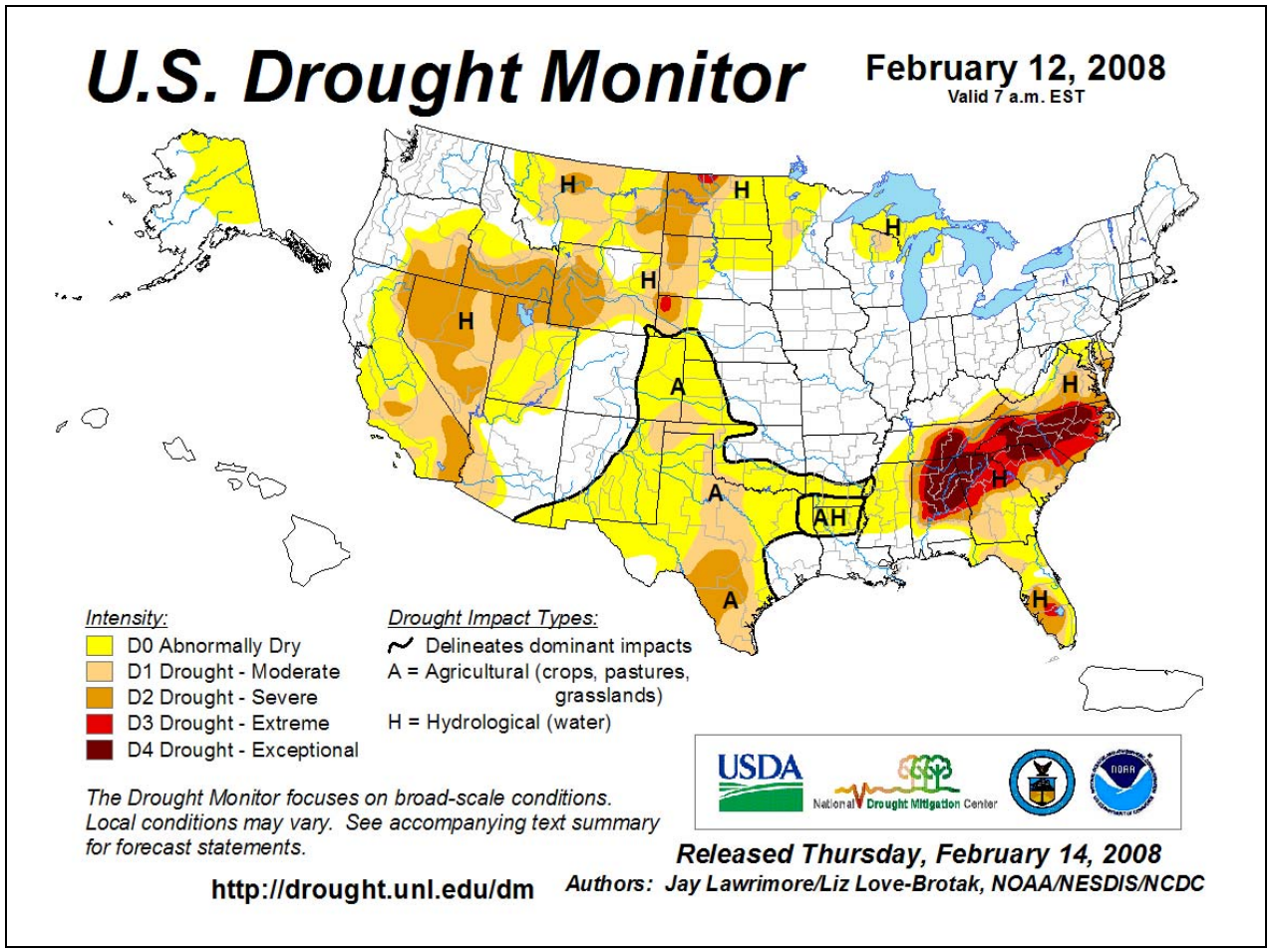
U.S. Drought Monitor:
From the Meteorologist's Perspective



Brad Rippey, USDA Agricultural Meteorologist
Washington, D.C.

A Brief History of the U.S. Drought Monitor

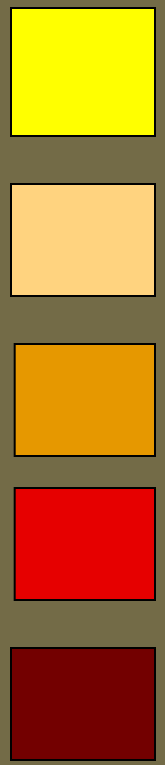
"In the summer of 1998, a dialogue began between the National Drought Mitigation Center (NDMC) and the National Oceanic and Atmospheric Administration's Climate Prediction Center (NOAA/CPC)… What emerged was a plan to develop a classification system for droughts that would be as recognizable to the public as the Fujita tornado intensity scale (F0-F5) and the Saffir-Simpson hurricane intensity scale (categories 1-5). Early in the process, the U.S. Department of Agriculture (USDA)… joined the effort. As a result of meetings held during the spring of 1999, an agreement was reached between NOAA, USDA, and NDMC to produce and maintain a drought monitoring product."

(from "The Drought Monitor," Bulletin of the American Meteorological Society, by Svoboda, Le Comte, Hayes, Heim, et al., August 2002)

