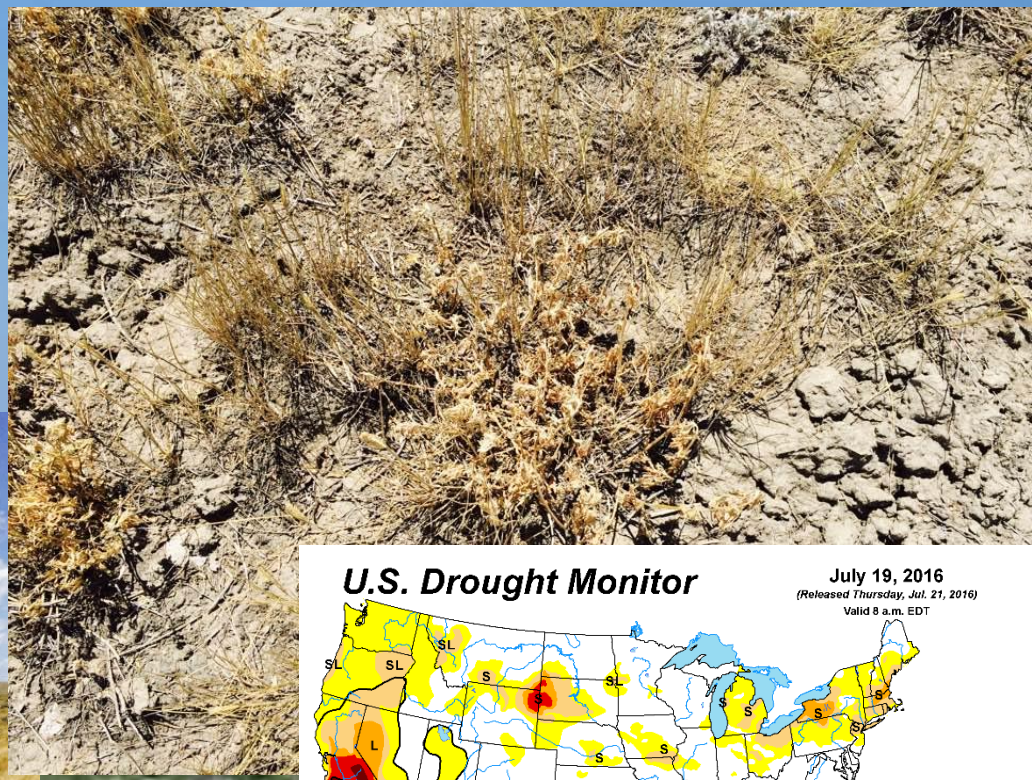
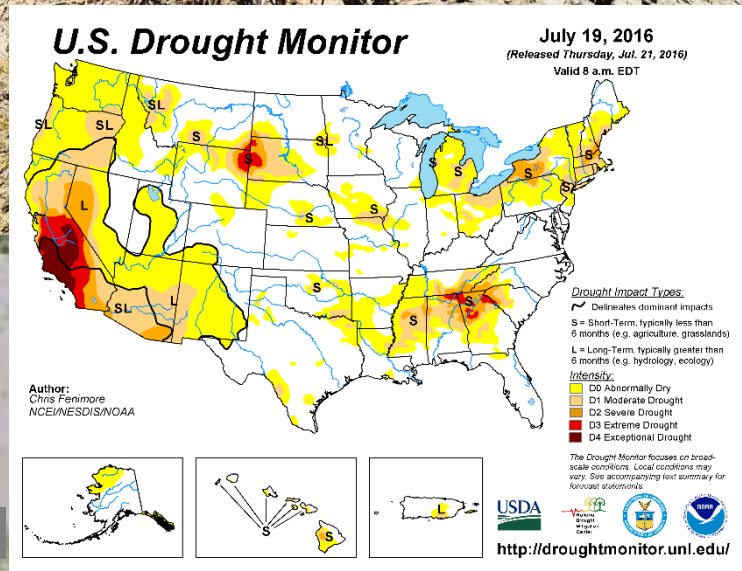
The United States Drought Monitor:

A Cornucopia of Data, a Single Map

Brian Fuchs, Climatologist
National Drought Mitigation Center
School of Natural Resources
University of Nebraska-Lincoln

USDM Forum
Keystone, SD
April 3-5, 2017

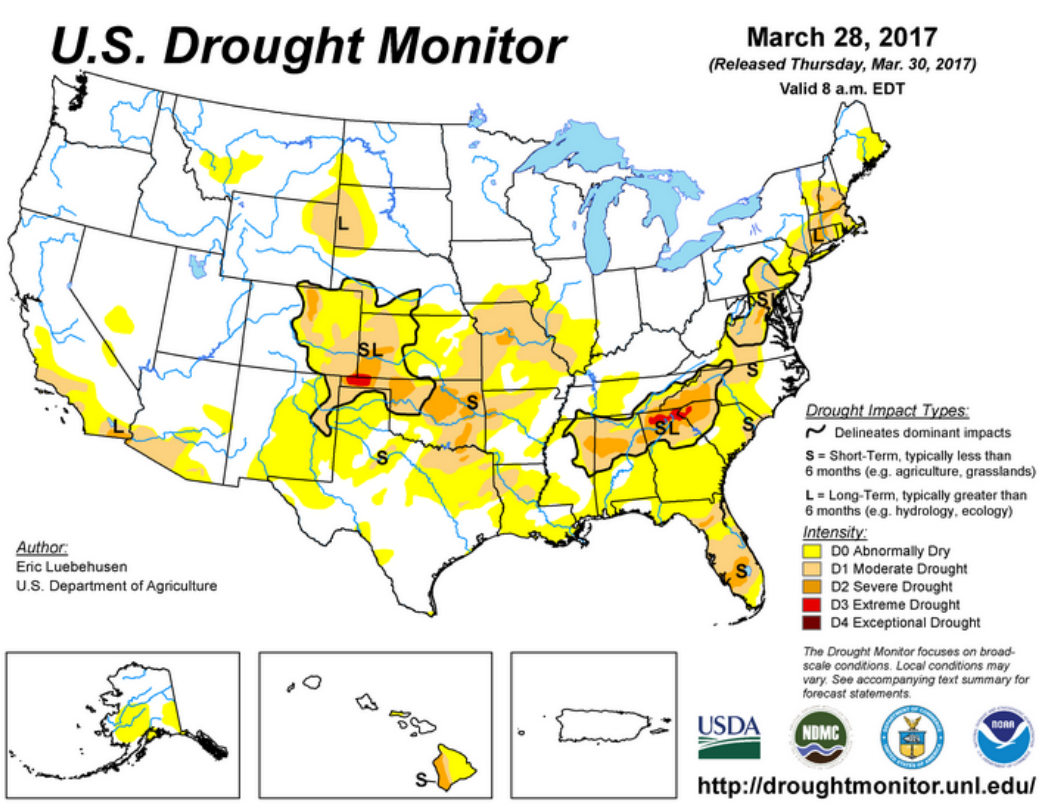




Photos courtesy of Cindy Painter, South Dakota

droughtmonitor.unl.edu

Important Update: There have been minor changes to the U.S. Drought Monitor data folder structure. Please visit **this page** to learn more.
This change will only affect PNG and PDF files.



NOTE: To view regional drought conditions, click on map above. State maps can be accessed from regional maps.

The data cutoff for Drought Monitor maps is each Tuesday at 8 a.m. EDT. The maps, which are based on analysis of the data, are released each Thursday at 8:30 a.m. Eastern Time.

Download PDF | View last week's map | Statistics Comparison | Statistics Table | Change Maps

The U.S. Drought Monitor is produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration.

