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New Assessment Tools in Monitoring Drought

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Prepared for:

USDA's 84th Agricultural Outlook Forum

Session 38: Food Risk & Security,

U.S. Drought Monitor & Disaster Declarations

February 22, 2008, 1:45 p.m. – 3:15 p.m.



As Brad Rippey has just discussed, the weekly U.S. Drought Monitor has undergone numerous changes (improvements) from its inception in 1999.

Over time, the main focus has been to SIMPLIFY the map for the end user (**although with increased information available to the author, the author's tasks have gotten a tad more *COMPLEX***).

Major changes to the USDM since 1999.....

EXPERIMENTAL DROUGHT MONITOR

May 20, 1999



D0a

D1a/D0h

D0a,h+

D0a,h

D1a,h

LEGEND:

D0 = Abnormal dryness but not currently classified as a drought.
D1 to D4 = Droughts ranging in severity from standard to exceptional.

a = impact on plant life (agric. or forests)

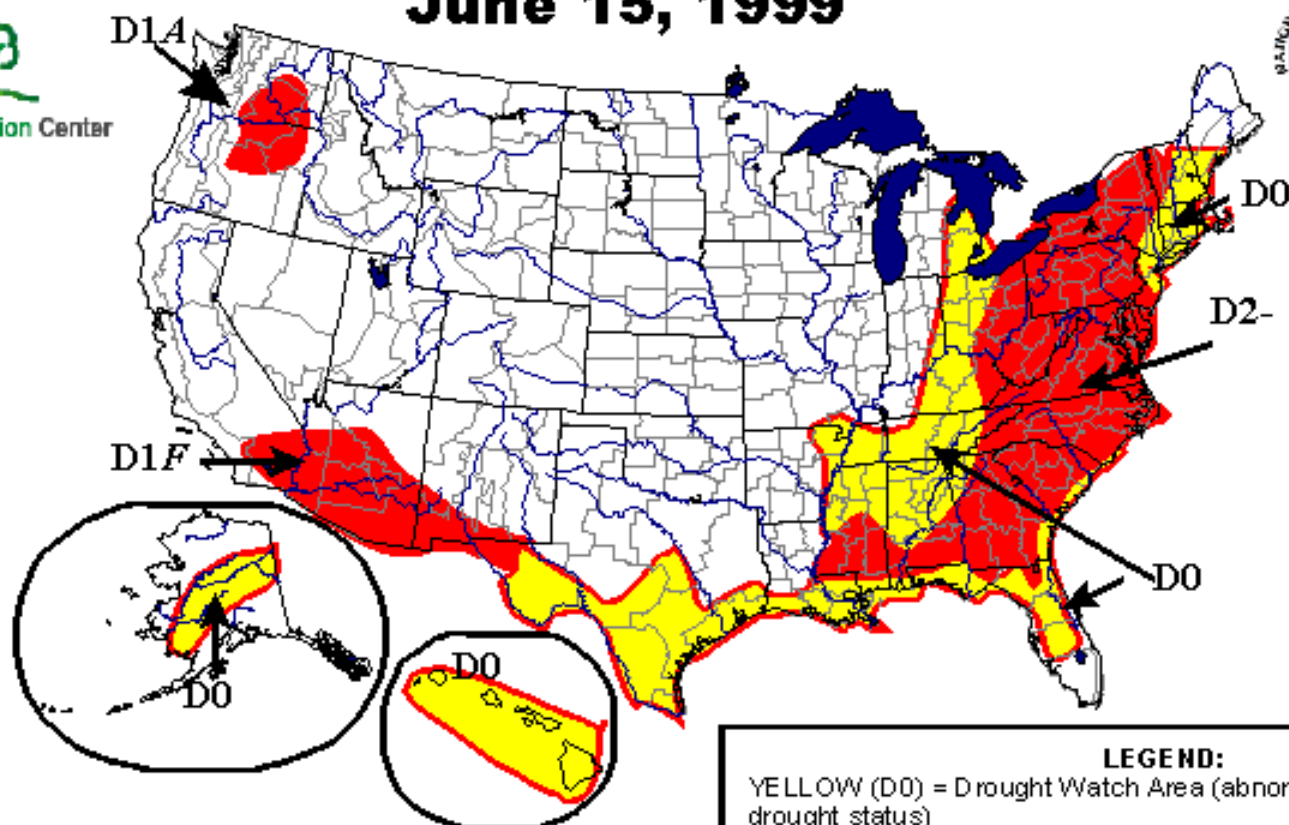
h = impact on water supplies (reservoirs, streams, wells)

+ or - refer to forecast 2-wk trend, where "+" means intensifying and "-" means weakening. No sign means no significant change.

Areas depicted on chart are derived by consolidating information from a number of sources based on surface observation networks and satellite. "Drought" is used to mean abnormal moisture shortages resulting in imminent or actual damage to crops, or pastures; high wildfire risk; or water shortages. Only relatively large areas are shown; local conditions may differ markedly from those shown on the map.



Experimental ***U.S. DROUGHT MONITOR*** **June 15, 1999**



Areas depicted on map are derived by consolidating information from a number of sources based on surface observations and satellite products. "Drought" is used to mean abnormal moisture shortages resulting in imminent or actual damage to crops or pastures; high wildfire risk; or water shortages. Only relatively large areas are shown; local conditions may differ markedly from those shown on the map.

LEGEND:

YELLOW (D0) = Drought Watch Area (abnormally dry but not full drought status)

RED (D1-D4) = Current drought ranging in severity from standard (D1) to severe (D2-D3) to extreme (D4)

Drought Type: *Used when impacts differ*

A = agricultural (crops, grasslands)

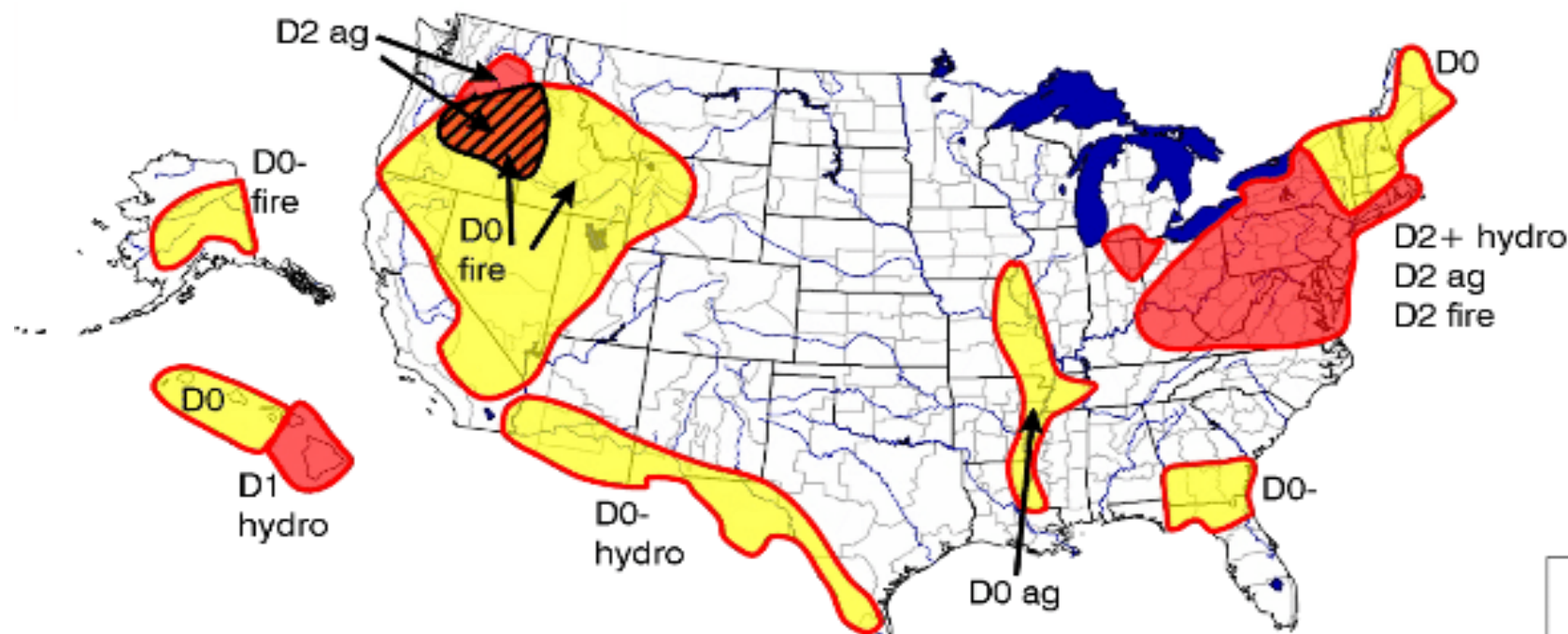
F = forestry (wildfire potential)

H = hydrological (rivers, wells, reservoirs)

Plus = Forecast to intensify, Minus = Forecast to diminish

July 20, 1999

Experimental U.S. Drought Monitor



"Drought" means moisture shortages leading to damaged crops or pastures, high wildfire risk, or water shortages. The map is based on information from many sources, including both satellite and surface data, and it focuses on widespread drought. Local conditions may vary.

Yellow (D0) = Drought Watch Area (abnormally dry but not full drought status)

Red (D1-D4) = Current drought ranging in severity from standard (D1) to severe (D2-D3) to extreme (D4)

Crosshatching () = Overlapping drought type areas

Drought type: Used when impacts differ

Ag = agricultural (crops, grasslands)

Fire = forestry (wildfire potential)

Hydro = hydrological (rivers, wells, reservoirs)

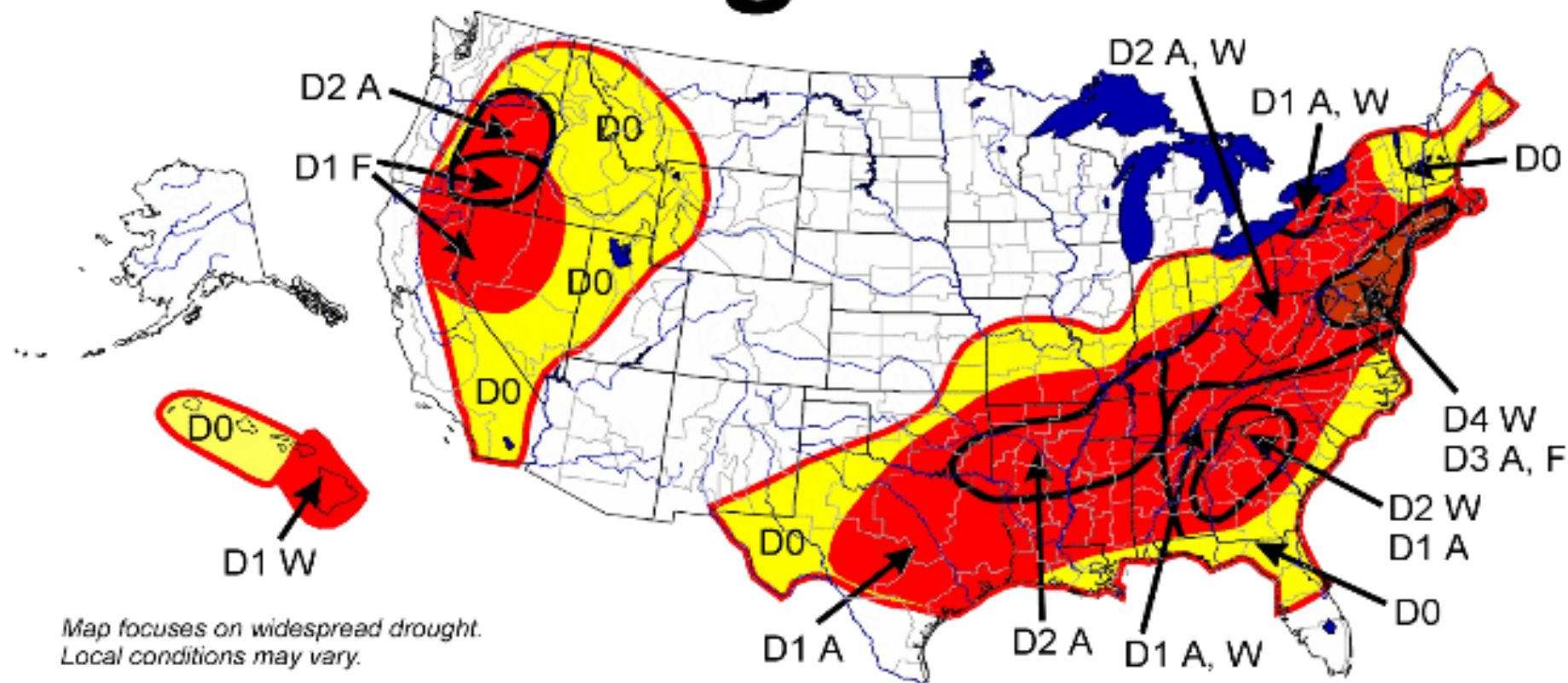
Plus (+) = Forecast to intensify

Minus (-) = Forecast to diminish



August 24, 1999

U.S. Drought Monitor



Map focuses on widespread drought.
Local conditions may vary.

- D0 Watch
- D1 Drought
- D2 Drought-Severe
- D3 Drought-Extreme
- D4 Drought-Exceptional

Drought type: used only
when impacts differ

A = Agriculture
W = Water
F = Forest fire danger

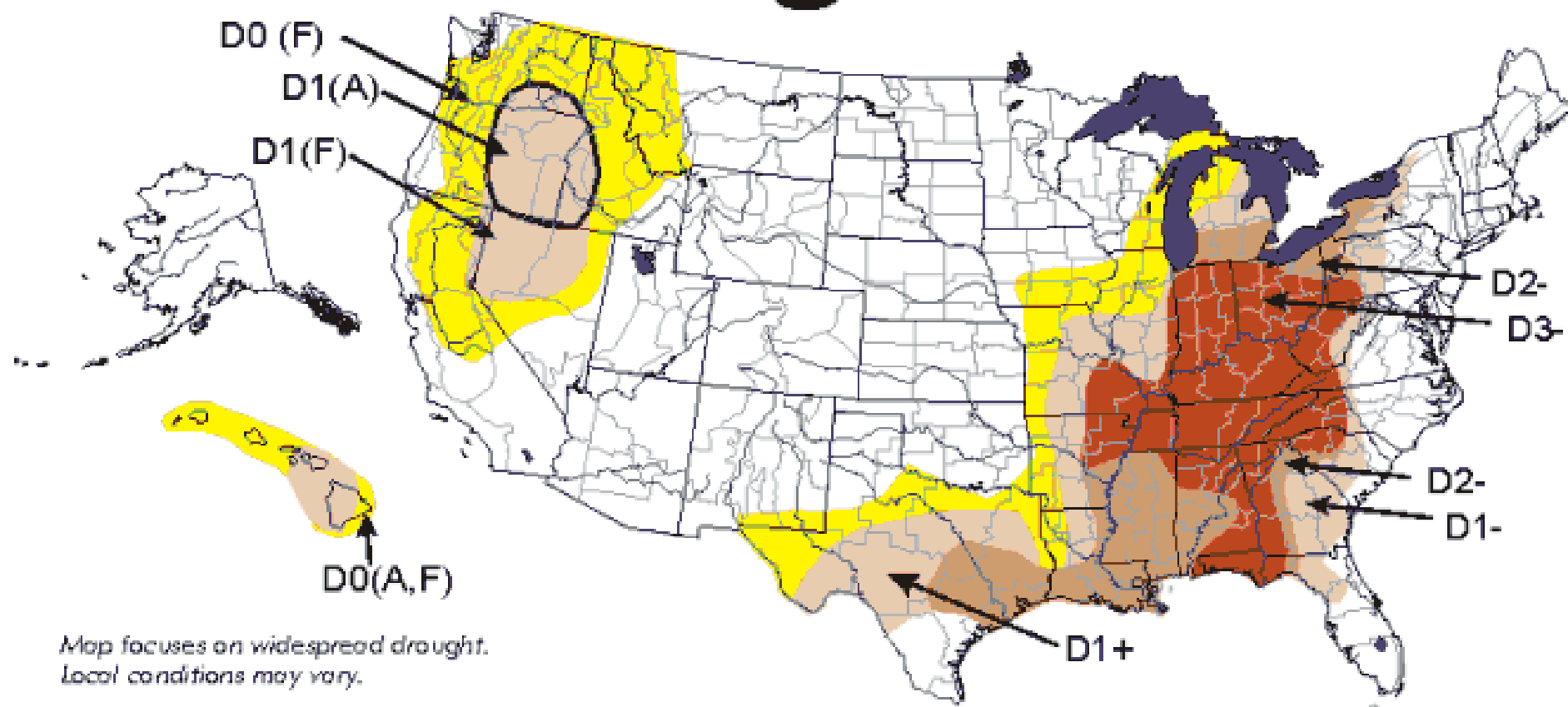


Plus (+) = Forecast to intensify next two weeks
Minus (-) = Forecast to diminish next two weeks
No sign = No change in drought classification forecast

• **Updated every Thursday morning** •

September 28, 1999

U.S. Drought Monitor



D0 Watch

D1 Drought

D2 Drought-Severe

D3 Drought-Extreme

D4 Drought-Exceptional

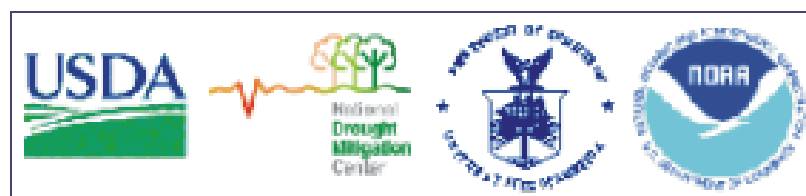
↗ Delineates Overlapping Areas

Drought type: used only
when impacts differ

A = Agriculture

W = Water

F = Forest fire danger



Plus (+) = Forecast to intensify next two weeks

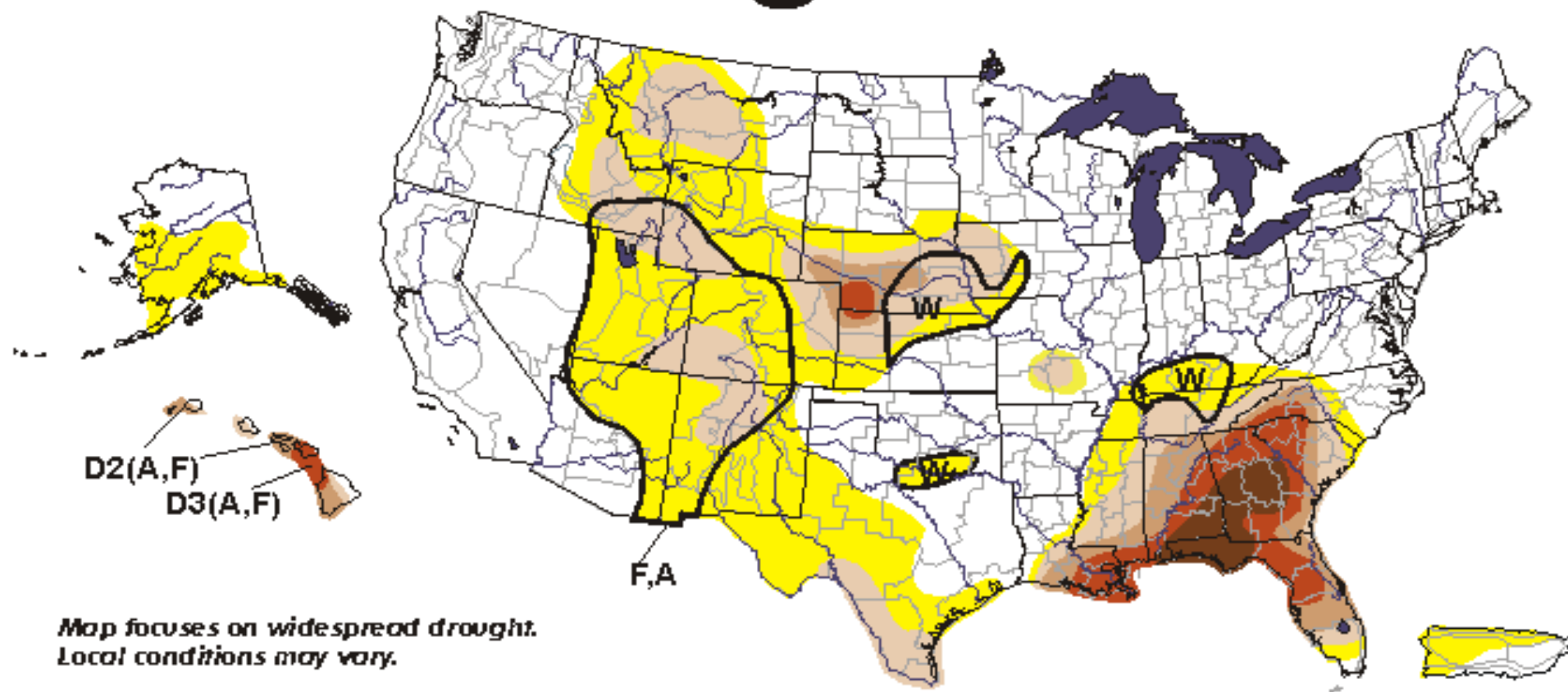
Minus (-) = Forecast to diminish next two weeks

No sign = No change in drought classification forecast

• Released Thursday, Sep 30, 1999 •

July 11, 2000 Valid 7 a.m. EST

U.S. Drought Monitor



**Map focuses on widespread drought.
Local conditions may vary.**

- | | |
|------------------------------|--|
| D0 Abnormally Dry | Drought type: used only
when impacts differ |
| D1 Drought-First Stage | |
| D2 Drought-Severe | |
| D3 Drought-Extreme | |
| D4 Drought-Exceptional | |
| Delineates Overlapping Areas | |
| A = Agriculture | |
| W = Water | |
| F = Wildfire danger | |