USDA

U.S. Drought Monitor Map

Drought Intensity Categories



D0 Abnormally Dry

D1 Drought – Moderate

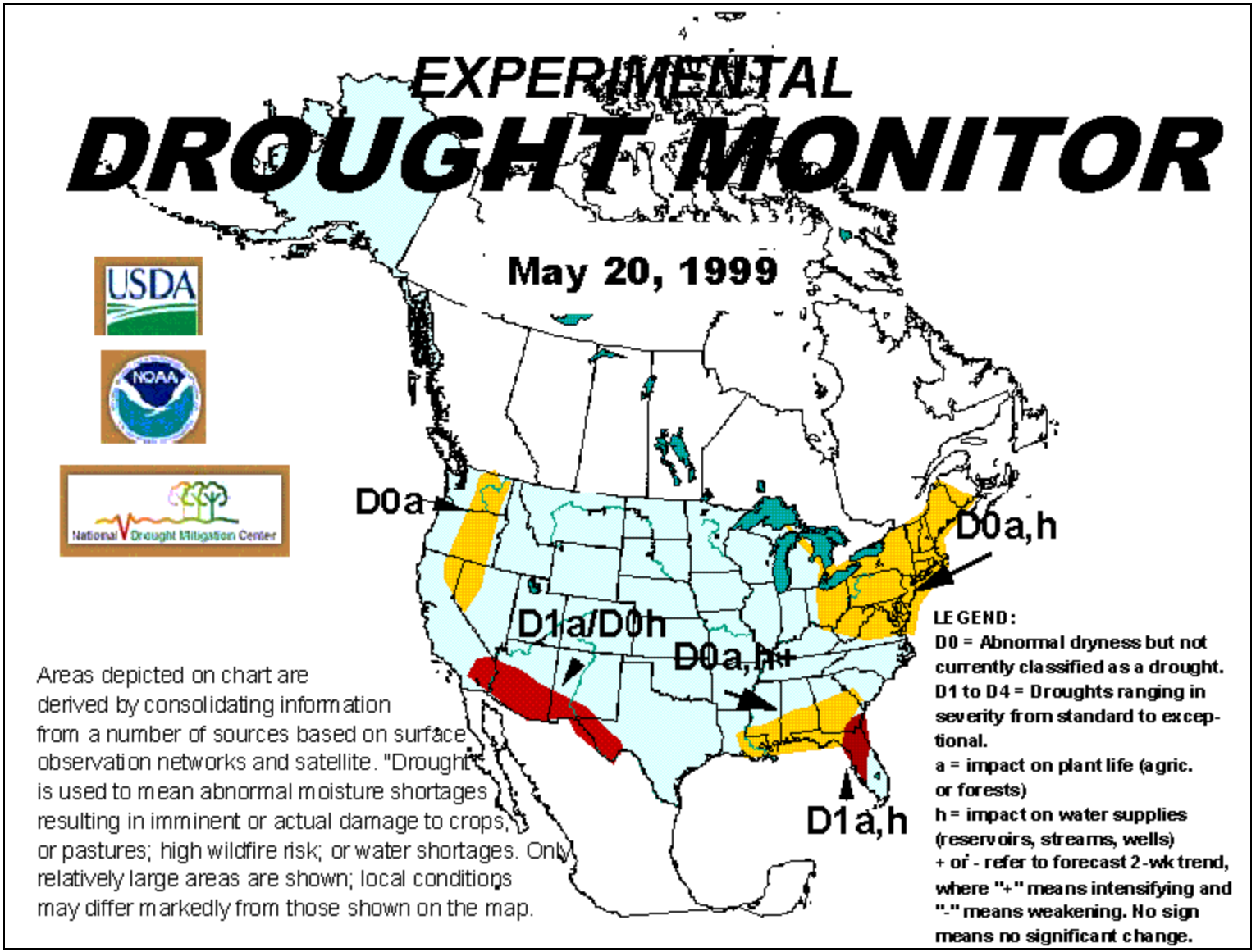
D2 Drought – Severe

D3 Drought – Extreme

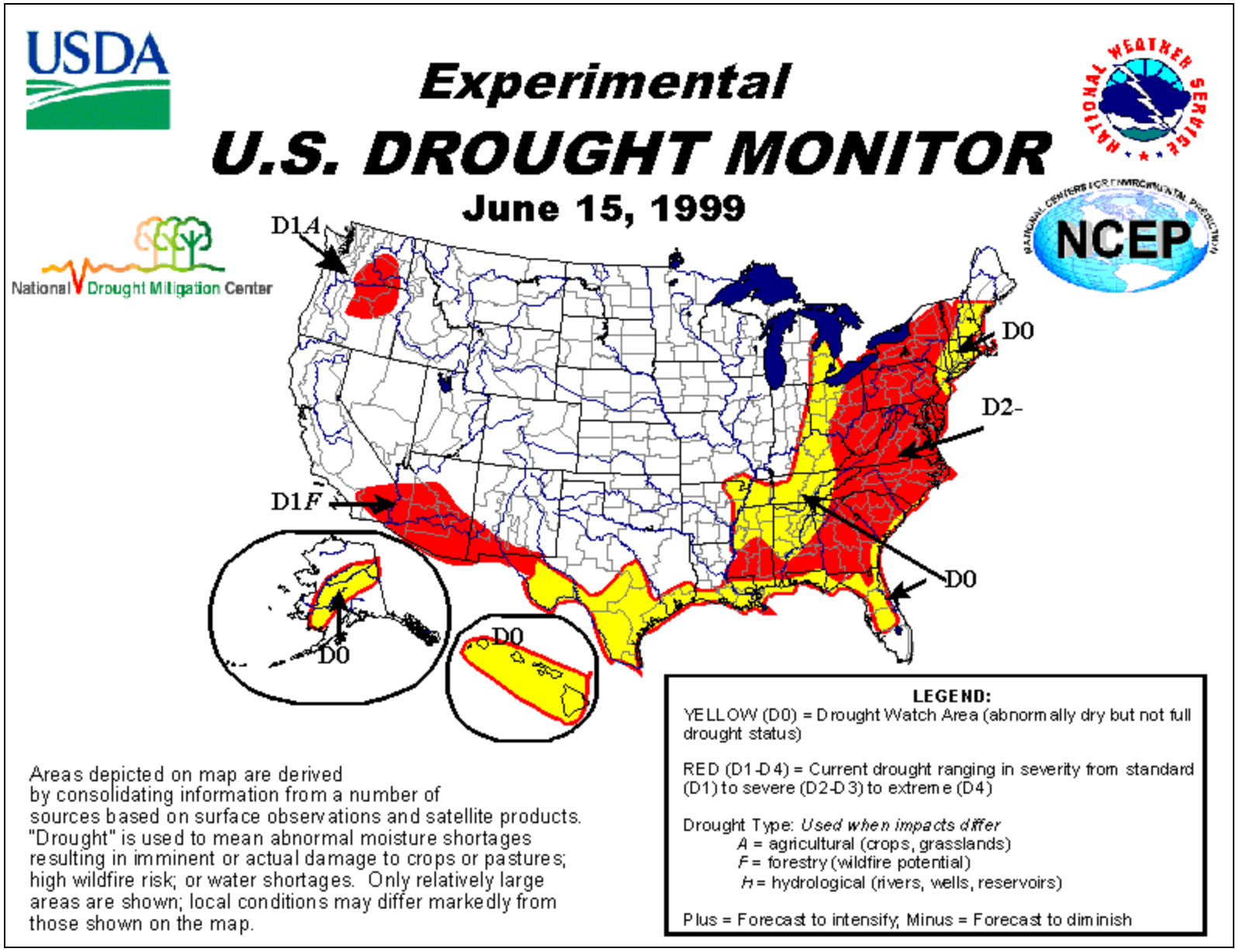
D4 Drought – Exceptional

USDA

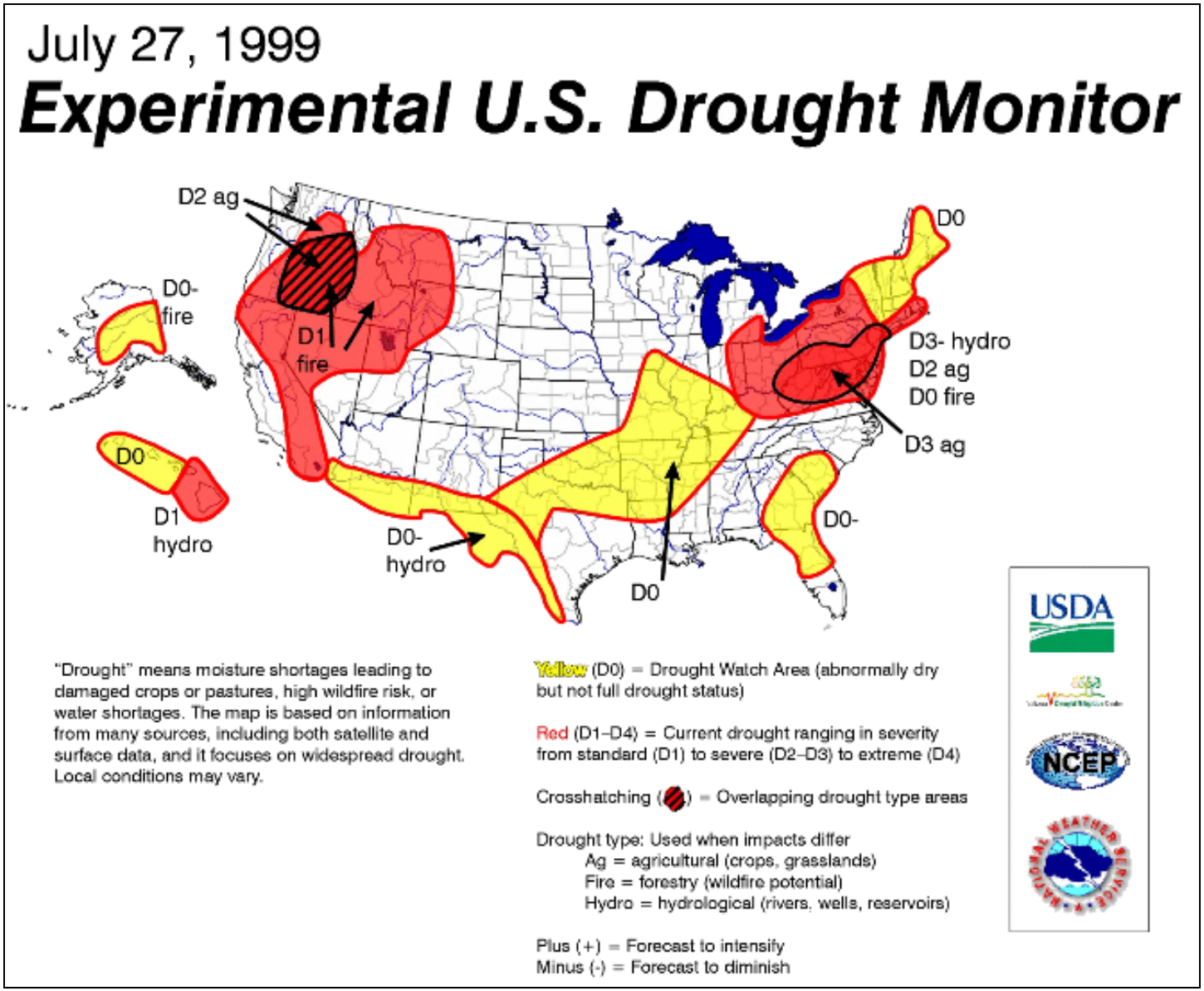
U.S. Drought Monitor Growing Pains, 1999-2000



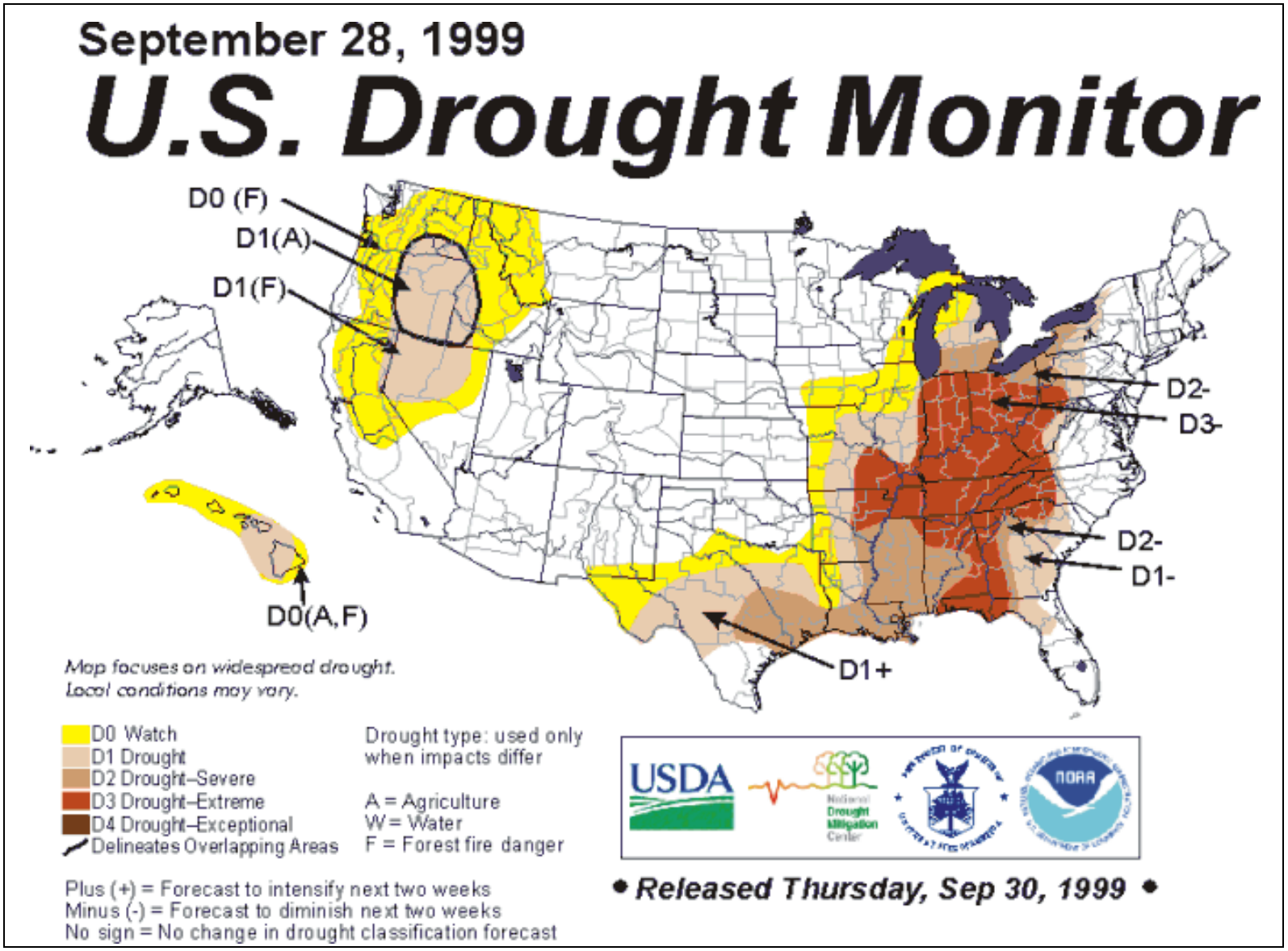
U.S. Drought Monitor Growing Pains, 1999-2000



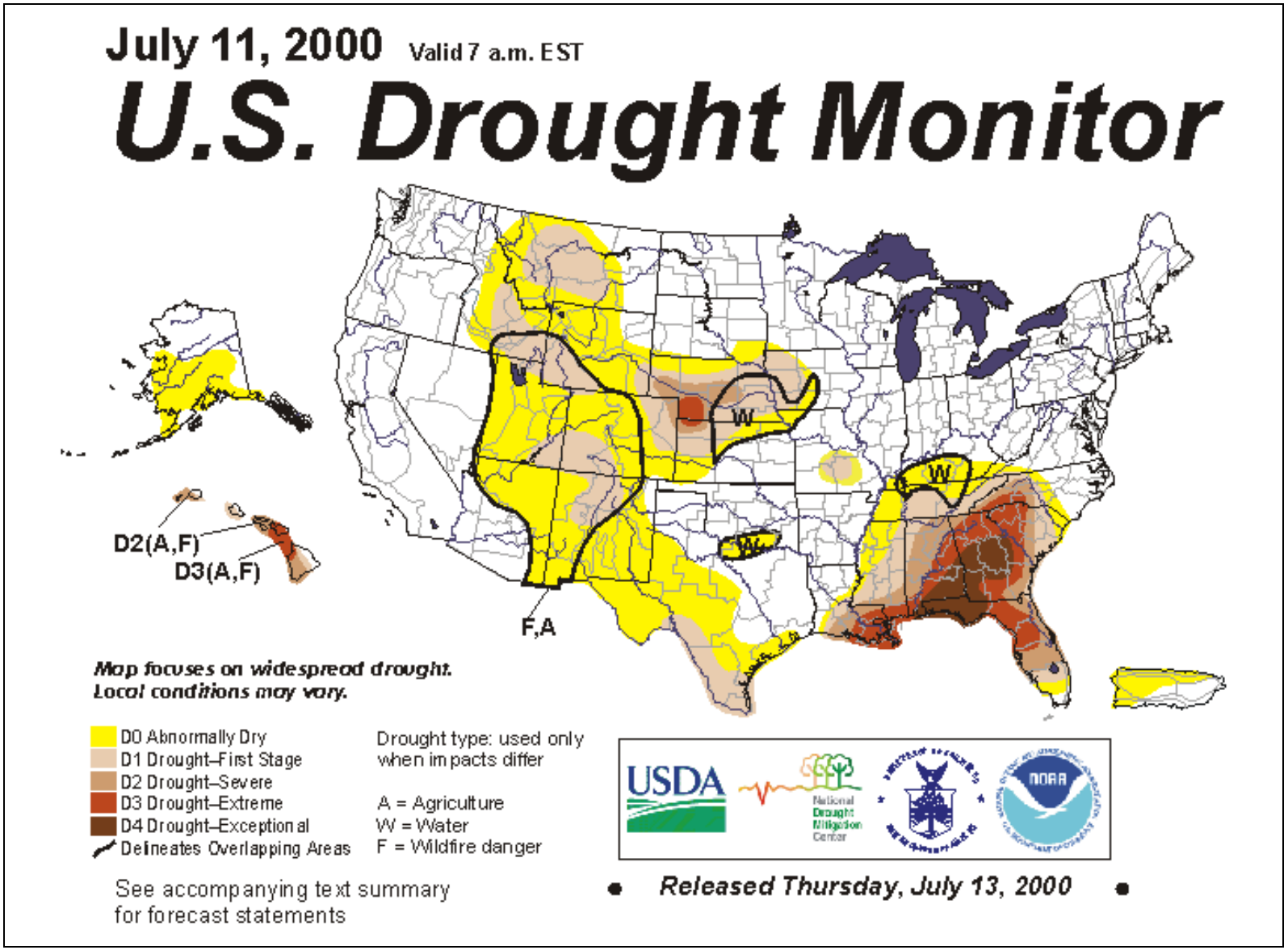
U.S. Drought Monitor Growing Pains, 1999-2000



