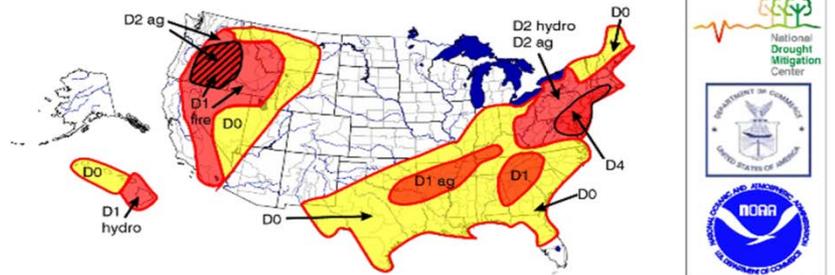


Dry Fusion: A Timeline of the U.S. Drought Monitor's Evolution

August 11, 1999 (revised as of 12:00 pm CDT)
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)

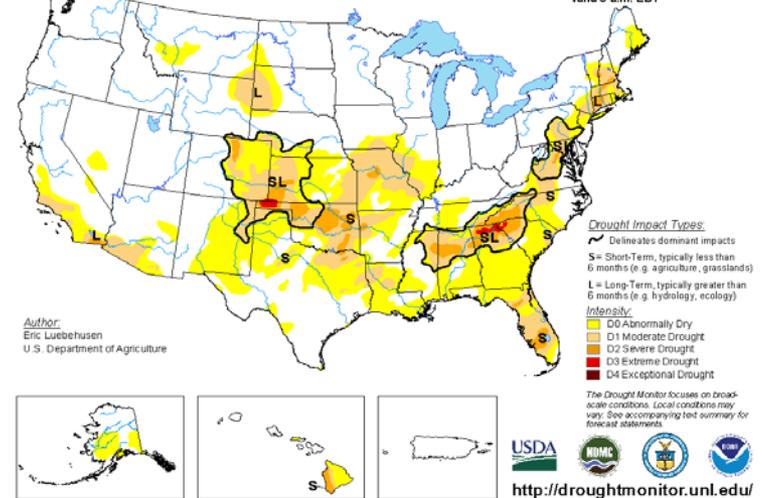
Crosshatching (■) = Overlapping drought type areas

Drought type: Used when impacts differ
 Ag = agricultural (crops, grasslands)
 Fire = forestry (wildfire potential)
 Hydro = hydrological (rivers, wells, reservoirs)

Plus (+) = Forecast to intensify next two weeks
 Minus (-) = Forecast to diminish next two weeks

U.S. Drought Monitor

March 28, 2017
 (Released Thursday, Mar. 30, 2017)
 Valid 8 a.m. EDT



Author:
 Eric Luebbehusen
 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.

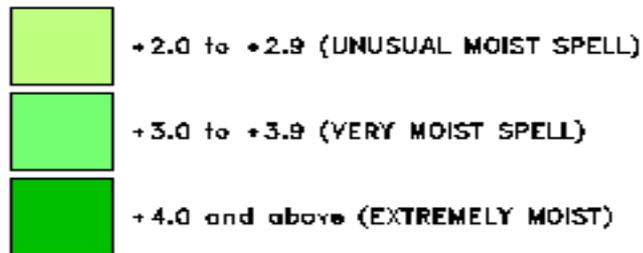
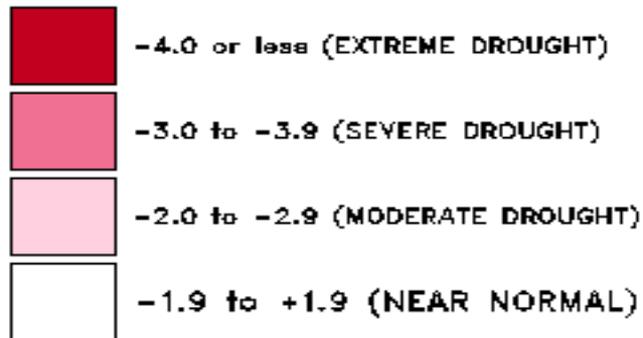
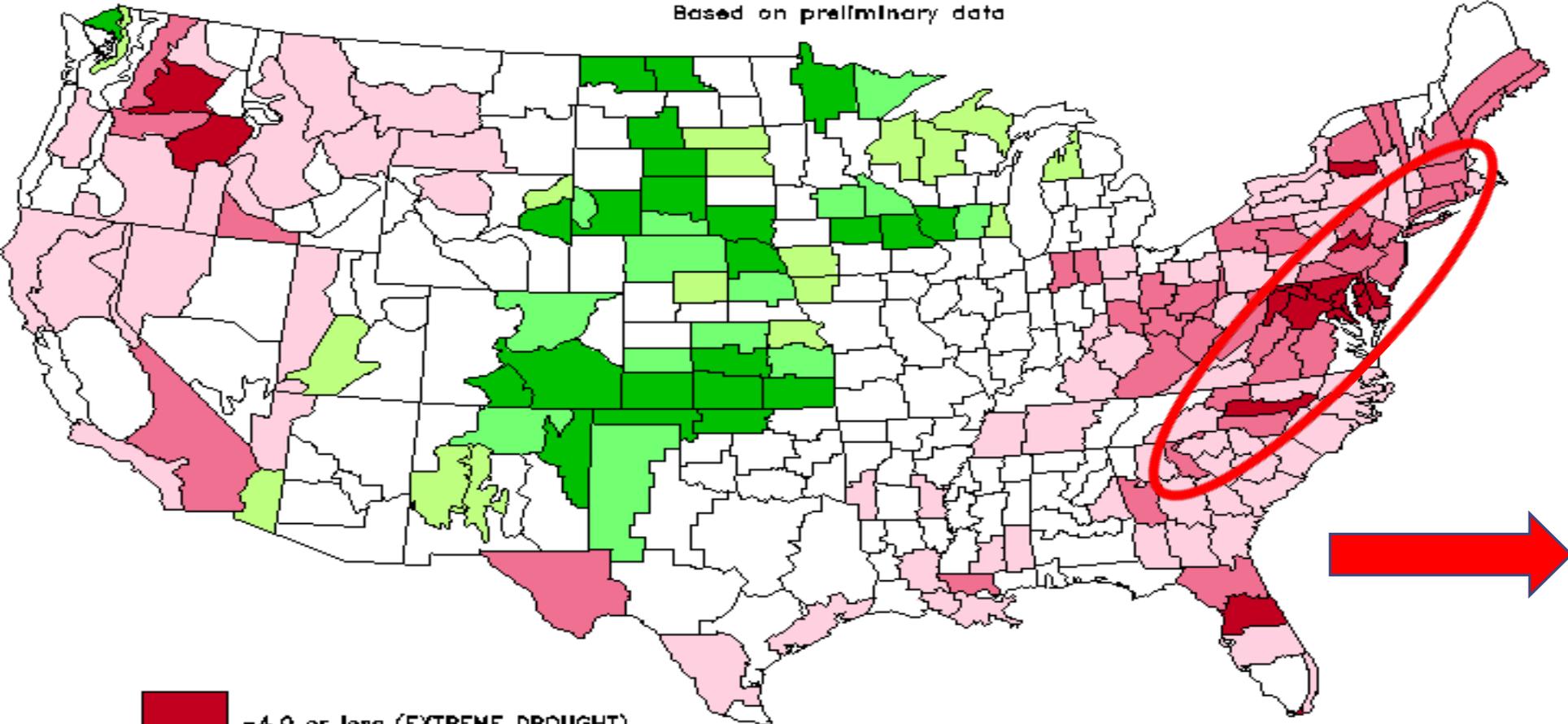
**Mark Svoboda, PhD, Director
 National Drought Mitigation Center
 University of Nebraska-Lincoln**

USDA Climate Hub Drought Workshop , Amarillo, TX, April 5, 2018

DROUGHT SEVERITY INDEX BY DIVISION (LONG TERM PALMER)

