



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

Weekly Report - Snowpack / Drought Monitor Update **Date: 22 January, 2009**

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Snow: Snow-water equivalent percent to date shows no significant change since last week (Fig 1). A few areas (coastal Oregon Mountains and eastern Nevada) have extreme deficits. Most of Arizona, New Mexico, northeastern Wyoming, and the southern half of Colorado have excessive surpluses. Although still early into the spring-summer runoff forecasting season, Fig. 1a reflects unofficial forecast changes (worsening) over most of the West as result of a strong ridge of high pressure dominating the region. This past week's snow depth changes across the West also shows decrease nearly everywhere as would be expected with very little precipitation falling. Snowfall totals do not consider snow density changes, sublimation, or wind driven effects but are still of interest to the skiing community and other stakeholders (Fig. 1b).

Temperature: SNOTEL and ACIS-day station average temperature anomalies were well above normal during the past week as a result of a strong ridge of high pressure over the West. Interior valleys resisted this trend as trapped cold air was difficult to mix out of these areas (Fig. 2). Specifically, the greatest positive temperature departures occurred over the High Plains in Montana (>+25F) and the greatest negative departures occurred over the northern Great Basin (<-10F) (Fig. 2a).

Precipitation: ACIS 7-day average precipitation anomaly for the period ending 21 January shows very little precipitation falling across the West (Fig. 3). Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2009 Water Year that began on October 1, 2008 shows values decreased about 10% over much of the West this week (Fig. 3a). For precipitation totals, departures, and percent of normal for several time periods. See: <http://www.water.gov/> and <http://cig.mesonet.org/~derek/public/droughtmonitoring/>.

WESTERN DROUGHT STATUS

The West

Continued high pressure centered over the Great Basin did little to alleviate drought conditions in the West. In California, D3 was expanded to include all of the Sacramento River basin, reflecting continued lack of precipitation this water year, in combination with two previous dry years. Department of Water Resources' 8-station northern Sierra precipitation index would need 35 inches to get to normal conditions, yet the average precipitation for February through September is typically just 19 inches. If the current precipitation trend continues, this would result in a three-year period of less than 75 percent of normal. Similar dry periods have been experienced just three other times in the 20th century: 1932-34, 1987-89, and 1990-92, with the last being most analogous to our current condition. Major reservoirs and runoff data also show a grim outlook for this area. In addition to the expansion of D3, D2 was introduced in Napa, Sonoma and Mendocino counties north of San Francisco to reflect continued lack of precipitation in this area, compounded by the previous two dry years. D2 was also expanded in the north of the state to include all of the Sacramento River Drainage climate division. 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.

Weekly Snowpack and Drought Monitor Update Report

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. 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).

OBSERVED FIRE DANGER CLASS

The National Interagency Coordination Center provides a variety of products that describe the current wildfire status for the U.S. - http://activefiremaps.fs.fed.us/lq_fire2.php. The latest Observed Fire Danger Class is shown in Figs. 6 shows the current active wildfires across the West - <http://geomac.usgs.gov/>.

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.

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/>

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

Weekly Snowpack and Drought Monitor Update Report

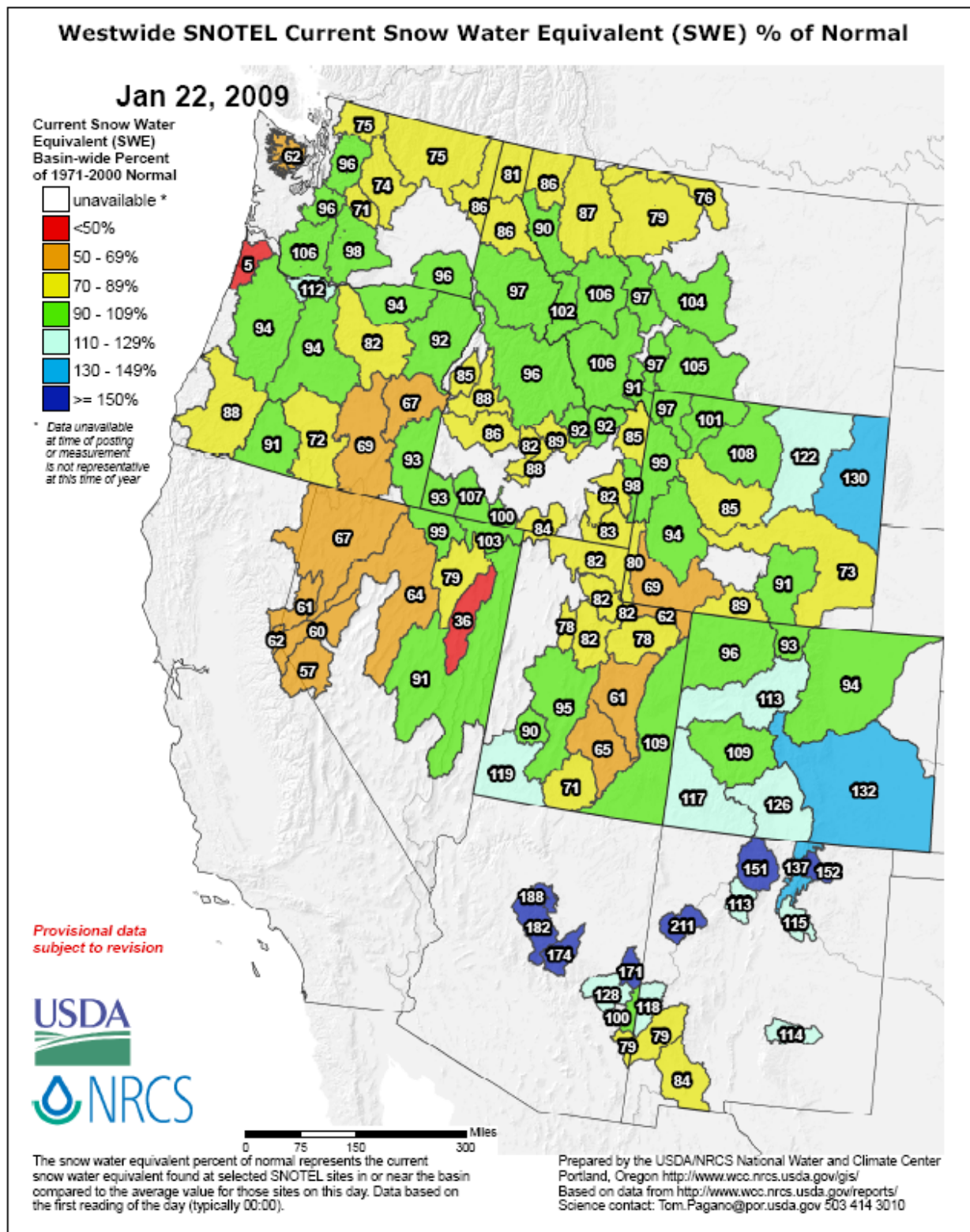


Fig. 1. Snow-water equivalent percent to date shows a few areas (coastal Oregon Mountains and eastern Nevada) with extreme deficits this week. Most of Arizona, New Mexico, northeastern Wyoming, and the southern half of Colorado have excessive surpluses. No significant change since last week.

