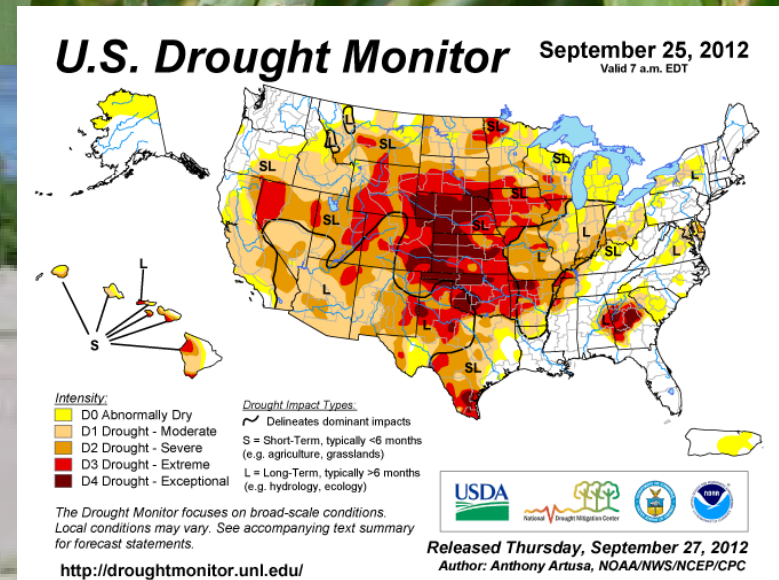


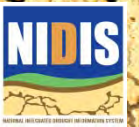
What Did We Learn from the 2012 Drought and What Should be Anticipated for 2013

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



Outline

- ▶ What is the National Drought Mitigation Center (NDMC)
- ▶ 2012 Drought Overview and Impacts
- ▶ 2013 Outlook
- ▶ Questions

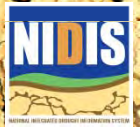


National Drought Mitigation Center



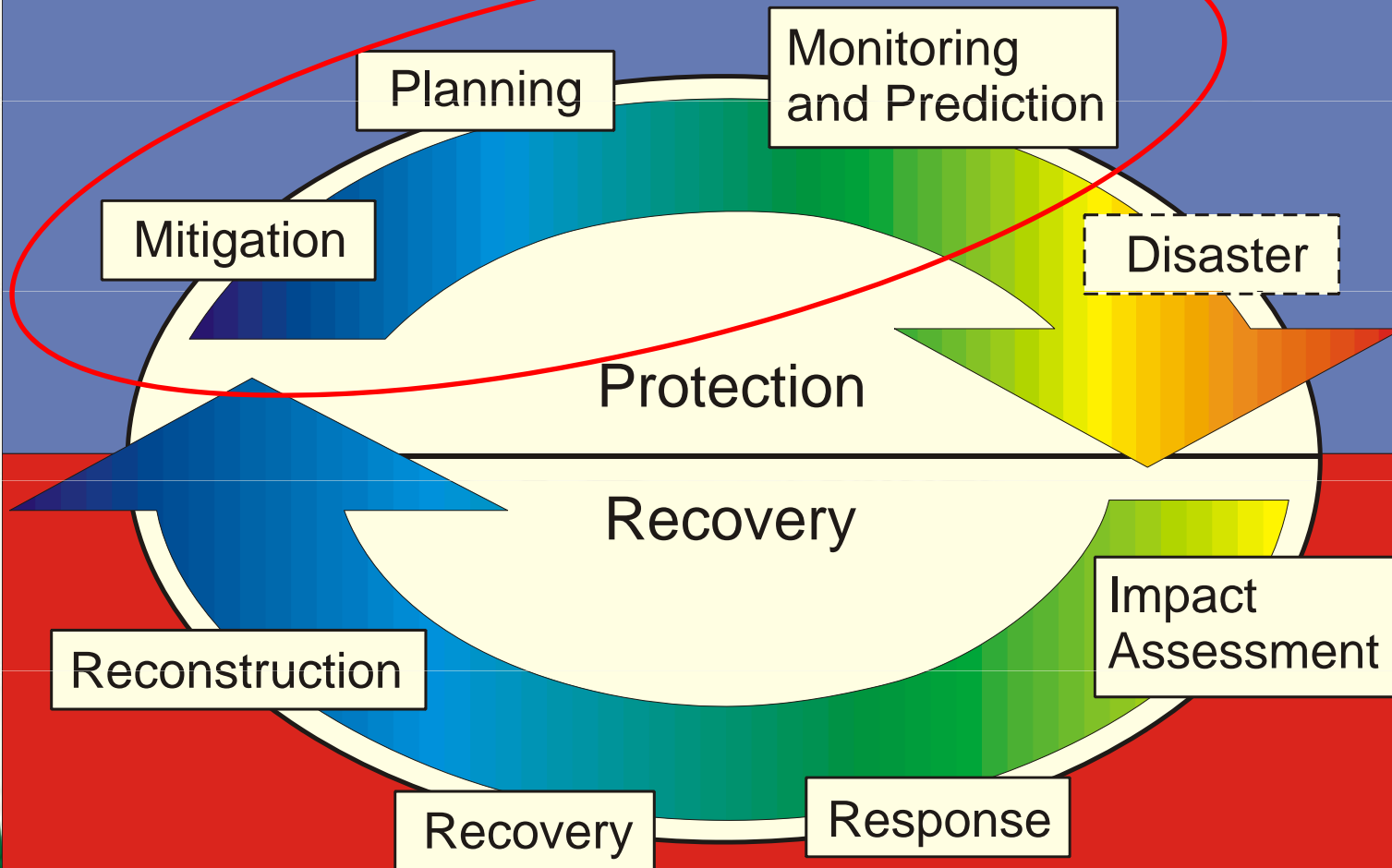
Mission: To lessen societal vulnerability to drought by promoting planning and the adoption of appropriate risk management techniques.

www.drought.unl.edu

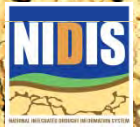


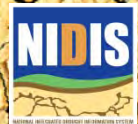
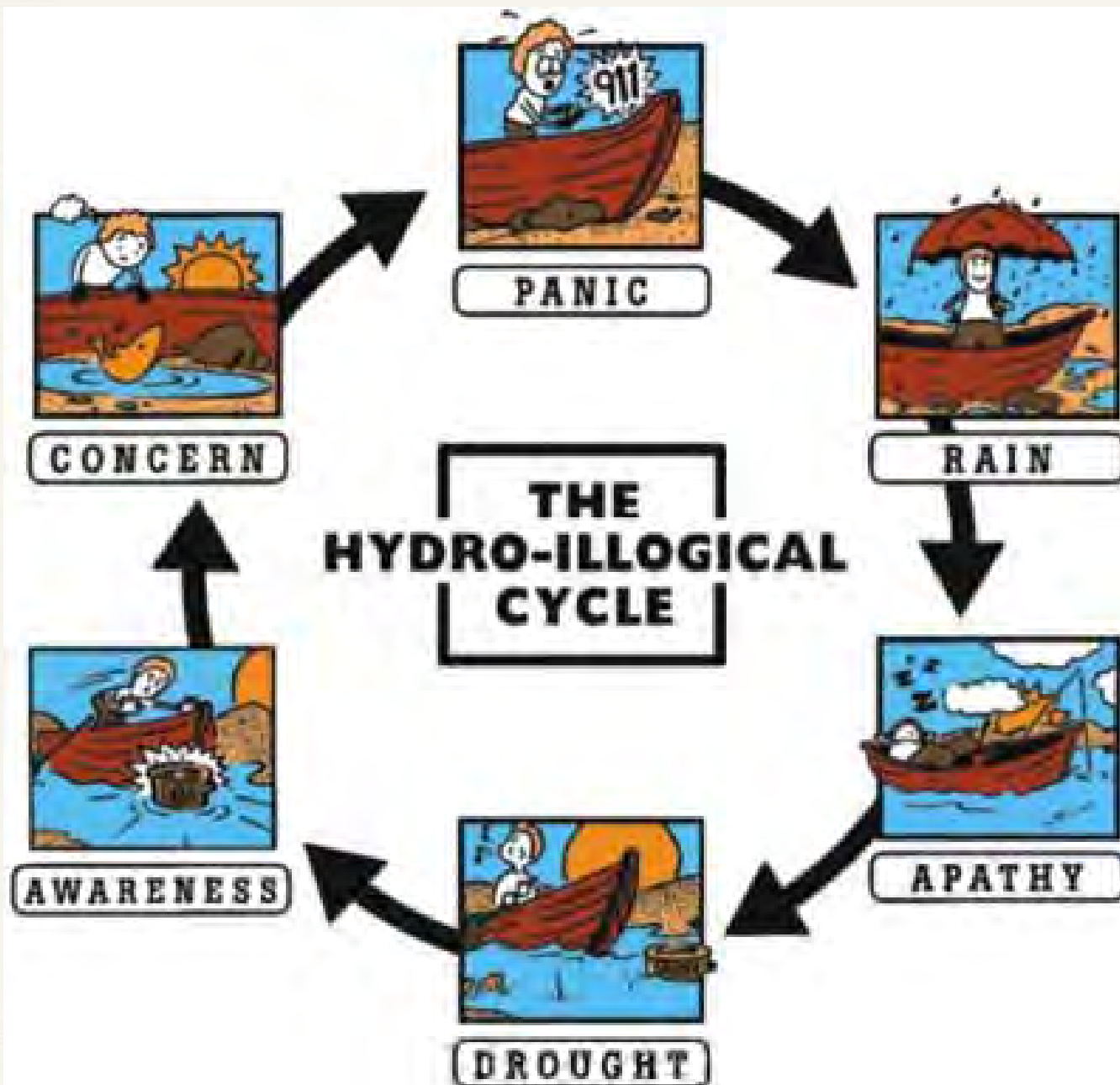
The Cycle of Disaster Management