U.S. Drought Monitor Growing Pains, 1999-2000



U.S. Drought Monitor Growing Pains, 1999-2000

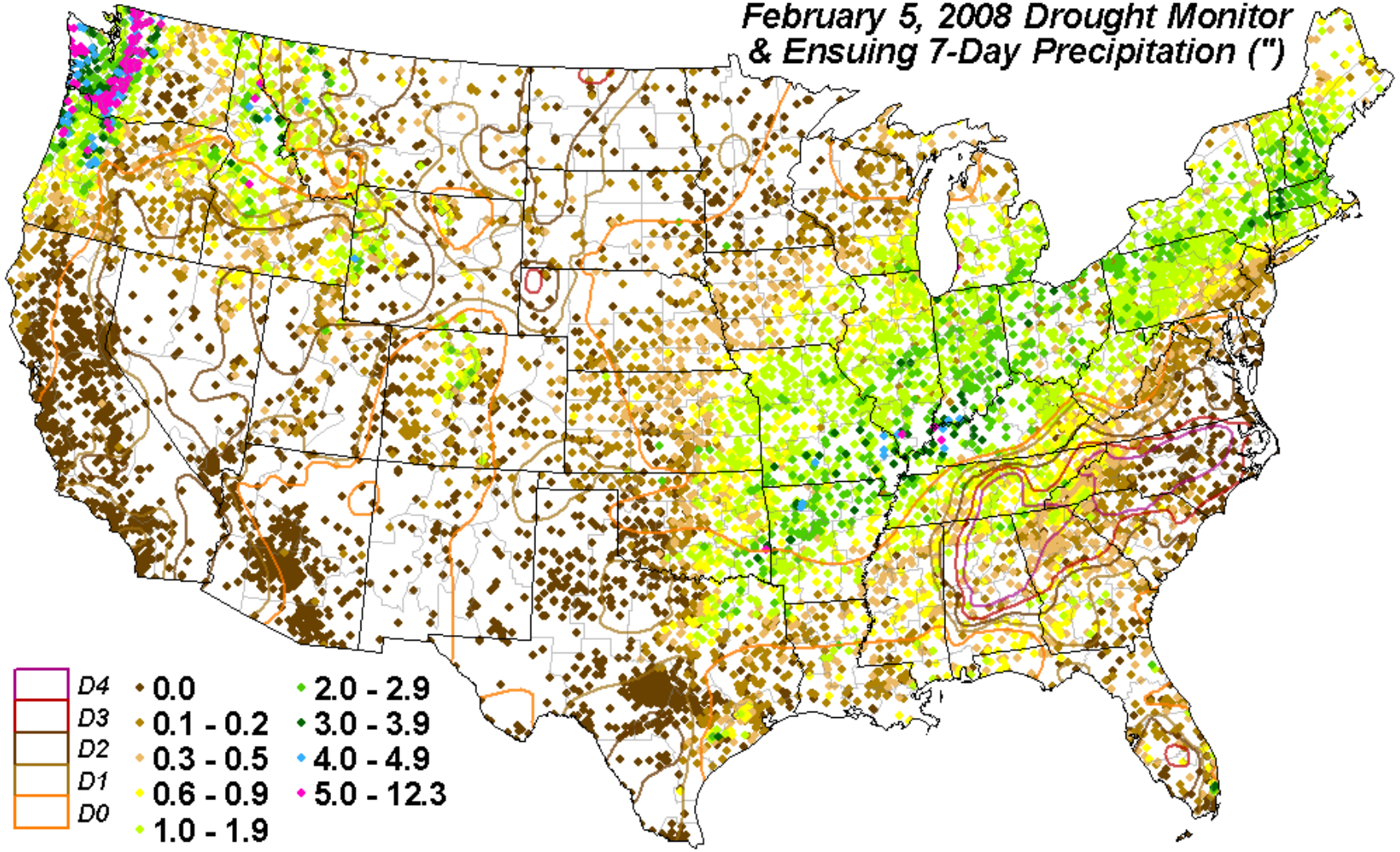


The Drought Monitor:
A new way of looking at drought in the U.S.

- **Integrates daily rainfall reports from thousands of stations**
- **Rates drought intensity by percentile ranks**
- **Uses weekly feedback from local experts to reflect impacts and for the product's "ground truth"**

USDA

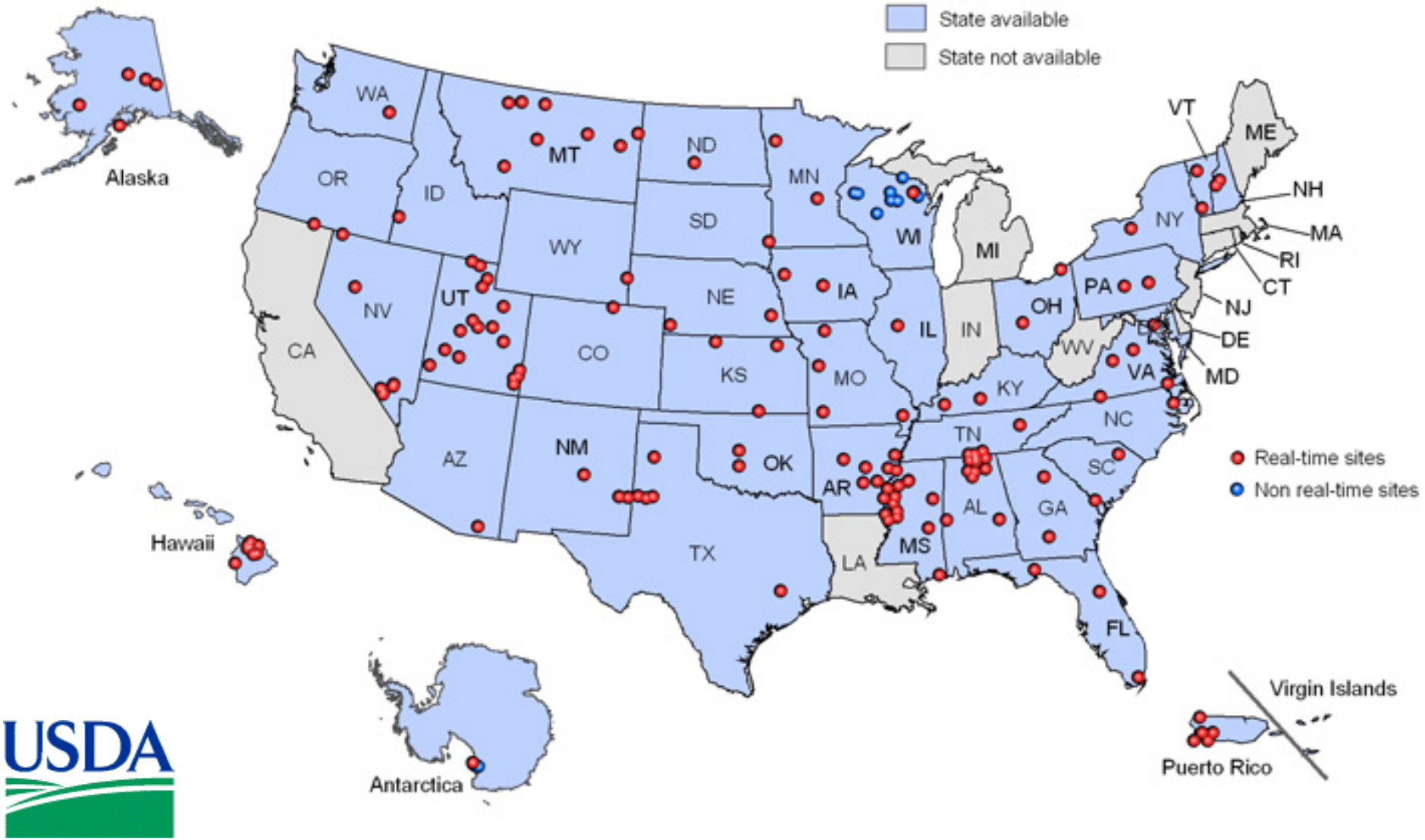
Drought Monitor Analysis Tools: Precipitation