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

Weekly Snowpack and Drought Monitor Update Report

7-Day Guidance Forecast Change as Percent of 1971-2000 Normal

Jan 22, 2009

For guidance only

7-Day Guidance
Forecast Change
(% normal)

- ✕ > 20% gain
- ▲ 16 - 20%
- ▲ 11 - 15%
- ▲ 6 - 10%
- ▲ 1 - 5%
- ⊖ no change
- ▼ -5 - -1%
- ▼ -10 - -6%
- ▼ -15 - -11%
- ▼ -20 - -16%
- ✕ > 20% loss
- ⊙ Unavailable*

* Forecast unavailable due
to insufficient realtime data
or low forecast skill

Provisional Data
Subject to Revision

0 50 100 200 Miles



Prepared by the USDA/NRCS National Water and Climate Center
Portland, Oregon http://www.wcc.nrcs.usda.gov/wsf/daily_forecasts.html
Based on data from
ftp://wcc.nrcs.usda.gov/data/water/wcs/daily_forecast/SummaryOutput.csv
Science contact: Tom.Pagano@por.usda.gov 503 414 3010

*This is a completely automated objective product
based on SNOTEL data. This product is not meant
to replace or supersede the official forecasts produced
in coordination with the National Weather Service.*

Fig. 1a: Selected preliminary daily water supply forecast changes (all downward) during the past week based in part on measured snowfall as noted in Fig. 1b that follows.

Ref: ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/daily_forecast/maps/west_dailyfcst_7daych.pdf

SNOTEL 7-Day Snow Depth Change (Inches)

Jan 22, 2009

7-day Snow Depth Change (Inches)

- ✕ > 36" gain
- ▲ 19 - 36"
- ▲ 13 - 18"
- ▲ 4 - 12"
- ▲ 1 - 3"
- 0"
- ▼ -3 - -1"
- ▼ -12 - -4"
- ▼ -18 - -13"
- ▼ -36 - -19"
- ♦ < -36" loss
- Snow free
- Unavailable*
- ✂ Data spike**

* Data unavailable at time of posting or snow depth sensor not available at site
** A "data spike" is a gain or loss of more than 100 inches in 24 hours

Provisional Data
Subject to Revision

Prepared by the USDA/NRCS National Water and Climate Center
Portland, Oregon <http://www.wcc.nrcs.usda.gov/gis/>
Based on data from <ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/data>
Science contact: Tom.Pagano@por.usda.gov 503 414 3010



Automated snow depth measurements are known to occasionally read spuriously large during precipitation events. Snow depth is also difficult to accurately measure at near-snow free conditions; data should be used with caution.

Fig. 1b: This past week's snow depth changes across the West. No surprises here with decreasing depths across the West as a result of very little precipitation falling anywhere.

Ref: ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/west_snowdepth_7ddelta.pdf

