



Drought Risk Management: An American Approach and Beyond

Michael Hayes
National Drought Mitigation Center
University of Nebraska-Lincoln

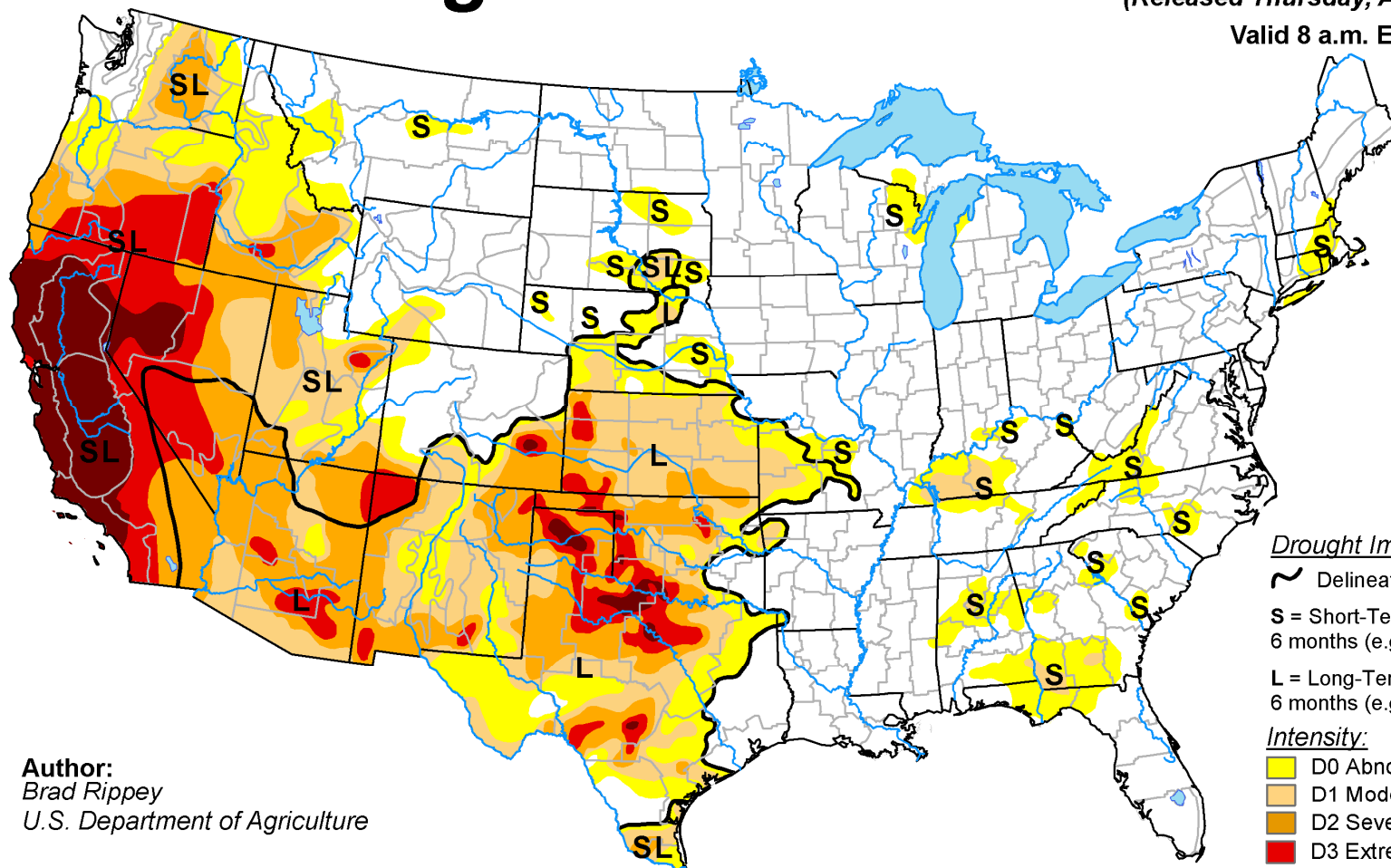
Photo: Nicole Wall, NDMC, Platte River, August 2012

U.S. Drought Monitor

August 5, 2014

(Released Thursday, Aug. 7, 2014)

Valid 8 a.m. EDT



Author:
Brad Rippey
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:

Yellow D0 Abnormally Dry

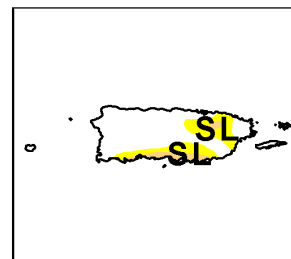
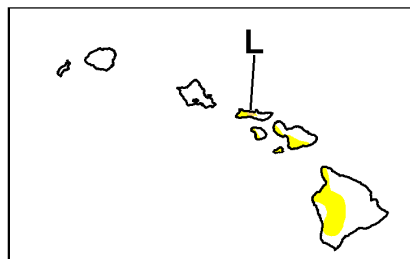
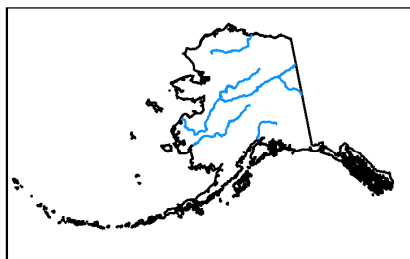
Light Orange D1 Moderate Drought