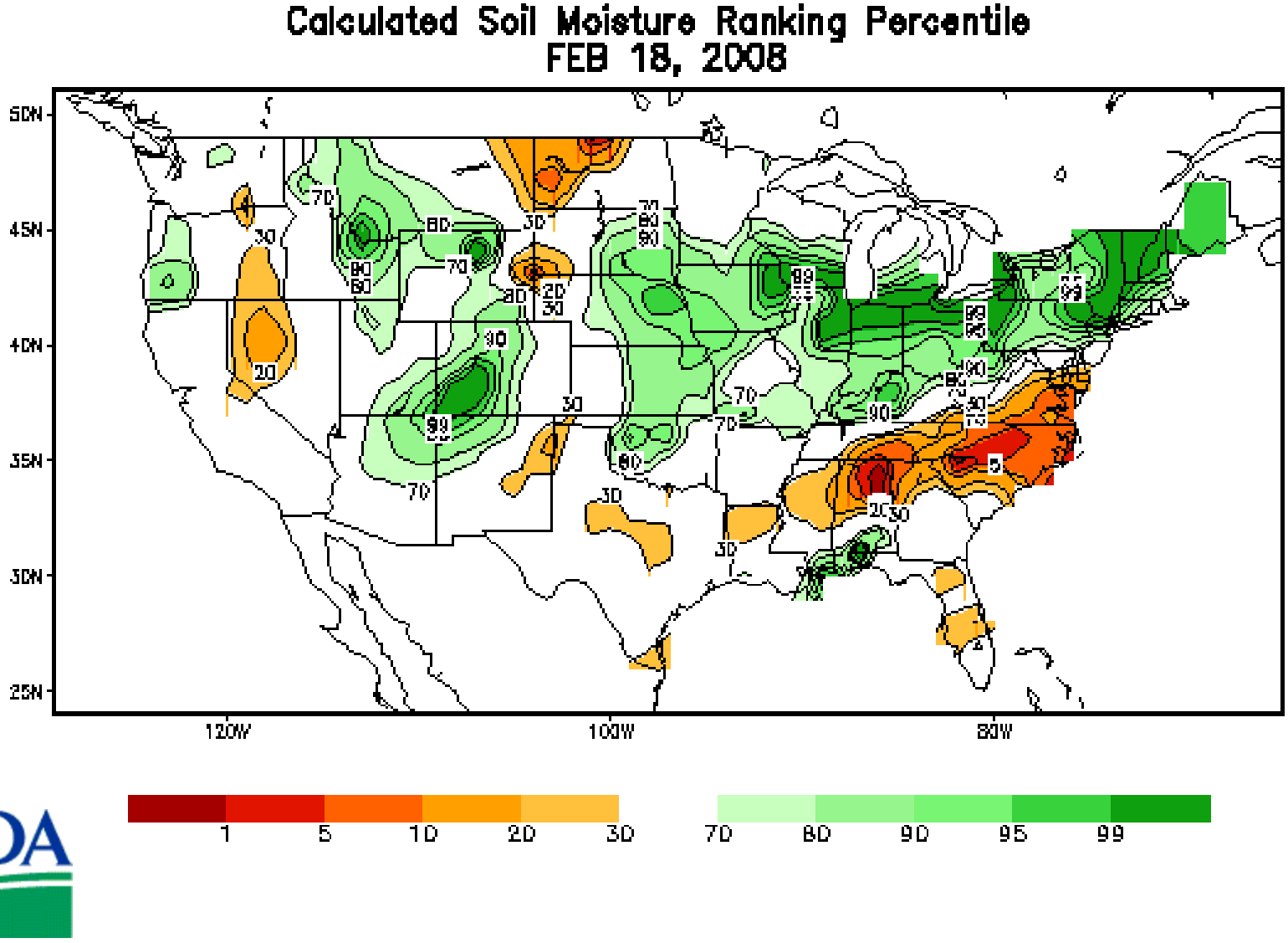
USDA

DM Analysis Tools: Observed Soil Moisture

SCAN: Soil Climate Analysis Network



DM Analysis Tools: CPC Modeled Soil Moisture



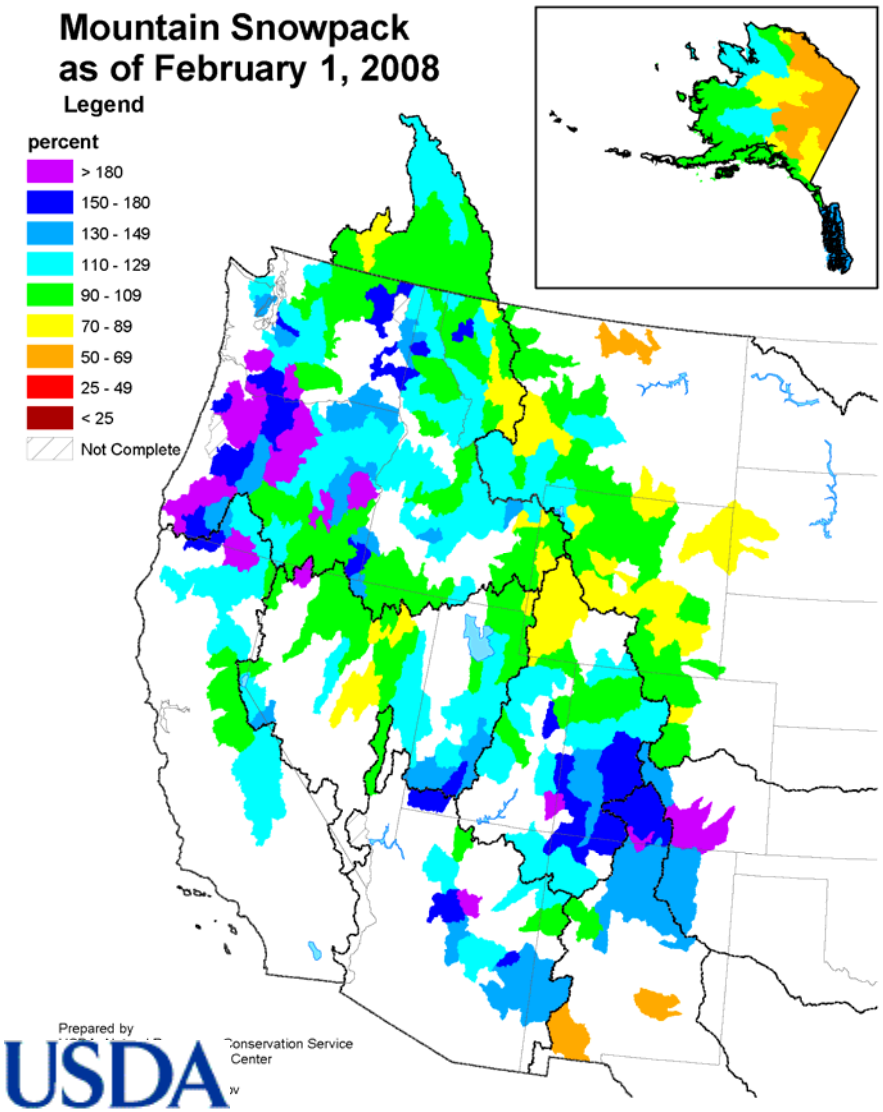
Percentiles and the U.S. Drought Monitor

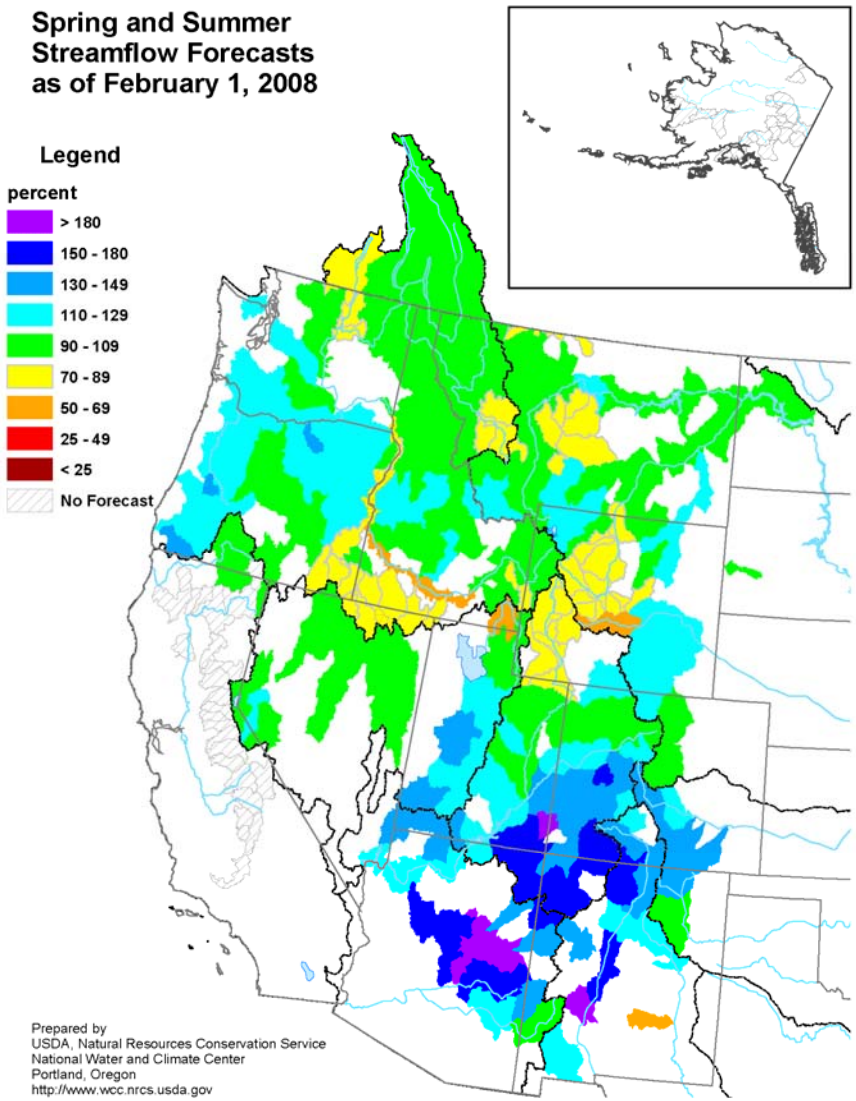
- Advantages of percentiles:
  - Can be applied to any parameter
  - Can be used for any length of data record
  - Helps to put drought in historical perspective

- D4, Exceptional Drought: once per 50 years or less
- D3, Extreme Drought: once per 20 to 50 years
- D2, Severe Drought: once per 10 to 20 years
- D1, Moderate Drought: once per 5 to 10 years
- D0, Abnormally Dry: once per 3 to 5 years