Weekly Snowpack and Drought Monitor Update Report

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

Jan 22, 2009

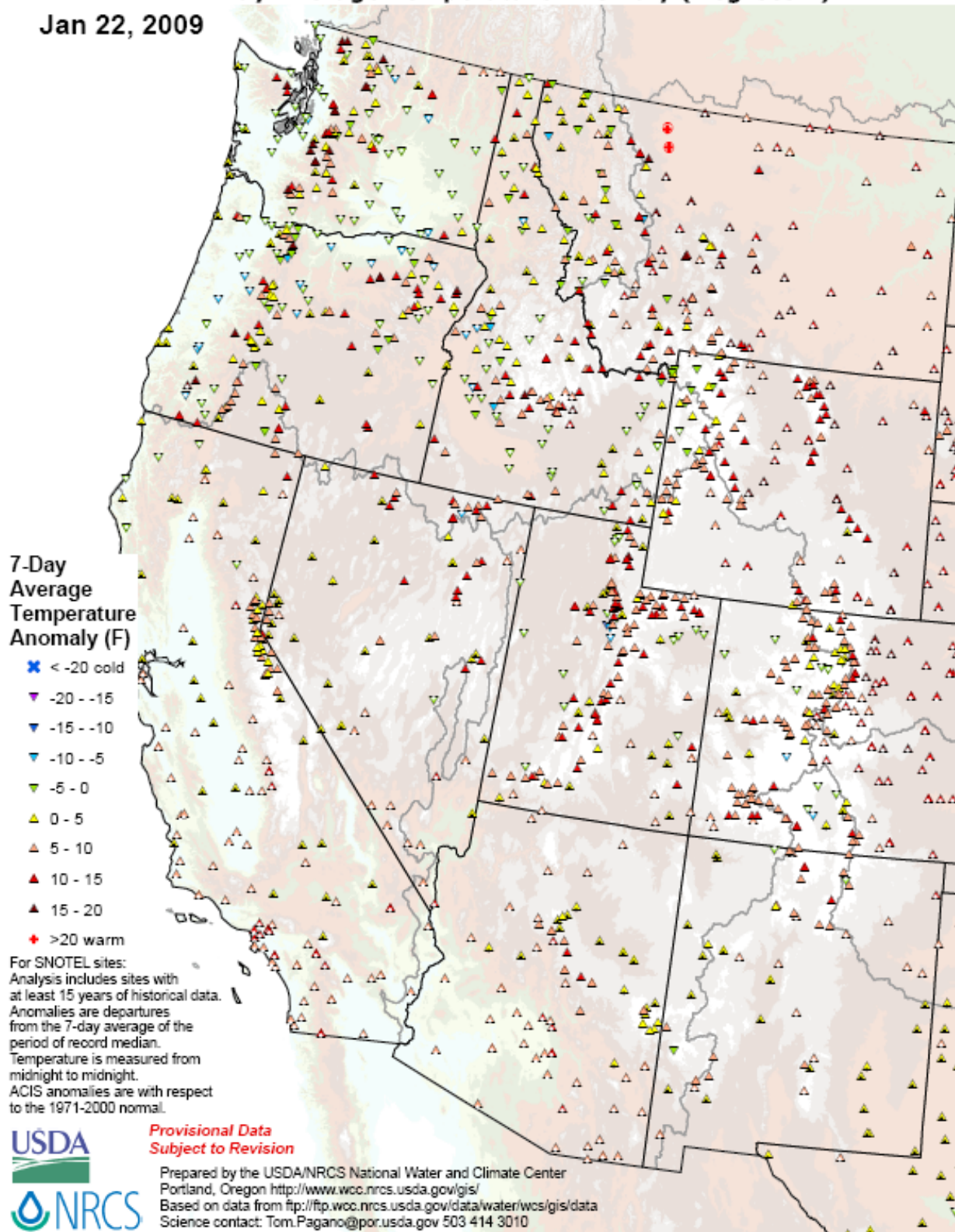
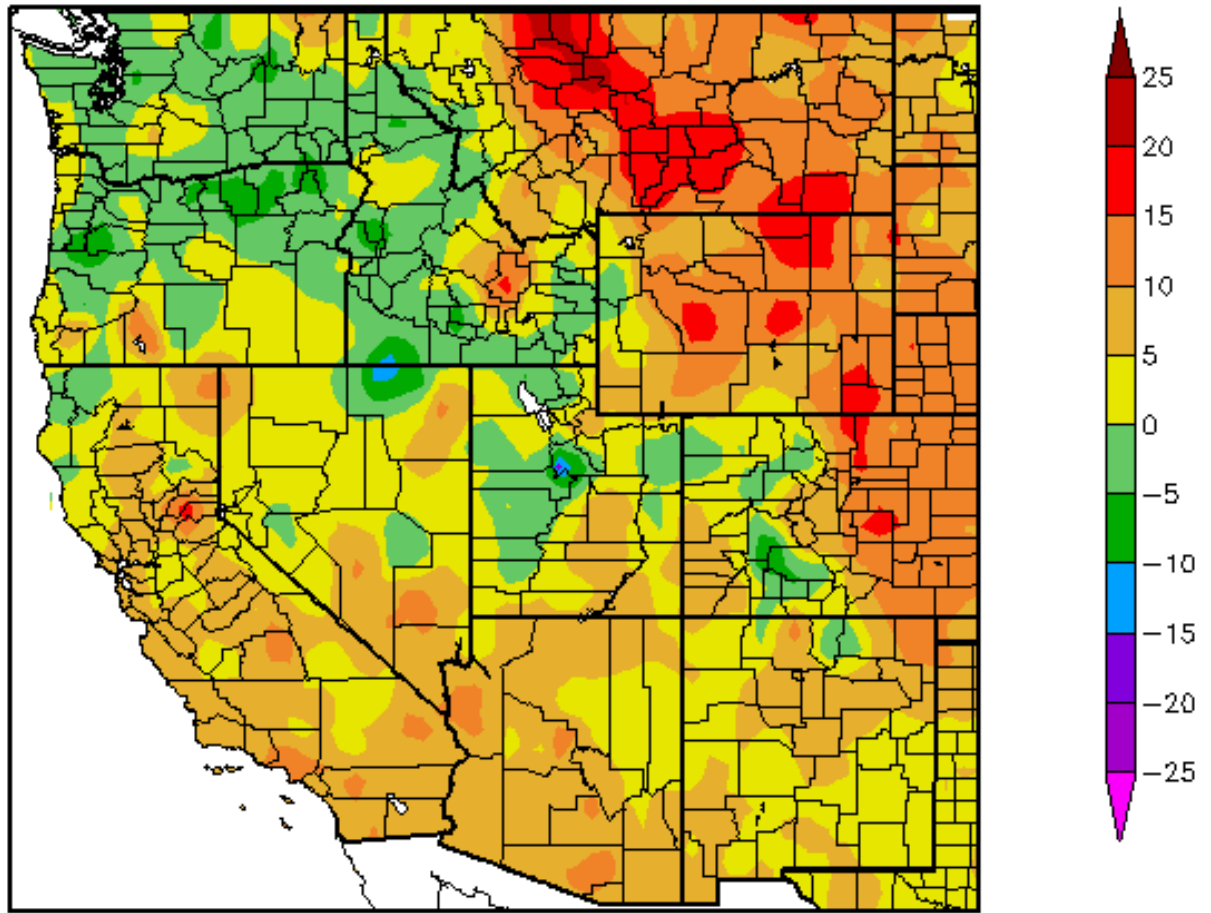


Fig. 2. SNOTEL and ACIS-day station average temperature anomalies were well above normal during the past week as a result of a strong ridge of high pressure over the West. Interior valleys resisted this trend as cool air was difficult to mix out of these regions.

Ref: <ftp://ftp.wcc.nrcs.usda.gov/data/water/wcs/gis/maps/WestwideTavg7dAnomalyAcis.pdf>

