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: 20 December 2012**

Happy Holidays

SNOTEL SNOWPACK AND PRECIPITATION SUMMARY

Temperature: SNOTEL and ACIS 7-day temperature anomaly ending 19 December shows values lower over the West Coast States and higher the further east one travels (Fig. 1a). ACIS 7-day average temperature anomalies show the greatest positive temperature departures in scattered areas from western Utah to the Western High Plains (>+10°F). The greatest negative departure occurred over parts of the Sierra and Klamath River Basin (<-6°F) (Fig. 1b).

Precipitation: ACIS 7-day average precipitation amounts for the period ending yesterday shows heavy amounts of precipitation over northwest Washington (as usual) and a secondary maximum over central Arizona (Fig. 2a). In terms of percent of normal, these two areas; especially over the 4-Corner States received well over twice of the typical amount of precipitation for the week (Fig. 2b). SNOTEL month to date precipitation percent of normal shows above normal values over all but parts of New Mexico and northeast Wyoming. The low value in the Olympics may be due to bad data (Fig. 2c). For the 2013 Water-Year that began on 1 October 2012, statistics continue to favor the Northern Tier States and the Northern Sierra with surplus moisture although yesterday's winter storm through Arizona helped bump the numbers up (Fig. 2d).

Snow: Snow depths for the week increased significantly over all but the Eastern Slopes of the Northern Rockies. For skiers, the Cascades were the big winners this week followed closely by the Central Rockies and Wasatch (Fig. 3a). As for snow water-equivalent, pockets of surpluses (SWE) exist in Arizona, parts of New Mexico, the Sierra, southwest and northeast Utah, the Northern Cascades, the Upper Snake and Yellowstone River Basins, and the northernmost Rockies. Elsewhere, especially over the Colorado Rockies, eastern Wyoming basins, and northern New Mexico basins, large deficits persist (Fig. 3b).

Blowing snow dominated much of New Mexico yesterday as a quick moving winter storm moved across the Southern Rockies – Photo: J. Curtis

Summary: Over the last 7 days, much of the eastern United States has received some precipitation, with the greatest amounts at the end of the period over portions of Louisiana, Mississippi, Alabama and Georgia, where up to 3 inches of rain was recorded. Portions of the central Plains and Midwest recorded light precipitation from Nebraska and Iowa into South Dakota, Minnesota and Wisconsin, where amounts were generally less than 1 inch and most fell on unfrozen soils. This allowed for good infiltration into the top layers of the profile. An active pattern continued in the Pacific Northwest, where precipitation amounts of 2 to 4 inches were common along the coast and several feet of snow fell in the upper elevations. Central Arizona also received some good rain over several days with amounts from 1.5 to 3 inches.

The West: A wet week over central Arizona and along the west coast allowed for some improvements to the drought status. In central Arizona, D2 conditions were improved where the most rains were recorded. In southern Nevada and into southern California, some improvements to the D1 and D2 conditions were made where indicators were improved out to 12 months. Areas of the central and northern Rocky Mountains have had a slow start to the snow season and lower elevations remain dry. In response to the dryness, D3 was expanded in central Wyoming and a small area of D4 was added near Rock Springs. In southwest Wyoming, D3 was improved as this area has received some recent precipitation, easing conditions. For Montana, some degradation was noted in the southeast and south central areas where dryness has persisted. Author: Brian Fuchs, 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

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

Soil Moisture

Soil moisture (Fig. 5), 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/.

Soil Climate Analysis Network (SCAN)

Figure 6 provides supplemental data on soil conditions (moisture and temperatures at various depths from 2 inches to 80 inches. For more information about SCAN see (brochure).

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.

State Activities

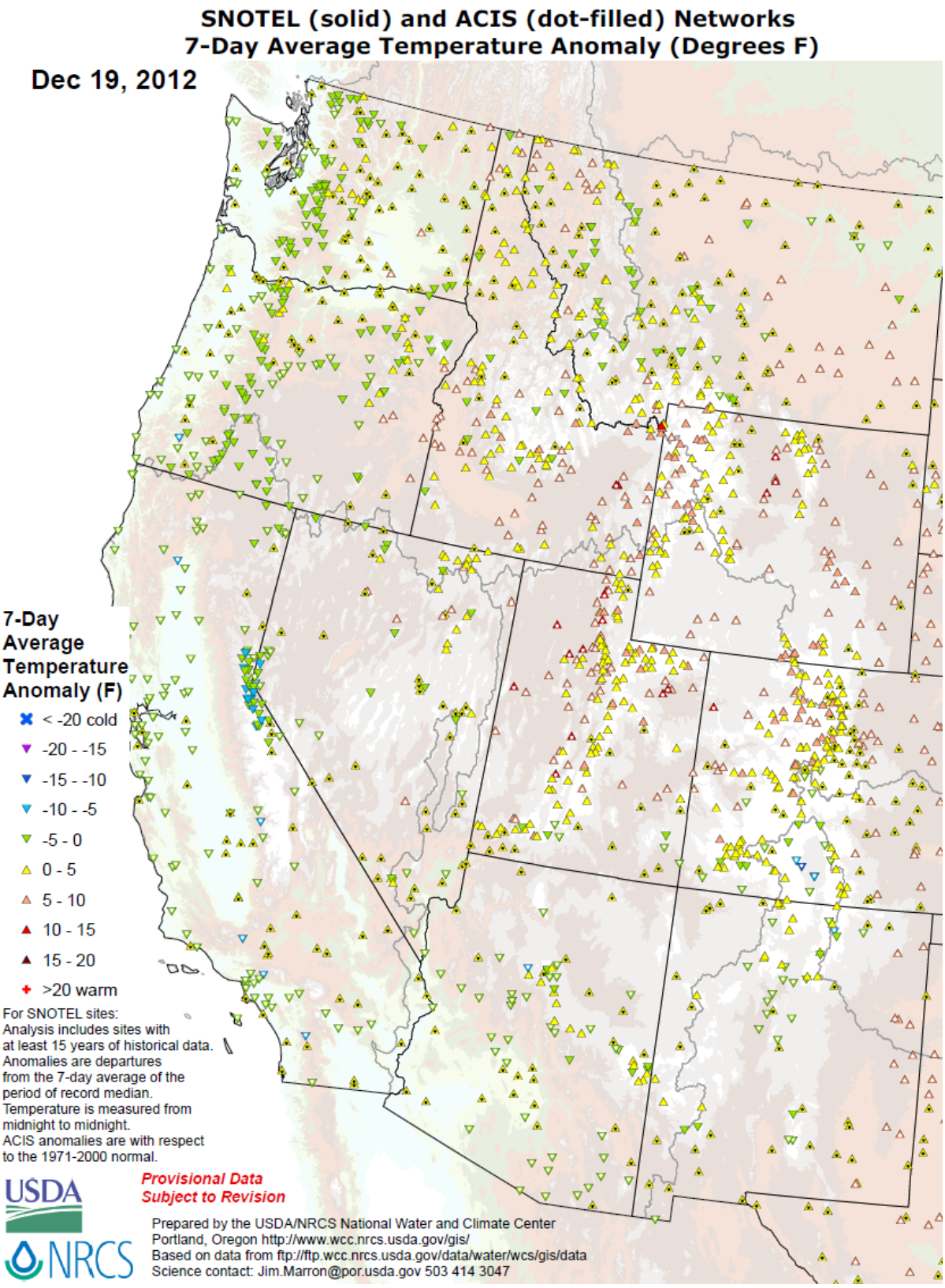
State government drought activities can be tracked at the following URL: http://drought.unl.edu/mitigate/mitigate.htm. NRCS SS/WSF State Office personnel are participating in state drought committee meetings and providing the committees and media with appropriate SS/WSF information - http://www.wcc.nrcs.usda.gov/cgibin/bor.pl.
Additional information describing the products available from the Drought Monitor can be found at the following URL: http://drought.unl.edu/dm/ and http://www.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. Reports from 2007 are available on-line while ones from 2001-2006 can be acquired upon request.

This report uses data and products provided by the Interagency Drought Monitor Consortium members and the National Interagency Fire Center.