Current National Drought Summary

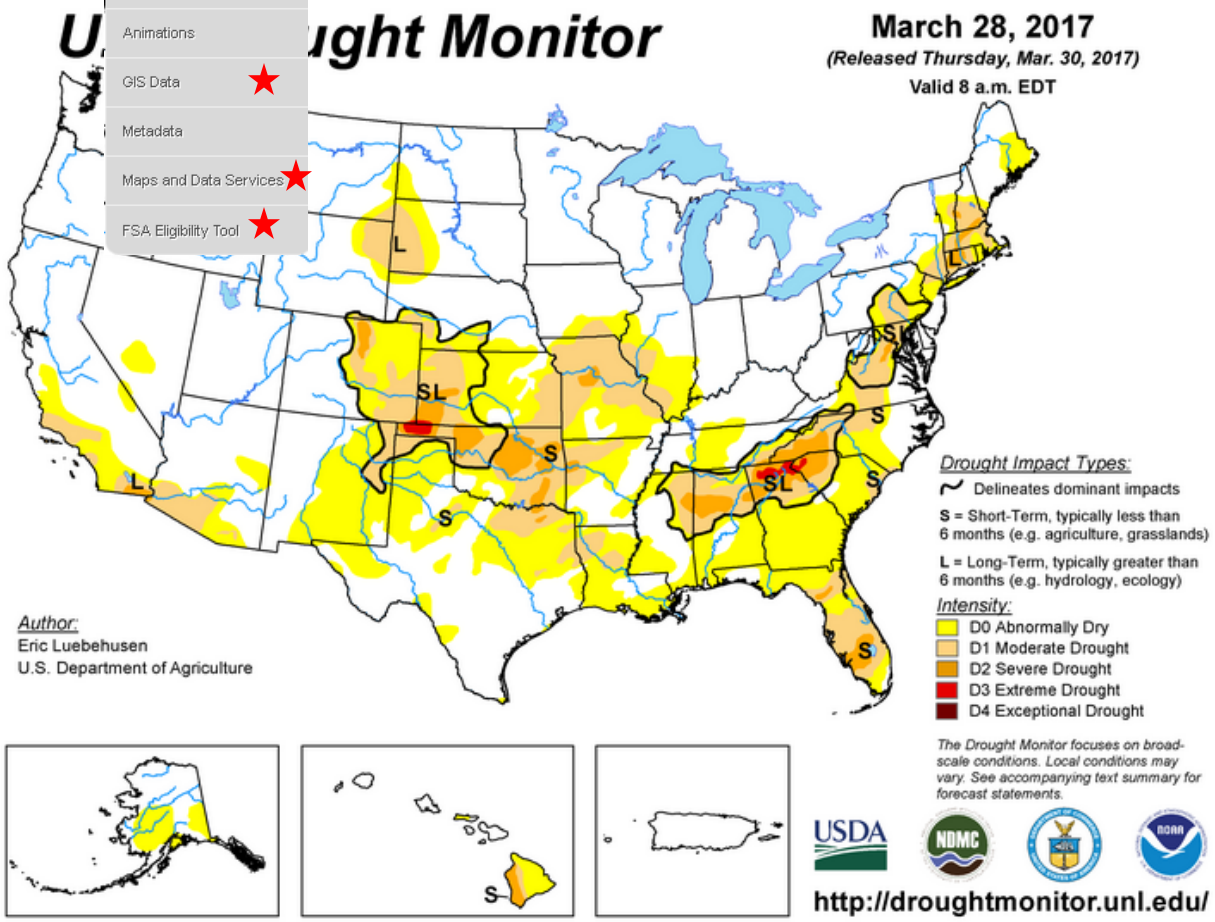
Summary

PLEASE NOTE – The Drought Monitor reflects observed precipitation through Tuesday, 1200 UTC (8 am, EDT); any rain that has fallen after the Tuesday 1200 UTC cutoff will be reflected in next week's map (in particular, Tuesday's and Wednesday's heavy rain on the central and southern Plains).

During the 7-day period (ending Tuesday morning), renewed Pacific storminess brought increasingly wet, mild weather to a large swath of the country. Precipitation was heaviest from the central and northern Pacific Coast into the central and northern Rockies

- Northeast
- Mid-Atlantic
- Southeast
- Delta
- Midwest and lower Ohio Valley
- Northern Plains
- Central and Southern Plains
- Texas
- Western U.S.
- Alaska, Hawaii, and Puerto Rico
- *Looking Ahead*

Important ... been minor changes to ... Monitor data folder structure. Please visit **this page** to learn more.
This chang... G and PDF files.



NOTE: To view regional drought conditions, click on map above. State maps can be accessed from regional maps.

Current National Drought Summary

Summary

PLEASE NOTE – The Drought Monitor reflects observed precipitation through Tuesday, 1200 UTC (8 am, EDT); any rain that has fallen after the Tuesday 1200 UTC cutoff will be reflected in next week's map (in particular, Tuesday's and Wednesday's heavy rain on the central and southern Plains).

During the 7-day period (ending Tuesday morning), renewed Pacific storminess brought increasingly wet, mild weather to a large swath of the country. Precipitation was heaviest from the central and northern Pacific Coast into the central and northern Rockies

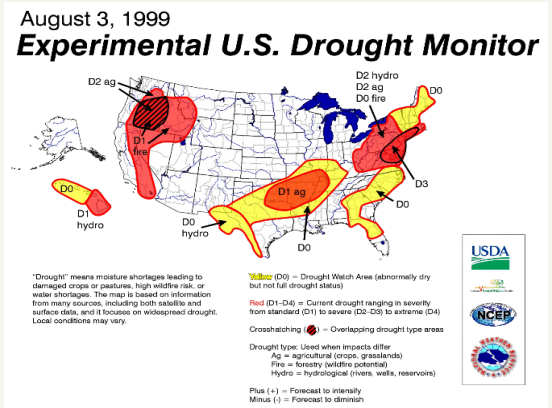
- Northeast
- Mid-Atlantic
- Southeast
- Delta
- Midwest and lower Ohio Valley
- Northern Plains
- Central and Southern Plains
- Texas

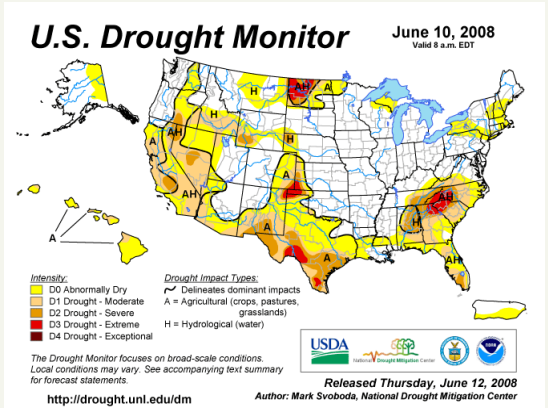
The U.S. Drought Monitor

National Drought Mitigation Center

Since 1999, NOAA (CPC, NCEI, WRCC), USDA, and the NDMC in an EQUAL Partnership have produced a weekly composite drought map -- the U.S. Drought Monitor -- with input from numerous federal and non-federal agencies

- **11 current authors, 2 legacy authors**
- **Western Region Climate Center on board 2008**
- **Incorporate relevant information and products from all entities (and levels of government) dealing with drought (RCC's, SC's, federal/state agencies, etc.) *(450+ experts)***