See accompanying text summary
for forecast statements

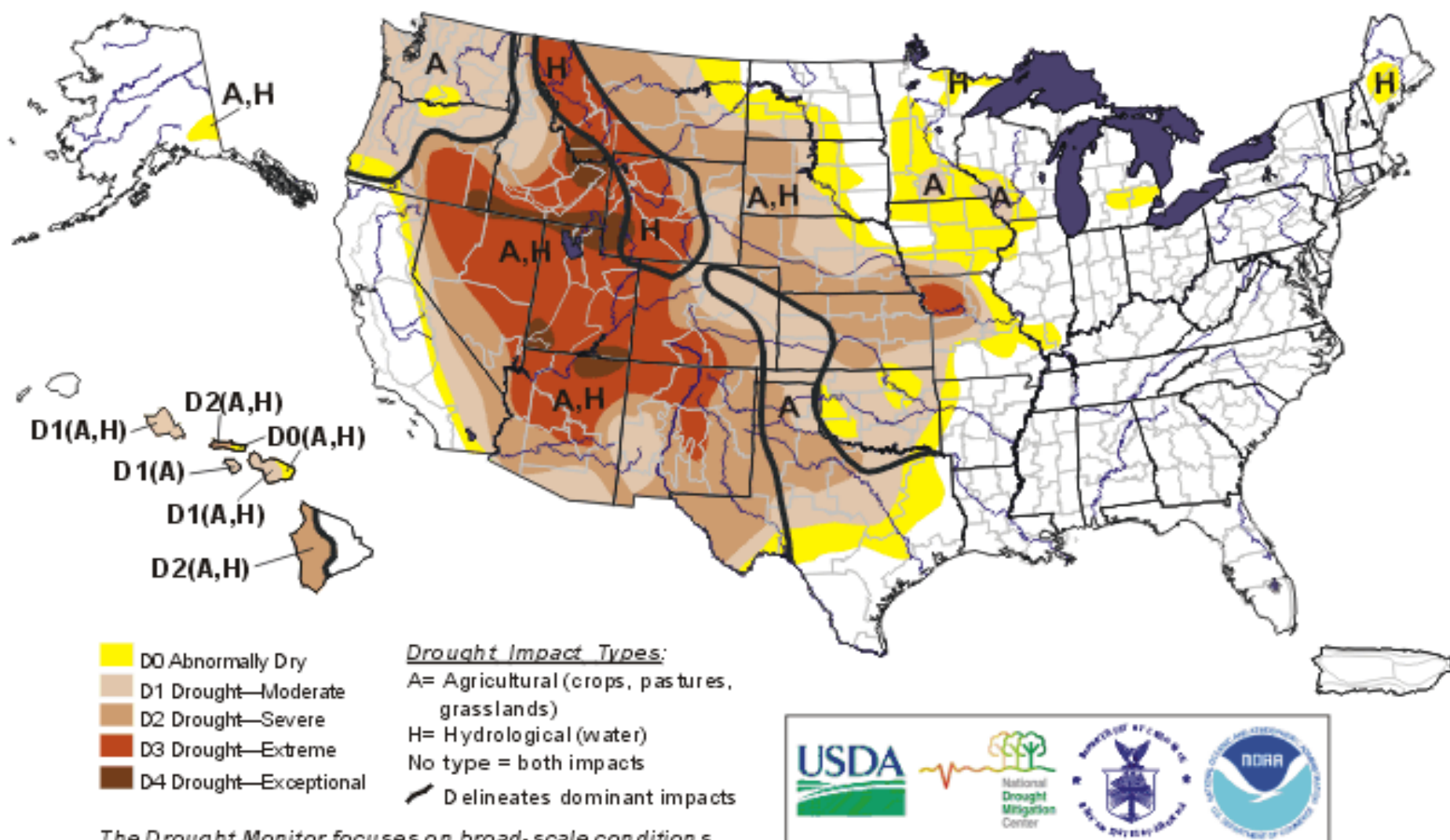


● Released Thursday, July 13, 2000 ●

U.S. Drought Monitor

August 12, 2003

Valid 8 a.m. EDT



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

Released Thursday, August 14, 2003

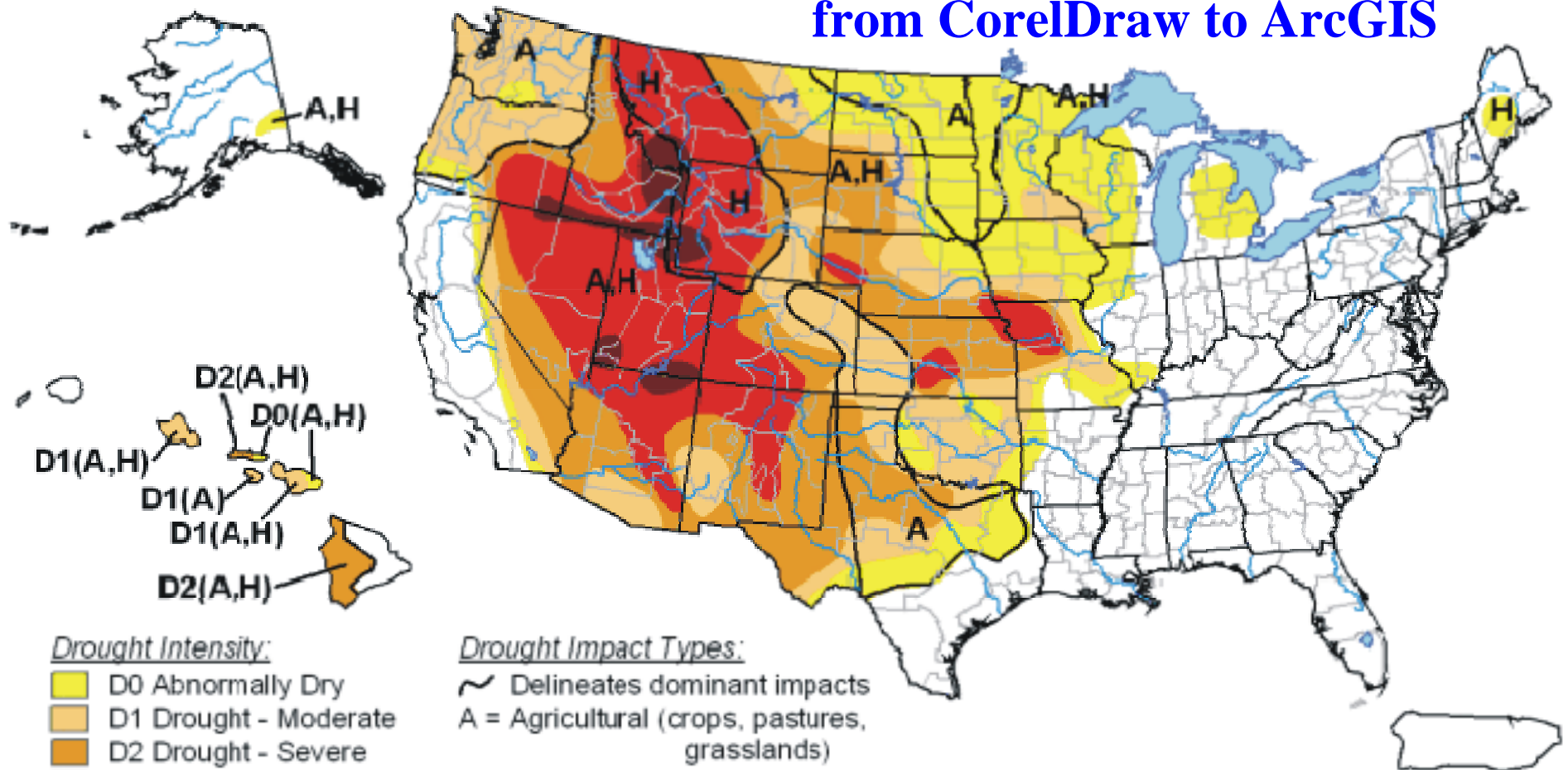
Author: Douglas Le Comte, NOAA A/CPC

U.S. Drought Monitor

August 19, 2003

Valid 8 a.m. EDT

from CorelDraw to ArcGIS



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

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



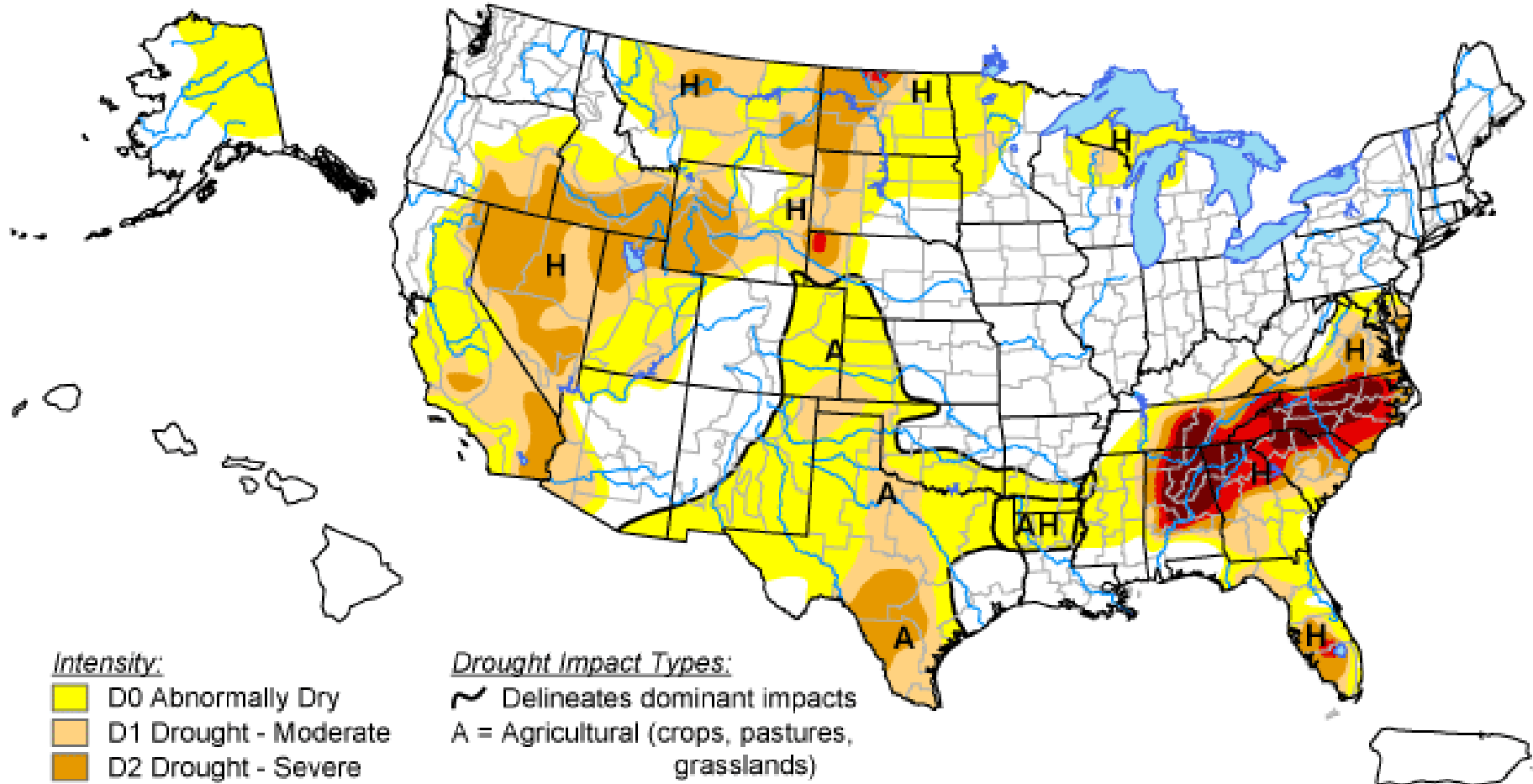
Released Thursday, August 21, 2003

Author: Candace Tankersley/Richard Heim, NOAA/NCDC

U.S. Drought Monitor

February 12, 2008

Valid 7 a.m. EST



Intensity:

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

Drought Impact Types:

- Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

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, February 14, 2008

Authors: Jay Lawrimore/Liz Love-Brotak, NOAA/NESDIS/NCDC



BACKGROUND

While trying to keep the USDM 'simple' for the consumer, the author(s) require as much current and past information as possible (e.g. multiple indices, products, local expertise, etc.) in order to determine this week's drought analyses since no single definition of drought or index works for all circumstances.

So, as technology continues to improve, we have tried to utilize these upgrades to assist us in creating the weekly USDM.

(Each of the following slides could be made into its own presentation)

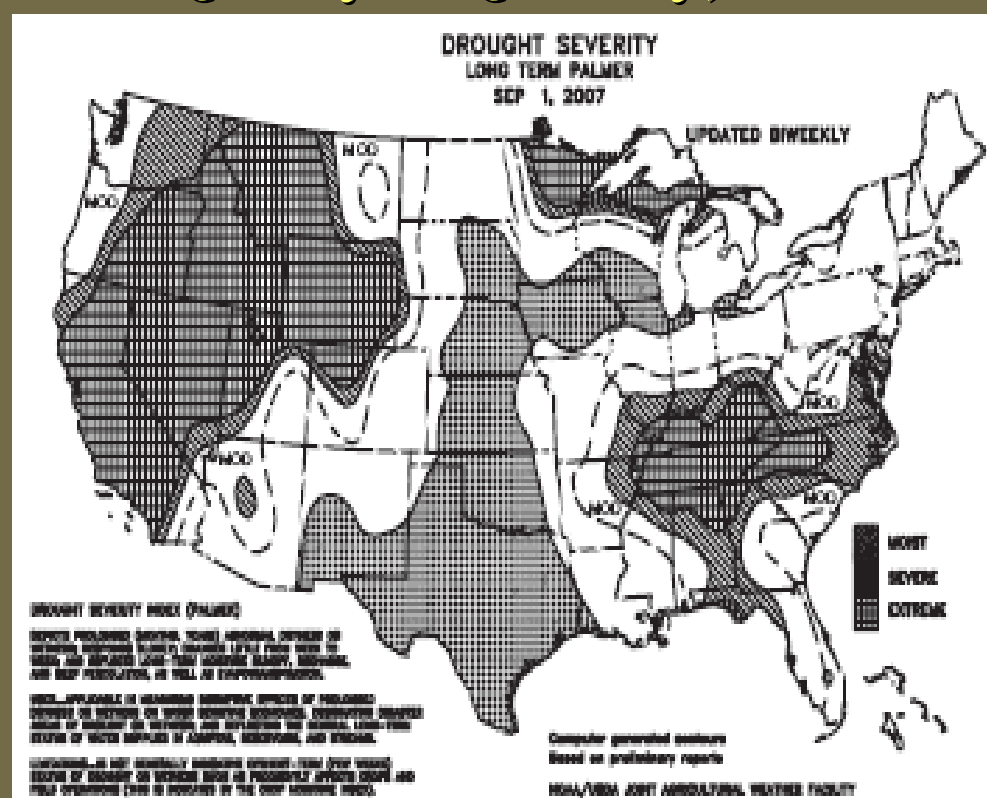
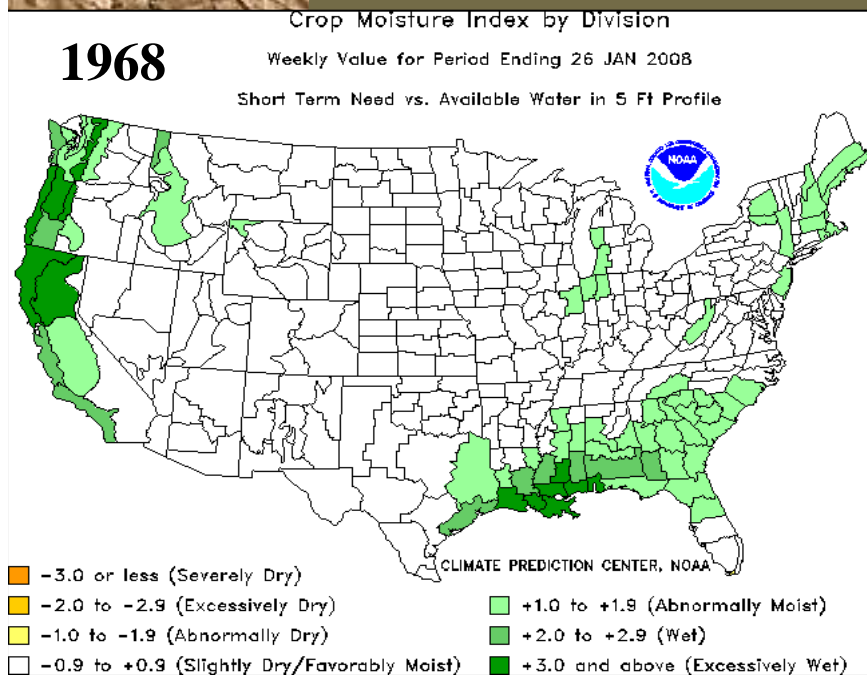
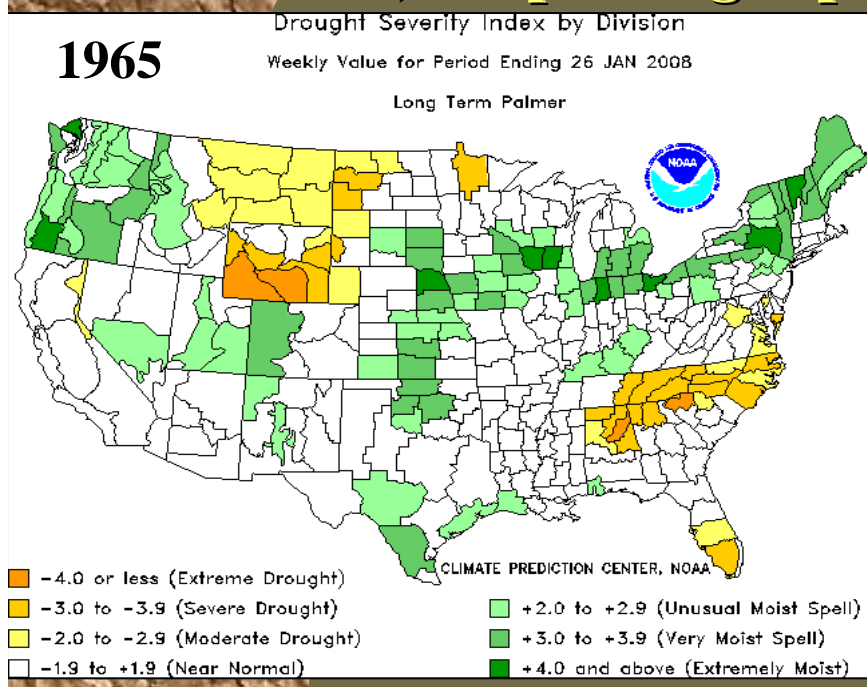


OVERVIEW

Modified or New Tools used in the Assessment of Drought in the Production of the USDM:

- 1) **Improving Input Data Quality & Quantity;**
- 2) **Creating New Products, Indices, or Blends for a more Objective Analyses, inc. Soil Moisture Models;**
- 3) **Differentiating between Temporal (Short vs. Long) & Regional (East vs. West) Drought Distinctions;**
- 4) **Migrating USDM Analyses & Production to State-of-the-Art Software (ArcGIS);**
- 5) **Consolidating all drought-related information to a “one-stop drought shop” (NIDIS & Drought Portal);**
- 6) **Expanding Drought Monitoring Beyond the U.S.;**
- 7) **Forecasting Drought (U.S. Seasonal Drought Outlooks);**

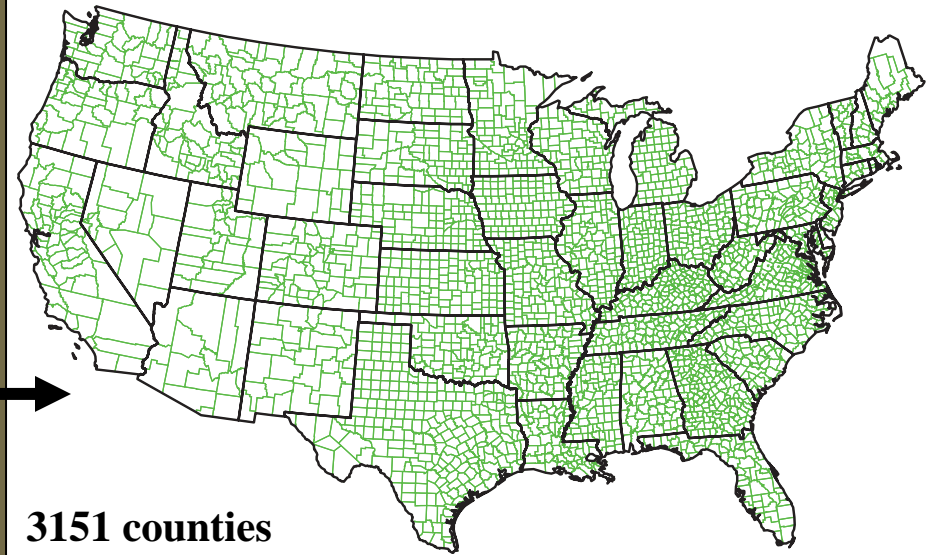
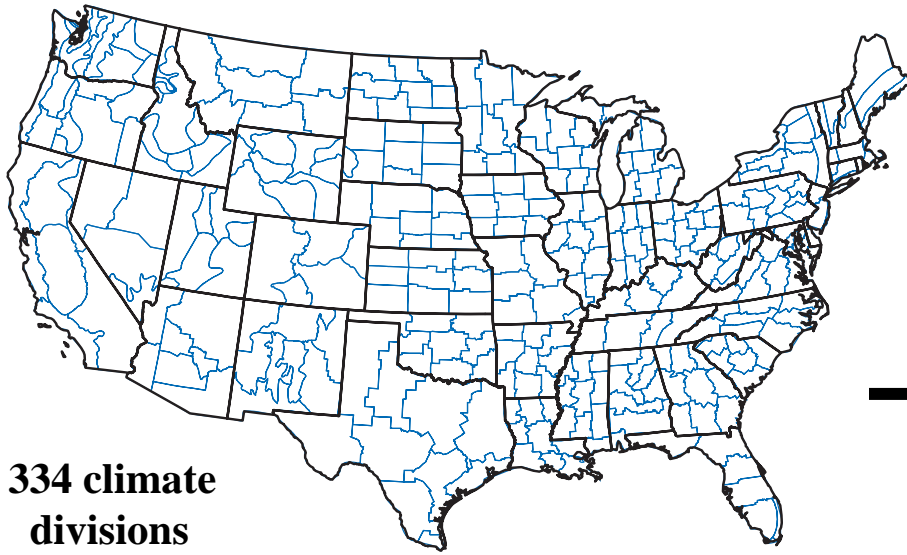
1) Improving Input Data Quality & Quantity;



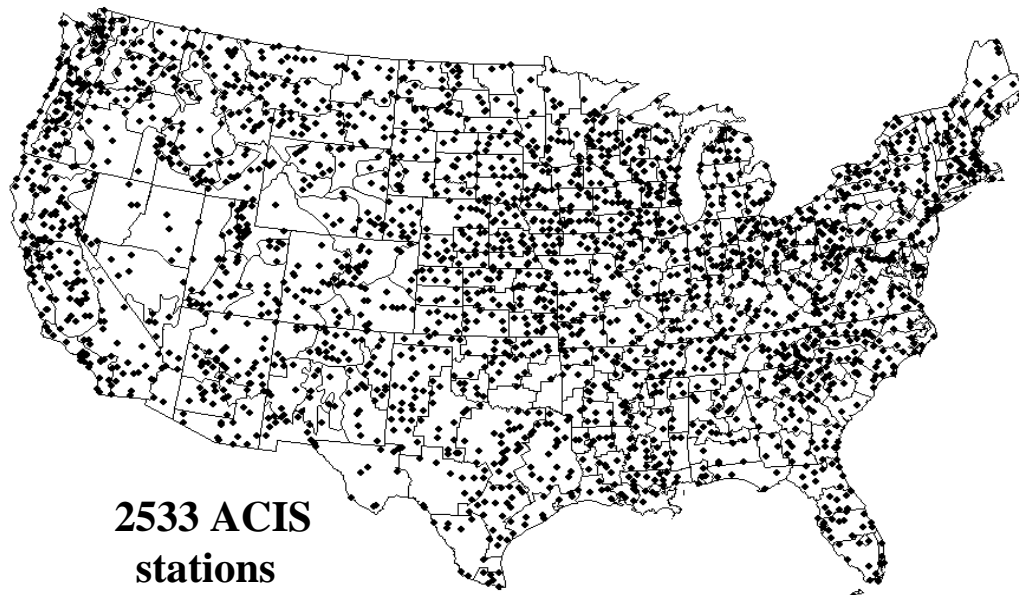
In the past, the **Palmer Drought Index** had been the standard for measuring drought in the U.S. (the **CMI** was developed 3 years later for short-term [ag] dryness)...

...but we've come a long way recently; increasing data quality & quantity, dissemination speed, user flexibility, and creating new products

1) Improving Input Data Quality & Quantity;



**Precipitation Stations After Gap Analysis
With At Least 30 Years of Data**

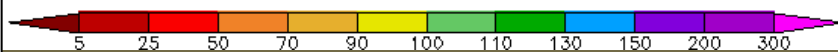
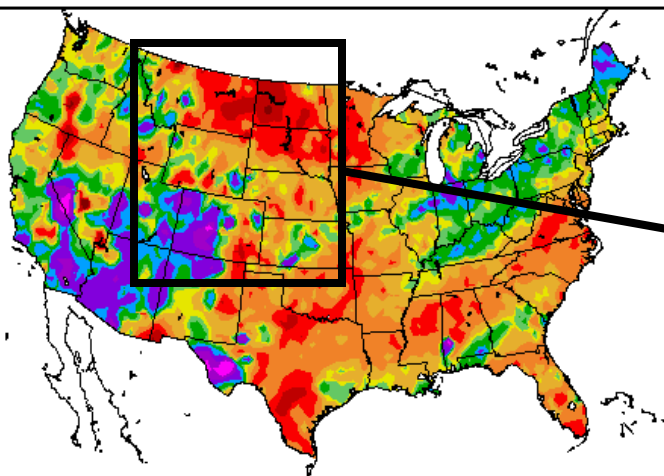


...although we still need to transition from a rather low-resolution (climate divisions) to higher resolution (e.g. county level) or to individual stations (e.g. ACIS) ...where there is enough past quality data for statistics.

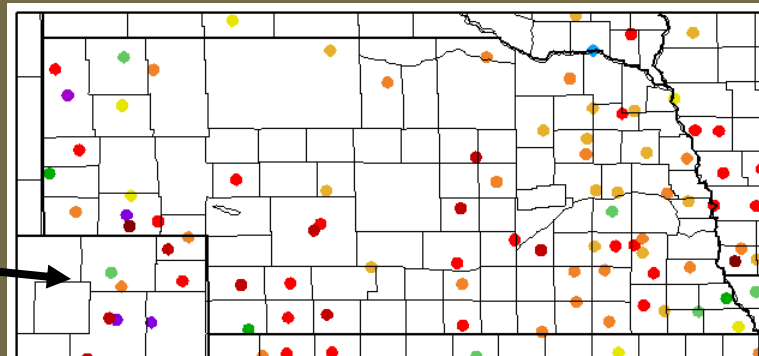
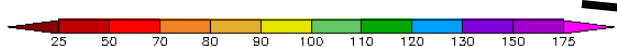
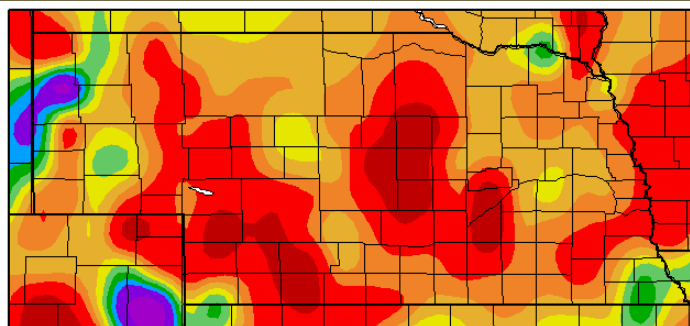
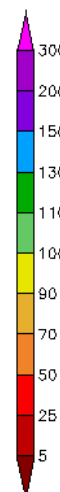
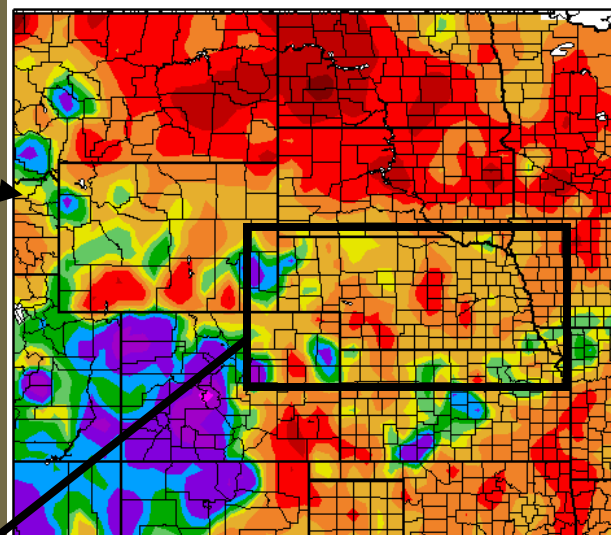
1) Improving Input Data Quality & Quantity;

ACIS data

Percent of Normal Precipitation (%)
11/1/2007 - 1/31/2008



Percent of Normal Precipitation (%)
11/1/2007 - 1/31/2008



3-Month (Nov'07-Jan'08) PNP

High Plains
Regional Climate Center

Home About US

Current Climate Summary

Options

Select Product

- Total Precipitation
- Precip Departure from Normal
- Precip % of Normal
- Average Temperature
- Temperature Departure from Normal
- HDD - Heating Degree Days
- HDD Departure from Normal
- CDD - Cooling Degree Days
- CDD Departure from Normal
- SPI

Products Not Available for Selected Timescale.

Select a Timescale/Date Range

Select a Region

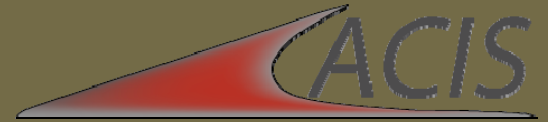
Select Map Style

- Shaded
- Dot

Selected Options

Applied Climate Information System

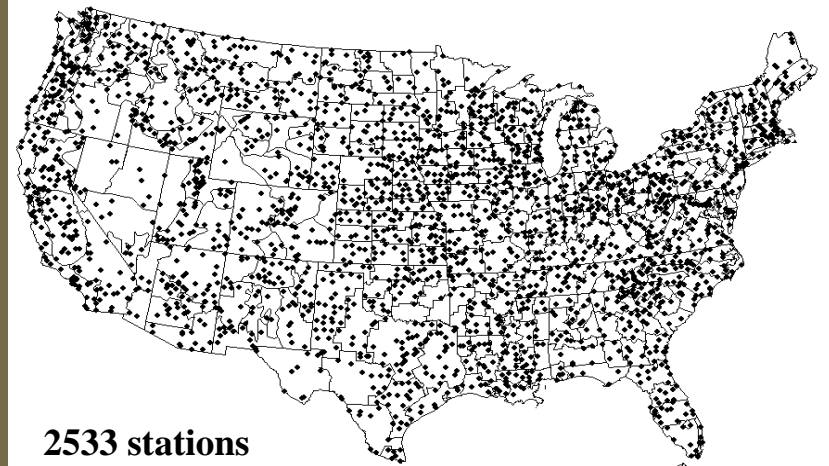
- Applied Climate Information System (ACIS)
 - NOAA Regional Climate Centers (RCCs)
- A framework for management of metadata and climate data:
 - Ingest, Quality Control, and Archive
 - Multiple Datasets
 - Networked/Robust System
 - Distributed Data Management
 - Manages climate data (so you don't have to!)