/s/
Micheal L. Golden
Deputy Chief, Soil Survey and Resource Assessment



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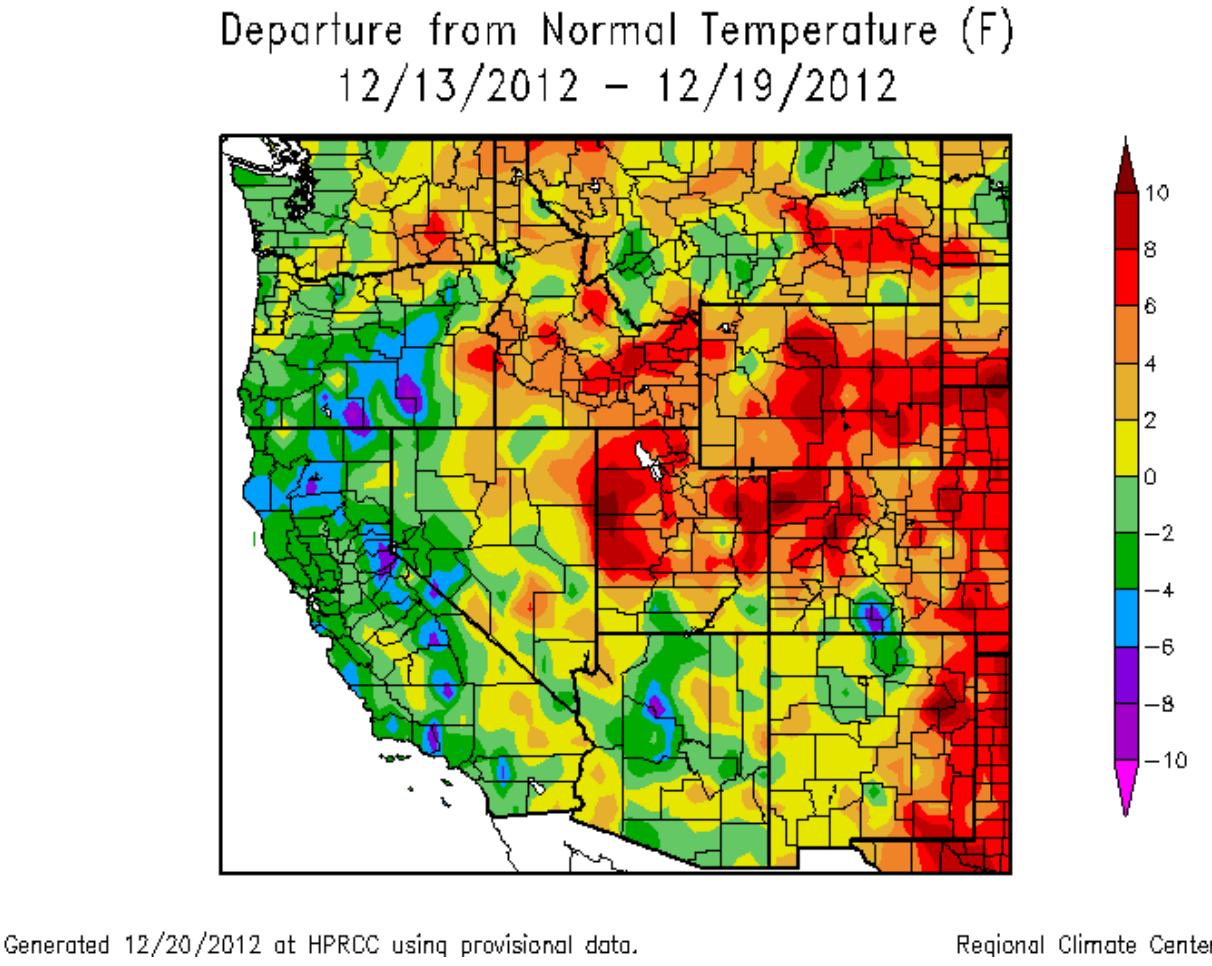
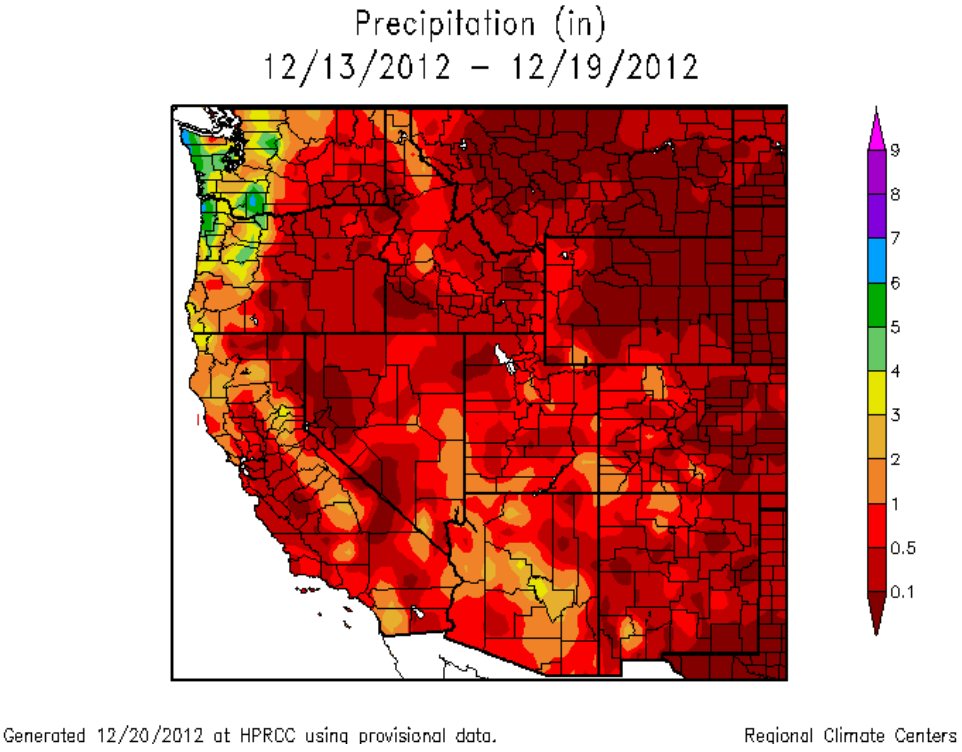


Fig. 1b: ACIS 7-day average temperature anomalies show the greatest positive temperature departures in scattered areas from western Utah to the Western High Plains (>+10°F). The greatest negative departure occurred over parts of the Sierra and Klamath River Basin (<-6°F).



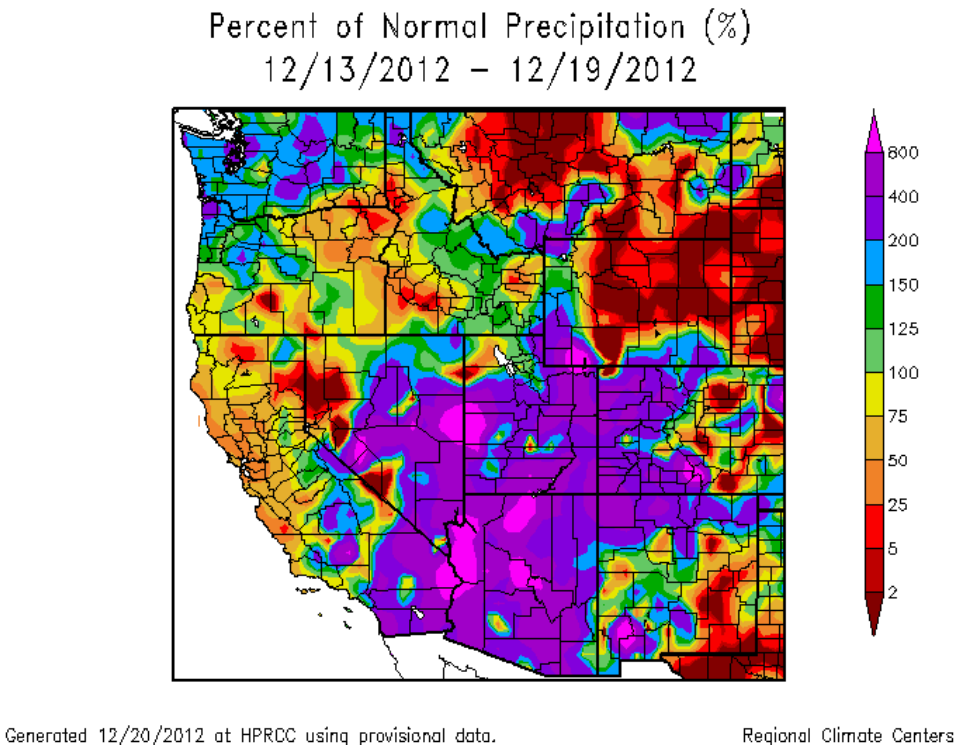


Fig. 2a and 2b: ACIS 7-day average precipitation amounts for the period ending yesterday shows heavy amounts of precipitation over northwest Washington (as usual) and a secondary maximum over central Arizona (Fig. 2a). In terms of percent of normal, these two areas; especially over the 4-Corner States received well over twice of the typical amount of precipitation for the week (Fig. 2b).

