



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

Weekly Report - Snowpack / Drought Monitor Update **Date: 20 August 2009**

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Temperature: SNOTEL and ACIS-day station average weekly temperature anomalies were below normal for this time of year; especially over the Northern Rockies and Intermountain West (Fig.1). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures occurred over southeast New Mexico and northern California (>+2F) and the greatest negative departures occurred over Wind River Range in Wyoming (<-10F) (Fig. 1a).

Precipitation: ACIS 7-day average precipitation amounts for the period ending 19 August shows a mostly dry West with the exception of scattered thunderstorms across the Northern Tier States and isolated storms over the Southern Rockies (Fig 2 and 2a). Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2009 Water Year that began on October 1, 2008 shows surplus values over southern Idaho into Wyoming and eastern Nevada with deficits over the northernmost Tier States, southwest New Mexico, and northwest Oregon. No appreciable change since last week (Fig. 2b).

WESTERN DROUGHT STATUS

The West: A thorough assessment was done for Montana, resulting in removal of abnormally dry conditions throughout most of the state. Dry conditions remain around Glacier National Park and the Blackfeet reservation, and a small area southeast of there. Several days of rain and showers across the state have helped to alleviate dry conditions.

The North American monsoon has brought less than expected rain to the southwestern states this summer. Moderate drought was introduced in Arizona to show degrading drought conditions in this state.

In northwestern California, impacts on the Klamath River water supply and nearby areas led to an expansion of D0 in Del Norte County. North central Washington continues to experience degrading conditions with low precipitation and warm temperatures, and severe drought (D2) was expanded to the Canadian border. 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

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on water shortages developing in streams, reservoirs, or wells, and some damage to crops and pastures (Figs. 3, 3a, and 3b).

SOIL MOISTURE

Soil moisture (Figs. 4a and 4b), 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/>.

OBSERVED FIRE DANGER CLASS

The [adjective class rating](#) is a method of normalizing rating classes across different fuel models, indexes, and station locations. It is based on the primary fuel model cataloged for the station, the fire danger index selected to reflect staffing levels, and climatological class breakpoints. This information is provided by local station managers. About 90% use the Burning Index (BI); others use Energy Release Component (ERC). Staffing class breakpoints are set by local managers from historical fire weather climatology (Figs. 5).

Only reporting station locations are indicated with a marker on the maps. Values between stations are estimated with an inverse distance-squared technique on a 10-km grid. This works pretty well in areas of relatively high station density, but has obvious shortcomings in other areas.

VEGETATION STRESS (Figure 6)

http://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/vh_currentImage.php

Image Interpretation

The images are color-coded maps of vegetation condition (health) estimated by the Vegetation and Temperature Condition Index (VT). The VT is a numerical index, which changes from 0 to 100 characterizing change in vegetation conditions from extremely poor (0) to excellent (100). Fair conditions are coded by green color (50), which changes to brown and red when conditions deteriorate and to blue when they improve. The VT reflects indirectly a combination of chlorophyll and moisture content in the vegetation and also changes in thermal conditions at the surface. This new approach combines the visible, near infrared and thermal radiances in a numerical index characterizing vegetation health. This approach is extremely useful in detecting and monitoring such complex and difficult-to-identify phenomenon as drought. The VT values below 35 are used for identifying vegetation stress which is an indirect drought indicator. The VT is very useful for early drought detection, assessing drought area coverage, duration, and intensity, and for monitoring drought impacts on vegetation and agricultural crops.

Background of the Tool

Monitoring vegetation health (condition), including drought detection and watch, is based on radiance measurements in the visible (VIS), near infrared (NIR), and 10.3-11.3 micrometers thermal (T) bands (channels) of the Advanced Very High Resolution Radiometer (AVHRR). These measurements are processed to reduce long-term noise. The VIS and NIR values were converted to the Normalized Difference Vegetation Index [$NDVI = (NIR - VIS) / (NIR + VIS)$] and the T to brightness temperature (BT) using a look-up table. The NDVI and BT were filtered in order to eliminate high frequency noise. They were also adjusted for a non-uniformity of the land surface due to climate and ecosystem differences using multi-

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year NDVI and BT data. The NDVI and BT were converted to the Vegetation Condition Index (VCI), Temperature Condition Index (TCI), and their combination (VT).

U.S. HISTORICAL STREAMFLOW

This map, (Fig. 7) 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.

http://water.usgs.gov/cgi-bin/waterwatch?state=us&map_type=dryw&web_type=map.

PASTURE AND RANGELAND CONDITIONS (Figure 8)

This product is produced and compiled by the NOAA's Climate Prediction Center:

<http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/pasture-range-statewide-conditions.pdf>.