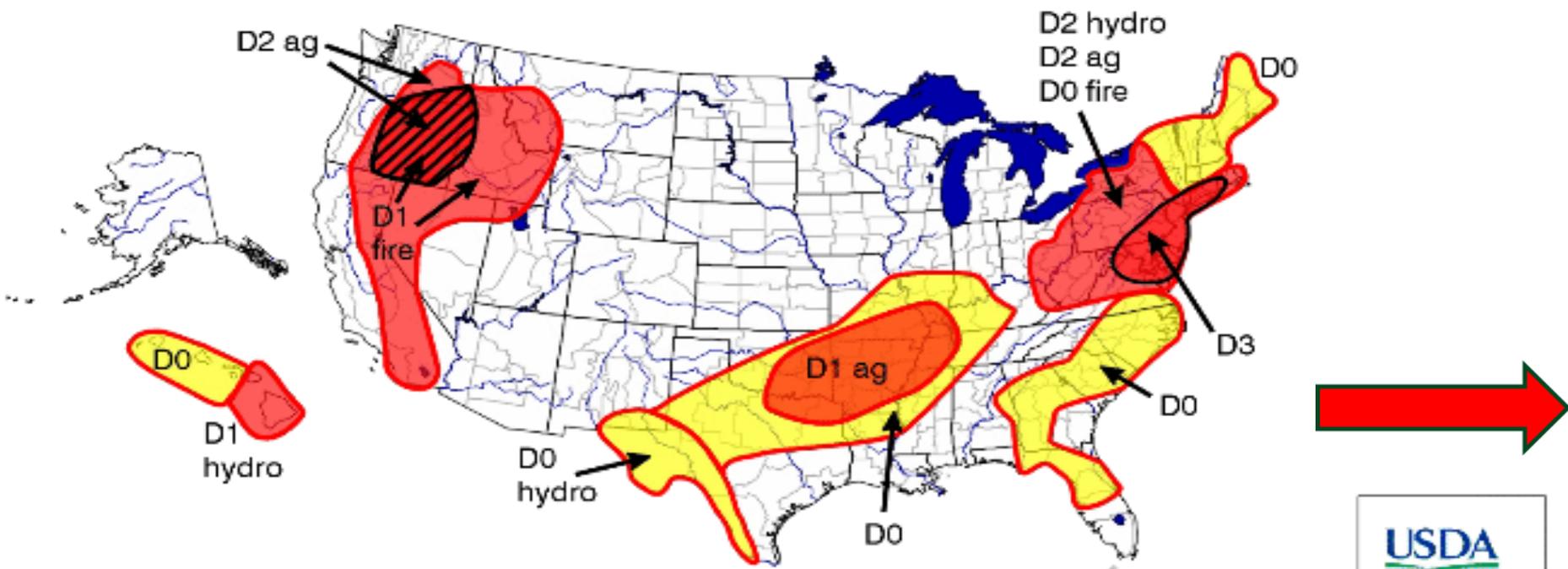
AUG 7, 1999

Based on preliminary data



August 3, 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)

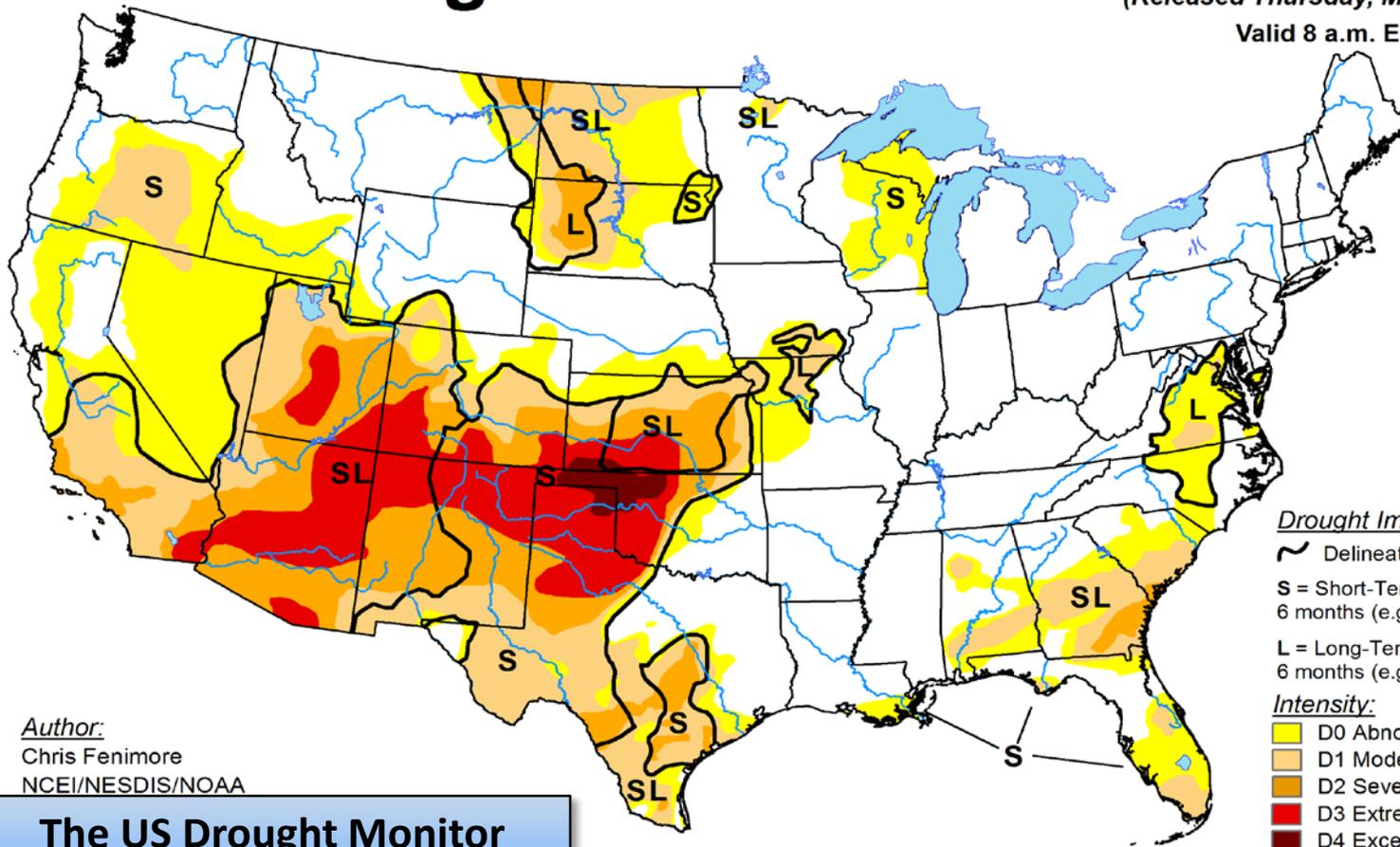
Plus (+) = Forecast to intensify

Minus (-) = Forecast to diminish



U.S. Drought Monitor

March 27, 2018
(Released Thursday, Mar. 29, 2018)
Valid 8 a.m. EDT



Drought Impact Types:

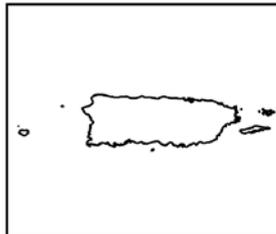
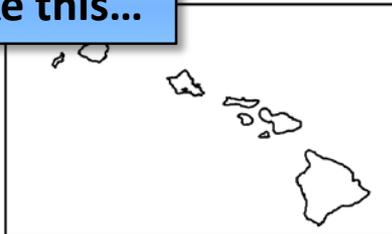
- Delineates dominant impacts
- S** = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L** = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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

Author:
Chris Fenimore
NCEI/NESDIS/NOAA

**The US Drought Monitor
didn't always look like this...**



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



<http://droughtmonitor.unl.edu/>

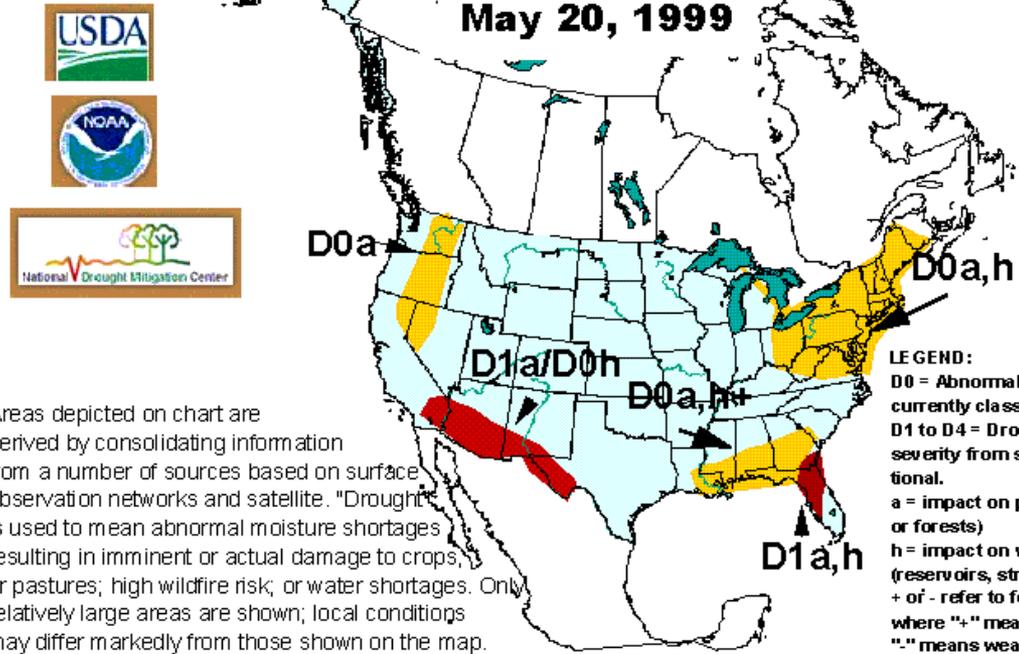
1999

The **very first** U.S. Drought Monitor!!