USDA

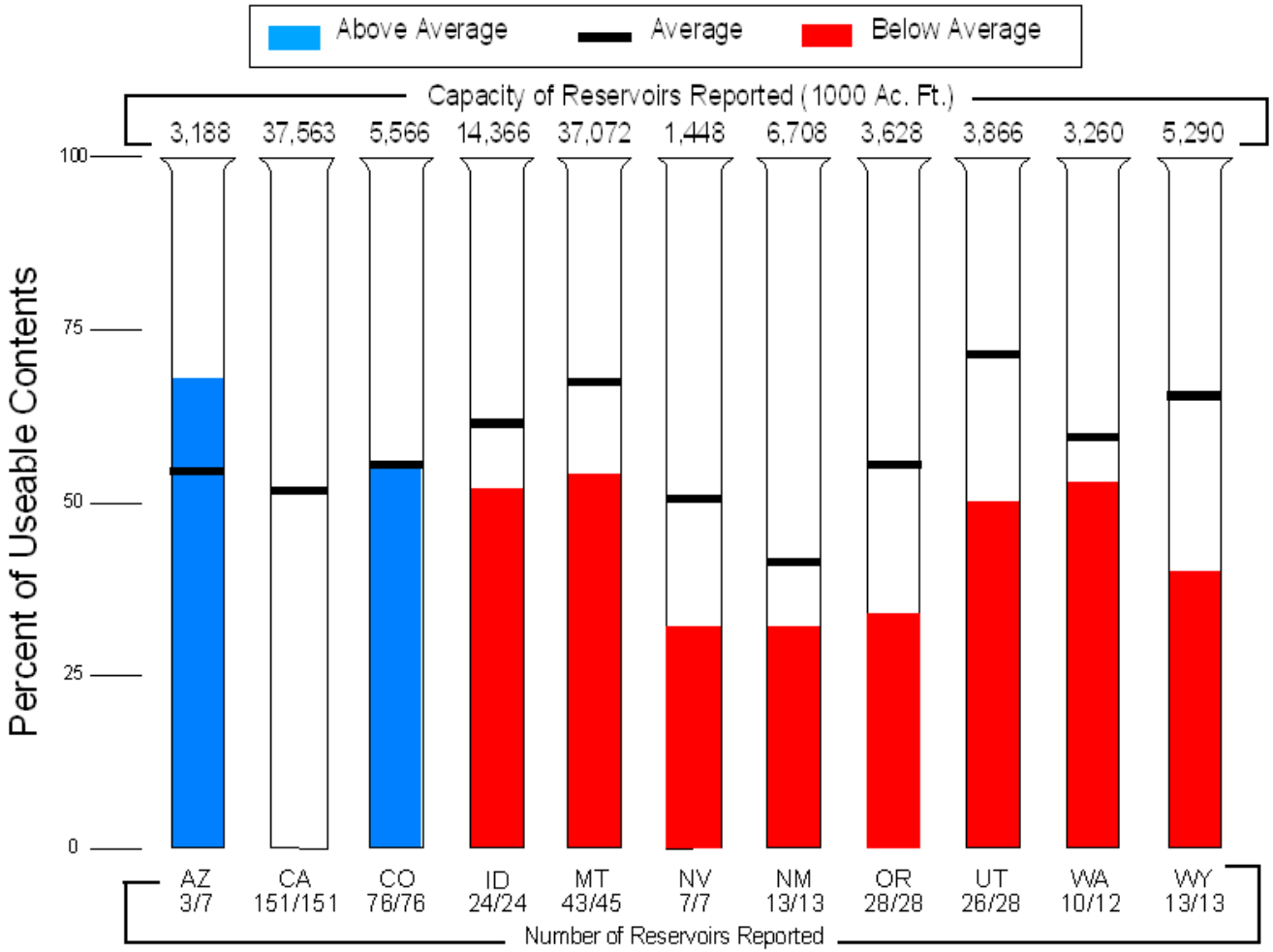
DM Analysis Tools: Western Water Supply





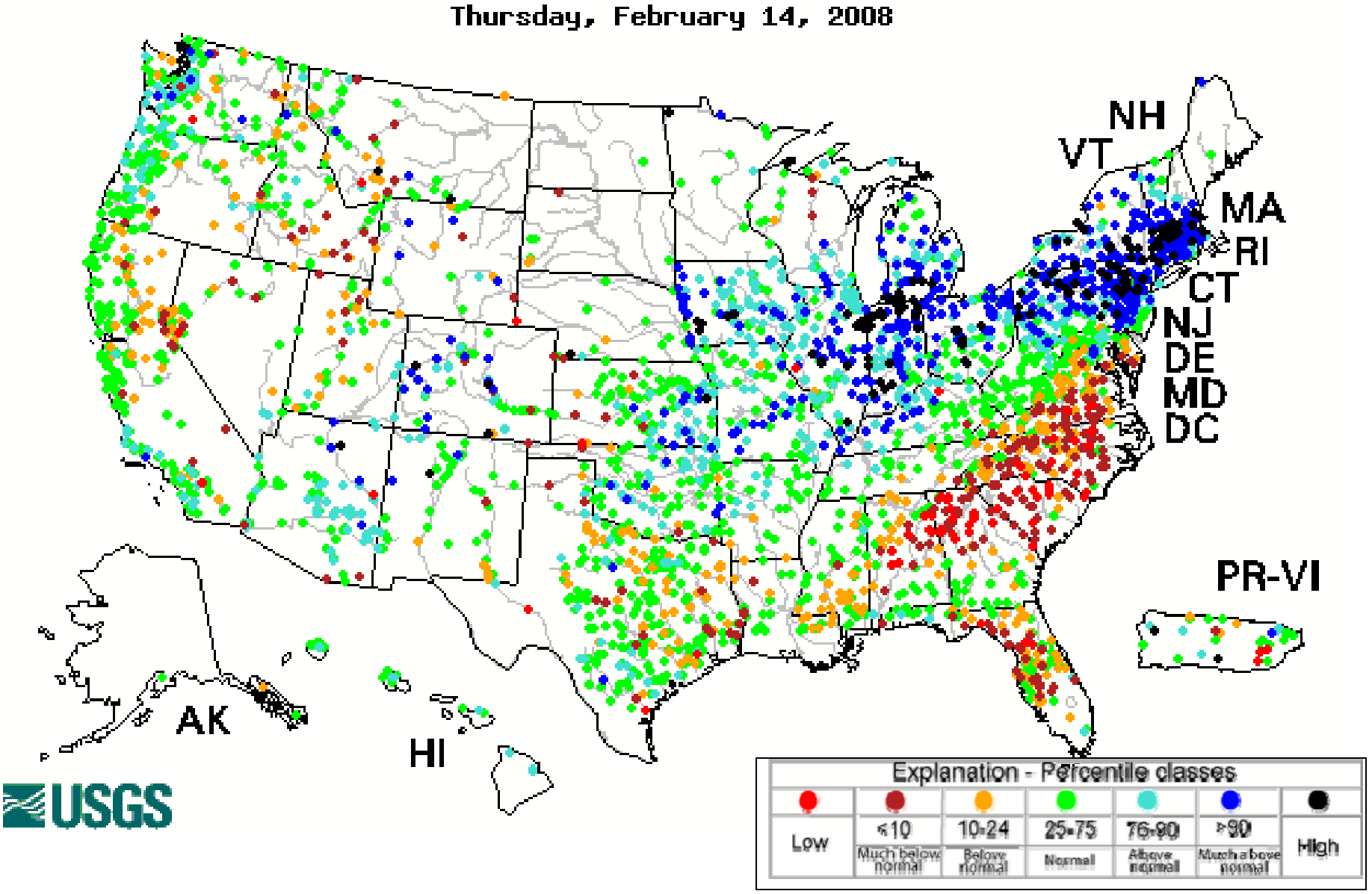
Drought Monitor Analysis Tools: Reservoirs

Reservoir Storage as of February 1, 2008

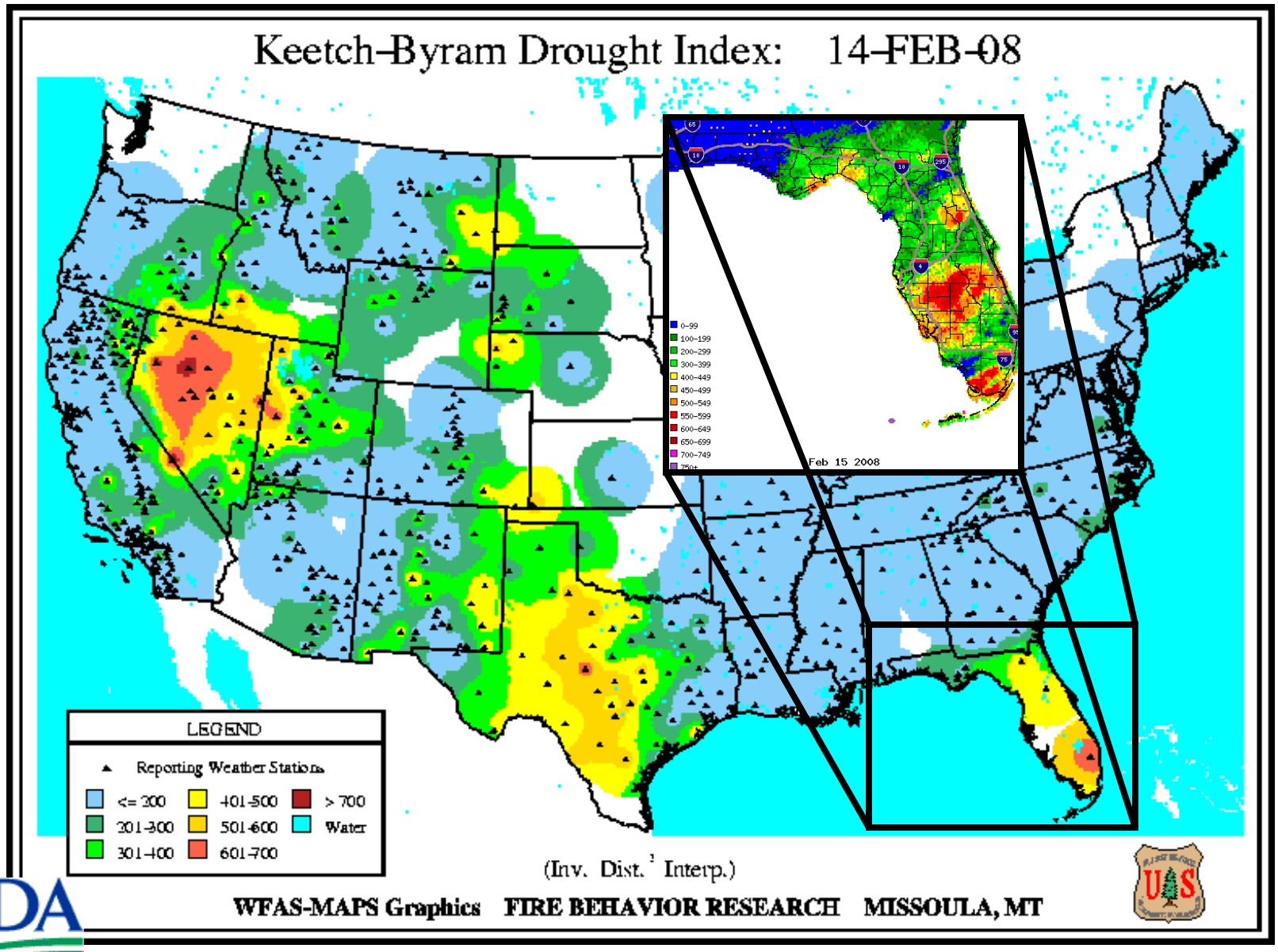


Prepared by: USDA, Natural Resources Conservation Service, National Water and Climate Center, Portland, OR
http://www.wcc.nrcs.usda.gov