Dark Orange D2 Severe Drought

Red D3 Extreme Drought

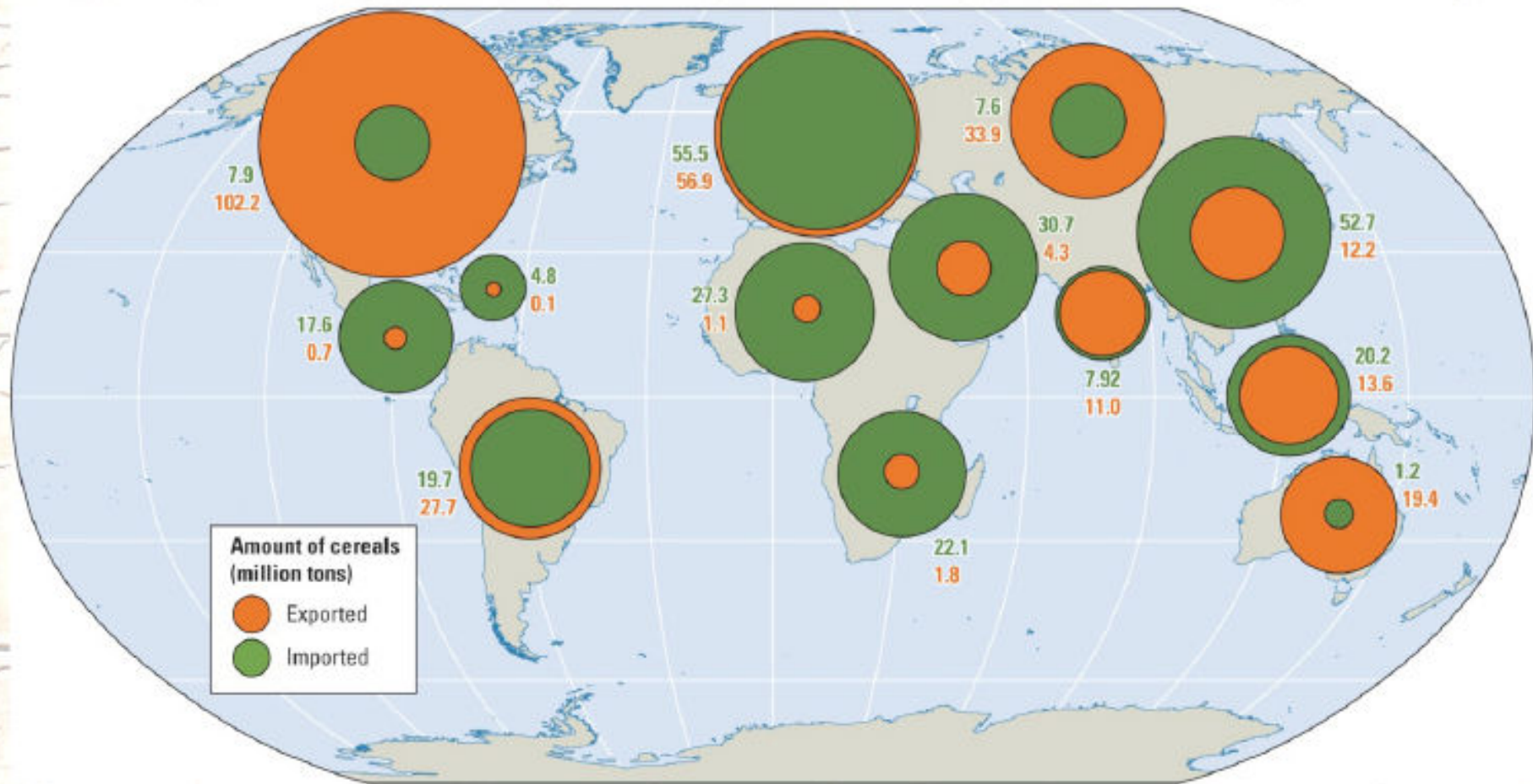
Dark Red D4 Exceptional Drought

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



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

Context: Drought and Food Security

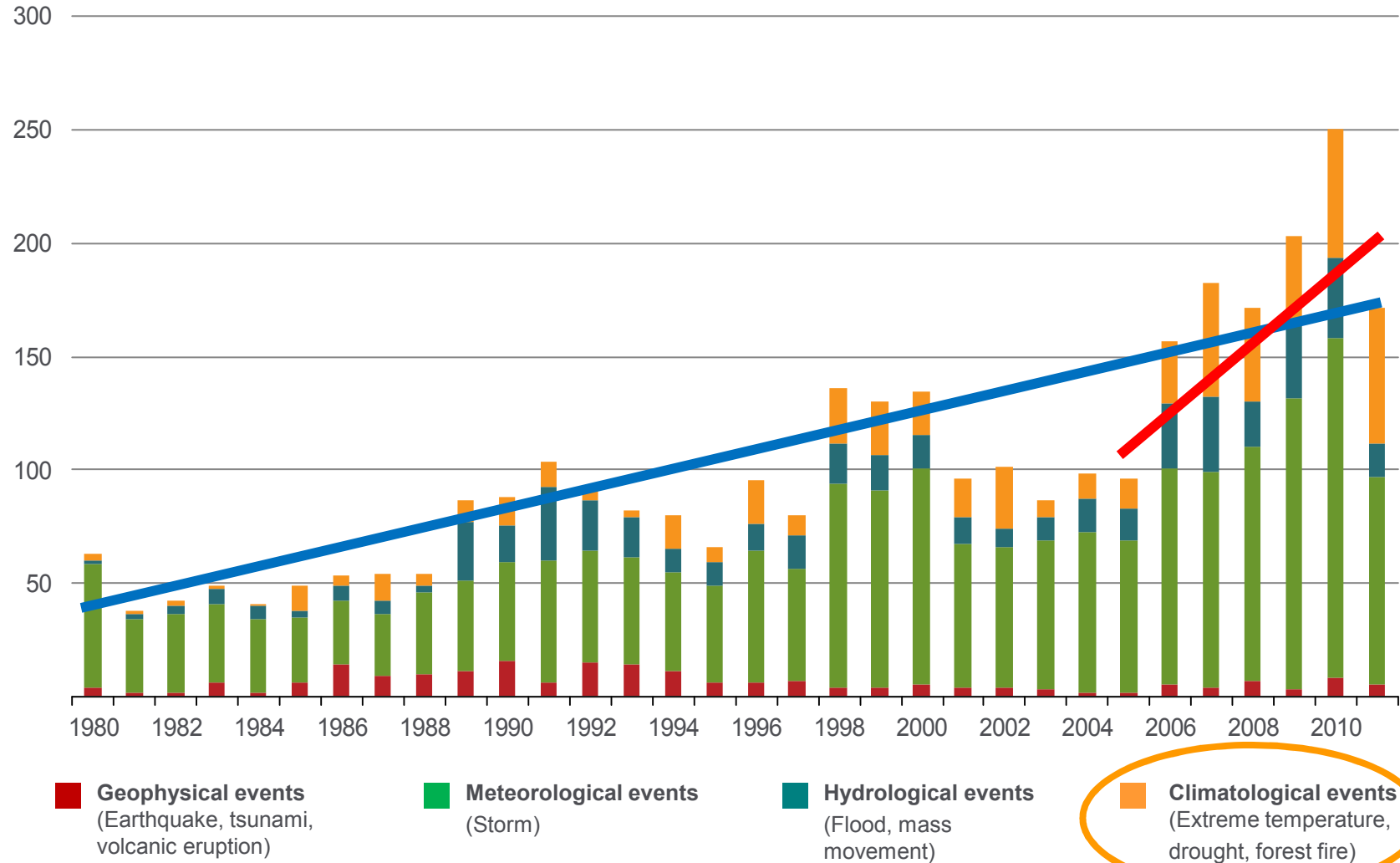


World grain trade depends on exports from a few countries

FAO 2009

Context: Natural Disasters in the U.S. 1980-2011

Number



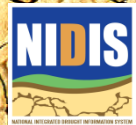
Source: MR NatCatSERVICE

© 2011 Munich Re

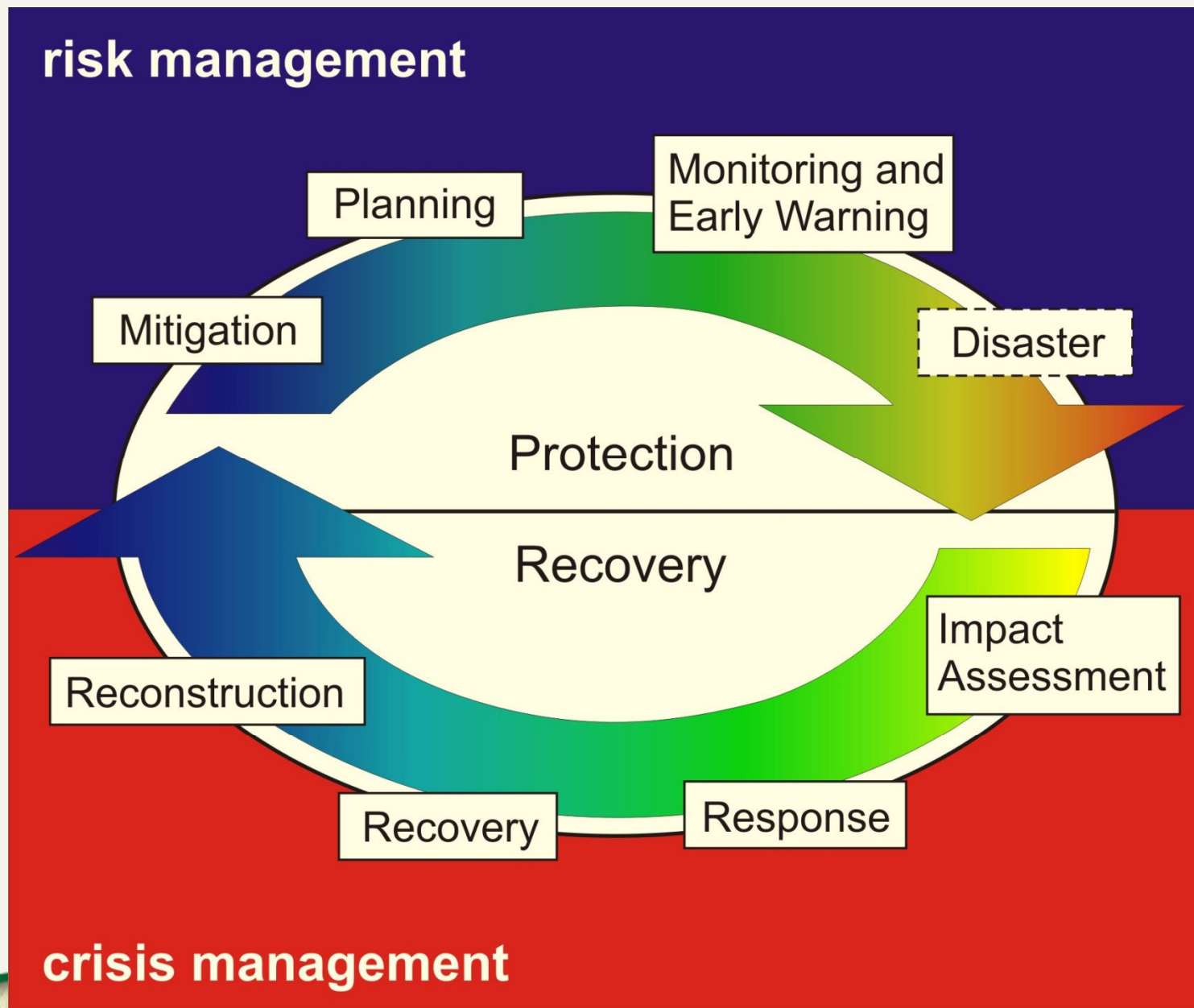


Context: Natural Disasters Worldwide

- ▶ Economic losses from disasters worldwide since 2000 are in the range of *US\$2.5 trillion* (UN, 2013)
 - Considerably higher than previous estimates
 - “Economic losses from disasters are out of control”
- ▶ “Losses from floods, earthquakes and drought will continue to escalate” **unless action is taken to reduce disaster risks**



The Cycle of Disaster Management



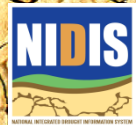
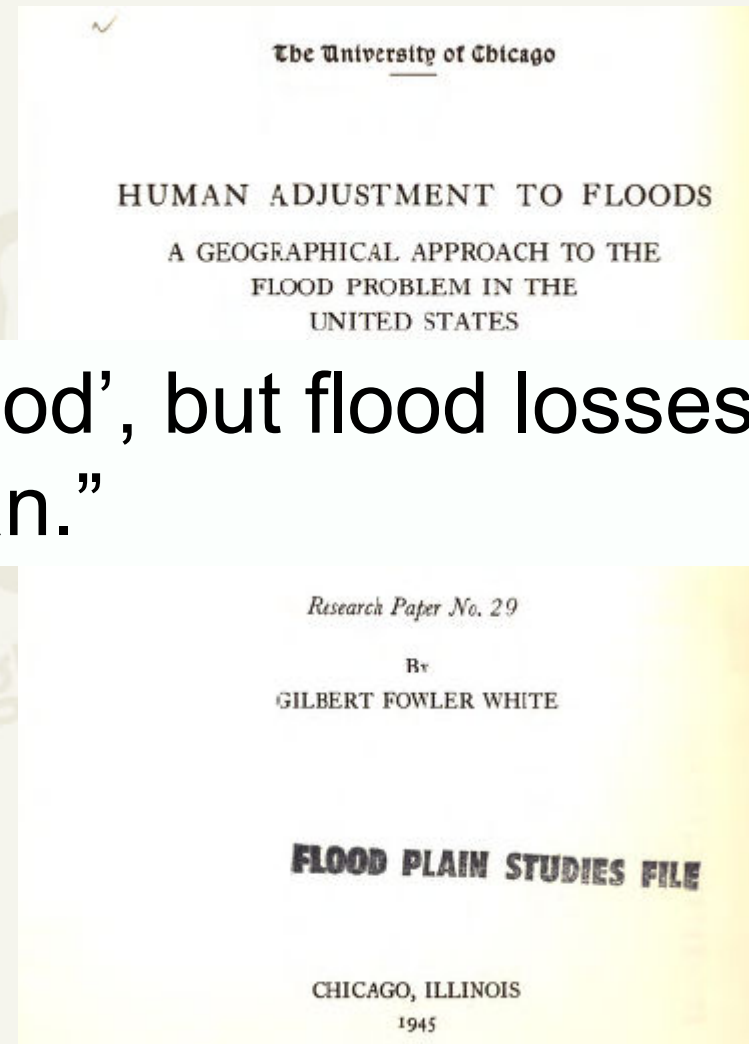
Disaster Management



“Floods are 'acts of God', but flood losses are largely acts of man.”