risk management



crisis management

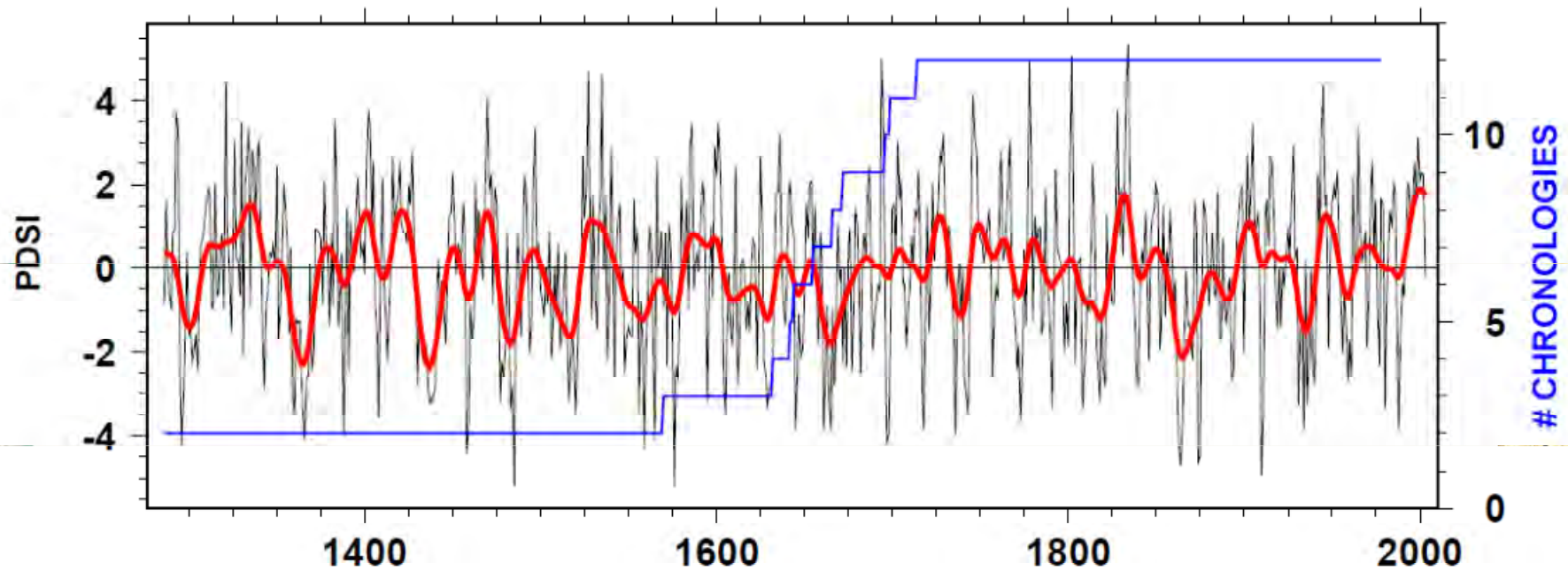




Drought is a Natural part of the Climate

TREE-RING RECONSTRUCTED DROUGHT

GRID POINT: 188 95.0W 47.5N

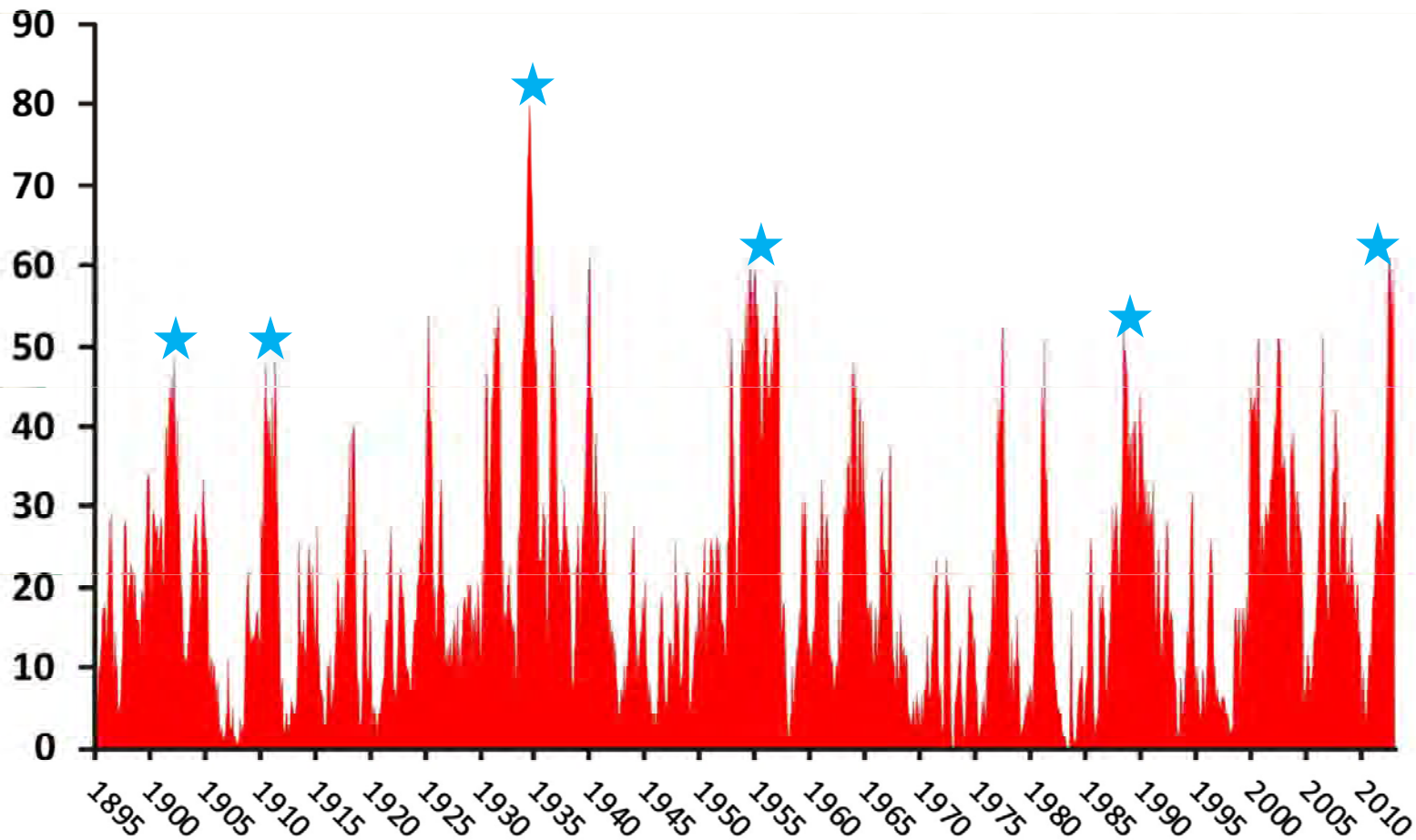


Paleo-Climatic data help to identify drought periods

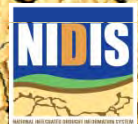
Percent Area of the United States in Moderate to Extreme Drought

January 1895–December 2012

We can identify many drought periods in the written record as well



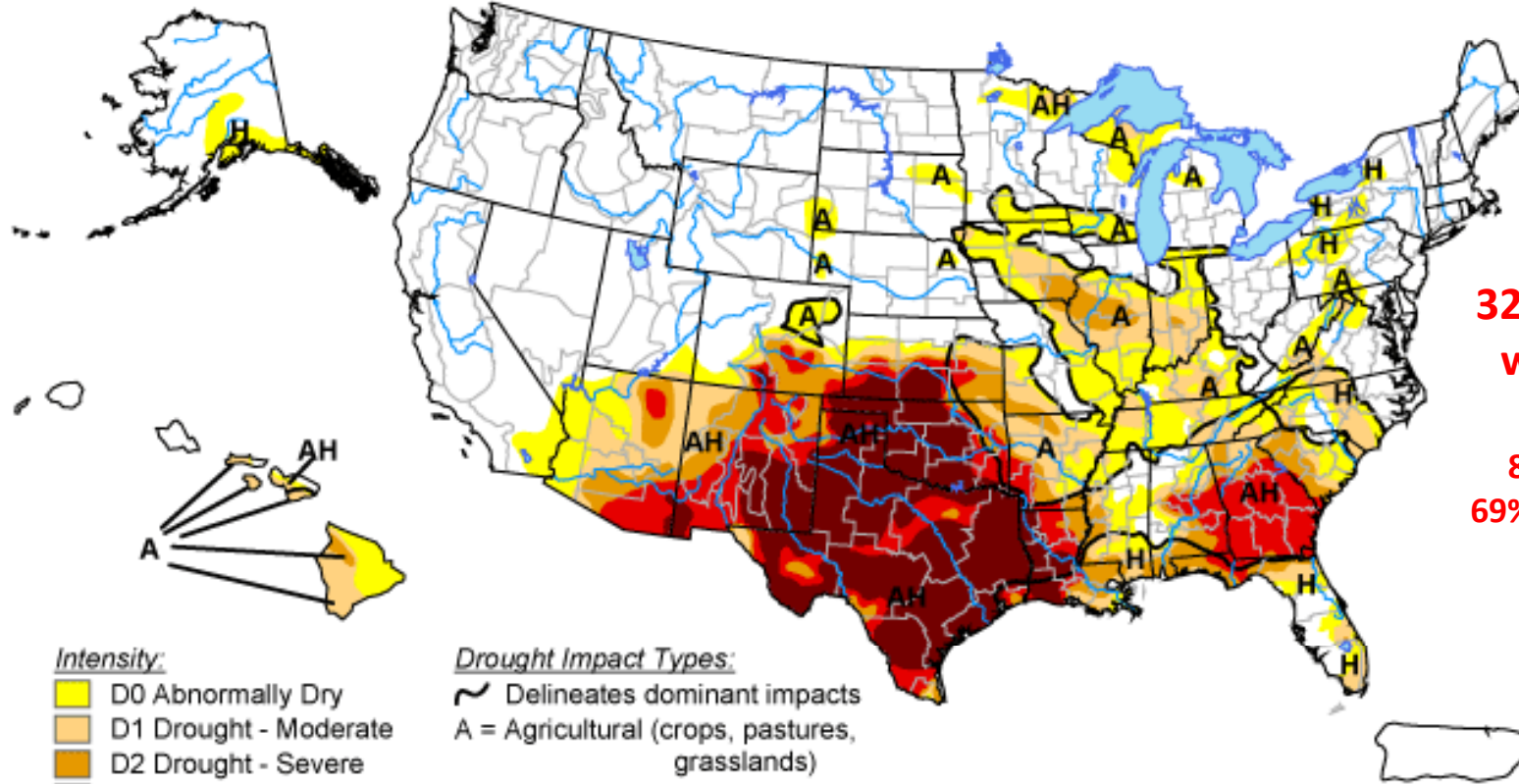
Based on data from the National Climatic Data Center/NOAA



Peak of the 2010-2011 Drought

U.S. Drought Monitor

August 30, 2011
Valid 8 a.m. EDT



32.83 % of the US
was in Drought

81% of Texas in D4
69% of Oklahoma in D4

Intensity:

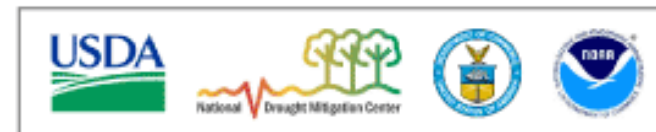
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

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

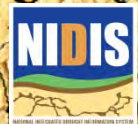
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

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



Released Thursday, September 1, 2011

Authors: Eric Luebehusen, U.S. Department of Agriculture

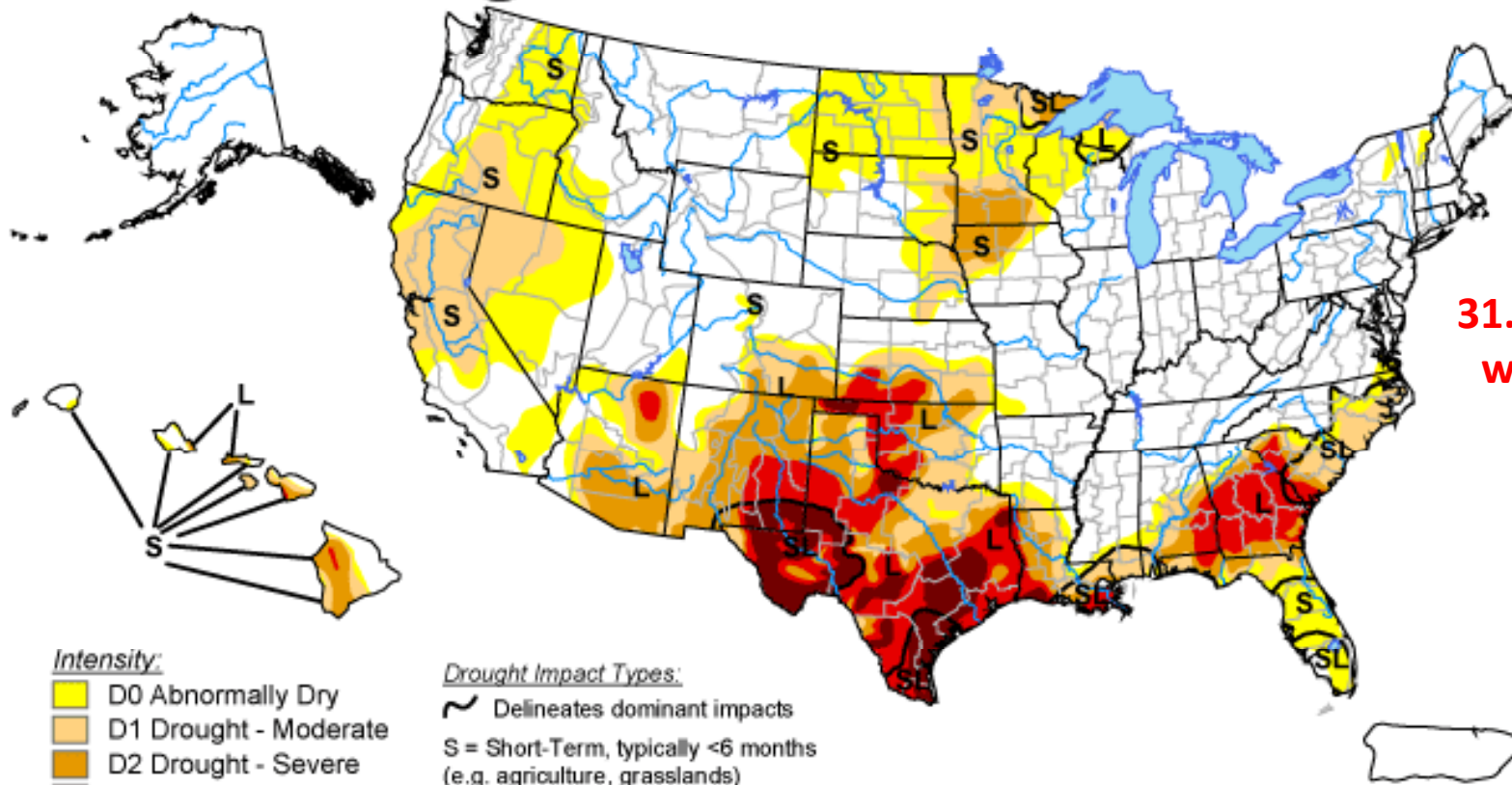


Start of 2012

U.S. Drought Monitor

January 3, 2012

Valid 7 a.m. EST



31.90 % of the US was in Drought

Intensity:

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

Drought Impact Types:

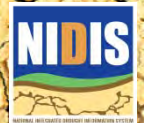
- ~ Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

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, January 5, 2012
Author: Brad Rippey, U.S. Department of Agriculture