ACIS provides a platform for suites of climate products:

- * CLIMOD (RCCs)
- * xmACIS (NWS)
- * NOWData (NWS)
- * AgACIS (NRCS)

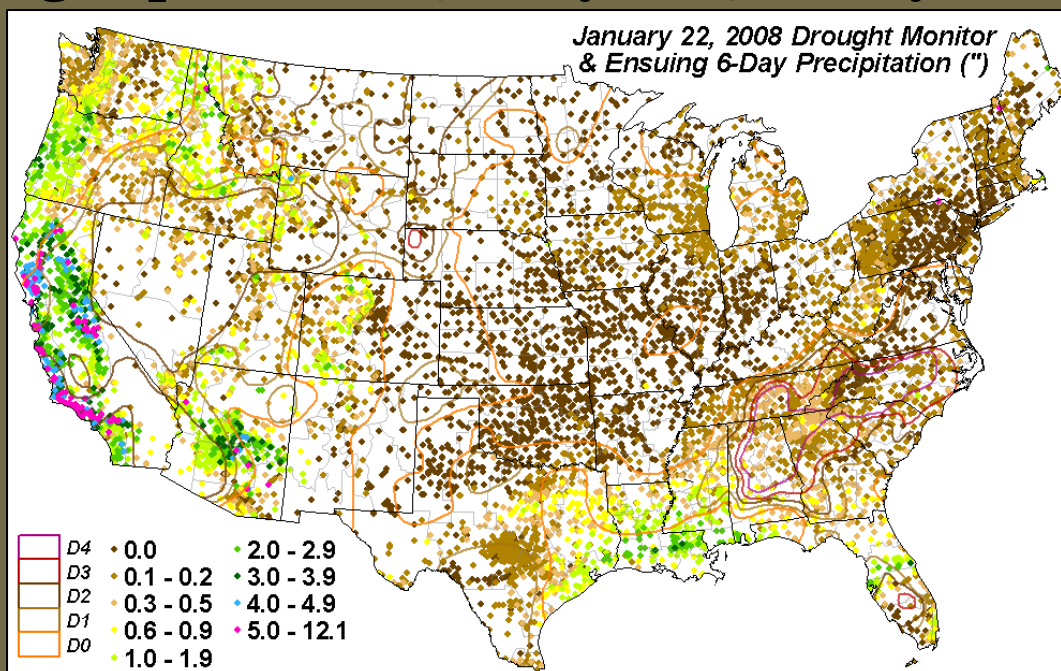
Precipitation Stations After Gap Analysis
With At Least 30 Years of Data



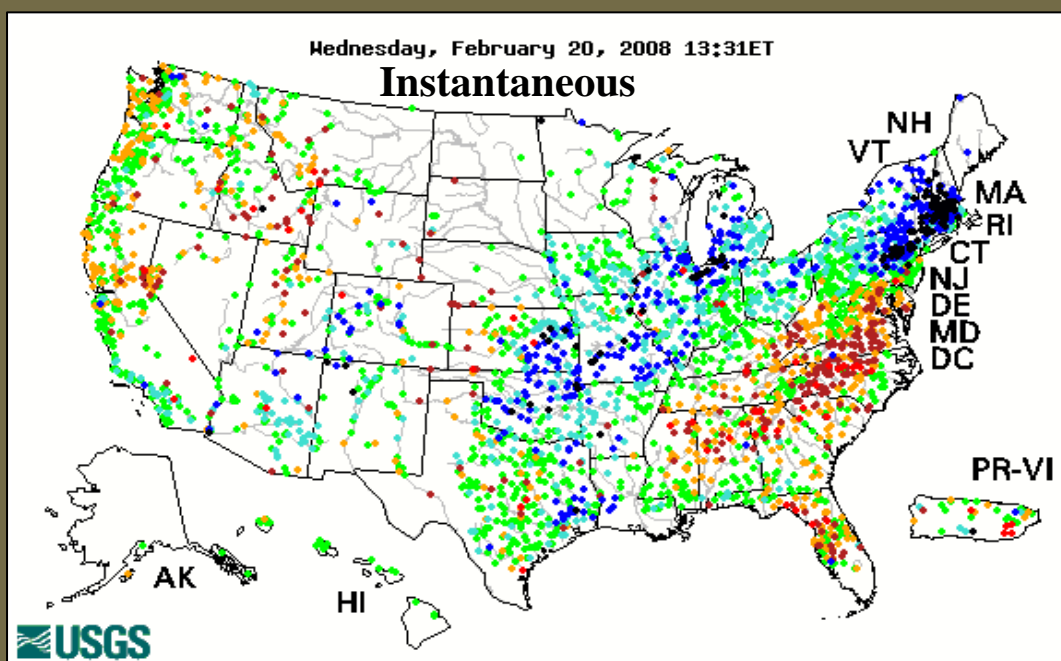
2533 stations

1) Improving Input Data Quality & Quantity;

**RFC
Network
(n-days)**



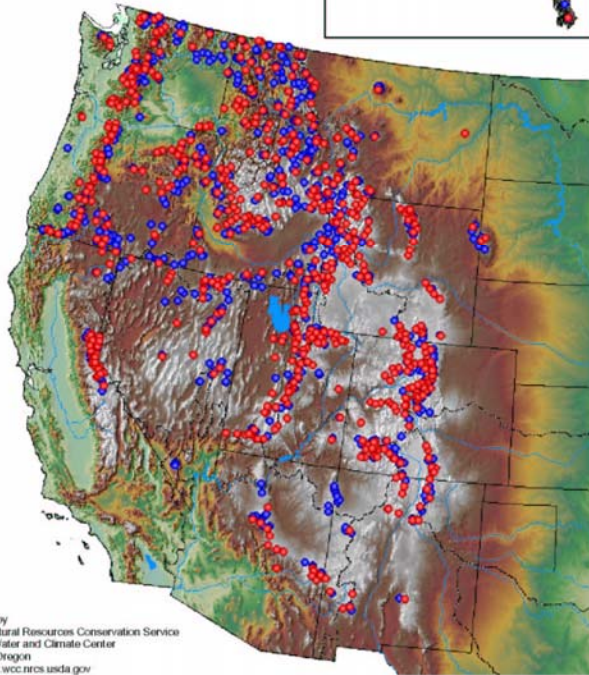
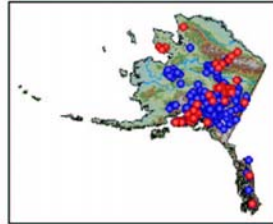
**USGS
Stream flow
Network
(Instant, 1-,
7-, 14-, and
28-days)**



1) Improving Input Data Quality & Quantity;

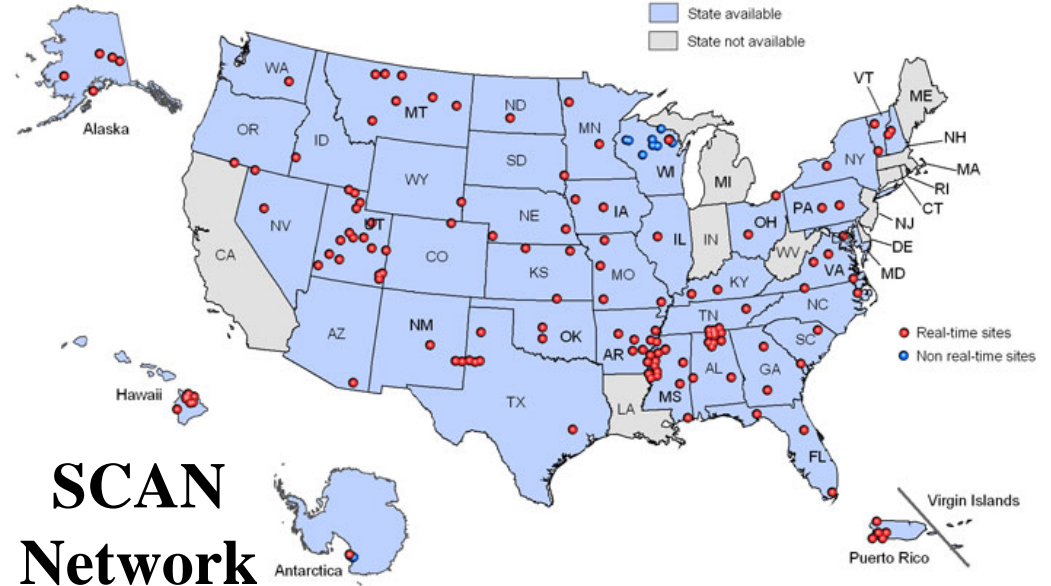
SNOTEL Site and Snow Course Locations

Legend
 ● SNOTEL
 ● Snow Course



Prepared by
 USDA, Natural Resources Conservation Service
 National Water and Climate Center
 Portland, Oregon
<http://www.wcc.nrcs.usda.gov/>

SNOTEL Network

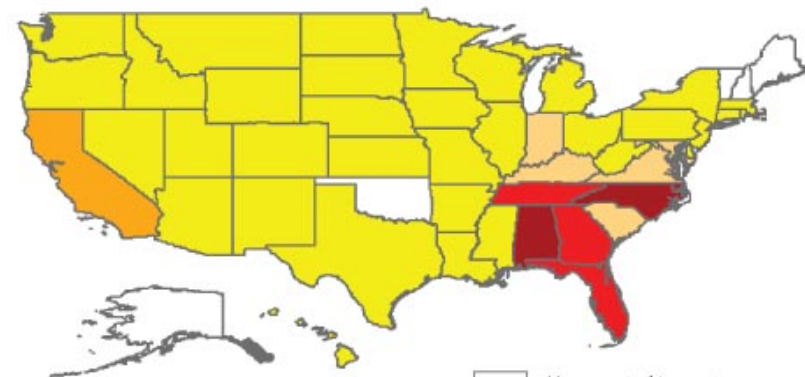


SCAN Network

Drought Impact Reporter

May - October 2007

National Drought Mitigation Center



Legend for Drought Impact Reporter:

- No reported impacts
- 1-19 reported impacts
- 20-37 reported impacts
- 38-55 reported impacts
- 56-73 reported impacts
- 74-92 reported impacts

NDMC



National Weather Service
Hydrologic Information Center

Site Map News Organization Search Enter Search Here Go

Current Flooding Outlooks Hydrologic Conditions Archive Home

Drought

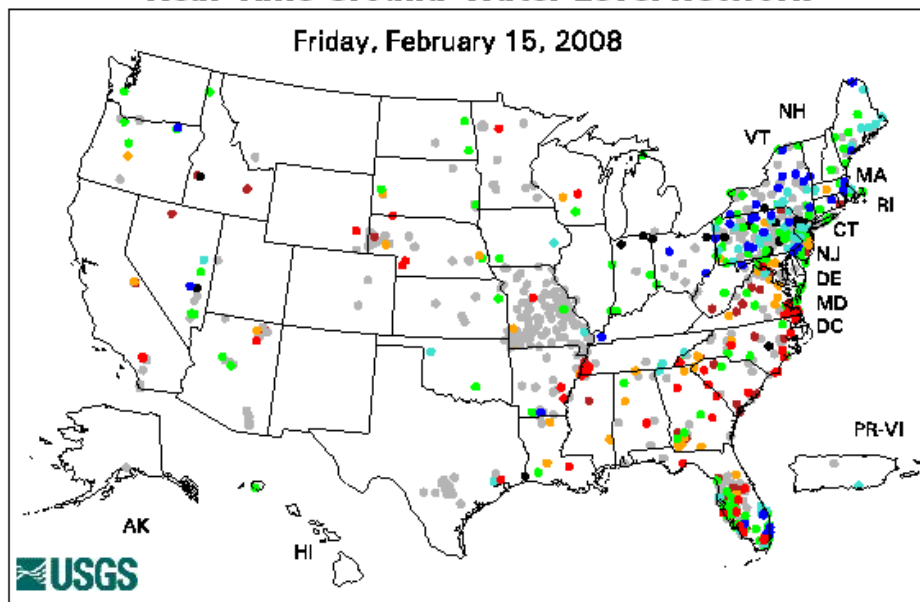
Drought statements issued by NWS Forecast Offices:

<ul style="list-style-type: none"> Bismark, ND [1/25/08] Riverton, WY [2/15/08] North Platte, NE [1/17/08] Goodland, KS [2/3/08] Amarillo, TX [2/5/08] San Angelo, TX [2/15/08] San Antonio, TX [2/7/08] Corpus Christi, TX [2/7/08] Brownsville, TX [2/9/08] 	<ul style="list-style-type: none"> Jackson, KY [2/1/08] Morristown, TN [2/14/08] Nashville, TN [1/12/08] Huntsville, AL [2/14/08] Birmingham, AL [2/14/08] Mobile, AL [2/15/08] Tallahassee, FL [2/15/08] Miami, FL [2/15/08] 	<ul style="list-style-type: none"> Taunton, MA [1/23/08] State College, PA [2/15/08] Mt. Holly, NJ [2/17/08] Blacksburg, VA [2/7/08] Raleigh, NC [1/25/08] Morehead City, NC [2/15/08] Greenville-Spartanburg, SC [2/7/08] Columbia, SC [2/7/08] Charleston, SC [2/8/08] Peachtree City, GA [2/7/08]
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1) Improving Input Data Quality & Quantity;

Real-Time Ground-Water Level Network

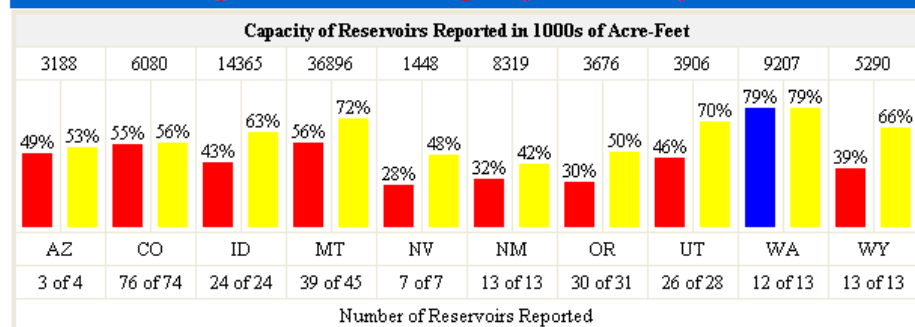
Friday, February 15, 2008



Explanation - Percentile classes							
●	●	●	●	●	●	●	●
New Low	<10 Much Below Normal	10-24 Below Normal	25-75 Normal	76-90 Above Normal	>90 Much Above Normal	New High	Not Ranked

Real-Time Ground-Water Level Network Well Count: 1017

Reservoir Storage as Percent of Capacity for January 1st, Water Year 2008



■ Storage is Below Average (% of Capacity)
■ Storage is At or Above Average (% of Capacity)
■ Average Storage as % of Capacity
 * = Data are not available for this state.

NWS RFC Reservoir Network

NEW! Interactive Water Supply Publications

CBRFC Main > Res

Graphic List

Reservoirs

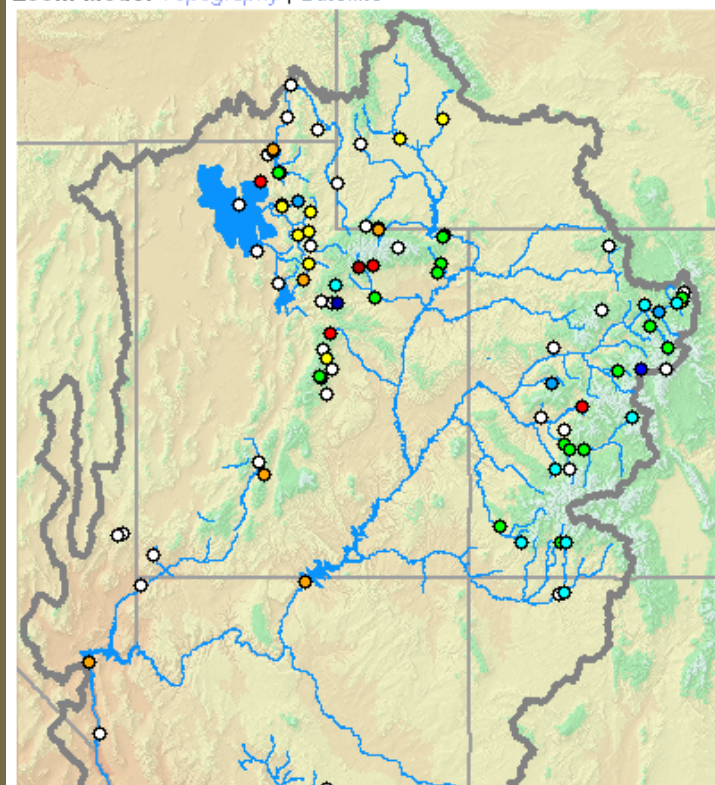
Legend. Map data updated 02/18:19:00 UTC, 02/18:12:00 MST. Click map to zoom.

Data Type: River | Snow

Click to: Select | Zoom Zoom to: 1x | 4x | 8x |

Zoom Mode: Topography | Satellite

Colorado River Basin



Legend

Storage (% Avg)

- No data
- < 25
- 25-50
- 50-75
- 75-90
- 90-110
- 110-125
- 125-150
- 150-175
- > 175

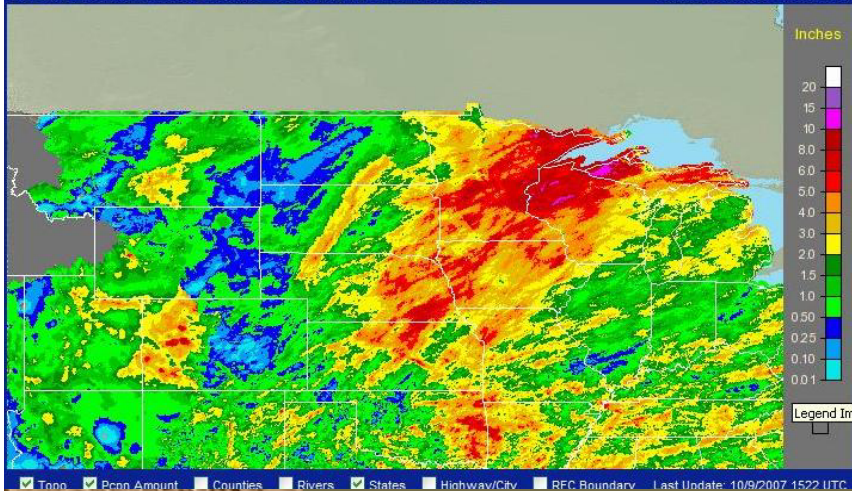
Display Options

- ☒ Topography
- ☒ States
- ☒ RFC
- ☒ Rivers
- ☐ HSAs
- ☐ Basins
- ☒ Data Points
- ☐ Station Labels

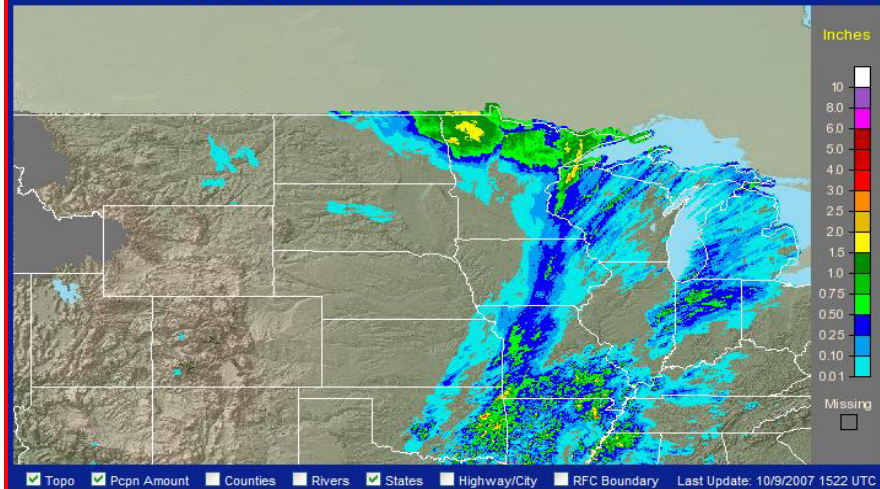
Apply

1) Improving Input Data Quality & Quantity;

NWS Central Region
30-Day Observed Precipitation - Valid 10/9/2007 1200 UTC



NWS Central Region
1-Day Observed Precipitation - Valid 10/9/2007 1200 UTC



1. Timeframe
☒ Current Data
☐ Archive: Month/Year
☐ Archive: Daily
October 9, 2007 - Today
October 9, 2007 - Last 7 Days
October 9, 2007 - Last 14 Days
October 9, 2007 - Last 30 Days
October 9, 2007 - Last 60 Days

2. Product
Observed

3. Location
☒ States
☐ NWS RFC/Regions
☐ NWS WFOs
CONUS + Puerto Rico
Alabama
Arizona
Arkansas
California

4. Units
☒ English
☐ Metric

Missing Data

Update URL for Bookmarking

Print/Save Map

<http://water.weather.gov>

NOTE: If you would like to bookmark or share your current view, you must first click the "Update URL for Bookmarking" button. The URL in your browser window can then be bookmarked or shared.

[Ask questions about the Precipitation Analysis website](#)

Images Download About NWS Precip Analysis Other Useful Information Survey & Feedback Regional / RFC Precip Data

CONUS + Puerto Rico: Current 1-Day Observed Precipitation
Valid at 10/9/2007 1200 UTC - Created 10/9/07 15:35 UTC

Legend In

Topo Pcpn Amount Counties Rivers States Highway/City RFC Boundary

1. Timeframe
☒ Current Data
☐ Archive: Month/Year
☐ Archive: Daily
October 9, 2007 - Today
October 9, 2007 - Last 7 Days
October 9, 2007 - Last 14 Days
October 9, 2007 - Last 30 Days
October 9, 2007 - Last 60 Days

2. Product
Observed

3. Location
☒ States
☐ NWS RFC/Regions
☐ NWS WFOs
CONUS + Puerto Rico
Alabama
Arizona
Arkansas
California

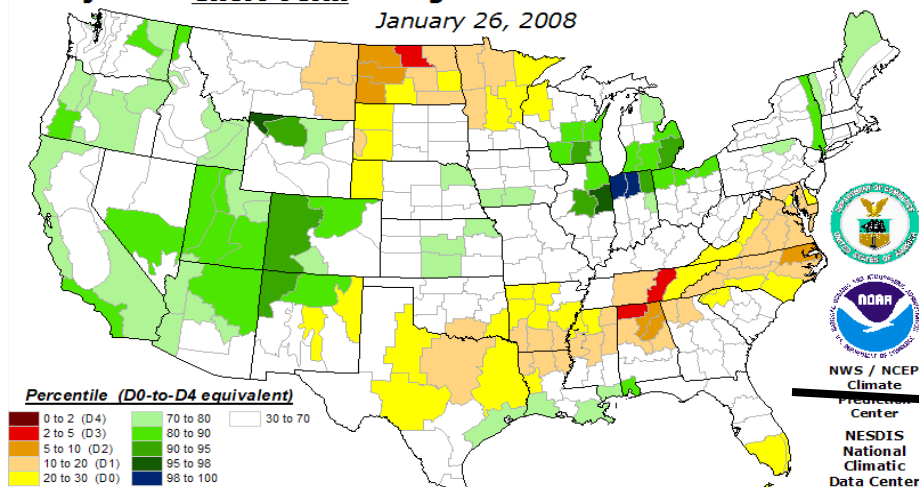
4. Units
☒ English
☐ Metric

Missing Data

2) New Products, Indices, Blends for a more Objective Analyses, including Soil Moisture Models;

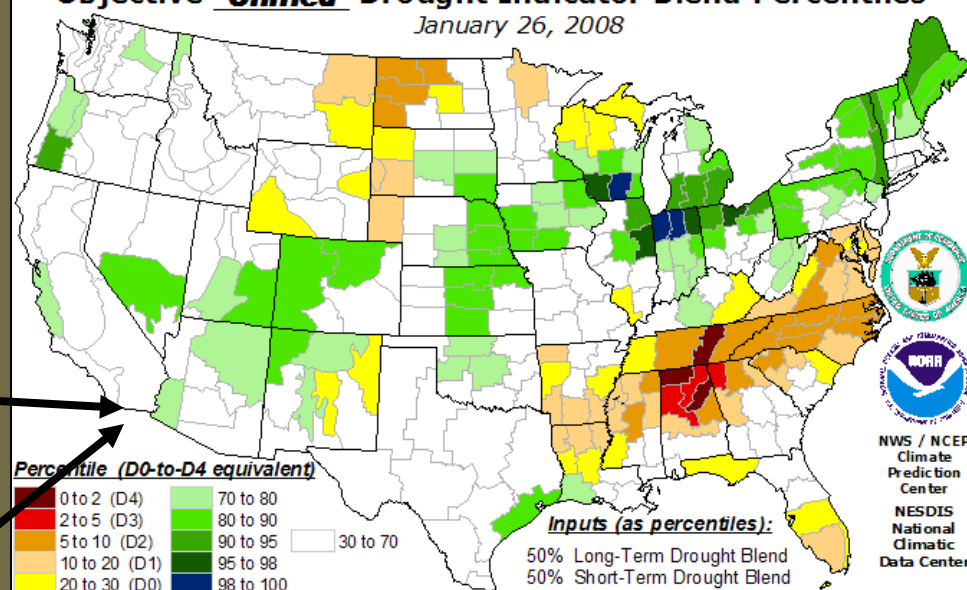
Objective **Short-Term** Drought Indicator Blend Percentiles

January 26, 2008



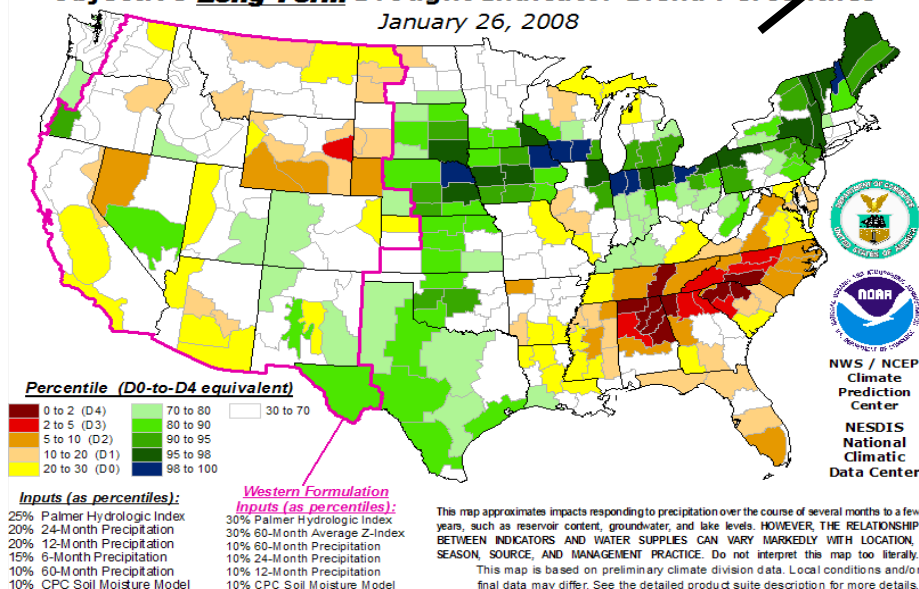
Objective **"Unified"** Drought Indicator Blend Percentiles

January 26, 2008



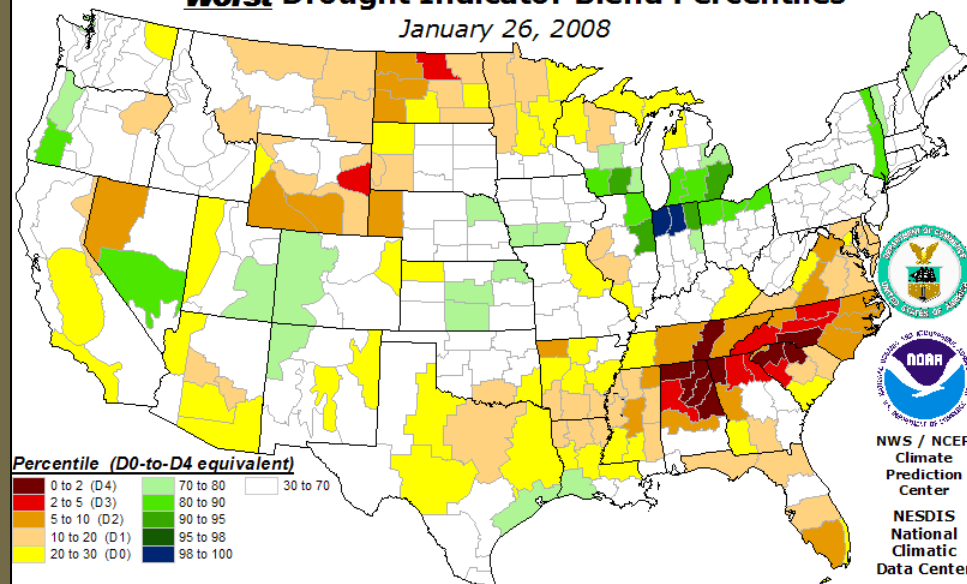
Objective **Long-Term** Drought Indicator Blend Percentiles