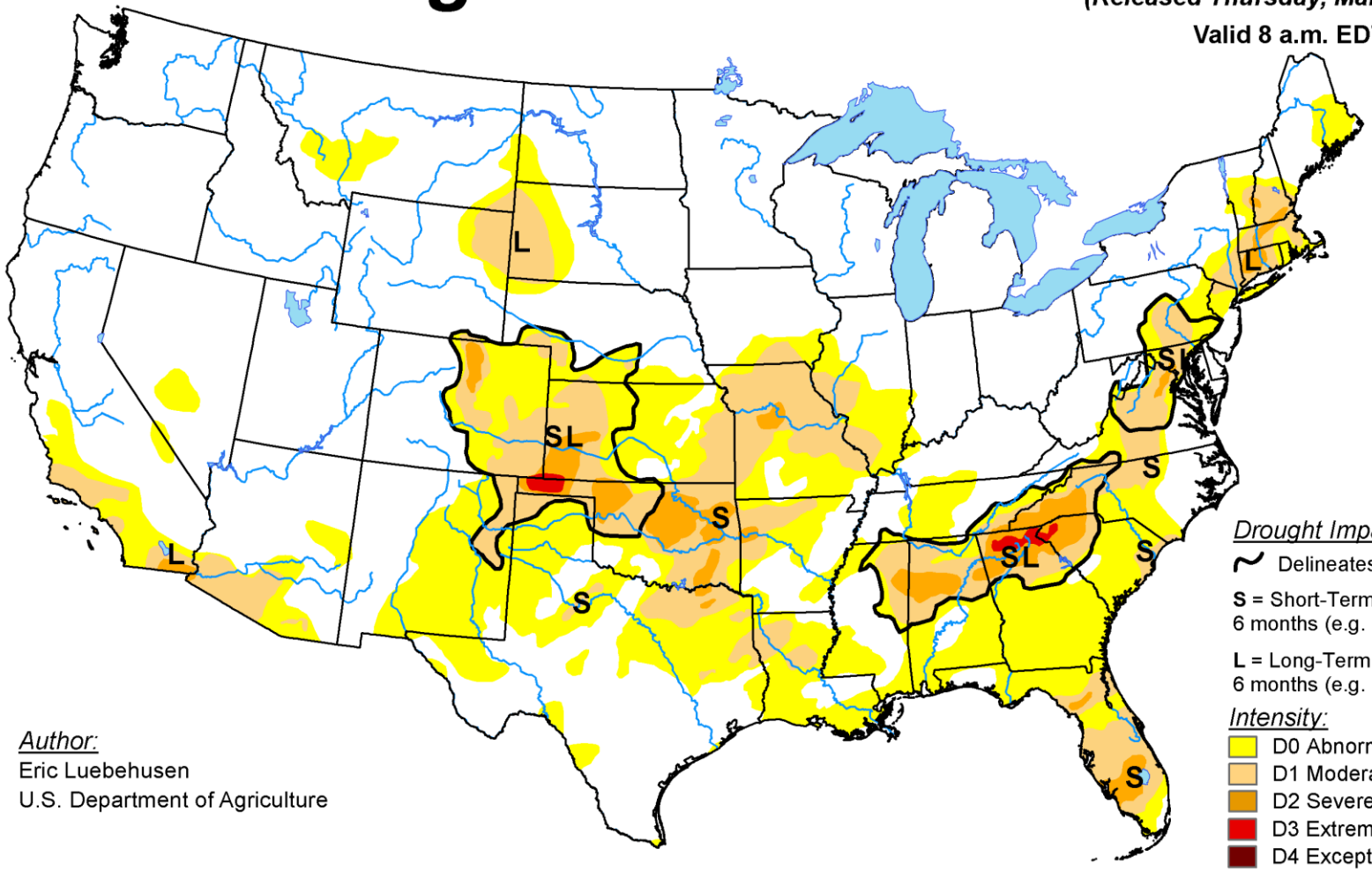


U.S. Drought Monitor

March 28, 2017

(Released Thursday, Mar. 30, 2017)

Valid 8 a.m. EDT



Author:
Eric Luebehusen
U.S. Department of Agriculture

Drought Impact Types:

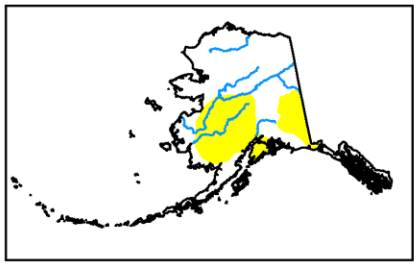
~ Delineates dominant impacts

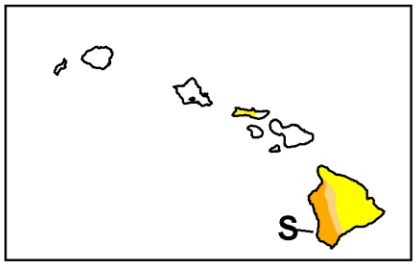
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

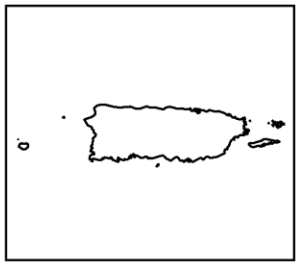
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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







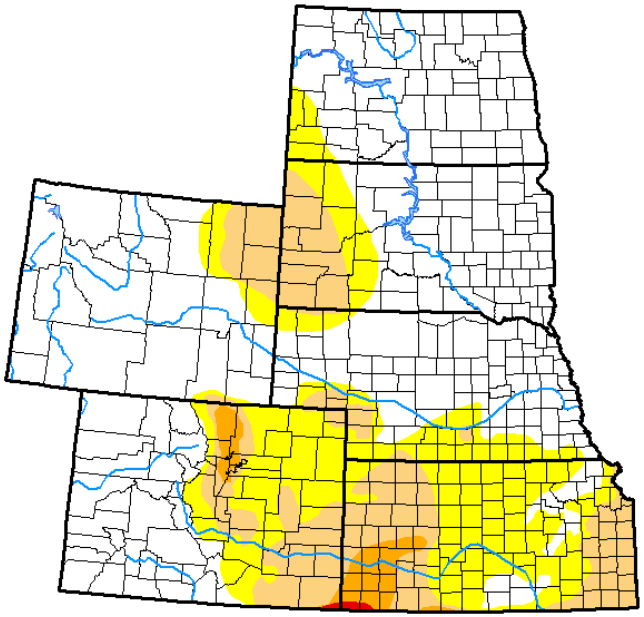
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

USDA NDMC

http://droughtmonitor.unl.edu/

U.S. Drought Monitor

High Plains



March 28, 2017

(Released Thursday, Mar. 30, 2017)

Valid 8 a.m. EDT

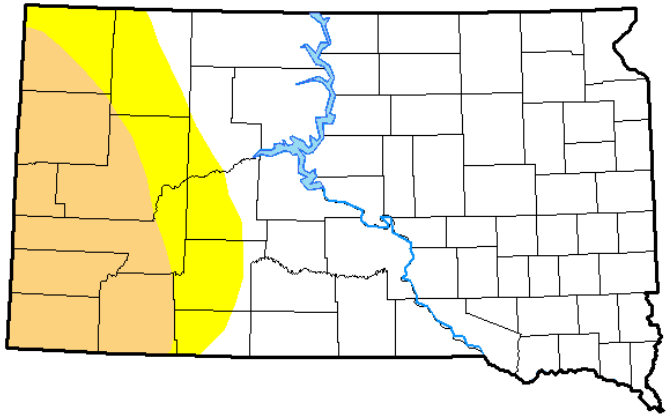
Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	62.61	37.39	17.01	2.11	0.13	0.00
Last Week 03-21-2017	59.21	40.79	22.12	2.51	0.13	0.00
3 Months Ago 12-27-2016	50.65	49.35	21.54	4.05	0.00	0.00
Start of Calendar Year 01-03-2017	50.65	49.35	21.54	3.85	0.00	0.00
Start of Water Year 09-27-2016	70.86	29.14	8.66	2.68	0.17	0.00
One Year Ago 03-29-2016	50.67	49.33	8.61	0.41	0.00	0.00

National Drought Mitigation Center

U.S. Drought Monitor

South Dakota



March 28, 2017

(Released Thursday, Mar. 30, 2017)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	69.93	30.07	17.85	0.00	0.00	0.00
Last Week 03-21-2017	69.93	30.07	17.85	0.00	0.00	0.00
3 Months Ago 12-27-2016	61.22	38.78	26.01	6.20	0.00	0.00
Start of Calendar Year 01-03-2017	61.22	38.78	26.01	6.00	0.00	0.00
Start of Water Year 09-27-2016	47.50	52.50	20.95	4.93	1.09	0.00
One Year Ago 03-29-2016	73.43	26.57	0.08	0.00	0.00	0.00

Intensity:

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

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

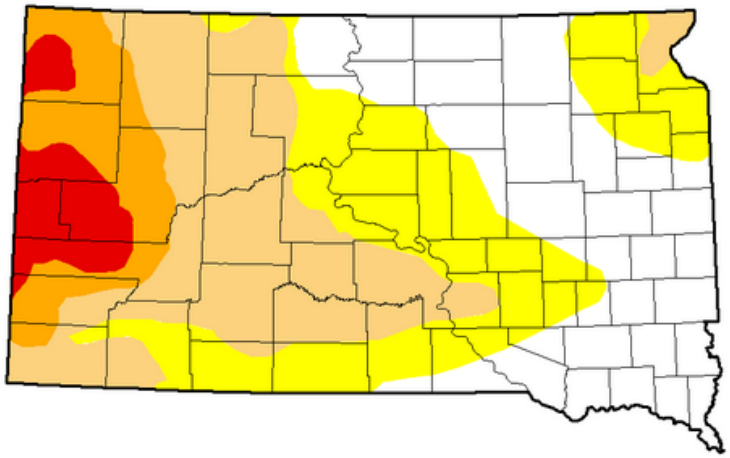
Author:
Eric Luebehusen
U.S. Department of Agriculture

http://droughtmonitor.unl.edu/

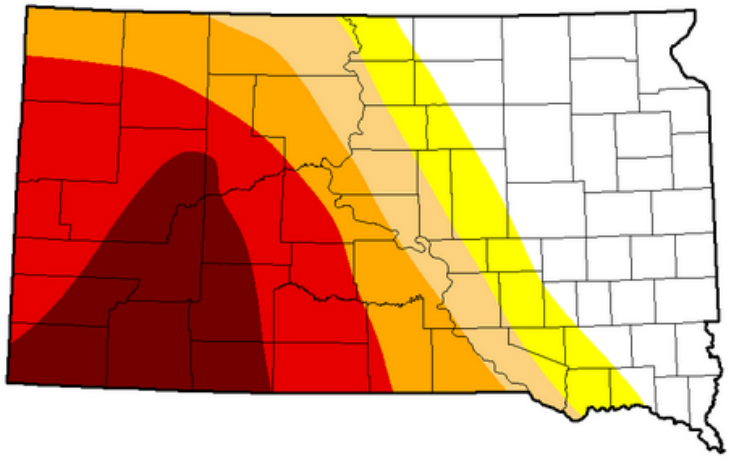
U.S. Drought Monitor Weekly Comparison

Important Update: There have been minor changes to the U.S. Drought Monitor data folder structure. Please visit **this page** to learn more.
This change will only affect PNG and PDF files.