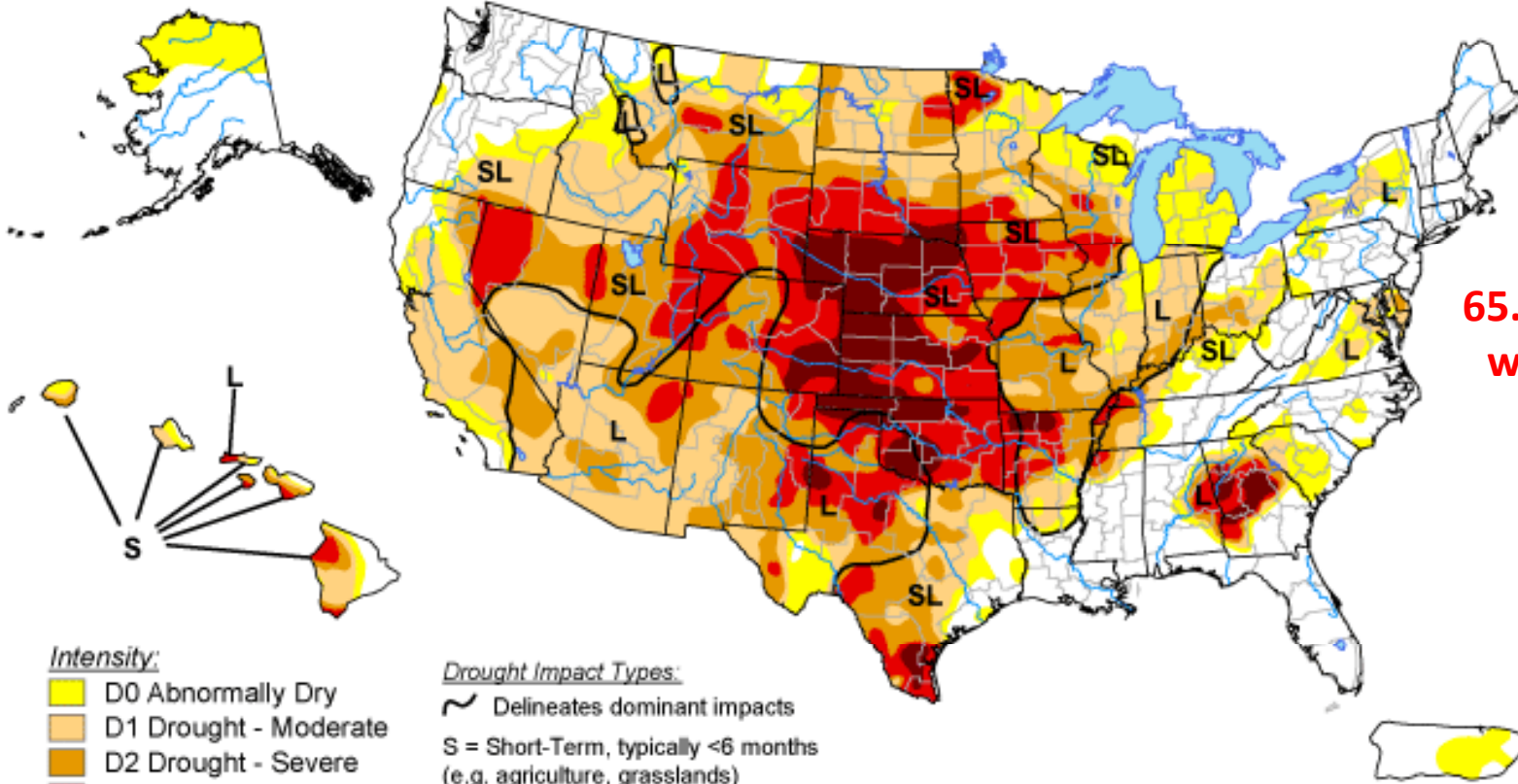


Peak of the 2012 Drought

U.S. Drought Monitor

September 25, 2012

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)

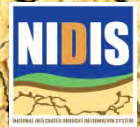
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

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



Released Thursday, September 27, 2012

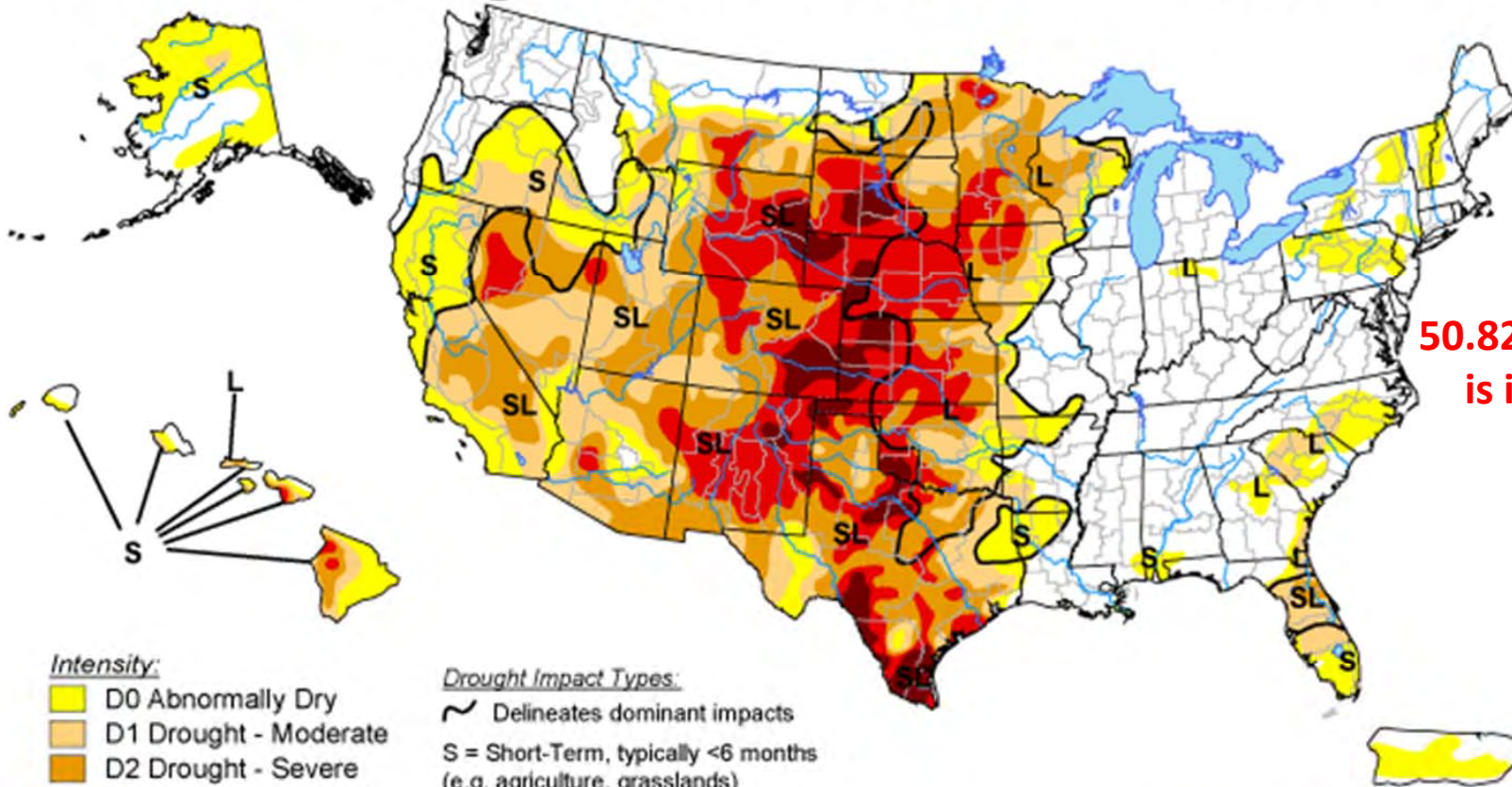
Author: Anthony Artusa, NOAA/NWS/NCEP/CPC



Current 2012-2013 Drought

U.S. Drought Monitor

April 9, 2013
Valid 7 a.m. EDT



50.82 % of the US
is in Drought

Intensity:

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

Drought Impact Types:

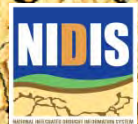
- ~ Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

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, April 11, 2013
Author: David Miskus, NOAA/NWS/NCEP/CPC



March 2012 in Nebraska

U.S. Drought Monitor

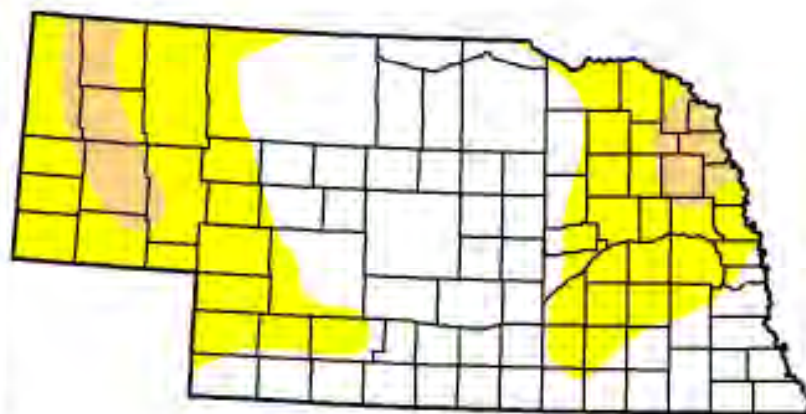
Nebraska

April 10, 2012

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	52.85	47.15	8.09	0.00	0.00	0.00
Last Week (04/03/2012 map)	48.89	51.11	2.84	0.00	0.00	0.00
3 Months Ago (01/10/2012 map)	67.30	32.70	13.81	0.65	0.00	0.00
Start of Calendar Year (12/27/2011 map)	71.68	28.32	13.81	0.65	0.00	0.00
Start of Water Year (09/27/2011 map)	75.70	24.30	0.00	0.00	0.00	0.00
One Year Ago (04/05/2011 map)	46.45	53.55	14.93	0.00	0.00	0.00



Intensity:

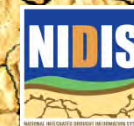
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

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

<http://droughtmonitor.unl.edu>



Released Thursday, April 12, 2012
David Miskus, NOAA/NWS/NCEP/CPC



Peak of the 2012 Drought in Nebraska

U.S. Drought Monitor

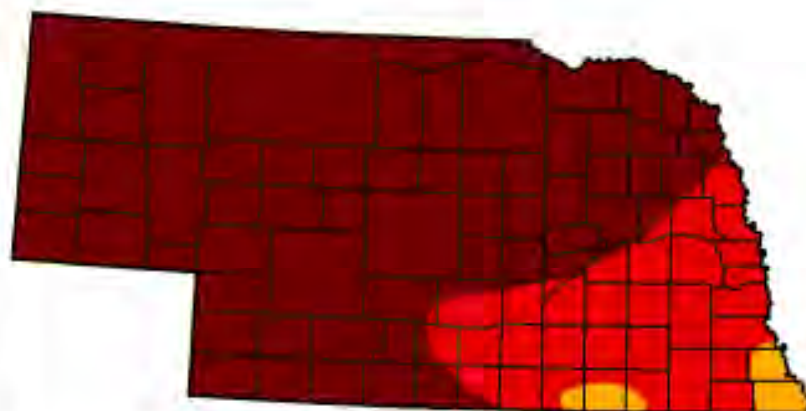
October 2, 2012

Valid 7 a.m. EST

Nebraska

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	100.00	97.94	77.61
Last Week (09/25/2012 map)	0.00	100.00	100.00	100.00	97.94	73.25
3 Months Ago (07/03/2012 map)	0.19	99.81	77.22	40.55	2.28	0.00
Start of Calendar Year (12/27/2011 map)	71.68	28.32	13.81	0.65	0.00	0.00
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	100.00	97.94	73.25
One Year Ago (09/27/2011 map)	75.70	24.30	0.00	0.00	0.00	0.00



Intensity:

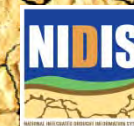
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

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

<http://droughtmonitor.unl.edu>



Released Thursday, October 4, 2012
Anthony Artusa, NOAA/NWS/NCEP/CPC



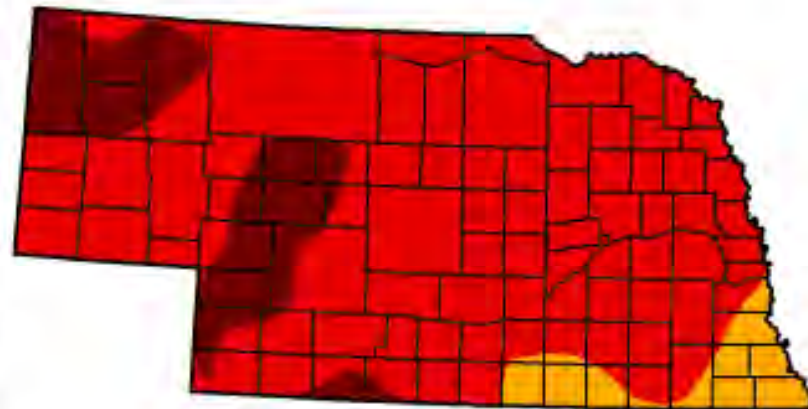
Current Conditions in Nebraska

U.S. Drought Monitor Nebraska

April 9, 2013
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	100.00	94.02	15.23
Last Week (04/02/2013 map)	0.00	100.00	100.00	100.00	94.04	75.72
3 Months Ago (01/08/2013 map)	0.00	100.00	100.00	100.00	96.20	77.46
Start of Calendar Year (01/01/2013 map)	0.00	100.00	100.00	100.00	96.20	77.46
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	100.00	97.94	73.25
One Year Ago (04/03/2012 map)	48.89	51.11	2.84	0.00	0.00	0.00



Intensity:

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

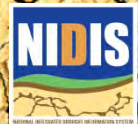
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu>



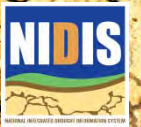
Released Thursday, April 11, 2013

David Miskus, NOAA/NWS/NCEP/Climate Prediction Center



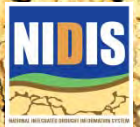
Were we ready ?