January 26, 2008



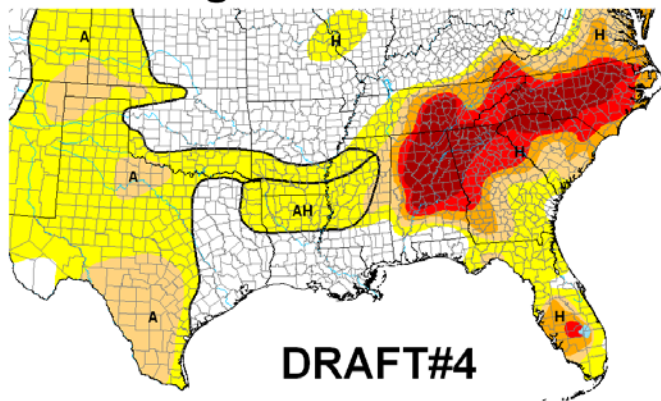
Worst Drought Indicator Blend Percentiles

January 26, 2008



2) New Products, Indices, Blends for a more Objective Analyses, including Soil Moisture Models;

U.S. Drought Monitor January 29, 2008 Valid 7 a.m. EST



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

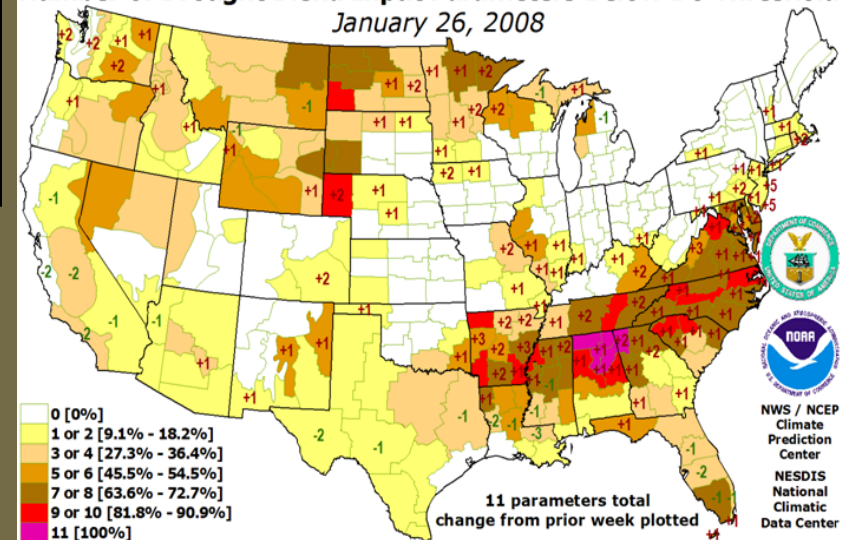
Drought Impact Index:
 A+ Agricultural (crops, pastures, grasslands)
 H Hydrological (water)
 (No type = Both impacts)

Released Thursday, January 31, 2008
 Author: David Miskus, JAWF/CPC/NOAA

For D0-D4; 11 parameters & change from last week →

Four regional draft maps with counties ←

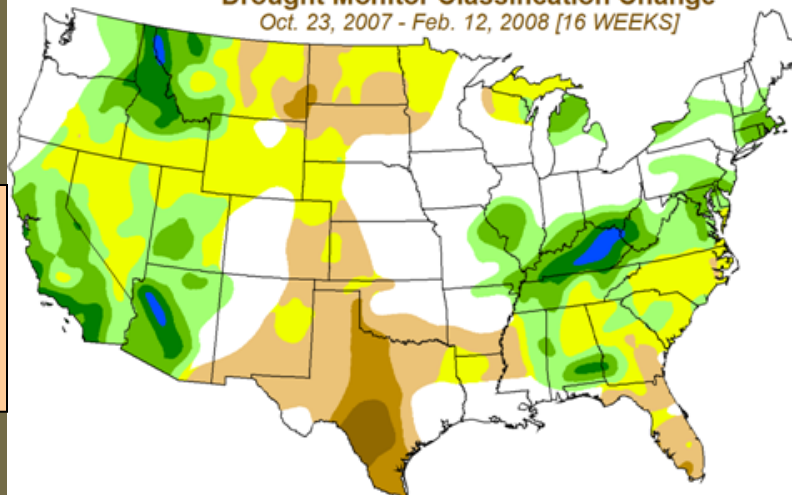
Number of Drought Blend Input Parameters Below D0 Threshold January 26, 2008



NWS / NCEP
 Climate Prediction Center
 NESDIS
 National Climatic Data Center

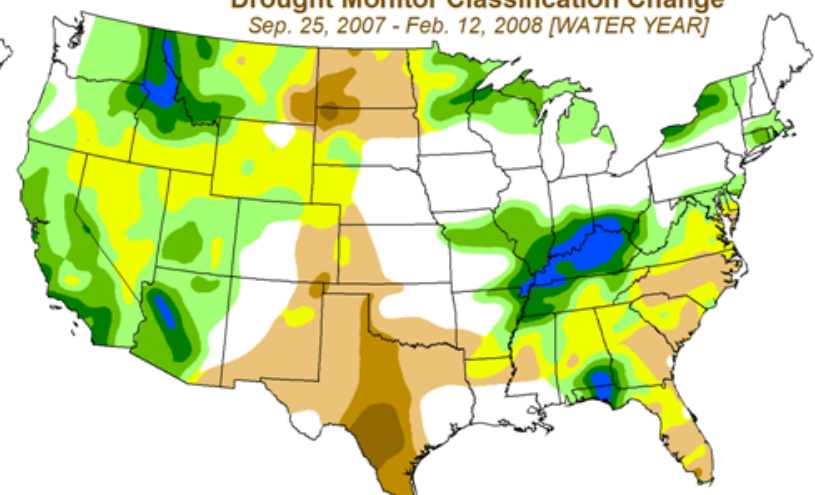
For 1-, 4-, 16-weeks & Water Year comparisons

Drought Monitor Classification Change Oct. 23, 2007 - Feb. 12, 2008 [16 WEEKS]



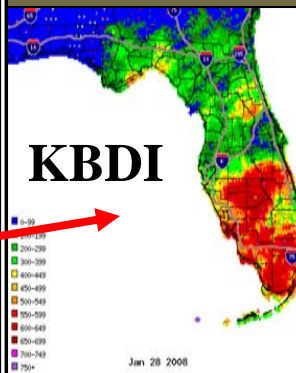
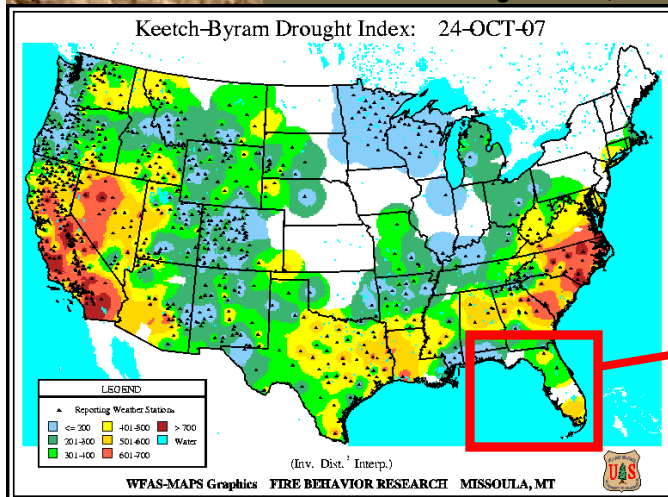
Legend:
 5 class improvement
 4 class improvement
 3 class improvement
 2 class improvement
 1 class improvement
 unchanged
 1 class deterioration
 2 class deterioration
 3 class deterioration
 4 class deterioration
 5 class deterioration

Drought Monitor Classification Change Sep. 25, 2007 - Feb. 12, 2008 [WATER YEAR]



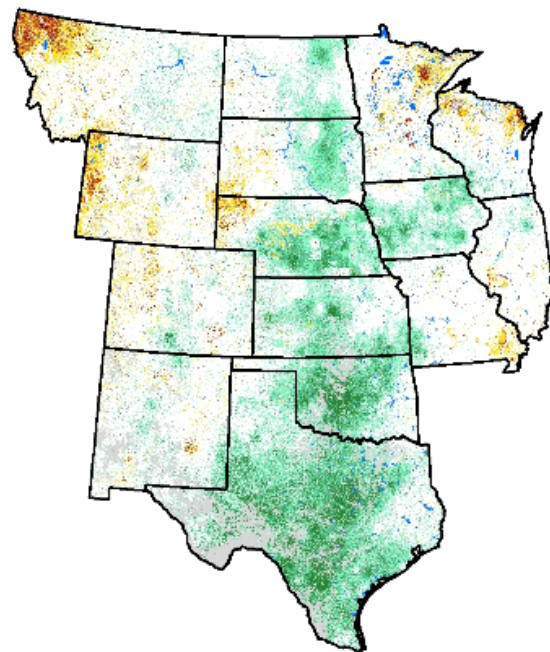
These maps depict approximate changes in drought intensity from selected initial times to the current week, with no consideration given to intervening weeks. The difference calculations are based on interpolated 4 km grids of Drought Monitor classifications, and as a result, will be smoother than would similar products based directly on the published versions of the Drought Monitor.

2) New Products, Indices, Blends for a more Objective Analyses, including Soil Moisture Models;



**Vegetation Drought Response Index
Complete**

September 24, 2007

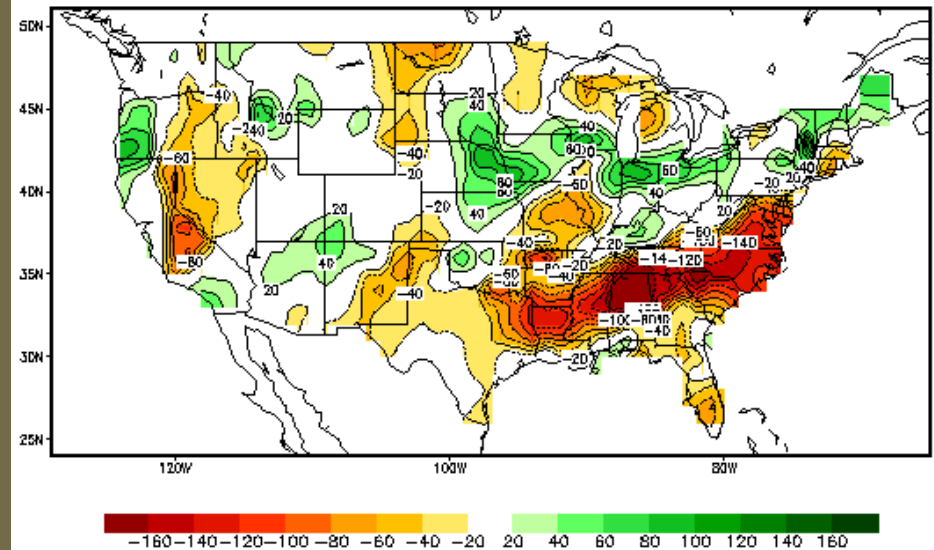


Condition

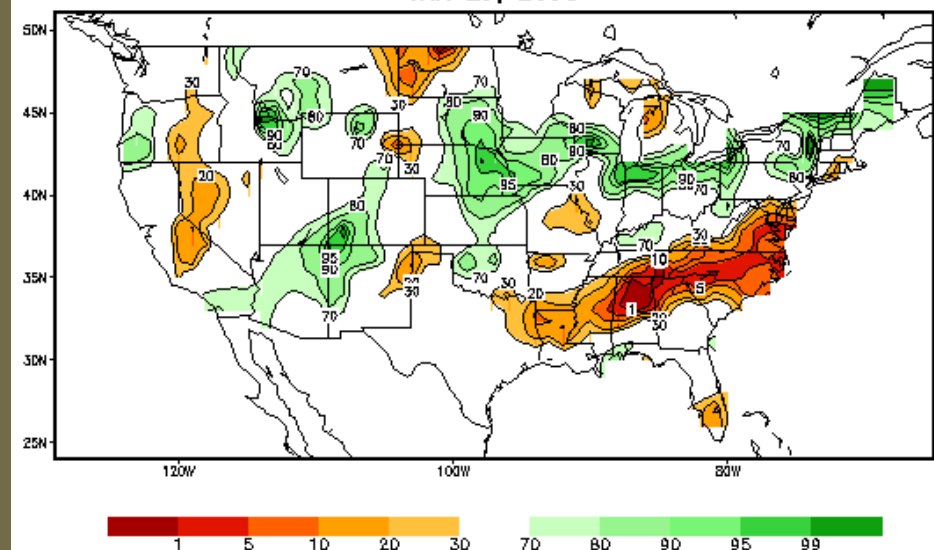
- Extreme Drought
- Severe Drought
- Moderate Drought
- Near Normal
- Unusually Moist Spell
- Very Moist Spell
- Extreme Moist Spell
- Out of Season
- Water



Calculated Soil Moisture Anomaly (mm) JAN 29, 2008



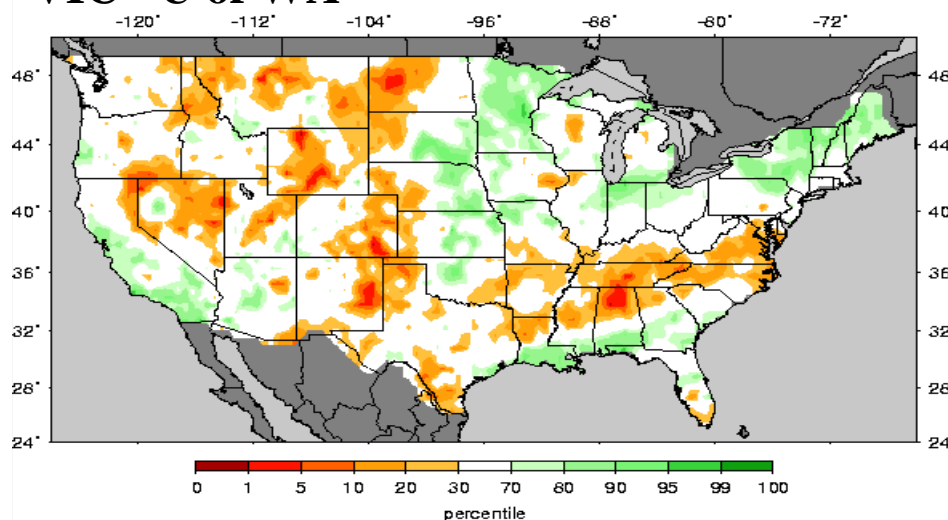
Calculated Soil Moisture Ranking Percentile JAN 29, 2008



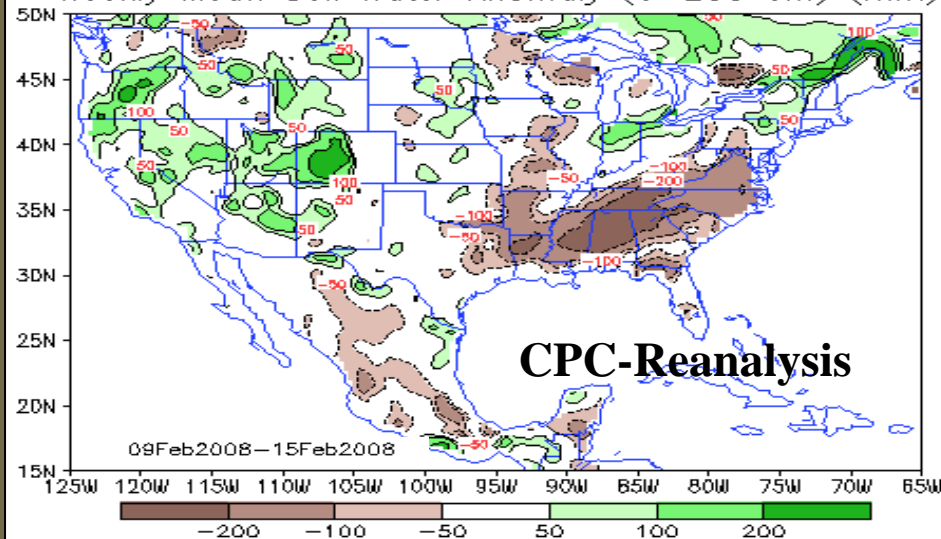
2) New Products, Indices, Blends for a more Objective Analyses, including Soil Moisture Models;

VIC - U of WA

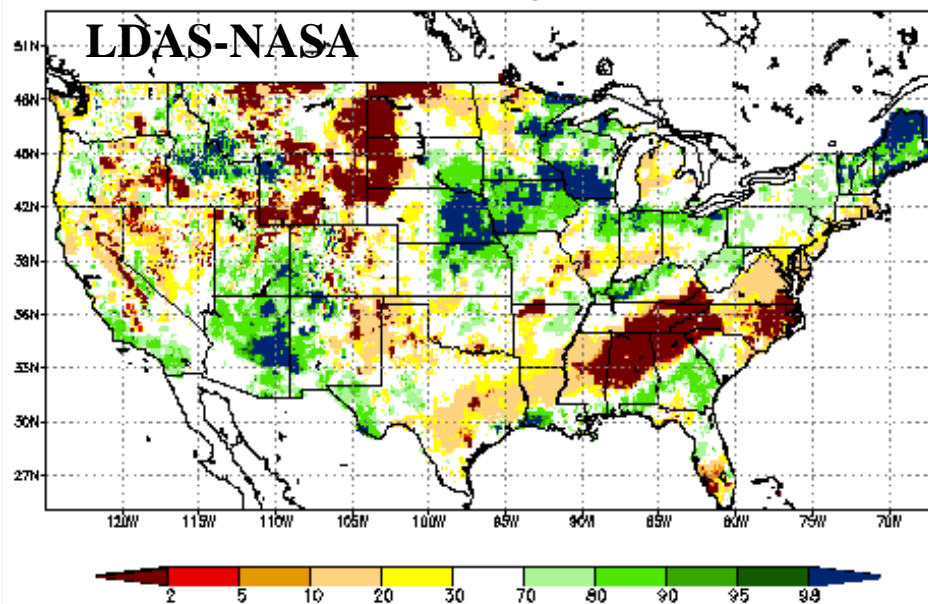
Soil Moisture Percentiles (wrt/ 1915-2003)
20080127



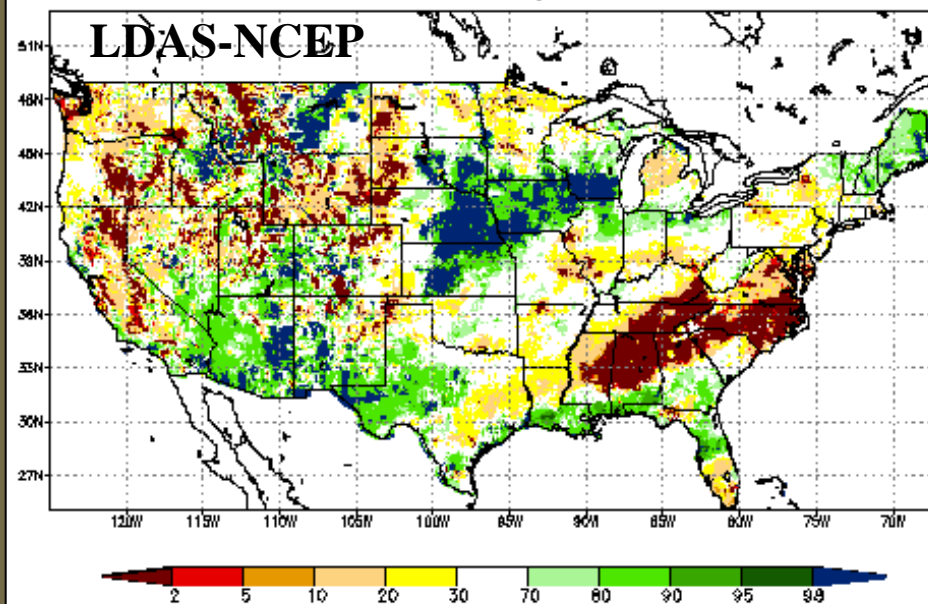
Weekly Mean Soil Water Anomaly (0-200 cm) (mm)



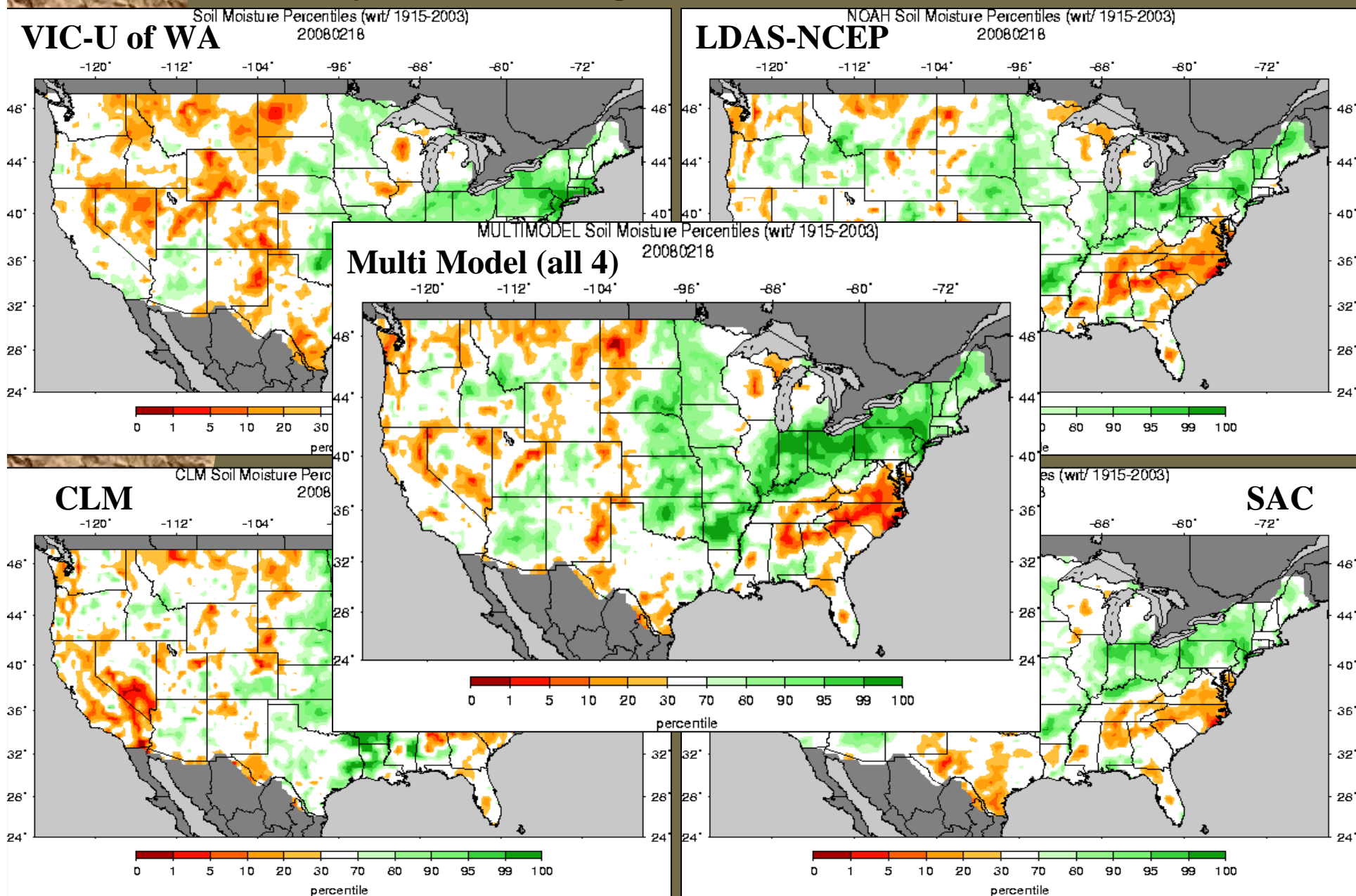
Mosaic - Current Total Column Soil Moisture Percentile
Valid: JAN 28, 2008



Noah - Current Total Column Soil Moisture Percentile
Valid: JAN 27, 2008



2) New Products, Indices, Blends for a more Objective Analyses, including Soil Moisture Models;

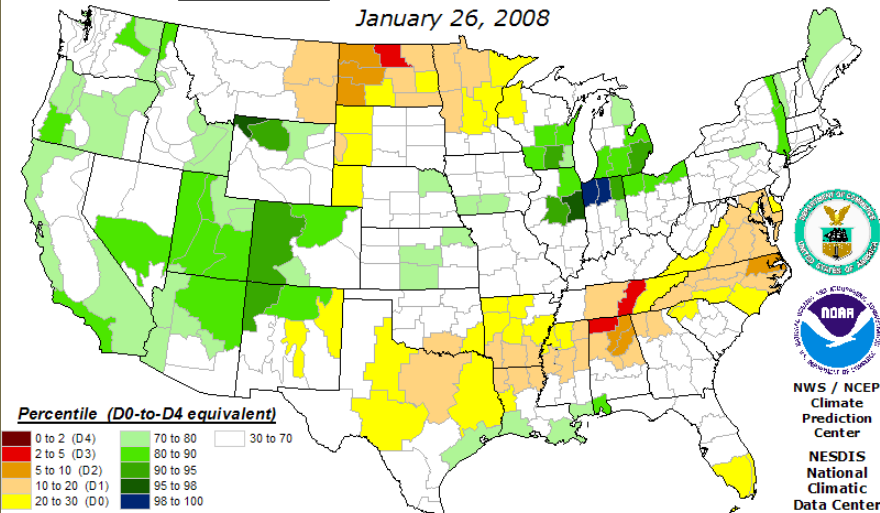


3) Temporal & Regional Drought Distinctions;

30-Days

Objective **Short-Term** Drought Indicator Blend Percentiles

January 26, 2008



Inputs (as percentiles):

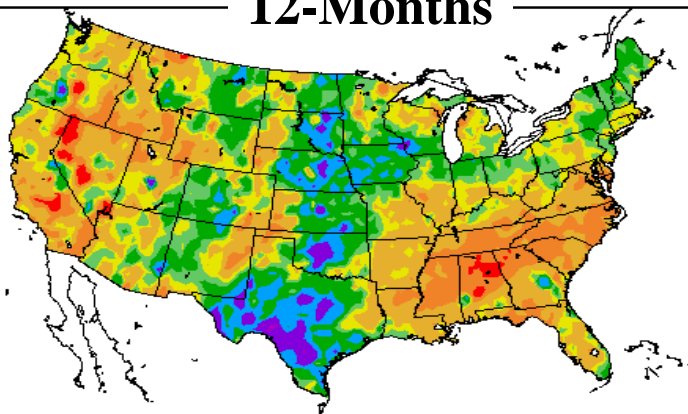
35% Palmer Z-Index
25% 3-Month Precipitation
20% 1-Month Precipitation
13% CPC Soil Moisture Model
7% Palmer Drought Index

This map approximates impacts that respond to precipitation over several days to a few months, such as agriculture, topsoil moisture, unregulated streamflows, and most aspects of wildfire danger. The relationship between indicators and impacts can vary significantly with location and season. Do not interpret this map too literally.

This map is based on preliminary climate division data. Local conditions and/or final data may differ. See the detailed product suite description for more details.