State | South Dakota | Statistics type: Traditional Percent Area | Legend



PNG PDF JPG | July 19, 2016

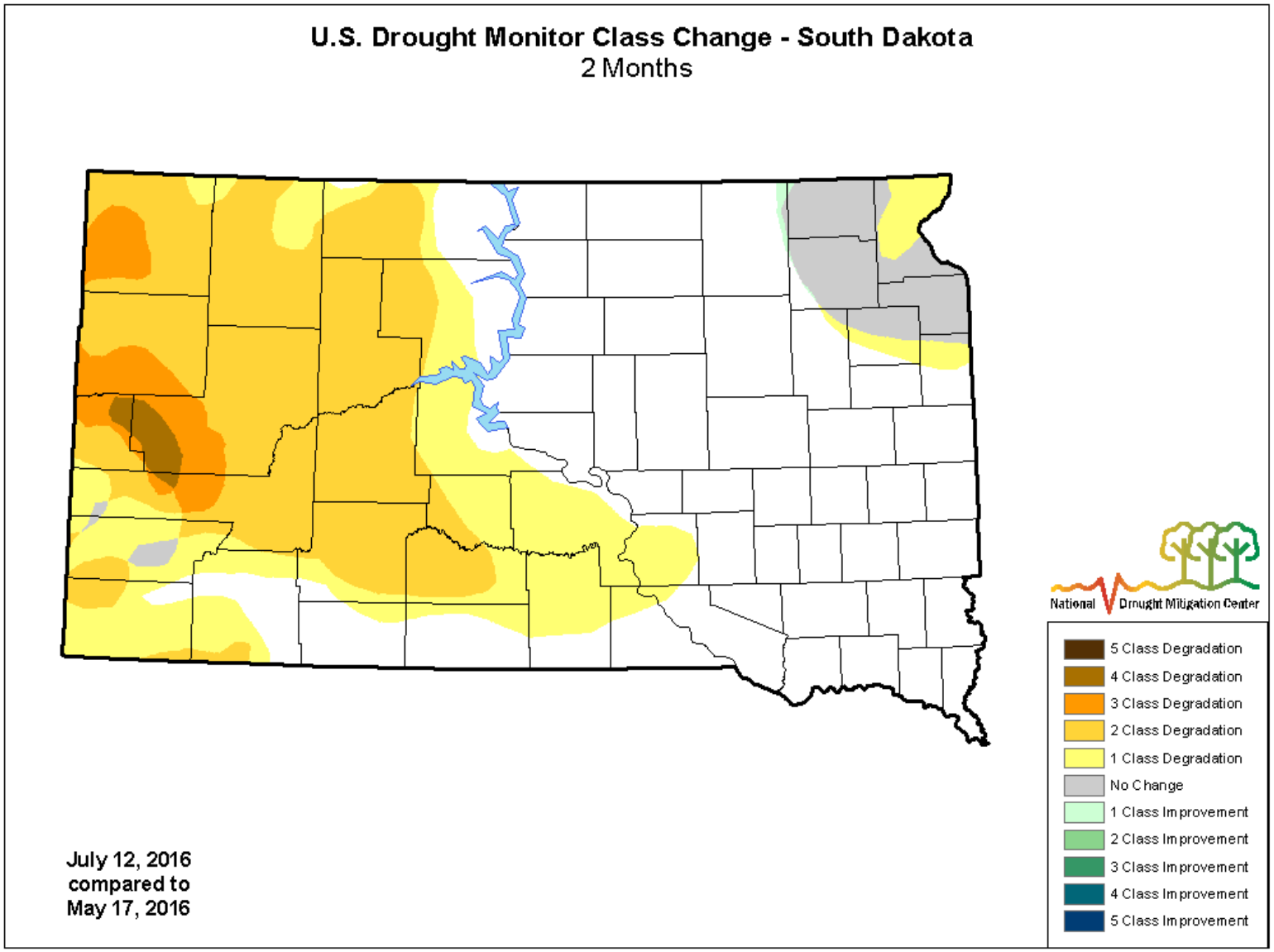


PNG PDF JPG | August 13, 2002

Statistics Comparison

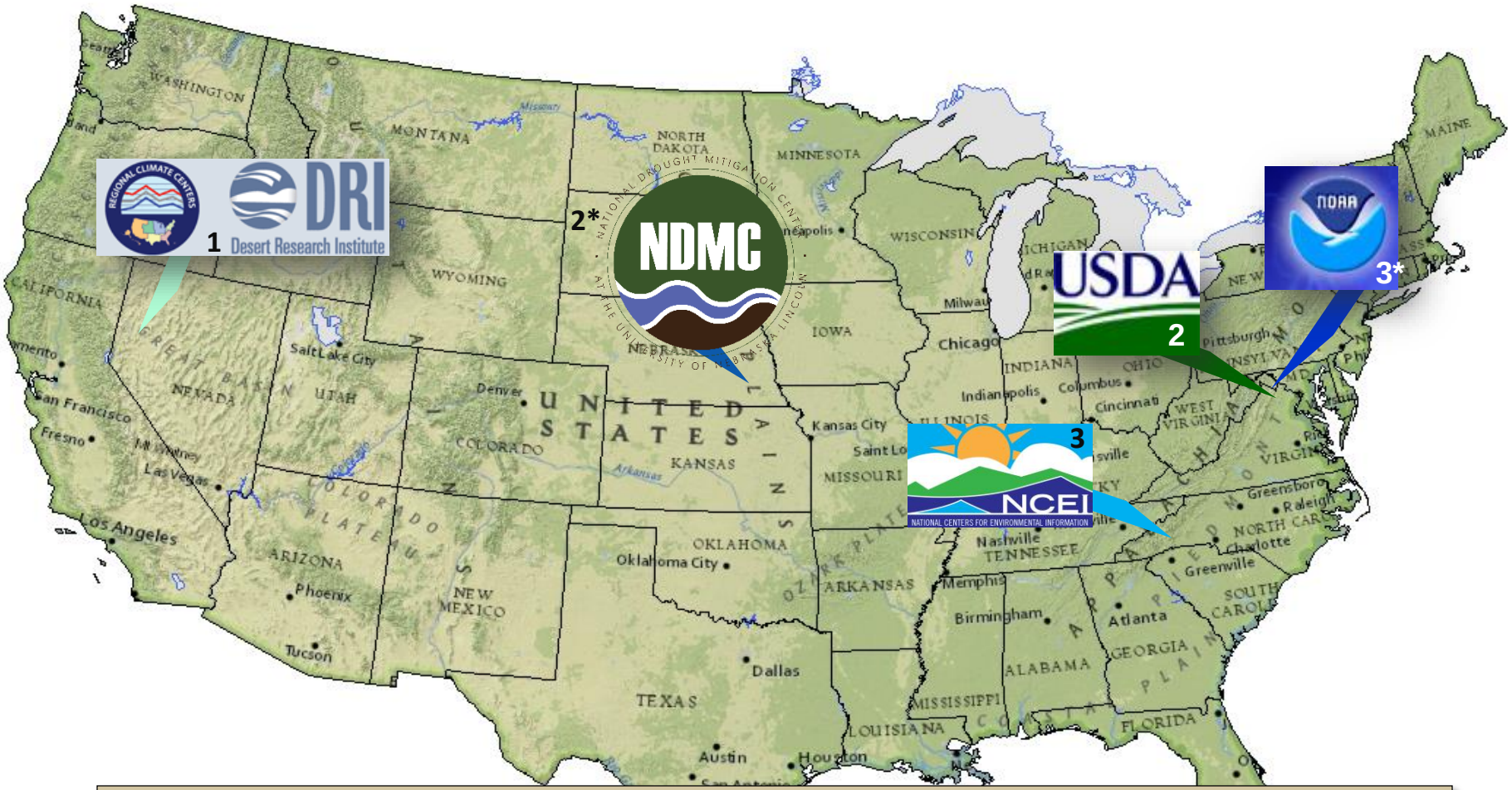
Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
2016-07-19	30.99	69.01	42.68	14.91	5.72	0.00
2002-08-13	29.72	70.28	60.87	51.28	36.73	14.80

U.S. Drought Monitor Change Maps



http://droughtmonitor.unl.edu

How is all of this done?