Collaborative effort between the NDMC, NOAA and USDA

It was **experimental**, and became operational, partially in response to intensifying dryness in the eastern U.S. and across portions of the West. **The map was created in Core!DRAW!** 😊

EXPERIMENTAL DROUGHT MONITOR



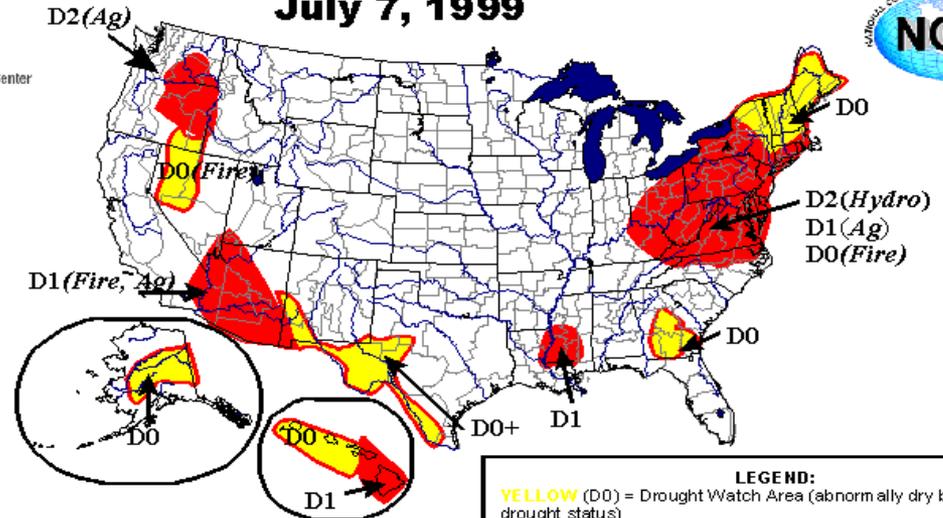
Areas depicted on chart are derived by consolidating information from a number of sources based on surface observation networks and satellite. "Drought" is used to mean abnormal moisture shortages resulting in imminent or actual damage to crops, or pastures; high wildfire risk; or water shortages. Only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

Summer 1999

Authors refined the map areas and tweaked the colors



Experimental U.S. DROUGHT MONITOR July 7, 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*
Ag = agricultural (crops, grasslands)
Fire = forestry (wildfire potential)
Hydro = hydrological (rivers, wells, reservoirs)

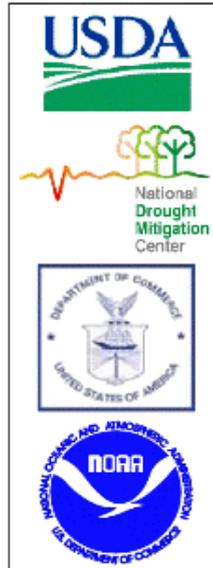
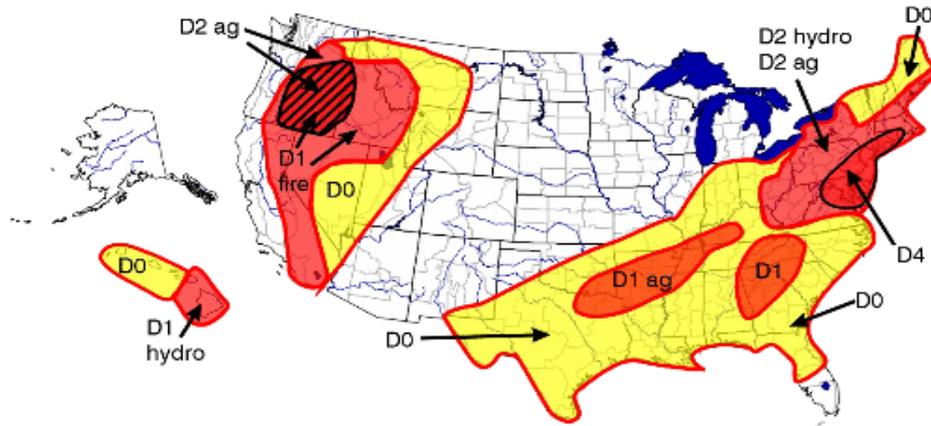
Plus = Forecast to intensify, Minus = Forecast to diminish



August 11, 1999

The revised map was presented to senior-level government officials at a **Secretarial White House Briefing**. They liked it so much...

August 11, 1999 (revised as of 12:00 pm CDT)
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 next two weeks

Minus (-) = Forecast to diminish next two weeks



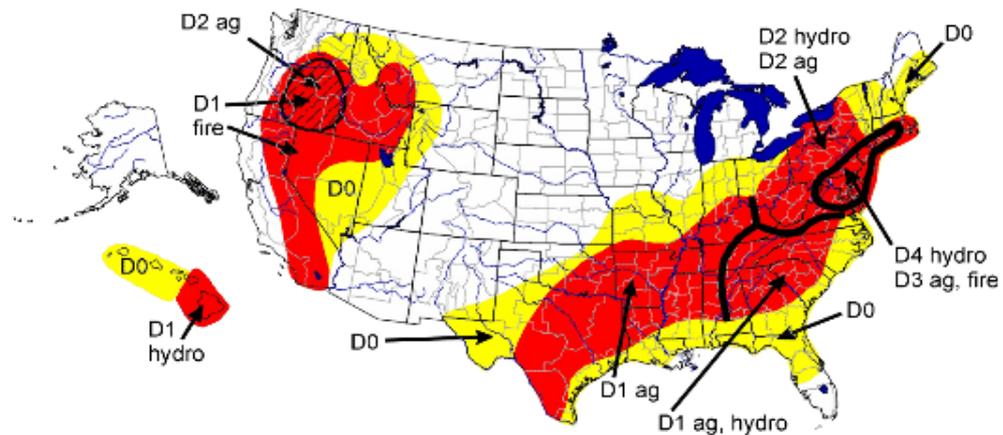
August 18, 1999

...the following week, it went operational, making this **the first “official” U.S. Drought Monitor!**

This might have been the **fastest Experimental to Operational** product in government history!

~24 experts make up the DROUGHT listserver

August 18, 1999 (scheduled release time Thursday a.m.)
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 next two weeks
Minus (-) = Forecast to diminish next two weeks



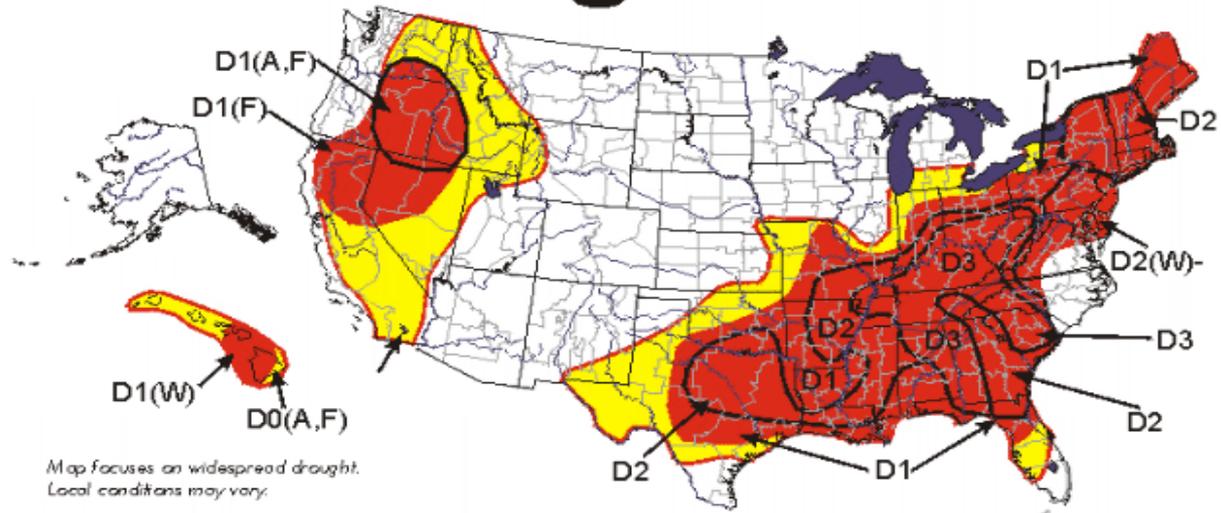
September 1999

The format began to resemble the map we see today, although it remained clear that artistic flair was lacking

(Note the drought scale!)