Drought Monitor Analysis Tools: Streamflow

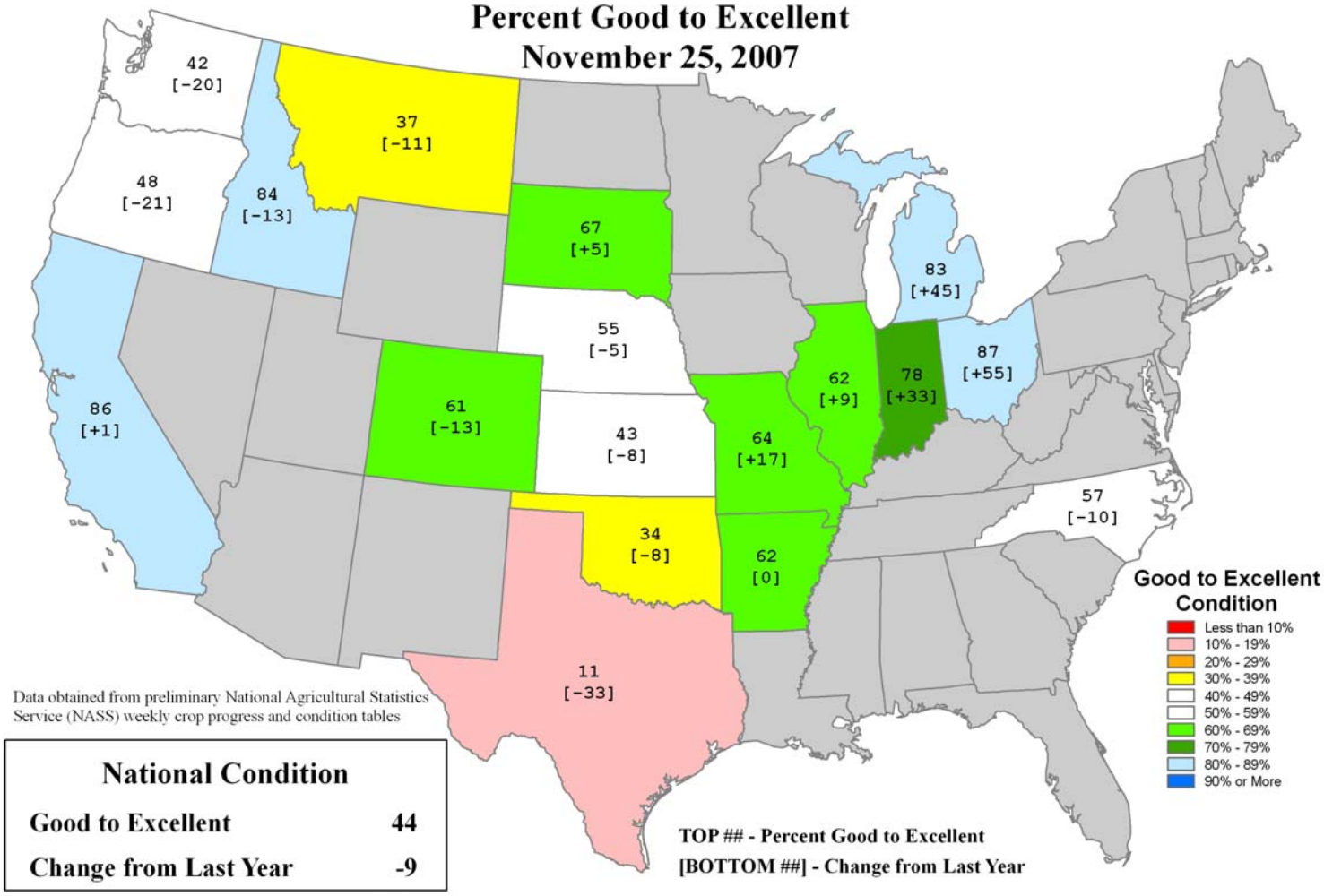


Drought Monitor Analysis Tools: Fire Danger



DM Analysis Tools: Agricultural Reports

U.S. Winter Wheat Condition



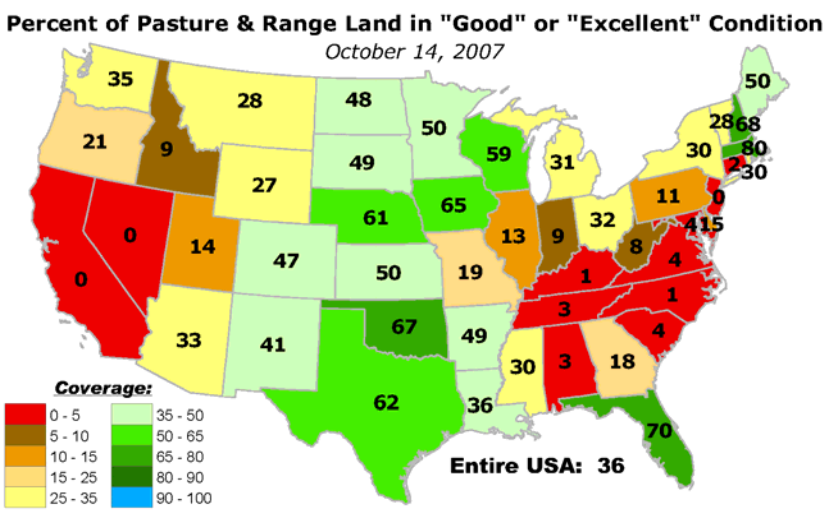
Data obtained from preliminary National Agricultural Statistics Service (NASS) weekly crop progress and condition tables

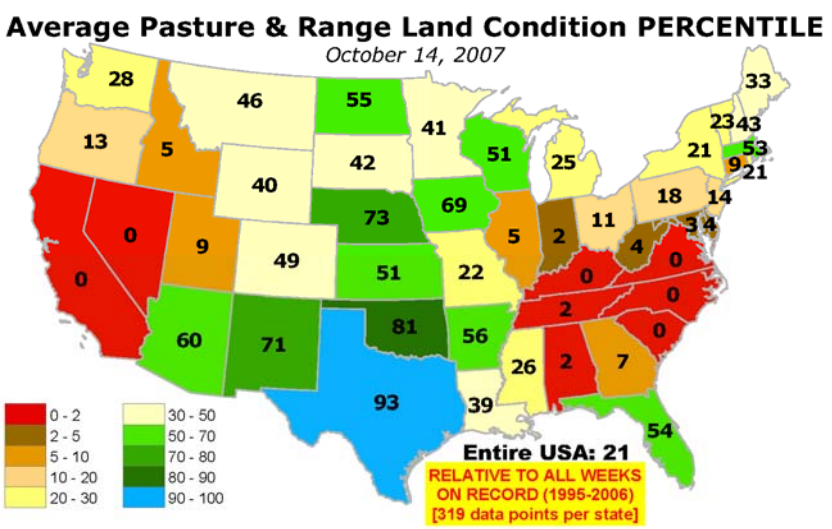
National Condition	
Good to Excellent	44
Change from Last Year	-9

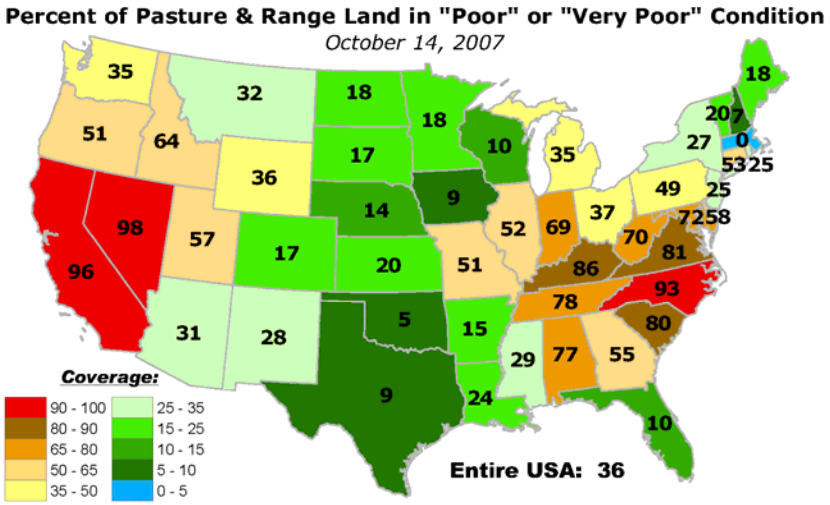
USDA

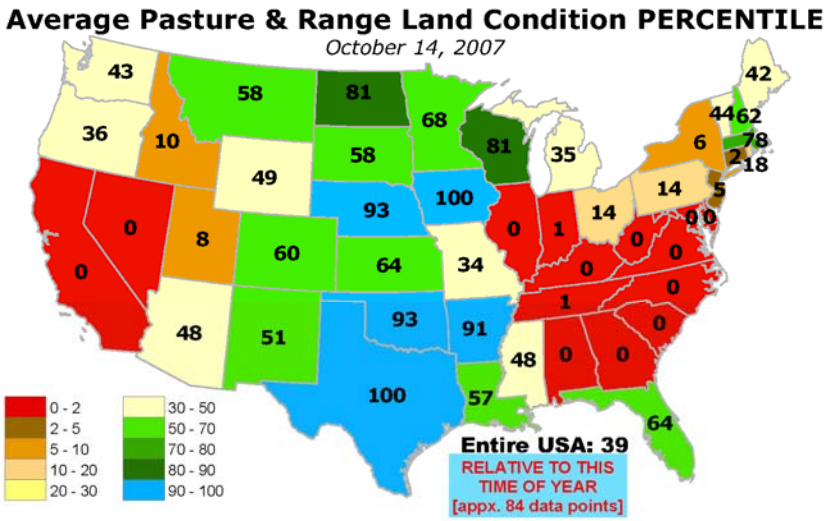
USDA Joint Agricultural Weather Facility (JAWF)

DM Analysis Tools: Agricultural Reports









USDA

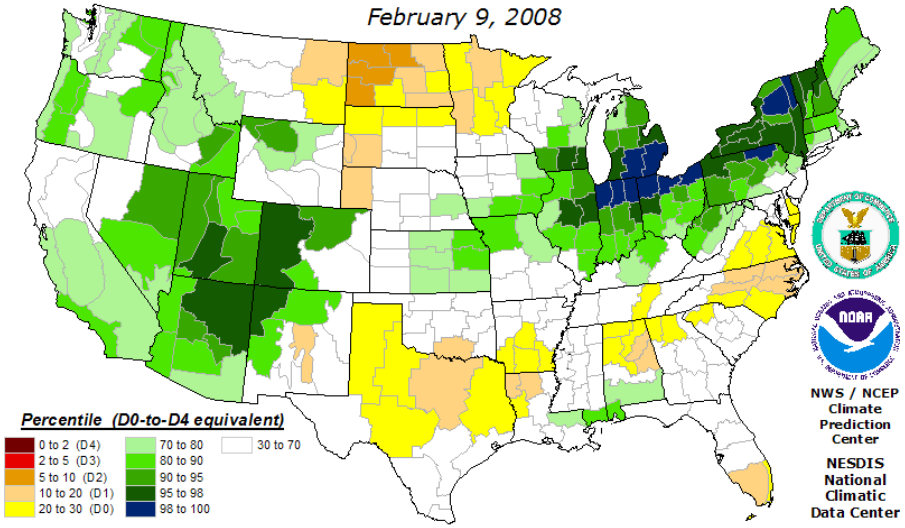
Long- and Short-Term Blends

- Produced weekly using CPC's real-time daily and weekly climate division data and NCDC's monthly archive of indices for 1932-2000
- All parameters are first rendered as percentiles w/ respect to 1932-2000 data using a percent rank method

USDA

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

February 9, 2008



Percentile (D0-to-D4 equivalent)

0 to 2 (D4)	70 to 80	30 to 70
2 to 5 (D3)	80 to 90	
5 to 10 (D2)	90 to 95	
10 to 20 (D1)	95 to 98	
20 to 30 (D0)	98 to 100	

NWS / NCEP Climate Prediction Center

NESDIS National Climatic Data Center

Inputs (as percentiles):

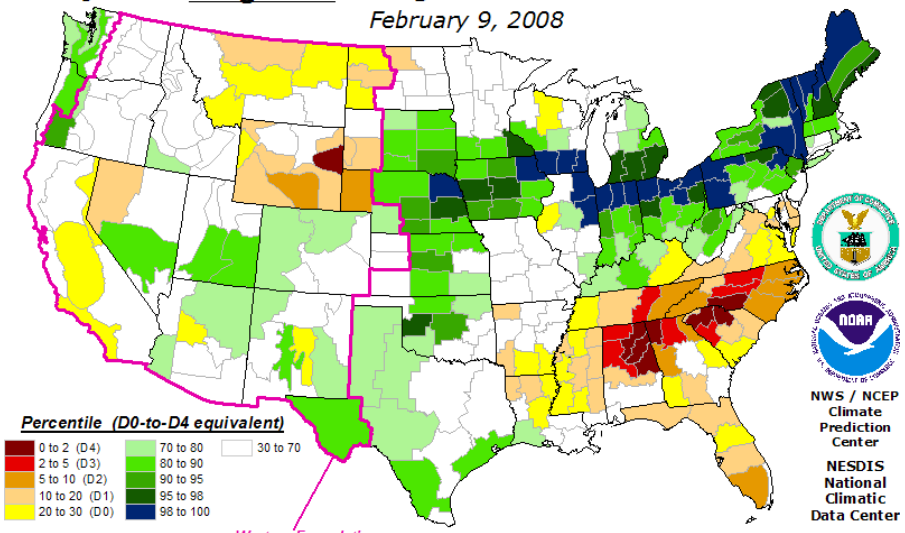
35% Palmer Z-Index
25% 3-Month Precipitation
20% 1-Month Precipitation
13% CPC Soil Moisture Model
7% Palmer Drought Index

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.