National Drought Mitigation Center



No strong signals before the start of the 2012 drought

- ▶ Very mild winter in 2011-2012
- ▶ Very little recharge of soil moisture in the plains
- ▶ Early green-up started the 2012 growing season earlier
- ▶ 2012 temperatures were key
- ▶ A continuing drought over the southern plains (lack of moisture fetch further to the north)



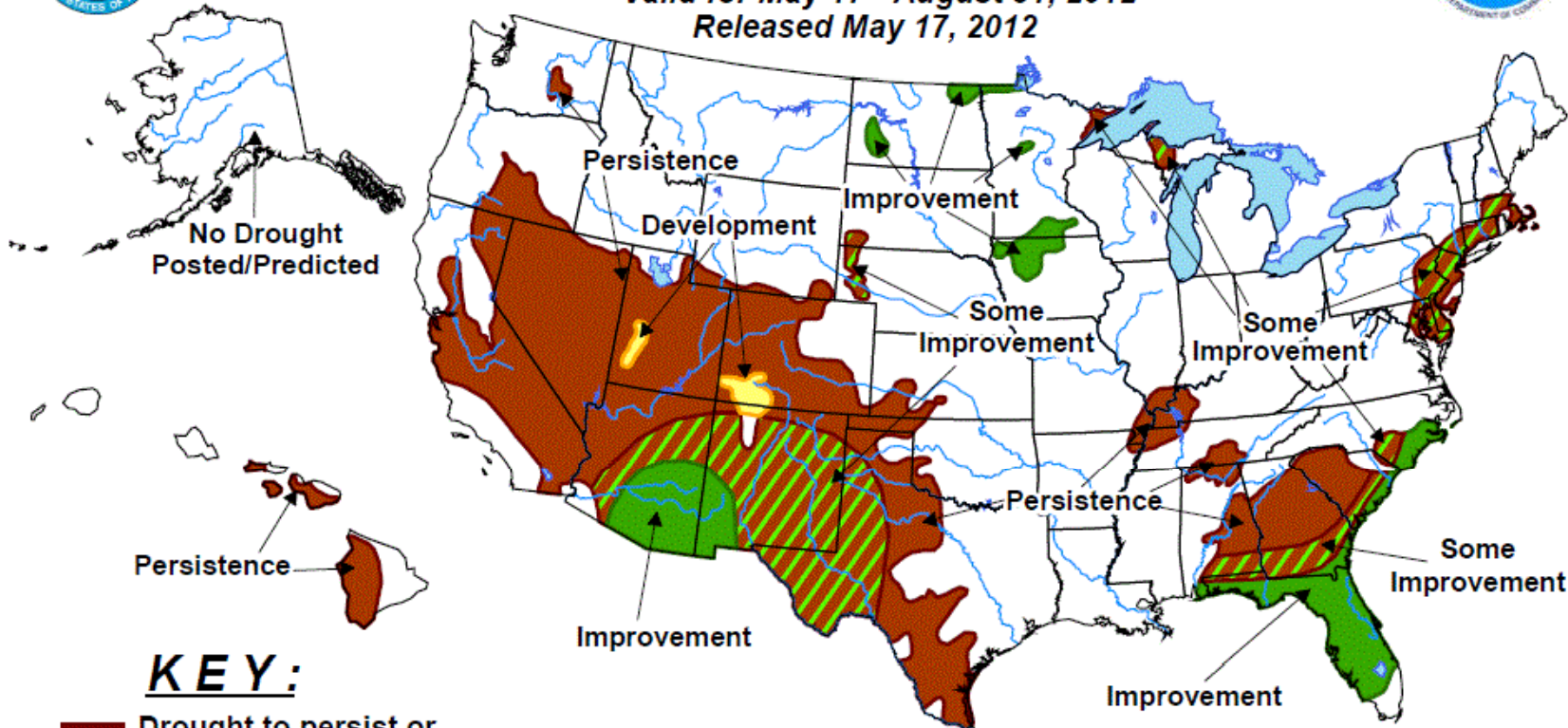
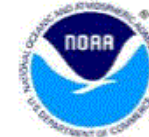
Outlook: May 2012



U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for May 17 - August 31, 2012

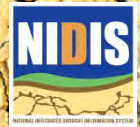
Released May 17, 2012



KEY:

- Drought to persist or intensify
- Drought likely to improve, impacts ease
- Drought development likely
- No Drought Posted/Predicted

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.



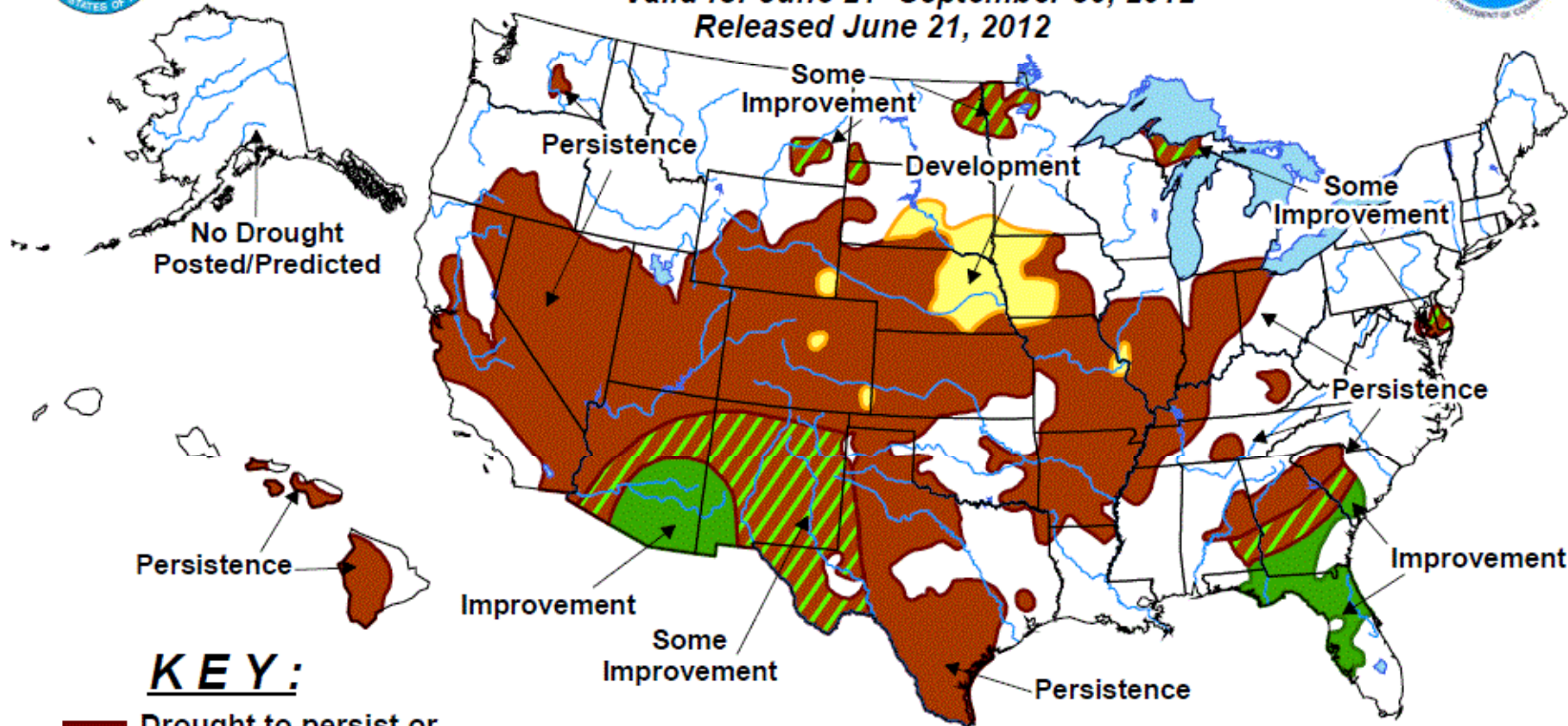
Outlook: June 2012







U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for June 21 - September 30, 2012

Released June 21, 2012

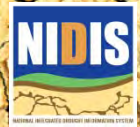


KEY:

-  Drought to persist or intensify
-  Drought ongoing, some improvement
-  Drought likely to improve, impacts ease
-  Drought development likely

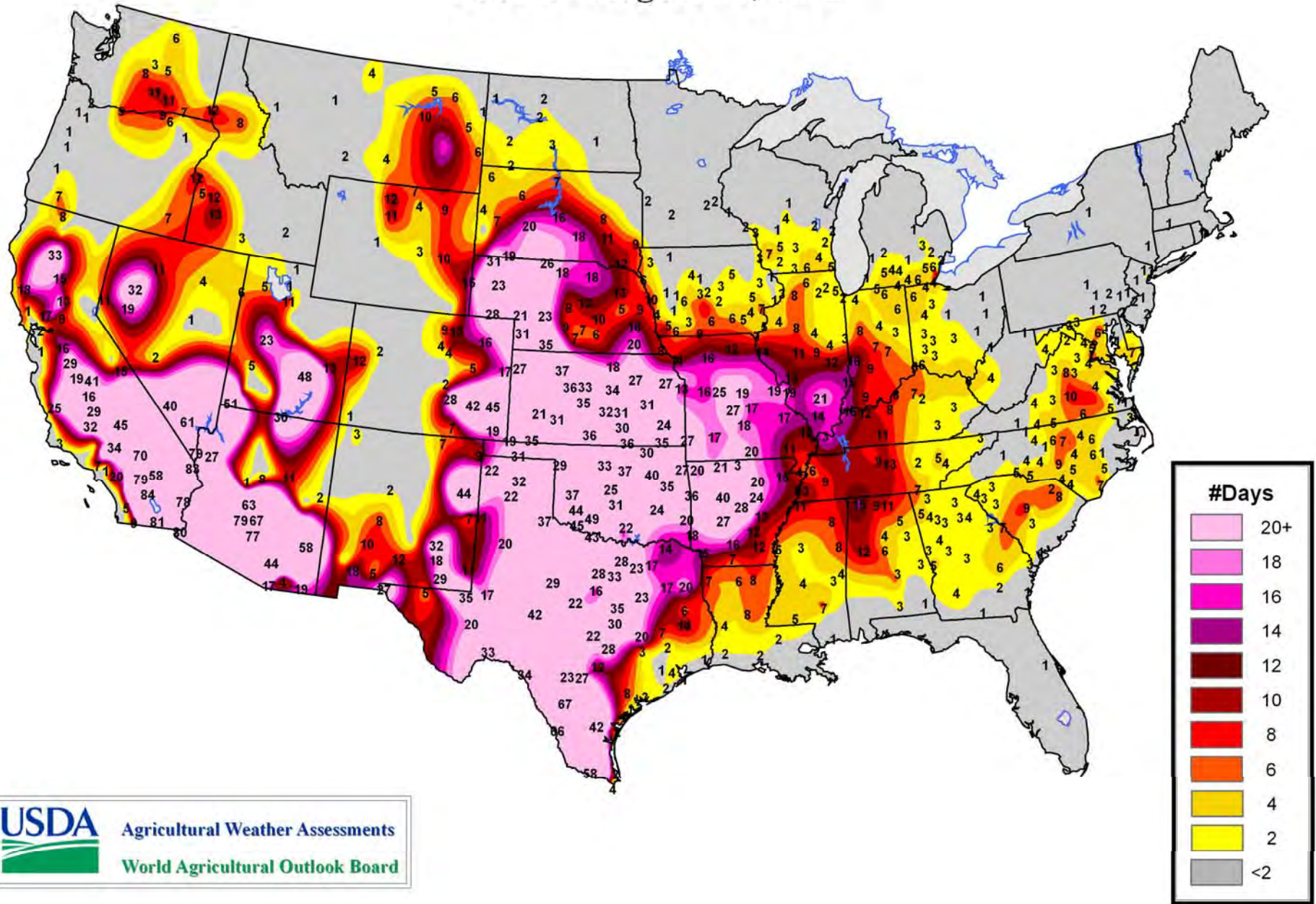
No Drought Posted/Predicted

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.



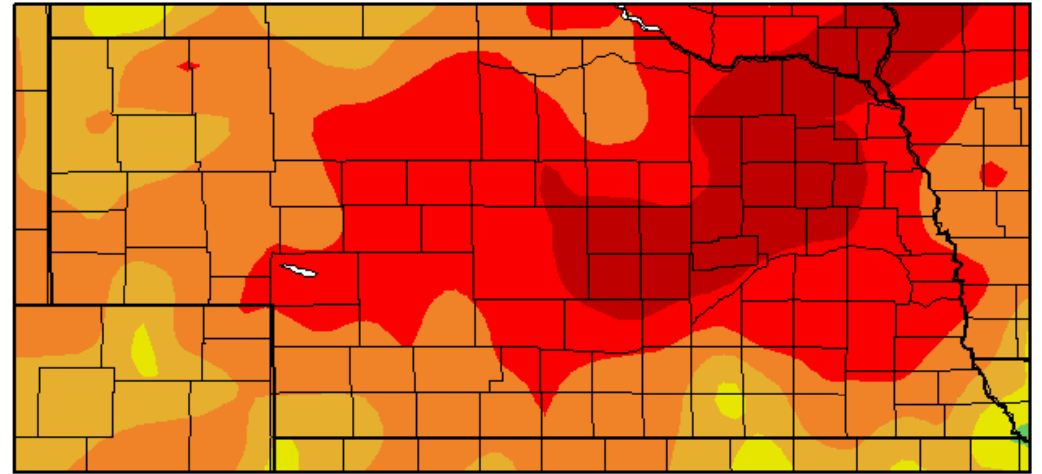
Number of Days $\geq 100^{\circ}\text{F}$

June 1 - August 31, 2012

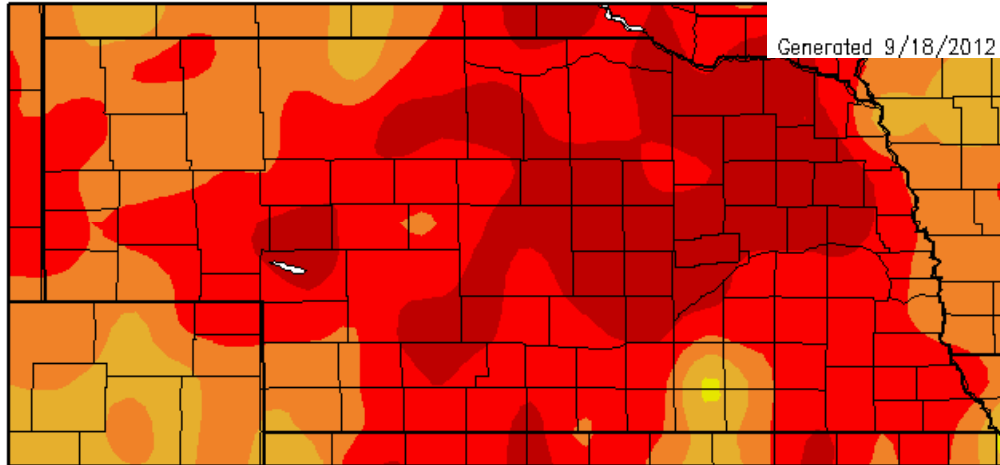


Summer 2012 Precipitation

Departure from Normal Precipitation (in)
6/1/2012 – 8/31/2012



Departure from Normal Precipitation
1/1/2012 – 12/31/2012



Generated 9/18/2012 at HPRCC using provisional data.