September 7, 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
 - 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



• Updated every Thursday morning •

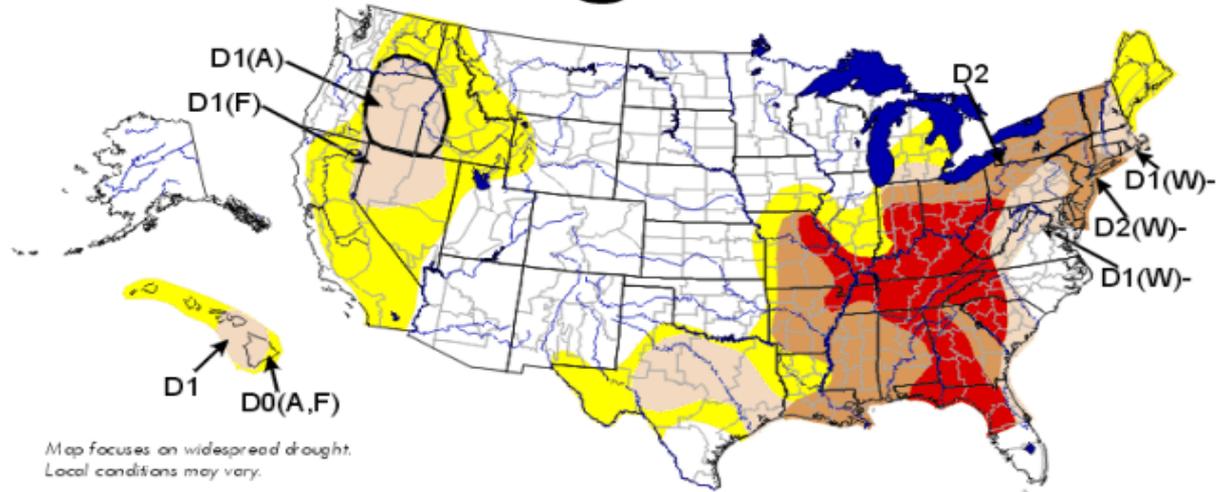


September 1999

The *color issue* was finally resolved in mid-September, 1999; The USDM still had a “Watch” and Forecast component.

September 15, 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
 - 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



• Updated every Thursday morning •



December 2000

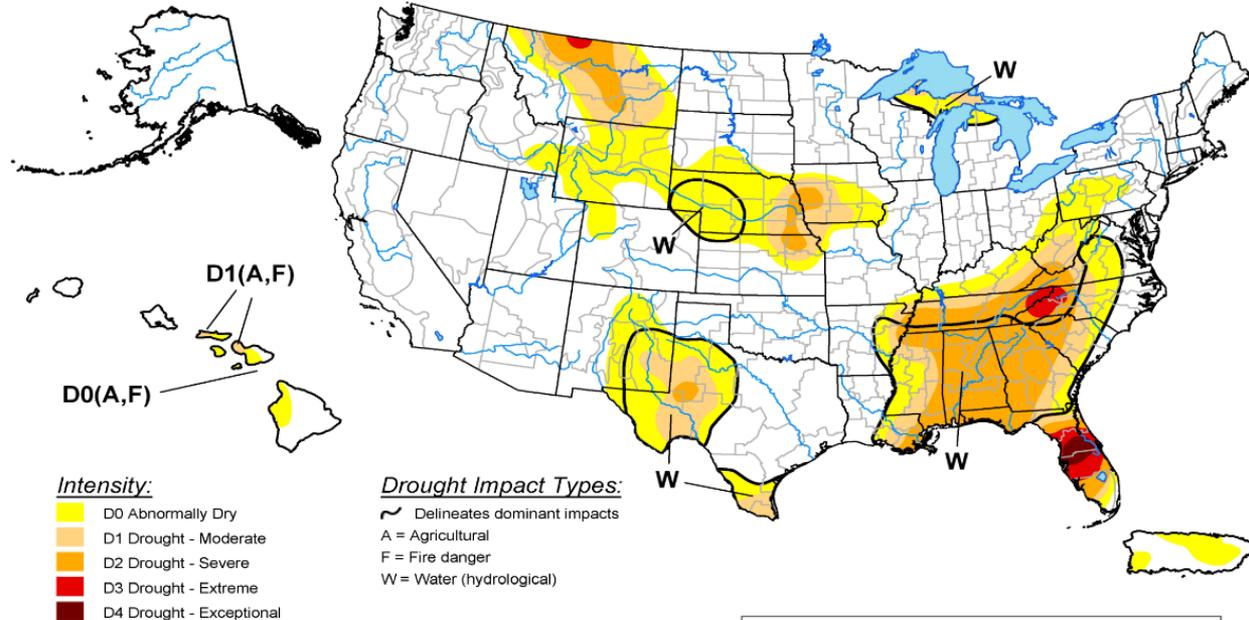
Forecast component is dropped, D0 goes from “Watch” to “Abnormally Dry” (going into and coming out of drought) & authors put their names on the map.

- Accountability
- Transparency

FIRST USDM User Forum hosted by NDMC in Lincoln, NE

Objective Blends were borne out of this first Forum...

U.S. Drought Monitor December 12, 2000 Valid 7 a.m. EST



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 14, 2000

Author: David Miskus, NOAA/CPC/JAWF

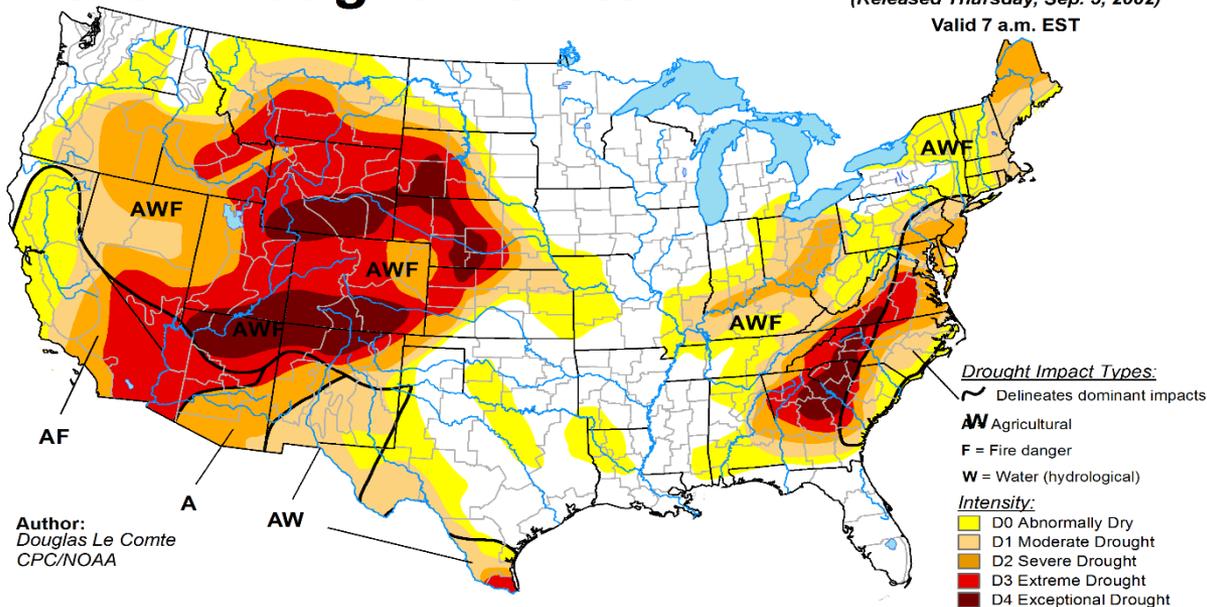


Summer/Fall 2002

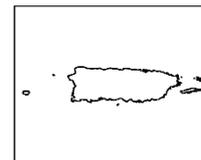
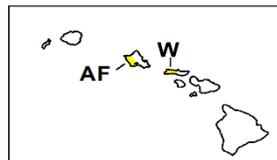
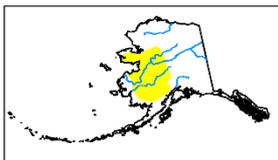
First federal use (USDA) of USDM as a trigger for drought response/relief (Dried Milk) for livestock.