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

February 9, 2008



Percentile (D0-to-D4 equivalent)

0 to 2 (D4)	70 to 80	30 to 70
2 to 5 (D3)	80 to 90	
5 to 10 (D2)	90 to 95	
10 to 20 (D1)	95 to 98	
20 to 30 (D0)	98 to 100	

NWS / NCEP Climate Prediction Center

NESDIS National Climatic Data Center

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):

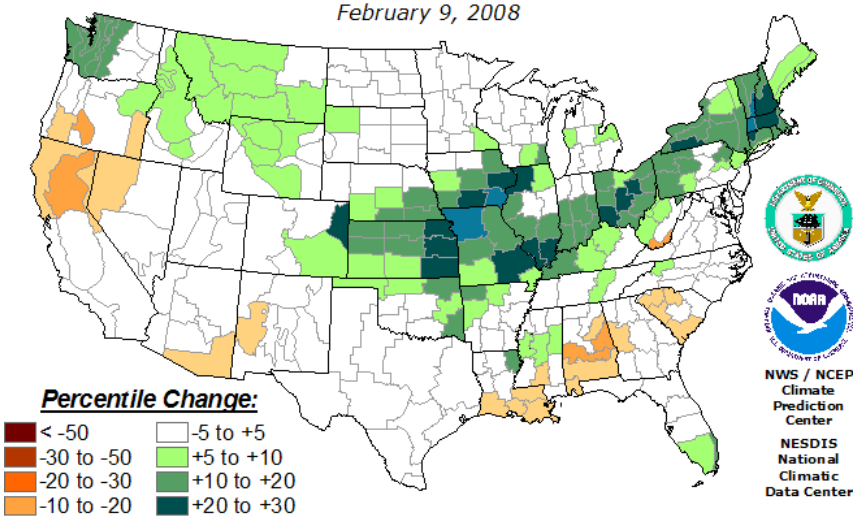
30% Palmer Hydrologic Index
30% 60-Month Average Z-Index
10% 60-Month Precipitation
10% 24-Month Precipitation
10% 12-Month Precipitation
10% CPC Soil Moisture Model

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.

1-Week Change in ***Short-Term*** Drought Indicator Blend Percentiles

February 9, 2008



Percentile Change:

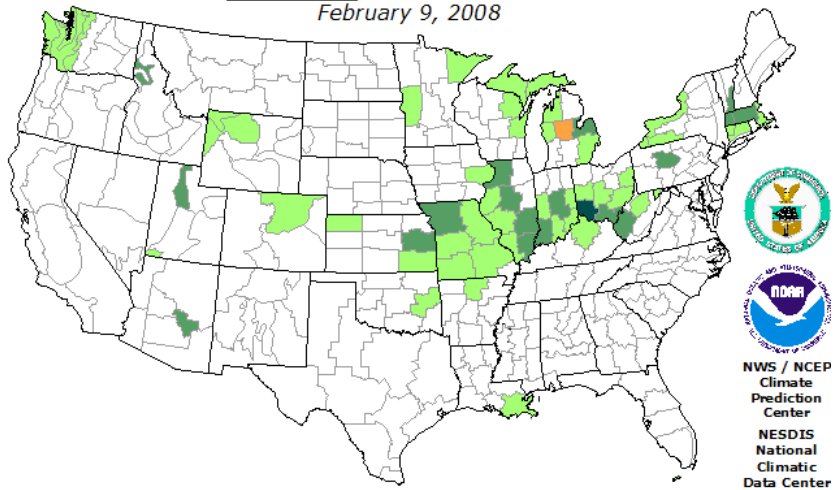
< -50	-5 to +5
-30 to -50	+5 to +10
-20 to -30	+10 to +20
-10 to -20	+20 to +30
-5 to -10	+30 to +50
	> +50

NWS / NCEP Climate Prediction Center

NESDIS National Climatic Data Center

1-Week Change in ***Long-Term*** Drought Indicator Blend Percentiles

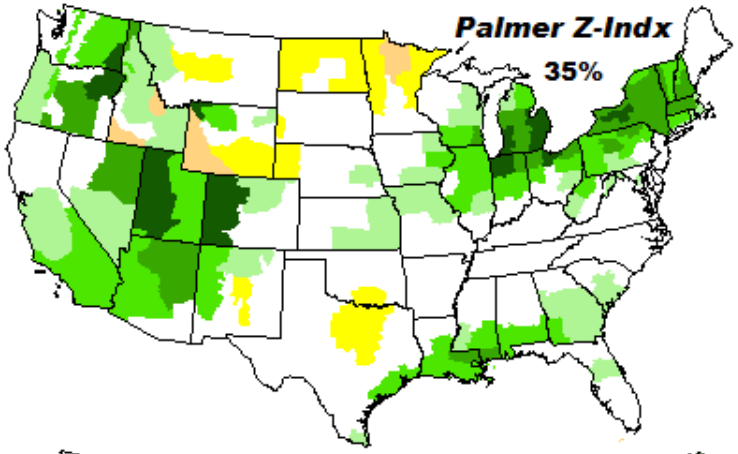
February 9, 2008

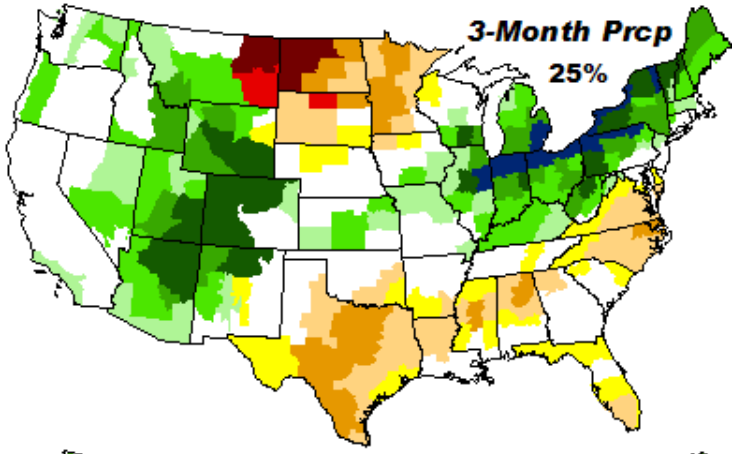


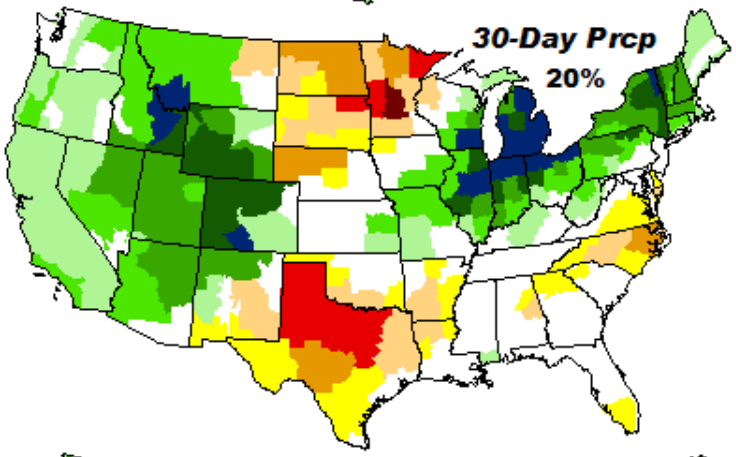
NWS / NCEP Climate Prediction Center

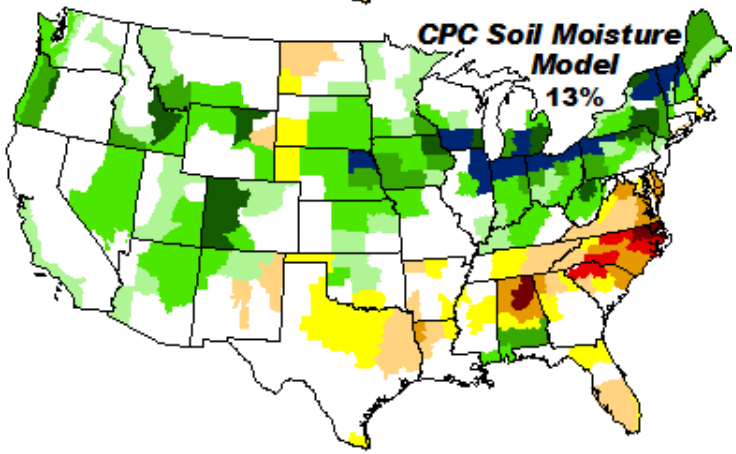
NESDIS National Climatic Data Center

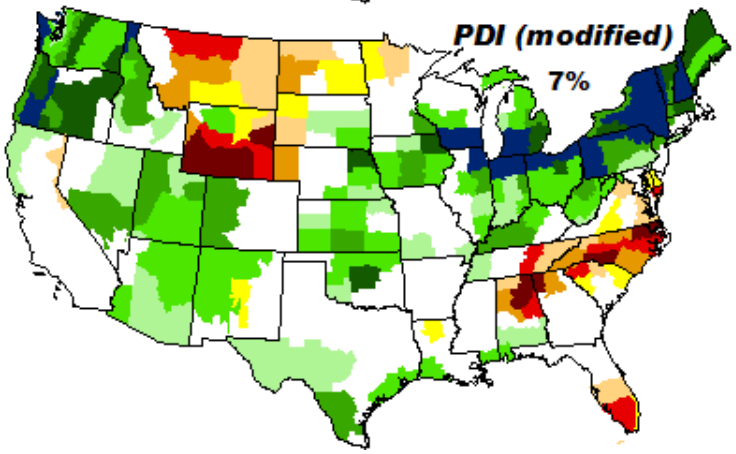
Objective ***Short-Term*** Drought Indicator Blend Percentiles -- *February 9, 2008*











