



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

Weekly Report - Snowpack / Drought Monitor Update

Date: 10 June 2010

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Snow: SNOTEL Snow-Water Equivalent percent of normal values for 10 June 2010 shows a lot of basin to basin variability. Late season snowpack that is normally non-existent will result in skewed percentages. Clearly high percentages indicate late season snow pack with minimal actual SWE (Fig. 1).

Temperature: SNOTEL 7-day average temperature departures from normal map reveal cooler temperatures over the Wyoming Rockies to the Cascades and warmer temperatures over the Wasatch, Southern Sierra, Arizona Mountains, and the Central and Southern Rockies (Fig. 2). ACIS 7-day average temperature anomalies show that the greatest positive temperature departures were over parts of the Great Basin, Wasatch, and Central and Southern Rockies ($>+10^{\circ}\text{F}$) and the greatest negative departure occurred over north-central Washington ($<-6\text{F}$) (Fig. 2a).

Precipitation: As of today, Portland has recorded the most May-June precipitation amounts on record. Additionally, here's a summary of some Pacific Northwest amounts during the past three weeks (May 17th through June 7th):

Central Washington:

Wenatchee:	Observed Precip: 2.04"	Normal: .46"	Pct of Normal: 443%
Ephrata:	Observed Precip: 2.17"	Normal: .46"	Pct of Normal: 472%
Omak:	Observed Precip: 3.70"	Normal: .84"	Pct of Normal: 440%
Winthrop:	Observed Precip: 3.66"	Normal: .80"	Pct of Normal: 456%

Eastern Washington:

Spokane:	Observed Precip: 3.17"	Normal: 1.12"	Pct of Normal: 283%
Pullman:	Observed Precip: 2.27"	Normal: 1.30"	Pct of Normal: 175%
Colville:	Observed Precip: 3.23"	Normal: 1.08"	Pct of Normal: 299% (5/17-6/4)

North Idaho:

Kellogg:	Observed Precip: 4.94"	Normal: 1.92"	Pct of Normal: 257%
Lewiston:	Observed Precip: 2.53"	Normal: 1.04"	Pct of Normal: 243%
Winchester:	Observed Precip: 4.36"	Normal: 2.20"	Pct of Normal: 198%

ACIS 7-day average precipitation amounts for the period ending 9 June shows the bulk of the heaviest precipitation falling over the Cascades, south coastal Oregon, and northern Idaho (Fig. 3). In terms of percent of normal, much of the Pacific NW, north coastal California, much of Idaho, and Montana Rockies experienced four to eight times the normal precipitation this week. Exceptions dominated over parts of the Southwest, most of Nevada, and the Northern High Plains (Fig 3a). For the 2010 Water-Year that began on 1 October 2009, Arizona, southern New Mexico, eastern Nevada, the Olympic Range (WA), central Montana, and northeast Wyoming have the largest surpluses while the northern much of Idaho, Upper Snake River, and Colorado have the greatest deficits (Fig. 3b).

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WESTERN DROUGHT STATUS

The West: Cooler than normal temperatures were widespread over much of the West except for Colorado and New Mexico, which saw slightly above normal readings. This was accompanied by generous precipitation totals (3-5 inches or more) across portions of northern California and many locations across the Pacific Northwest. The recent rains, coupled with rapid snow melt in many places across the West, has led to flooding, but the underlying dryness in the basins and their projected low streamflow forecasts issued by USDA-NRCS and the National Weather Service are calling for many basins in Wyoming, southwestern Colorado, Utah, Montana, Idaho and southern Oregon to be less than 70% of average, with a few falling at less than 50% of average. Adequate reservoir storage will be beneficial in staving off some of the impacts that will come later during the summer months. Areas that improved this week include the Sevier basin of Utah (reduction of D0) and northeastern Oregon, all of eastern Washington and southwestern Idaho (removal of D0). There was also a reduction of D1/D2 in the Idaho Panhandle as a result of the heavy rains, snow melt and cooler temperatures. Year-to-date and Water-Year-to-date precipitation and streamflow numbers (October 1 to present) are in better shape after this early summer boost. The same conditions also led to some improvements in northwestern Wyoming in the Yellowstone region where the D2 was reduced a bit, but the D1 and D2 found here is still a situation worth watching. Farther south, the D0 found in the San Juan region of southwestern Colorado shows a slight expansion this week on the heels of the continued dryness in the region. Author: Mark Svoboda, National Drought Mitigation Center

A comprehensive narrative describing drought conditions for the nation can be found at the end of this document.

DROUGHT IMPACTS DEFINITIONS (<http://drought.unl.edu/dm/classify.htm>)

The possible impacts associated with **D4 (H, A)** drought include widespread crop/pasture losses and shortages of water in reservoirs, streams, and wells creating water emergencies. The possible impacts associated with **D3 (H, A)** drought include major crop/pasture losses and widespread water shortages or restrictions. Possible impacts from **D2 (H, A)** drought are focused on water shortages common and water restrictions imposed and crop or pasture losses likely. The possible impacts associated with **D1 (H, A)** drought are focused on water shortages developing in streams, reservoirs, or wells, and some damage to crops and pastures (Figs. 4 and 4a).

SOIL MOISTURE

Soil moisture (Figs. 5a and 5b), is simulated by the [VIC macroscale hydrologic model](#). The detailed, physically-based VIC model is driven by observed daily precipitation and temperature maxima and minima from approximately 2130 stations, selected for reporting reliably in real-time and for having records of longer than 45 years (and various other criteria). Another good resource can be found at: <http://www.emc.ncep.noaa.gov/mmb/nldas/drought/>.

U.S. HISTORICAL STREAMFLOW

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

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.

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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.