Regional Climate Centers



Generated 1/11/2013 at HPRCC using provisional data.

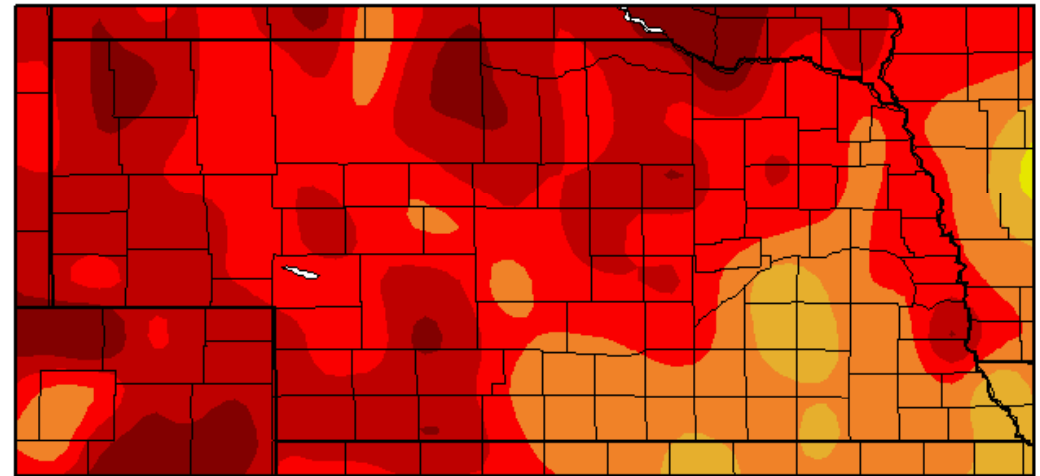
Regional Climate Centers

Annual Precipitation for 2012

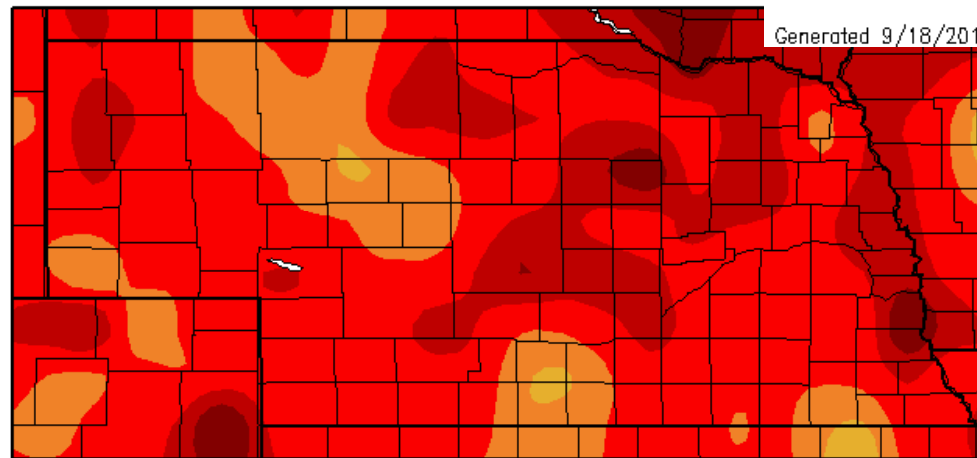
NIDIS
UNIVERSITY OF
Nebraska
Lincoln
National Drought Mitigation Center

Summer 2012 Temperatures

Departure from Normal Temperature (F)
6/1/2012 – 8/31/2012



Departure from Normal Temperature
1/1/2012 – 12/31/2012



Generated 9/18/2012 at HPRCC using provisional data.

Regional Climate Centers



Generated 1/11/2013 at HPRCC using provisional data.

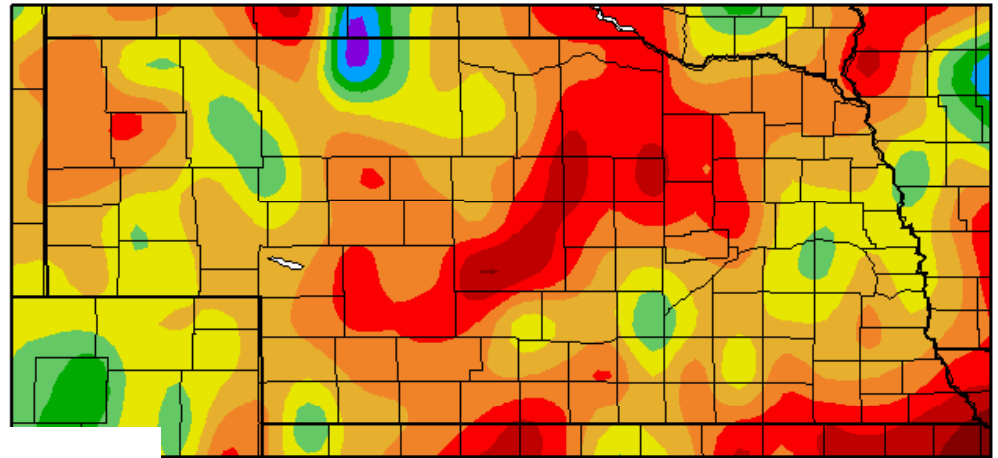
Regional Climate Centers

Annual Temperatures for 2012

NIDIS
UNIVERSITY OF
Nebraska
Lincoln
National Drought Mitigation Center

Current "recharge" period

Departure from Normal Precipitation (in)
10/1/2012 - 4/10/2013

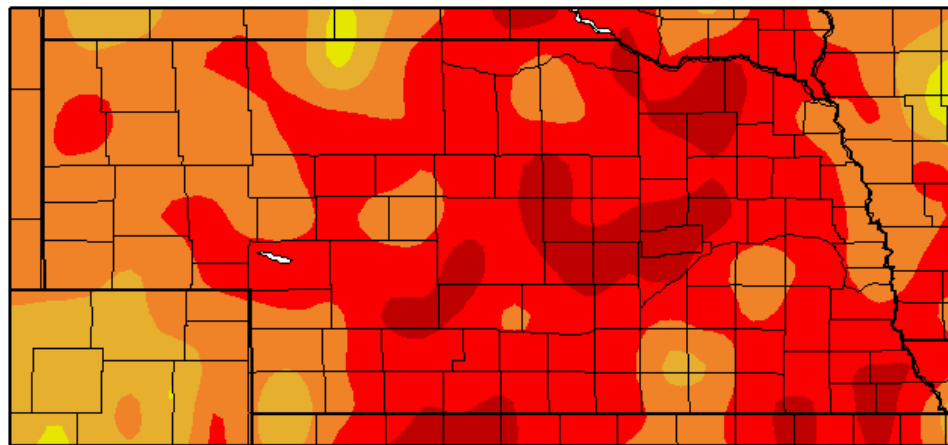


Departure from Normal Precipitation (in)
4/11/2012 - 4/10/2013



13 at HPRCC using provisional data.

Regional Climate Centers

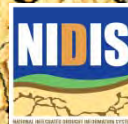


Last 12 months



2012 Impact to Agriculture...

National Drought Mitigation Center



U.S. Corn Areas Experiencing Drought

Reflects September 25, 2012
U.S. Drought Monitor data

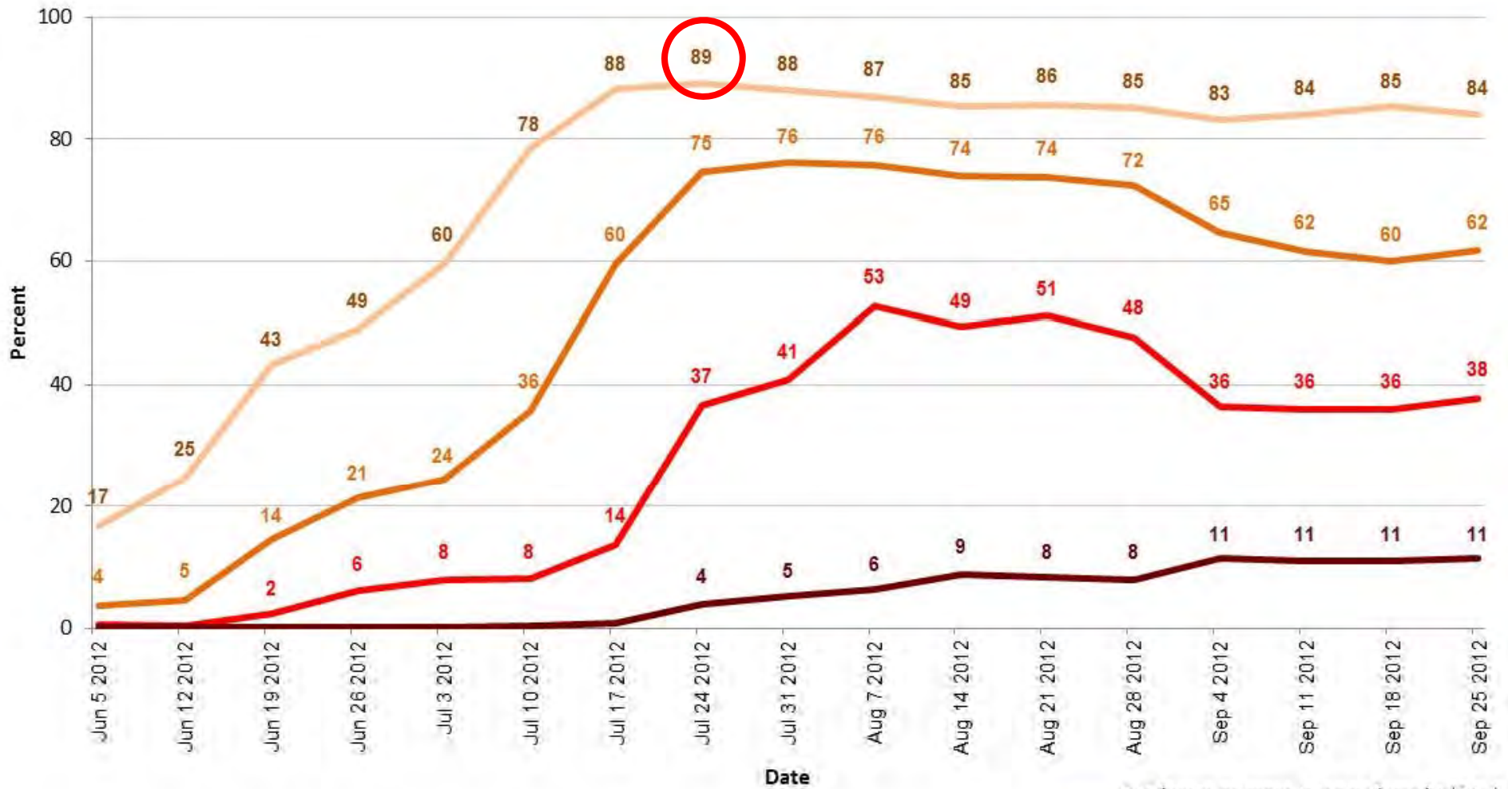
Approximately 84% of the corn grown in the U.S.
is within an area experiencing drought, based on
historical NASS crop production data.




Major and minor agricultural areas are derived from NASS county-level crop production data from 2006 to 2010. Additional information on these agricultural data can be found at: <http://www.nass.usda.gov/>.

Mapped drought areas are derived from the U.S. Drought Monitor product and do not depict the intensity of drought in any particular location. More information on the Drought Monitor can be found at: <http://www.drought.unl.edu/dm/monitor.html>.