Departure from Normal Temperature (F)
1/15/2009 – 1/21/2009



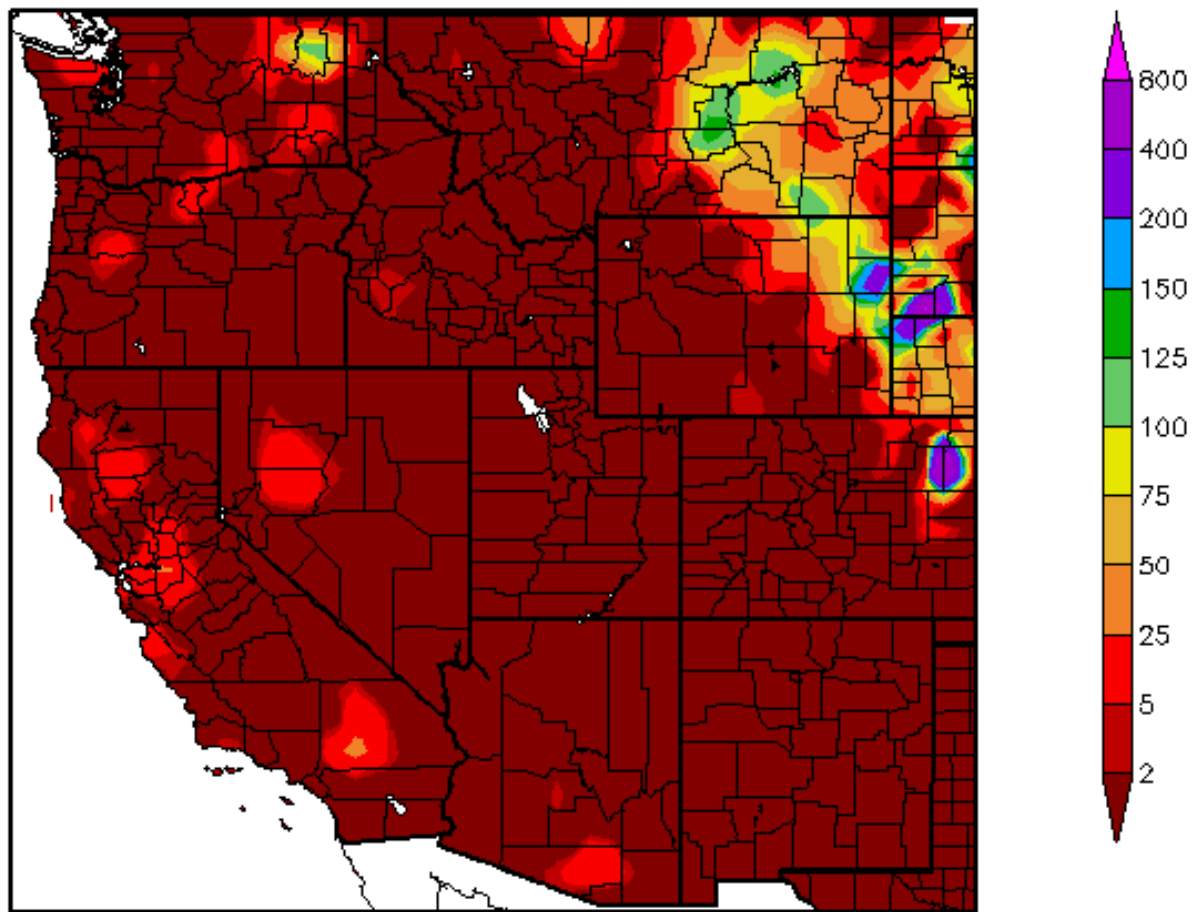
Generated 1/22/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Fig. 2a. ACIS 7-day average temperature anomalies: Greatest positive temperature departures occurred over the High Plains in Montana (>+25F) and the greatest negative departures occurred over the northern Great Basin (<-10F).

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

Percent of Normal Precipitation (%)
1/15/2009 – 1/21/2009



Generated 1/22/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Fig. 3. ACIS 7-day average precipitation anomaly for the period ending 21 January shows very little precipitation falling across the West.