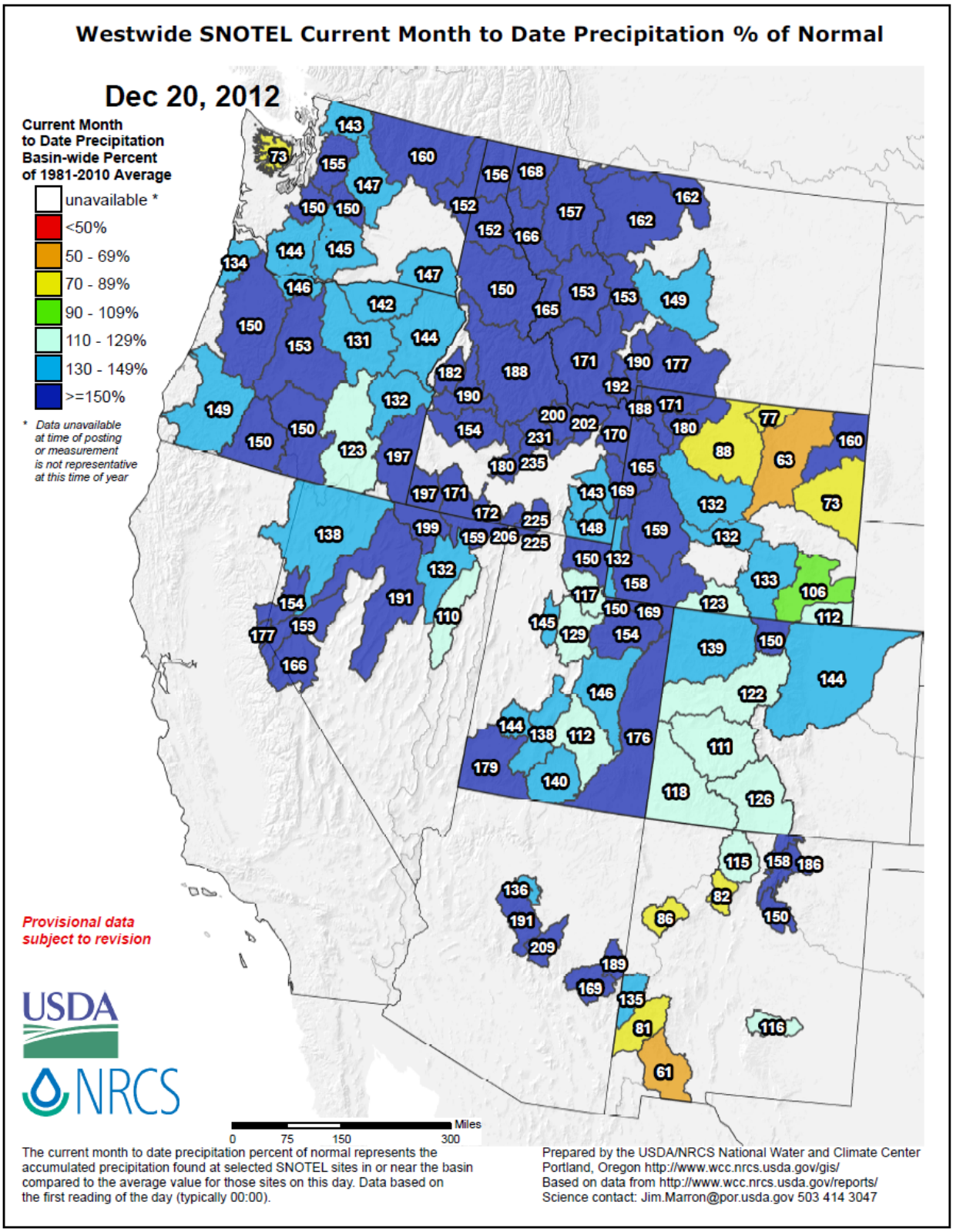


Fig. 2c: SNOTEL month to date precipitation percent of normal shows above normal values over all but parts of New Mexico and northeast Wyoming. The low value in the Olympics may be due to bad data.

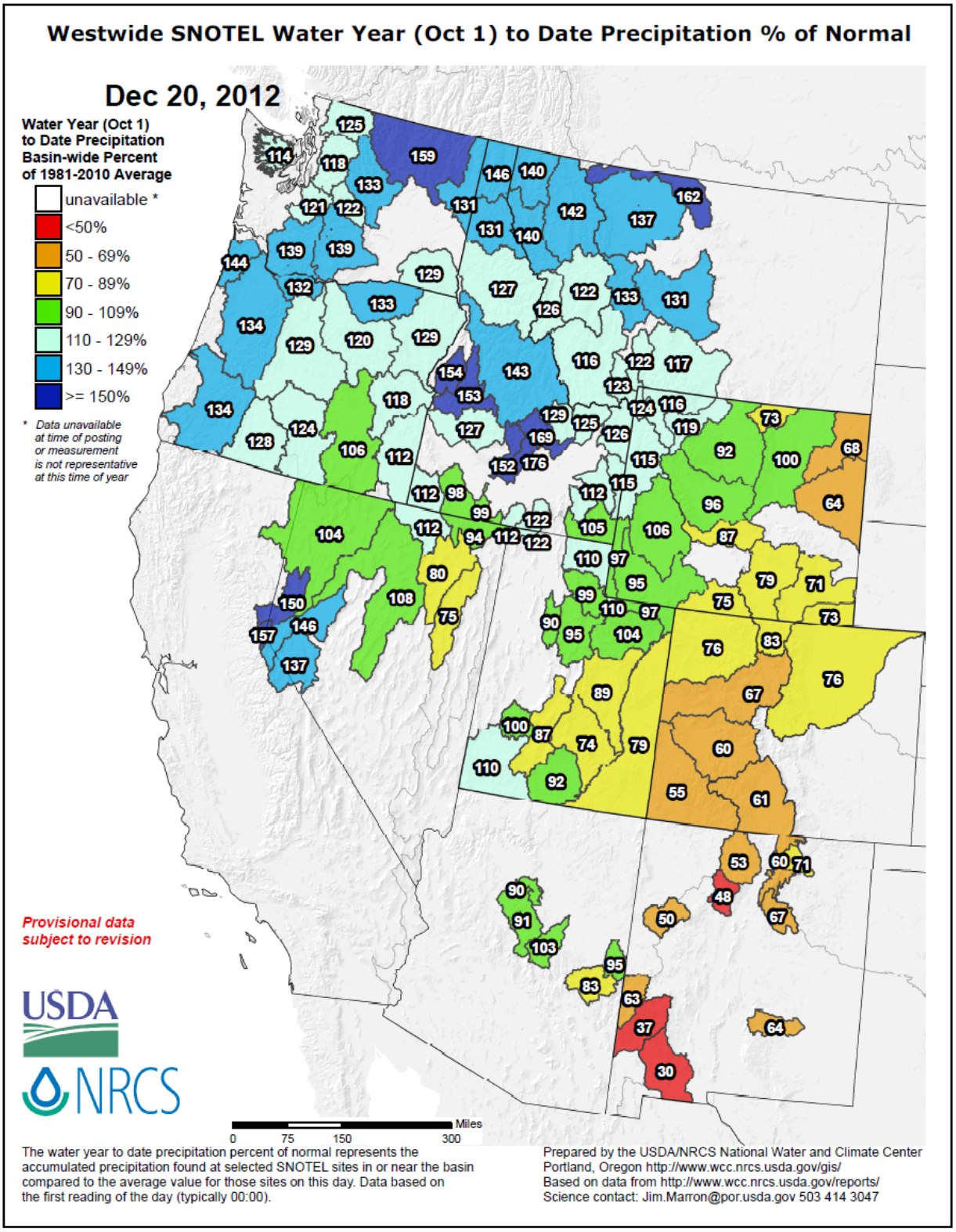


Fig. 2d: For the 2013 Water-Year that began on 1 October 2012, statistics continue to favor the Northern Tier States and the Northern Sierra with surplus moisture although yesterday's winter storm through Arizona helped bump the numbers up.