U.S. Drought Monitor

September 3, 2002
(Released Thursday, Sep. 5, 2002)
Valid 7 a.m. EST



Author:
Douglas Le Comte
CPC/NOAA



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



<http://droughtmonitor.unl.edu/>



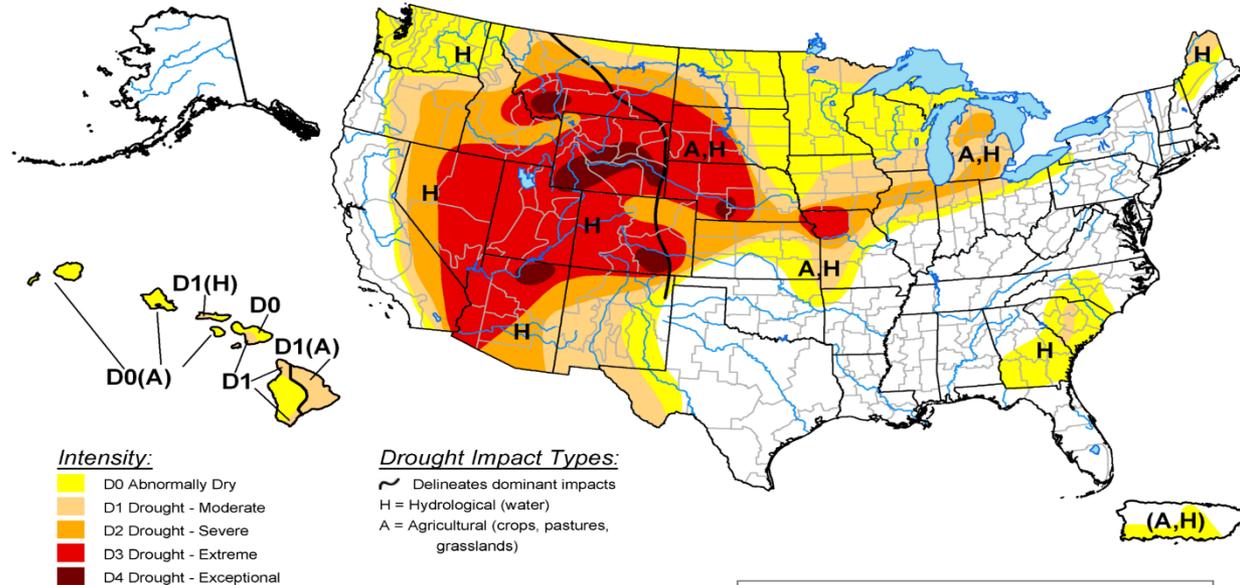
2003

The Fire ("F")
Impact type was
dropped in early
2003 b/c there is
always a fire
season and it is
hard to weigh the
impact of
drought on fire.

**DROUGHT List
Server grows to
150...**

U.S. Drought Monitor February 18, 2003

Valid 7 a.m. EST



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



Released Thursday, February 20, 2003

<http://drought.unl.edu/dm> Mark Svoboda/Michael Hayes, National Drought Mitigation Center

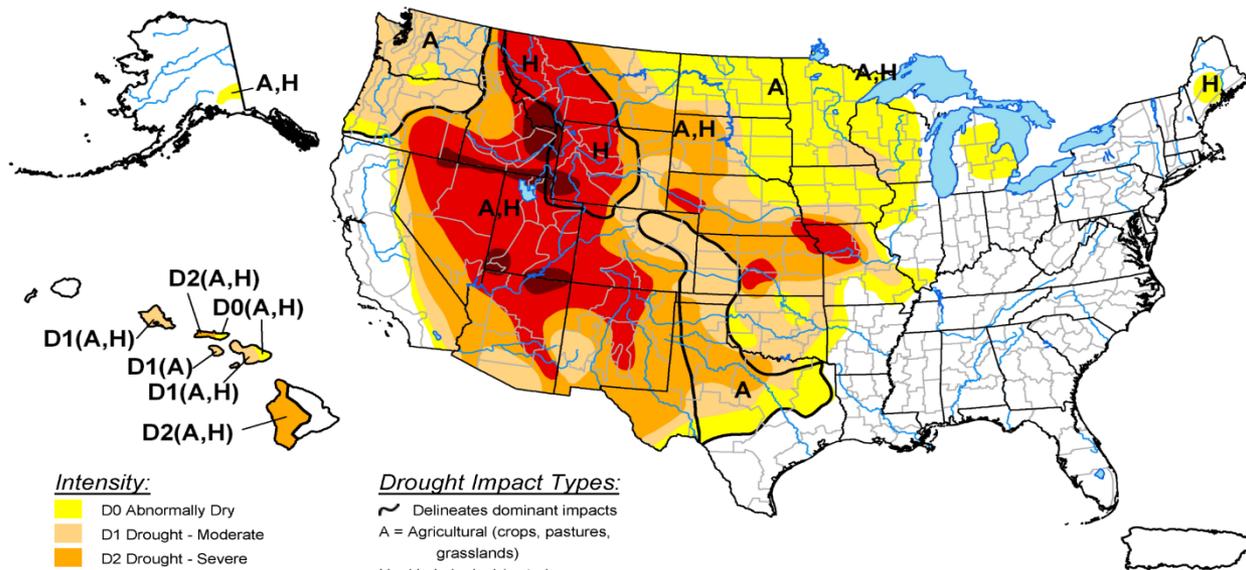


August 2003

USDM Authors make a transparent **switch from CoreIDRAW to GIS** (Geographic Information System) to create the map. There was a steep learning curve, but it made the USDM a leader on the GIS front and would pay big dividends down the road in regards to timeliness and accuracy.

U.S. Drought Monitor

August 19, 2003
Valid 7 a.m. EST



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



Released Thursday, August 21, 2003

Author: Candace Tankersley/Richard Heim, NOAA/NCDC

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



2008

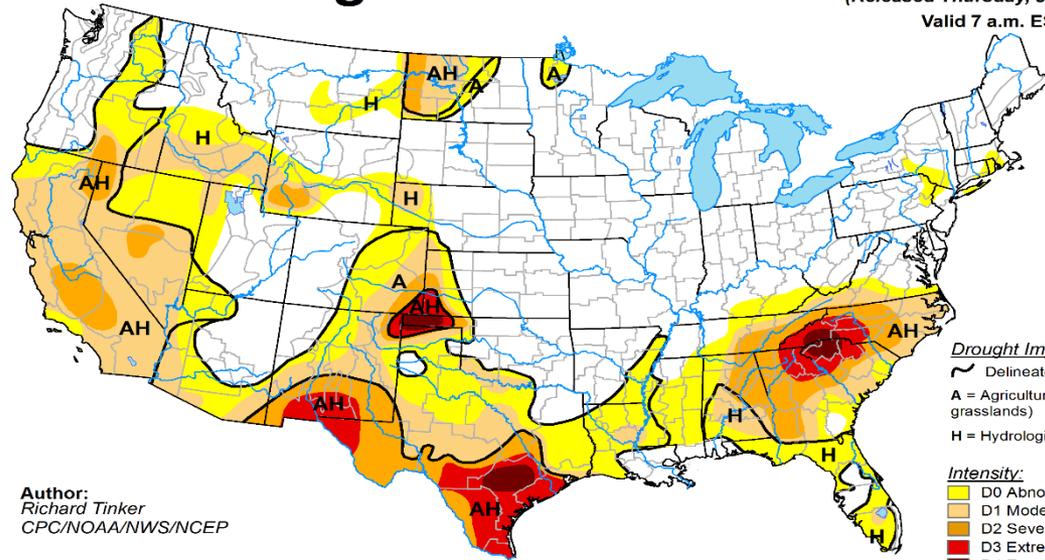
USDAM written in by Congress as a “trigger” within the Farm Bill.

First launch of Regional and State (w/ counties) level zoom views and statistics

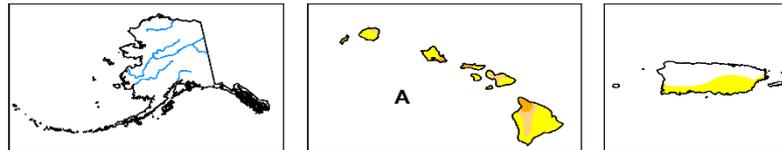
DROUGHT List Server grows to over 225 experts....

U.S. Drought Monitor

July 1, 2008
(Released Thursday, Jul. 3, 2008)
Valid 7 a.m. EST



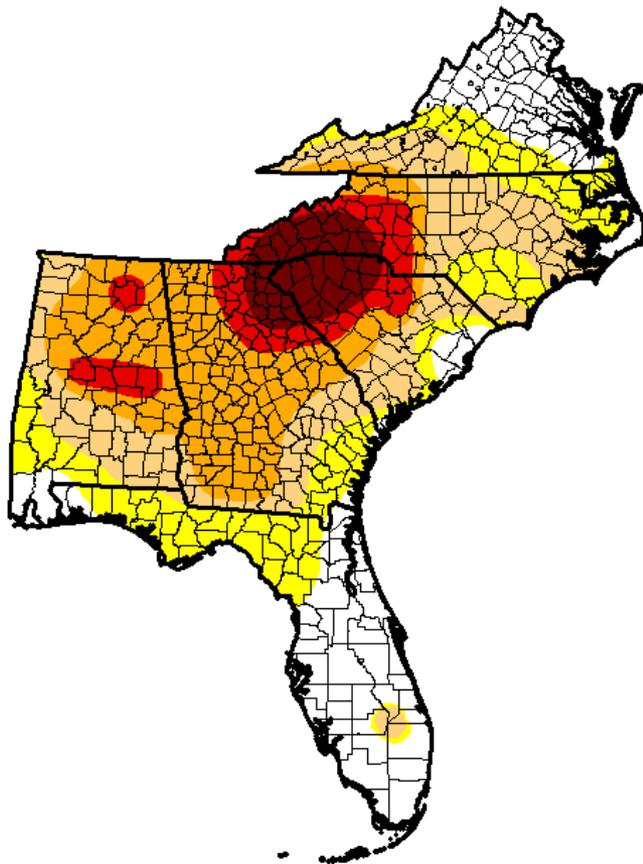
Author:
Richard Tinker
CPC/NOAA/NWS/NCEP