Percent of Normal Precipitation (%)
1/30/2007 – 1/29/2008

12-Months



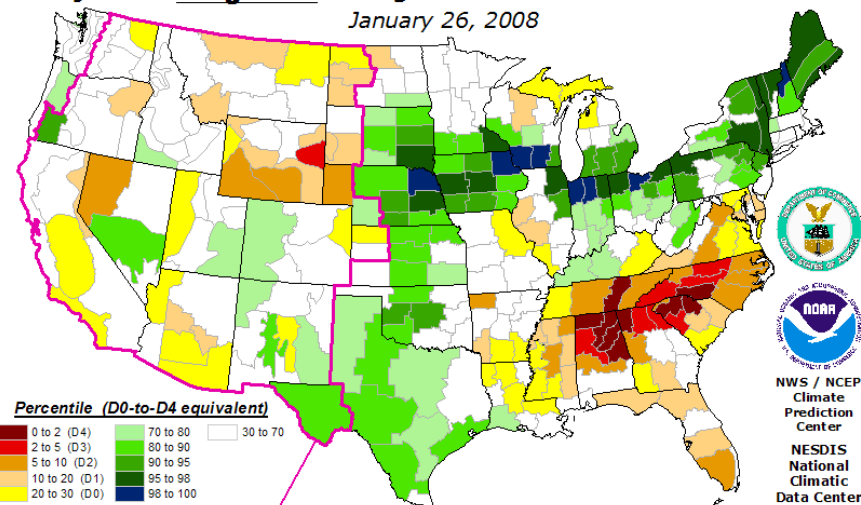
5 25 50 70 90 100 110 130 150 200 300

1/30/2008 at HPRCC using provisional data.

NOAA Regional Climate

Objective **Long-Term** Drought Indicator Blend Percentiles

January 26, 2008



Inputs (as percentiles):

25% Palmer Hydrologic Index
20% 24-Month Precipitation
20% 12-Month Precipitation
10% 6-Month Precipitation
10% 3-Month Precipitation
10% CPC Soil Moisture Model

Western Formulation

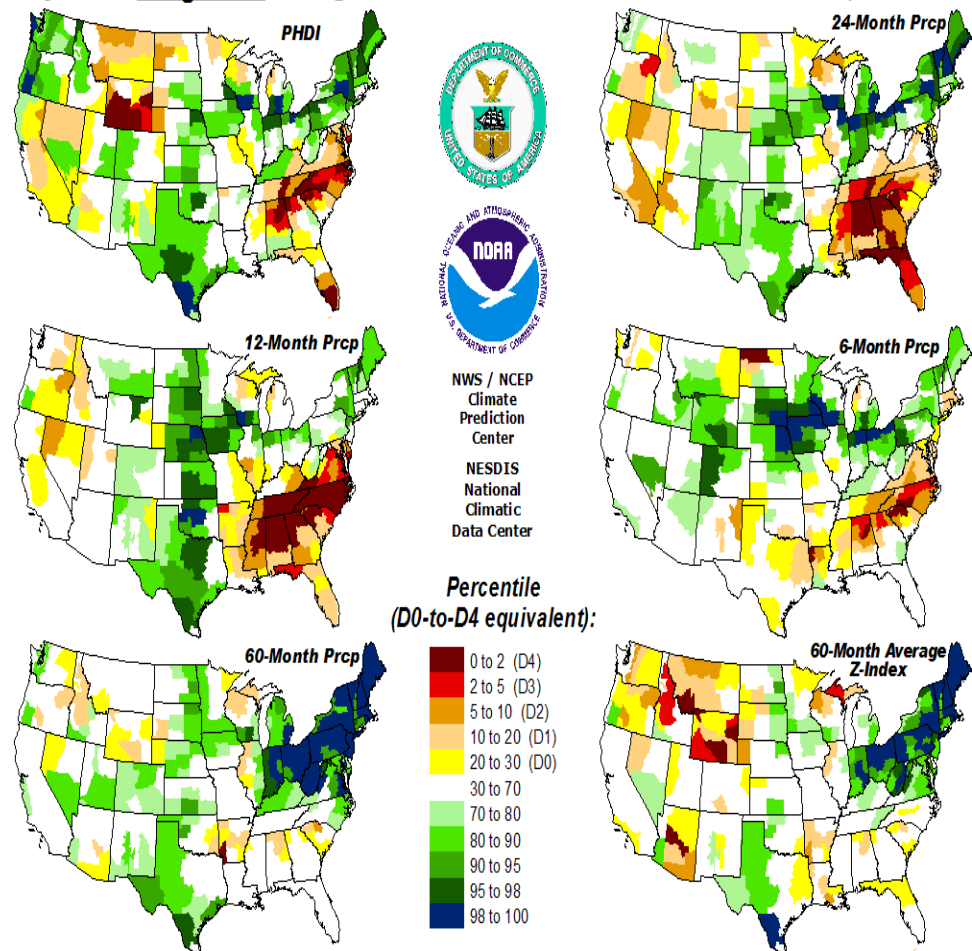
Inputs (as percentiles):
30% Palmer Hydrologic Index
30% 60-Month Average Z-Index
10% 60-Month Precipitation
10% 24-Month Precipitation
10% 12-Month Precipitation
10% CPC Soil Moisture Model

This map approximates impacts responding to precipitation over the course of several months to a few years, such as reservoir content, groundwater, and lake levels. HOWEVER, THE RELATIONSHIP BETWEEN INDICATORS AND WATER SUPPLIES CAN VARY MARKEDLY WITH LOCATION, SEASON, SOURCE, AND MANAGEMENT PRACTICE. Do not interpret this map too literally.

This map is based on preliminary climate division data. Local conditions and/or final data may differ. See the detailed product suite description for more details.

3) Temporal & Regional Drought Distinctions;

Objective **Long-Term** Drought Indicator Blend Percentiles -- January 26, 2008



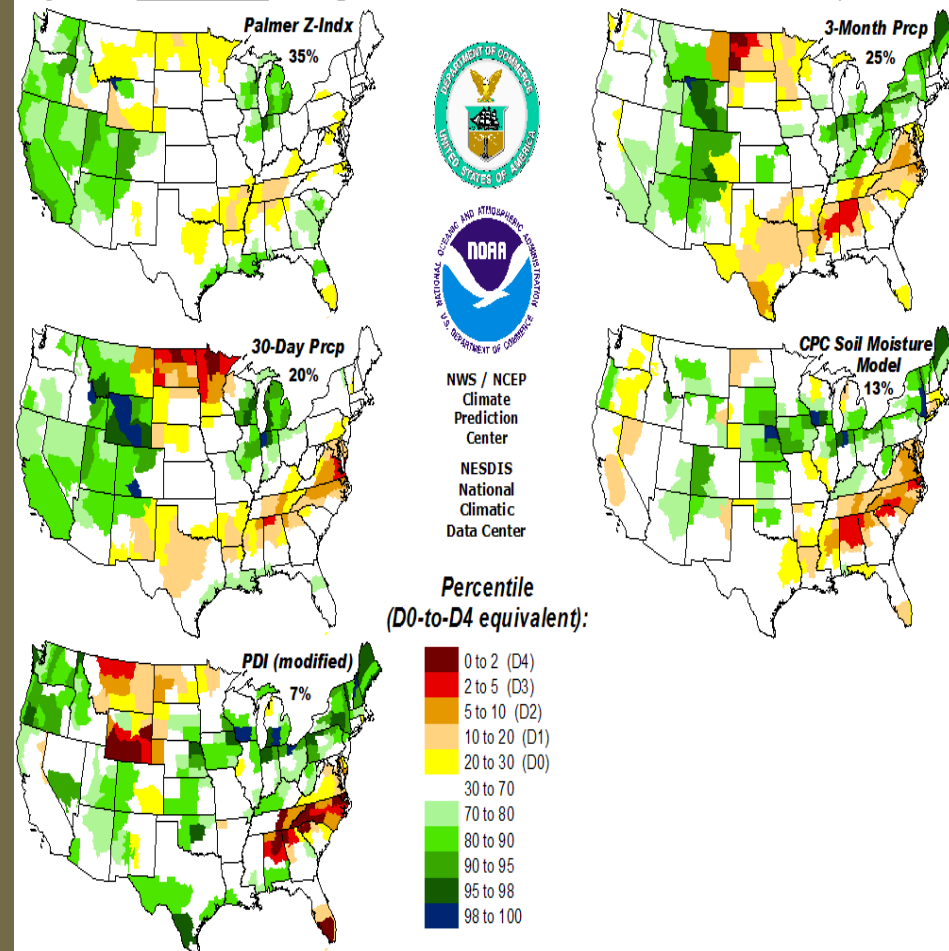
Inputs (as percentiles):

25% Palmer Hydrologic Index
20% 24-Month Precipitation
20% 12-Month Precipitation
15% 6-Month Precipitation
10% 60-Month Precipitation
10% CPC Soil Moisture Model

Western Formulation Inputs (as percentiles):

30% Palmer Hydrologic Index
30% 60-Month Average Z-Index
10% 60-Month Precipitation
10% 24-Month Precipitation
10% 12-Month Precipitation
10% CPC Soil Moisture Model

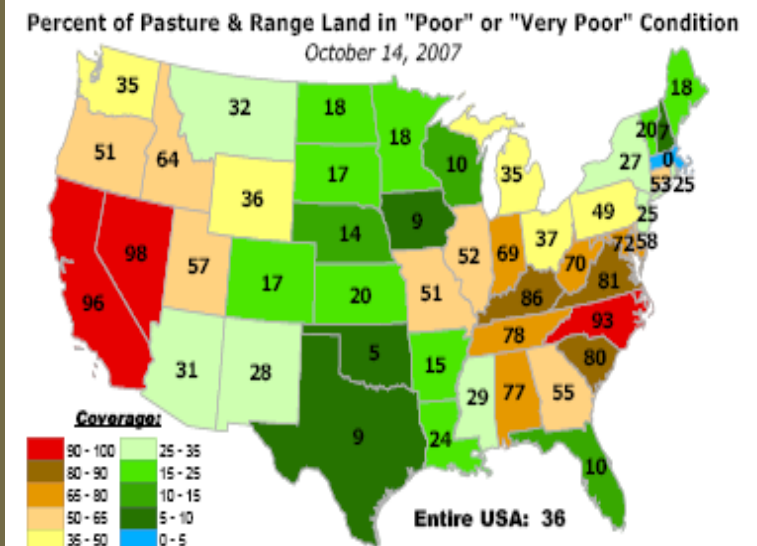
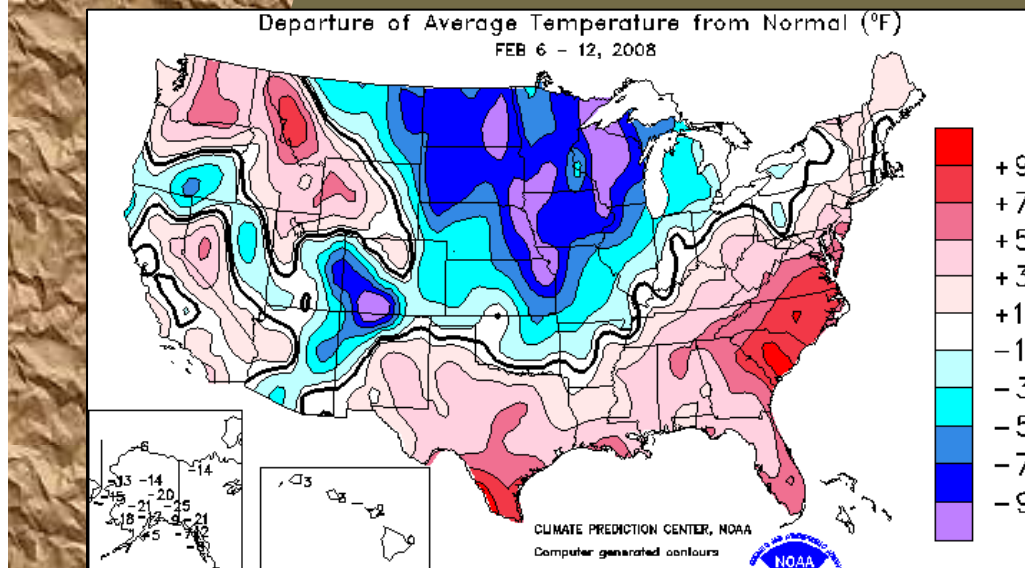
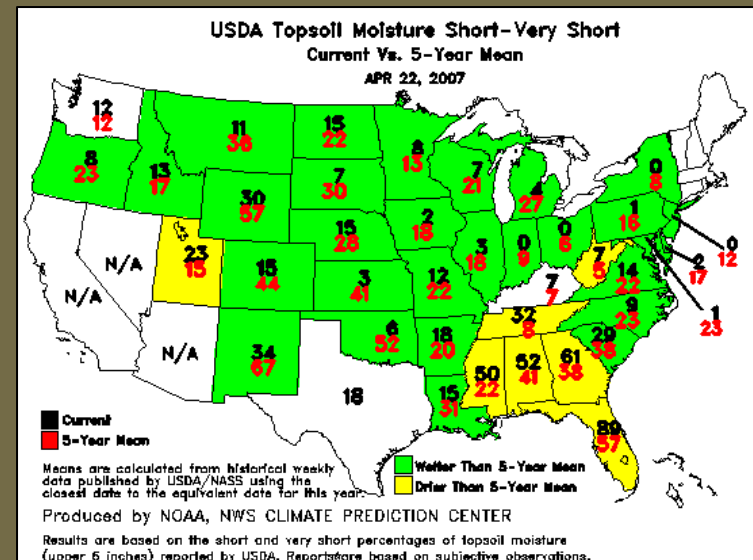
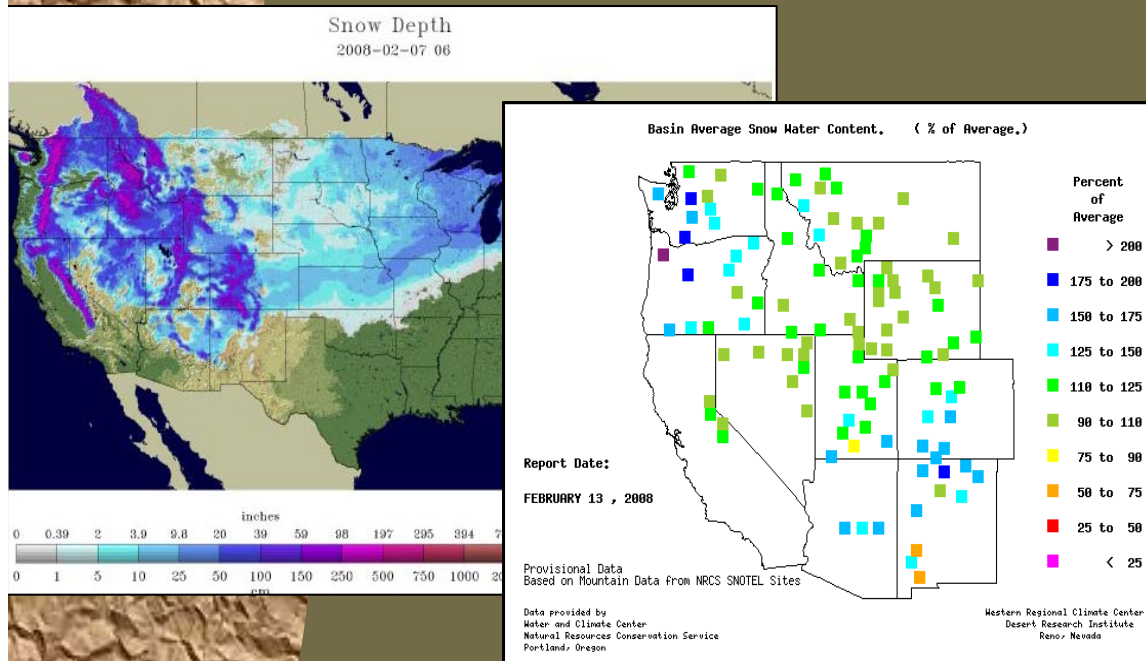
Objective **Short-Term** Drought Indicator Blend Percentiles -- January 26, 2008



Inputs (as percentiles):

35% Palmer Z-Index
25% 3-Month Precipitation
20% 1-Month Precipitation
13% CPC Soil Moisture Model
7% Palmer Drought Index

3) Temporal & Regional Drought Distinctions; Seasons ... Winter vs. Summer



3) Temporal & Regional Drought Distinctions;

West

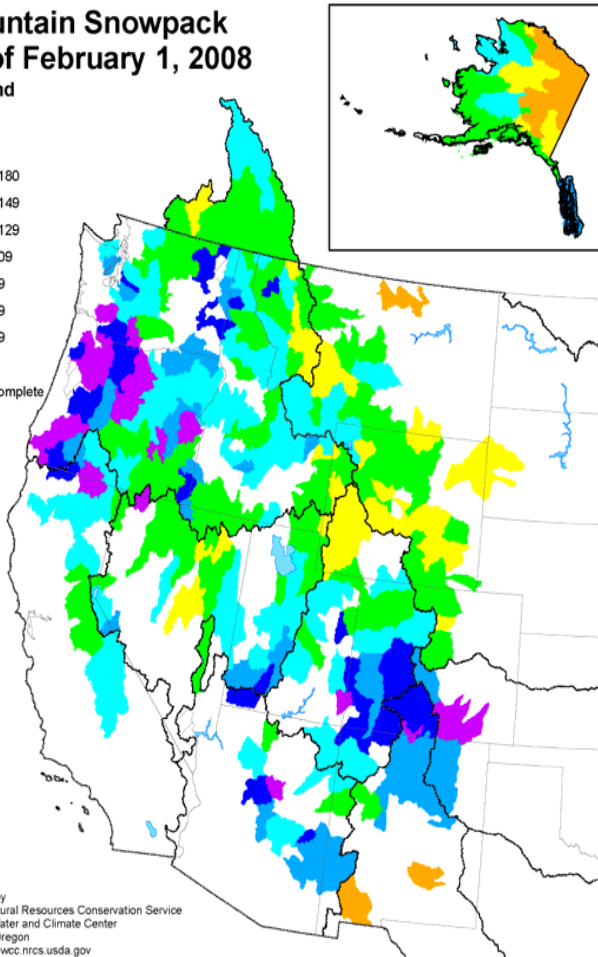
Plains

East & South

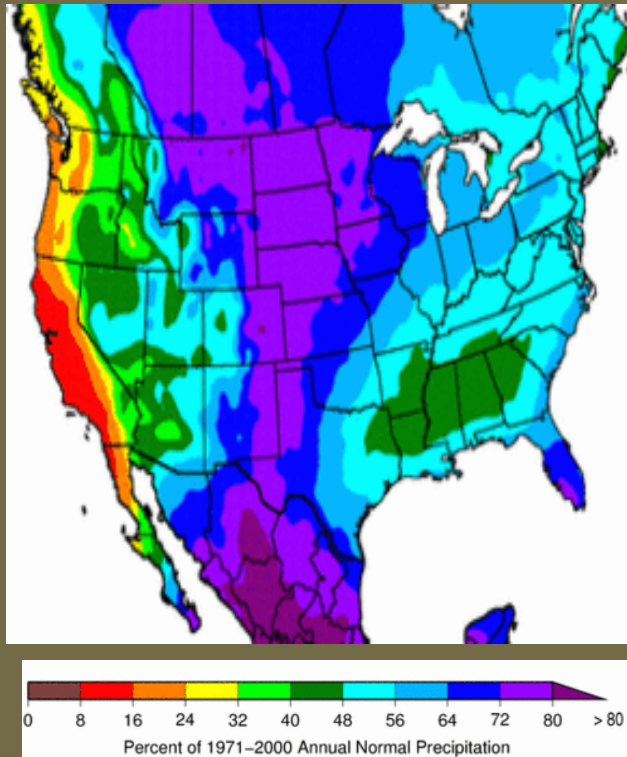
Mountain Snowpack as of February 1, 2008

Legend

percent



Winter Mountain
Snowpack

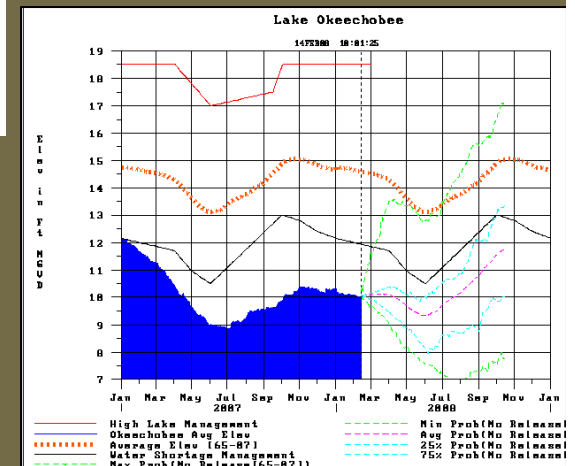
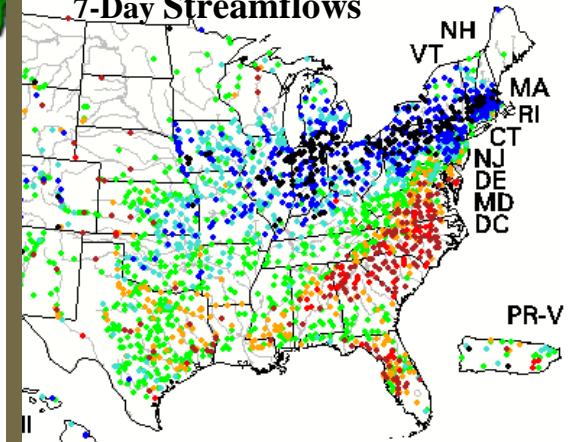


Percent of Normal Annual
Precipitation (Apr-Sep)

Spring & Summer
(Growing Season)

Wednesday, February 13, 2008

7-Day Streamflows

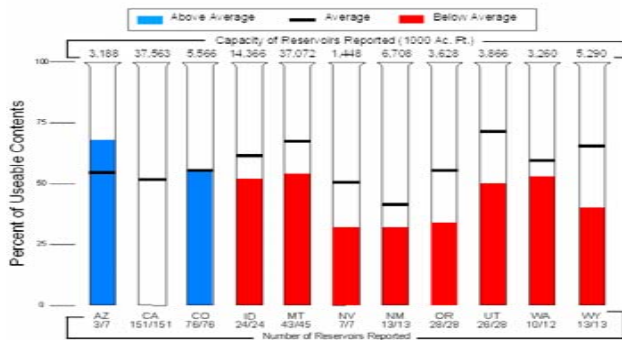


Year-Round (Even
Precip Distribution)

3) Temporal & Regional Drought Distinctions;

West

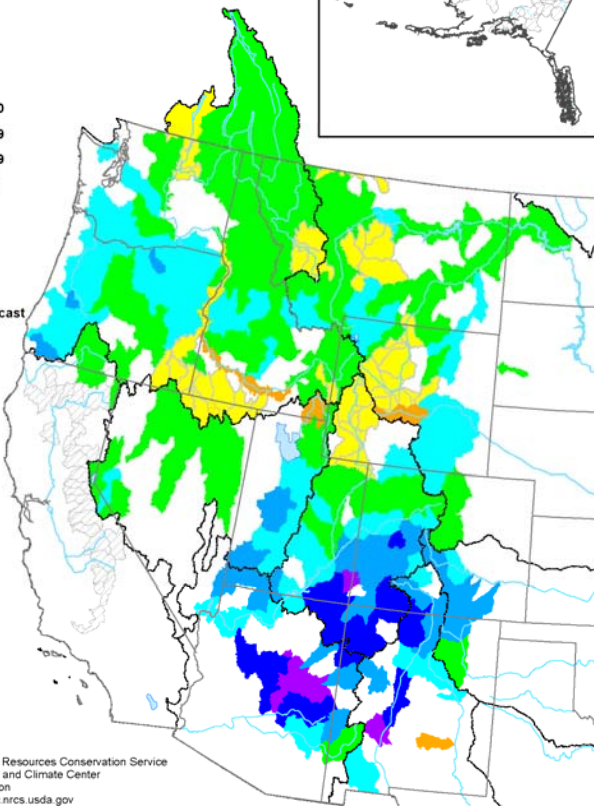
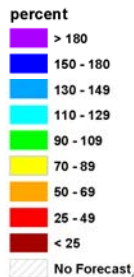
Reservoir Storage as of February 1, 2008



Prepared by: USDA, Natural Resources Conservation Service, National Water and Climate Center, Portland, OR
http://www.nrcs.usda.gov

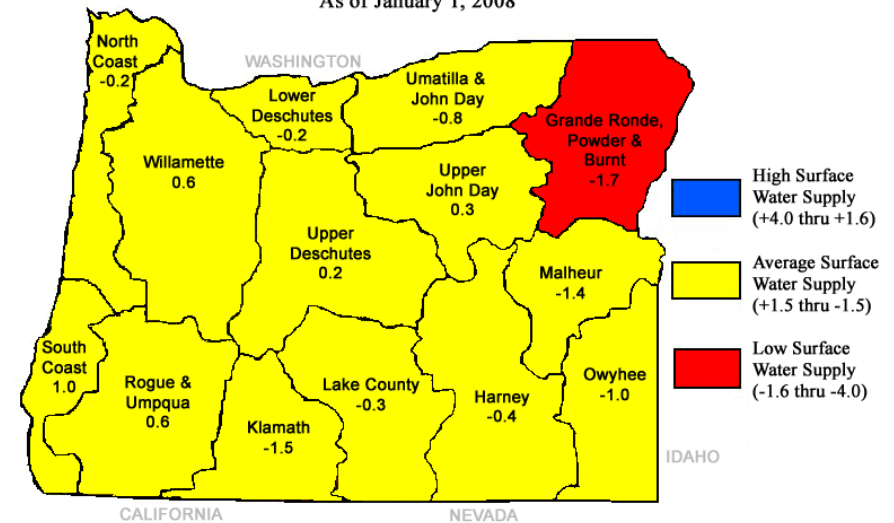
Spring and Summer Streamflow Forecasts as of February 1, 2008

Legend



Prepared by
USDA, Natural Resources Conservation Service
National Water and Climate Center
Portland, Oregon
http://www.nrcs.usda.gov

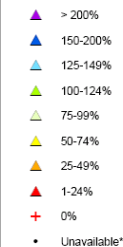
OREGON SURFACE WATER SUPPLY INDEX (SWSI)
As of January 1, 2008



Washington
SNOTEL Month to Date (MTD) Precipitation
% of Normal

Sep 30, 2007

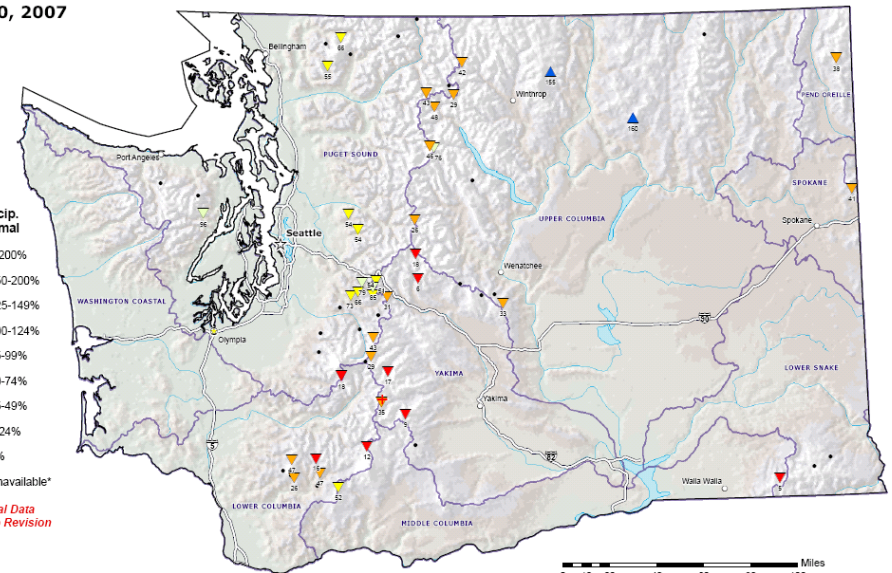
Current
MTD Precip.
% of Normal



Provisional Data
Subject to Revision



Prepared by the
USDA/NRCS National Water and Climate Center
Portland, Oregon
http://www.nrcs.usda.gov/gis/