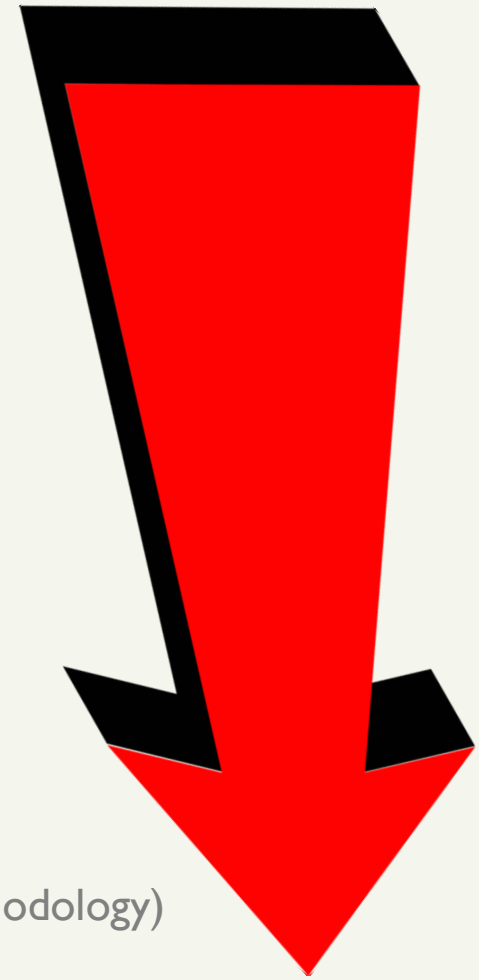
Requirement: Authors must work at a regional or national "center", government or academia/research

There are currently 11* authors, and all are volunteers

USDA World Agricultural Outlook Board

U.S. Drought Monitor Objectives

- Assessment of **current** conditions and **current** impacts
- The U.S. Drought Monitor is ***NOT*** a model
  - The map is made manually each week based off the previous map
- The U.S. Drought Monitor is ***NOT*** interpreting just precipitation
- The U.S. Drought Monitor is ***NOT*** a forecast or drought declaration
  - Can be used by decision makers in this way though
- Identifying **impacts**
  - "**S**" short-term impacts, "**L**" long-term impacts or "**SL**" for a combination of both
  - "**S**"-6 month time scales or less, "**L**"-greater than 6 month time scales
- Incorporate **local expert** input
  - Accomplished via email and impact reports
- Authors try to be as **objective** as possible (using the percentiles methodology)
  - The physical data and indicators ***must*** support the depiction on the map
  - Impact data validates physical data
- ***"Convergence of evidence"*** approach



U.S. Drought Monitor Approach

National Drought Mitigation Center

"Convergence of Evidence"

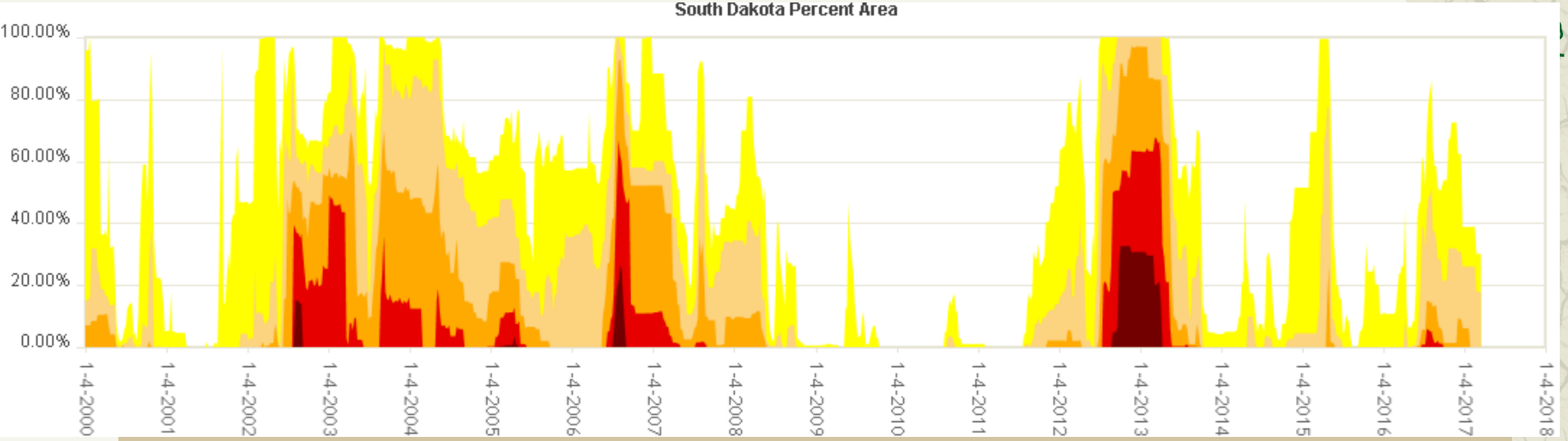
- Many types of drought "information" can be collectively analyzed
  - ***Determining if the majority of information is 'converging' (telling the same story)*** about the accuracy, or inaccuracy, of the drought as depicted by the U.S. Drought Monitor
- Authors need to ***look at 100% of the data, BUT don't believe in any one piece of data input 100%*** in making a decision…
- ***Multiple indicators and many types of information are part of the analysis***
  - These data will identify different climatic and hydrologic parameters which are needed to understand the complete picture of a drought indicator's performance and how they interact
- ***Impacts are the "ground truth"***, yet aren't monitored to the extent which other data are….**you can't measure what you don't monitor!**

Percentiles and the U.S. Drought Monitor

National Drought Mitigation Center

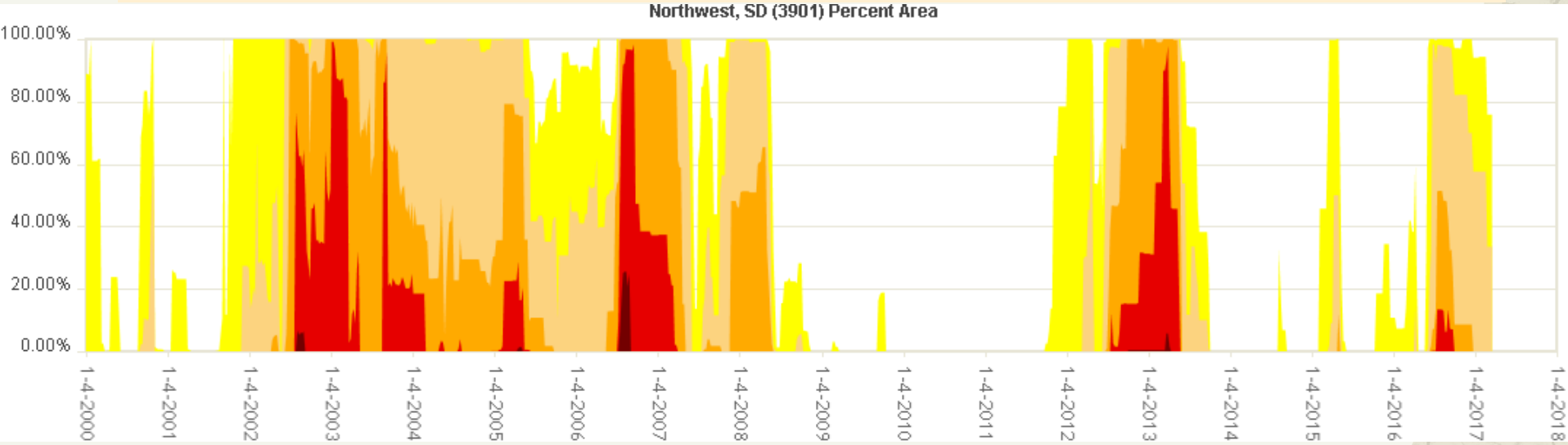
- **Advantages of percentiles:**
  - Can be applied to any parameter
  - Can be used for any length of data record
  - Puts drought in historical perspective
    - How many occurrences in a given period of time

- D4: Exceptional Drought  (*1st-2nd* percentile)
- D3: Extreme Drought  (*3rd-5th* percentile)
- D2: Severe Drought  (*6th-10th* percentile)
- D1: Moderate Drought  (*11th-20th* percentile)
- D0: Abnormally Dry  (*21st-30th* percentile)