<http://droughtmonitor.unl.edu/>



U.S. Drought Monitor Southeast

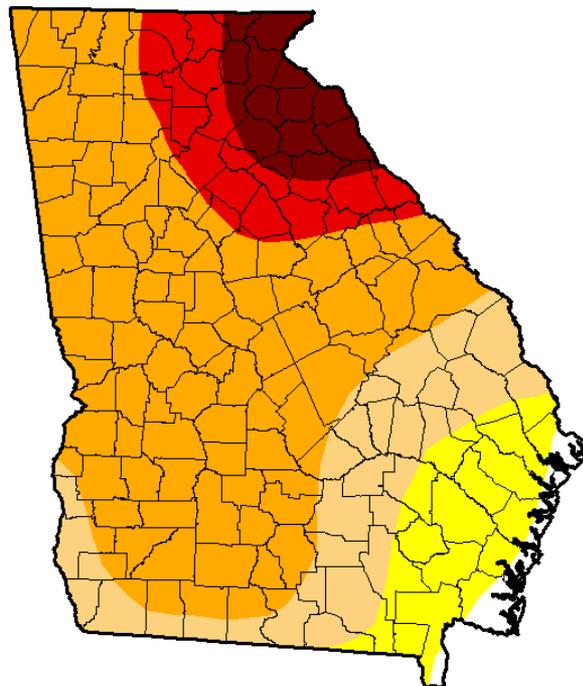


August 5, 2008
(Released Thursday, Aug. 7, 2008)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	22.98	77.02	57.04	35.03	13.83	6.29
Last Week 7/29/2008	22.98	77.02	58.69	34.36	12.23	6.29
3 Months Ago 5/6/2008	26.41	73.59	43.56	23.25	8.93	0.00
Start of Calendar Year 1/1/2008	9.61	90.39	74.26	58.47	40.96	22.00
Start of Water Year	10.38	89.62	76.74	58.97	40.98	15.49

U.S. Drought Monitor Georgia



August 5, 2008
(Released Thursday, Aug. 7, 2008)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	1.95	98.05	87.17	69.71	15.50	6.25
Last Week 7/29/2008	1.95	98.05	87.17	69.71	15.50	6.25
3 Months Ago 5/6/2008	33.70	66.30	43.16	29.92	15.80	0.00
Start of Calendar Year 1/1/2008	2.01	97.99	75.04	65.23	49.44	15.73
Start of Water Year 9/25/2007	24.19	75.81	64.21	52.59	39.36	27.00
One Year Ago 8/7/2007	0.00	100.00	86.01	67.35	47.92	22.87

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:
Brian Fuchs
National Drought Mitigation Center

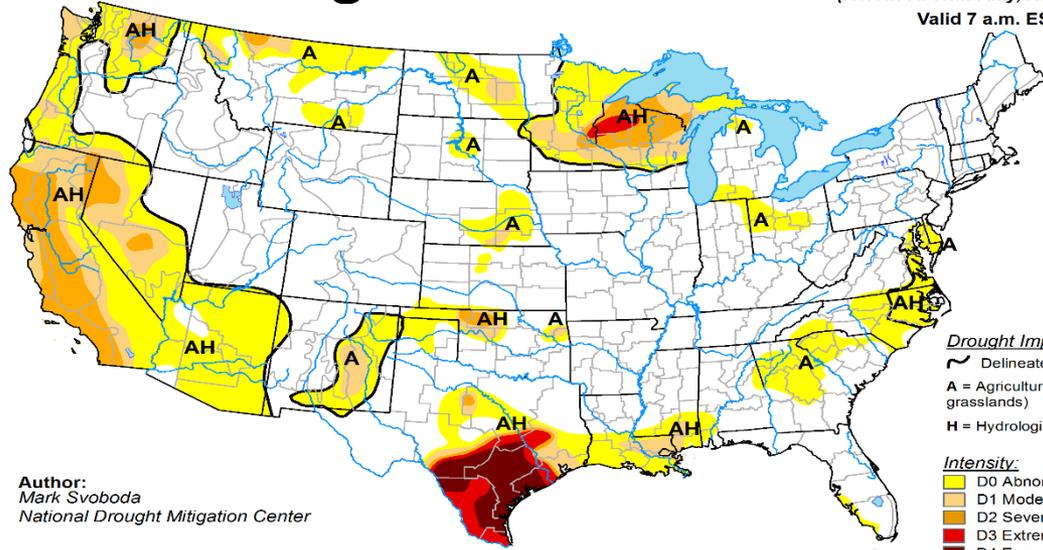


2009

USDM
celebrates
10th year and
500th map!

U.S. Drought Monitor

August 4, 2009
(Released Thursday, Aug. 6, 2009)
Valid 7 a.m. EST

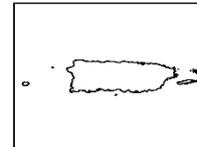
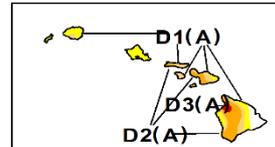


Author:
Mark Svoboda
National Drought Mitigation Center

Drought Impact Types:
~ Delineates dominant impacts
A = Agricultural (crops, pastures, grasslands)
H = Hydrological (water)

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.



<http://droughtmonitor.unl.edu/>

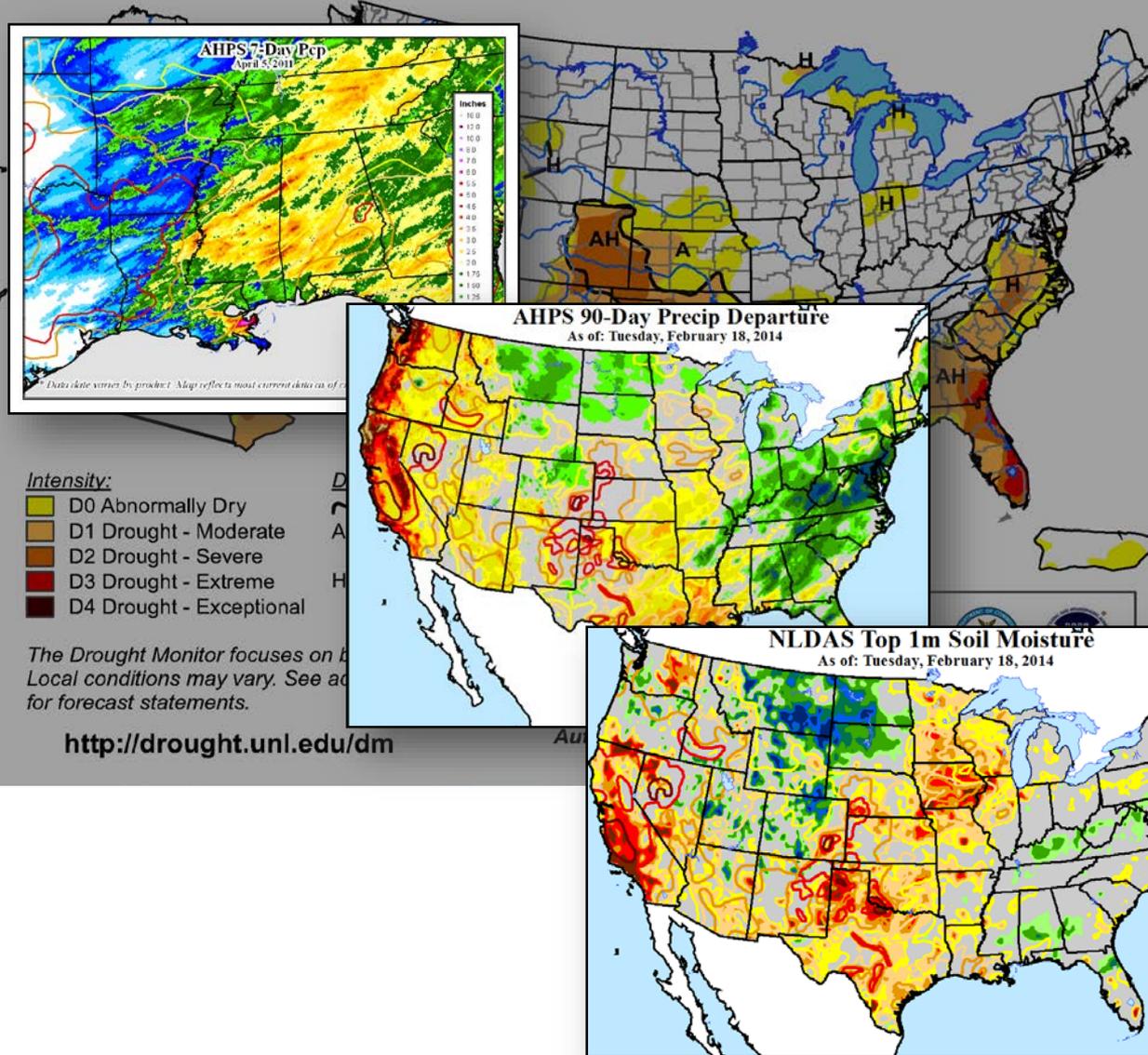


2008-2011

Several authors began **incorporating GIS weather, climate and hydrological data** directly into the map-editing process; consequently, accuracy and detail increase over the next several years – no more “eyeballing” it!