* Data unavailable at time of posting or unavailable long-term normal

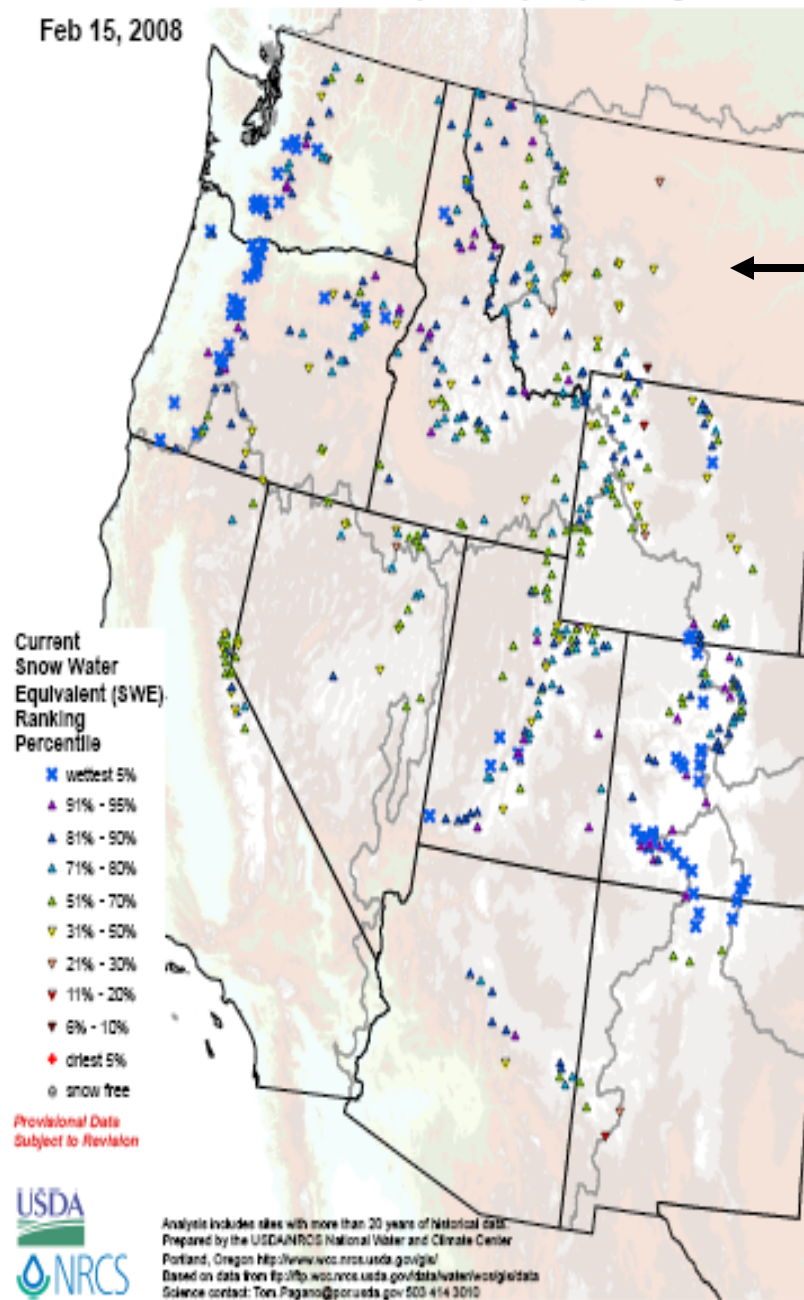
3) Temporal & Regional Drought Distinctions;

West

Snow

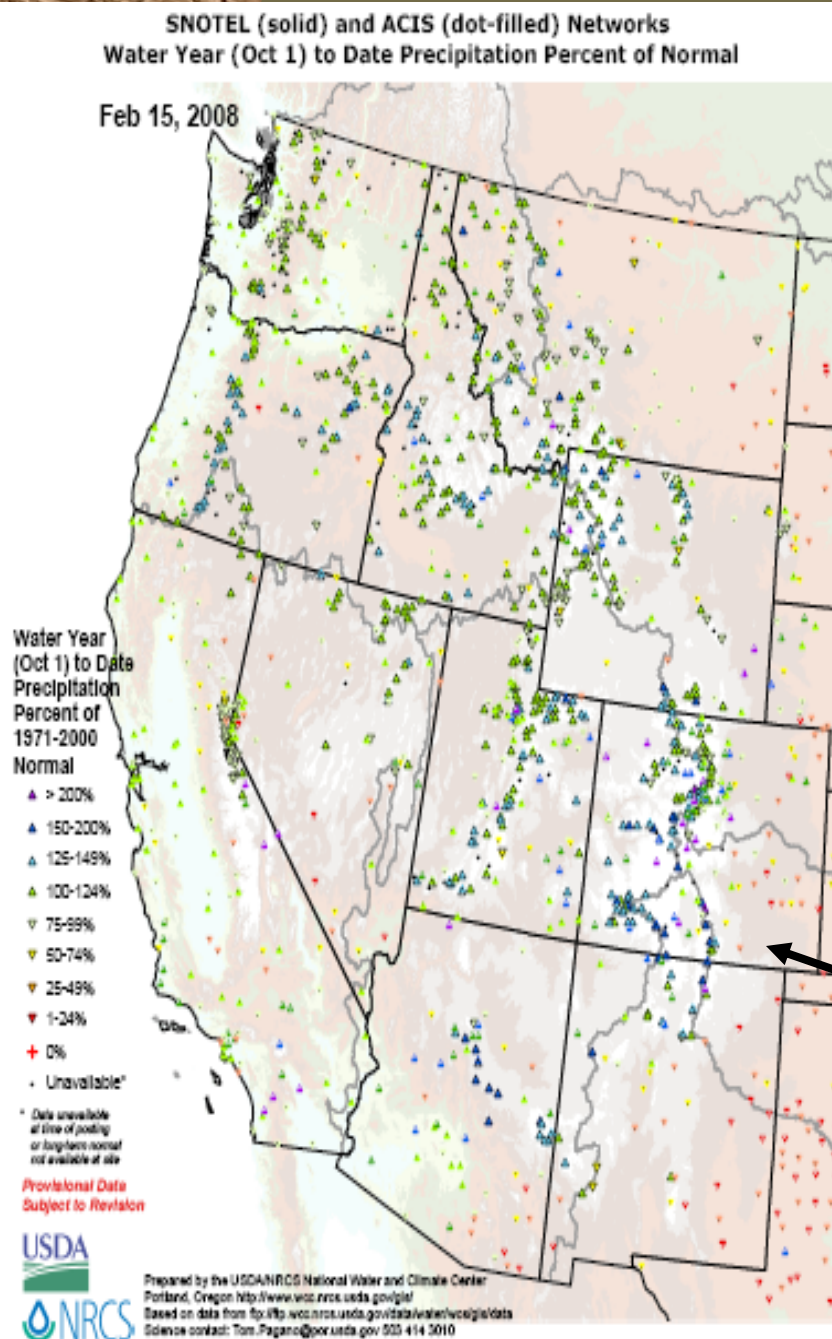
SNOTEL Current Snow Water Equivalent (SWE) Ranking Percentile

Feb 15, 2008

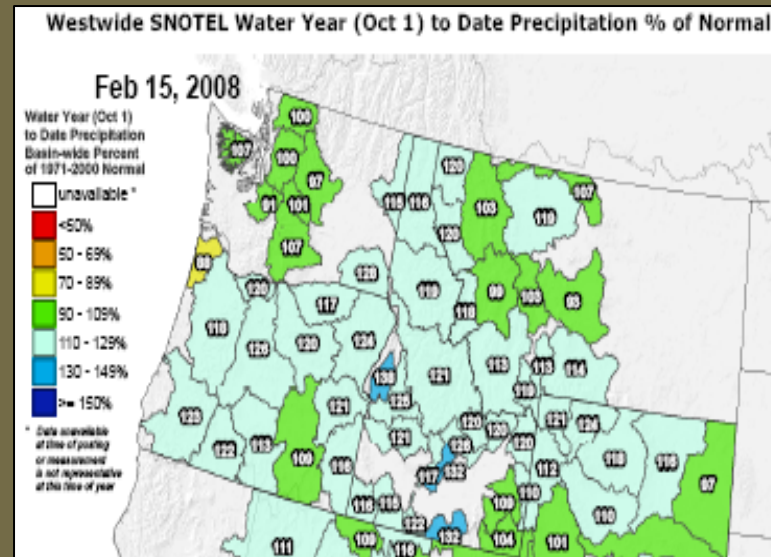


SNOTEL Snow Water Equivalent	Current	1st of Month	Change
West-wide maps	% of Normal Percentile Record % of Normal Peak	-	-
State maps NEW	% of Normal Select a State Select a State	-	-
SNOTEL & Snow Course Snow Water Equivalent		1st of Month	Change
West-wide maps	Alaska Arizona California Colorado Idaho Montana Nevada New Mexico Oregon Utah Washington Wyoming	% of Normal	-
State/basin maps		% of Normal for Alaska	-
		% of Normal by River Basin: Arkansas, Colorado and Rio Grande Columbia Great Basin and California Missouri	
SNOTEL Snow Depth	Current	1st of Month	Change
West-wide maps	Snow Depth	-	1 Day 3 Day 7 Day
State maps NEW	Snow Depth Select a State	-	-
SNOTEL Snow Density	Current	1st of Month	Change
West-wide maps	Snow Density	-	-
State maps NEW	Snow Density Select a State	-	-

3) Temporal & Regional Drought Distinctions;



West



Precipitation

GIS Products

Precipitation

ACIS + SNOTEL data

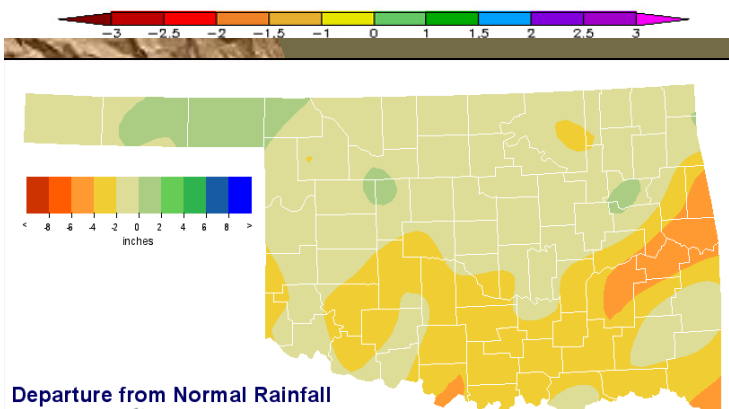
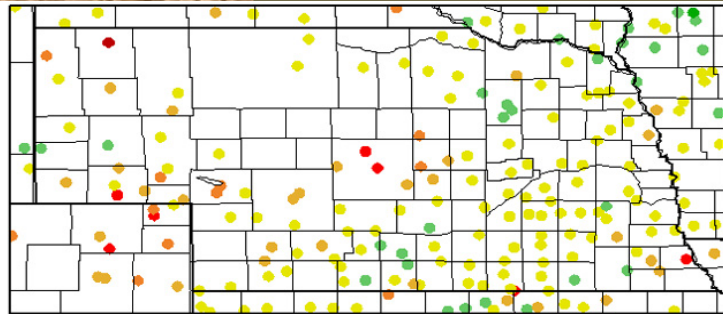
Note: Please manually reload .PDF files in internet browser to ensure you have the latest data.

SNOTEL Precipitation	Month to Date	Water Year to Date
West-wide Maps	% of Normal % of Monthly Total Normal	% of Normal % of Annual Total Normal Percentile Record
State Maps NEW	% of Normal Select a State	% of Normal Select a State
SNOTEL & ACIS Precipitation	Month to Date	Water Year to Date
West-wide Maps	% of Normal	% of Normal
PRISM Precipitation	Month to Date	Water Year to Date
U.S. Maps	Total Monthly Monthly % of Average	-

3) Temporal & Regional Drought Distinctions;

Plains

12-Month SPI
9/1/2005 - 8/31/2006

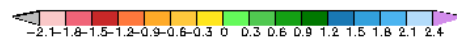
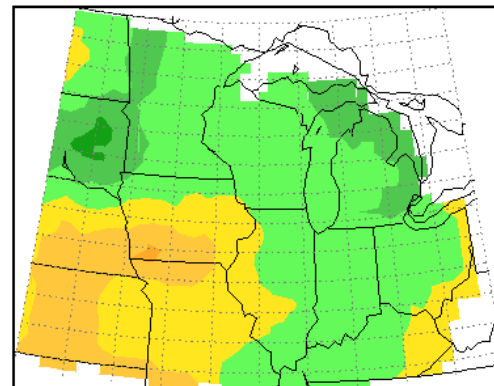


Departure from Normal Rainfall

Oklahoma Climatological Survey
Last 90 Days
Nov 16, 2007 through Feb 13, 2008
Copyright (c) 2008 Oklahoma Climatological Survey. All rights reserved. Rainfall data collected by Oklahoma Mesonet.

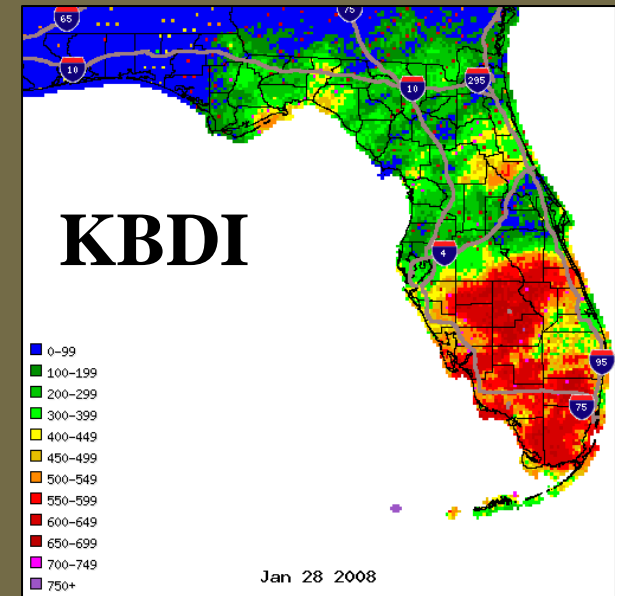
Midwest

Current Soil Moisture Deviation (inches), Depth = 0-12
2-21-2008



Midwestern Regional Climate Center
Illinois State Water Survey
Champaign, Illinois

East & South



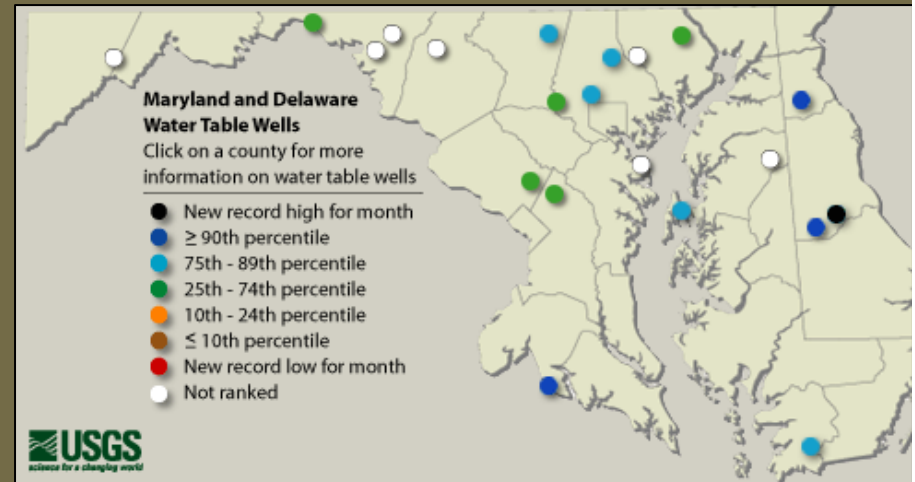
KBDI

0-99
100-199
200-299
300-399
400-449
450-499
500-549
550-599
600-649
650-699
700-749
750+

Jan 28 2008

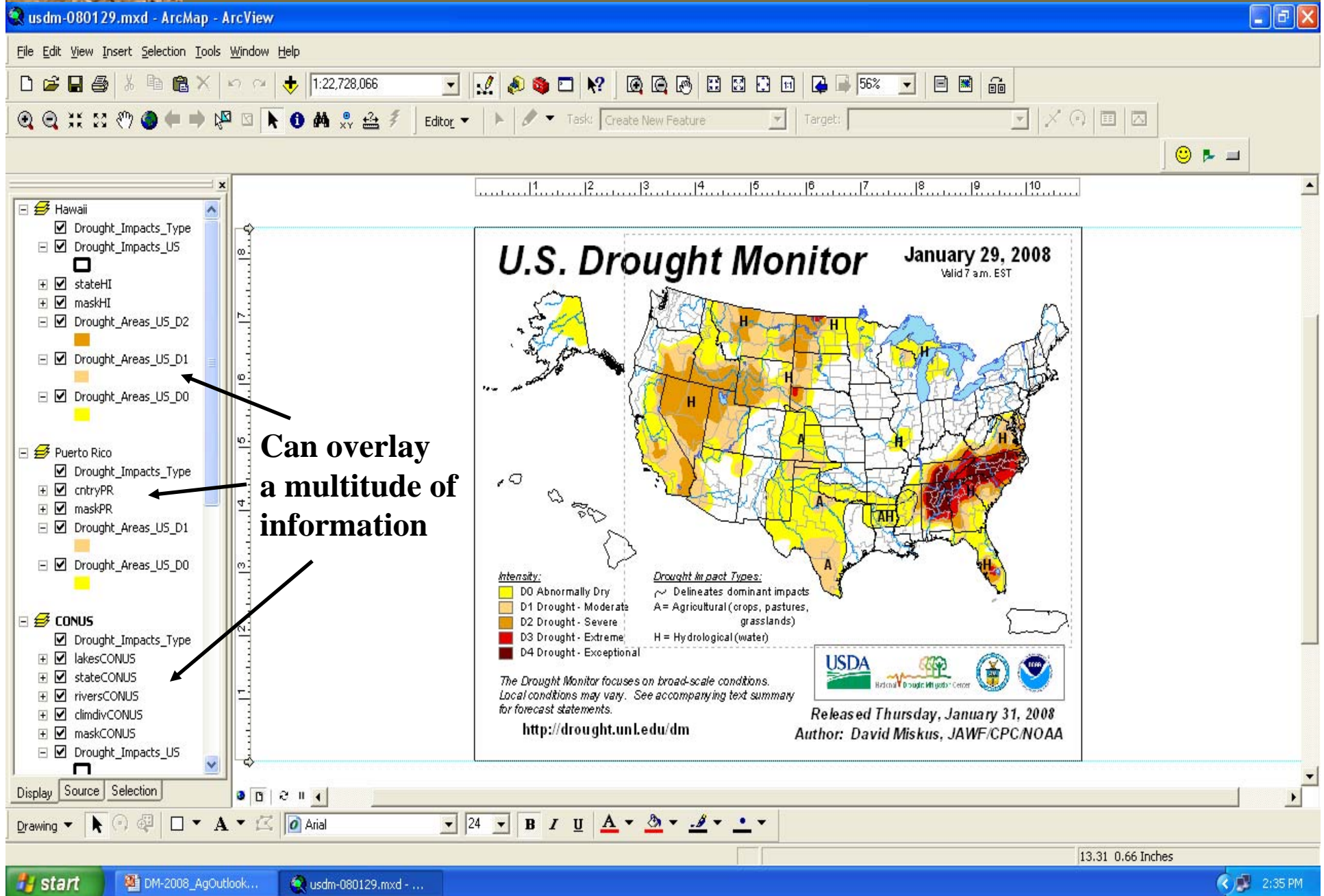
30-Day Precip for Texas Jan 15, 2008 through Feb 13, 2008

Climate Division	Total Rainfall	Departure from Normal	Pct of Normal	Driest since	Wettest since	Rank of 55 such periods	Driest on Record	Wettest on Record	30-day SPI (Amdt Score)	Most Like
Texas Statewide	1.25"	-0.37"	77 %	2003 (0.71")	2006 (1.78")	12th driest D4	0.42" (1943)	4.74" (1992)	-0.70 D0	1929 (9.38)
TX-CD1 (High Plains)	0.06"	-0.52"	11 %	1942 (0.04")	2006 (0.25")	2nd driest D8	0.04" (1942)	2.57" (1968)	-1.93 D3	1942 (9.77)
TX-CD2 (Low Rolling Plains)	0.09"	-0.93"	9 %	-- 2006 (1.61")		1st driest D4	0.24" (1963)	4.76" (1990)	-2.96 D4	1988 (9.16)
TX-CD3 (N. Central)	1.15"	-0.91"	56 %	2003 (0.82")	2006 (3.07")	9th driest D1	0.54" (1988)	6.20" (1990)	-1.24 D1	1967 (9.52)
TX-CD4 (East Texas)	3.46"	-0.25"	93 %	2003 (1.45")	2006 (4.96")	19th wettest	0.62" (1943)	7.43" (2004)	+0.49	1966 (9.15)
TX-CD5 (Trans Pecos)	0.29"	-0.17"	63 %	1996 (0.24")	2006 (0.90")	4th driest D5	0.14" (1943)	3.96" (1992)	-1.64 D3	1962 (9.86)
TX-CD6 (Edwards Plateau)	0.32"	-0.84"	28 %	1996 (0.23")	2006 (1.48")	2nd driest D8	0.23" (1996)	6.23" (1992)	-2.20 D4	1943 (9.54)
TX-CD7 (S. Central)	2.06"	-0.16"	93 %	2006 (1.02")	2005 (2.94")	25th wettest	0.29" (1996)	7.14" (1992)	+0.13	1930 (9.27)
TX-CD8 (Upper Coast)	6.29"	+2.69"	175 %	2006 (2.40")	2004 (6.69")	3rd wettest	0.69" (1999)	8.20" (1992)	+1.75	1980 (8.22)
TX-CD9 (South)	0.92"	-0.26"	78 %	2006 (0.20")	2005 (1.52")	22nd driest	0.04" (1996)	4.94" (1941)	-0.20	1985 (9.44)
TX-CD10 (Lower Valley)	1.90"	+0.50"	136 %	2006 (0.19")	2001 (2.00")	18th wettest	0.02" (1943)	4.40" (1988)	+0.58	1989 (8.97)



USGS
science for a changing world

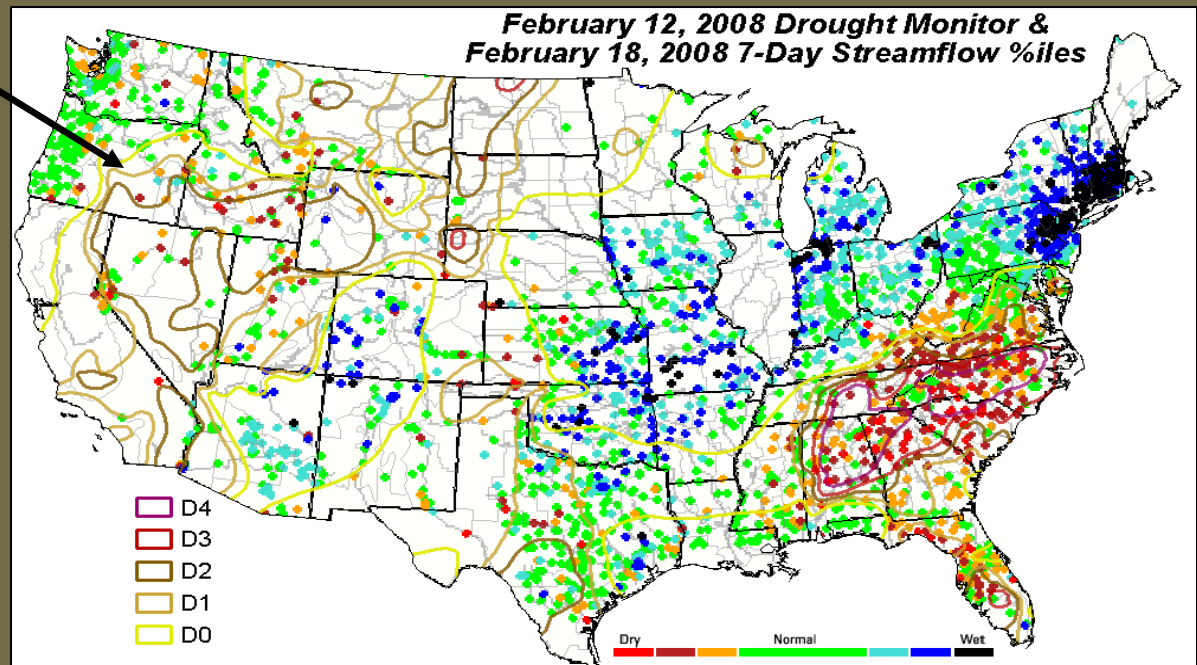
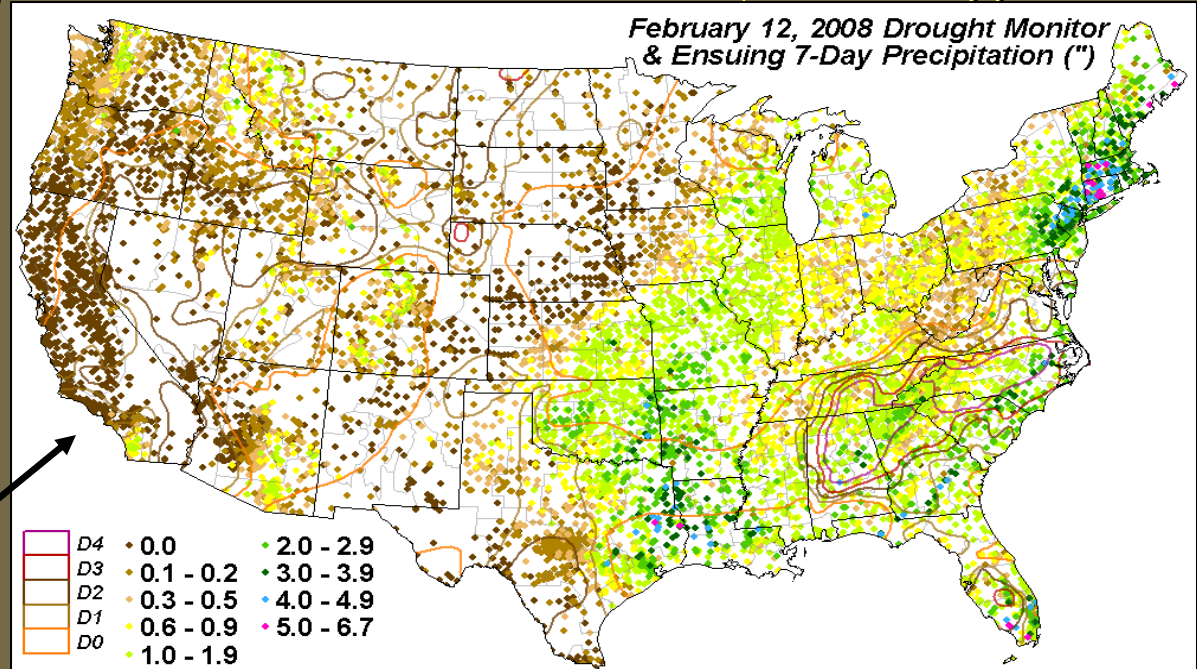
4) Utilizing State-of-the-Art Software (ArcGIS);



4) Utilizing State-of-the-Art Software (ArcGIS);

Some of our routine weekly GIS overlay products includes the past week's D0-D4 contours on the 7-day precipitation dot plot & on the 7-Day USGS stream flow percentiles

The same could be done to many of these other new USDM tools.