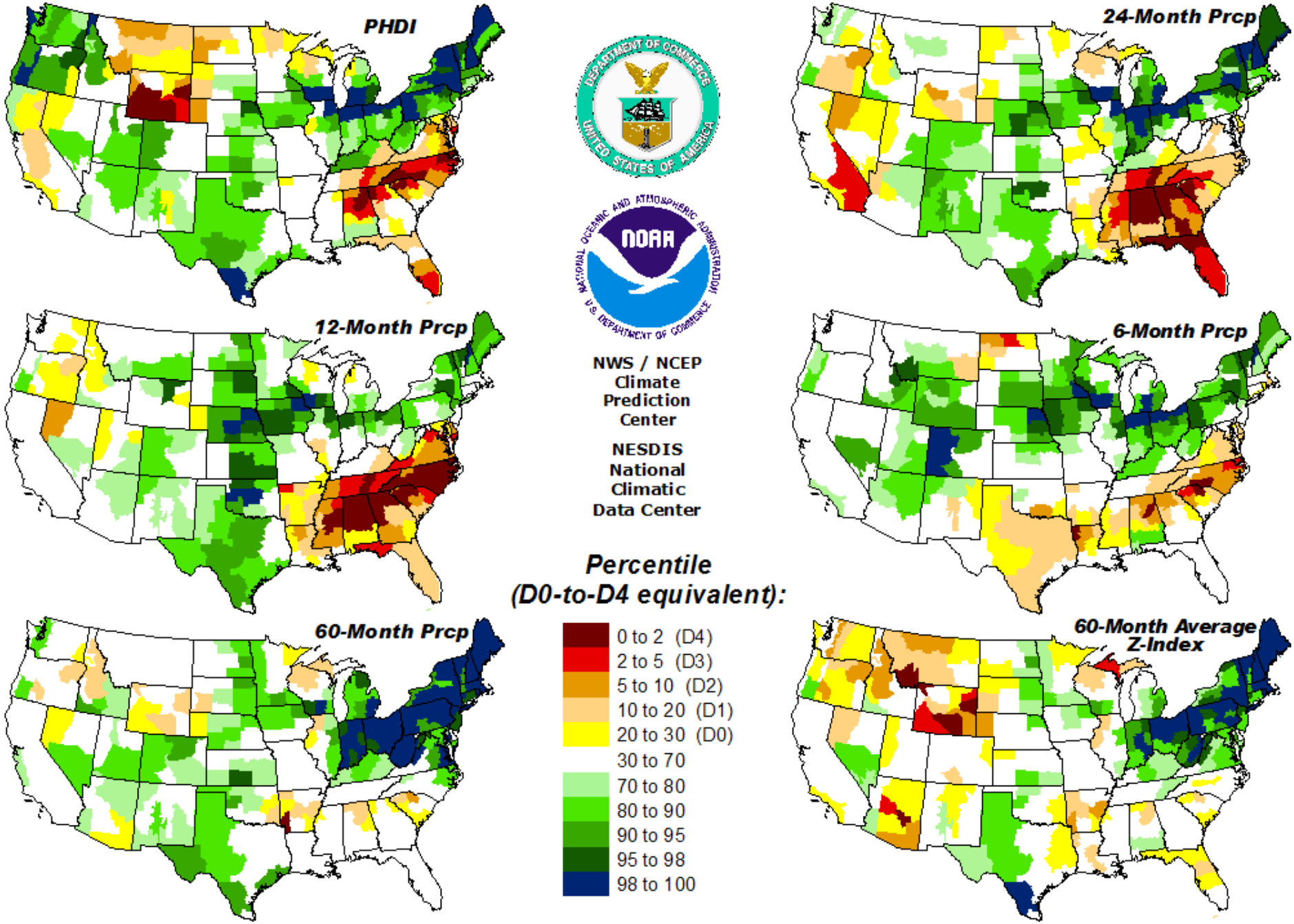
NWS / NCEP
Climate
Prediction
Center

NESDIS
National
Climatic
Data Center

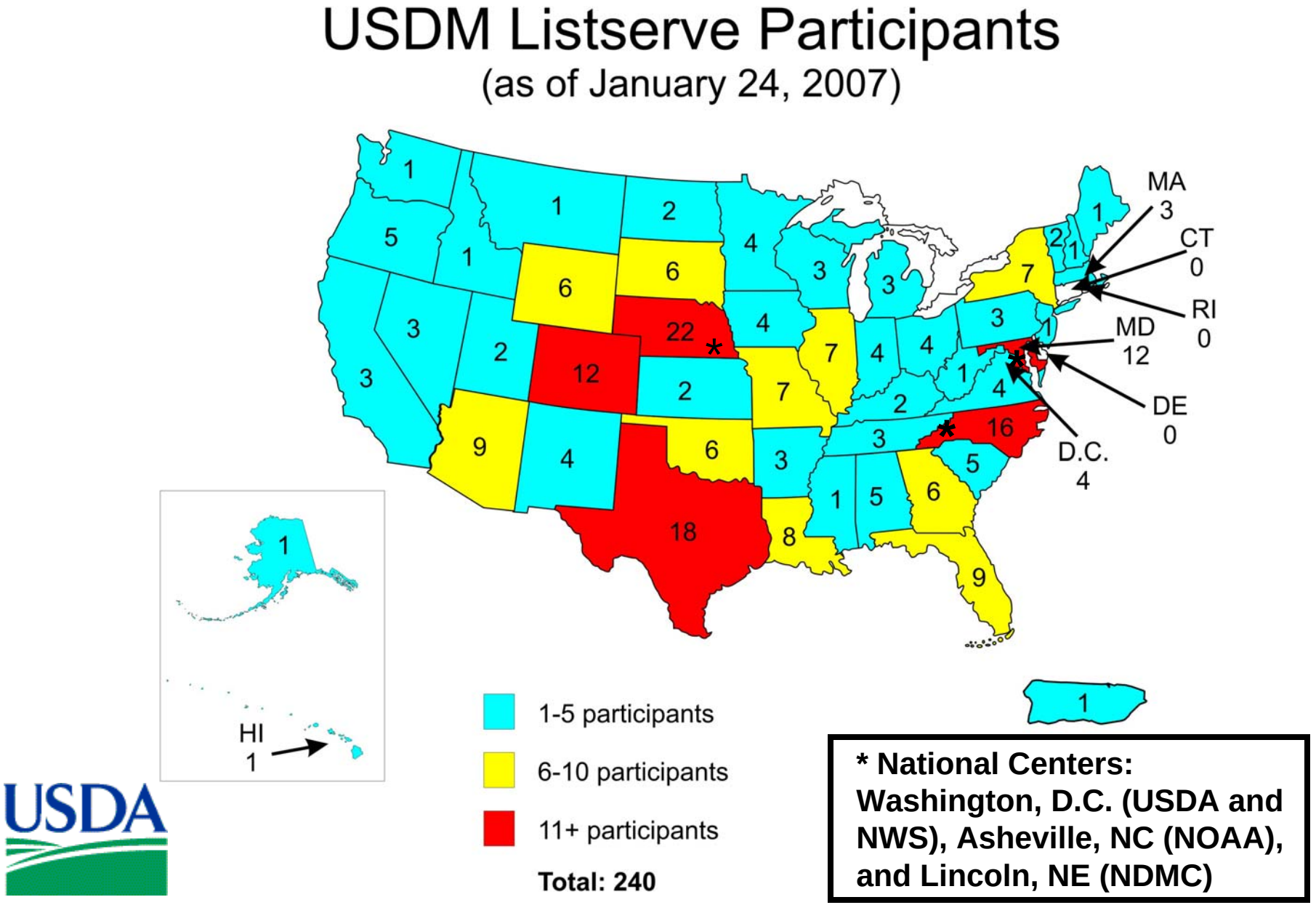
Percentile
(D0-to-D4 equivalent):

- 0 to 2 (D4)
- 2 to 5 (D3)
- 5 to 10 (D2)
- 10 to 20 (D1)
- 20 to 30 (D0)
- 30 to 70
- 70 to 80
- 80 to 90
- 90 to 95
- 95 to 98
- 98 to 100

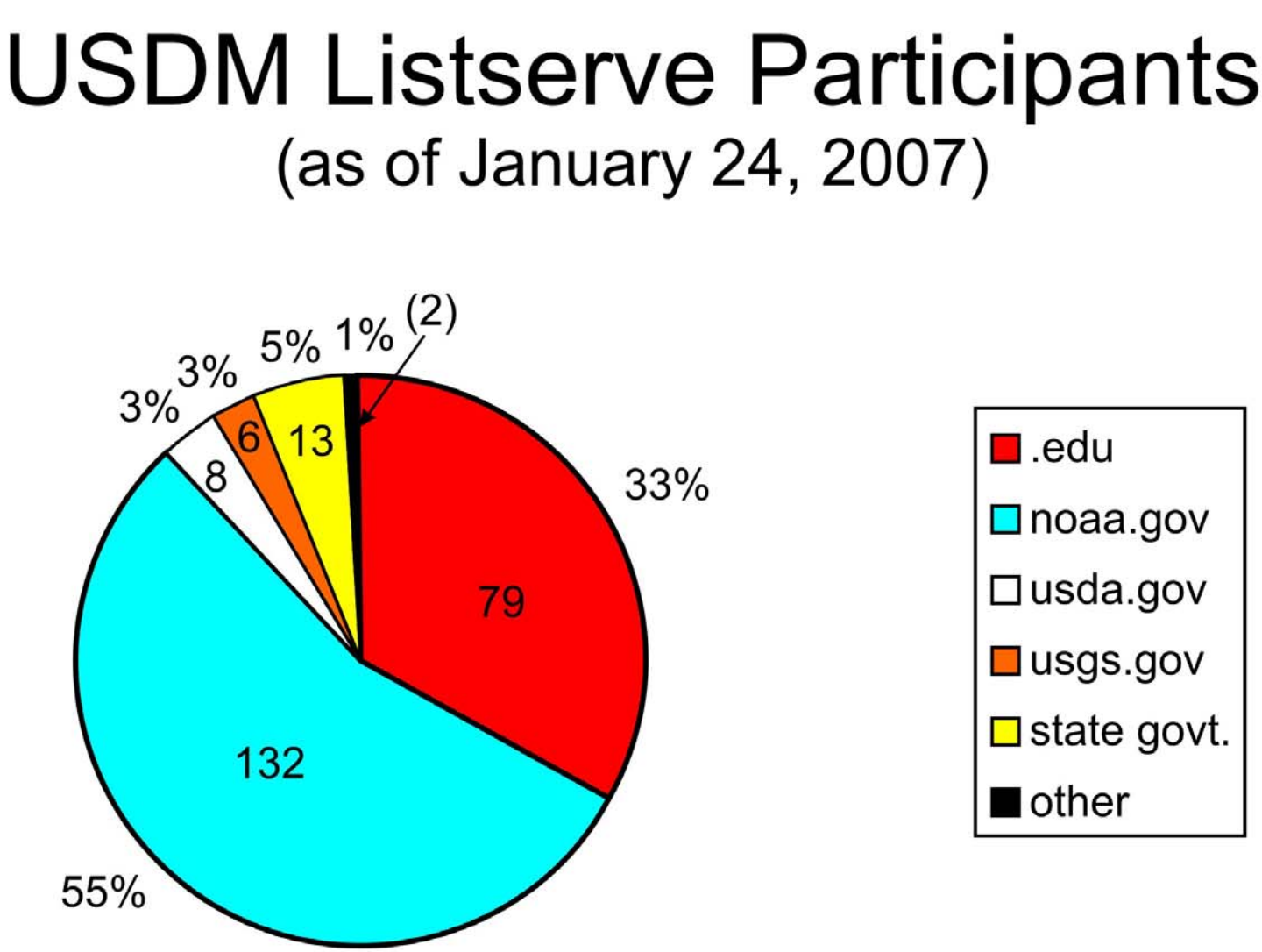
Objective ***Long-Term*** Drought Indicator Blend Percentiles -- *February 9, 2008*



Creating the USDM: Help from Afar



Creating the USDM: Help from Afar



Questions or Comments?

- Contact Information:
  - E-mail: brippey@oce.usda.gov
  - Phone: (202) 720-2397