U.S. Drought Monitor

March 22, 2011
Valid 8 a.m. EDT



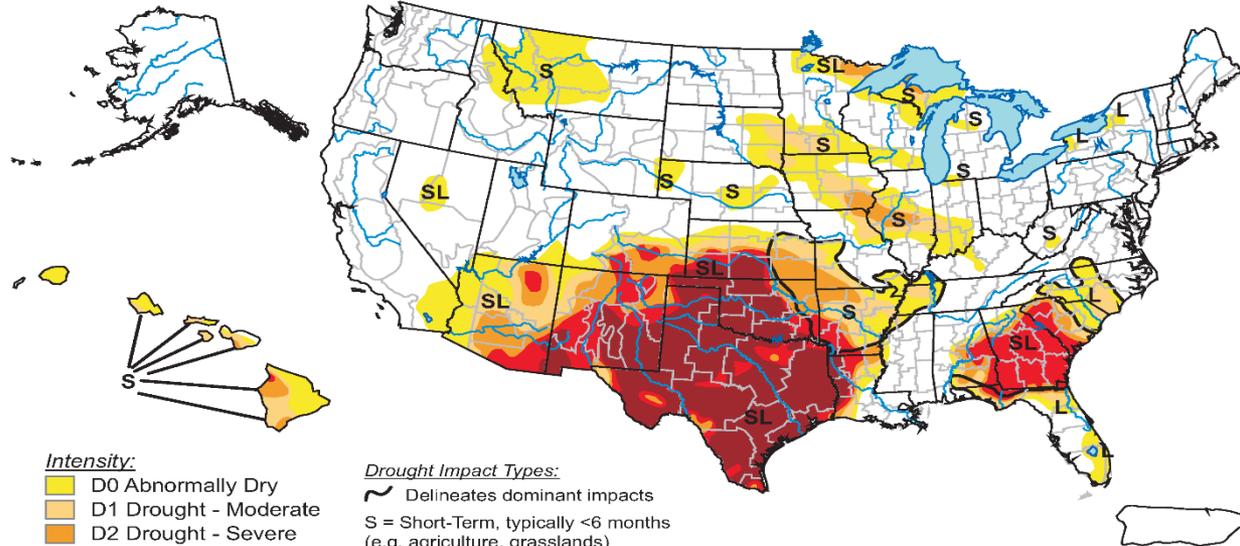
September 2011

USDM authors changed the Drought Impact Types from “A” (Agricultural) and “H” (Hydrological) to “S” (Short-Term) and “L” (Long-Term), removing ambiguity and confusion that was repeatedly reported while better accounting for environmental/ecological droughts

DROUGHT List Server exceeds 300 experts

U.S. Drought Monitor

September 27, 2011
Valid 8 a.m. EDT



Intensity:

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

Drought Impact Types:

- ~ Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

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

<http://droughtmonitor.unl.edu/>

Released Thursday, September 29, 2011

Author: Michael Brewer/Liz Love-Brotak, NOAA/NESDIS/NCDC



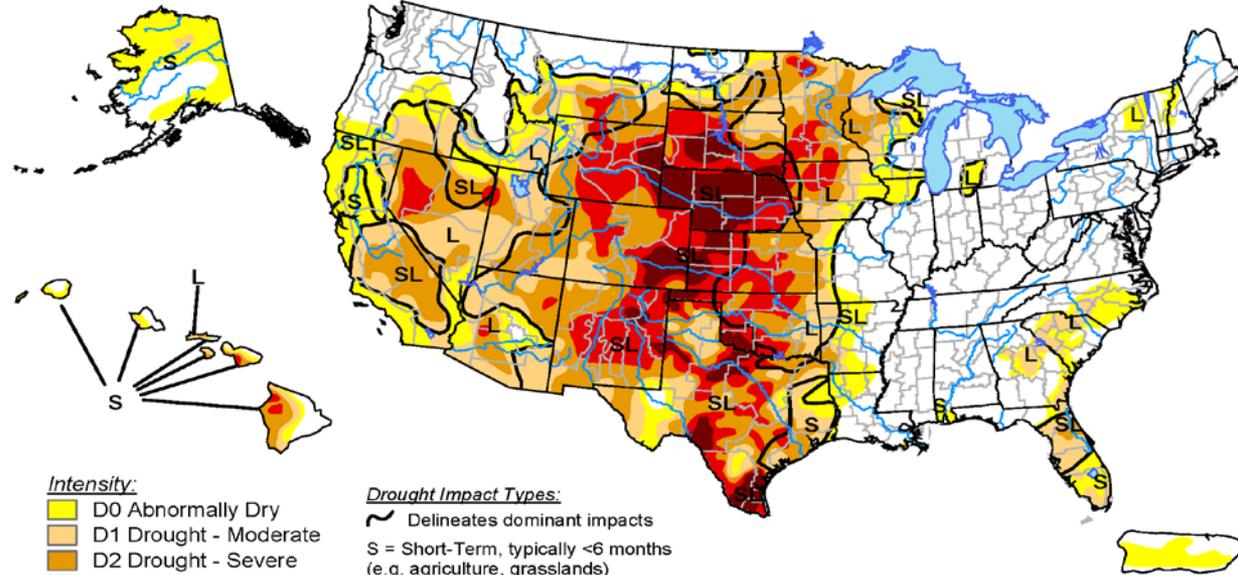
Early 2013

The **National Drought Mitigation Center** took over the final map production so the map is 100% consistent week to week in projection, size, and colors. (USDM authors still modify drought areas)

December 2013:
750th USDM made

U.S. Drought Monitor

March 26, 2013
Valid 7 a.m. EDT



Intensity:

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

Drought Impact Types:

- Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

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

<http://droughtmonitor.unl.edu/>



Released Thursday, March 28, 2013
Author: Anthony Artusa, NOAA/NWS/NCEP/CPC



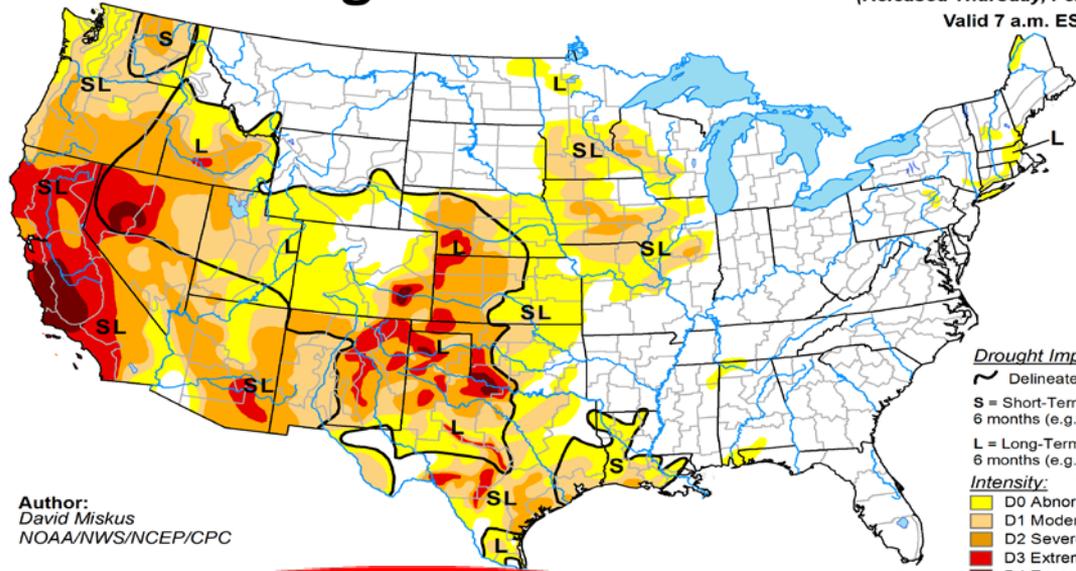
Late 2013

The **NDMC** changed the final map layout to make sure the non-CONUS areas are clearly depicted as being as such, and are on their own scale.