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

**SNOTEL (solid) and ACIS (dot-filled) Networks
7-Day Average Temperature Anomaly (Degrees F)**

Aug 20, 2009

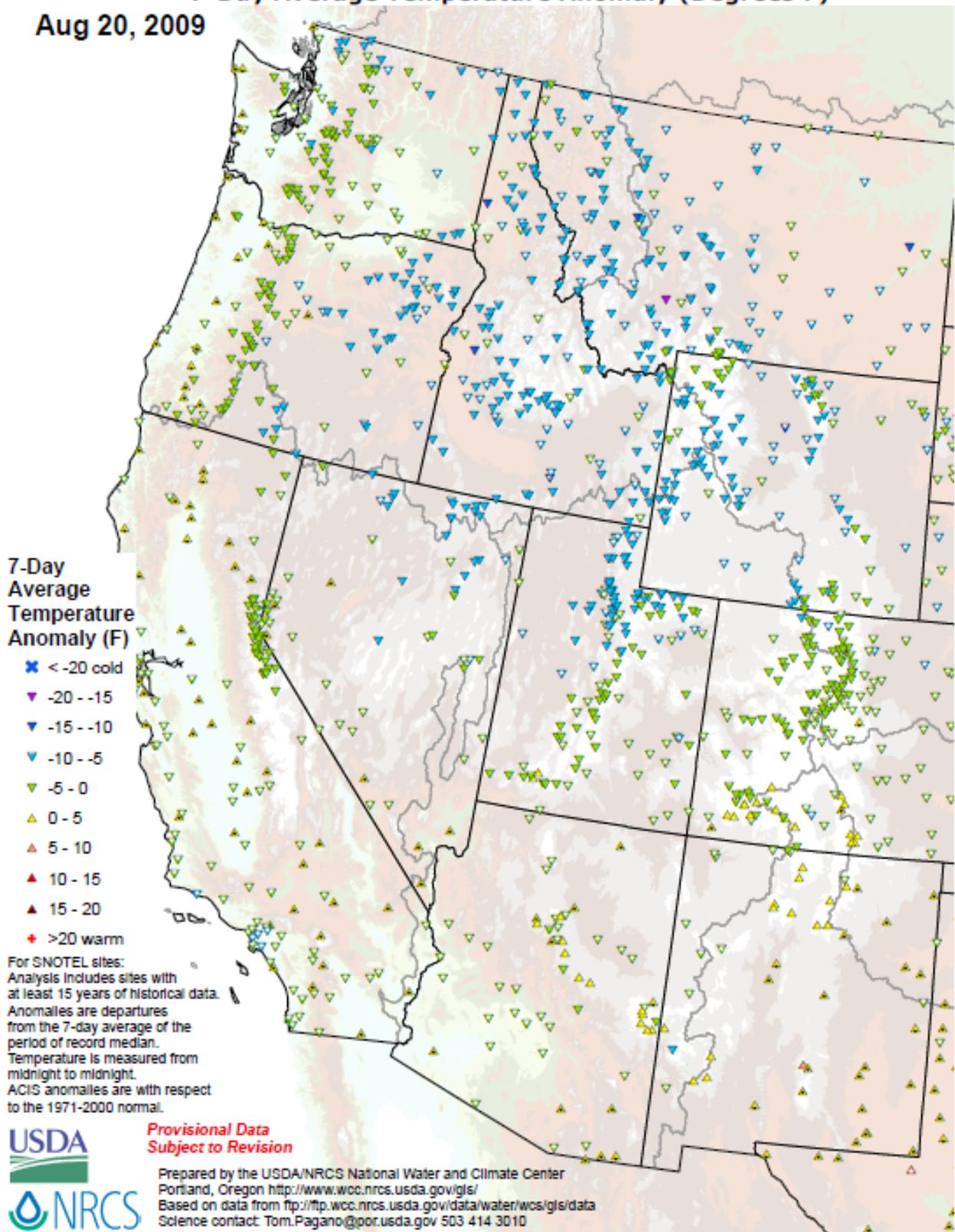
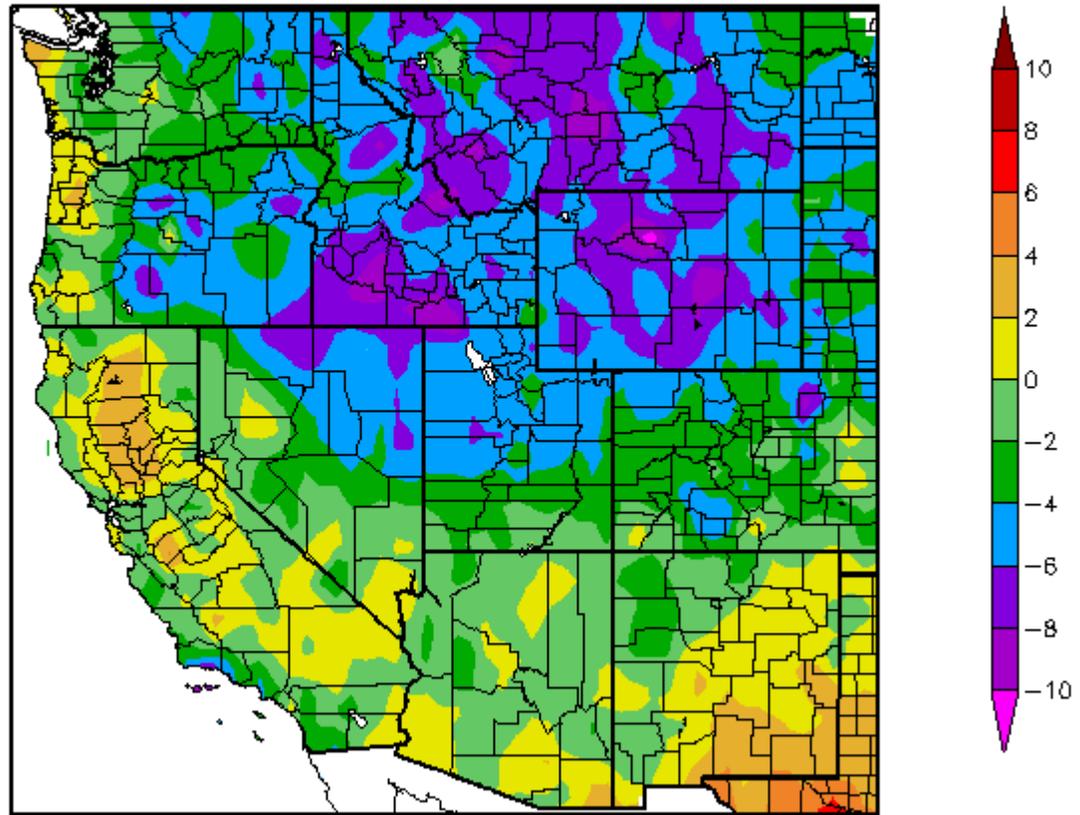


Fig. 1. SNOTEL and ACIS-day station average weekly temperature anomalies were below normal for this time of year; especially over the Northern Rockies and Intermountain West.
<http://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/WestwideTavg7dAnomalyAcis.pdf>

Departure from Normal Temperature (F)
8/13/2009 – 8/19/2009



Generated 8/20/2009 at HPRCC using provisional data.

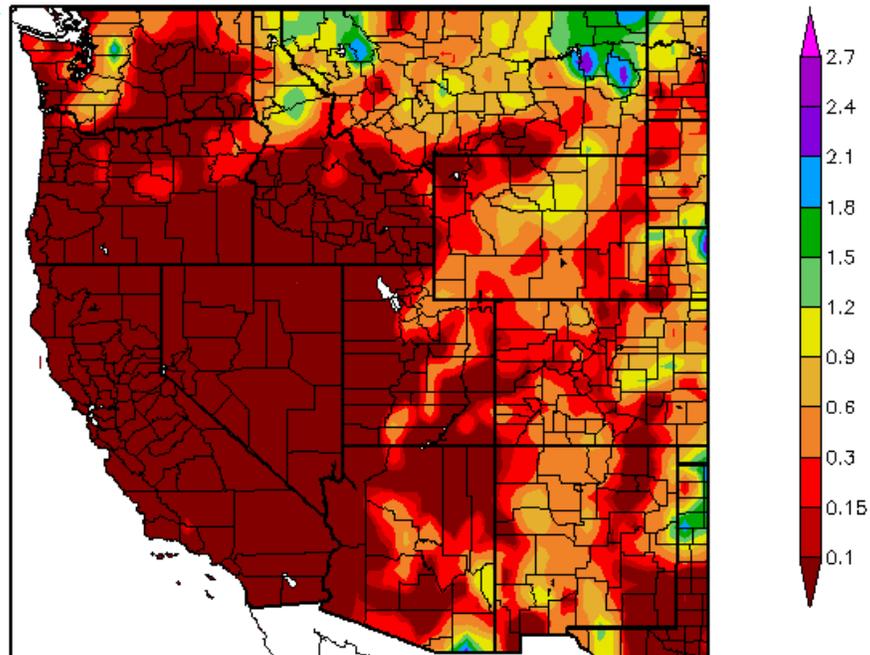
NOAA Regional Climate Centers

Fig. 1a. ACIS 7-day average temperature anomalies show that the greatest positive temperature departures occurred over southeast New Mexico and northern California (>+2F) and the greatest negative departures occurred over Wind River Range in Wyoming (<-10F).