Figure 7 contains top soil moisture percentiles and weekly changes:

<http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/topsoil-statewide-statistics.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

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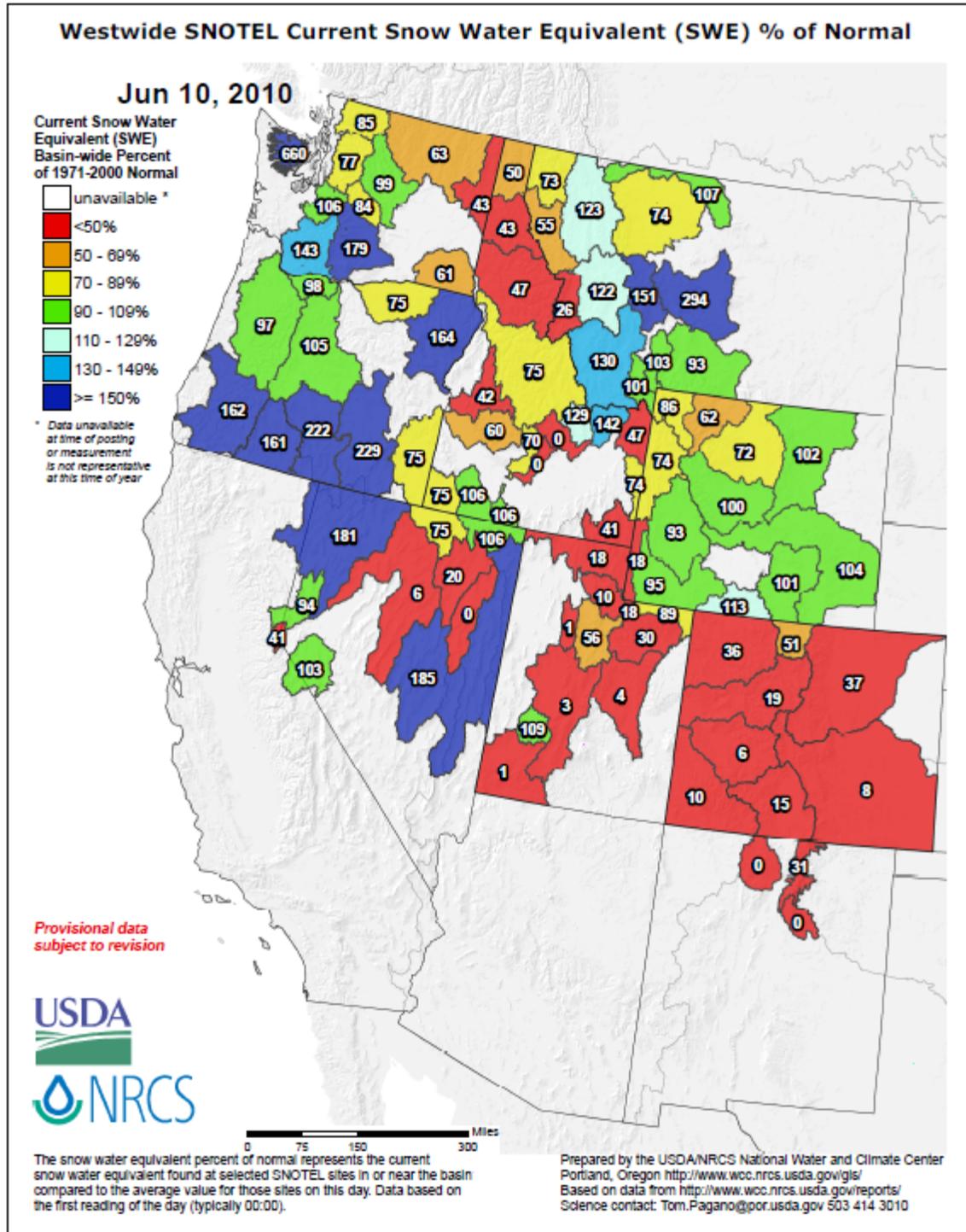


Fig. 1: SNOTEL Snow-Water Equivalent percent of normal values for 10 June 2010 shows a lot of basin to basin variability. Late season snowpack that is normally non-existent will result in skewed percentages. Clearly high percentages indicate late season snow pack with minimal actual SWE. This will be the last SWE chart that will be used this season.