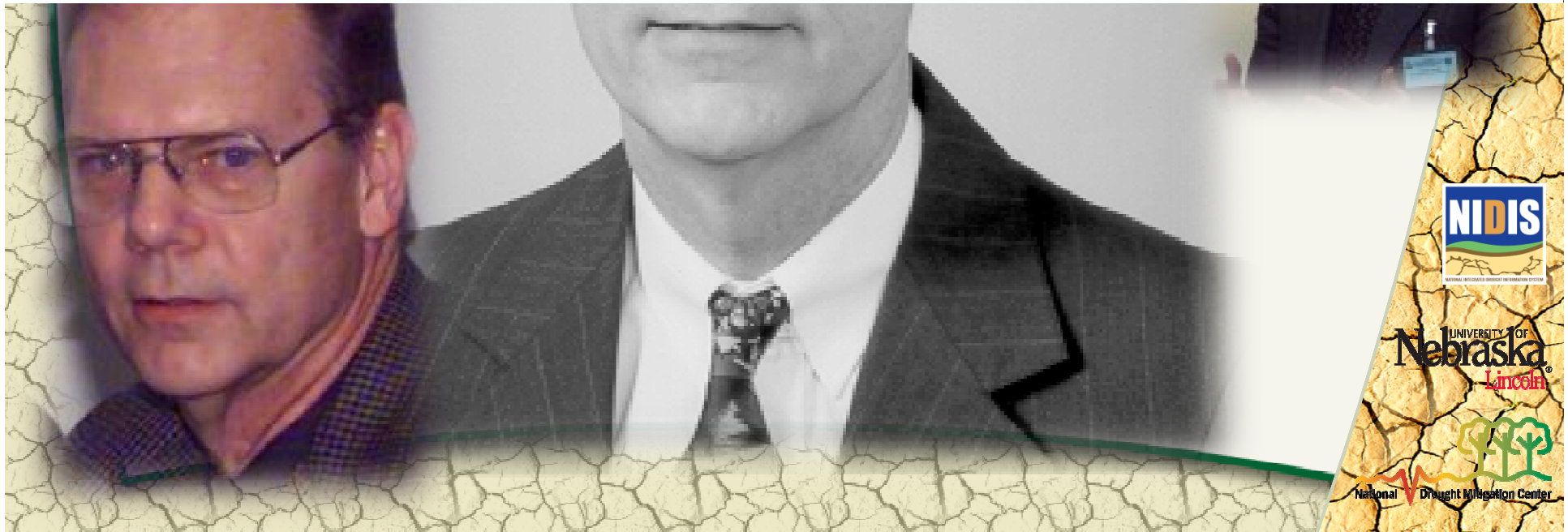
Gilbert Fowler White



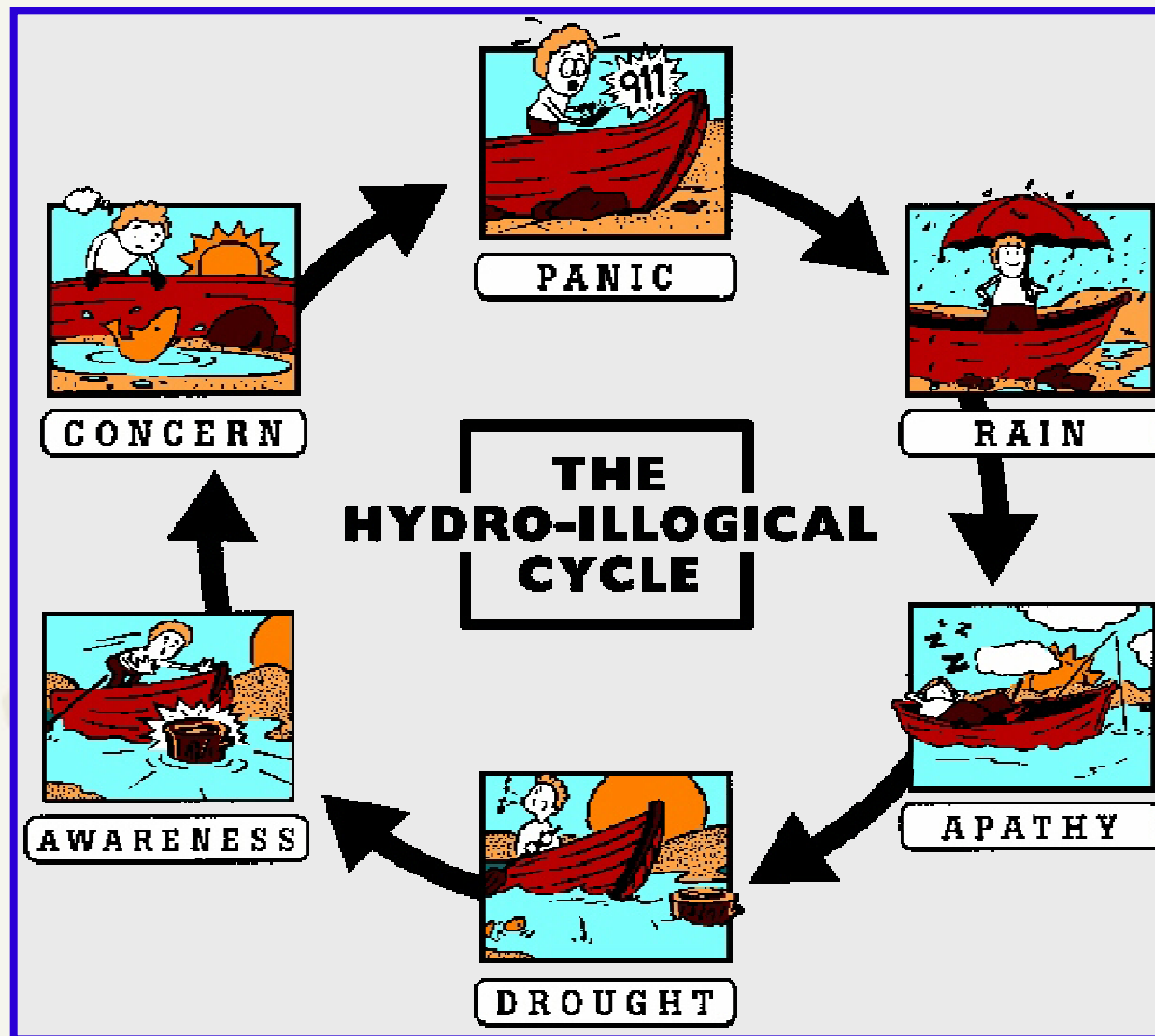
Drought Management: Don Wilhite

“Governments should prepare for droughts by developing and implementing strategies and plans that reduce associated impacts.”