Ref: http://www.hprcc.unl.edu/maps/current/index.php?action=update_product&product=TDept

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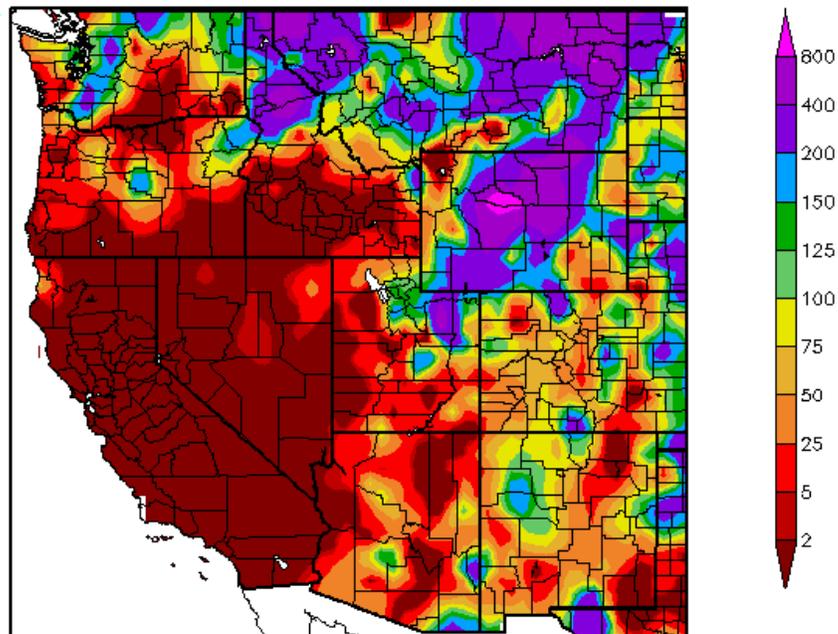
Precipitation (in)
8/13/2009 – 8/19/2009



Generated 8/20/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
8/13/2009 – 8/19/2009



Generated 8/20/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Fig. 2. and 2a. ACIS 7-day average precipitation amounts for the period ending 19 August shows a mostly dry West with the exception of scattered thunderstorms across the Northern Tier States and isolated storms over the Southern Rockies. Ref: <http://www.hprcc.unl.edu/maps/current/>.

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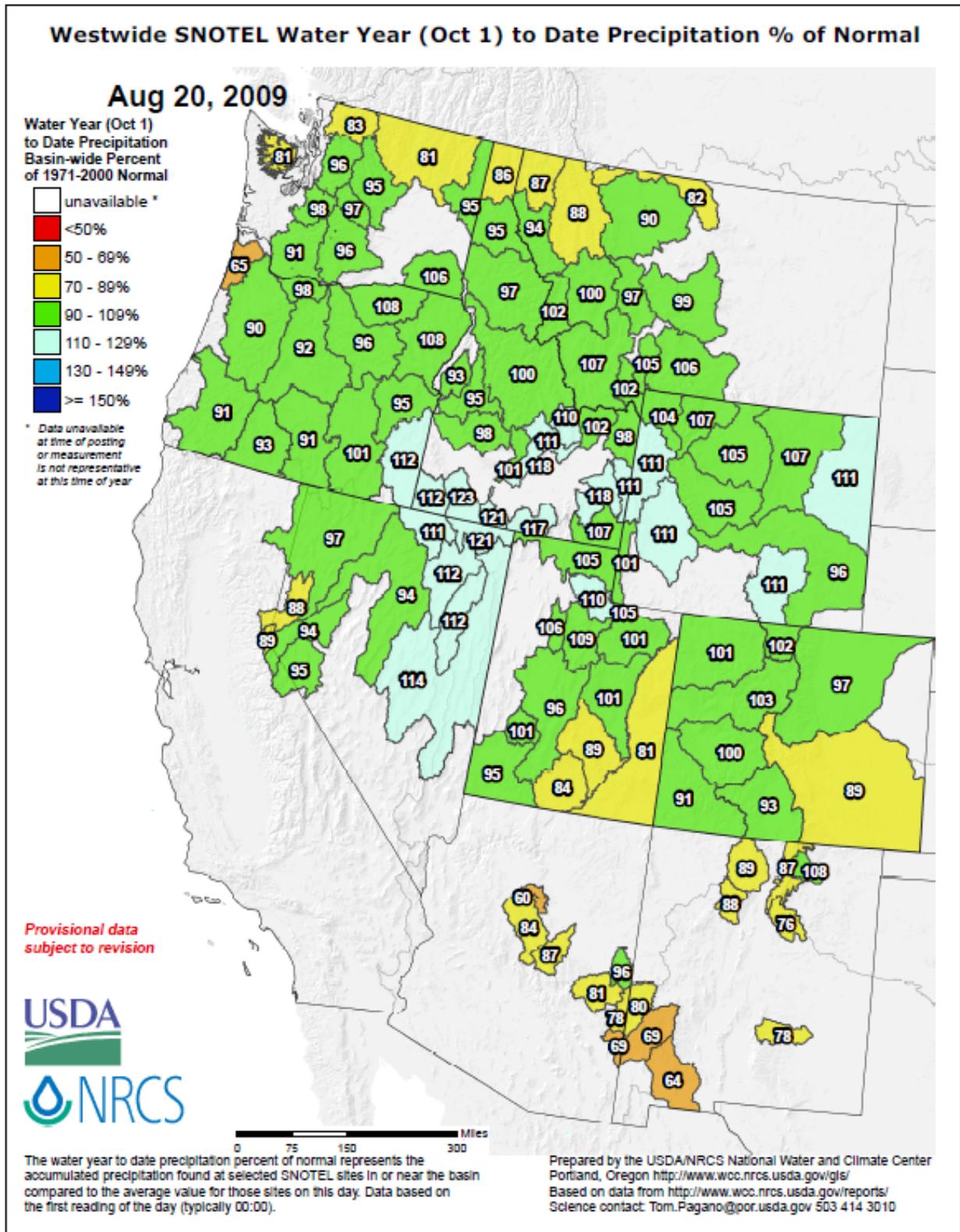


Fig 2b. Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2009 Water Year that began on October 1, 2008 shows surplus values over southern Idaho into Wyoming and eastern Nevada with deficits over the northernmost Tier States, southwest New Mexico, and northwest Oregon. No appreciable change since last week.