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

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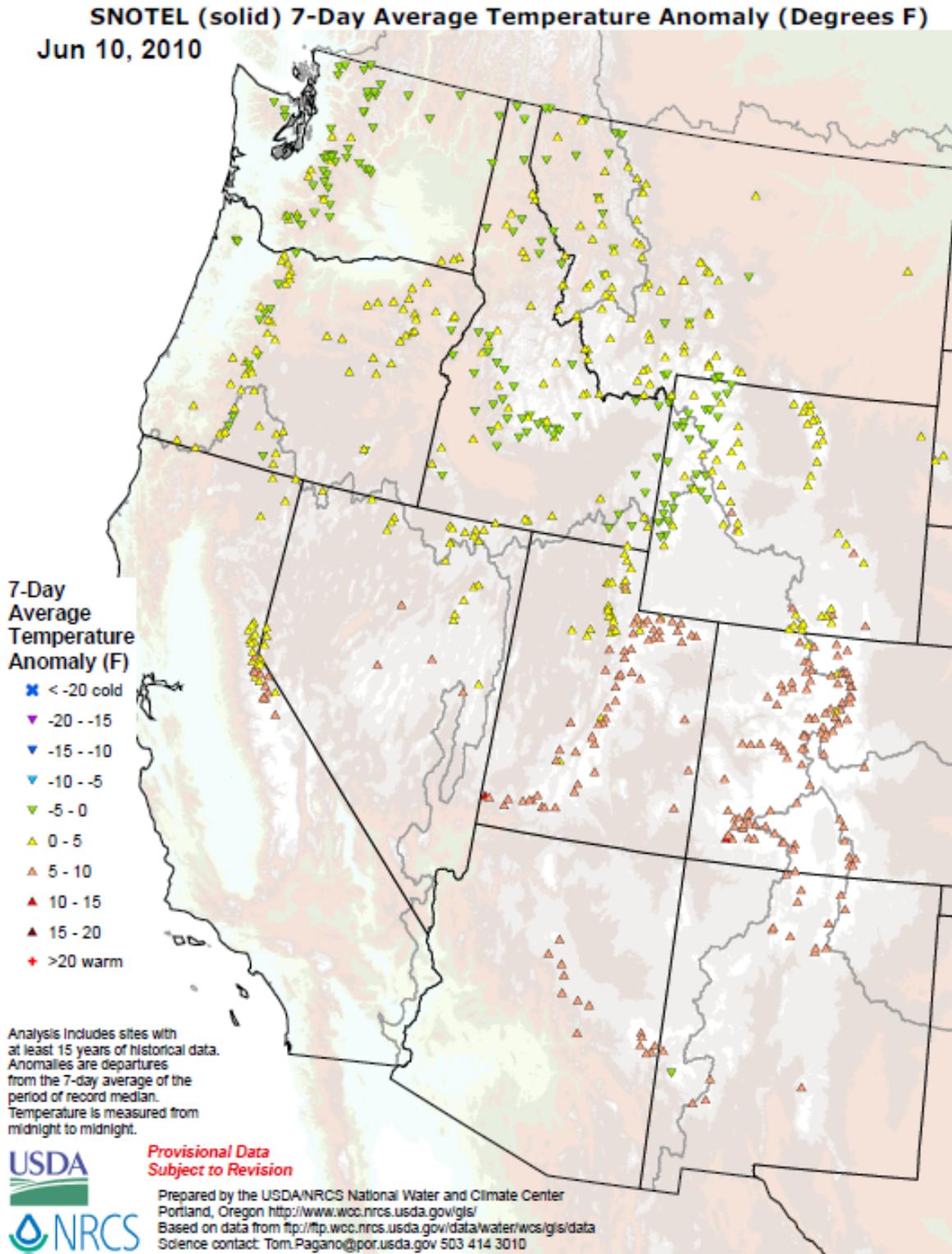
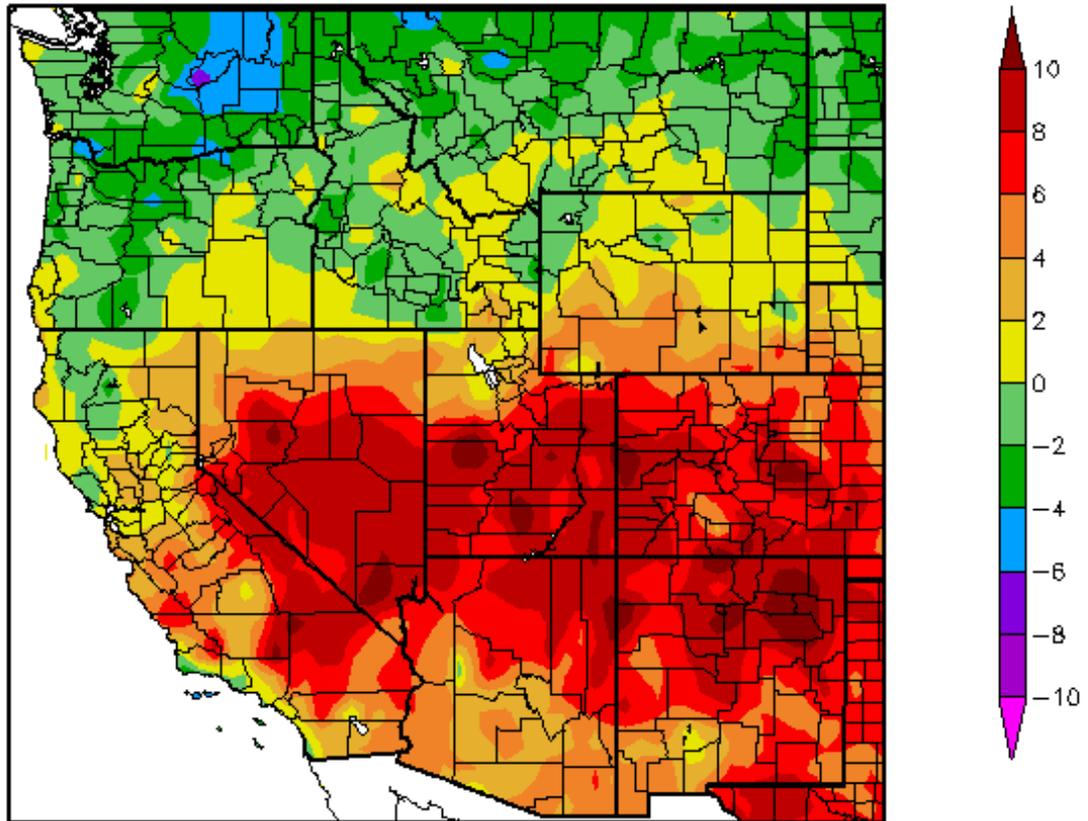


Fig. 2: SNOTEL 7-day average temperature departures from normal map reveal cooler temperatures over the Wyoming Rockies to the Cascades and warmer temperatures over the Wasatch, Southern Sierra, Arizona Mountains, and the Central and Southern Rockies.

Ref: <http://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/WestwideTavg7dAnomaly.pdf>

Departure from Normal Temperature (F)
6/3/2010 – 6/9/2010



Generated 6/10/2010 at HPRCC using provisional data.

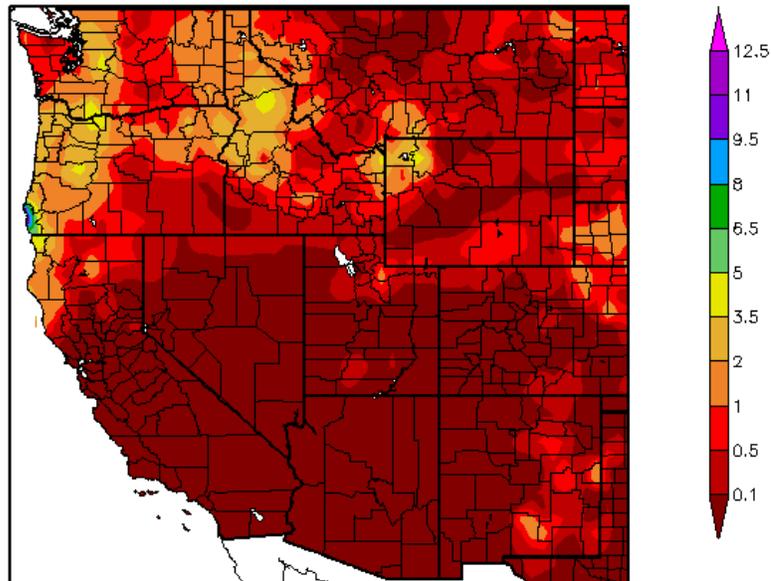
NOAA Regional Climate Centers

Fig. 2a: ACIS 7-day average temperature anomalies show that the greatest positive temperature departures were over parts of the Great Basin, Wasatch, and Central and Southern Rockies (>+10°F) and the greatest negative departure occurred over north-central Washington (<-6F). This pattern reflect a very strong Jet Stream that is separating cool air to the north from the warmer air to the south.