-Wilhite and Glantz, 1985



Don Wilhite

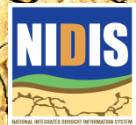


National Drought Mitigation Center

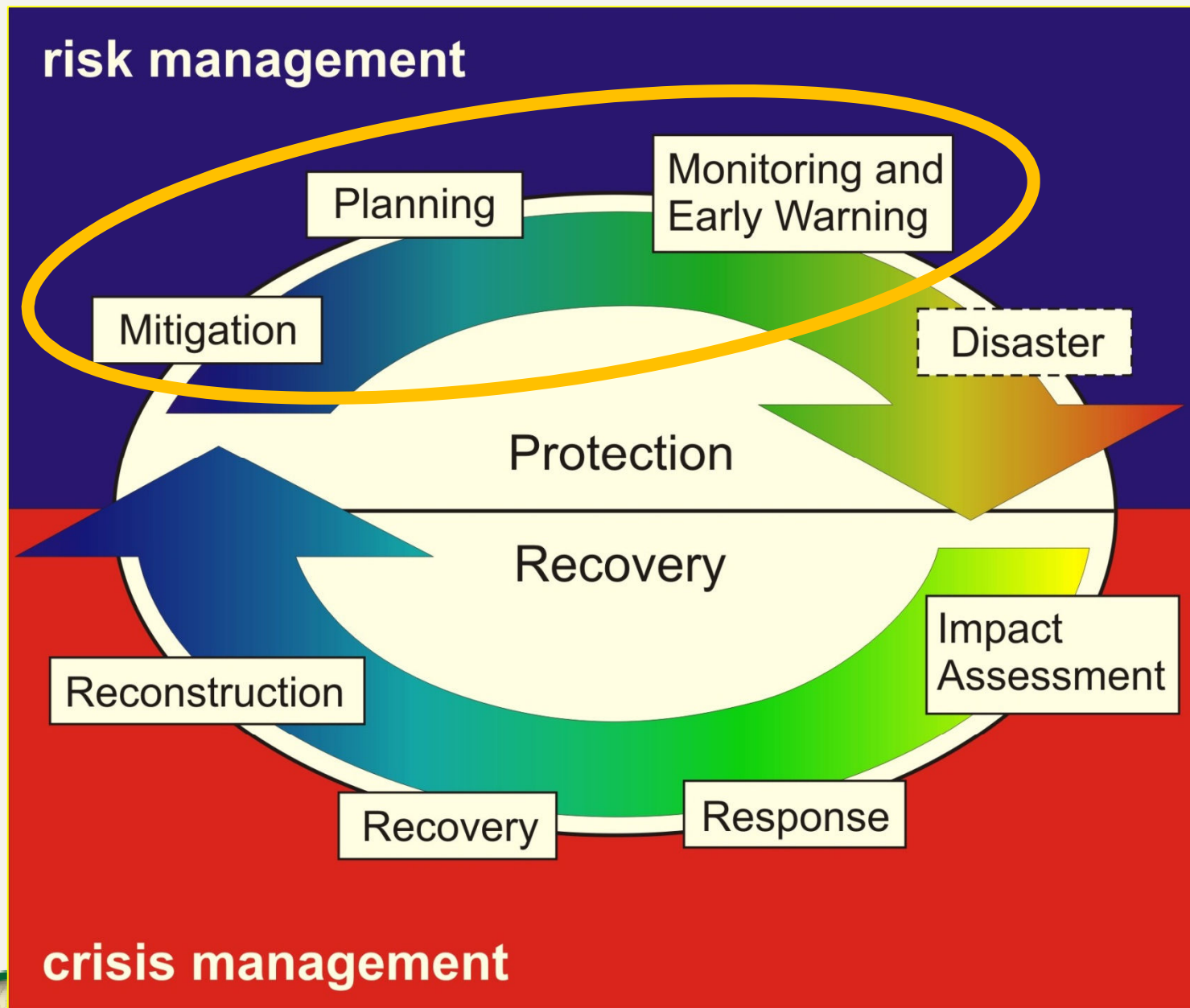


Founded: **1995** at the University of Nebraska-Lincoln

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

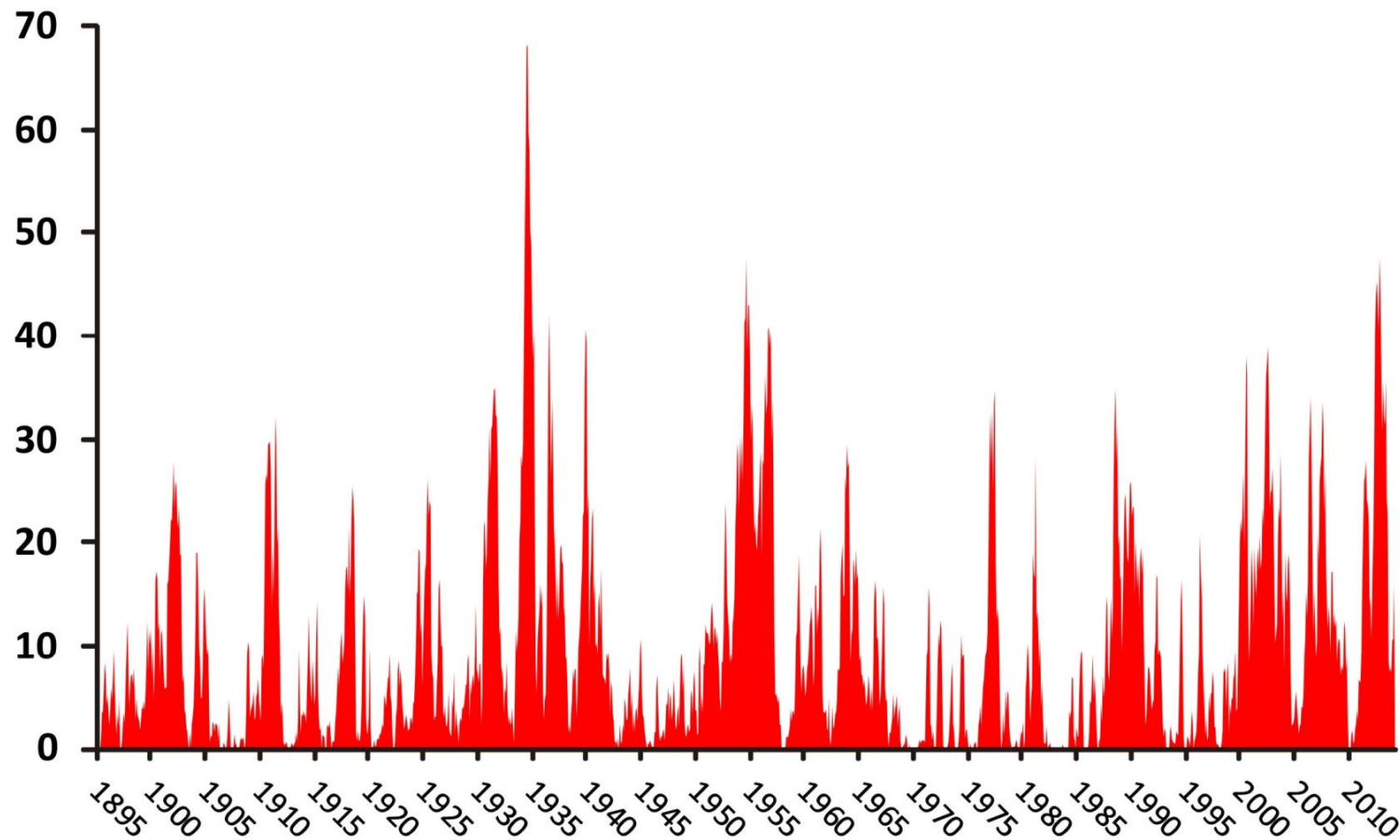


The Cycle of Disaster Management



Percent Area of the United States in Severe to Extreme Drought

January 1895–March 2014



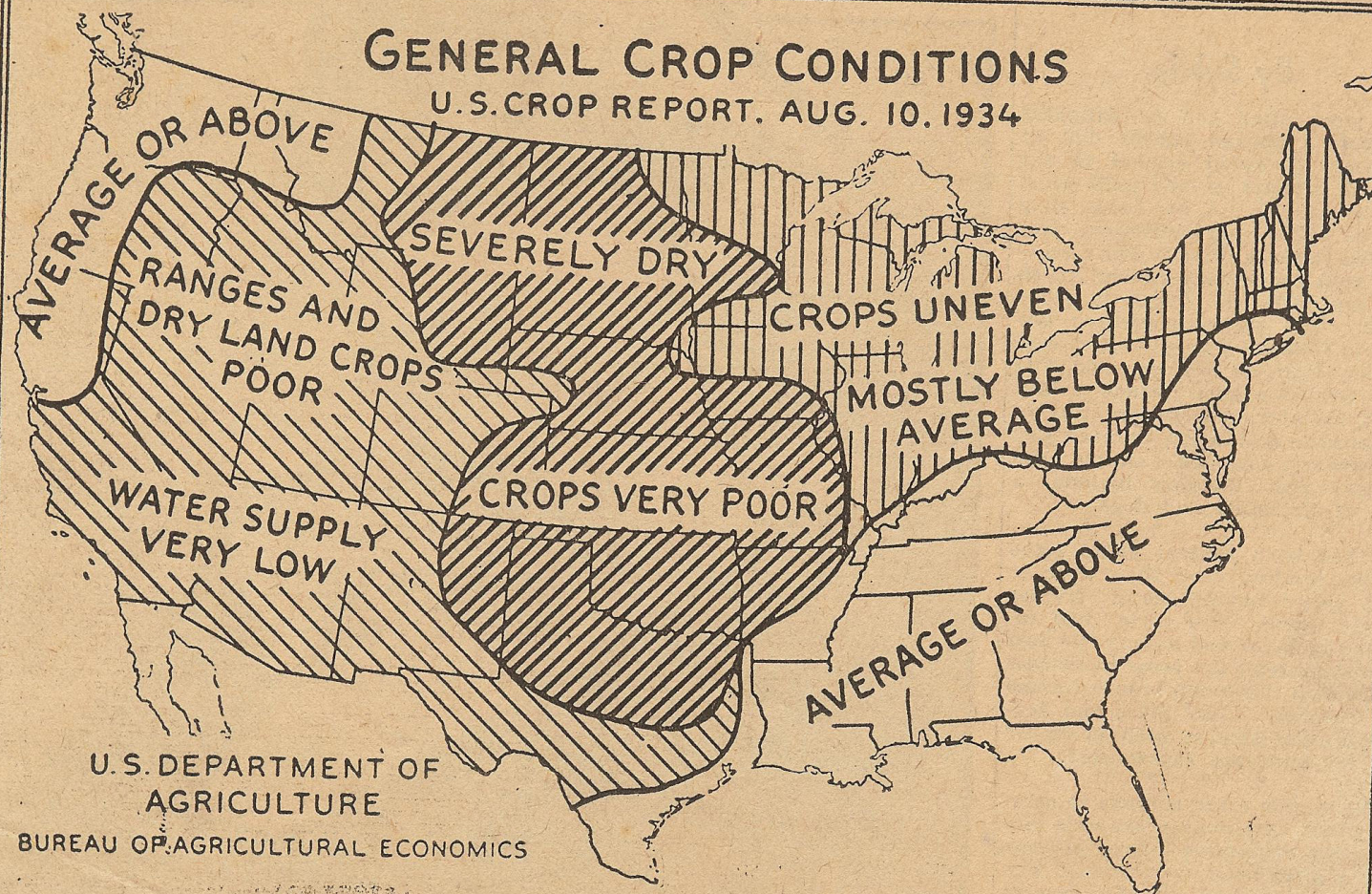
Based on data from the National Climatic Data Center/NOAA