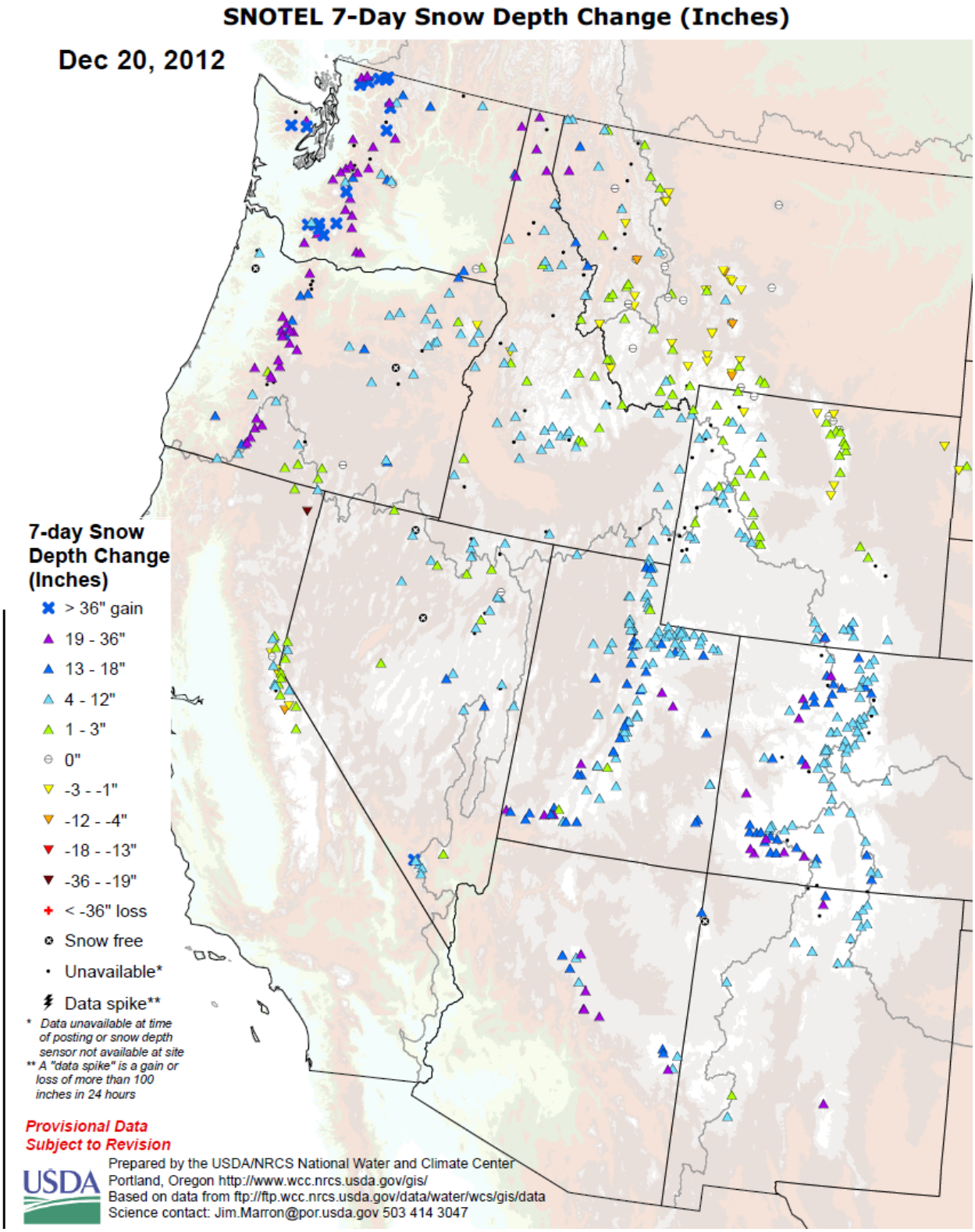


Fig. 3a: Snow depths for the week increased significantly over all but the Eastern Slopes of the Northern Rockies. The Cascades were the big winners this week for skiers followed closely by the Central Rockies and Wasatch.

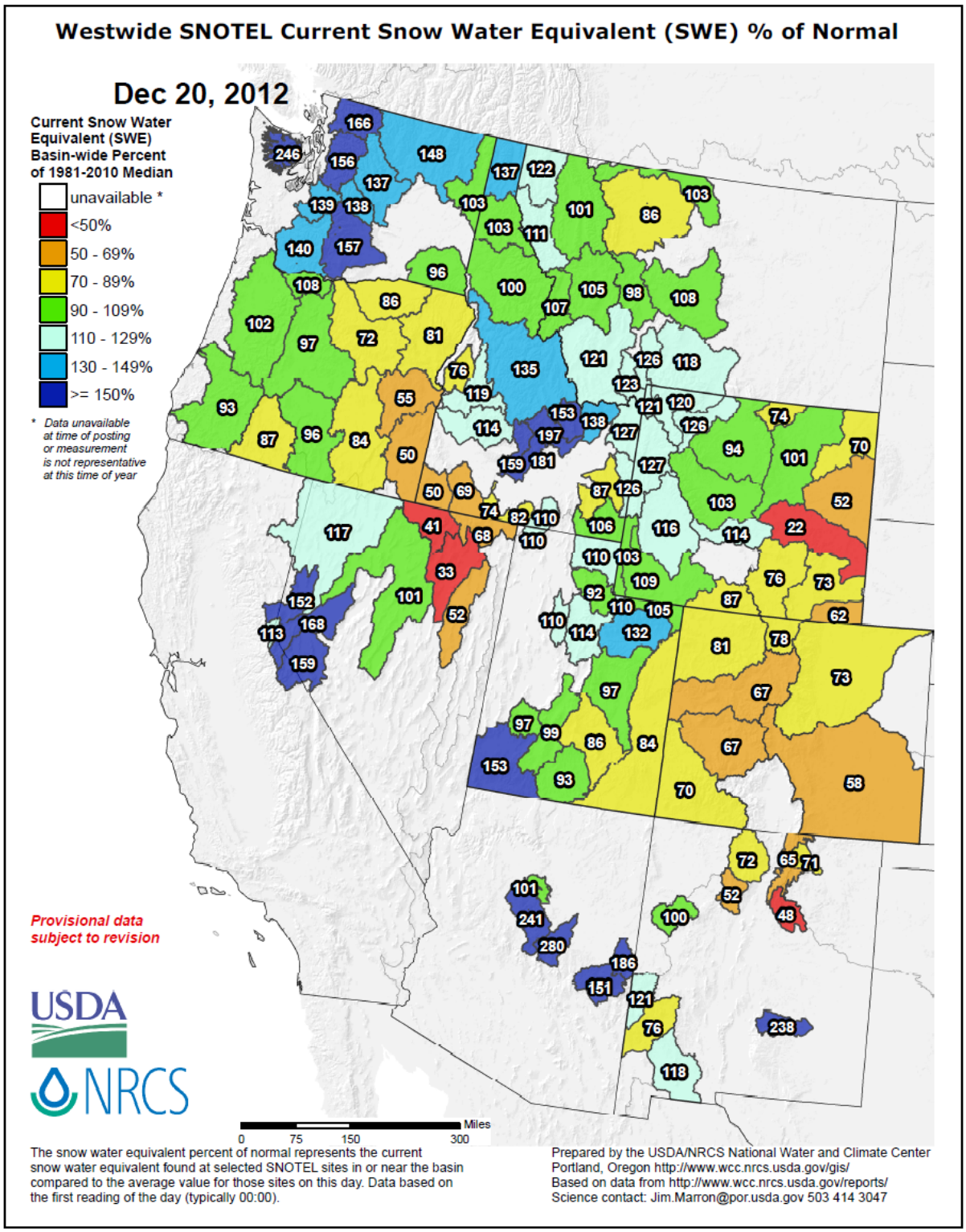


Fig. 3b: Snow Water-Equivalent: Pockets of surpluses (SWE) exist in Arizona, parts of New Mexico, the Sierra, southwest and northeast Utah, the Northern Cascades, the Upper Snake and Yellowstone River Basins, and the northernmost Rockies. Elsewhere, especially over the Colorado Rockies, eastern Wyoming basins, and northern New Mexico basins, large deficits persist.

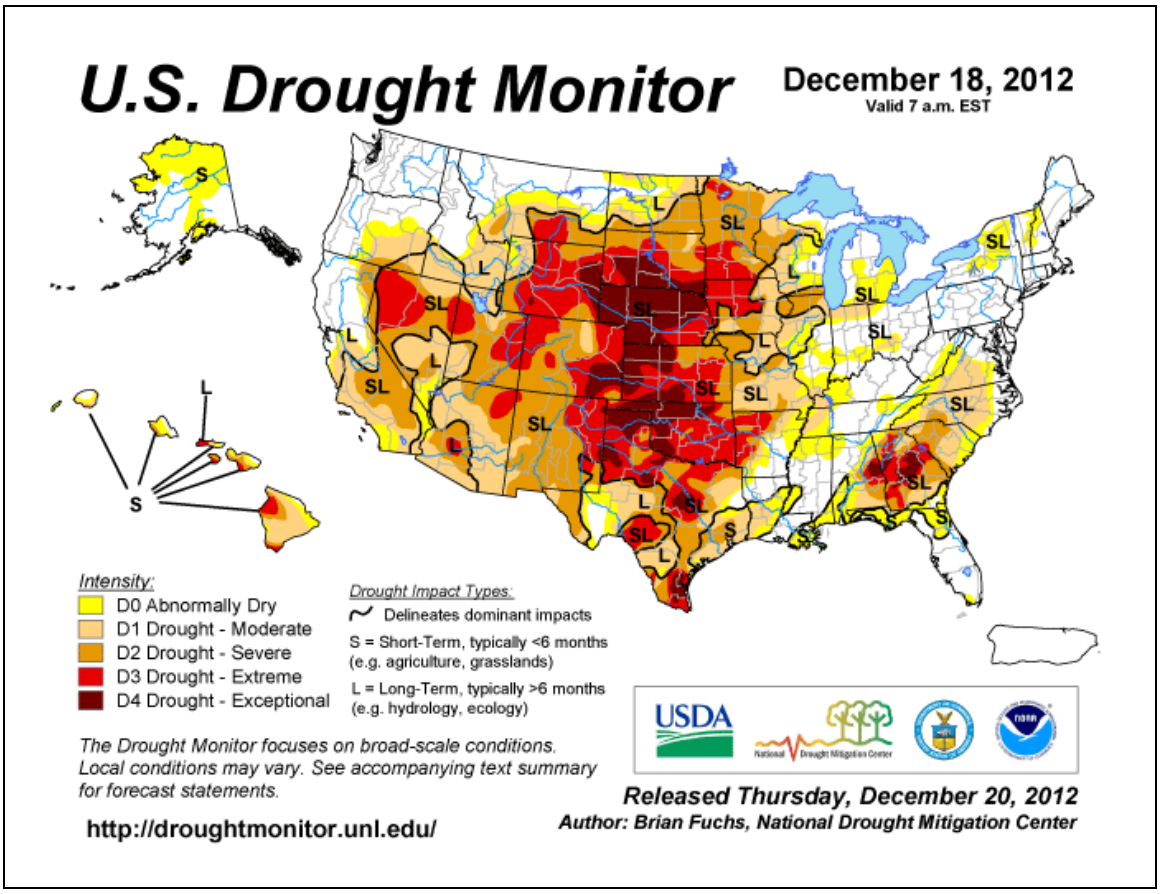


Fig. 4: Current Drought Monitor weekly summary. The exceptional D4 levels of drought are found over Georgia, Alabama, and scattered across the western corn belt of the Plains into Colorado and Wyoming. For more drought news, see Drought Impact Reporter. Click for the latest statistics for California Reservoirs. The late November drought indicator blend and component percentiles spreadsheet is a great resource for climate division drought statistics. See Fig. 8 for the latest Drought Outlook (Forecast).