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

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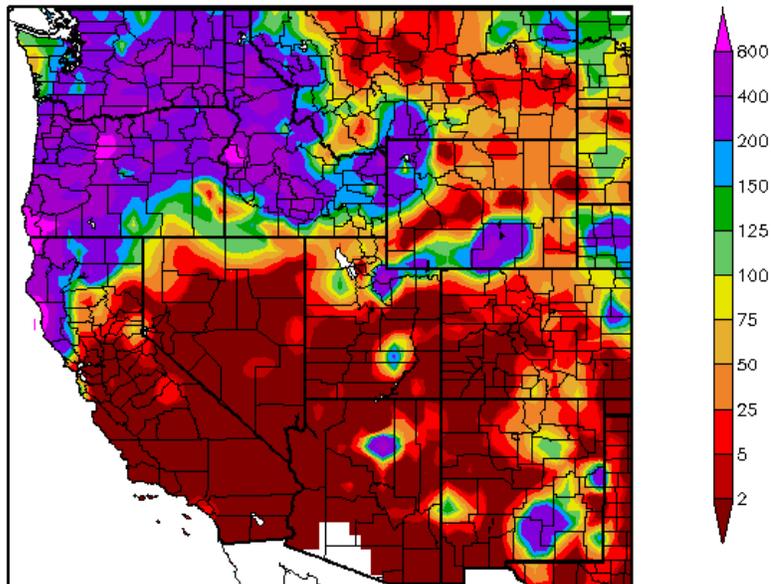
Precipitation (in)
6/3/2010 - 6/9/2010



Generated 6/10/2010 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
6/3/2010 - 6/9/2010



Generated 6/10/2010 at HPRCC using provisional data.

NOAA Regional Climate Centers

Fig. 3 and 3a: ACIS 7-day average precipitation amounts for the period ending 9 June shows the bulk of the heaviest precipitation falling over the Cascades, south coastal Oregon, and northern Idaho. In terms of percent of normal, much of the Pacific NW, north coastal California, much of Idaho, and Montana Rockies experienced four to eight times the normal precipitation this week. Exceptions dominated over parts of the Southwest, most of Nevada, and the Northern High Plains. Ref: <http://www.hprcc.unl.edu/maps/current/>

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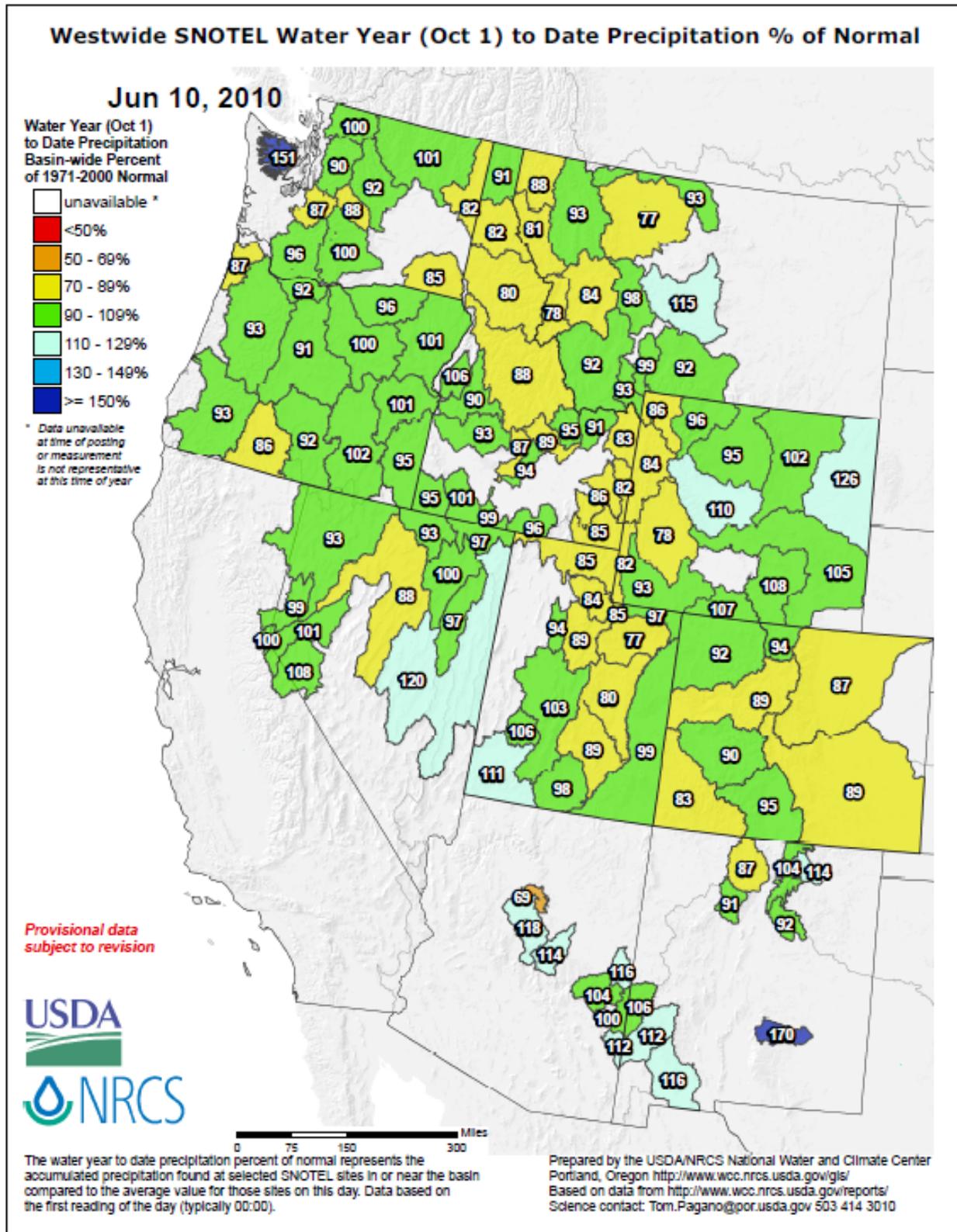
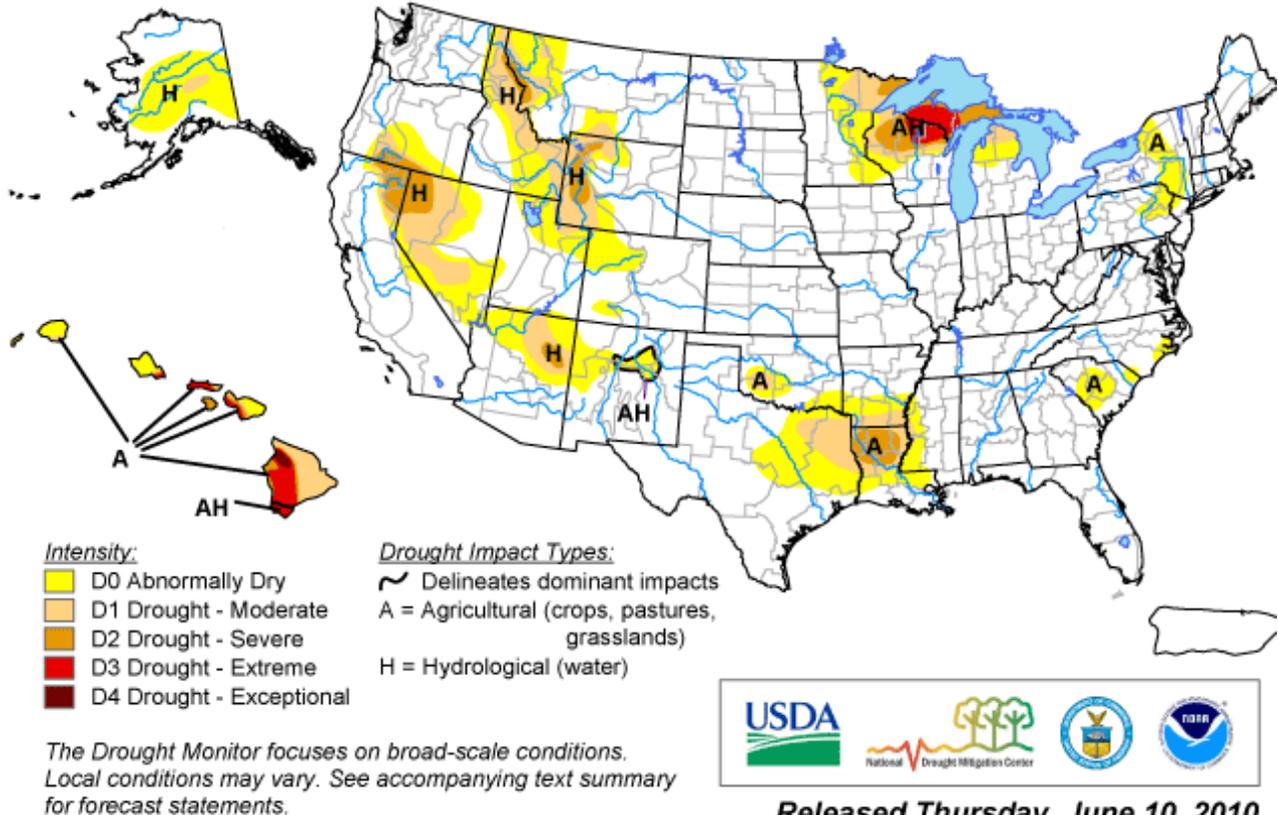