CROP EXPERTS MAKE MAP OF DROUTH AREAS

GENERAL CROP CONDITIONS

U.S. CROP REPORT, AUG. 10, 1934



This chart, prepared by the United States Department of Agriculture, shows conditions in the different parts of the United States

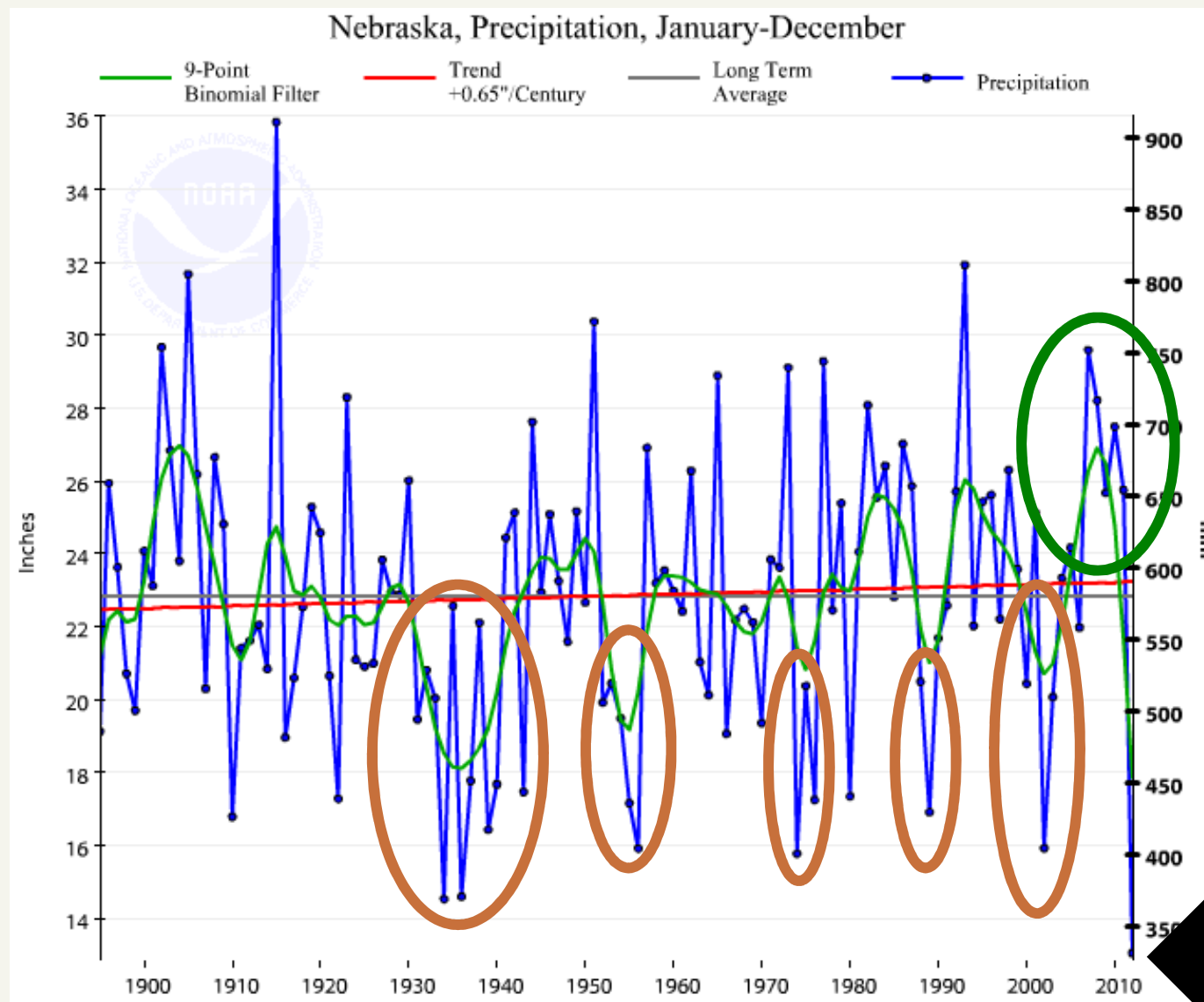
1930s



GROVE AND BUILDINGS COVERED BY DRIFTING SOIL - J. OAK - 1935

© 1935
JOSEPH PHOTO
CO.
GREGORY, I. D.
D-15

Nebraska Annual Precipitation (1895-2012)



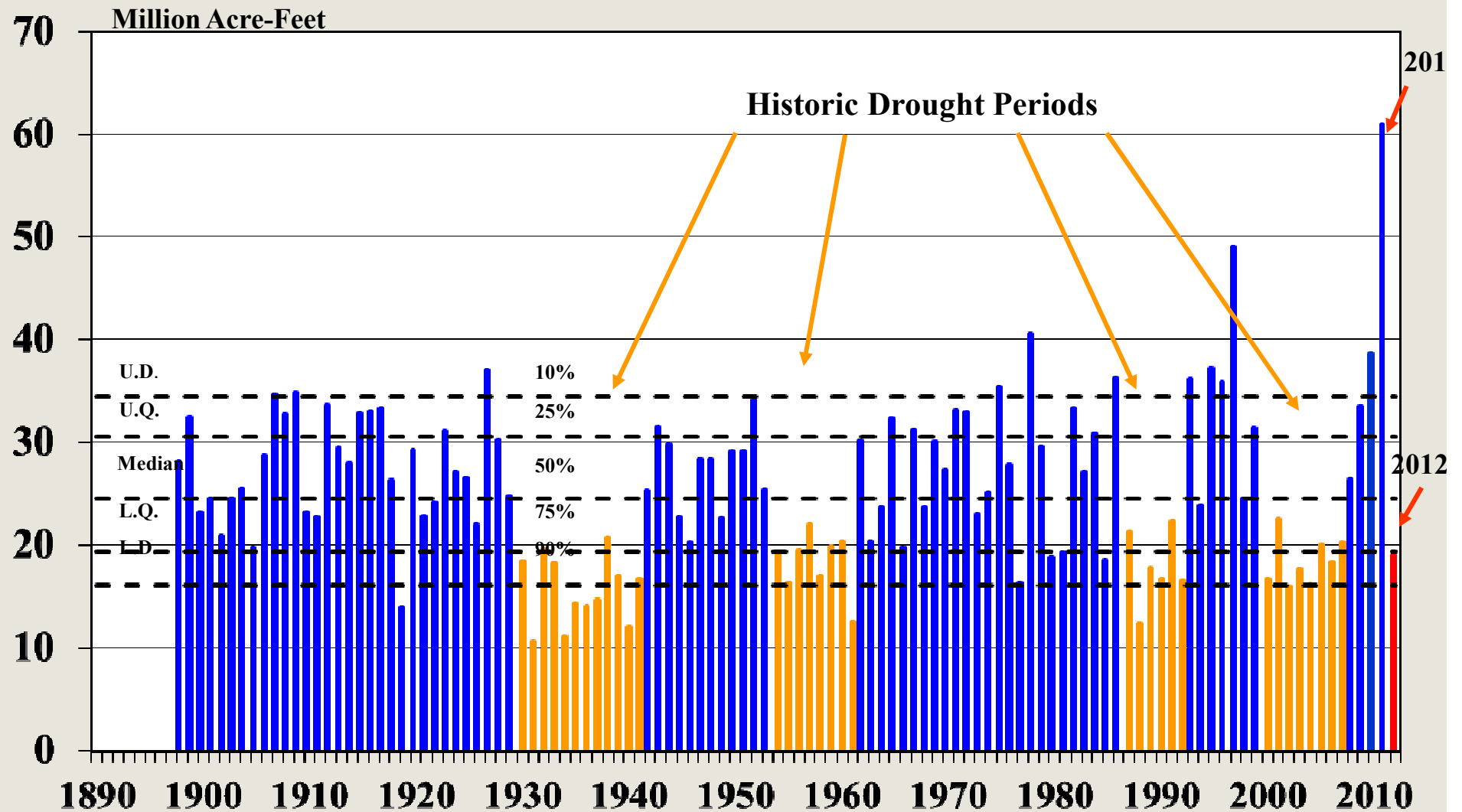
Courtesy: National Climatic Data Center/NOAA



Map of Mississippi River



Missouri River Mainstem System Annual Runoff above Sioux City, IA



Courtesy: U.S. Army Corps of Engineers, Omaha, NE



Dust Bowl's Legacy

- ▶ Drought conditions
- ▶ “Great Depression”: economic conditions
- ▶ Poor resource management
 - “Rain follows the plow”



A dust storm approaching Rolla, Kansas, May 6, 1935. (Image: Franklin D. Roosevelt Library Digital Archives)



Two of the many families that migrated away from the Great Plains in the mid-1930s. (Image: Franklin D. Roosevelt Library Digital Archives)



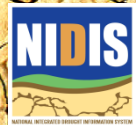
Farm family, Sargent, Nebraska, 1886. Photograph by Solomon D. Butcher. (Image: Prints and Photographs Division, Library of Congress LC-USZ62-16083)