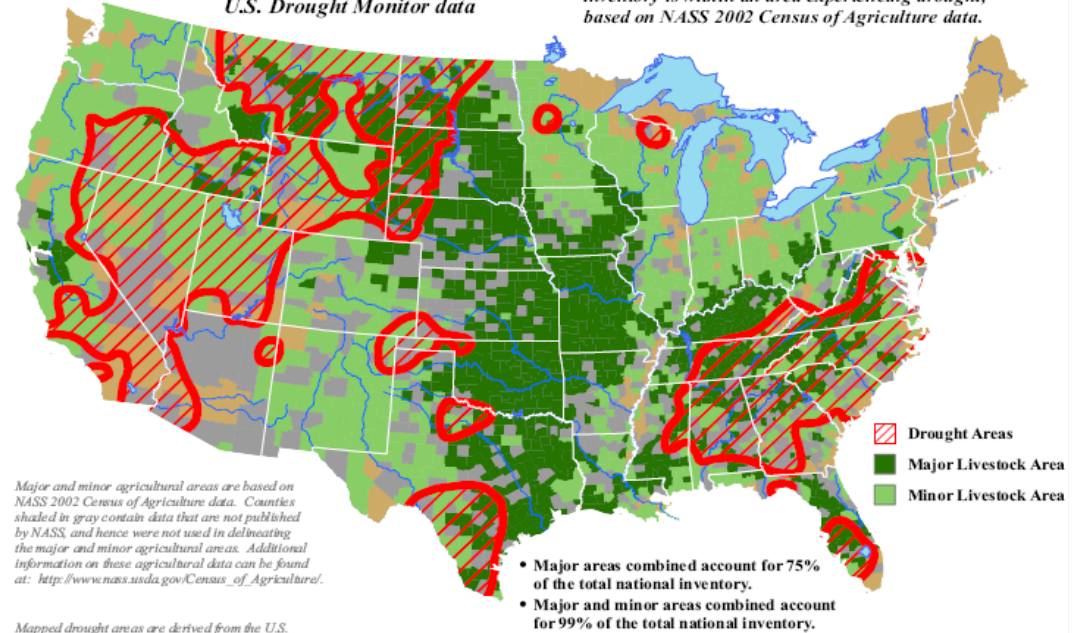


4) Utilizing the USDM with ArcGIS Applications;

U.S. Beef Cow Areas Experiencing Drought

Reflects January 29, 2008
U.S. Drought Monitor data

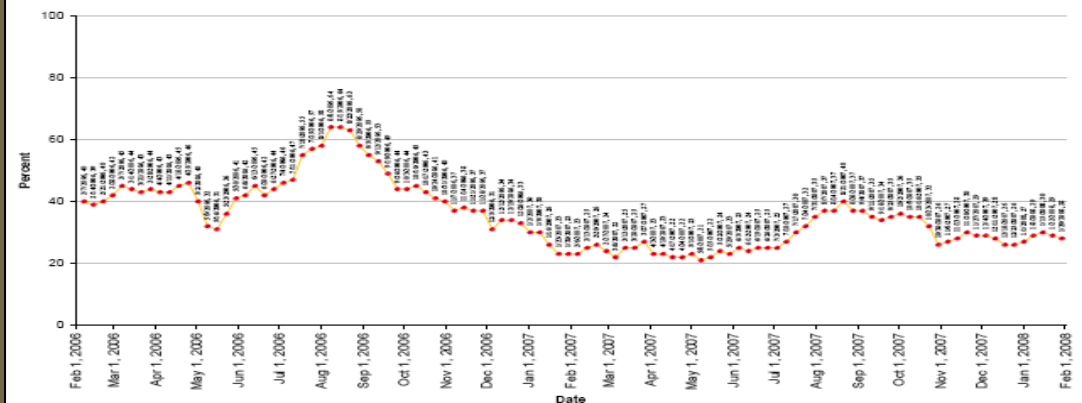
Approximately 28% of the domestic beef cow inventory is within an area experiencing drought, based on NASS 2002 Census of Agriculture data.



USDA World Agricultural Outlook Board
Joint Agricultural Weather Facility

Shapefiles of the weekly USDM where drought \geq D1 are overlaid on U.S. Beef Cow area shapefiles, and weekly statistics are made.

United States Beef Cow Areas Located in Moderate or More Intense Drought (D1+)



5) One-Stop Drought Shopping = NIDIS;

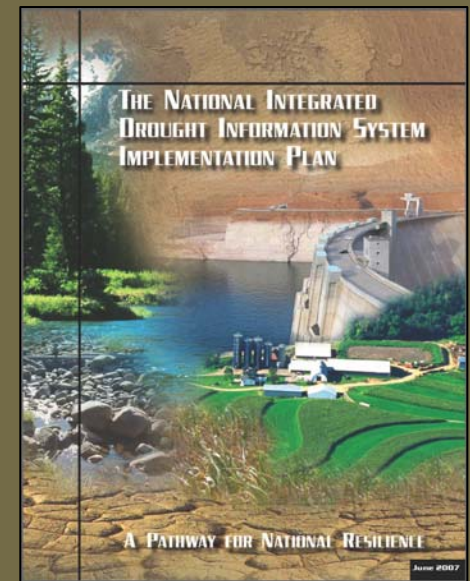
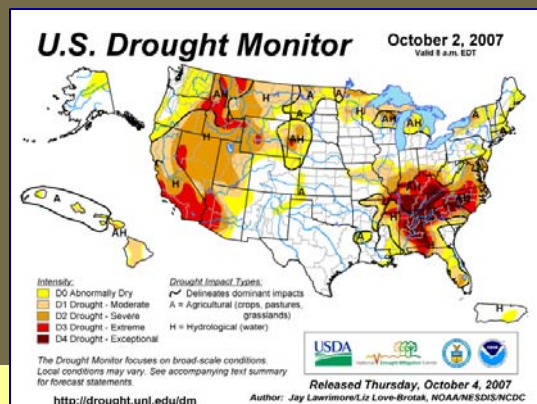
What is NIDIS?

A National Integrated Drought Information System (NIDIS)

National Integrated Drought Information System

NIDIS: An integrated, **interagency** national drought monitoring and forecasting system that provides:

- An **early warning & forecast** system for drought.
- Drought impact and causation **education**.
- Information for drought **mitigation**.
- An interactive, web-based **drought portal**.
- Improved **observational** capabilities.



NIDIS Builds Upon Collaborative Successes!

NIDIS Interagency Partners

Federal Level

U.S. Department of Agriculture (USDA): Agricultural Research Service, Cooperative State Research, Education, Farm Service Agency, Forest Service, National Agricultural Statistics Service, Natural Resources Conservation Service, Risk Management Agency

U.S. Department of Commerce (DoC): International Trade Administration, National Oceanic and Atmospheric Administration

U.S. Department of Energy (DoE): Office of Electricity Delivery and Energy Reliability, Office of Energy Efficiency & Renewable Energy, Office of Science

U.S. Department of Homeland Security (DHS): Federal Emergency Management (FEMA) Directorate

U.S. Department of the Interior (DoI): Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, National Park Service, U.S. Fish and Wildlife Service, U.S. Geological Survey,

U.S. Department of Transportation (DoT): Federal Aviation Administration, Federal Highway Administration, Surface Transportation Board

Environmental Protection Agency (EPA)

Farm Credit Administration (FCA)

Federal Energy Regulatory Commission (FERC)

Internal Revenue Services

International Trade Commission (USITC)

National Aeronautics and Space Administration (NASA)

National Science Foundation (NSF)

Small Business Administration (SBA)



NIDIS Interagency Partners

Regional, State, Tribal, and Local Levels

Western Governors' Association – a key sponsor of early NIDIS development efforts and ongoing concerns representing drought in the Western States;

Western States Water Council – represents water managers in the Western United States;

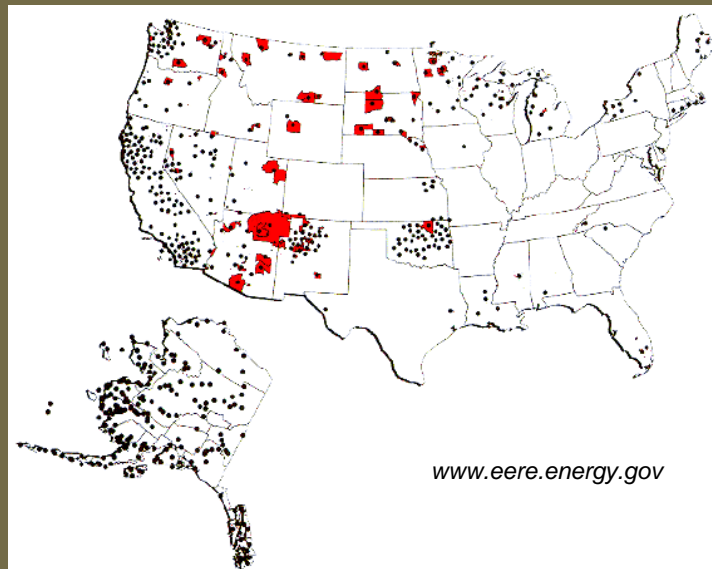
National Conference of State Legislatures – drought monitoring and mitigation activities will require state support, much of which require state legislative involvement

National League of Cities – water availability and quality issues

American Association of State Climatologists – an organization state-appointed individuals, many of whom are active participants in the Drought Monitor or serve on drought monitoring committees within their respective states. Most are housed at universities and also conduct applied climate research;

National Drought Mitigation Center – A national clearinghouse for drought-related information, research, mitigation measures, and operational home of the Drought Monitor and operational home of the Drought Monitor and Drought Impact Reporter;

Native American tribal governments – mostly located in arid regions in which water is a vital concern:



www.eere.energy.gov

5) One-Stop Drought Shopping = Drought Portal; **NIDIS – U.S. Drought Portal**

drought.gov: *A Window on Drought Information*

Why a Portal?

A Web site and services that improve the access, processing, and sharing of structured and unstructured information within and across a given “enterprise” through:



Portlets - Components of a portal web site that provide aggregated, reusable access to specific information sources or applications (e.g., remote web services, search engines). Access is standardized and reusable (using APIs [application programming interfaces]).

Web Services - Applications and utilities that allow data exchange in a highly interoperable, standardized language/vendor/platform-neutral manner. Crawlers and other content aggregation are supported.

Communities - A virtual workspace of a portal for collaboration, communication, and information dissemination/collection. Communities contain portlets and projects.

Projects - Workspaces within a community that involves subsets of Portal membership. Projects contain portlets and can be part of one or more communities, facilitating collaboration via overviews, discussions, and document/project management.

Wildberry Client Review - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites RSS Mail Print W Go Go Links Settings

Address http://www.wildberrygroup.com/Client/NIDIS/web_mockup_rd4_2.html

Google EROS Go Bookmarks 200 blocked Check AutoLink AutoFill Send to EROS Settings

Search Web Mail My Yahoo! Fantasy Sports Football Games Music Answers Personals

NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM **DROUGHT.GOV**

Search: Everywhere

What is NIDIS 1. Current Drought Drought-Related Facts 2. Impacts Planning Educational Resources 3. Drought-Related Research Contact Us Log In

Current Drought

U.S. Drought Monitor August 28, 2007

Where are Drought Conditions Now?

The U.S. Drought Monitor integrates many types of data into a single map each week. It shows drought's location and intensity. Drought trackers look at climate and water data, satellite imagery, and reported impacts. Local resource managers establish their own criteria for stages of drought.

Impacts

How is the Drought Affecting Me?

Drought affects many activities, like agriculture, water supply and quality, energy, tourism, ecosystems, and communities. The Drought Impact Reporter compiles accounts from different sources, such as media, extension agents, the National Weather Service, and agricultural producers.

Forecast

U.S. Seasonal Drought Outlook
Drought Forecasts During the 2007-2008 Season
Released August 16, 2007

Will the Drought Continue?

Forecasting drought in the continental United States is still highly experimental. The U.S. Seasonal Drought Outlook is released each month, looking three months ahead. The Drought Outlook identifies areas where forecasters expect drought to appear, continue, get better or get worse.

What's New

The U.S. Drought Monitor provides comprehensive information on drought in 2004 and enacted...

More about NIDIS

The NIDIS Implementation Plan, published in June 2007, provides a detailed overview of the NIDIS initiative (pdf version).

Administration: (July 17, 2007)
2007 Starts Warmer, Drier Than Average for Much of U.S., Global Average

Showcase Portlets:

- 1.) U.S. Drought Monitor (NOAA, USDA, NDMC)
- 2.) Drought Impacts Reporter (NDMC)
- 3.) Climate Prediction Center Seasonal Drought Outlook (NOAA)

Done Internet

U.S. Drought Portal Home Page

Showcase Portlets and Key Themes

Wildberry Client Review - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Reload Print Mail News RSS Feeds

Address http://www.wildberrygroup.com/Client/NIDIS/web_mockup_rd4_2.html Go Links

Google EROS Search Web 200 blocked Check AutoLink AutoFill Send to EROS Settings

Y! Search Web Mail My Yahoo! Fantasy Sports Football Games Music Answers Personals

NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM DROUGHT.GOV

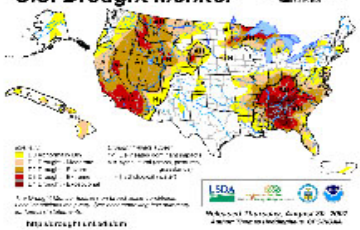
1 2 3 4 5 6

Search: Everywhere

What is NIDIS? Current Drought Drought-Related Forecasts Impacts Planning Educational Resources Drought-Related Research Contact Us Log In

Current Drought

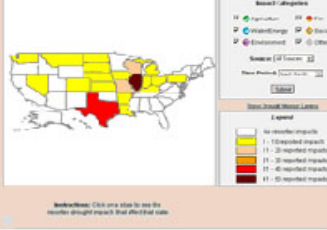
U.S. Drought Monitor August 28, 2007



Where are Drought Conditions Now?

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Impacts

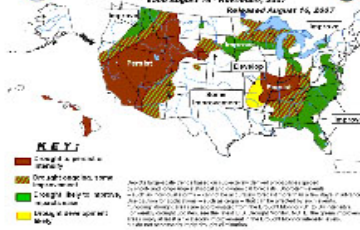


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What's New

The U.S. Drought Portal was officially launched on November 1, 2007. It was created to provide comprehensive information on emerging and ongoing droughts, and to enhance the nation's drought preparedness. The Drought Portal is part of the National Integrated Drought Information System (NIDIS), which was recommended by the Western Governors Association in 2004 and enacted into law in 2006.

[More about NIDIS...](#)

The NIDIS Implementation Plan, published in June 2007, provides a detailed overview of the NIDIS initiative (pdf version).

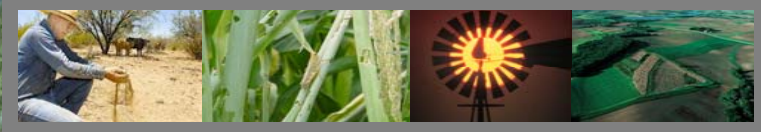

Media Resources

National Oceanic and Atmospheric Administration: (August 15, 2007)
Record Warmth in Western U.S. in July, Drought Severity Worsened, Global Temperature 7th Warmest for July... ([view article](#))

National Oceanic and Atmospheric Administration: (July 17, 2007)
2007 Starts Warmer, Drier Than Average for Much of U.S., Global Average

U.S. Drought Portal Key Theme Example

Current Drought




NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

Search Site: Everywhere

What is NIDIS? **Current Drought** Drought-Related Forecasts Impacts Planning Educational Resources Drought-Related Research

Supporting Data and Information

(Expand all / Collapse all)

-  **Drought Indices**
-  **Hydrological Monitoring**
-  **Remote Sensing**
-  **Wildfire**
-  **Paleo-Climatic Data**
-  **Local, State and Regional**
-  **Water Quality**
-  **Map Viewer**

What areas are in drought now?

U.S. Drought Monitor September 11, 2007
Version 3.0



U.S. Drought Monitor blending numeric measures of drought and experts' observations into a single map every Wednesday. It was started in 1999 as a federal and academic partnership out of a Western Governors' Association initiative to better understand and respond to drought for policy making.

The U.S. Drought Monitor is produced by a group of authors from the U.S. Department of Agriculture, National Oceanic and Atmospheric Administration, and the Drought Mitigation Center. It incorporates review from 250 climatologists, hydrologists, and others across the country.

Each week the author revises the previous map based on rain, snow and other events, and reports of how drought is affecting crops, wildlife and other indicators. Authors balance data and reports to come up with a new map every Wednesday afternoon. It is released the following Thursday morning.

Released Thursday, September 13, 2007
Author: Rich Tinker, Climate Prediction Center, NOAA

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

Visit the US Drought Monitor for the current drought conditions...

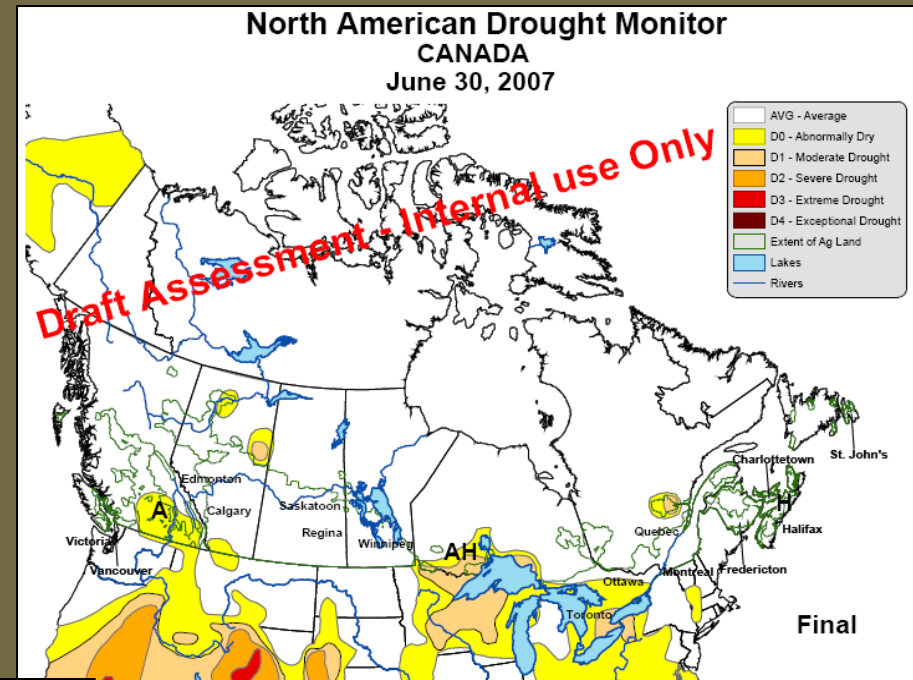
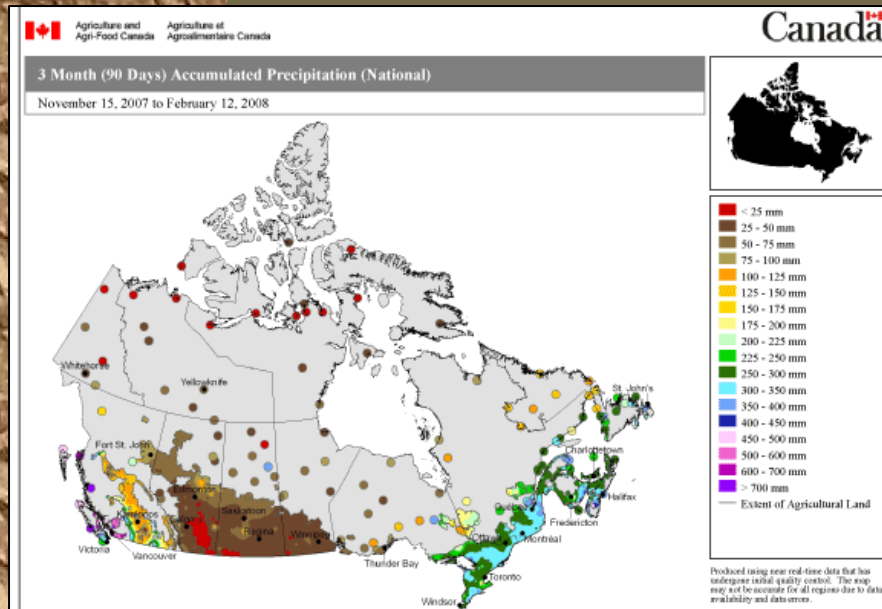
North American Drought Monitor July 31, 2007
Version 2.0



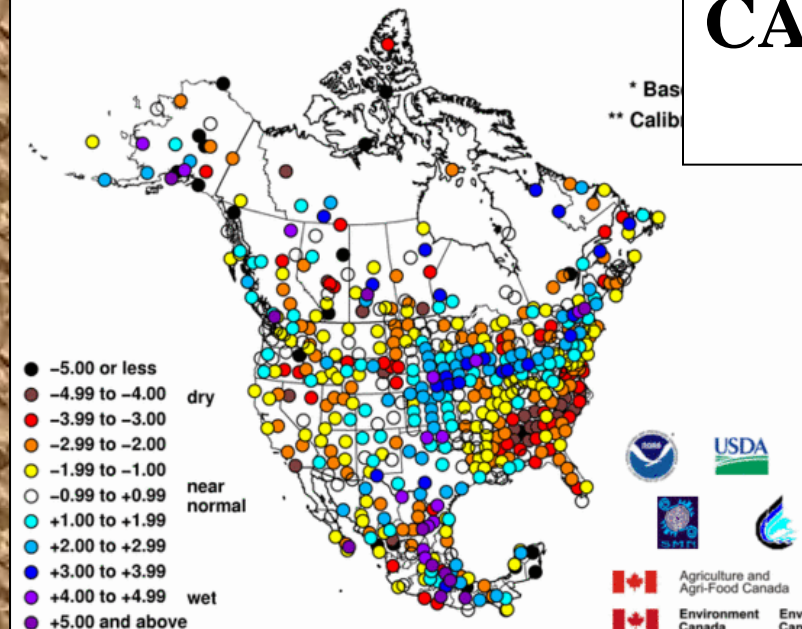
North American Drought Monitor is a monthly monitoring map for the entire continent that has been produced in cooperation with Canada and Mexico since 2003.

Plenty of related
info to view

6) Expanding Drought Monitoring Beyond the U.S.;



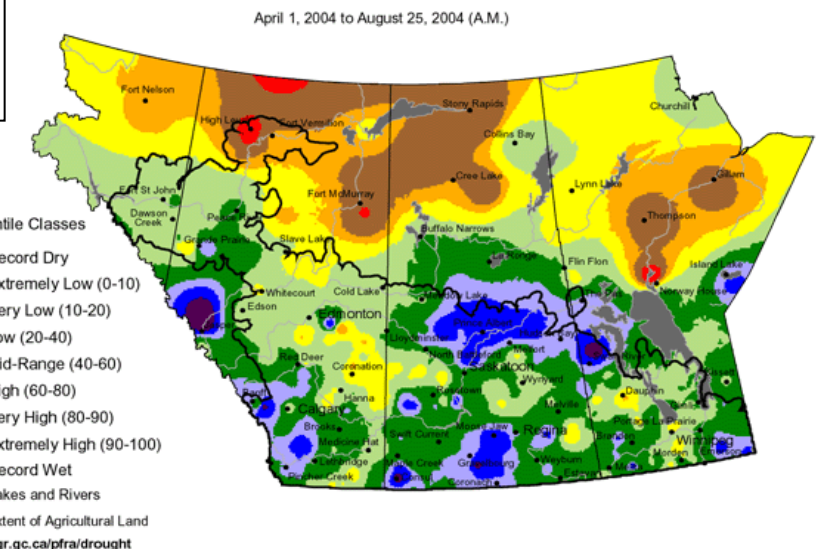
Palmer Hydrological Drought Index
January 2008



CANADA

+

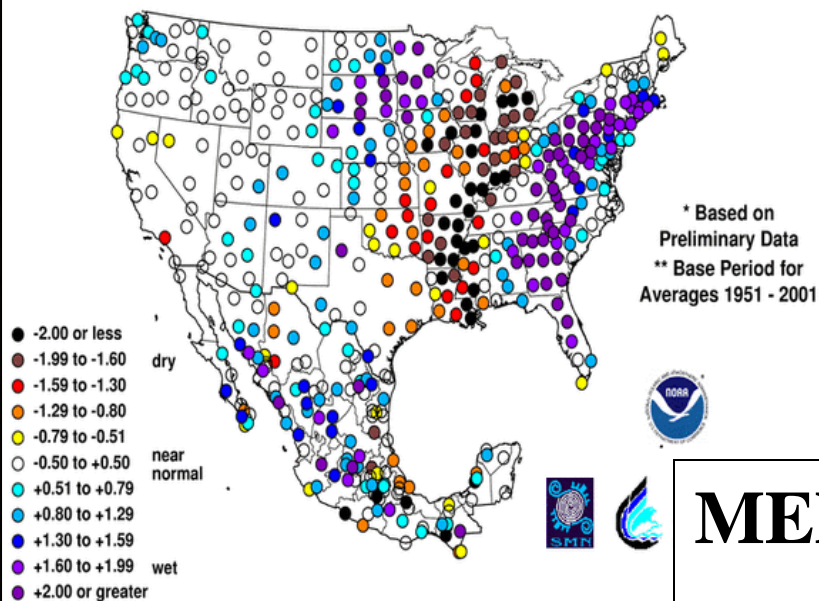
Current Precipitation Compared to Historical Distribution



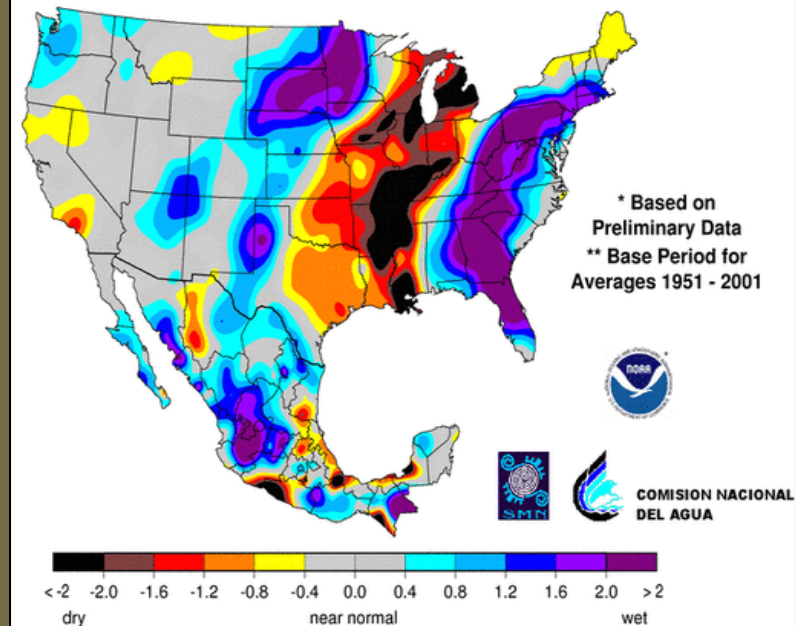
Prepared by Agriculture and Agri-Food Canada (PFRA) using data from the Timely Climate Monitoring Network and the many federal and provincial agencies and volunteers that support it.