Fig 3b: For the 2010 Water-Year that began on 1 October 2009, Arizona, southern New Mexico, eastern Nevada, the Olympic Range (WA), central Montana, and northeast Wyoming have the largest surpluses while the northern much of Idaho, Upper Snake River, and Colorado have the greatest deficits.

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

U.S. Drought Monitor

June 8, 2010
Valid 8 a.m. EDT



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

Released Thursday, June 10, 2010
Author: Mark Svoboda, National Drought Mitigation Center

Fig. 4: Current Drought Monitor weekly summary. Hawaii is once again the only state that has a D4 drought level. For a historical perspective on Wisconsin's drought, see the following temporary links:

- <http://www.crh.noaa.gov/product.php?site=grb&product=pns&issuedby=GRB&format=CI&version=1&glossary=0>
- <http://www.crh.noaa.gov/product.php?site=GRB&issuedby=GRB&product=PNS&format=CI&version=3&glossary=0>
- <http://www.crh.noaa.gov/product.php?site=GRB&issuedby=GRB&product=PNS&format=CI&version=4&glossary=0>

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

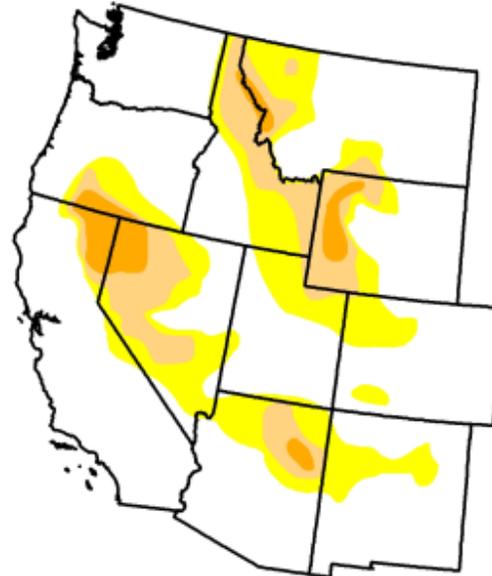
U.S. Drought Monitor

West

June 8, 2010
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	68.9	31.1	13.4	3.4	0.0	0.0
Last Week (06/01/2010 map)	61.2	38.8	14.1	4.1	0.0	0.0
3 Months Ago (03/16/2010 map)	38.1	61.9	22.3	5.6	0.0	0.0
Start of Calendar Year (01/05/2010 map)	40.1	59.9	30.6	9.9	0.5	0.0
Start of Water Year (10/06/2009 map)	42.1	57.9	25.4	8.5	0.0	0.0
One Year Ago (06/09/2009 map)	48.8	51.2	22.9	8.3	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



Released Thursday, June 10, 2010

Author: Mark Svoboda, National Drought Mitigation Center

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

Fig. 4a: Drought Monitor for the Western States with statistics over various time periods. Regionally there were some improvements since last week.