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

U.S. Drought Monitor

August 18, 2009
Valid 8 a.m. EDT

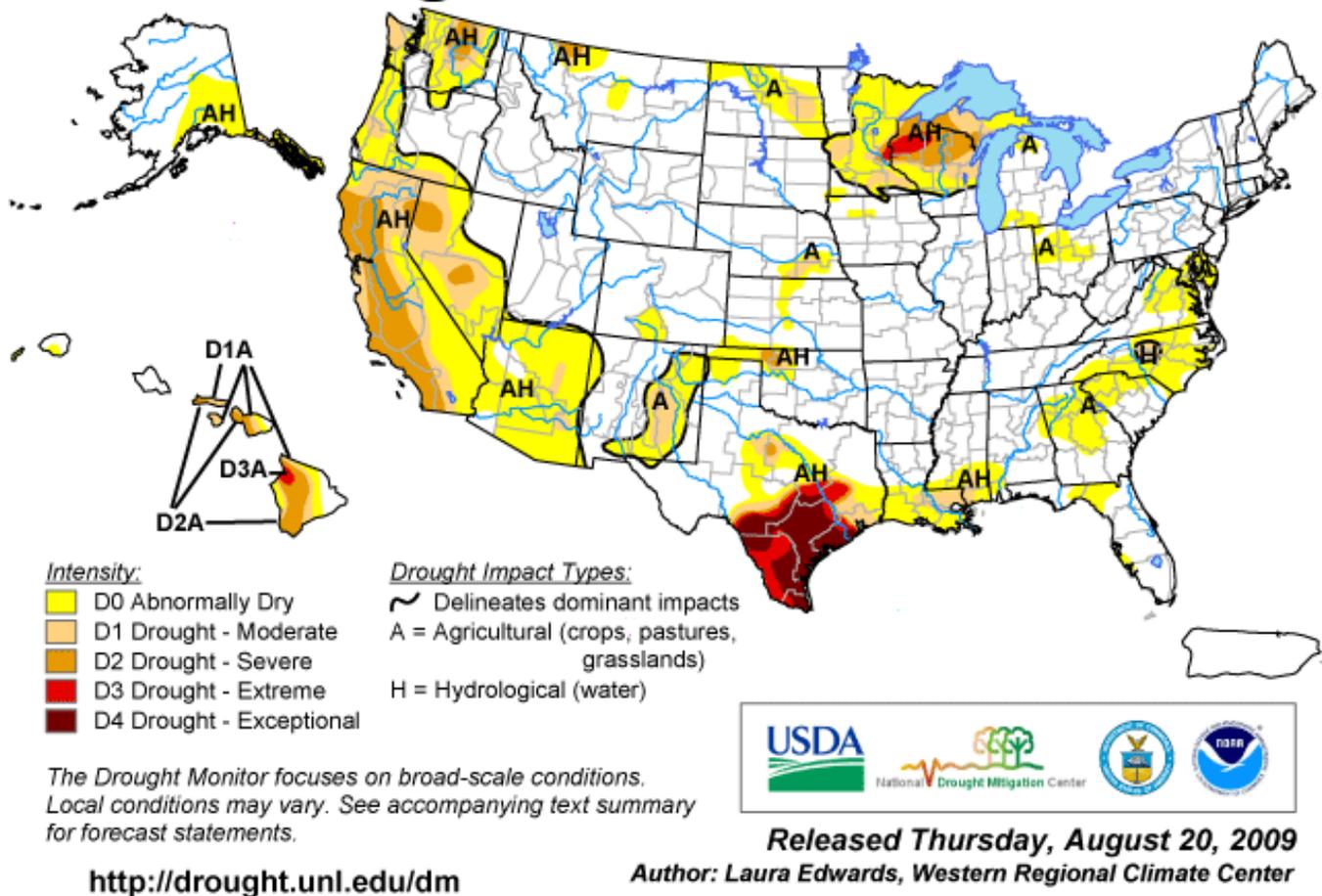


Fig. 3. Current Drought Monitor weekly summary.

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

U.S. Drought Monitor

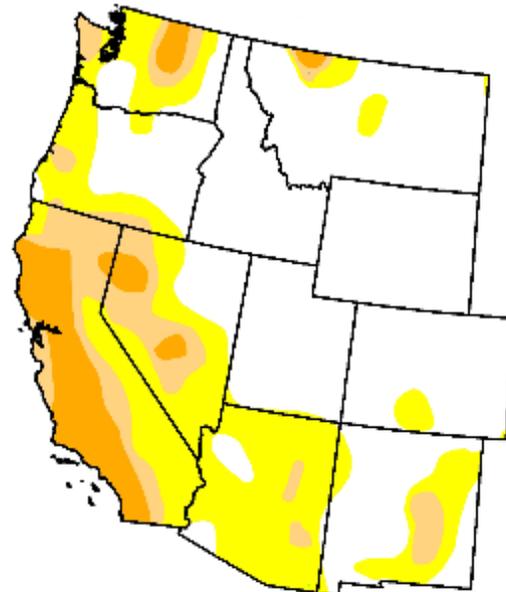
West

August 18, 2009

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	57.5	42.5	17.0	7.2	0.0	0.0
Last Week (08/11/2009 map)	53.6	46.4	16.8	7.1	0.0	0.0
3 Months Ago (05/26/2009 map)	50.7	49.3	22.6	6.6	0.0	0.0
Start of Calendar Year (01/06/2009 map)	37.4	62.6	28.9	8.8	0.4	0.0
Start of Water Year (10/07/2008 map)	41.3	58.7	28.6	10.4	0.1	0.0
One Year Ago (08/19/2008 map)	34.7	65.3	29.8	9.7	0.2	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, August 20, 2009

Author: Laura Edwards, Western Regional Climate Center

Fig. 3a. Drought Monitor for the Western States with statistics over various time periods. Regionally, there was little appreciable change during the past week.

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

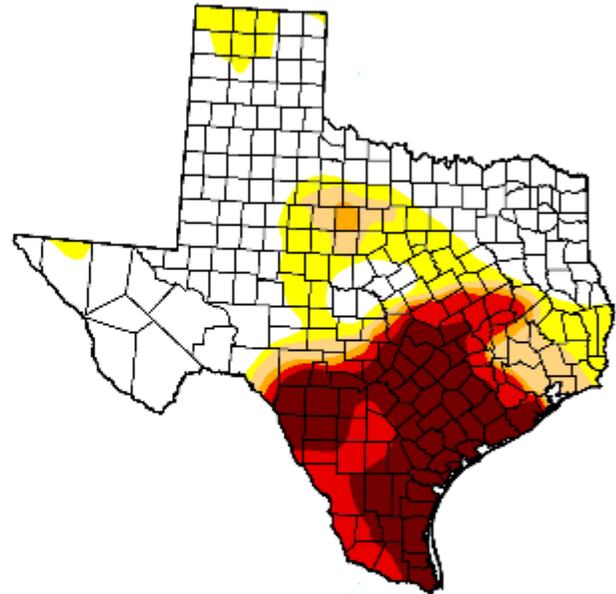
U.S. Drought Monitor

Texas

August 18, 2009
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	49.9	50.1	35.3	28.9	26.7	18.1
Last Week (08/11/2009 map)	50.0	50.0	34.1	28.9	26.6	16.8
3 Months Ago (05/26/2009 map)	32.9	67.1	47.8	31.6	17.4	6.7
Start of Calendar Year (01/06/2009 map)	41.7	58.3	24.5	15.0	9.1	4.2
Start of Water Year (10/07/2008 map)	67.2	32.8	20.5	11.0	3.6	0.0
One Year Ago (08/19/2008 map)	31.7	68.3	40.6	21.6	7.3	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, August 20, 2009

Author: Laura Edwards, Western Regional Climate Center

Fig. 3b: Texas is the only state with D4 drought condition in the US. Note that there was a slight increase in D4 since last week.