Agriculture Headlines

Drought and Economy Plague Sheep Farmers
Dec 10, **U.S**. Sheep producers across the U.S. were struggling to remain viable after a hot, dry summer parched pastures, reduced water supplies and drove up corn and hay prices. Lamb prices have fallen over the past year or so with the importation of lamb from New Zealand and elsewhere. Some ranchers and others suspect that meatpackers may be keeping prices for lamb artificially low.

Orange Juice Futures Surge on Fla. Crop Concerns
Dec 12, **Florida**. Dry weather in southern Florida has reduced the size of oranges, driving the price of orange futures 3.2 percent higher.

State's Christmas tree growers feel impact of drought
Dec 10, **Wisconsin**. More than 20 percent of the Christmas tree farms in Wisconsin were left with drought-damaged trees after a hot, dry summer. Inspectors from the state Department of Agriculture, Trade and Consumer Protection visited 446 Christmas tree fields owned by 212 growers during the fall and found that 97 of those exhibited some damage from drought. Tree growers in southern Wisconsin, particularly in the central sands region, experienced tree losses of 40 percent or more on 50 to 75 percent of the farms, according to the chief of the agriculture department's plant protection section.

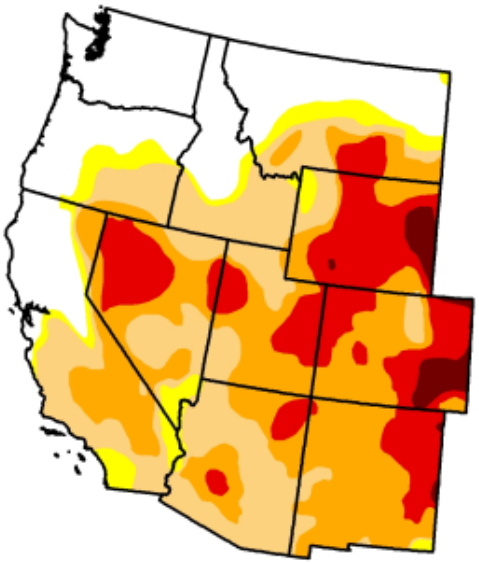
U.S. Drought Monitor

December 18, 2012
Valid 7 a.m. EST

West

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	24.28	75.72	69.42	45.92	18.83	2.15
Last Week (12/11/2012 map)	24.41	75.59	69.53	45.99	17.85	2.12
3 Months Ago (09/18/2012 map)	15.26	84.74	76.89	43.64	16.85	1.77
Start of Calendar Year (12/27/2011 map)	48.49	51.51	20.05	12.22	2.67	0.78
Start of Water Year (09/25/2012 map)	15.12	84.88	77.15	43.65	16.85	1.77
One Year Ago (12/13/2011 map)	66.66	33.34	18.06	14.36	6.96	1.85



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://droughtmonitor.unl.edu

Released Thursday, December 20, 2012
Brian Fuchs, National Drought Mitigation Center

Fig. 4a: Drought Monitor for the Western States with statistics over various time periods. No significant changes occurred this week. See latest Climate Assessment for the Southwest Report. See latest Western Water Assessment Report.

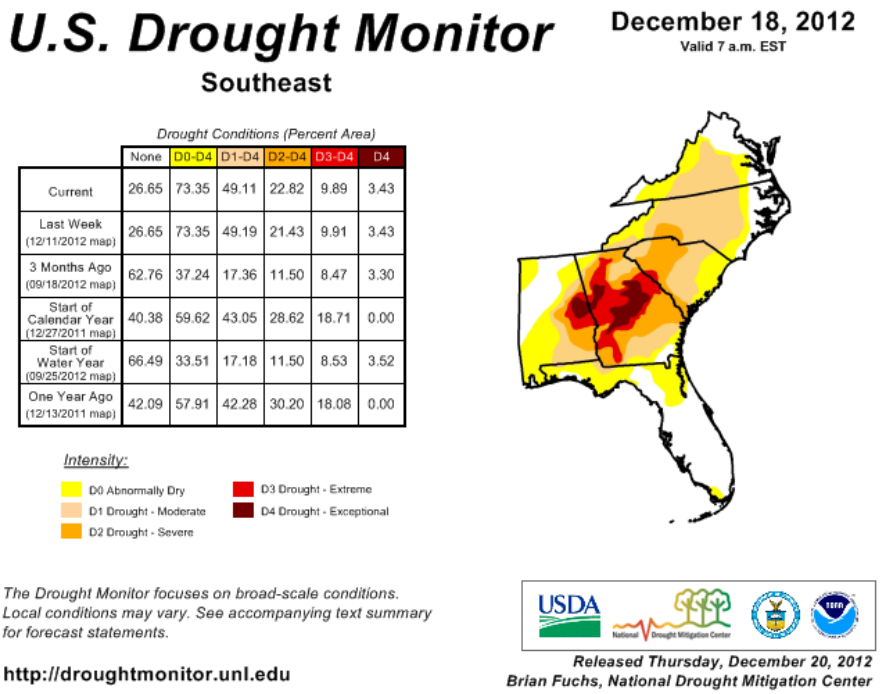


Fig. 4b: **D4 conditions are over Georgia and Alabama. No significant changes this week. See the Weekly GriDSSAT Output Products: http://gridssat.nsstc.uah.edu/ for more details.**

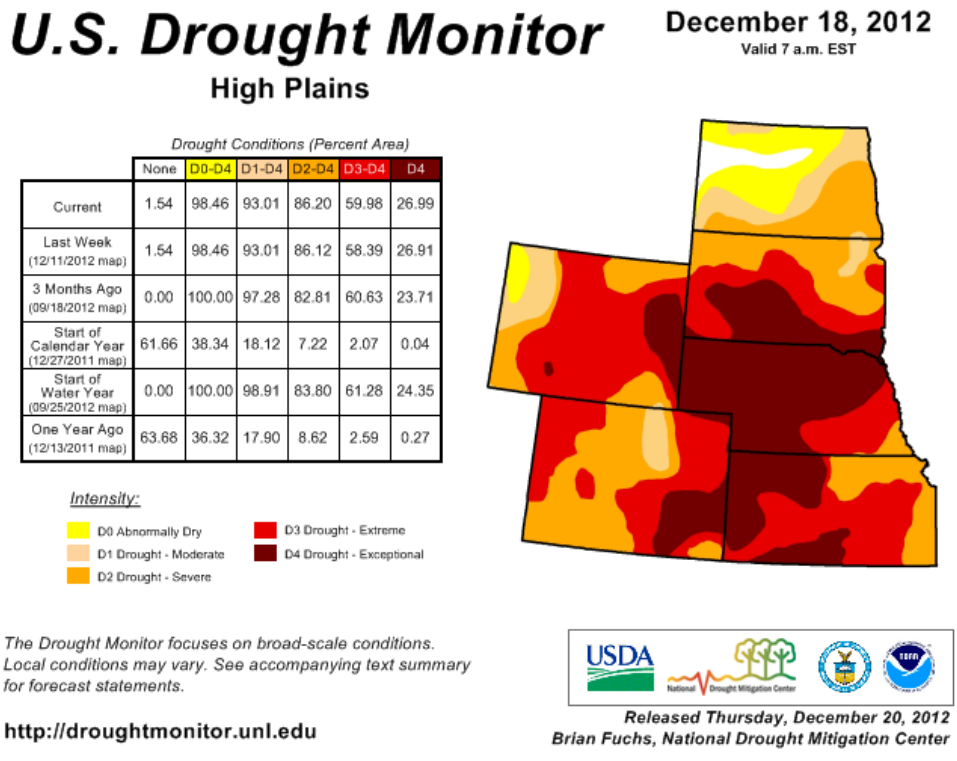


Fig. 4c: Drought Monitor for the High Plains with statistics over various time periods. Conditions remained essentially unchanged this week. See the latest Kansas Drought Report.