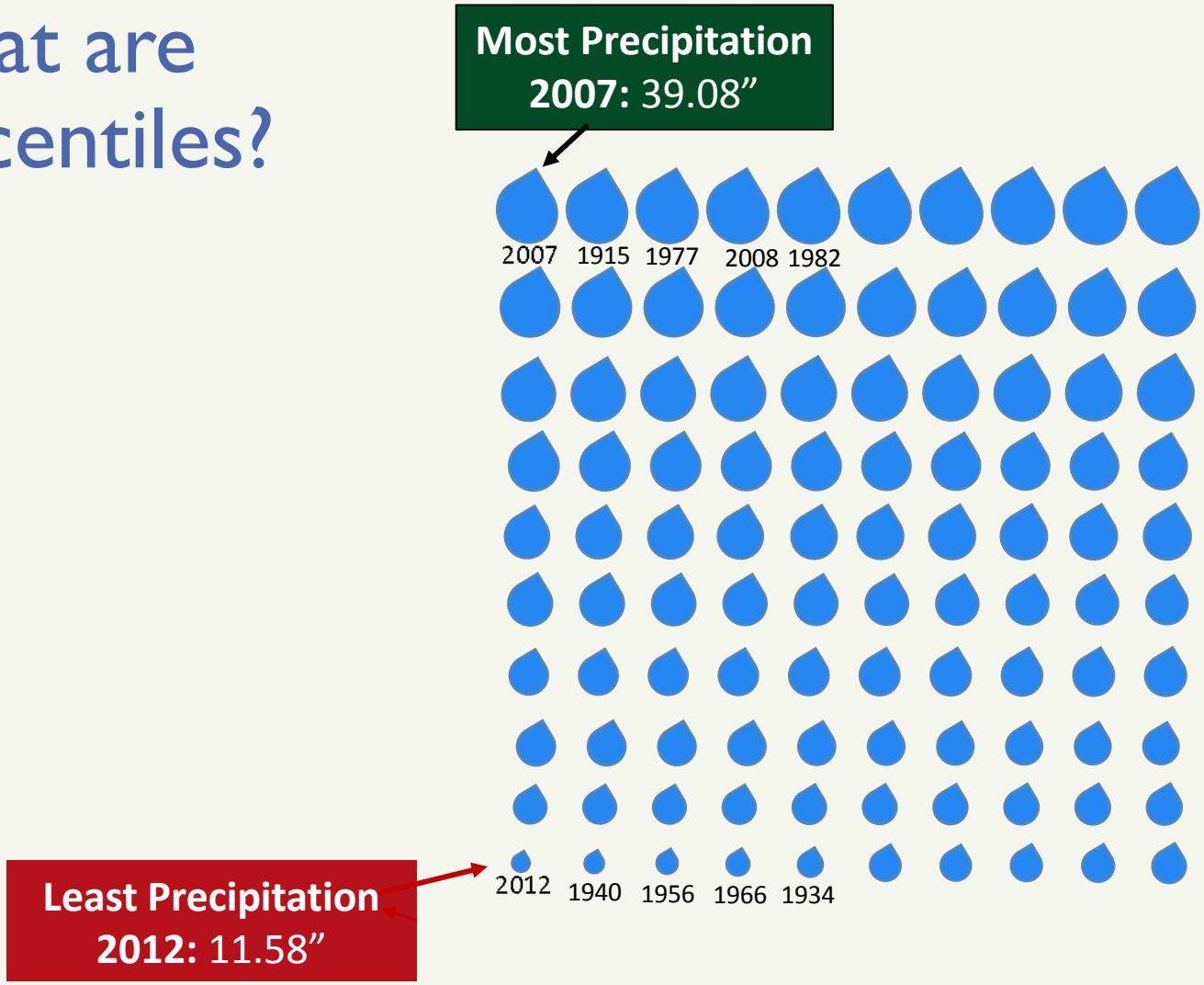


The drought categories are associated with historical occurrence/likelihood (percentile ranking)

It is not anecdotal or subjective, like "It's really, really dry!!" ….or, "I don't remember it ever being this dry, we have to be D4!!"

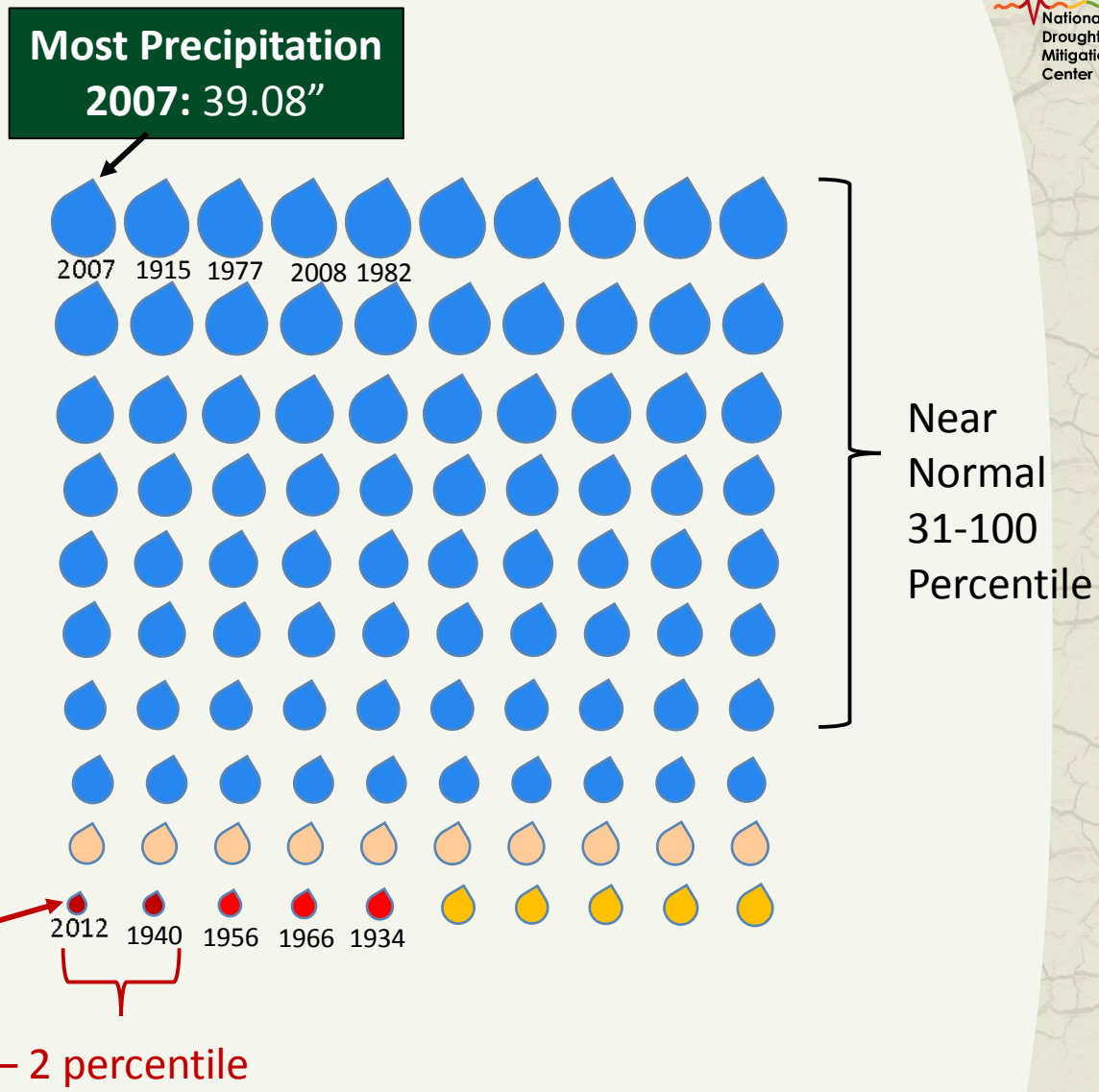


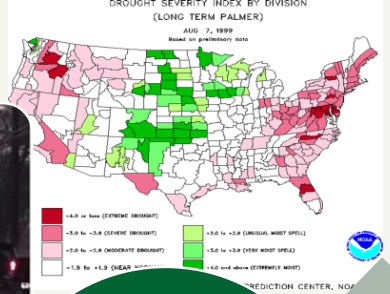
What are percentiles?

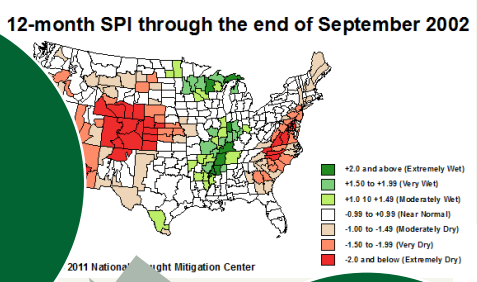


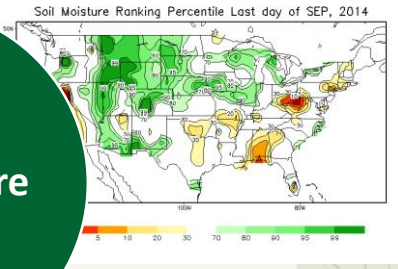
What are percentiles?

