Iron Mountain, the 21-month precipitation deficit is now approaching 15 inches. A minor adjustment was made in northwestern Pennsylvania, where abnormal dryness (D0) was extended westward to the Ohio border to be consistent with unusually low groundwater levels.

Southeast and Texas: Percent of Normal Precipitation (PNP) maps for the last 14, 30, 60 and 90 days show a pronounced reversal from longer-term PNP maps (6 months to 2 years). Within the last 90 days, precipitation has been well below normal. In Louisiana, rainfall has been 25 to 50 percent of normal in the past two weeks, with a significant portion of southeastern Louisiana reporting only 5 to 25 percent of normal rainfall. The southeastern half of Alabama has also been very dry during the same

period, with only 5 to 25 percent of normal rainfall received, and sizable areas below 5 percent of normal. Stream flows have been unusually low (25th percentile or less) in Louisiana for at least the past 4 weeks, but stream flows in Alabama have fallen to unusually low values only in the past week or two. In addition, precipitation departures of 6-8 inches have accumulated over the past 60 days in this area. Based on these indicators and others such as the objective short-term drought indicator blends, an area of D0 dryness was introduced to both southern Louisiana and southeastern Alabama. The pre-existing D0 area over northeastern Louisiana was extended slightly southward to be consistent with recent drought indicators. The warm, dry weather across the central Gulf Coast was beneficial for crop planting. Elsewhere, the areas of abnormal dryness in southern and western Texas persisted, with little if any rainfall reported in these regions during the past week. As temperatures continue to rise and agricultural water demands increase, these areas will be closely monitored.

The West: Once again, most of the precipitation that fell across the Western states during the past 7-days did not fall over areas that needed it; however, there were some notable exceptions. Liquid equivalent precipitation amounts of 2.0 inches or more were reported over western Wyoming, northwestern parts of Colorado, northern Utah, and a few scattered locations in Idaho. In northwestern Colorado, April 6 snow pack and WYTD (since October 1, 2009) percent of normal precipitation were boosted, resulting in a slight improvement for far northern portions of both Routt and Jackson Counties. Not surprisingly, with the current El Nino winding down, seasonal mountain snow water content (SWC) (as of April 1, 2010) has generally been below to well below average across the Pacific Northwest and northern Rockies, and near to well above average in the higher terrain of California and Arizona. The interior Pacific Northwest had considerable differences in its mountain SWC, and was dominated by a fairly variable SWC pattern, with prevailing values ranging from 50 to 75 percent of normal. In parts of northern Idaho and northwestern Montana, SWC values ranged from only 25 to 50 percent of normal. Some improvements were made in southeastern Oregon, based on recently received heavy precipitation and basin-averaged SWC, ranging from 90 to 110 percent of average.

Across California and the interior Southwest, seasonal mountain SWC was generally near to above average. The recent, beneficial precipitation that fell in northern California keeps the region on pace for achieving a median April to July runoff. Unfortunately, near average precipitation and SWC for the winter season will not be enough to make up for storage deficits in the mountain block, reservoirs, and valley groundwater basins. In addition, the winter storm tracks tended to favor certain reservoirs and not others. Across the Mogollon Rim of central Arizona, snow pack values of 180 percent or more of normal were reported. SWE values in central Arizona were considerably in excess of 180 percent of average. No changes have been made to the drought depictions in California or the interior Southwest this week.

Alaska and Hawaii: The interior of south-central Alaska continues to experience abnormal dryness (D0). Frequent storms over the Gulf of Alaska and along the coast have necessitated a slight northward retraction of this dryness area away from the Kenai Peninsula and Anchorage. In Hawaii, trade wind showers have brought modest improvement in the drought depiction over eastern portions of both Maui and the Big Island.

Looking Ahead: For the ensuing 5 days (April 8-12), moderate to heavy precipitation (0.50 to 1.50 inches) is forecast for the drought areas of the northern Rockies, with lighter (less than 0.50 inch) amounts anticipated over the central Intermountain region, and upper Great Lakes area. Generally moderate amounts of rain (0.50 – 0.75 inch) can be expected across the dry areas of the Deep South, with 1.50 inches for central Kentucky. Occasional storms moving across the contiguous United States will prevent many areas from experiencing further degradation. For the 6 to 10-day outlooks (April 13-

17), significant precipitation is most likely across the western and central contiguous U.S., and Alaska, with lesser amounts over the eastern third of the Nation.

Author: Anthony Artusa, 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 April 7, 2010