United States Corn Areas Located in Drought




Agricultural Weather Assessments
World Agricultural Outlook Board

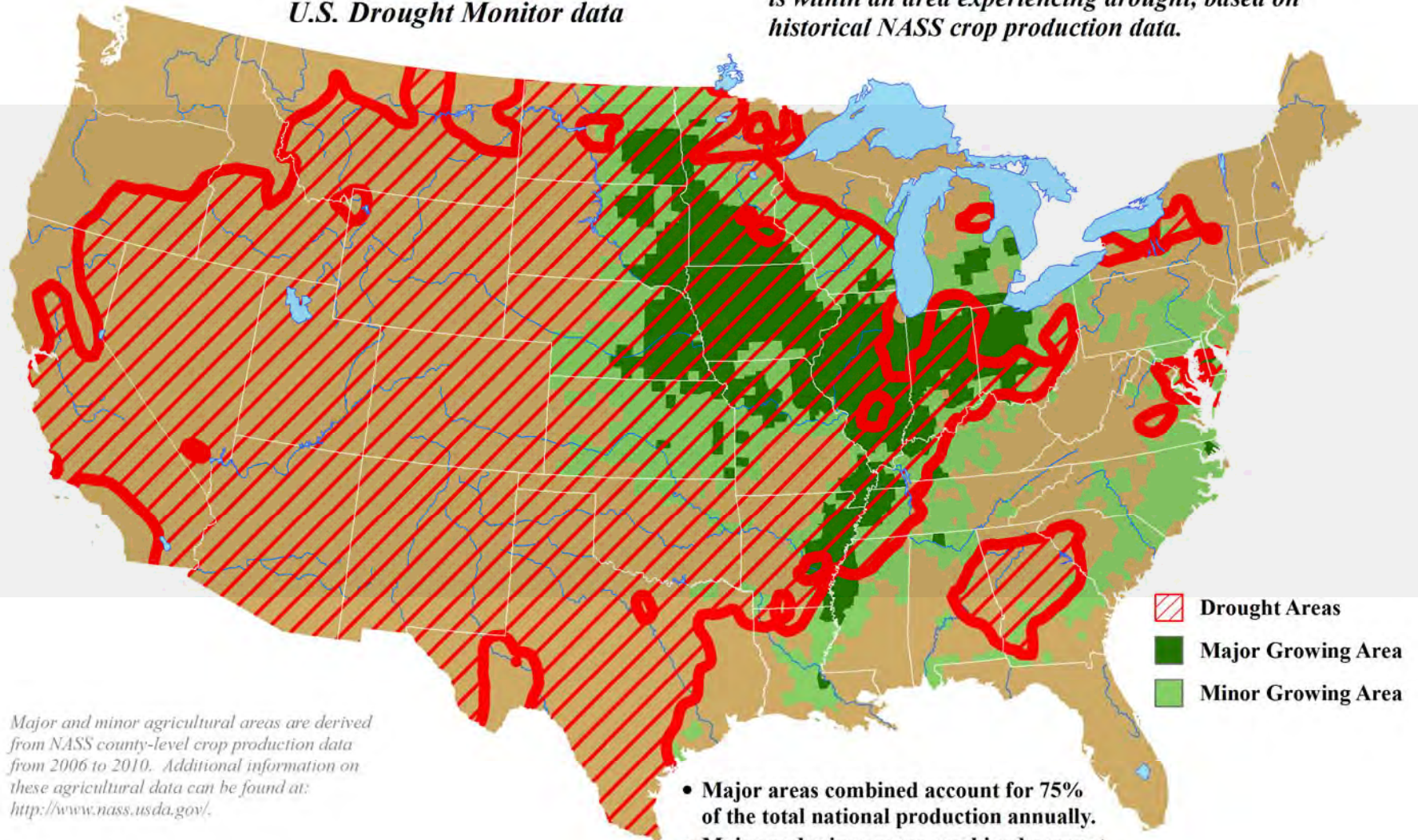
- Moderate or more intense drought (D1+)
- Severe or more intense drought (D2+)
- Extreme or more intense drought (D3+)
- Exceptional drought (D4)



U.S. Soybean Areas Experiencing Drought

Reflects September 25, 2012
U.S. Drought Monitor data

Approximately 80% of the soybeans grown in the U.S. is within an area experiencing drought, based on historical NASS crop production data.

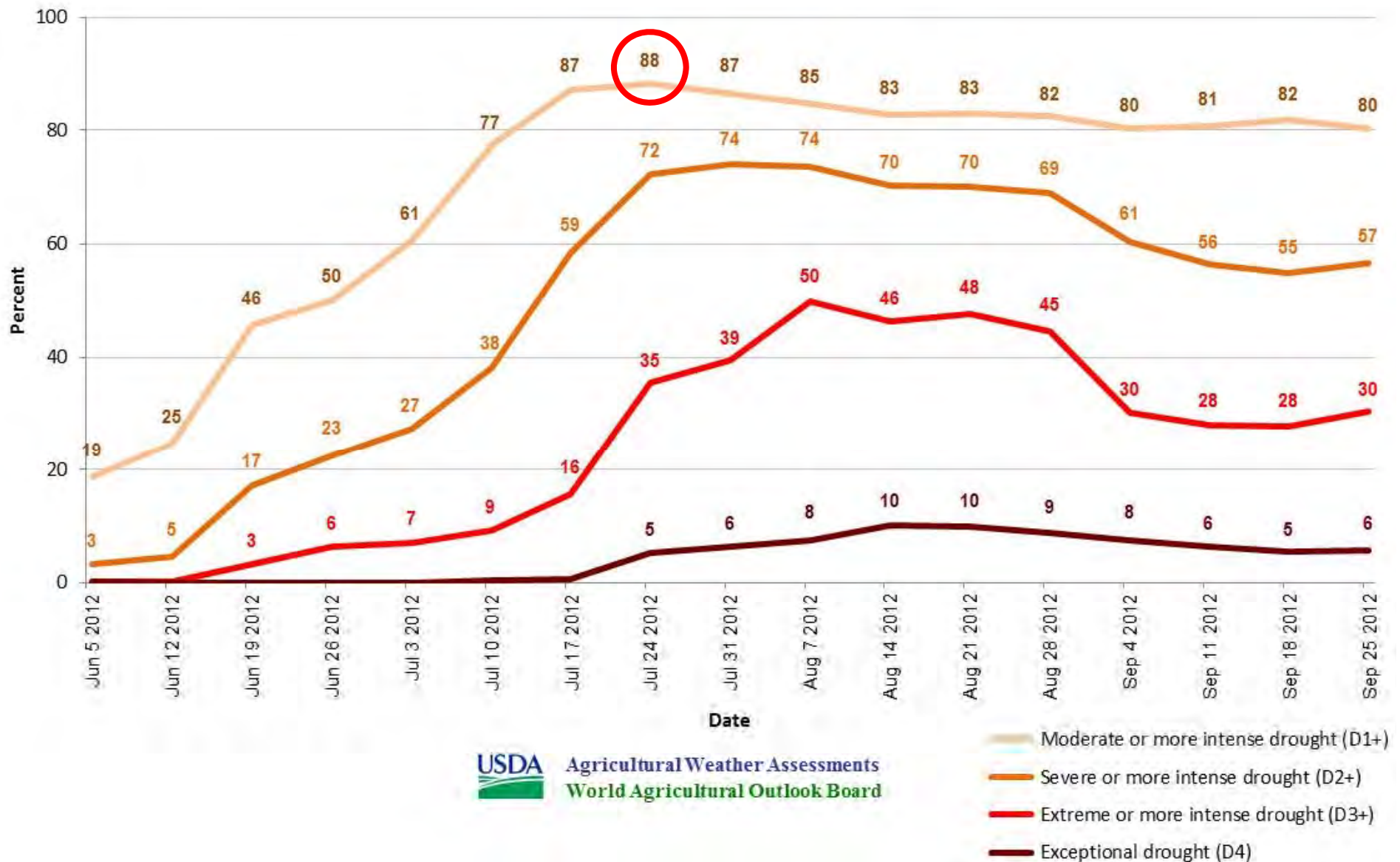


Major and minor agricultural areas are derived from NASS county-level crop production data from 2006 to 2010. Additional information on these agricultural data can be found at: <http://www.nass.usda.gov/>.

Mapped drought areas are derived from the U.S. Drought Monitor product and do not depict the intensity of drought in any particular location. More information on the Drought Monitor can be found at: <http://www.drought.unl.edu/dm/monitor.html>.

- Major areas combined account for 75% of the total national production annually.
- Major and minor areas combined account for 99% of the total national production annually.

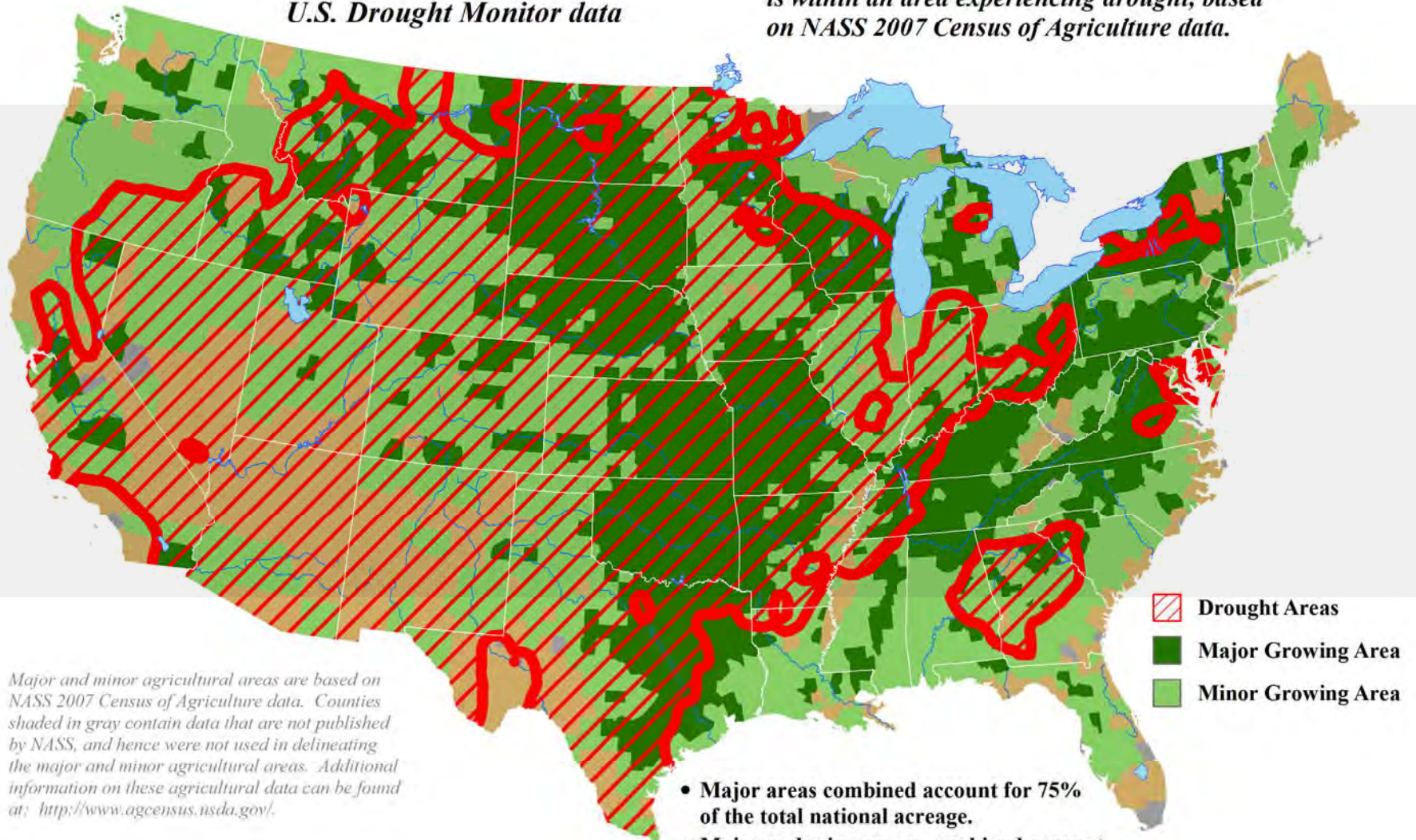
United States Soybean Areas Located in Drought



U.S. Hay Areas Experiencing Drought

Reflects September 25, 2012
U.S. Drought Monitor data

Approximately 69% of the domestic hay acreage
is within an area experiencing drought, based
on NASS 2007 Census of Agriculture data.