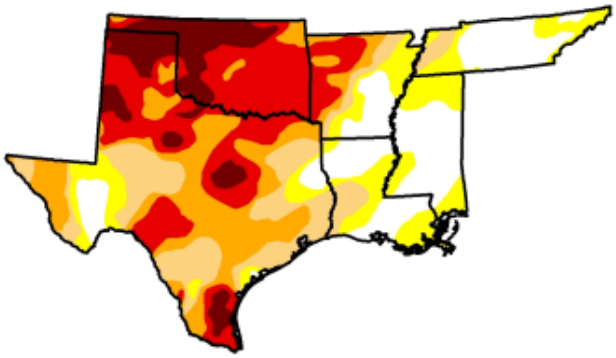
U.S. Drought Monitor

December 18, 2012
Valid 7 a.m. EST

South

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	19.12	80.88	65.58	49.90	32.03	9.60
Last Week (12/11/2012 map)	18.32	81.68	65.80	51.03	30.79	8.87
3 Months Ago (09/18/2012 map)	25.06	74.94	65.27	48.67	28.85	8.96
Start of Calendar Year (12/27/2011 map)	26.47	73.53	69.01	54.81	39.11	17.15
Start of Water Year (09/25/2012 map)	24.13	75.87	66.61	51.50	29.86	9.11
One Year Ago (12/13/2011 map)	22.72	77.28	71.33	58.38	45.85	21.86



Intensity:

- D0 Abnormally Dry
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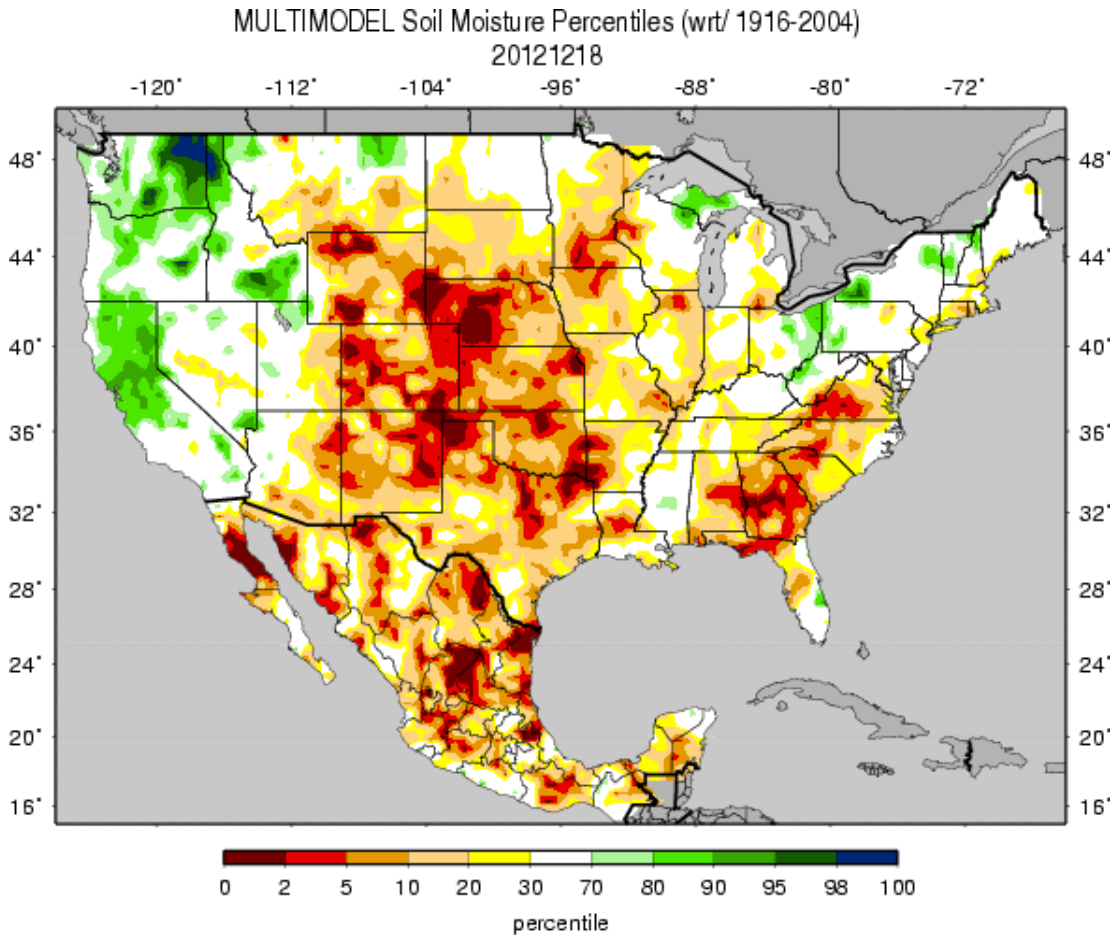
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, December 20, 2012
Brian Fuchs, National Drought Mitigation Center

Fig. 4d: **Drought Monitor for the South-Central Region with statistics over various time periods. Note some further deterioration in D2-D4 categories this week. Check out the Texas Drought Website.**



Figs. 5: Soil Moisture ranking in percentile as of 18 December shows dryness scattered across the Southeast, Plains, much of the Rockies, and eastern half of the Southwest. Wetness dominates from northern California to eastern Washington and southeastern Idaho. Freezing soils will increasingly dominate in the coming months and may skew actual moisture values over the Northern States.

Useful Hydrological Links:

USDA western U.S. mountain snow water content anomaly map.

USGS (U.S. Geological Service) observed streamflow; NOAA Climate Prediction Center (CPC) modeled runoff anomalies and percentiles; VIC (University of Washington Variable Infiltration Capacity macro scale hydrologic model) 1-, 2-, 3-, and 6-month and water year-to-date runoff percentiles; NLDAS (North American Land Data Assimilation System) modeled streamflow anomalies and percentiles; NLDAS model runoff anomalies and percentiles; USGS groundwater observations (real-time network, climate response network, total active network); USDA snow water content observations for the West (SNOTEL station percentiles and percent of normal, SNOTEL basin percent of normal and percent of average) and Alaska (SNOTEL station percent of normal, SNOTEL basin percent of normal); USDA reservoir storage as percent of capacity.

Soil Climate Analysis Network (SCAN)

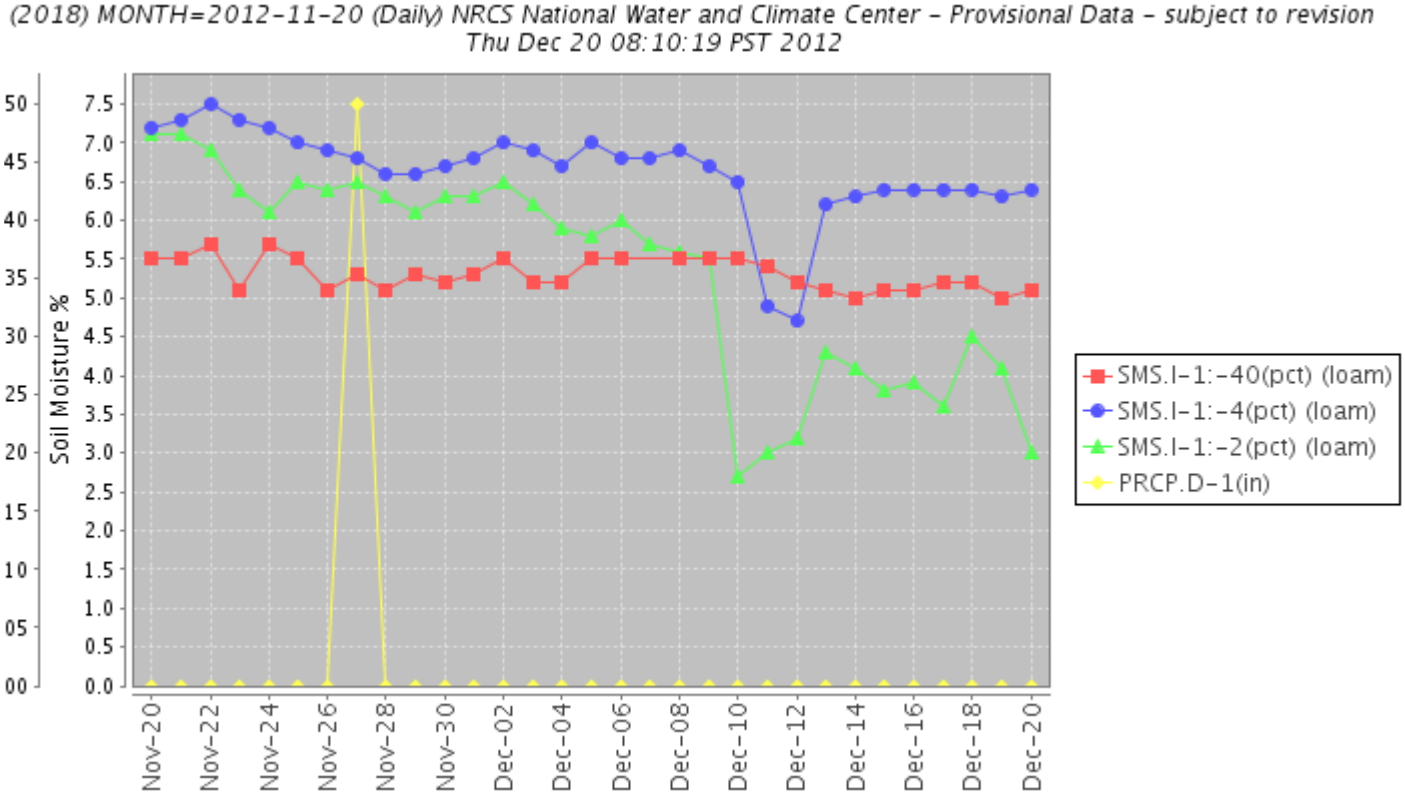


Fig. 6: This NRCS resource shows a site over southeastern Wyoming with dismal moisture content at all layers. Note that the scale to the right has been expanded to emphasize just how dry it is.