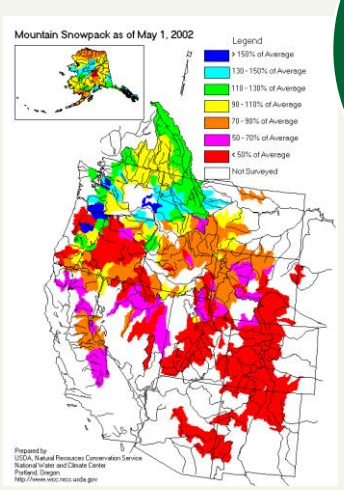
			Percentile
	D0	Abnormally Dry	21-30
	D1	Moderate Drought	11-20
	D2	Severe Drought	6-10
	D3	Extreme Drought	3 - 5
	D4	Exceptional Drought	1 - 2

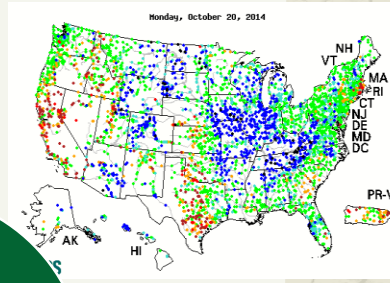


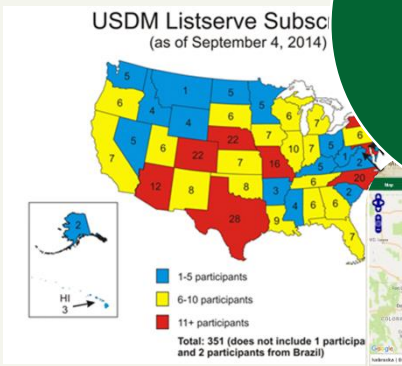


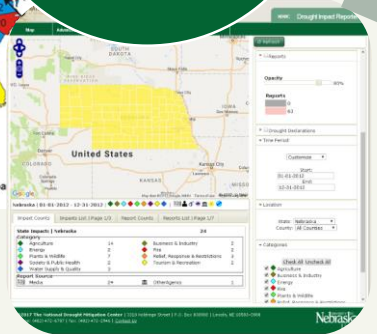


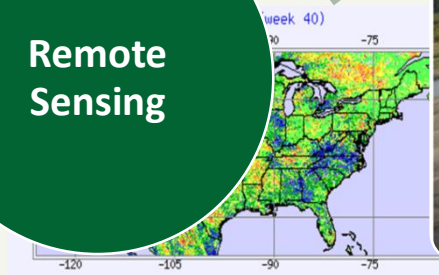












Indices: SPI/PDSI

Soil Moisture

Streamflow and Reservoirs

Remote Sensing

Expert Local Input and Impacts

Precipitation and Snow

Most of the information analyzed each week falls into one of these categories.

Authors now use roughly ***40-50 unique indicators*** while creating the U.S. Drought Monitor map, but not all areas are represented equally by all pieces of data.

U.S. Drought Monitor

National Drought Mitigation Center

Integrates Key Drought Indicators:

- Palmer Drought Index
- SPI
- SPEI
- KBDI
- Modeled Soil Moisture
  - NLDAS
- 7-14 Day Avg. Streamflow
- Precipitation Anomalies
- AHPS Precipitation
- Other data which are available

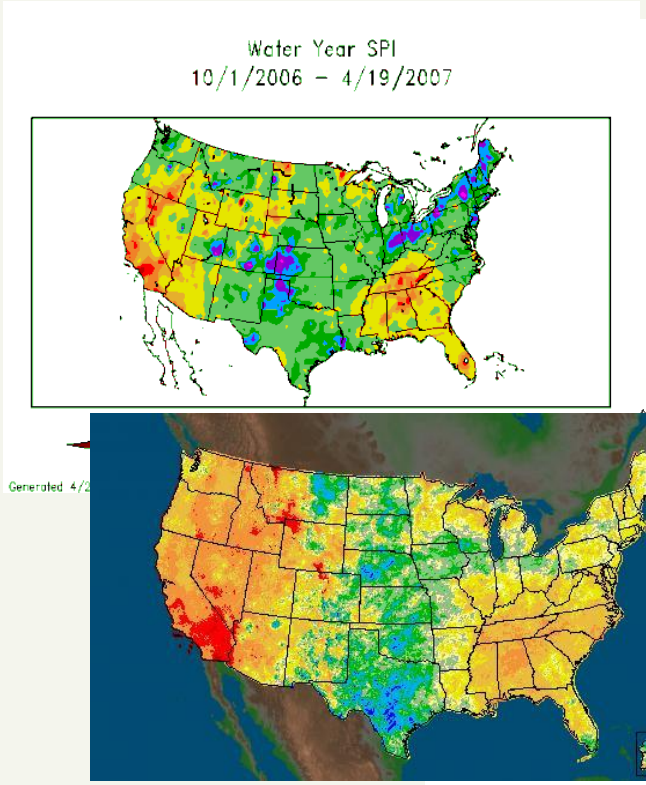
Growing Season:

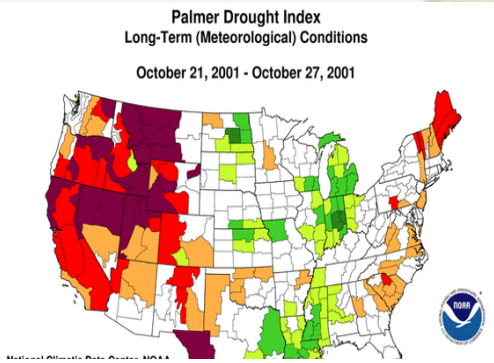
- Crop Moisture Index
- Sat. Veg. Health Index
- VegDRI/ESI/etc.
- Soil Moisture
- Mesonets
- State/Regional data

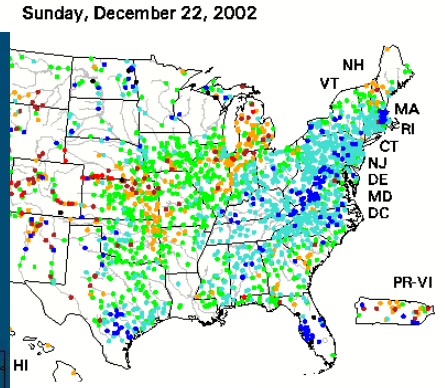
In The West:

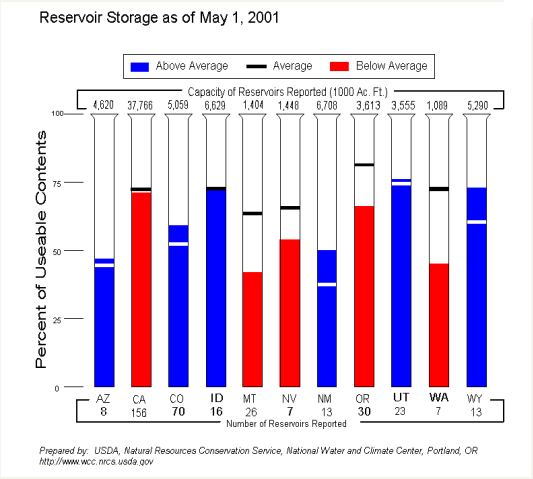
- SWSI
- Reservoir levels
- Snowpack (SNOTEL)
- SWE
- Streamflow