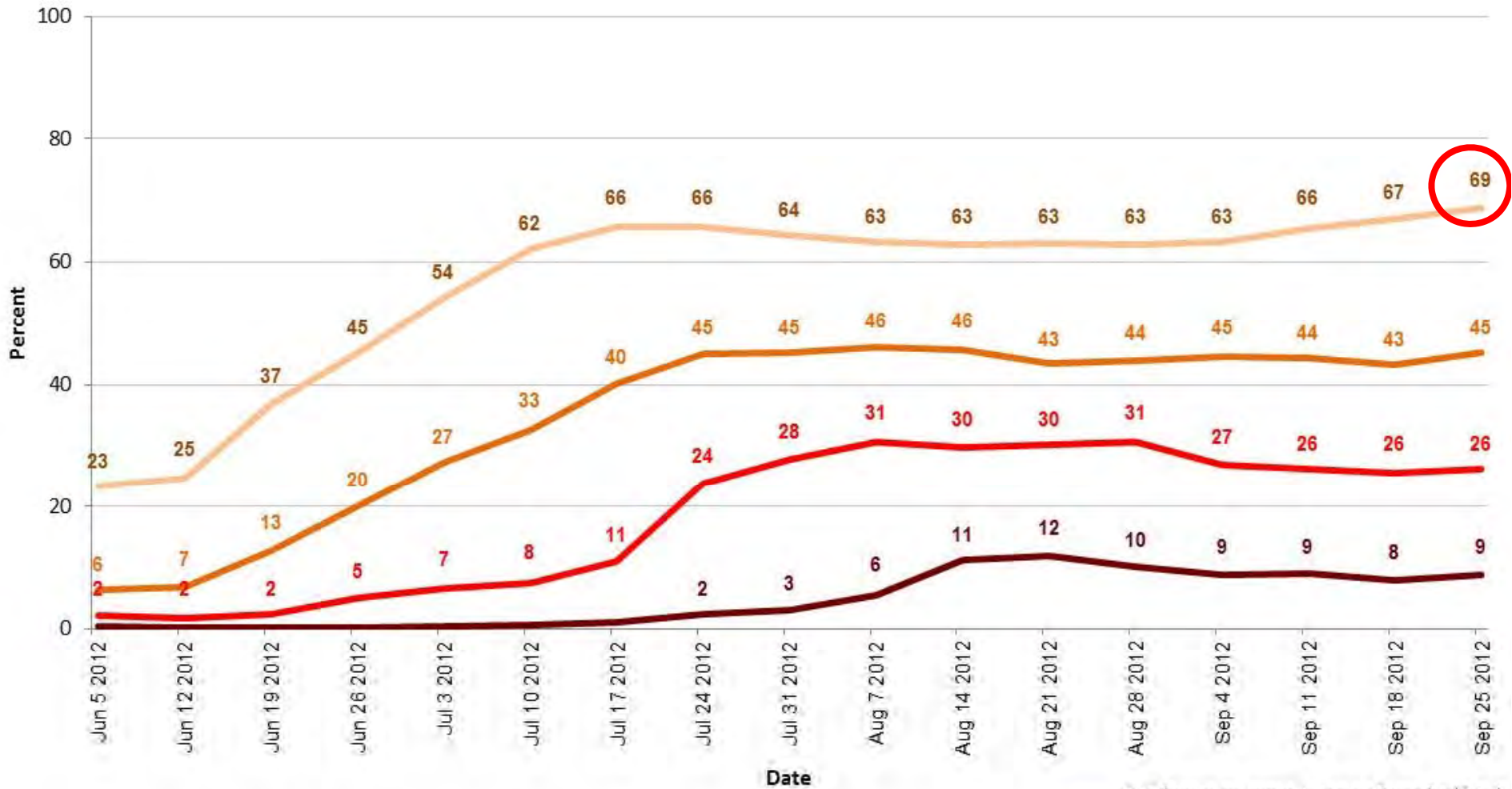



Major and minor agricultural areas are based on NASS 2007 Census of Agriculture data. Counties shaded in gray contain data that are not published by NASS, and hence were not used in delineating the major and minor agricultural areas. Additional information on these agricultural data can be found at: <http://www.agcensus.usda.gov/>.

Mapped drought areas are derived from the U.S. Drought Monitor product and do not depict the intensity of drought in any particular location. More information on the Drought Monitor can be found at: <http://www.drought.unl.edu/dm/monitor.html>.

- Major areas combined account for 75% of the total national acreage.
- Major and minor areas combined account for 99% of the total national acreage.

United States Hay Areas Located in Drought




Agricultural Weather Assessments
World Agricultural Outlook Board

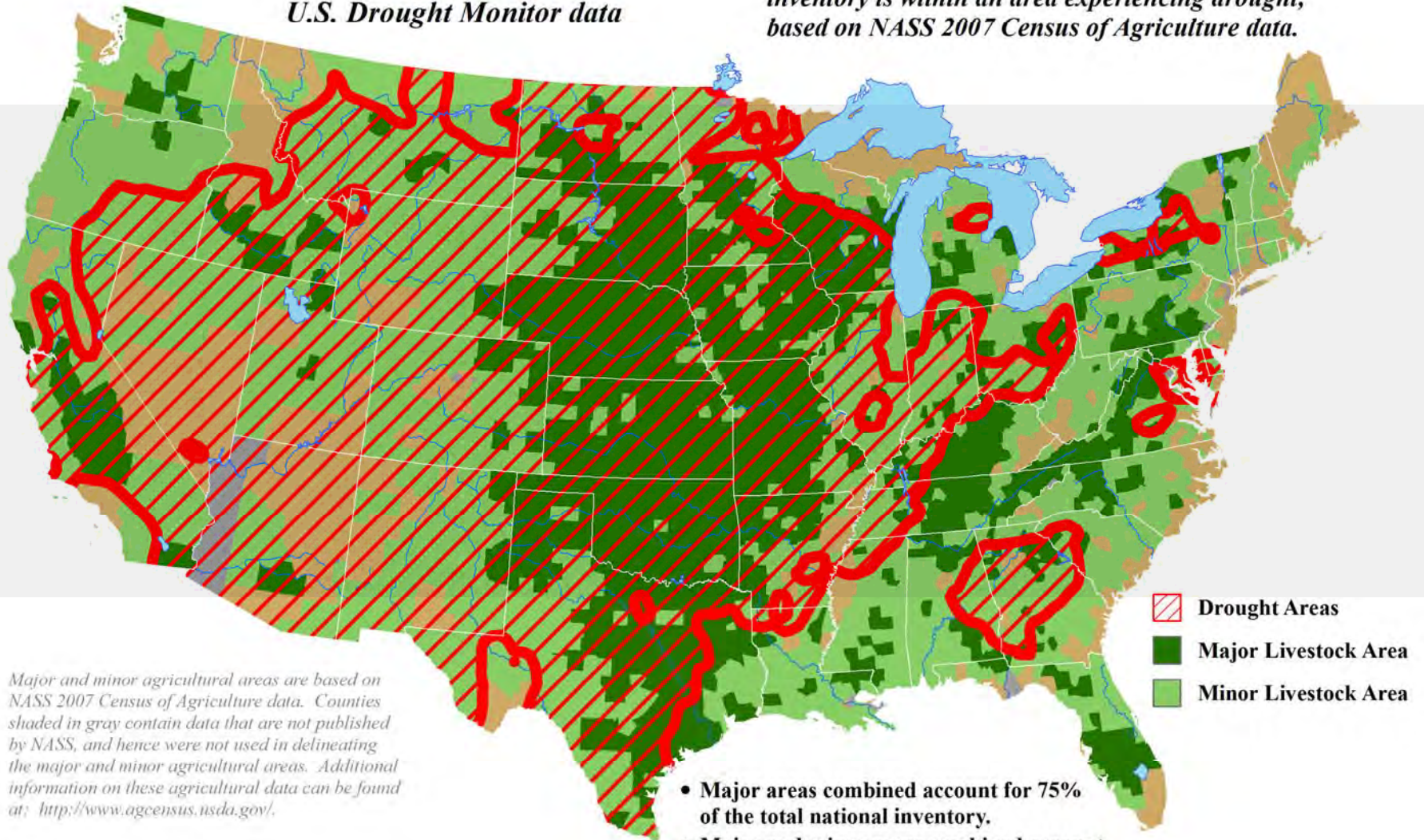
- Moderate or more intense drought (D1+)
- Severe or more intense drought (D2+)
- Extreme or more intense drought (D3+)
- Exceptional drought (D4)



U.S. Cattle Areas Experiencing Drought

Reflects September 25, 2012
U.S. Drought Monitor data

Approximately 76% of the domestic cattle
inventory is within an area experiencing drought,
based on NASS 2007 Census of Agriculture data.

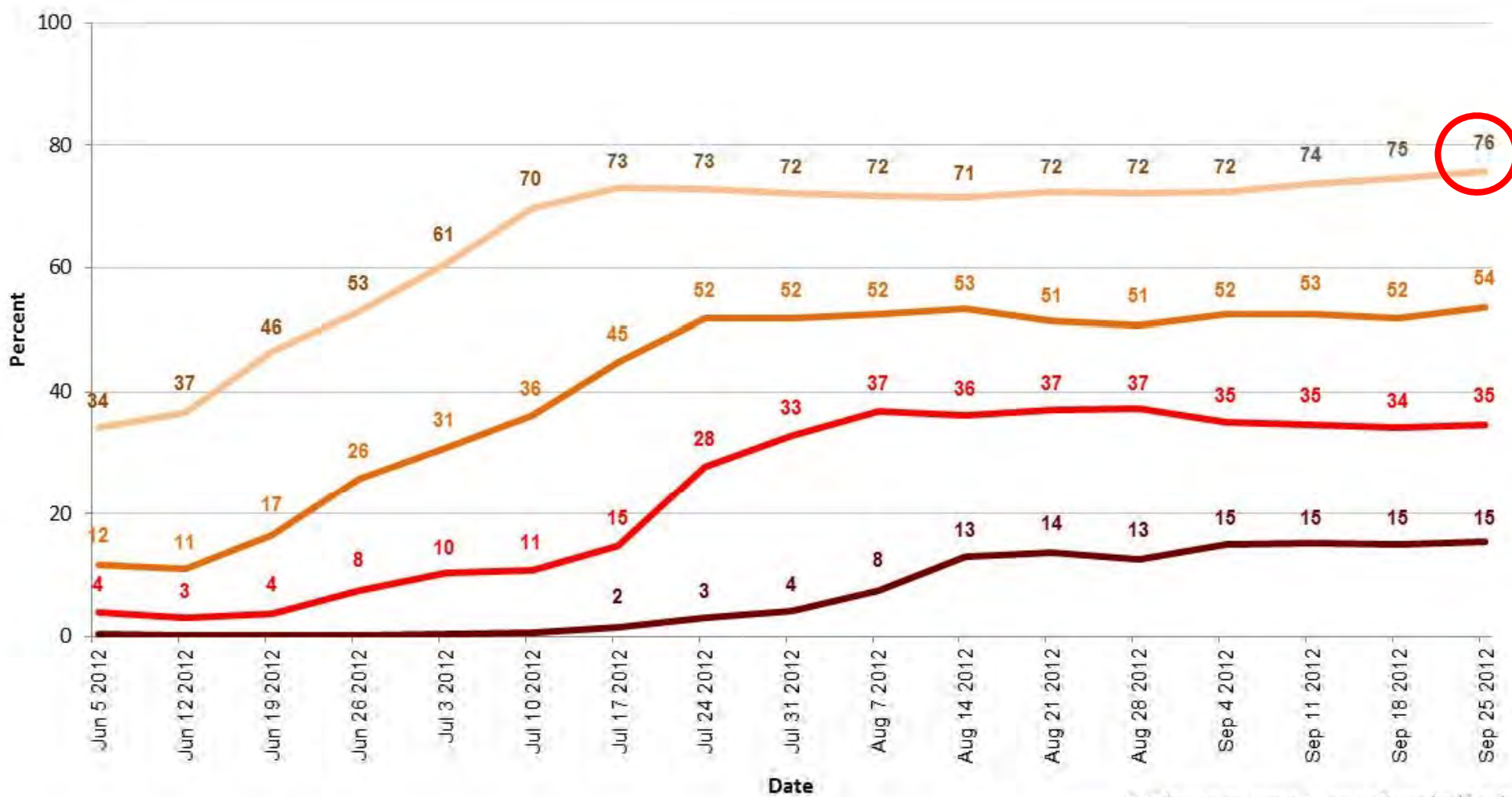


Major and minor agricultural areas are based on NASS 2007 Census of Agriculture data. Counties shaded in gray contain data that are not published by NASS, and hence were not used in delineating the major and minor agricultural areas. Additional information on these agricultural data can be found at: <http://www.agcensus.usda.gov/>.





Mapped drought areas are derived from the U.S. Drought Monitor product and do not depict the intensity of drought in any particular location. More information on the Drought Monitor can be found at: <http://www.drought.unl.edu/dm/monitor.html>.

- Major areas combined account for 75% of the total national inventory.
- Major and minor areas combined account for 99% of the total national inventory.

United States Cattle Areas Located in Drought

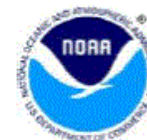



Agricultural Weather Assessments
World Agricultural Outlook Board

-  Moderate or more intense drought (D1+)
-  Severe or more intense drought (D2+)
-  Extreme or more intense drought (D3+)
-  Exceptional drought (D4)



Going into 2013.....