2013: 7M page views/2.6M user sessions

U.S. Drought Monitor

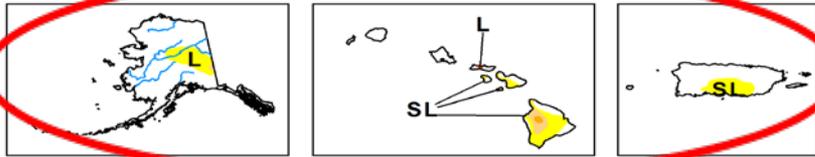
February 18, 2014
(Released Thursday, Feb. 20, 2014)
Valid 7 a.m. EST



Author:
David Miskus
NOAA/NWS/NCEP/CPC

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
National Drought Mitigation Center
NOAA
<http://droughtmonitor.unl.edu/>



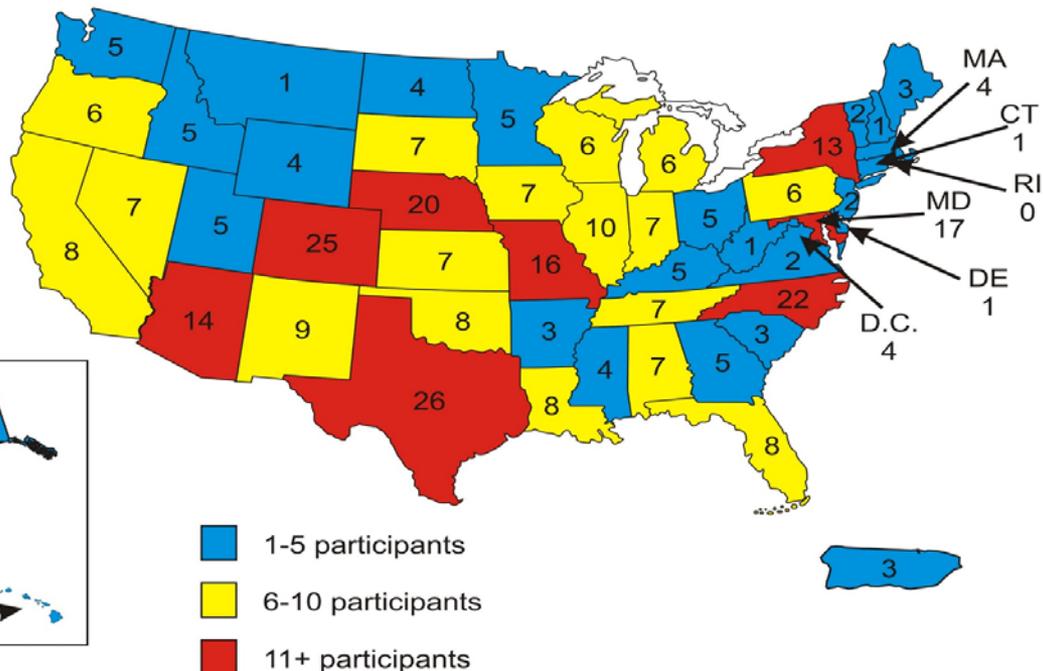
USDM Listserve Subscribers

(as of August 20, 2015)

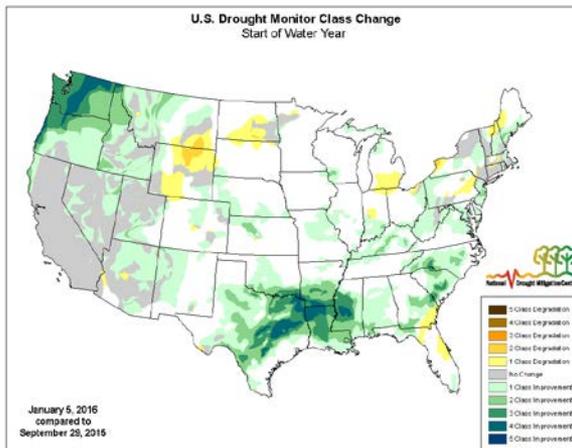
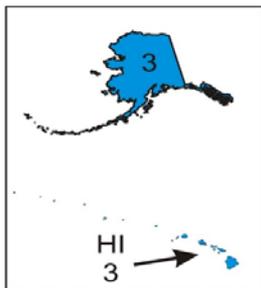
2015

Robust suite of web mapping services are available. **361 participants** on the USDM list server.

2015: 7.7M page views/3.5M user sessions



Total: 361 (does not include 1 participant from Canada and 2 participants from Brazil)



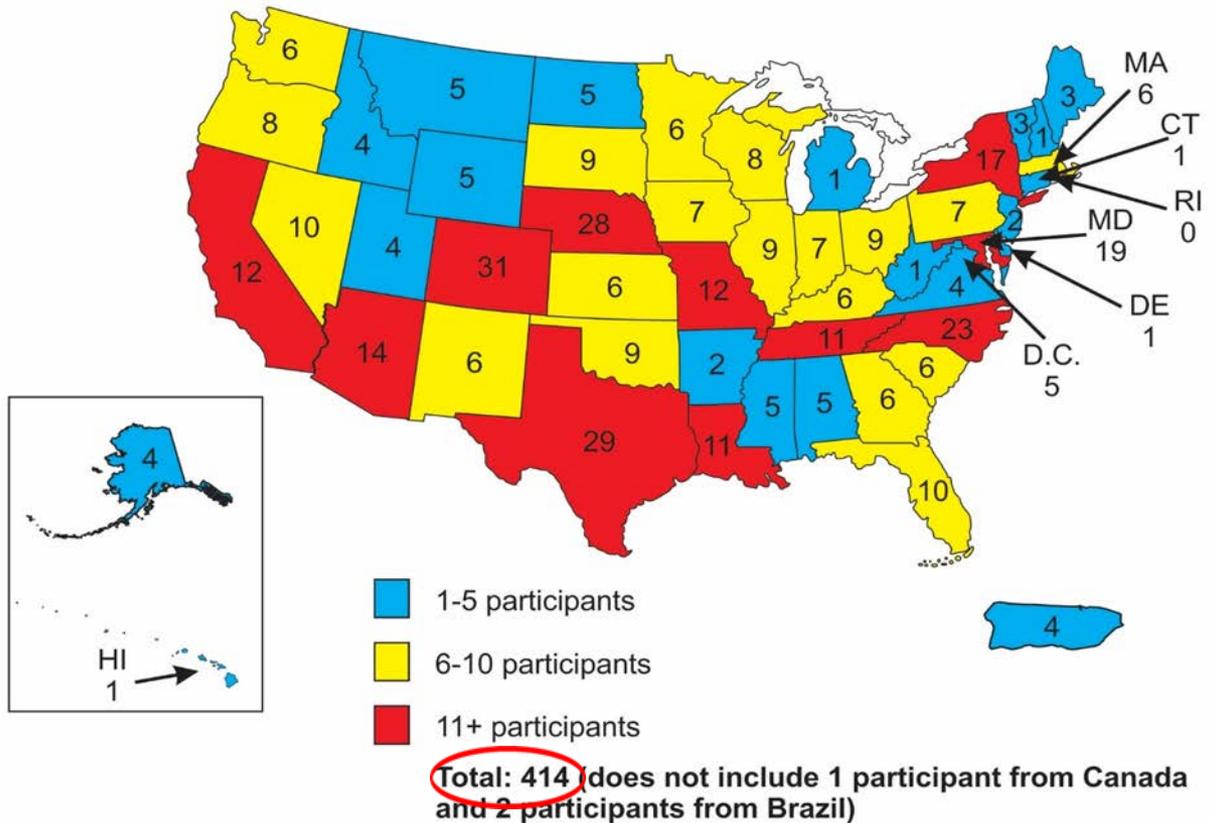
2017

Robust suite of web mapping services are available. **414 participants** on the USDM list server.

2018

1000th map is approaching!

USDM Listserve Subscribers (as of August 30, 2017)



USDM Next Steps

- Continue *interactions* with local drought task forces, *State Climate Offices*, WFOs/RFCs, Regional Climate Centers, *University Extension agents*, *USDA Climate Hubs + field offices*
 - Foster new basin/state interactions
 - NIDIS RDEWS basin briefings/outlooks...more coming?
 - MO Basin/PacNW-Columbia/ Midwest, others??
- Continue to evolve...encourage and incorporate *new/enhanced/innovative products via GIS and cloud environs*:
 - ACIS gridded SPI-SPEI/sc-PDSI
 - *2018: Gridded Objective Indice Blends + new regional/seasonal/thematic blends (e.g., flash, snow, forest)*
 - Augment with more emerging satellite products (e.g., *ET-based: ESI, EDDI, QuickDRI, relative humidity, vapor pressure deficit*)
 - NLDAS, Composite Drought Indices, Soil Moisture
 - *“Uber” Drought DSS-Tool prototype*
 - *Centralized Author “cloud environment” with USDM list serve interface*
- *Integrate U.S. Virgin Islands?*

THANKS!

Questions, comments?

Mark Svoboda
msvoboda2@unl.edu
402-472-8238