Ref: http://www.drought.unl.edu/dm/DM_state.htm?TX.S

Drought Monitor Classification Changes for Selected Time Periods

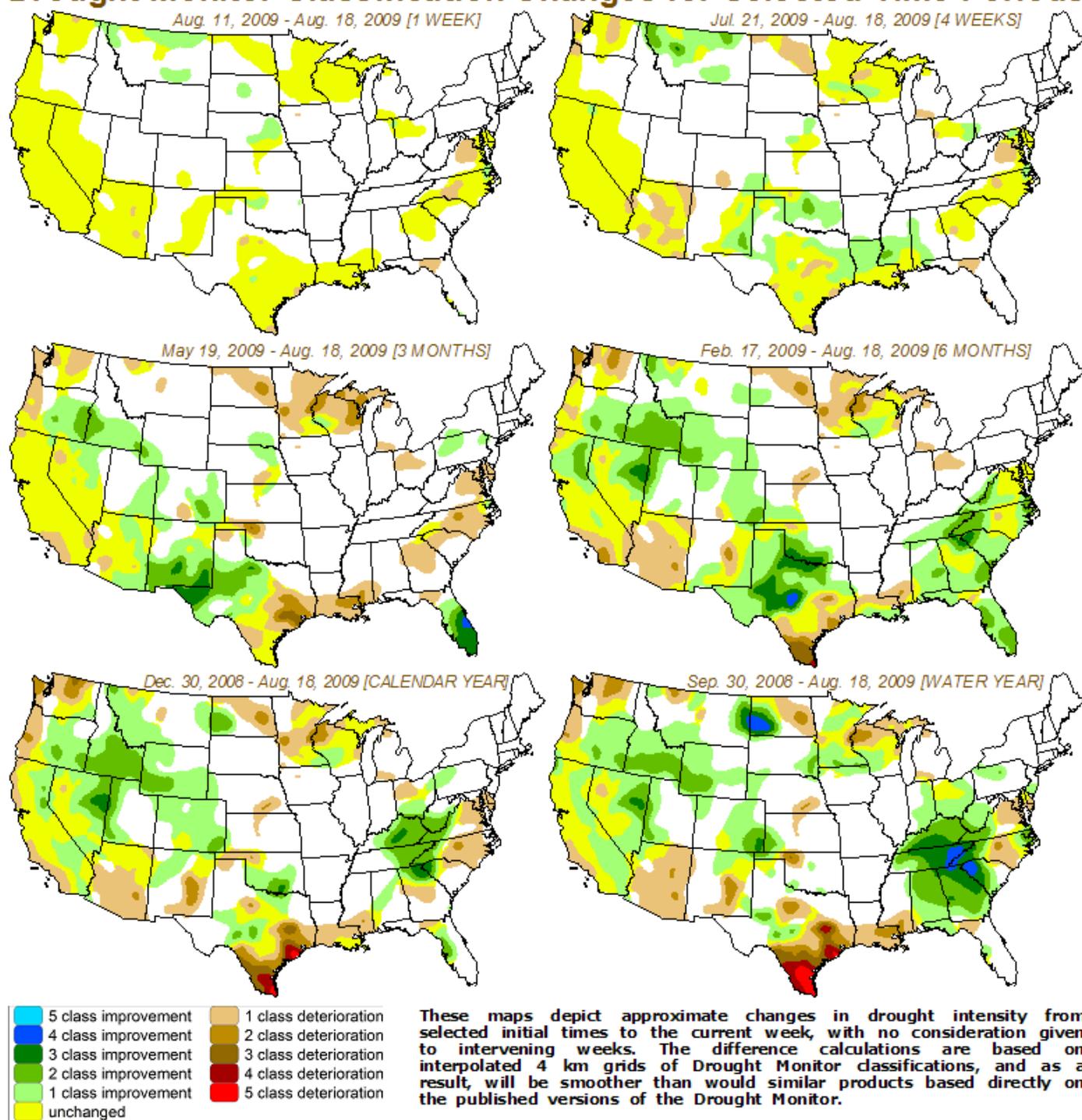
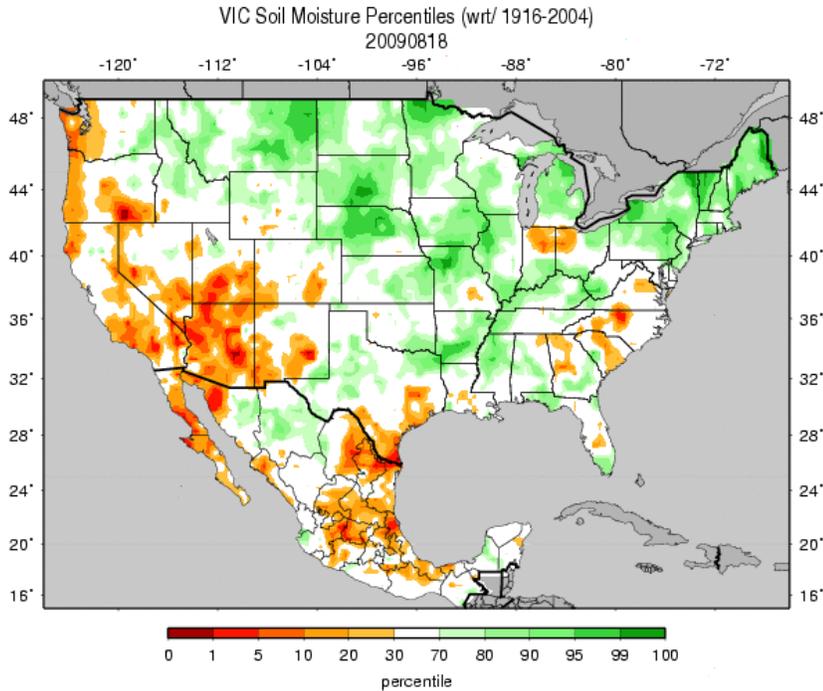


Fig. 3c: Drought monitor classification changes for selected time periods shows little change during the past week.

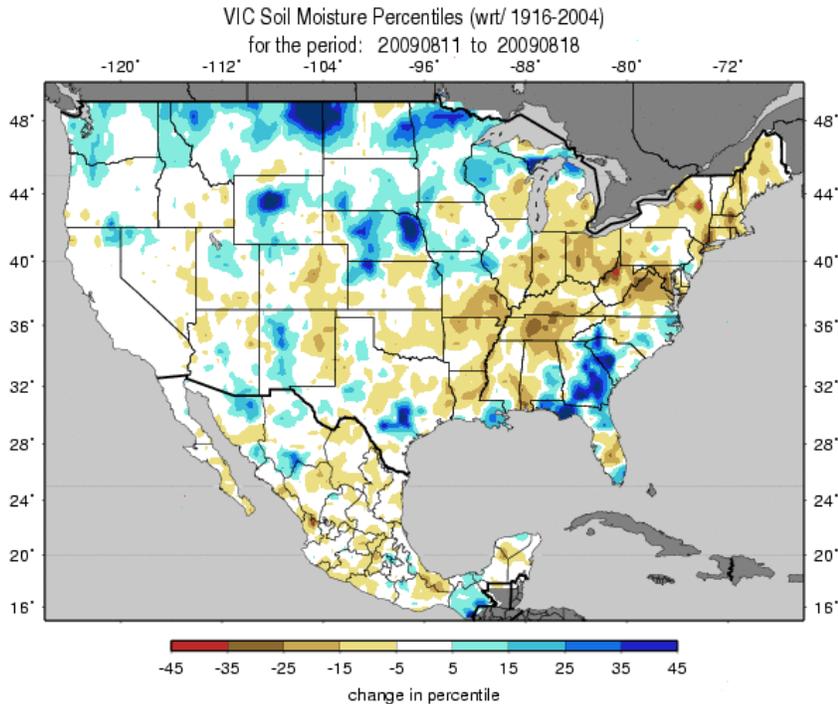
Ref: <http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/dm-change-4maps.png>

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Figs. 4a: Soil Moisture ranking in percentile based on 1916-2004 climatology as of 18 August. Near saturation exists over the northeastern to the Northern Plains, while excessive dryness is scattered across the parts of the Southwest and Northwest.

Ref: http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_gnt.gif



Figs. 4b: Soil Moisture change in percentile based on 1916-2004 climatology for this past week. Excessive drying is found over much of the eastern third of the nation with the exception of northern Florida, Georgia and South Carolina due to a tropical storm moving through the area. Excessive moistening is found over the Central and Northern Plains.