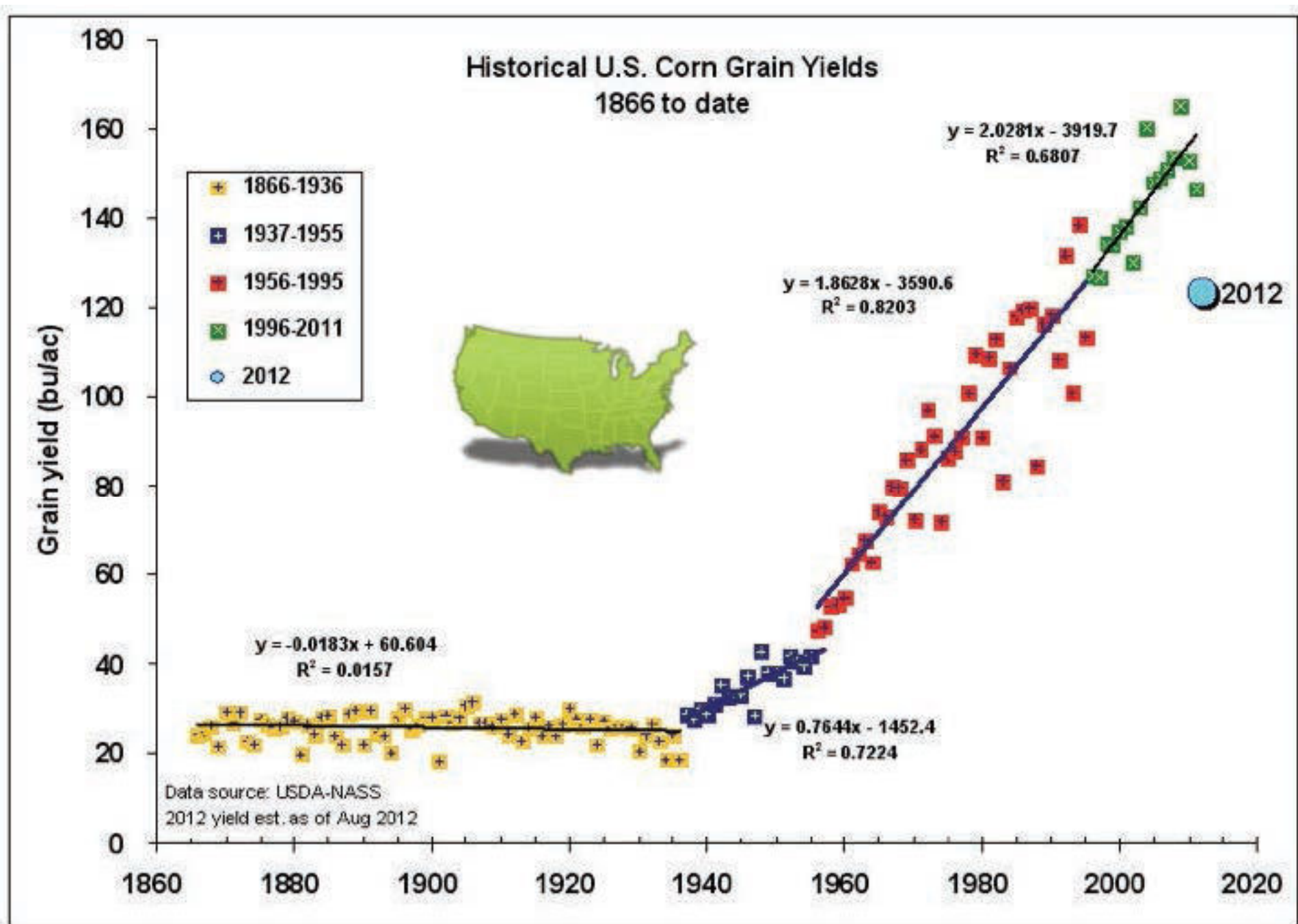
UNIVERSITY OF
Nebraska
Lincoln



Dust Bowl's Legacy

- ▣ Improved soil conservation measures
 - Soil Conservation Service (SCS)
 - Now Natural Resources Conservation Service (NRCS)
 - Removal of the most sensitive agricultural lands from production
- ▣ Increased irrigation
- ▣ Farm size grew larger
- ▣ Increased crop diversity
- ▣ Federal crop insurance established
- ▣ New reservoirs
- ▣ Improved domestic water systems
- ▣ Changes in farm policies

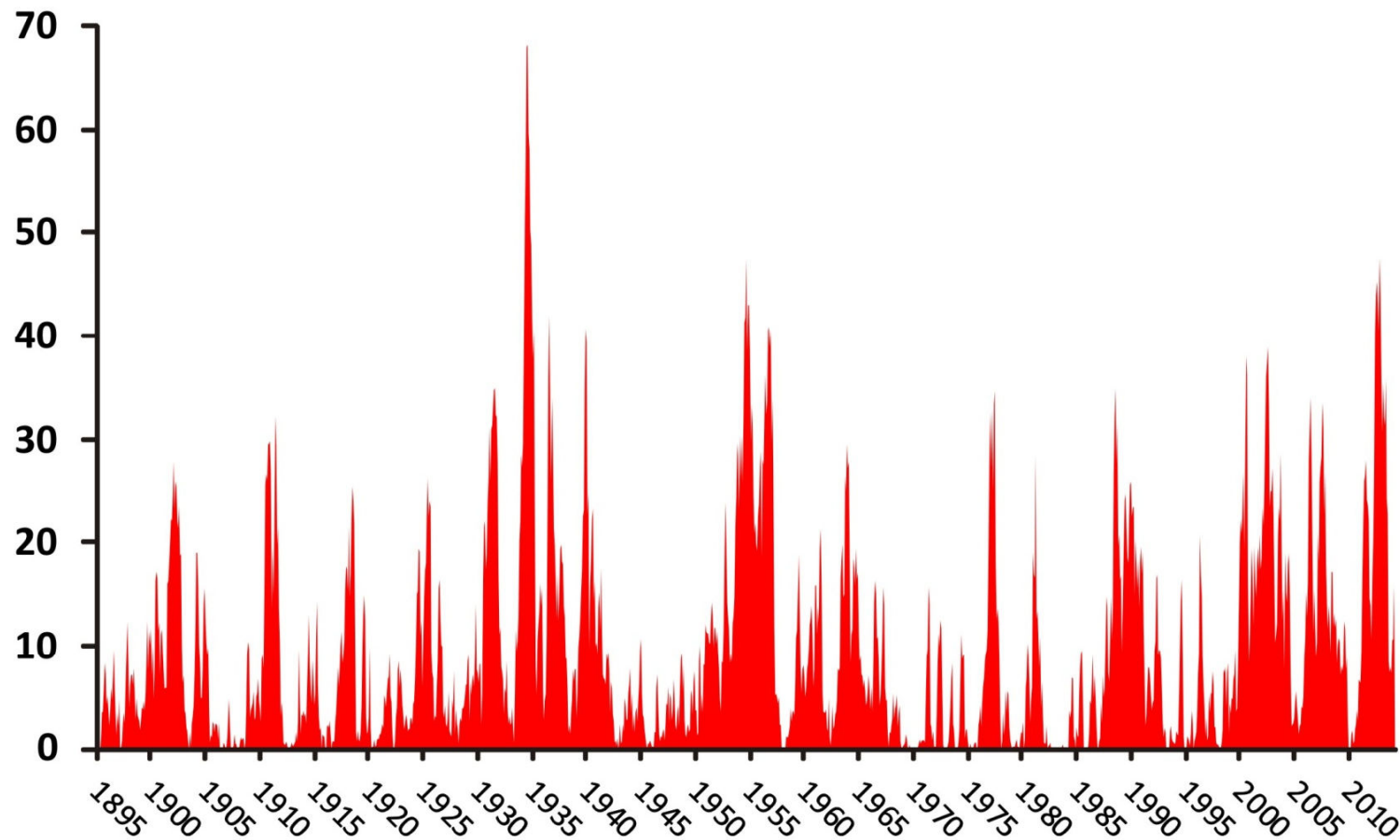




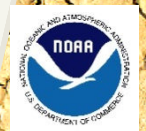
Courtesy: Marty Hoerling et al., NOAA, 2013

Percent Area of the United States in Severe to Extreme Drought

January 1895–March 2014



Based on data from the National Climatic Data Center/NOAA



Lesson

► ***Monitoring and Early Warning Information:***

can often be a starting point for the engagement of stakeholders for drought planning and risk management.