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

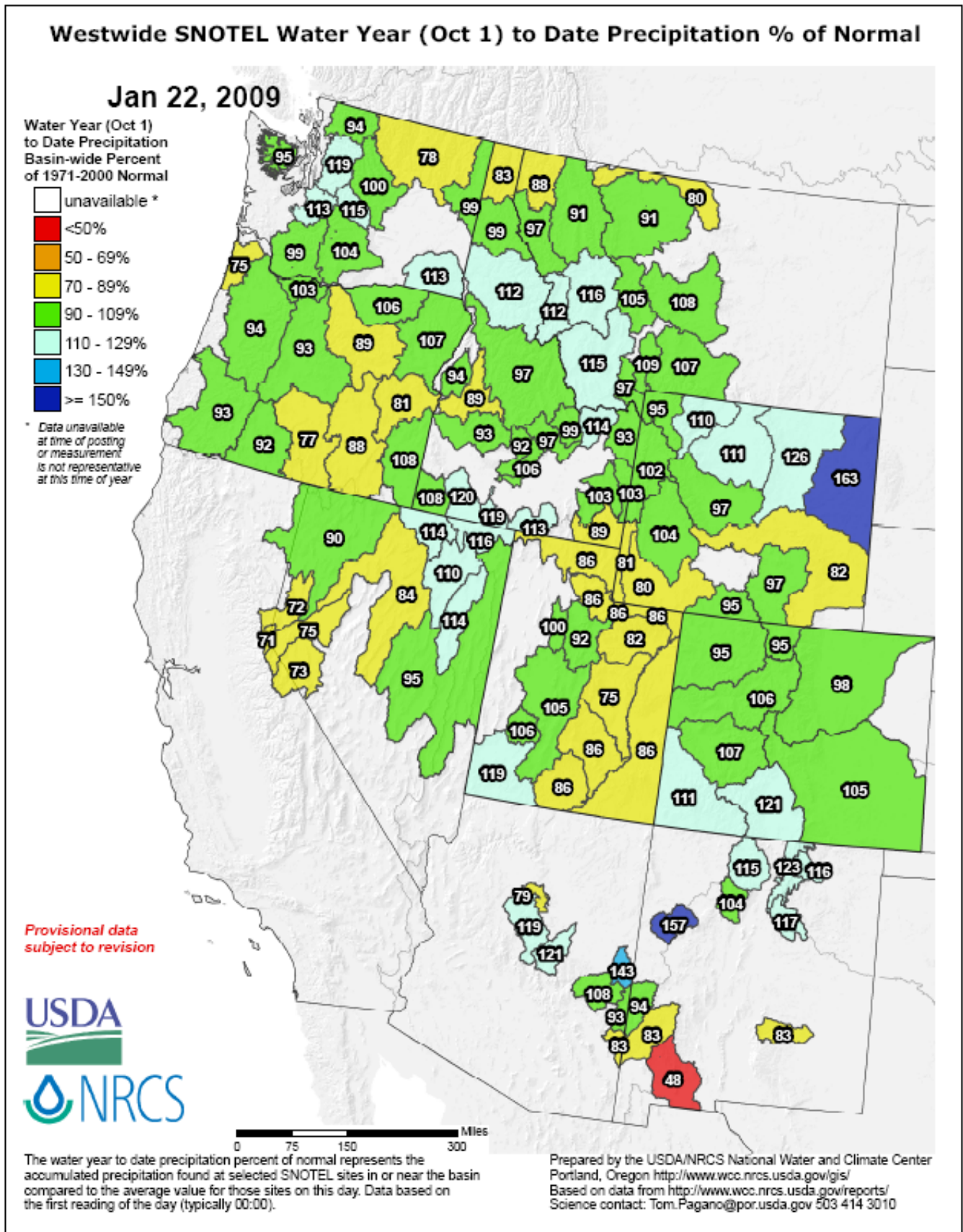
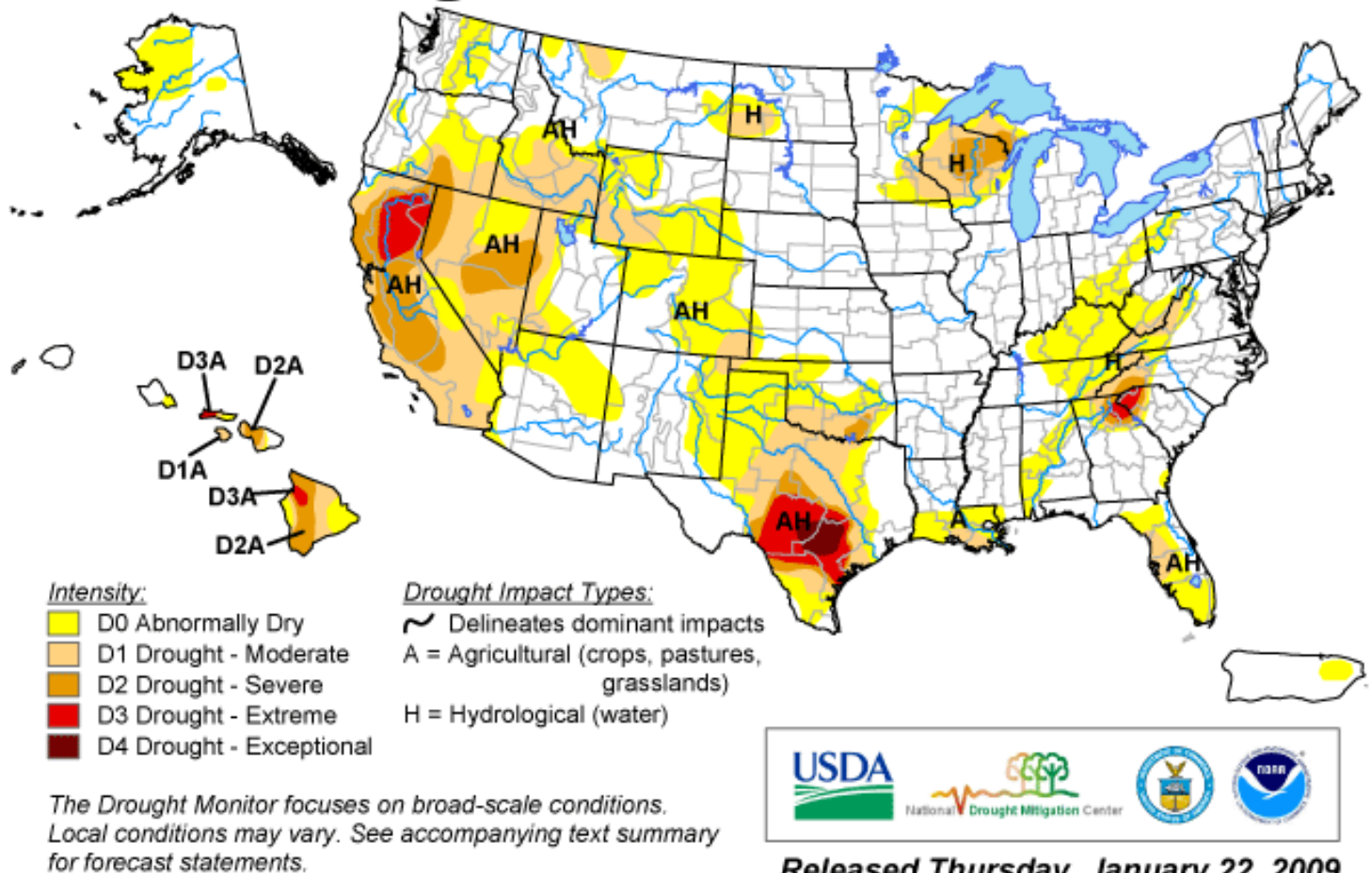


Fig 3b. Seasonal precipitation (rain & snow water equivalent) as a percent of normal for the 2009 Water Year that began on October 1, 2008 shows values decreased about 10% over much of the West this week.

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

U.S. Drought Monitor

January 20, 2009
Valid 8 a.m. EST



Released Thursday, January 22, 2009

Author: Laura Edwards, Western Regional Climate Center

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

Fig. 4. Current Drought Monitor weekly summary.

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

U.S. Drought Monitor

West

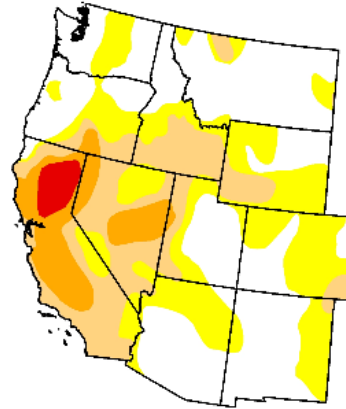
January 20, 2009

Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	43.2	56.8	28.2	9.8	1.7	0.0
Last Week (01/13/2009 map)	41.9	58.1	28.5	9.1	0.4	0.0
3 Months Ago (10/28/2008 map)	39.9	60.1	30.0	10.4	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 (01/22/2008 map)	28.7	71.3	51.8	26.2	0.0	0.0

Intensity:

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



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, January 22, 2009

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Fig. 4a. Drought Monitor for the Western States with statistics over various time periods. Note deterioration over northern California since last week. 2008 Drought Impacts for California can be viewed here: <http://drought.unl.edu/droughtscape/2009Winter/dswinter09-cadrought.htm>

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

California Drought Fact Sheet 2009

Precipitation

Precipitation for the Northern California (Sacramento Basin) 8-Station Index has been below the long-term average for the past two water years. As water year 2009 evolves, it is looking like a third consecutive dry year is on tap as seen in the table below. To get to an average water year total, approximately 35 more inches of precipitation is needed. Note that this is approximately the total precipitation of each of the past two years for the index. Average precipitation for the February through September period is 19 inches.