Ref:

http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_gnt.1wk.gif

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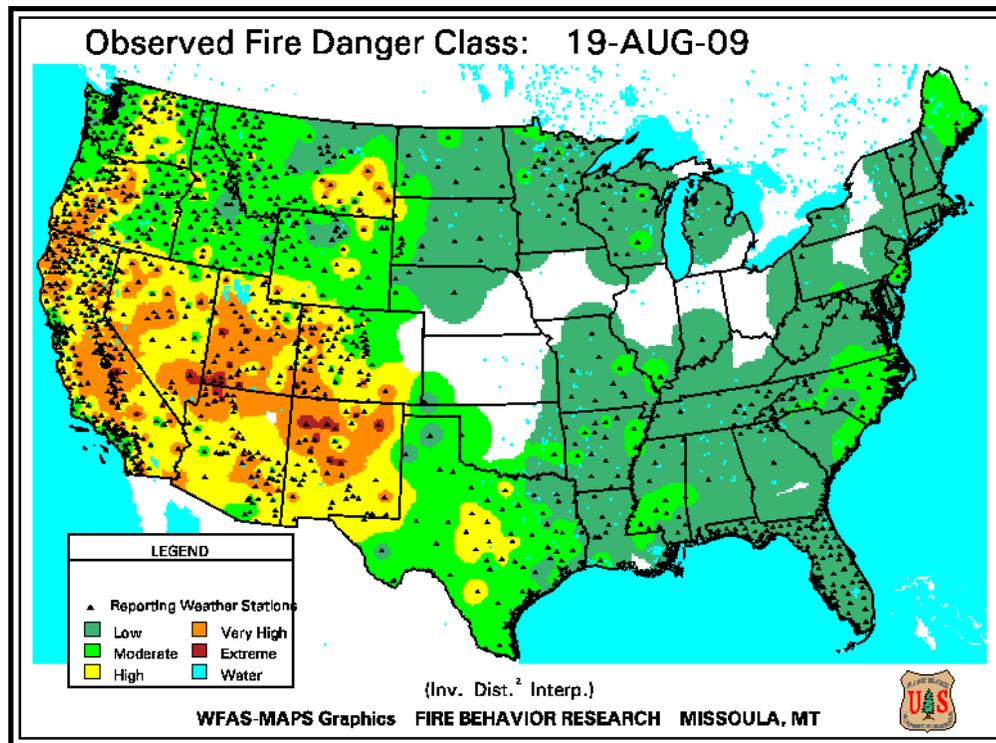


Fig. 5a. Observed Fire Danger Class. Conditions over the southern and western regions of the West are at very high to extreme levels. Ref: http://www.wfas.net/images/firedanger/fd_class.gif

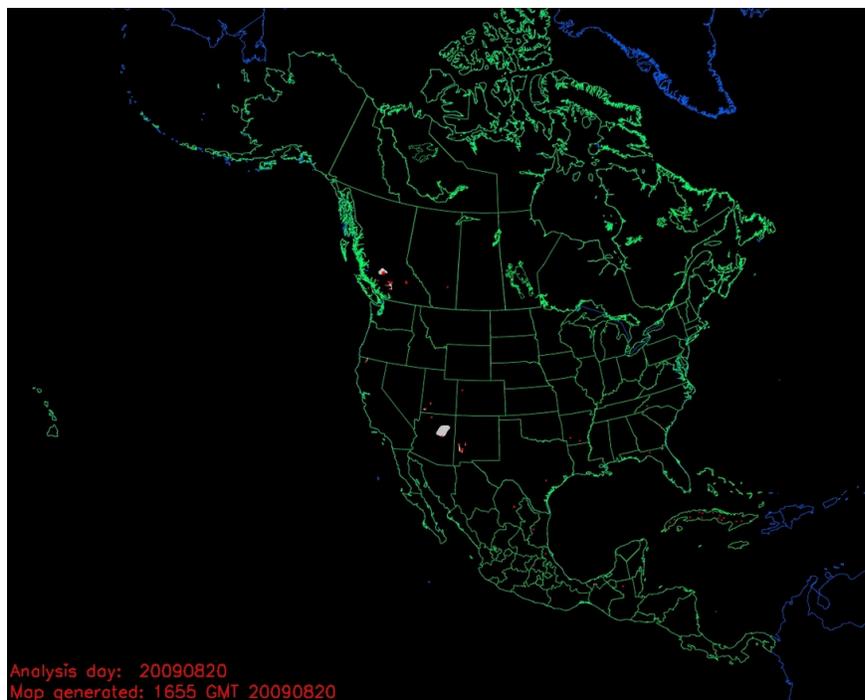


Fig. 5b. Hazard Mapping System Fire and Smoke. Analysis is for 8/20/2009 with fires shown as red dots. Fire sizes have decreased significantly this week as cooler weather dominated. Smoke, when detected by the analyst, is in gray. Ref: <http://www.osdpd.noaa.gov/ml/land/hms.html>.