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

Drought Monitor Classification Changes for Selected Time Periods

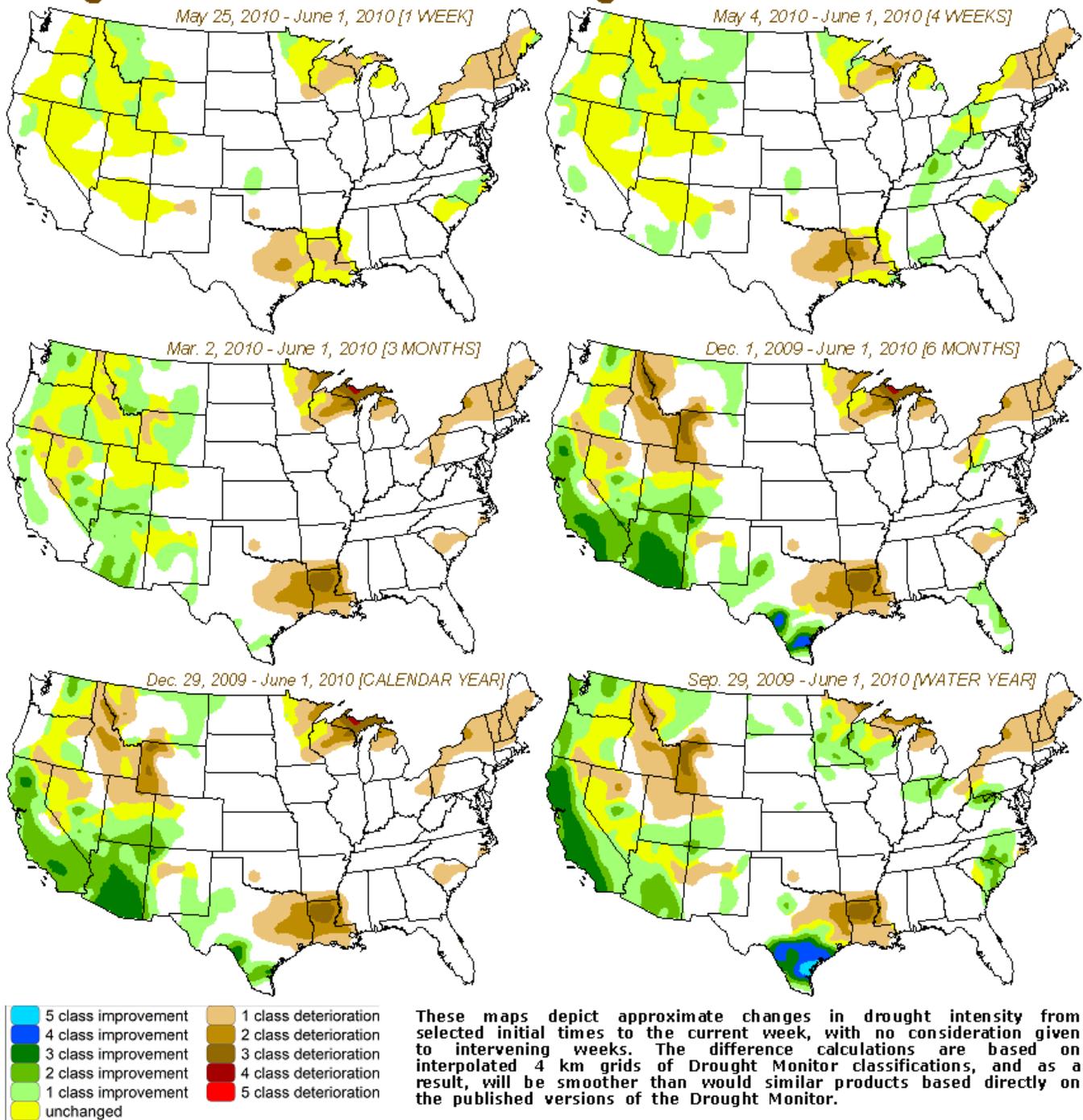
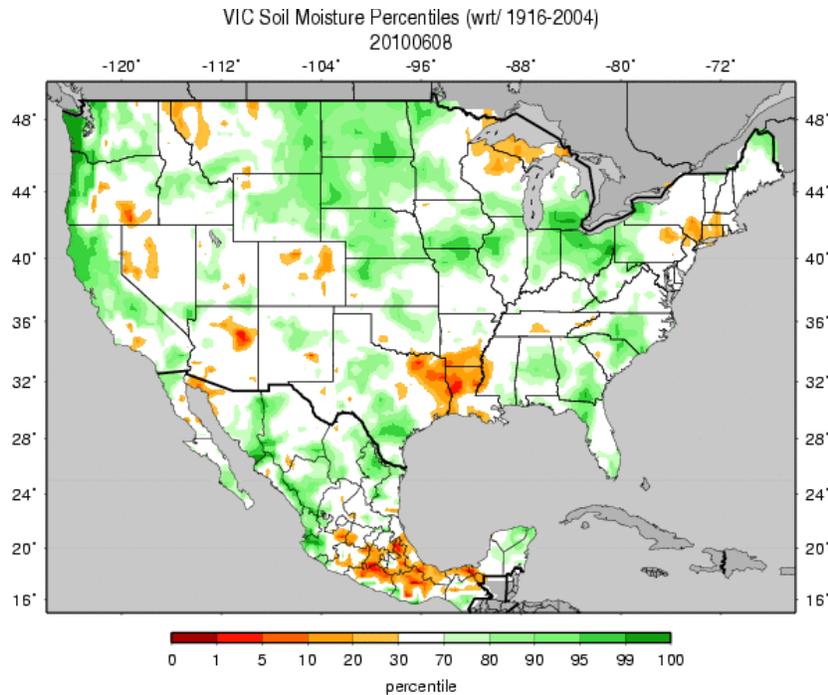


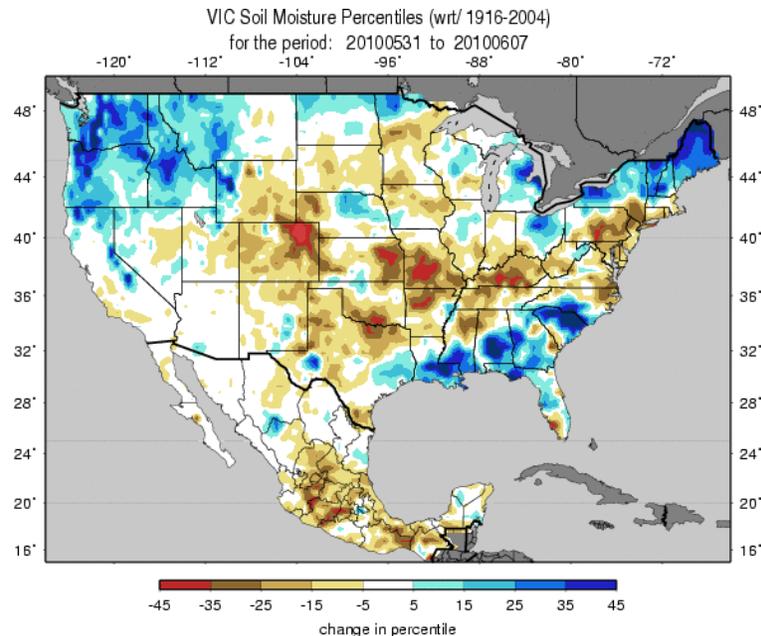
Fig. 4b : Drought Monitor Classification Changes show some change over the US as of 1 June (ending a week ago). Ref: <http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/dm-change-4maps.png>

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Figs. 5a: Soil Moisture ranking in percentile based on 1916-2004 climatology as of 8 June. Excessive moisture and dryness patterns are generally mixed across the U.S with the worst conditions over Louisiana and the best conditions over the High Plains, and Pacific Coast into central California.