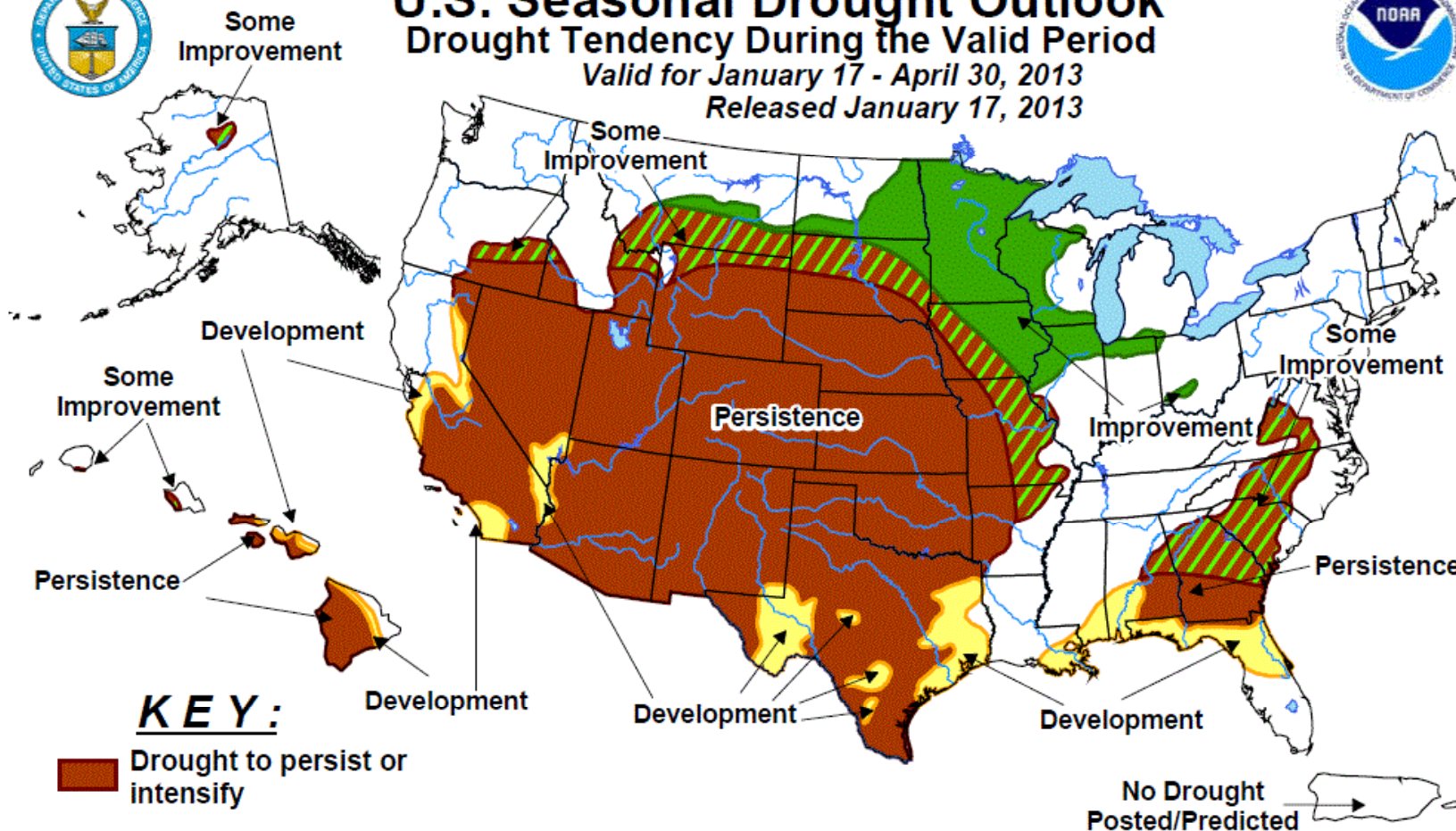


U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for January 17 - April 30, 2013

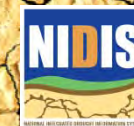
Released January 17, 2013



KEY:

- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events – such as individual storms – cannot be accurately forecast more than a few days in advance. Use caution for applications – such as crops – that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.



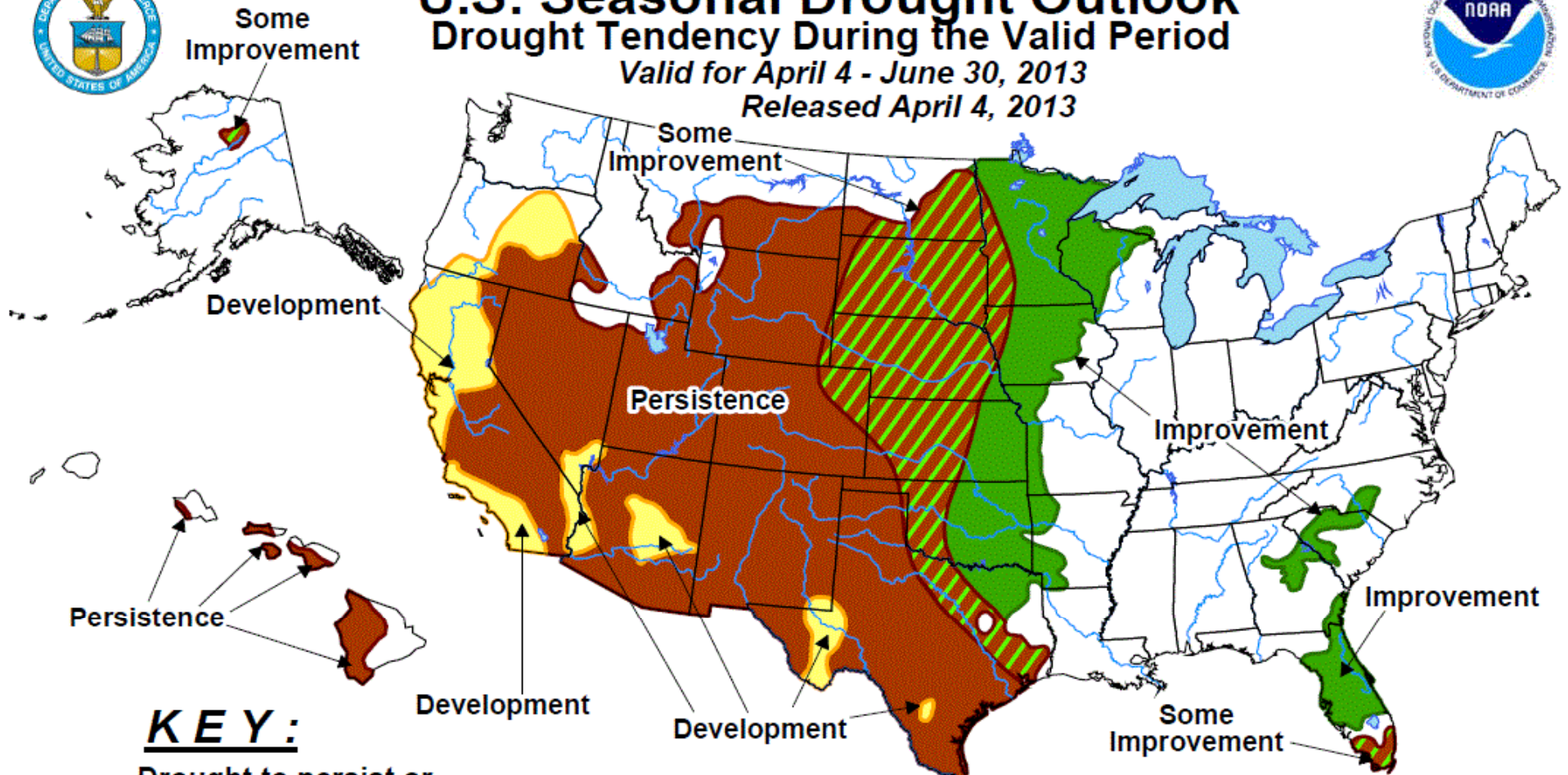


U.S. Seasonal Drought Outlook





Drought Tendency During the Valid Period


Valid for April 4 - June 30, 2013

Released April 4, 2013



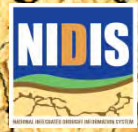
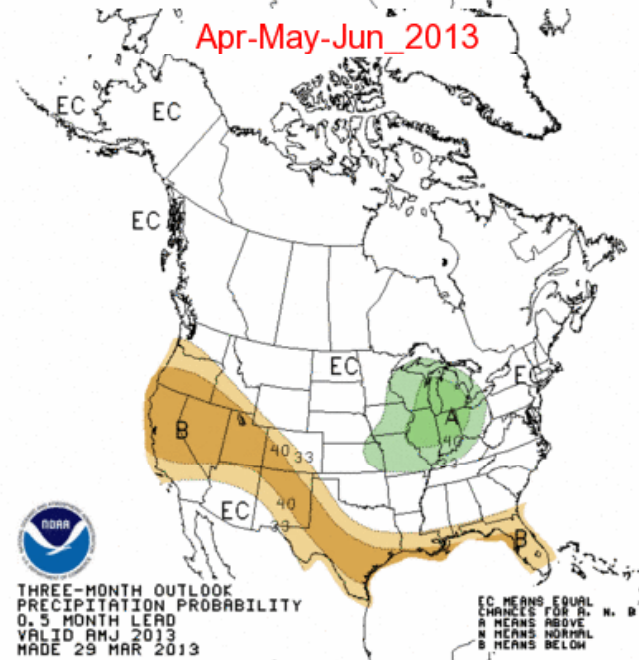
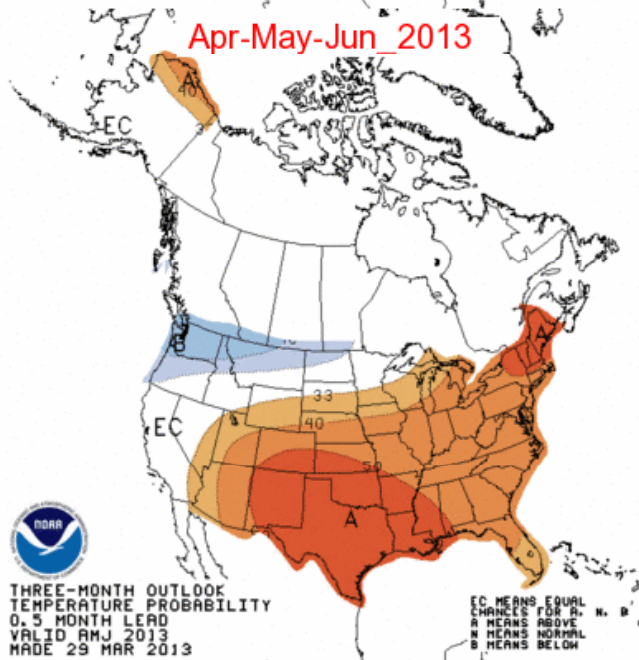
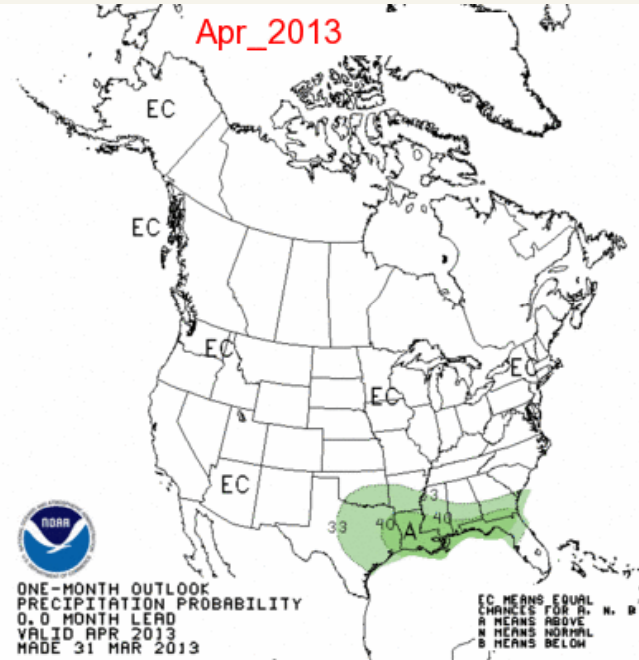
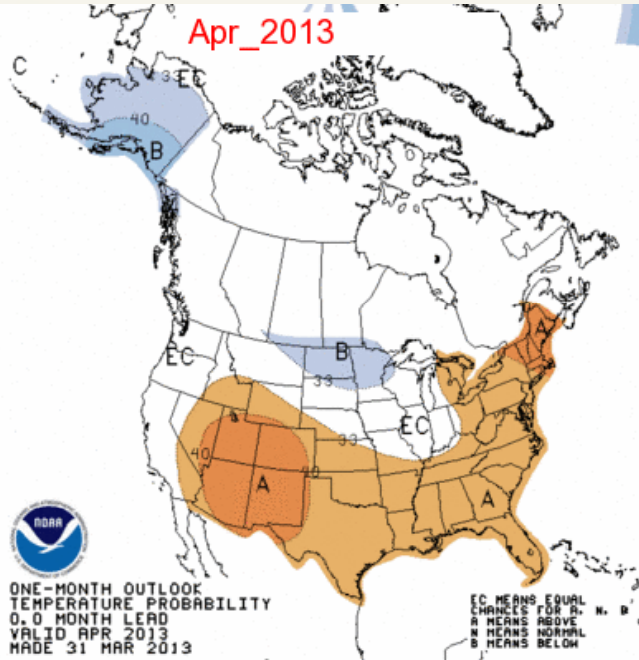
KEY:

-  Drought to persist or intensify
-  Drought ongoing, some improvement
-  Drought likely to improve, impacts ease
-  Drought development likely

No Drought Posted/Predicted 

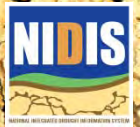
Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

Seasonal Forecasts

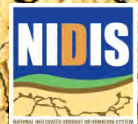


What have we learned up to this point?

- ▶ Seasonal forecasts are difficult to make with a great amount of certainty
- ▶ As in 2010-2011, drought can be very intense, but isolated
- ▶ As in 2012-2013, drought can have a large spatial footprint
- ▶ In both instances, droughts developed rapidly and intensified rapidly as well
- ▶ Multi-Year drought events have added challenges
- ▶ Planning and monitoring conditions is important both before and during any drought episode
- ▶ We will be discussing drought for much of 2013 as little relief is being projected



Any Questions ?



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