Useful Agriculture Links:

USDA (U.S. Department of Agriculture) observed soil moisture conditions, departures and percentiles, and comparison to 5-year average and 10-year average; the Palmer Crop Moisture Index (CMI), which intensified during the month in the West and Lower to Mid-Mississippi Valley (weeks 1, 2, 3, 4, 5); CPC modeled soil moisture anomalies and percentiles for end of May, and soil moisture anomaly change compared to previous month; CPC's Leaky Bucket model soil moisture percentiles; NLDAS modeled soil moisture percentiles for the top soil layer and total soil layer; VIC modeled soil moisture percentiles, and soil moisture percentile change compared to previous month; USDA observed pasture and rangeland conditions; Vegetation Drought Response Index (VegDRI); the NOAA/NESDIS satellite-based Vegetation Health Index (VHI); the USGS agro-hydrologic model (Soil Water Index, Water Requirement Satisfaction Index); Selected SNOTEL Sites (measured 2", 4", 8", 20", and 40" soil moisture depths).

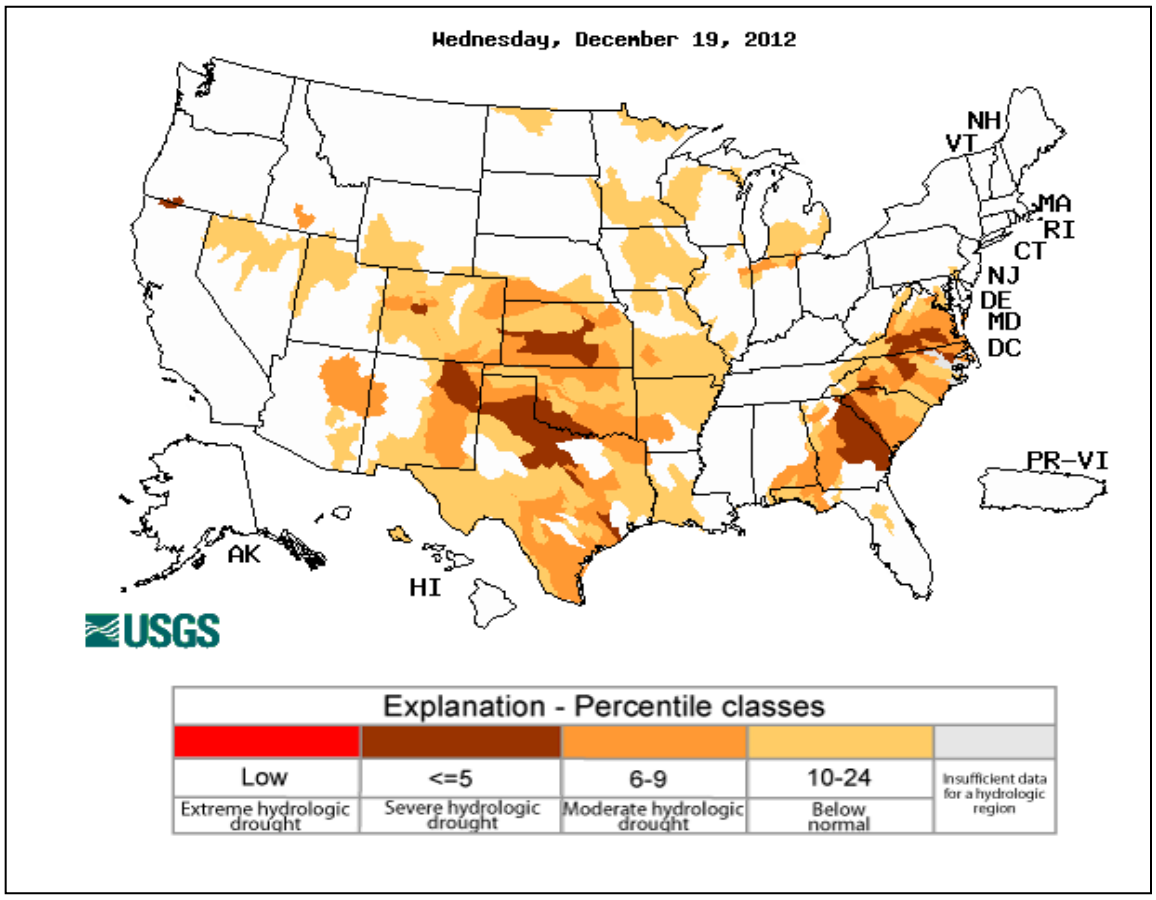


Fig. 7: Map of below normal 7-day average streamflow compared to historical streamflow for the day of year. Severe conditions exist over northeast New Mexico, western Colorado, the Central and Southern Plains, southeast Texas, and parts of the Southeast. The severe flow area bordering on the California and Oregon state line seems to be bad data. See the USGS National Water Information System Mapper.

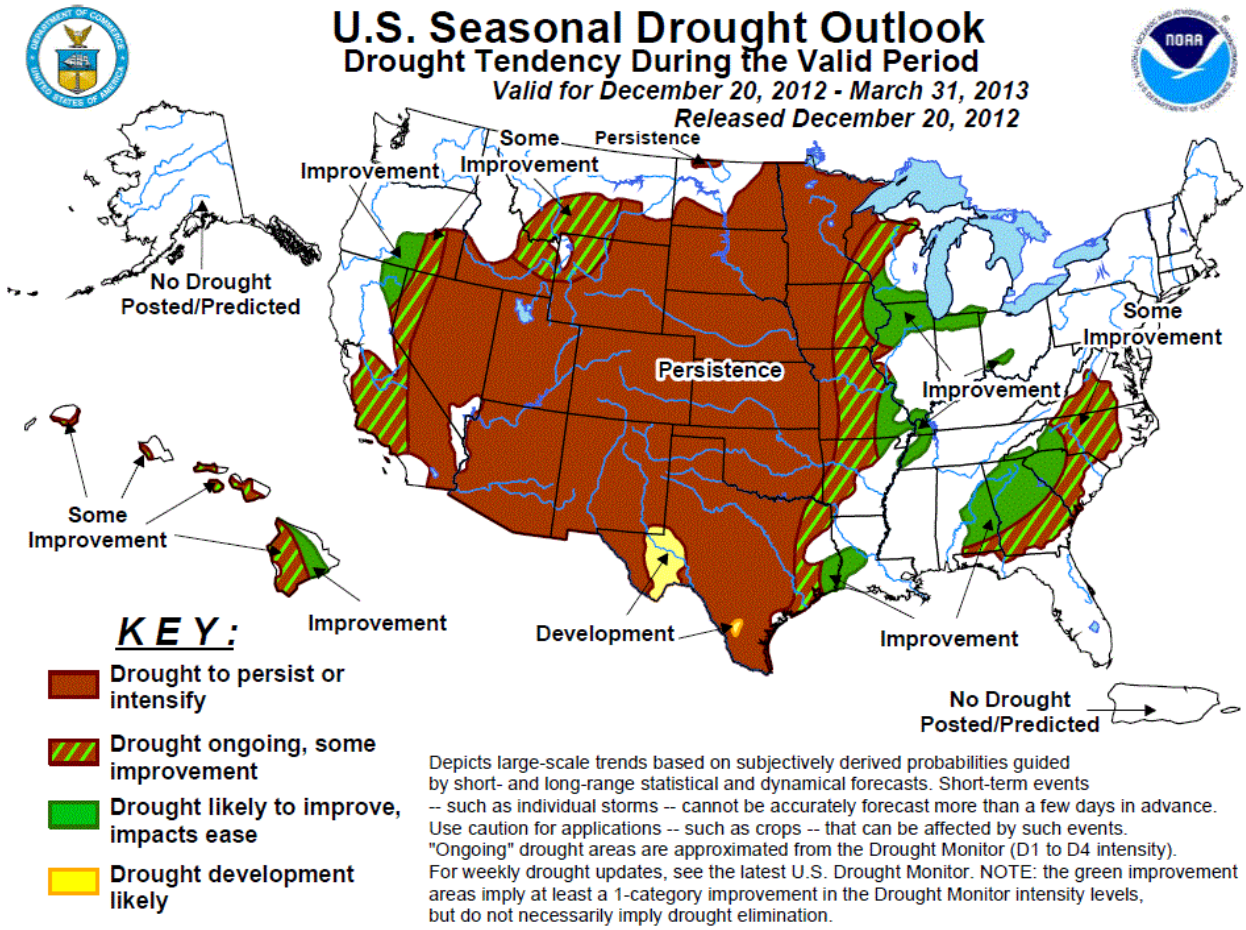


Fig. 8: U.S. seasonal Drought Outlook released today, 20 December.