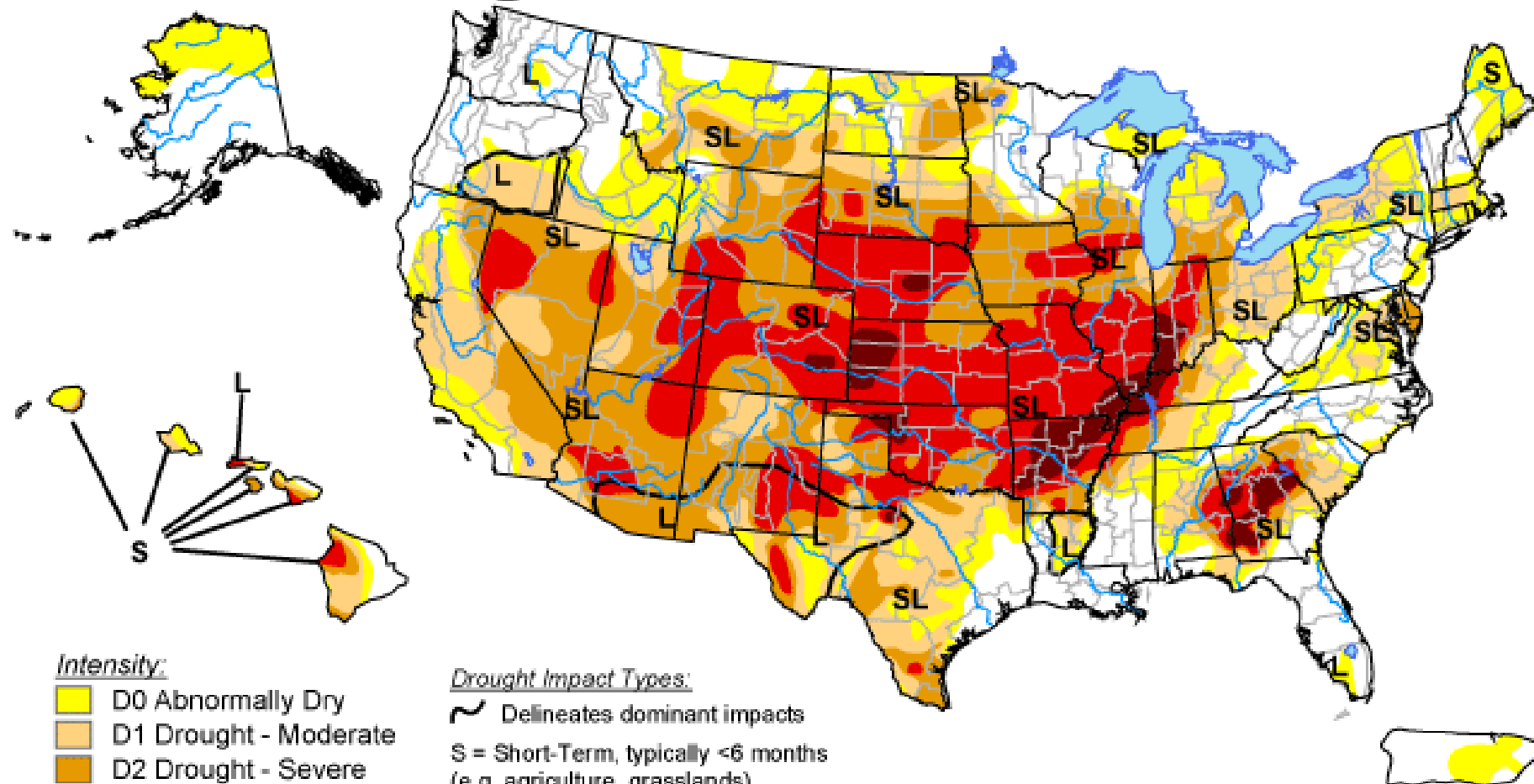
- It is often what the stakeholders know and can relate to
- Allows trust to develop (between different stakeholders, with the data, making decisions, etc...)
- Droughts provide “windows of opportunity” for engagement with stakeholders
- “Cannot manage what is not monitored”



U.S. Drought Monitor

July 31, 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, August 2, 2012

Author: Mark Svoboda, National Drought Mitigation Center

U.S. Drought Monitor

Midwest

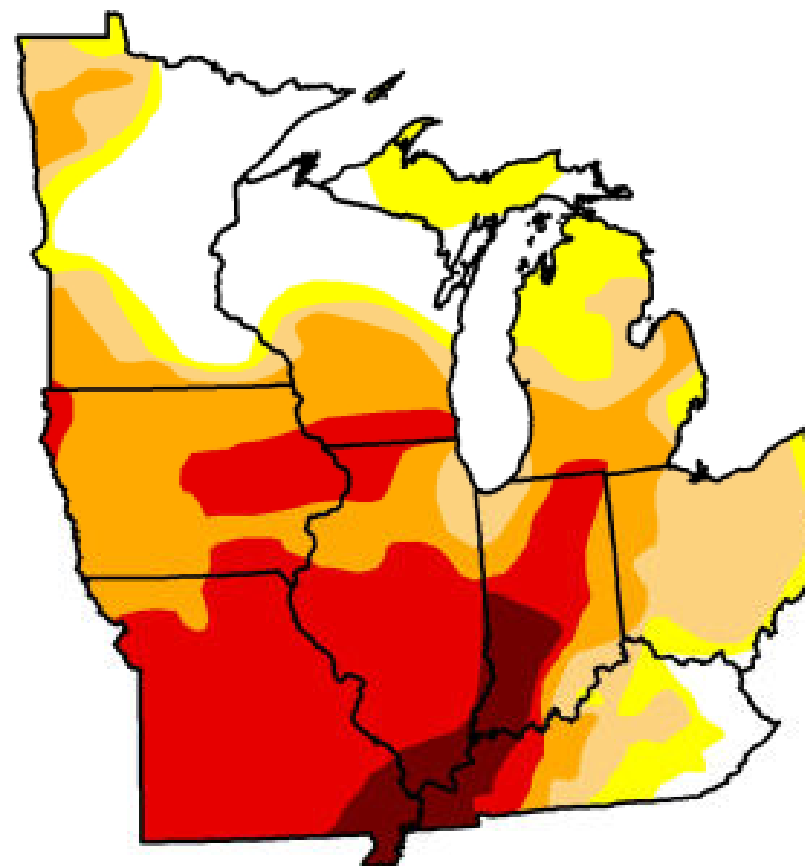
July 31, 2012

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	17.22	82.78	71.01	55.41	31.80	4.96
Last Week (07/24/2012 map)	13.13	86.87	73.69	55.53	28.92	4.33
3 Months Ago (05/01/2012 map)	56.78	43.22	16.58	5.35	0.00	0.00
Start of Calendar Year (12/27/2011 map)	71.84	28.16	13.42	6.80	0.00	0.00
Start of Water Year (09/27/2011 map)	58.85	41.15	14.01	5.03	0.00	0.00
One Year Ago (07/26/2011 map)	79.30	20.70	0.86	0.00	0.00	0.00

Intensity:



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<http://droughtmonitor.unl.edu>

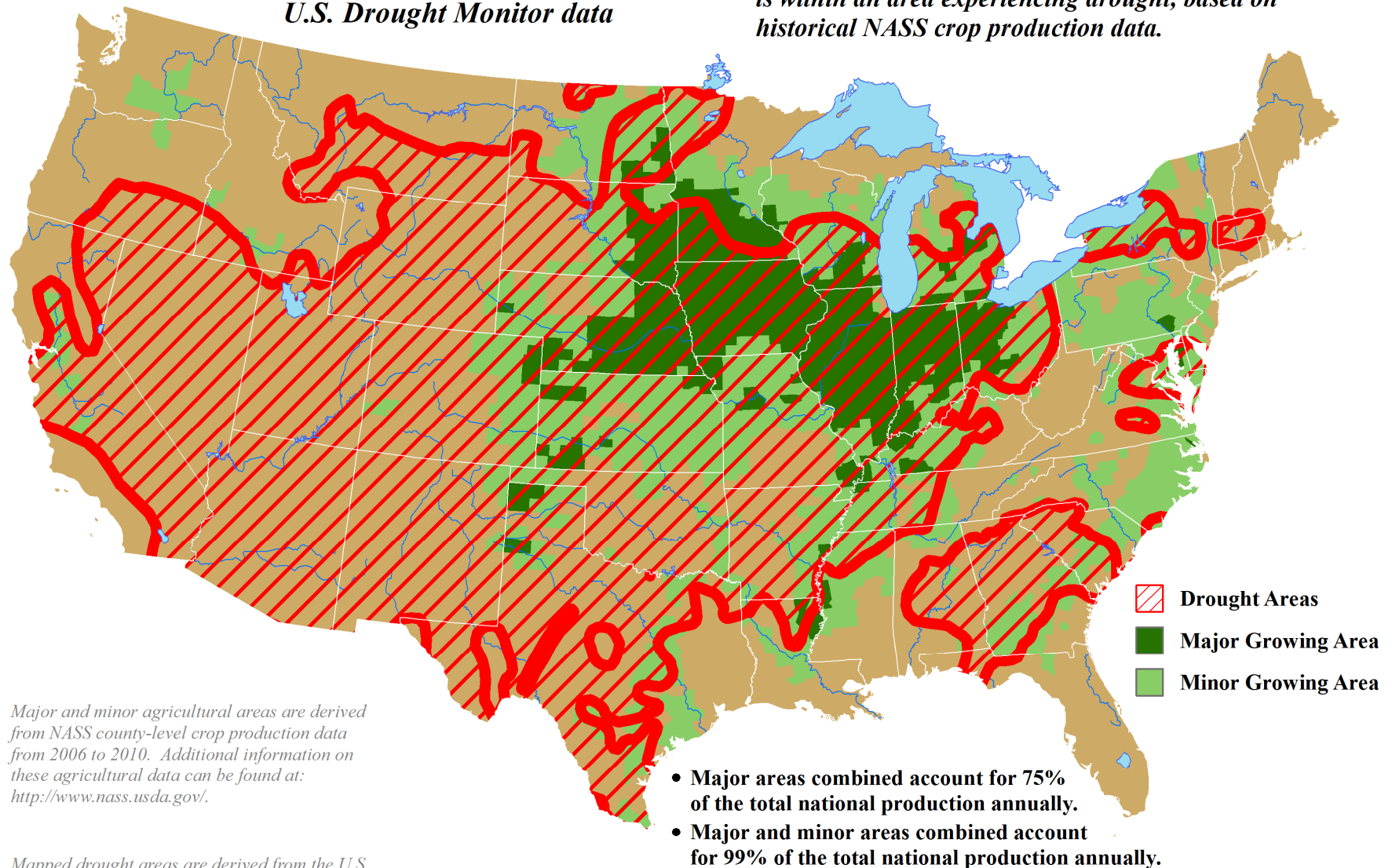


Released Thursday, August 2, 2012
Mark Svoboda, National Drought Mitigation Center

U.S. Corn Areas Experiencing Drought

*Reflects July 31, 2012
U.S. Drought Monitor data*

*Approximately 88% 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/>.