Water Year	WRCC CA Climate Tracker		Northern California 8-Station Index	
	Statewide Average	% of Normal	Annual Sum	% of Normal
2007	14.36	67%	37.21	74%
2008	16.40	76%	34.97	70%
2009 to date*			15.40	66%

*as of 1/20/2009

The following table provides information on past comparable periods with three consecutive years of below-normal precipitation for the 8-Station Index.

Water Year	WRCC CA Climate Tracker		Northern California 8-Station Index	
	Statewide Average	% of Normal	Annual Sum	% of Normal
1932	20.54	95%	42.03	83%
1933	15.59	72%	32.27	64%
1934	15.01	69%	36.31	72%
1987	14.06	65%	28.56	57%
1988	18.61	86%	34.86	69%
1989	19.41	90%	50.13	100%
1990	15.26	71%	35.97	72%
1991	16.97	79%	32.17	64%
1992	19.16	89%	36.01	72%

It is rare to find three consecutive years with less than 75% of normal precipitation. The three three-year periods shown above come closest – especially 1990-1992. Note that the closest corresponding periods of dryness are associated with the two six-year droughts of the 20th century.

U.S. Drought Monitor

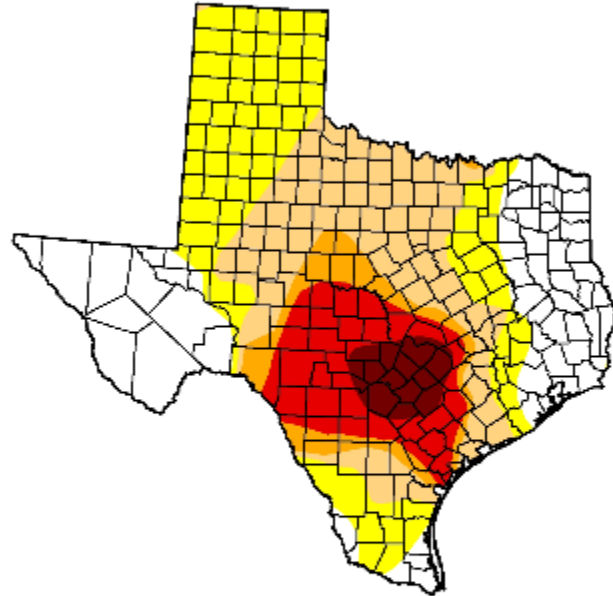
Texas

January 20, 2009
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	26.9	73.1	45.8	22.2	16.0	4.2
Last Week (01/13/2009 map)	29.0	71.0	43.0	20.6	15.1	4.2
3 Months Ago (10/28/2008 map)	61.1	38.9	22.4	15.2	5.0	0.0
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 (01/22/2008 map)	32.4	67.6	24.9	0.0	0.0	0.0

Intensity:

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



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



Released Thursday, January 22, 2009

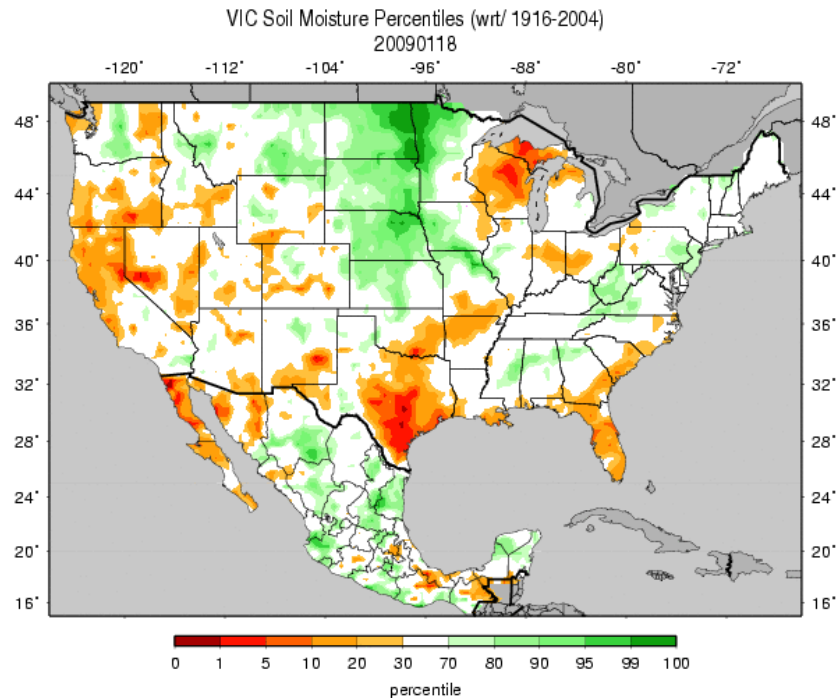
Author: Laura Edwards, Western Regional Climate Center

Fig. 4b: Texas now stands alone as the only state with D4 drought condition. Note gradual worsening since last week. Since 2004, Texas has gone from having periods of ample rain to periods of not enough. For example, Victoria in 2007 got 71.8 inches of rain, the second wettest year on record. Last year Victoria got just 21.7 inches, the fifth driest year.

Additional news: <http://www.victoriaadvocate.com/news/regionstate/story/394226.html#>.

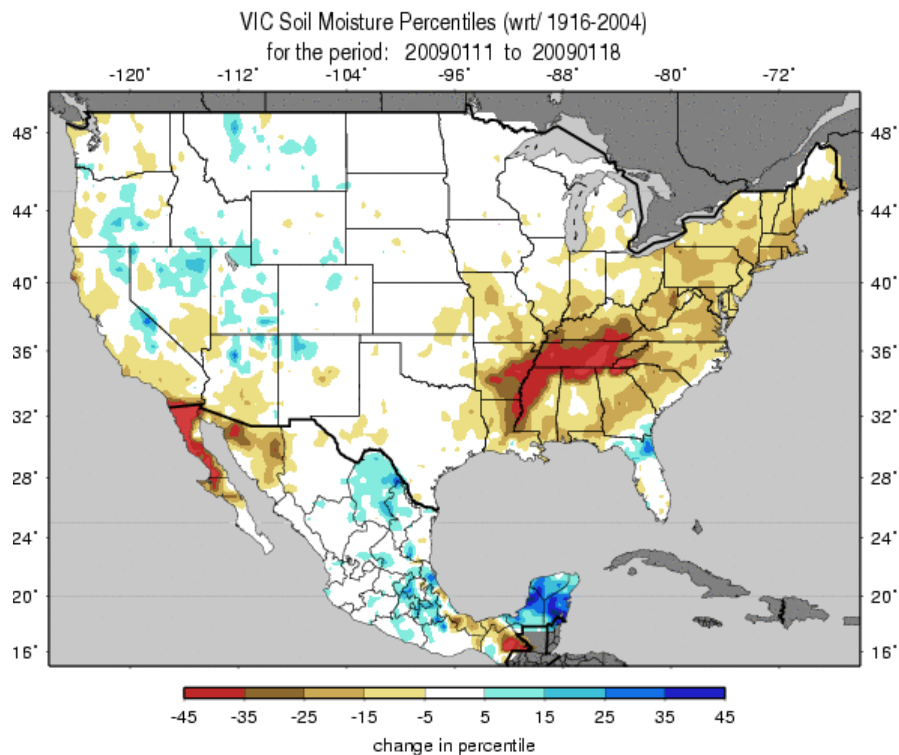
Ref: http://www.drought.unl.edu/dm/DM_southeast.htm