National Drought Summary -- December 18, 2012

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/.

Over the last 7 days, much of the eastern United States has received some precipitation, with the greatest amounts at the end of the period over portions of Louisiana, Mississippi, Alabama and Georgia, where up to 3 inches of rain was recorded. Portions of the central Plains and Midwest recorded light precipitation from Nebraska and Iowa into South Dakota, Minnesota and Wisconsin, where amounts were generally less than 1 inch and most fell on unfrozen soils. This allowed for good infiltration into the top layers of the profile. An active pattern continued in the Pacific Northwest, where precipitation amounts of 2 to 4 inches were common along the coast and several feet of snow fell in the upper elevations. Central Arizona also received some good

rain over several days with amounts from 1.5 to 3 inches.

The Northeast: Some scattered precipitation events occurred, with some amounts over 1 inch in Maine, Pennsylvania, New York, Massachusetts, and Connecticut. With the region being drought free and just a few areas of abnormally dry conditions currently, no changes were made in the region this week.

Mid-Atlantic: This was a dry week in the region, with very little precipitation. The last 30 to 60 days have been dry in the region, but the time of the year has allowed for very few impacts. No changes were made this week to the United States Drought Monitor depiction.

Southeast: Dry conditions through much of Virginia and the Carolinas continued this week, as the last few months have been dry with well below normal precipitation. This week, D2 was expanded out of South Carolina and into North Carolina. In Georgia, D2 was also expanded in the northeast portion of the state, where ponds continue to dry up. In areas of Mississippi, Alabama, and Georgia, a large area of precipitation amounts from 2 to 3 inches was recorded. This helped to bring amounts near normal for the month, but the last 30 to 60 days still show large deficits in many areas. In Alabama, D1 and D2 were improved in the northeast portion of the state where conditions warranted.

South: Dry conditions prevailed over much of the region this week, with only east Texas and Louisiana recording significant precipitation amounts. Improvements to the drought depiction were made in east Texas and Louisiana, with D1 and D2 areas being reduced. Degradation to the drought status in Oklahoma and Texas was made, with D3 expanding in central Oklahoma and along the border with Texas. In central Texas, a new area of D4 was introduced and D3 expanded, D0 was expanded in west Texas, and D3 was expanded in north central Texas.

Midwest: Widespread precipitation over much of the area was welcomed with the continuing dry conditions for the region. Amounts were generally less than 1 inch for most places and no changes were made this week.

The Plains: Rains over eastern Nebraska and into north Central Kansas were welcomed, but generally less than 1 inch for the total amounts. Most other locations were again dry for the week and no changes were made on the Plains for this week.

The West: A wet week over central Arizona and along the west coast allowed for some improvements to the drought status. In central Arizona, D2 conditions were improved where the most rains were recorded. In southern Nevada and into southern California, some improvements to the D1 and D2 conditions were made where indicators were improved out to 12 months. Areas of the central and northern Rocky Mountains have had a slow start to the snow season and lower elevations remain dry. In response to the dryness, D3 was expanded in central Wyoming and a small area of D4 was added near Rock Springs. In southwest Wyoming, D3 was improved as this area has received some recent precipitation, easing conditions. For Montana, some degradation was noted in the southeast and south central areas where dryness has persisted.

Hawaii, Alaska and Puerto Rico: The northeast slopes of the Hawaiian Islands have received enough precipitation recently to allow for some improvements on the Big Island, Maui, Molokai, and Oahu. No changes were made for Alaska and Puerto Rico this week.

Looking Ahead: Over the next five days (December 19-23) the weather pattern should stay active, with multiple storm systems impacting the country. A vigorous system will be moving out of the Plains and into the Midwest and Great Lakes region and finally into New England over the next 5 days. Precipitation amounts are expected to be in the 0.50 to 2.40 inch range, with the greatest amounts expected over New England. A second system will be coming into the Pacific Northwest with projected precipitation amounts of up to 9.00 inches in southern Oregon and northern California along the coast. Temperatures during this time look to be above normal over much of the eastern half of the country and below normal along the west coast. Extremes will range from 9 degrees Fahrenheit above normal in Oklahoma and Arkansas to 6 degrees Fahrenheit below normal in southern Oregon.

The CPC 6-10 day forecast (December 24-28) is showing a good chance for below normal temperatures over much of the United States, from the northern Rocky Mountains all the way to the southeast. The coldest temperatures are expected over the central Plains to Montana. The best chances for temperatures above normal are in Alaska and the northern Great Lakes into New England. The precipitation pattern stays active, but much of the country will have good chances of above normal precipitation, with the best chances over the southeast and Great Basin.

Author: Brian Fuchs, 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

S ... Short-Term, typically <6 months (e.g. agricultural, grasslands)
L ... Long-Term, typically >6 months (e.g. hydrology, ecology)

Updated December 19, 2012

The Latest Climate Prediction Center Seasonal Outlook is now available.

See Special Report Below

Highlights for the drought-monitoring period ending 7 am EST on December 11 include:

- There was a one-half percentage point drop in overall U.S. drought coverage, mainly on the strength of precipitation in northern California and from the lower Mississippi Valley into the middle Ohio Valley. The portion of the contiguous U.S. in drought currently stands at 61.87%.
- However, the portion of the contiguous U.S. in the worst category – D4, or exceptional drought – remained virtually unchanged at 6% (rounded) for the eighteenth consecutive week (August 14 – December 11).
- Hay in drought fell slightly to 64%, but has been at or above 60% for 23 consecutive weeks – since July 10.
- Cattle in drought were unchanged at 73%, and has been greater than two-thirds of the domestic inventory for 23 consecutive weeks (July 10 – December 11).
- Winter wheat in drought was down slightly to 63%, although the hard red winter wheat belt – especially from South Dakota to Texas – remains deeply entrenched in drought.
- Weather outlook: A developing storm over the Southwest will drift northeastward, reaching the western Corn Belt by Saturday and the Great Lakes region on Sunday. Storm-total precipitation could reach one to two inches in the mountains of the Southwest, but only light rain will fall on the central and southern Plains. Slightly heavier precipitation, locally in excess of a half-inch, will fall during the weekend across the upper Midwest. Early next week, more significant rain (generally one to two inches) can be expected across the South and East. During the weekend and early next week, stormy conditions will resume in northern California and the Pacific Northwest, where five-day precipitation totals could reach two to five inches.

Brad Rippey, USDA Meteorologist
Office of the Chief Economist
World Agricultural Outlook Board
Washington, D.C.

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Western Governors Emphasize Need for Short- and Long-term Strategies, Preparedness at National Drought Forum

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WASHINGTON, D.C. - Speaking at the National Drought Forum held here today, Kansas Gov. Sam Brownback emphasized the critical importance of water resources in the arid West and actions states have taken or that are needed to be adequately prepared.

"The moderate to exceptional drought conditions we've seen this year in Kansas and throughout much of the West are hurting communities, economies, agriculture and the quality of life," Brownback said. "Drought impacts next year could be far more severe, especially given the reservoir storage in many basins has been depleted. In Kansas, we

revised our drought operations plan; identified tools to meet emergency water needs; and looked for ways we could better prepare for the next drought.

"A key outcome of this forum is to identify strategies that we can put in place now, given that drought is projected to continue into 2013. As governors, we are anxious to work with partners to see real progress this spring."

Western Governors have a long and successful track record of working to address drought, including the establishment of the National Integrated Drought Information System in 2006 with federal agencies. They worked in partnership with the National Oceanic Atmospheric Administration and signed a joint memorandum of understanding in 2011 aimed at addressing extreme weather and disaster risk reduction.

Prior to the conference, Gov. Gary Herbert, Chairman of the Western Governors' Association, pointed to long-term strategies to better cope with drought.

"We can't make it rain, but we can do a better job of preparing for drought conditions and mitigating the impacts of drought," Herbert said. "We will continue to push for better forecasting of drought and better coordination of drought preparedness on the ground in order to help communities."

Steps that could be taken immediately include: real-time coordination and information-sharing on the status, impacts, and prospects for drought; identification of priority basins and projects; preparation of mitigation strategies for 2013; and coordination of disaster declarations and drought relief programs. Longer term strategies include: improved drought forecasting; reauthorization of the National Integrated Drought Information System; and establishment of a comprehensive, integrated drought preparedness policy.

Additional information on WGA's water and drought programs can be found at:
http://www.westgov.org/initiatives/water