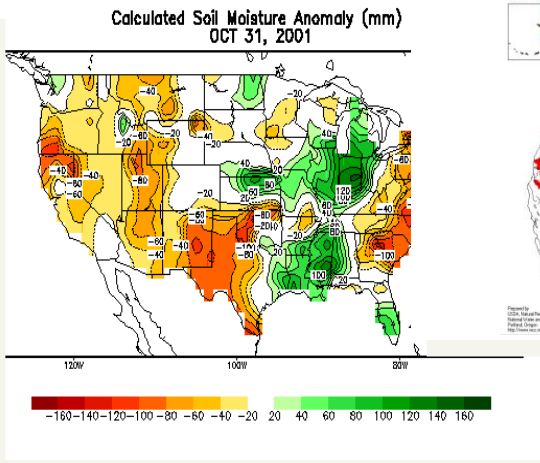
Created in ArcGIS

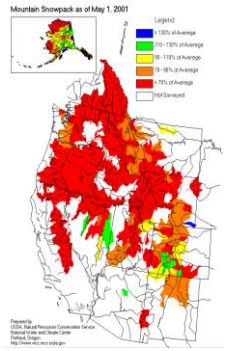












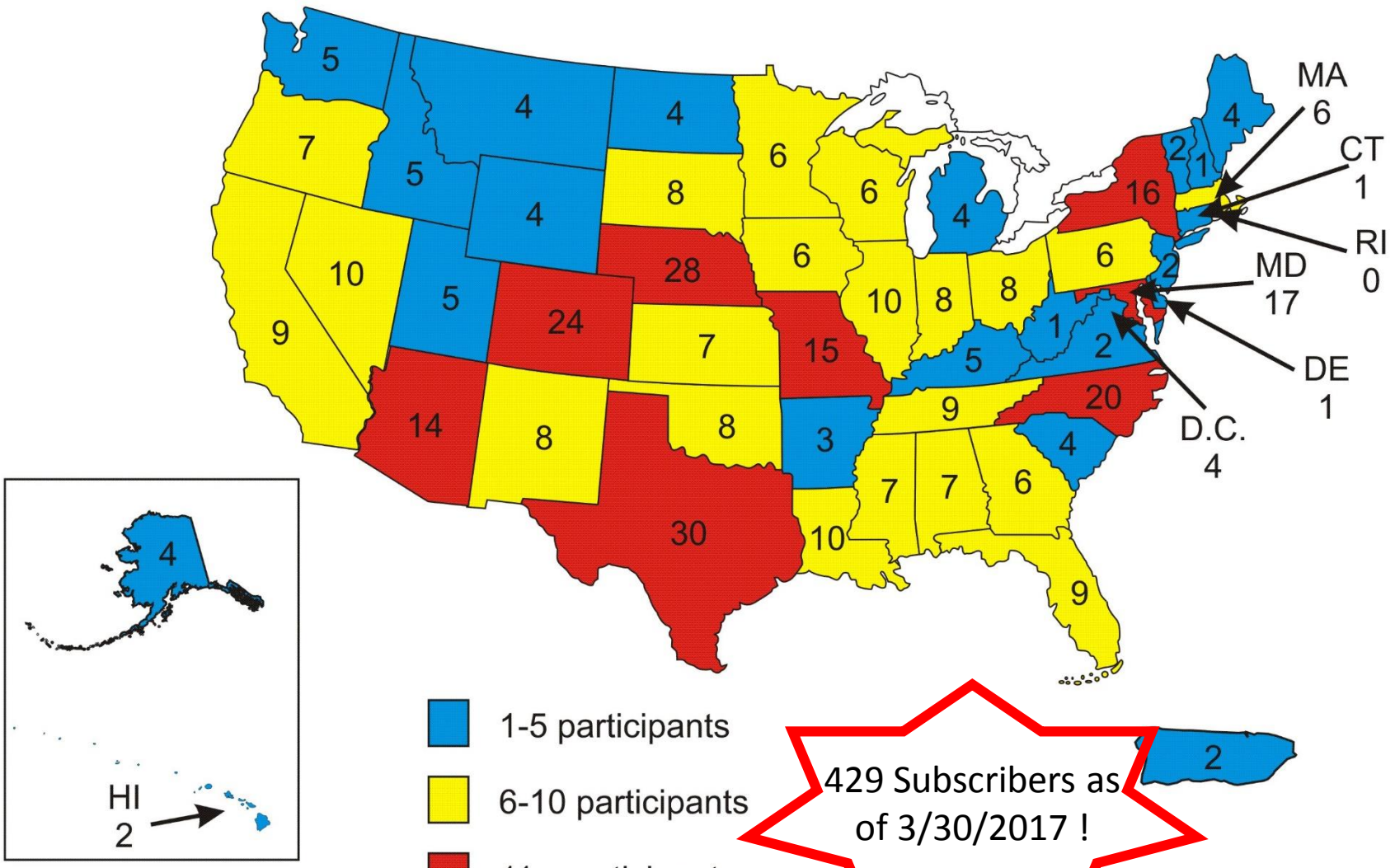
Regional and Local Feedback/Input Process

- Annual User **Feedback Forums** (USDM/NADM) since 2000
- Various webinars/telecons/reports/data/products
- ***Regional Climate Centers*** and *NOAA* **Regional Climate Service Directors and Coordinators along w/ Weather Forecast Offices (WFOs)**
- ***State Climatologists***
- ***USDA FSA/NRCS***
- ***Native American Tribal input***
- ***CoCoRaHS (impacts)***
- National Integrated Drought Information System ***(NIDIS) Pilot RDEWS*** basin webinars:
  - UCRB (Upper Colorado River Basin)
  - ACF (Apalachicola-Chattahoochee-Flint)
  - Southern Plains
  - MORB (Missouri River Basin)
  - California/Nevada
  - Pacific Northwest/Midwest (both coming online)
- ***Drought Task Forces***: North Carolina, Hawaii, Oklahoma, Texas, New Mexico, Alabama, Florida, South Dakota, Kentucky, Arizona, Montana, and California

- **And MANY OTHERS !**

USDM Listserve Subscribers

(as of August 24, 2016)

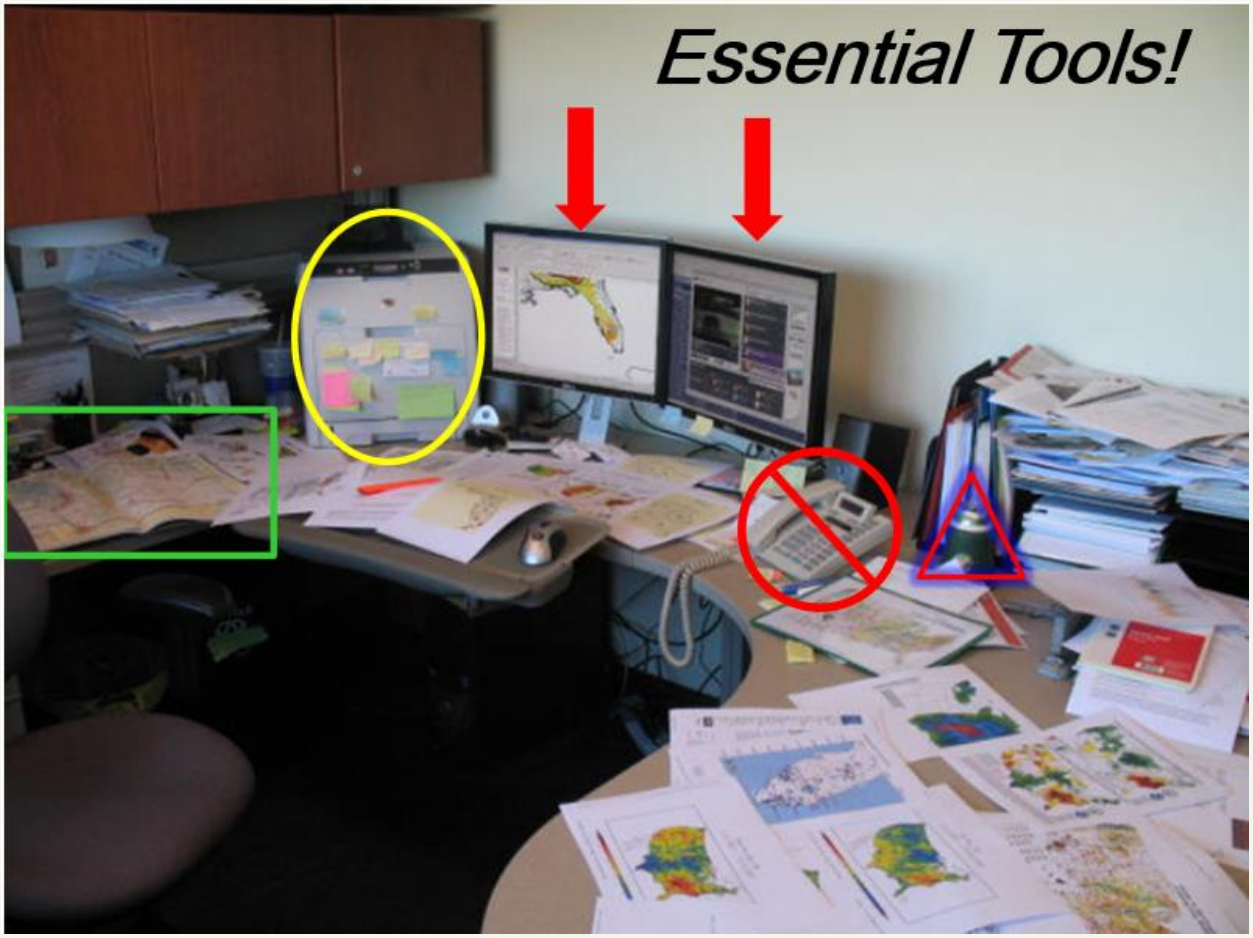


Total: 394 (does not include 2 participants from Canada and 2 participants from Brazil)

National Drought Mitigation Center

National Drought Mitigation Center

The author analyzes and synthesizes all data & local input into one drought map



National Drought Mitigation Center

Any Questions ?

Contact Information:

Brian Fuchs
bfuchs2@unl.edu
402-472-6775

National Drought Mitigation Center
School of Natural Resources
University of Nebraska-Lincoln

National Drought Mitigation Center