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Figs. 5: Soil Moisture Ranking and change in percentile based on 1915-2003 climatology for this past week. Near saturation exists over the Northern Plain while excessive dryness dominates the central-southern Texas and the Upper Peninsula of Michigan as of 18 January.

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



Figs. 5a: Soil moisture change for week ending 18 January. Note significant decrease in moisture over the Tennessee River Valley.

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

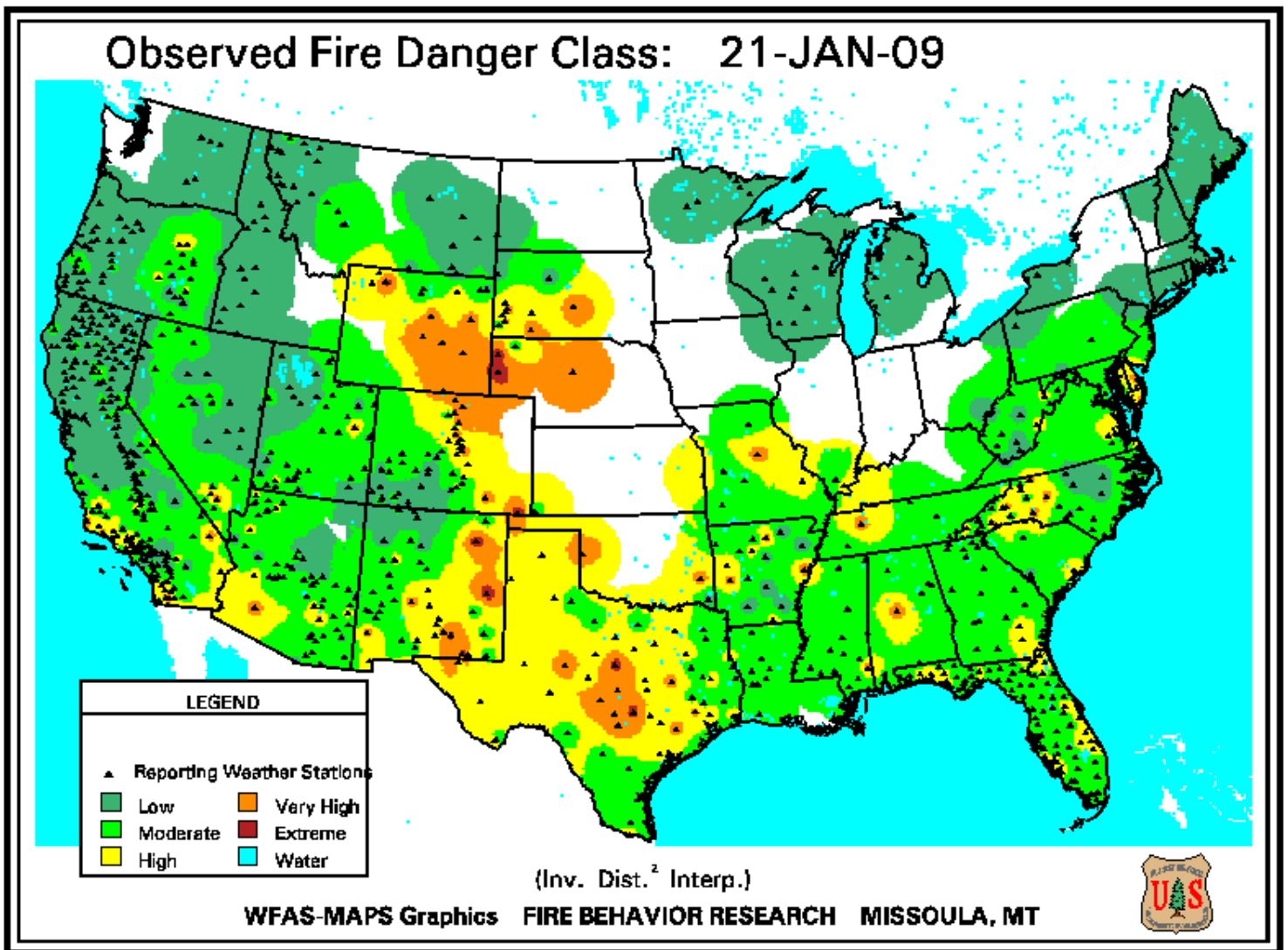
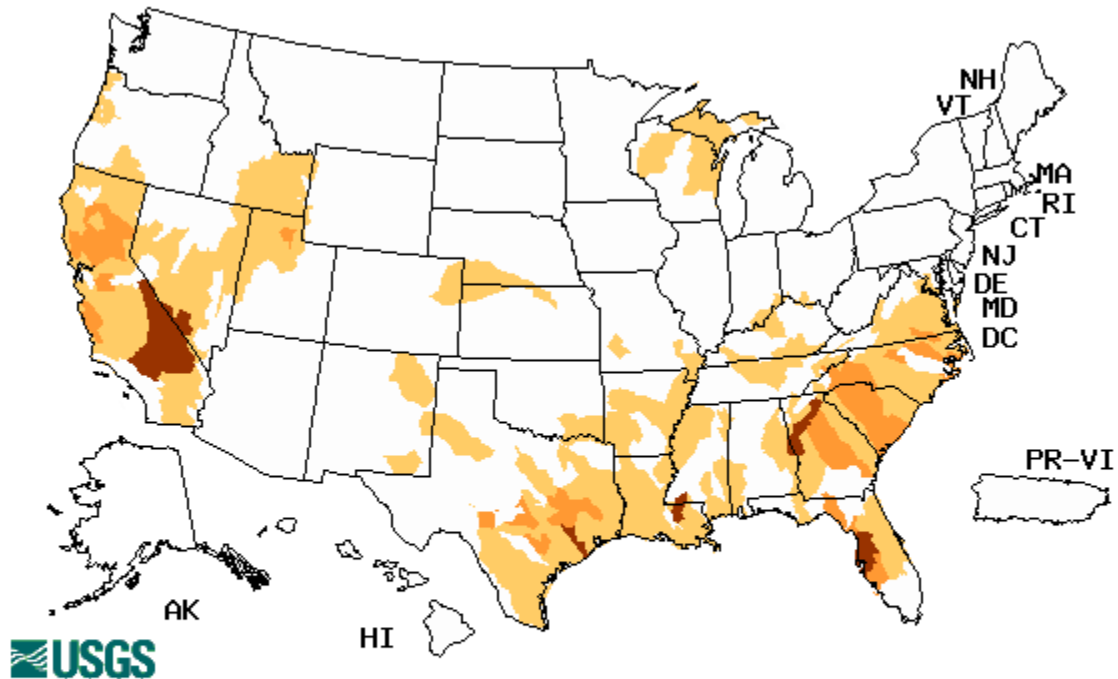