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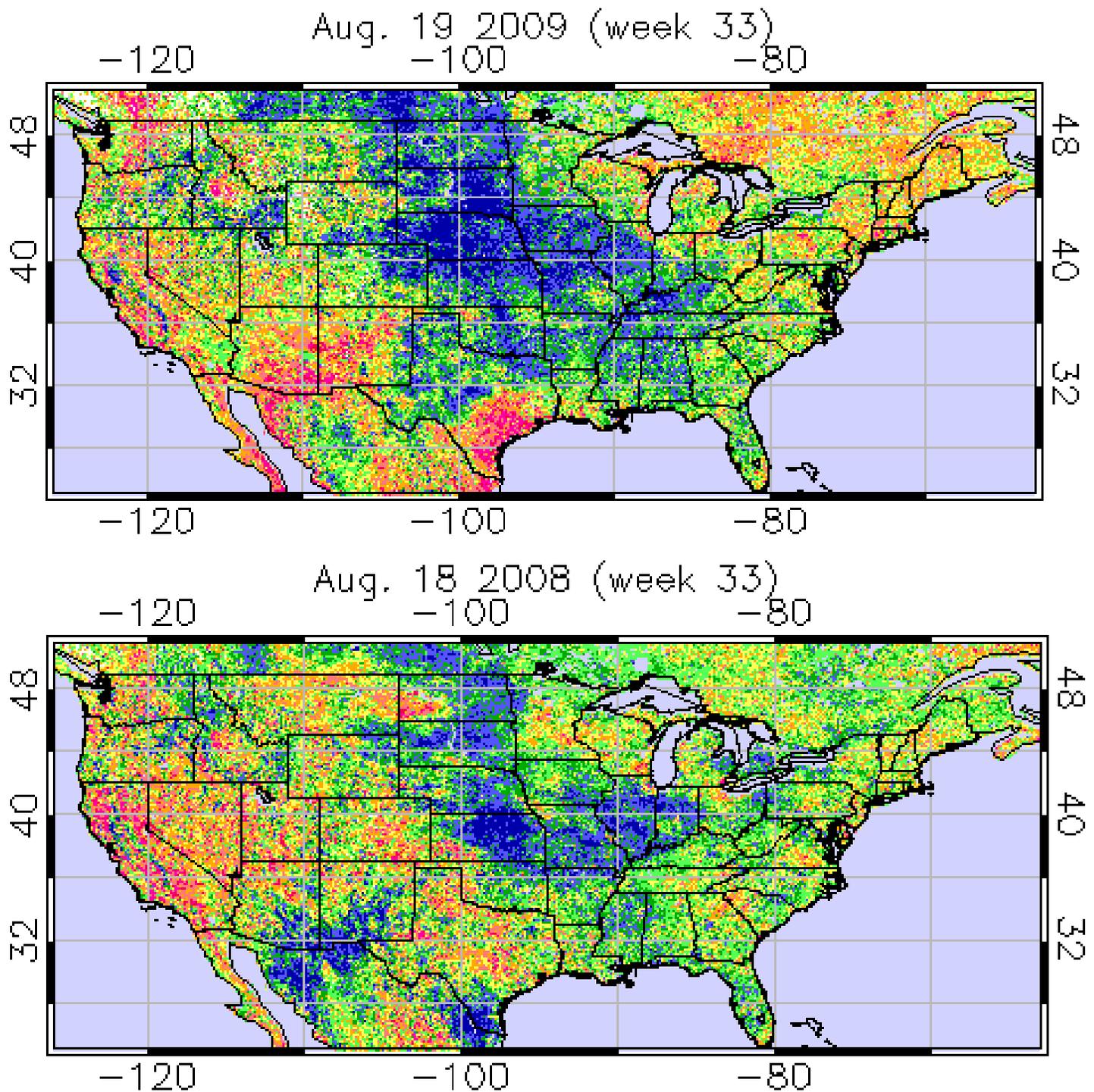
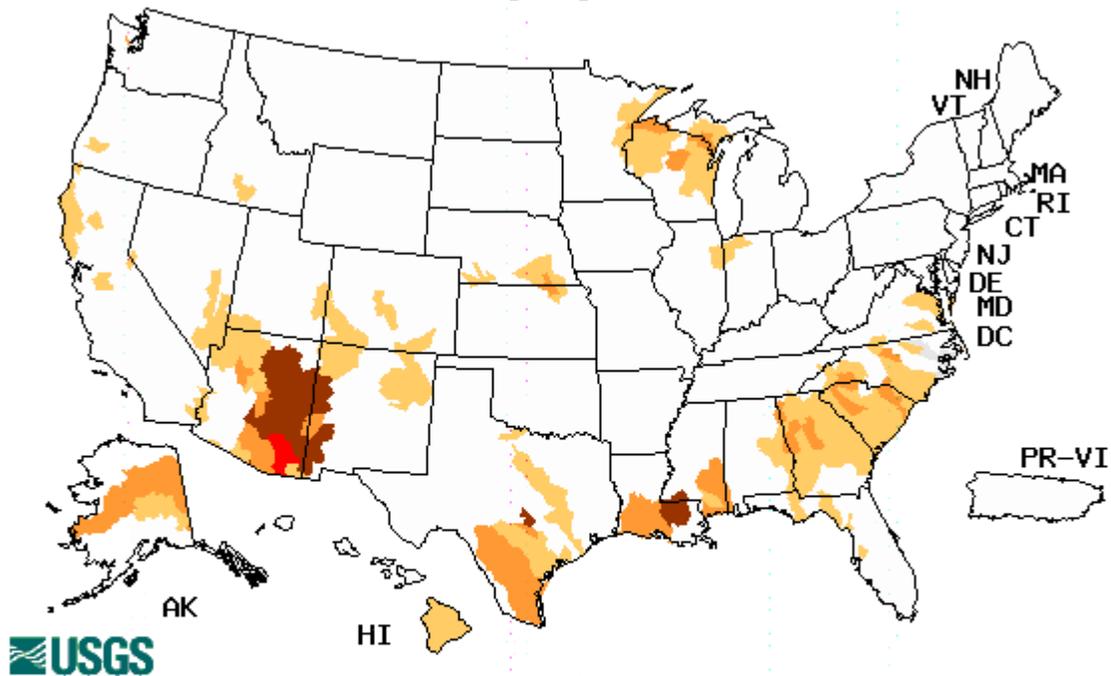


Fig. 6. Vegetation Drought Response Index: Note the comparison to last year. The Central and the Northern Great Plains show very favorable conditions while southern Texas, New Mexico, Arizona, and north-central Washington shows very stressed conditions past this week. Last year, California and southwest North Dakota were the most stressed areas.

Ref: http://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/vh_currentImage.php

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Wednesday, August 19, 2009

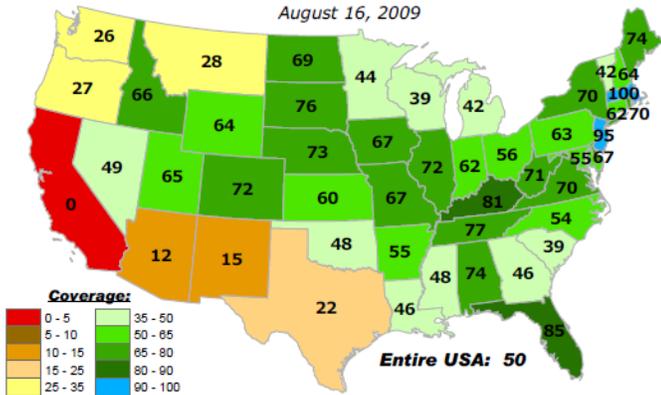


Explanation - Percentile classes				
Low	<=5	6-9	10-24	Insufficient data for a hydrologic region
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal	

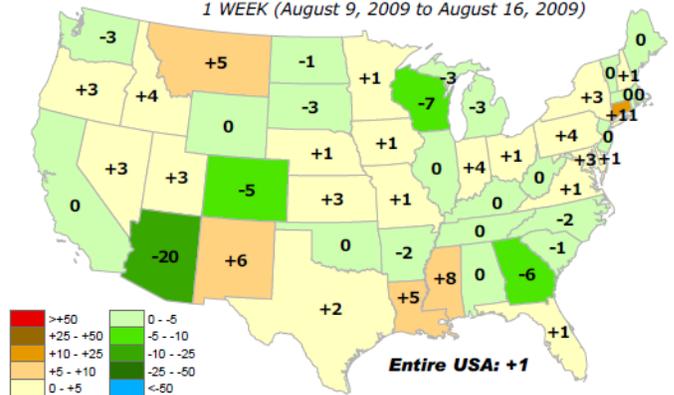
Fig. 7. Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Arizona and southern Louisiana have the lowest streamflows in the country. Ref: <http://water.usgs.gov/waterwatch/?m=dryw&w=map&r=us>.