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 extreme moistening over the Southeast, New England, and the Pacific NW. A dry week dominated over the Central US from Colorado to Kentucky.

Ref: <http://www.emc.ncep.noaa.gov/mmb/nldas/drought/> (very useful resource) and http://www.hydro.washington.edu/forecast/monitor/curr/conus.mexico/CONUS.MEXICO.vic.sm_qnt.1wk.gif

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Wednesday, June 09, 2010

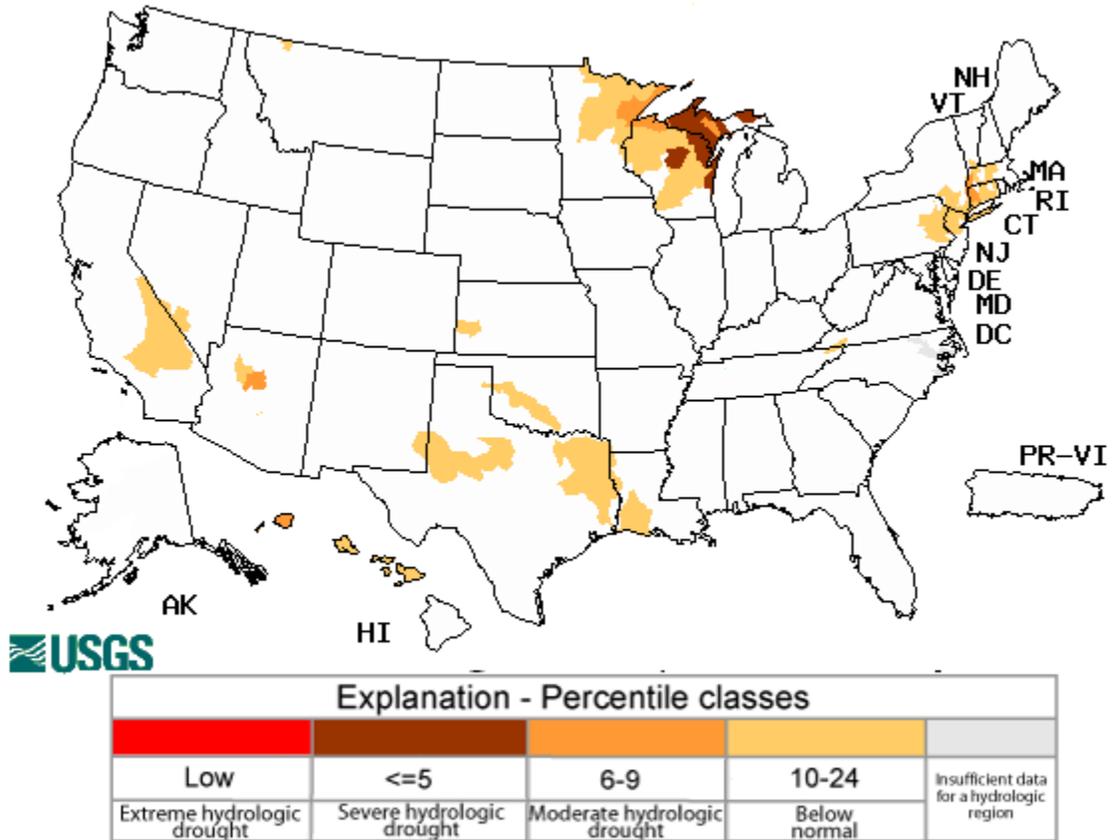


Fig. 6: Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Significant worsening conditions are noted over Northern Wisconsin-Upper Michigan Peninsula. Ref: <http://waterwatch.usgs.gov/?m=dryw&r>

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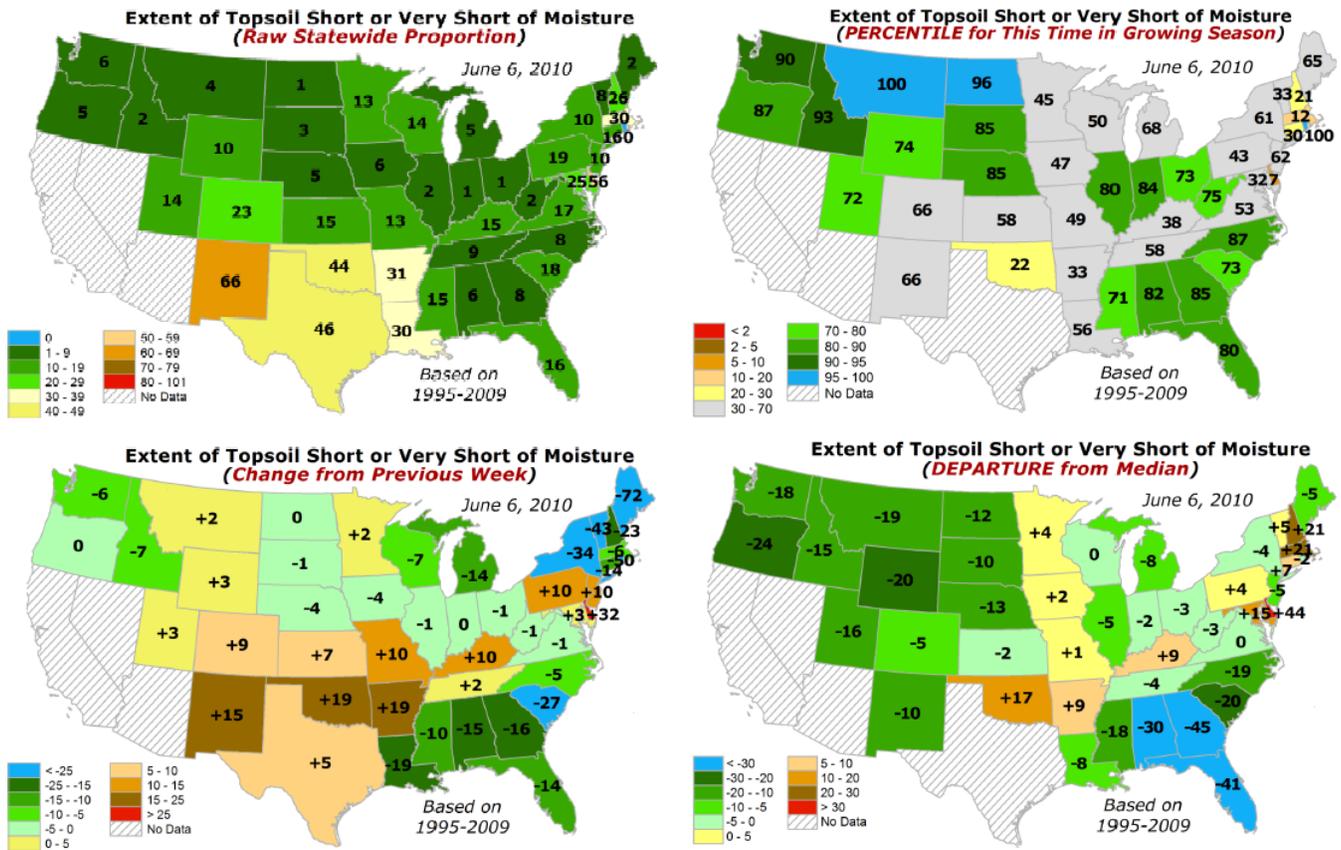