Fig. 6. Observed Fire Danger Class. Conditions have deteriorated over the Central High Plains since last week. Source: Forest Service Fire Behavior Research – Missoula, MT.

Ref: http://www.fs.fed.us/land/wfas/fd_class.gif

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Wednesday, January 21, 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. California shows an expanding area of severe stream flows while conditions continue to worsen from Texas to Virginia during this past week. Elsewhere, cold temperatures have probably frozen rivers and thus do not necessarily reflect accurate flows. Ref: <http://water.usgs.gov/waterwatch/?m=dryw&w=map&r=us>

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National Drought Summary -- January 20, 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 Plains

The drought in Texas continues to expand, and this week worsening conditions in the east central part of the state brought D0 and D1 designations towards the Houston area. Precipitation deficits of the last few months, as well as reports of increasing burn bans and poor streamflow are among the factors that were considered. In west central Texas, further degradation was made, introducing D2 to encompass most of Val Verde County and others, as well as a southern expansion of D2 extent over Maverick and Dimmit counties. Following on its heels, D3 was expanded as well.

In the far northern High Plains, western North Dakota was improved to reduce areas of both D1 and D0, reflecting snowfall in the last 60 and 90 day periods. The drought area now resides south of the Missouri River.

The Southeast

Record low streamflow and other indicators were motivation to degrade the eastern portion of the drought area in South Carolina this week. D1 and D2 were extended eastward to reflect this. Elsewhere in the southeast, no changes were warranted this week.

The West

Continued high pressure centered over the Great Basin did little to alleviate drought conditions in the West. In California, D3 was expanded to include all of the Sacramento River basin, reflecting continued lack of precipitation this water year, in combination with two previous dry years. Department of Water Resources' 8-station northern Sierra precipitation index would need 35 inches to get to normal conditions, yet the average precipitation for February through September is typically just 19 inches. If the current precipitation trend continues, this would result in a three-year period of less than 75 percent of normal. Similar dry periods have been experienced just three other times in the 20th century: 1932-34, 1987-89, and 1990-92, with the last being most analogous to our current condition. Major reservoirs and runoff data also show a grim outlook for this area. In addition to the expansion of D3, D2 was introduced in Napa, Sonoma and Mendocino counties north of San Francisco to reflect continued lack of precipitation in this area, compounded by the previous two dry years. D2 was also expanded in the north of the state to include all of the Sacramento River Drainage climate division.

In Oregon, an area of D0 was placed over I-5 between Eugene and Salem to show precipitation deficits of 30-50 percent in this region over the last year. Central Washington was reassessed from last week's depiction, and the area of D0 was reduced. Northern and east central Idaho was also improved from last week, based on decent snowfall totals recently in this region, and to be in agreement with the drought depiction in Montana and other neighboring states. Both D0 and D1 areas were reduced.

The Midwest and Northeast

A reassessment of conditions along the Ohio-Kentucky border justified the removal of D1 in this area. In the Upper Peninsula of Michigan, some recent precipitation warranted slight improvements on the Keweenaw Peninsula, with reduction of D1. This area has received above normal precipitation since September, such as 1.45 inches above normal at Ironwood for this

Weekly Snowpack and Drought Monitor Update Report

period. Long term dryness remains since August in Houghton, Iron and part of Baraga County, so this area is still in the D1 category. No changes were made in the northeast this week.

Hawaii, Alaska and Puerto Rico

Improvements in agricultural impacts warranted removal of D1A on Oahu, and slight reduction of D3 on the Big Island. Waimanalo Reservoir is slowly rising as well. In Alaska, D0 was introduced in the Fairbanks area based on the current water year snowfall and precipitation shortages as compared to normal. Snowfall is currently at 52% of normal, and precipitation at 62% of normal according to the NRCS. Recent precipitation in the last week on the Seward Peninsula was a welcome sight, but long term dryness remains so there were no changes to the D0 extent in the northwest part of the state. Puerto Rico's eastern interior has also had significant shortages in precipitation this dry season, with upwards of 16 inches deficit in the last 60 and 90 day periods. D0 was introduced to reflect this.

Looking Ahead:

A more active weather pattern is setting up over the Pacific Ocean, with some much needed precipitation anticipated in areas of the western United States over the next week. Below normal temperatures in the northern tier should help retain the snowpack in the mountains. There remains much uncertainty yet among the models for the coming weekend's forecast, with a split flow projected to develop off the west coast and exactly where it will bring most of the precipitation. The Climate Prediction Center's six to ten day outlook shows below normal temperatures across Alaska and the western states and above normal temperatures in the south from Texas to Virginia. The precipitation outlook for the same period calls for dry conditions from Texas to Florida and Alaska, and areas of above normal precipitation in the northern Rockies and the Ohio River Valley. Looking further ahead into the eight to fourteen day period, the same temperature pattern is set with cooler temperatures in the west and warmer temperatures in the eastern half of the country. Precipitation is projected to be similar to the six to ten day forecast as well, with drier conditions in Alaska, Plains states and Florida, and wetter conditions in the Pacific Northwest and Ohio River Valley.

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: 22 January 2009