6) Expanding Drought Monitoring Beyond the U.S.;

1-Month Standardized Precipitation Index
September 2004



1-Month Standardized Precipitation Index
September 2004

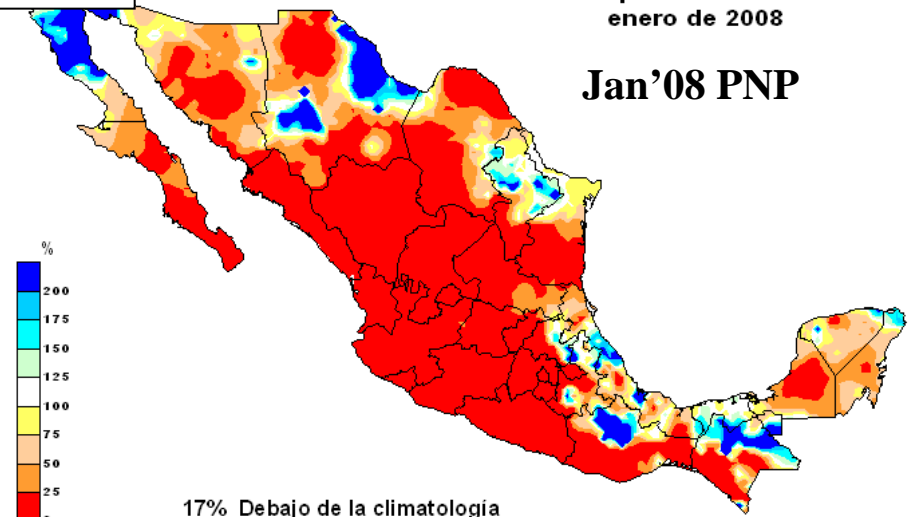


MEXICO

+

Anomalia porcentual de la lluvia
enero de 2008

Jan'08 PNP



Analysis by Mexico

United States

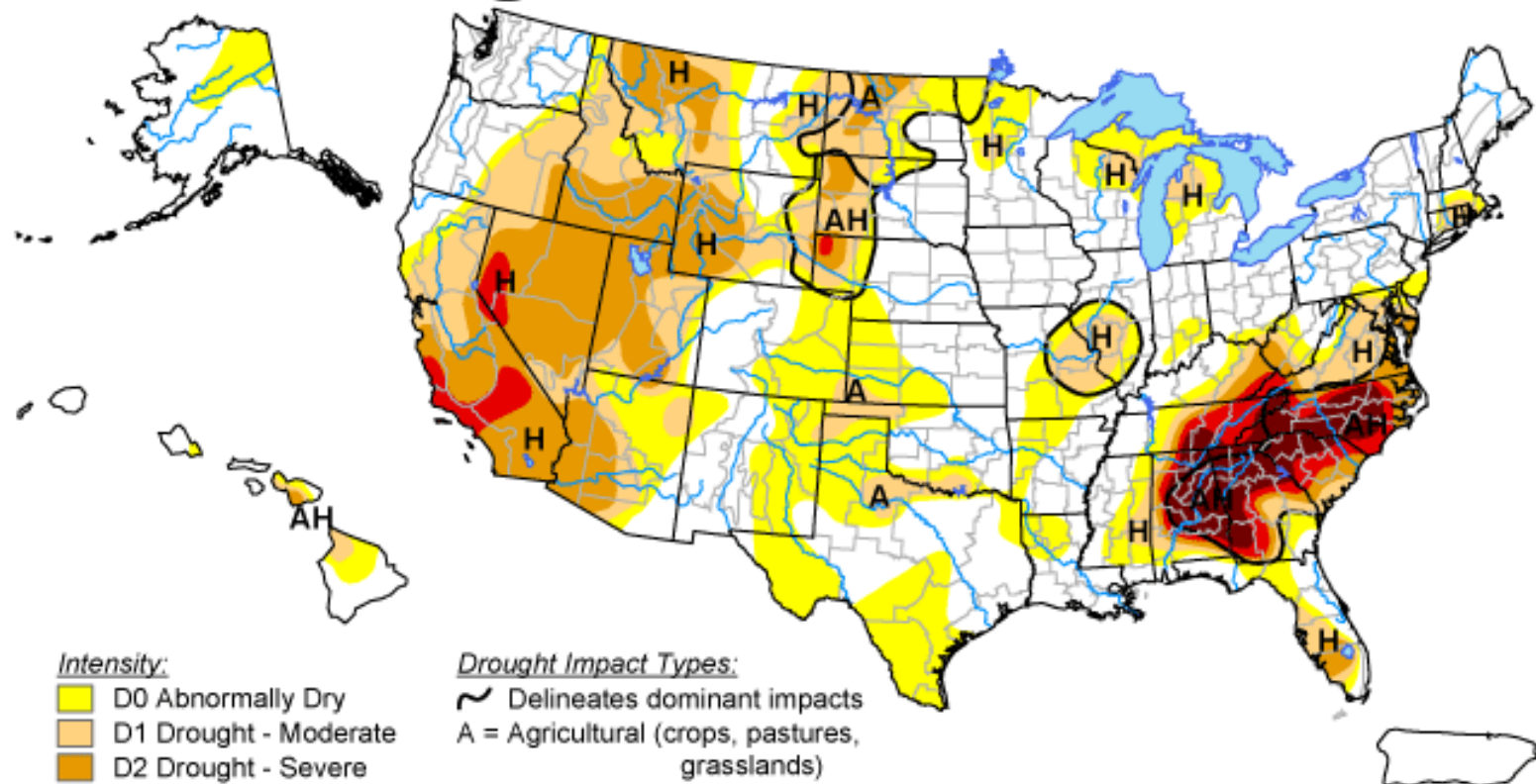
=

(USDM: end of month
or start of next month)

U.S. Drought Monitor

December 4, 2007

Valid 7 a.m. EST



Intensity:

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

Drought Impact Types:

- Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

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, December 6, 2007
Author: Brad Rippey, U.S. Department of Agriculture

North American Drought Monitor

December 31, 2007

Released: Wednesday, January 16, 2008

<http://www.ncdc.noaa.gov/nadm.html>

Analysts:

Canada - Trevor Hadwen

Dwayne Chobanik

Mexico - Valentina Davydova

Adelina Albanil

Elvia Delgado

Fernando Romero






U.S.A. - Richard Heim

Jay Lawrimore*


Liz Love-Brotak

(* Responsible for collecting analysts' input & assembling the NA-DM map)

Intensity:

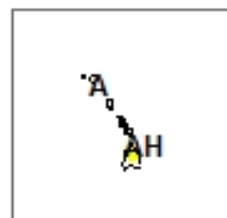
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-  D4 Drought - Exceptional

Drought Impact Types:

 Delineates dominant impacts

A = Agriculture

H = Hydrological (Water)



Available in
English

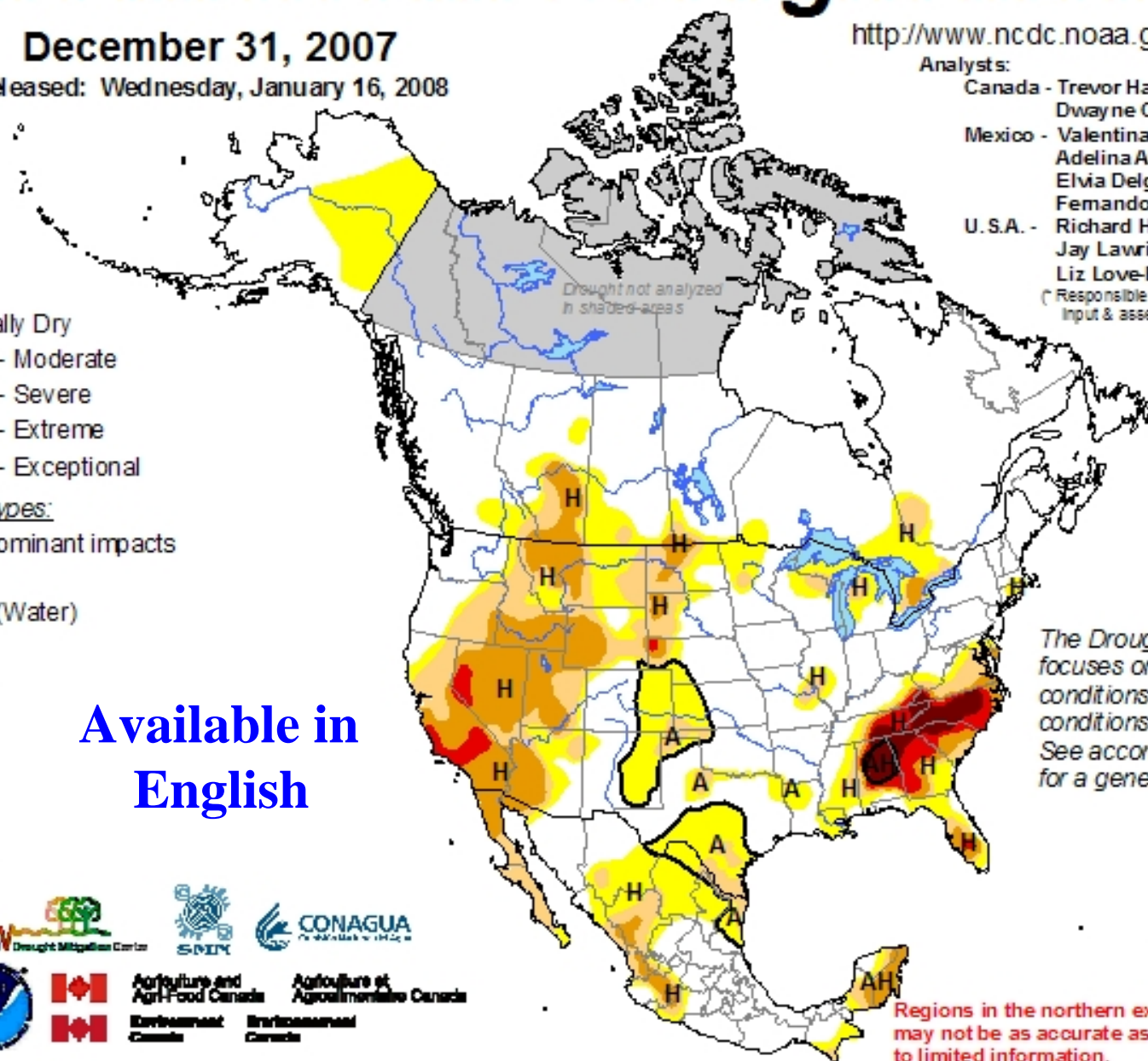


Agriculture and
Agri-Food Canada

Environment
Canada

Agriculture et
Agroalimentaire Canada

Environnement
Canada



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



Regions in the northern extremes of Canada may not be as accurate as other regions due to limited information.

Monitor de Sequía de América del Norte

Diciembre 31, 2007

Liberado: Miércoles, 16 de Enero de 2008






<http://www.ncdc.noaa.gov/nadm.html>

Analysts:

Canada - Trevor Hadwen
Dwayne Chobanik
Mexico - Valentina Davydova
Adelina Albanil
Elvia Delgado
Fernando Romero
U.S.A. - Richard Heim
Jay Lawrimore*
Liz Love-Brotak

* Responsable de la Integración del mapa

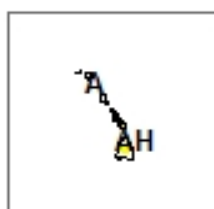
Intensidad de la Sequía:

-  D0 Anormalmente Seco
-  D1 Sequía - Moderada
-  D2 Sequía - Severa
-  D3 Sequía - Extrema
-  D4 Sequía - Excepcional

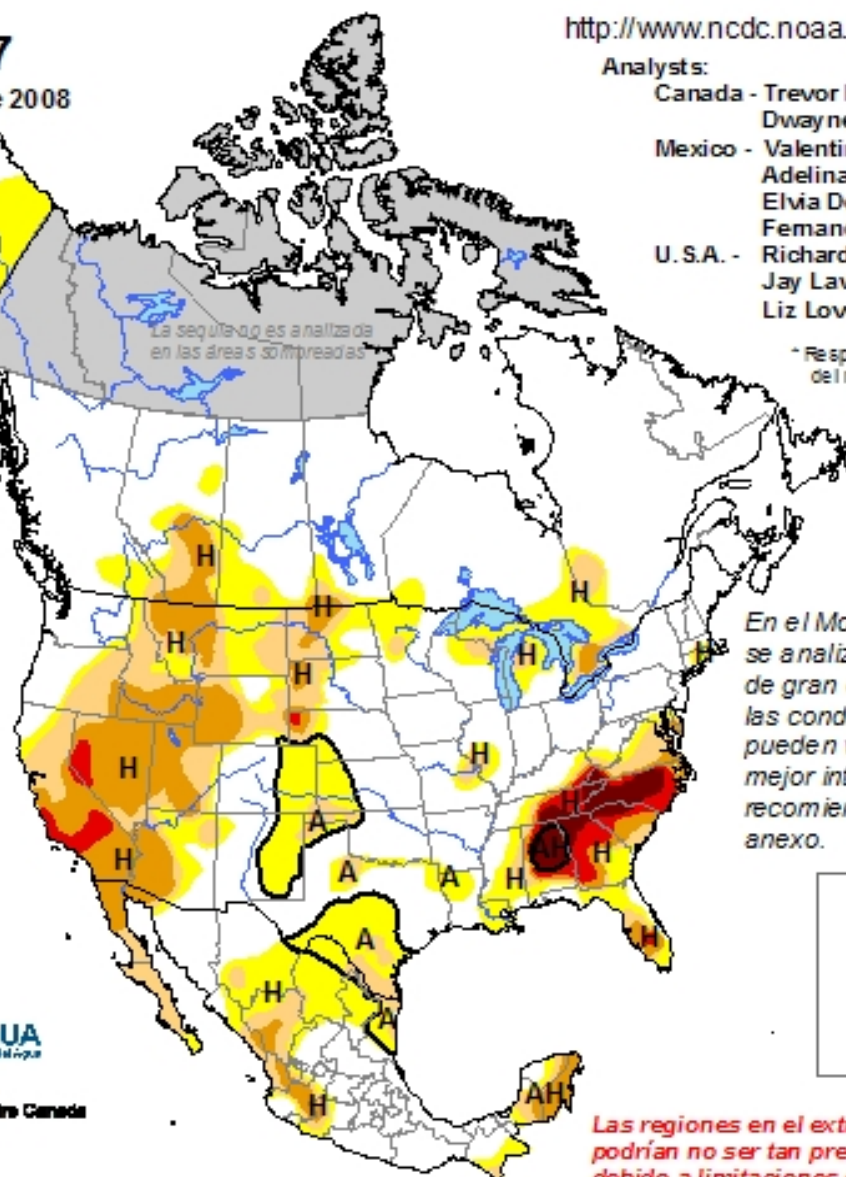
 Delimita impactos dominantes

A = Agrícola

H = Hidrológica



Available in
Spanish



En el Monitor de Sequía se analizan condiciones de gran escala, por lo que las condiciones locales pueden variar. Para una mejor interpretación se recomienda ver el texto anexo.



Las regiones en el extremo norte de Canadá podrían no ser tan precisas como el resto, debido a limitaciones en la información.

Outil de surveillance des sécheresses à l'échelle nord-américaine

<http://www.ncdc.noaa.gov/nadm.html>

31 Décembre 2007

Parution : Mercredi, le 16 Janvier, 2008

Analystes :

Canada - Trevor Hadwen

Dwayne Chobanik

Mexique - Valentina Davydova

Adelina Albanil

Elvia Delgado

Fernando Romero

É.-U. -

Richard Heim

Jay Lawrimore*

Liz Love-Brotak

* Responsable d'assembler la carte de NA-DM et le texte

Intensité de la sécheresse :

D0 Sécheresse anormale

D1 Sécheresse modérée

D2 Sécheresse grave

D3 Sécheresse extrême

D4 Sécheresse exceptionnelle

~ Délimite les impacts dominants

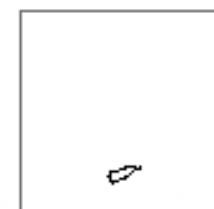
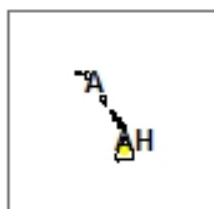
A = Agriculture

H = Hydrologique (eau)

La sécheresse n'a pas été analysée dans les zones ombrées

L'outil de surveillance des sécheresses s'attarde aux conditions à grande échelle. Les conditions locales peuvent varier. Voir le texte d'accompagnement pour un sommaire général.

Available in
French



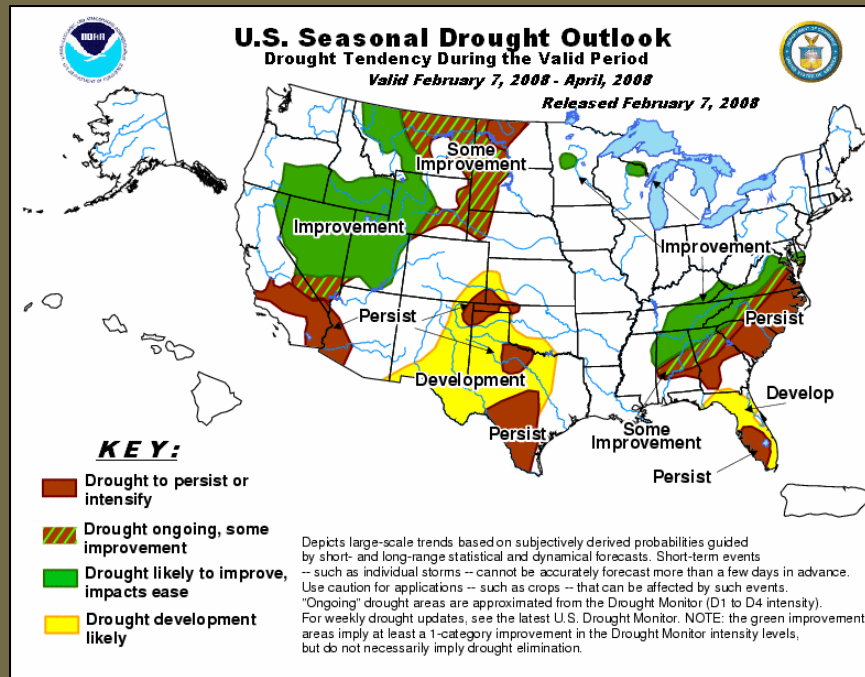
Il est possible que les données sur les régions situées à l'extrême nord du Canada ne soient pas aussi précises que les autres régions en raison du peu d'information disponible.



7) Drought Forecasts;

Short and Long-Term Forecast Contributions

(see Douglas LeComte
for more information)



Start with
latest U.S. Drought
Monitor D1 areas

+

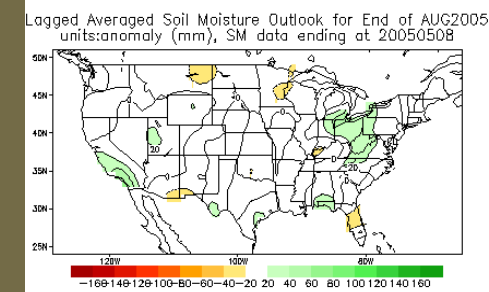
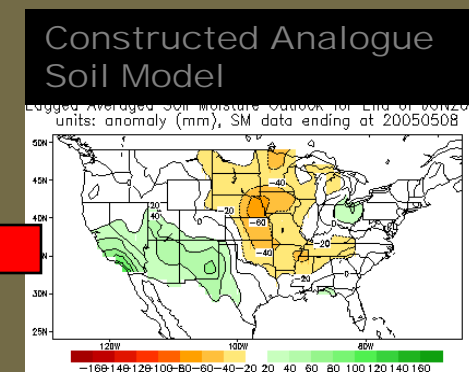
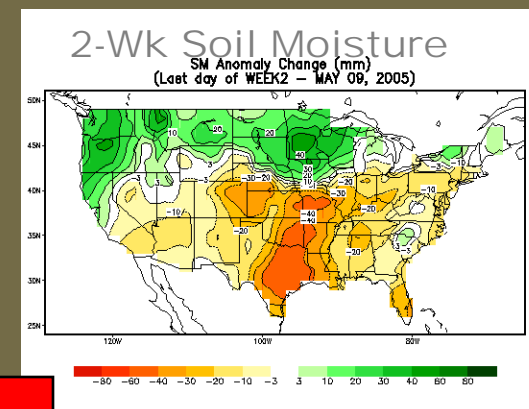
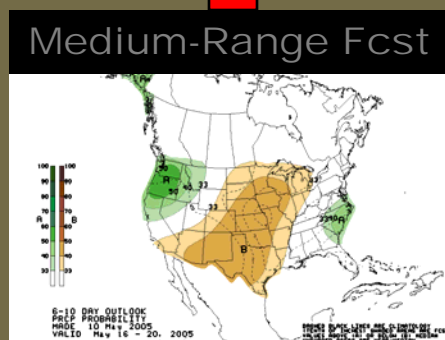
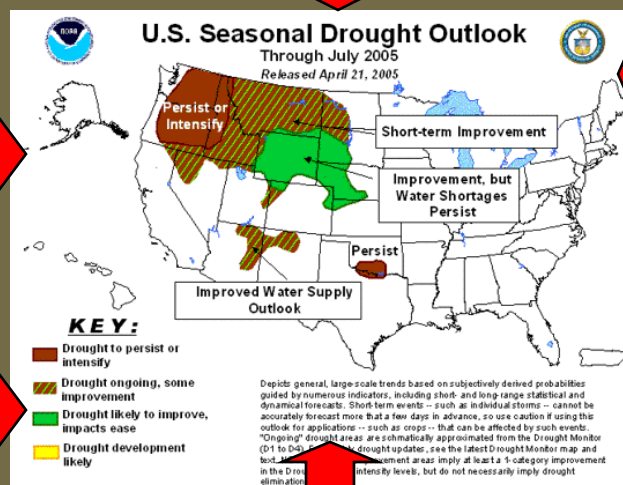
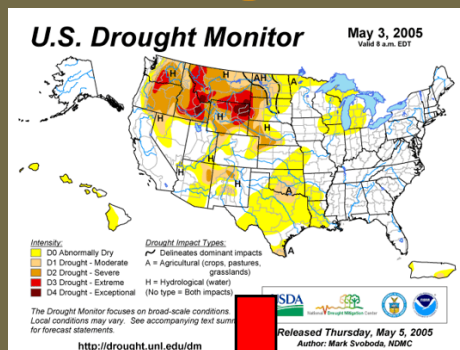
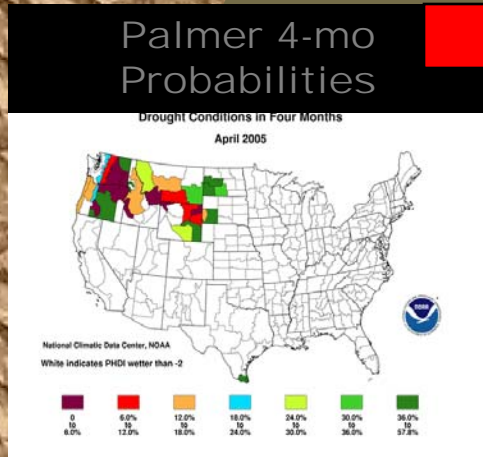
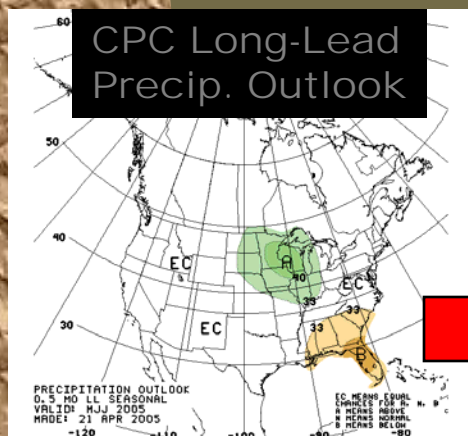
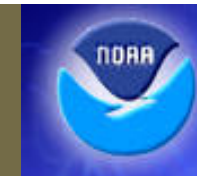
2-week
Soil Moisture
Forecasts

+

3-month
Precipitation and
Temperature
Outlooks

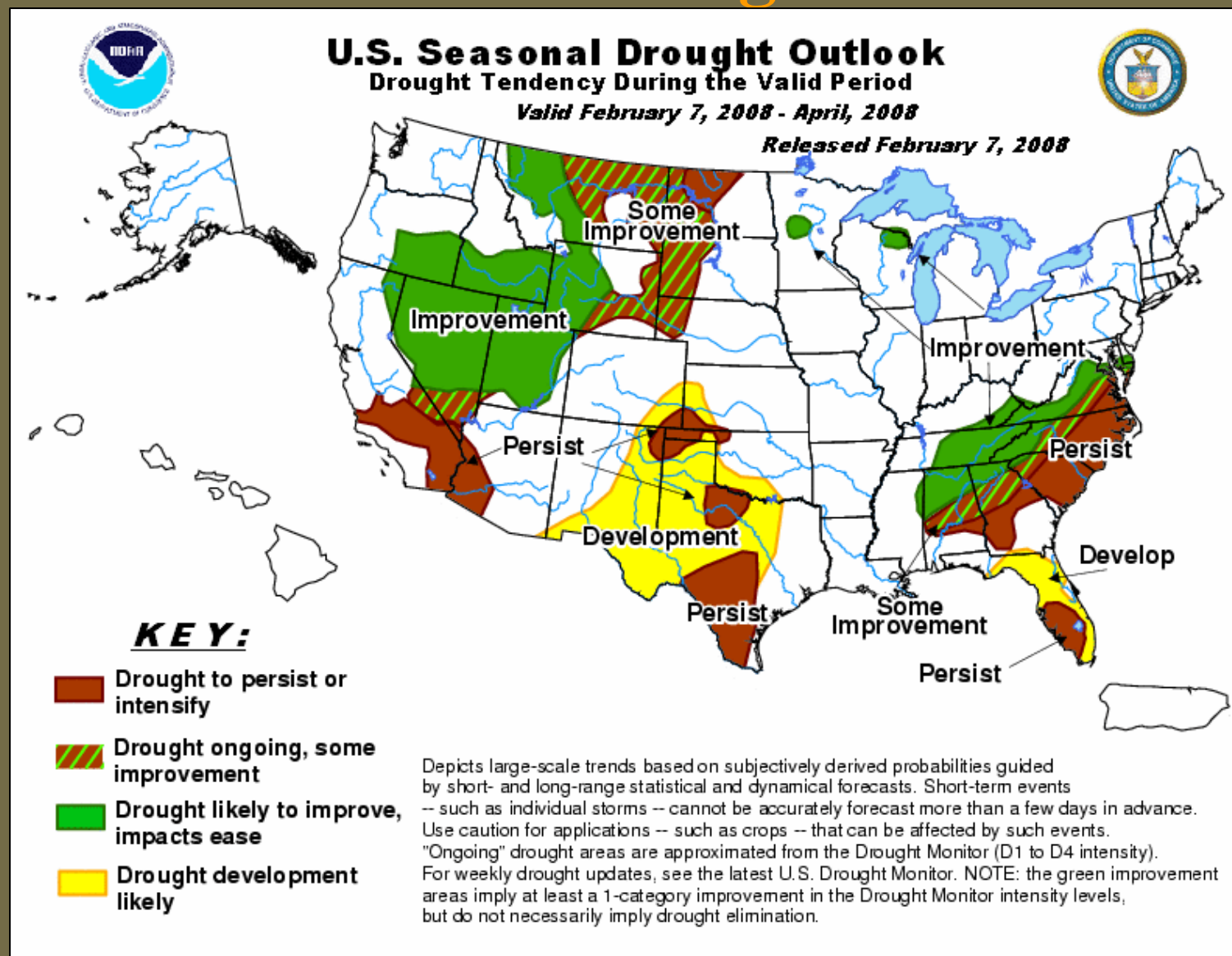


7) Drought Forecasts; Principal Drought Outlook Inputs





7) Drought Forecasts; Latest Seasonal Drought Outlook



http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html

Thank You!

and to the many contributors
of this presentation



Feb. 21-22, 2008