Fig. 7: Maps of Top Soil deficits in terms of percentiles. Note worsening conditions over New Mexico (+15) and improving conditions over Washington (-6) on lower left panel.

Ref: <http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/topsoil-statewide-statistics.pdf>

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National Drought Summary – June 8, 2010

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

The Northeast: Widespread precipitation fell across a large portion of the region last week with totals ranging from 1-4 inches in some parts. Temperatures were also above-normal for all but a small portion of Vermont and New Hampshire. This has led to a substantial improvement through the removal of a large amount of D0 across Maine, New Hampshire, Vermont and Massachusetts.

Northeastern and western New York, western Pennsylvania and east-central Ohio are also now depicted as drought/dryness free. The D1 found last week in north-central New York is now D0 as remnants of longer-term dryness back to the start of the year remain. In fact, the recent seasonal dryness over the past 30-60 days has also led to a slight expansion of D0 across eastern Pennsylvania and extreme northwestern New Jersey, where the rains of last week missed their mark.

Mid-Atlantic: The recent wet weather pattern (2-4 inches) has led to a breaking up of the D0 found along the coastal reaches of the Carolinas. Pockets of dryness remain, however, as we head into summer.

Southern Plains and Gulf Coast: The coastal areas received some generous rainfall amounts (2 to 5 inches) from south-central Texas to south Florida. As a result, most of the changes this week are reflected through improvements to the map. D0 and D1 have retreated northward in both southeastern Texas and southern Louisiana. Not all shared in the recent rains, though, as D0-D1 both pushed northward into more of Arkansas, northeastern Texas (into the Dallas-Fort Worth region) and even into southeastern Oklahoma. In addition, a new area of D1 has been introduced this week in southwestern Oklahoma where year-to-date totals are running around half or less of where they should be going into the hot summer months. The fringe D0 around this area of D1 in Oklahoma has also expanded.

Upper Midwest: The past week brought some relief to the dryness/drought with light rains, but most of the heaviest precipitation fell to the south of the D1-D3 core entrenched across northern Wisconsin, Minnesota and Michigan's Upper Peninsula. This results in mainly a status quo situation where the rains haven't been above and beyond what is normally expected this time of year now that temperatures are rising and water demands are beginning to increase.

The West: Cooler than normal temperatures were widespread over much of the West except for Colorado and New Mexico, which saw slightly above normal readings. This was accompanied by generous precipitation totals (3-5 inches or more) across portions of northern California and many locations across the Pacific Northwest. The recent rains, coupled with rapid snow melt in many places across the West, has led to flooding, but the underlying dryness in the basins and their projected low streamflow forecasts issued by USDA-NRCS and the National Weather Service are calling for many basins in Wyoming, southwestern Colorado, Utah, Montana, Idaho and southern Oregon to be less than 70% of average, with a few falling at less than 50% of average. Adequate reservoir storage will be beneficial in staving off some of the impacts that will come later during the summer months. Areas that improved this week include the Sevier basin of Utah (reduction of D0) and northeastern Oregon, all of eastern Washington and southwestern Idaho (removal of D0). There was also a reduction of D1/D2 in

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the Idaho Panhandle as a result of the heavy rains, snow melt and cooler temperatures. Year-to-date and Water-Year-to-date precipitation and streamflow numbers (October 1 to present) are in better shape after this early summer boost. The same conditions also led to some improvements in northwestern Wyoming in the Yellowstone region where the D2 was reduced a bit, but the D1 and D2 found here is still a situation worth watching. Farther south, the D0 found in the San Juan region of southwestern Colorado shows a slight expansion this week on the heels of the continued dryness in the region.

Hawaii, Alaska and Puerto Rico: Another dry week and steady reports of drought impacts on range/pasture conditions, livestock health, water supply and fires have led to further deterioration in the form of at least D1 across all of the Big Island now that it covers the windward side. D3 has also spread across the southeast portion of the Big Island as well. Windward Maui and Oahu are now both covered with D0 as well.

Looking Ahead: Over the next 5 days (June 10-14) we can expect to see above-normal temperatures across the southern Plains, Gulf Coast and mid-Atlantic, with the warmest air lodged over the Southeast. Substantially cooler air (9 to 12 degrees below normal) will fill in across much of the West (except for northern coastal California) and northern Plains. Parts of New England and up into Maine can also expect slightly cooler than normal temperatures during this time. As for precipitation, many of the dry/drought affected regions may be in line for some decent rains over the next five days. This includes the Pacific Northwest, which has already seen a very wet start to the summer months (> 200-300% of normal precipitation across much of the region) with rapid snow melt and rains contributing to flooding in many places. A good portion of Wyoming, eastern Colorado, the central Plains, southern Plains (eastern Oklahoma and eastern Texas) are showing good potential for some significant precipitation. The forecast is also favorable for the Great Lakes region, including much of Minnesota, Wisconsin and northern Michigan including the Upper Peninsula. Finally, the Ohio Valley and Northeast may also share in the wealth.

The CPC 6-10 day forecast (June 15–19) is showing increased odds for above-normal temperatures in the Four Corners region and throughout the central and southern Plains. Everywhere else can expect near-normal temperatures except for central Alaska, where the forecasts are leaning toward below-normal readings. Confidence is a bit low on the precipitation side of things, where chances are better for below-normal rainfall across southern and northern Alaska, the Intermountain West, most of Texas and northern New England into Maine. Better odds of above-normal precipitation are depicted across the northern Plains, Minnesota and northern Wisconsin along with the Southeast. Author: Mark Svoboda, National Drought Mitigation 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 June 9, 2010