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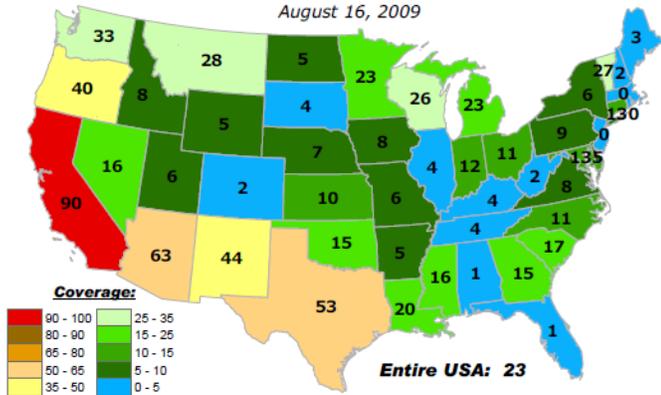
Percent of Pasture & Range Land in "Good" or "Excellent" Condition
August 16, 2009



CHANGE in % of Pasture and Range Lands in "Poor" or "Very Poor" Condition
1 WEEK (August 9, 2009 to August 16, 2009)



Percent of Pasture & Range Land in "Poor" or "Very Poor" Condition
August 16, 2009



CHANGE in % of Pasture and Range Lands in "Poor" or "Very Poor" Condition
4 WEEKS (July 19, 2009 to August 16, 2009)

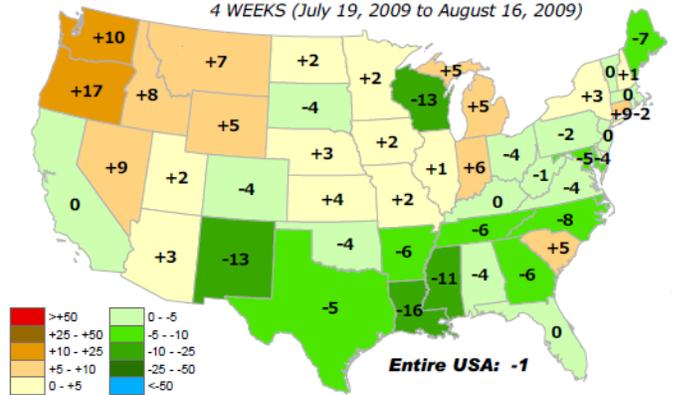


Fig. 8. Current Pasture and Range Land conditions and changes over the last week and last month.

Ref: <http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/pasture-range-statewide-conditions.pdf>

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National Drought Summary –August 18, 2009

The discussion in the Looking Ahead section is simply a description of what the official national guidance from the National Weather Service (NWS) National Centers for Environmental Prediction is depicting for current areas of dryness and drought. The NWS forecast products utilized include the HPC 5-day QPF and 5-day Mean Temperature progs, the 6-10 Day Outlooks of Temperature and Precipitation Probability, and the 8-14 Day Outlooks of Temperature and Precipitation Probability, valid as of late Wednesday afternoon of the USDM release week. The NWS forecast web page used for this section is: <http://www.cpc.ncep.noaa.gov/products/forecasts/>.

The Northeast and Mid-Atlantic: Most of this region was left unchanged this week. Some areas are drying out in northern Virginia where abnormally dry conditions (D0) were introduced this week. In southeastern Virginia and northeastern North Carolina, the D0 designation was removed due to recent heavy precipitation events during the last seven days. Some areas received over five inches of rain, and are now four to eight inches above normal for the last 30 days.

Southeast: While a wet week benefited the northeast part of North Carolina, the Central Piedmont continued to be passed over with this week's storm systems. As a result of increasing precipitation deficits in this region, streamflow on the decrease and reservoir levels slowly dropping, moderate drought was introduced in the Upper Cape River basin. For the same reasons, abnormally dry conditions were expanded in south central North Carolina, roughly south of a line from Charlotte to Raleigh.

In Florida, some short-term improvements in drought conditions are reflected in reduction of D0 in the southwestern part of the state. In north Florida, precipitation deficits are growing for the summer season and abnormally dry designation was introduced from approximately Tallahassee to I-75. No other changes were made in the southeast this week, with Tropical Depression Claudette moving through Alabama, staving off drought expansion.

The Midwest: Ohio was a mixed bag of winners and losers. An area from Sandusky, on Lake Erie, to Columbus is in D0. Further west, significant precipitation resulted in improvements to drought-free regions in northeastern Indiana, northwestern Ohio and southwestern Michigan. Weekly totals in this area ranged from two to nine inches according to local observers.

Areas of west central Wisconsin and central Minnesota were beneficiaries of more than 6 inches locally in previous D1, or moderate drought, regions. Improvements were made in both locations around Eau Claire County, WI, and west of Wright County, MN. In south central Minnesota, the lack of rain is having a bigger impact and D1 was expanded over Mankato and Blue Earth County.

Abnormally dry conditions persist in areas of northern Iowa with precipitation deficits for the last several months, and impacts on crop and soil moisture are now being reported. A new area of D0 was introduced in north central Iowa.

The Plains: In Nebraska, a swath of two to four inches of rain fell in the current Drought Monitor period. This will greatly benefit soybean crops, and help in the corn fields. Reductions of D0 and D1 were made as a result in eastern Nebraska from Kearney to Lincoln.

Improvements due to beneficial rainfall were made in some Oklahoma drought areas. All drought designations were removed from eastern Oklahoma. Several counties on the east

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and south side of the core drought in the state also improved one category due to weekly precipitation observations of over two inches in many areas.

Several small changes were made in Texas this week to reflect the slightly changing conditions around the exceptional drought in this state. Rain helped the panhandle region and an area southeast of San Antonio, and some improvements are depicted in these regions. Amarillo has now received record August monthly precipitation of 9.08 inches, with two weeks yet to go. Elsewhere, drought continues to expand in severity and extent. Several counties in central and north central Texas were degraded by one category. Despite decent rain in Shackelford County, surrounding areas continue to miss out, and some expansion was made here.

The West: A thorough assessment was done for Montana, resulting in removal of abnormally dry conditions throughout most of the state. Dry conditions remain around Glacier National Park and the Blackfeet reservation, and a small area southeast of there. Several days of rain and showers across the state have helped to alleviate dry conditions.

The North American monsoon has brought less than expected rain to the southwestern states this summer. Moderate drought was introduced in Arizona to show degrading drought conditions in this state.

In northwestern California, impacts on the Klamath River water supply and nearby areas led to an expansion of D0 in Del Norte County. North central Washington continues to experience degrading conditions with low precipitation and warm temperatures, and severe drought (D2) was expanded to the Canadian border.

Hawaii, Alaska and Puerto Rico: In Hawaii, Tropical Storm Felicia brought a number of improvements to the state's drought on three of the islands. Kauai is left with abnormal dry conditions in the southwest, Oahu is left drought-free, and east Maui was improved by one category.

Heavy rainfall east of Anchorage this week, with areas totaling over five inches, made way for clearing of abnormal dry conditions. Elsewhere in the state was left unchanged.

Puerto Rico remains unchanged as well and drought free this week.

Looking Ahead: In the near-term, storminess associated with a cold front will continue through the central US for the next couple of days before moving over the Great Lakes. Hurricane Bill appears to be moving back out to sea, and poses no threat to making landfall. For the next five days, precipitation will favor the eastern states, with climatologically dry conditions continuing in the West. The monsoon appears to remain relatively quiet for this time of year in the Southwest.

In the six to ten day forecast, the western continental US is projected to have above normal temperatures, and the east with below normal temperatures. During this period, precipitation is expected to be below normal in the northern states from Washington to Wisconsin, and above normal rainfall along the Eastern Seaboard. These are consistent with a ridge pattern in the west and a trough in the east. According to the Climate Prediction Center, model agreement is reasonable for this period. Alaska is projected to have below normal temperatures across the entire state, and below normal precipitation everywhere except the southeast where it may be wetter than normal.

Author: Laura Edwards, Western Regional Climate Center.

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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 August 20, 2009