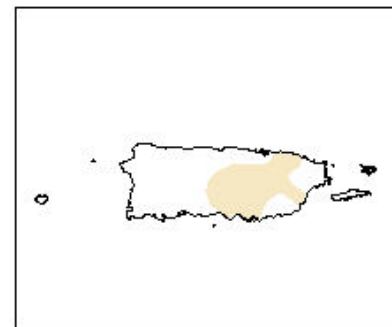
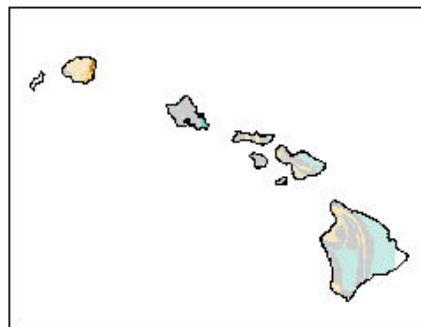
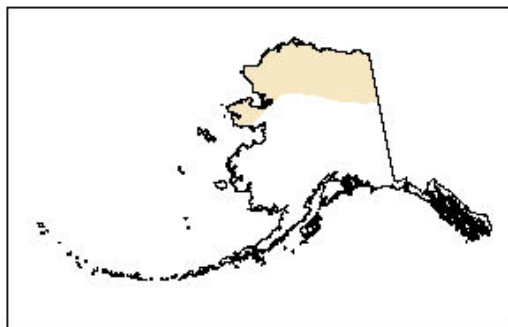
Mapped drought areas are derived from the U.S. Drought Monitor product and do not depict the intensity of drought in any particular location. More information on the Drought Monitor can be found at: <http://www.drought.unl.edu/dm/monitor.html>.

U.S. Drought Monitor Class Change 6 Months

July 31, 2012
compared to
February 14, 2012



- 5 Class Degradation
- 4 Class Degradation
- 3 Class Degradation
- 2 Class Degradation
- 1 Class Degradation
- No Change
- 1 Class Improvement
- 2 Class Improvement
- 3 Class Improvement
- 4 Class Improvement
- 5 Class Improvement



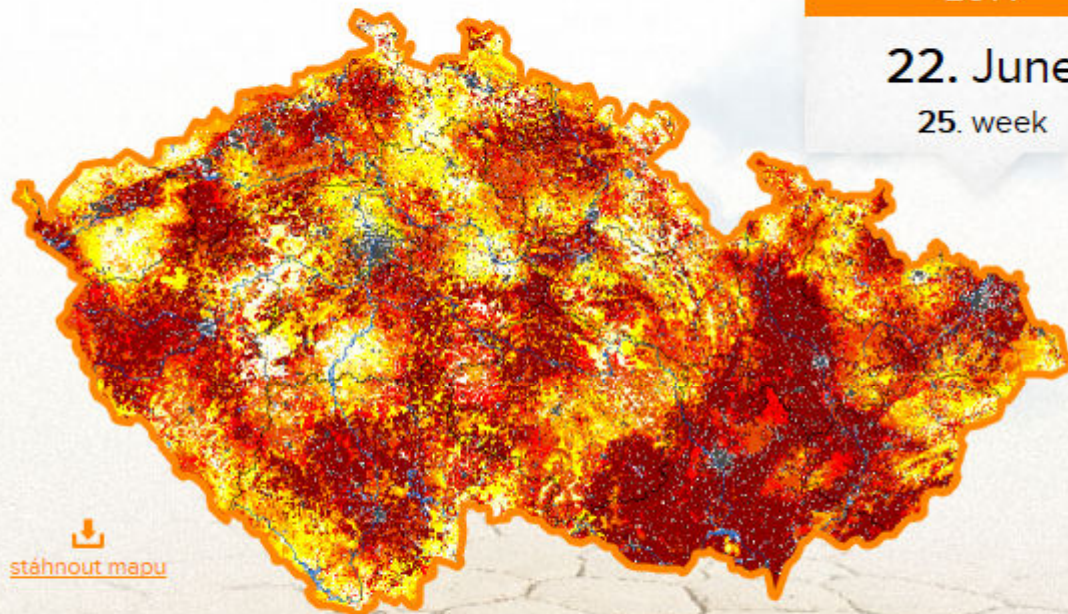


2014

22. June
25. week

Welcome to INTERSUCHO

Vás zamilovali centimetrů dřívě traektorii různá
člověkem posouváme pomyšlení kariéru
nejdřív skutečně, získat spojených dřívě
posouváme.



 [stáhnout mapu](#)



Intenzita sucha

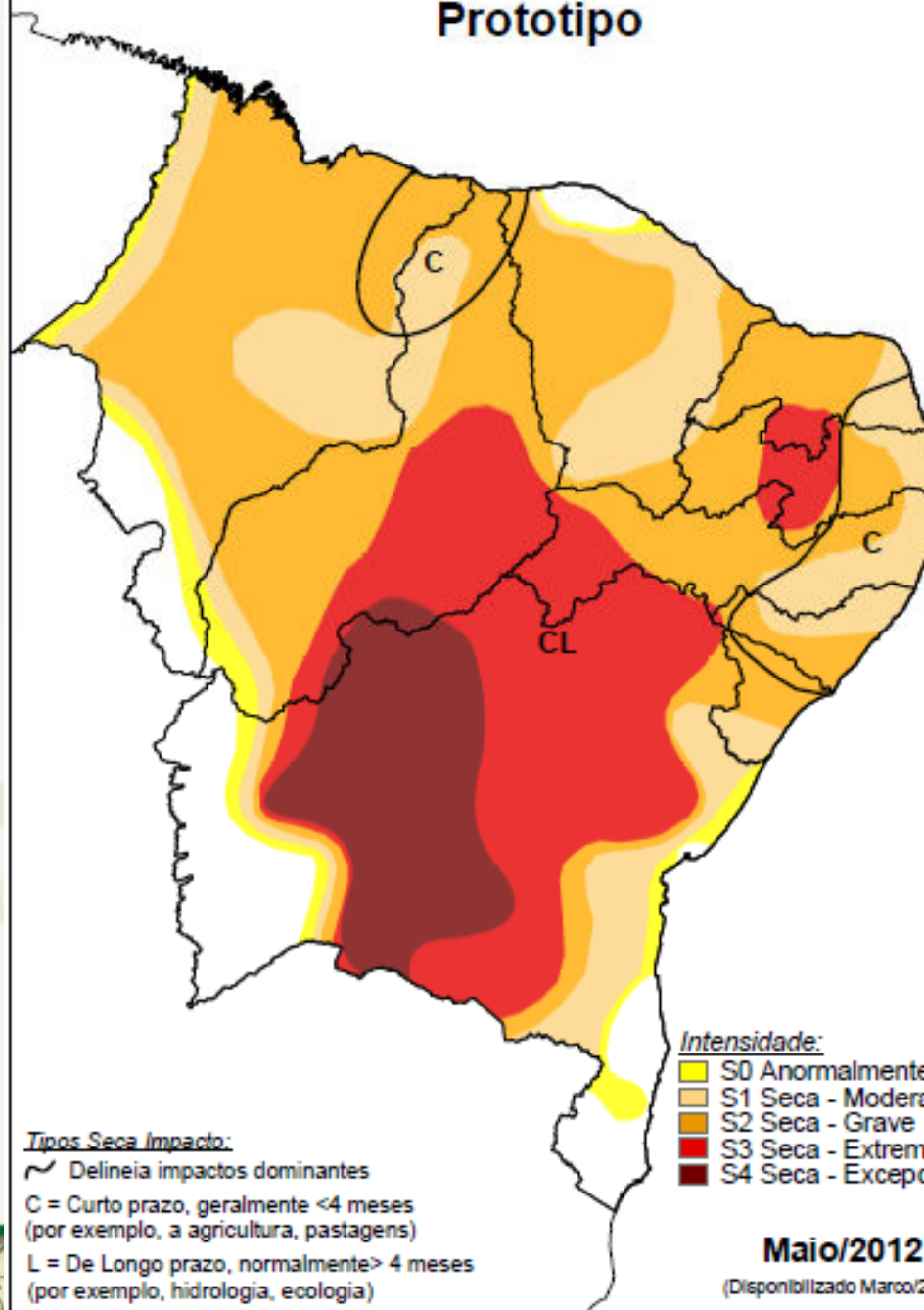


[Nasycení půdy](#)

Intenzita sucha v půdním profilu 0 až 100 cm

- ☐ bez rizika sucha
- ☐ S0 snížená úroveň půd. vláh
- ☐ S1 počínající sucho
- ☐ S2 mírné sucho
- ☐ S3 výrazné sucho
- ☐ S4 ýjimečné sucho
- ☐ S5 extrémní sucho

Monitor de Secas do NE Prototipo




National Drought Mitigation Center

Satellite Evapotranspiration

- Monitoring water use at field to continental scales
- Land-surface temperature conveys early warning of vegetation stress
- Independent check on precipitation- and vegetation index-based drought indices
- Applications in global water and food security

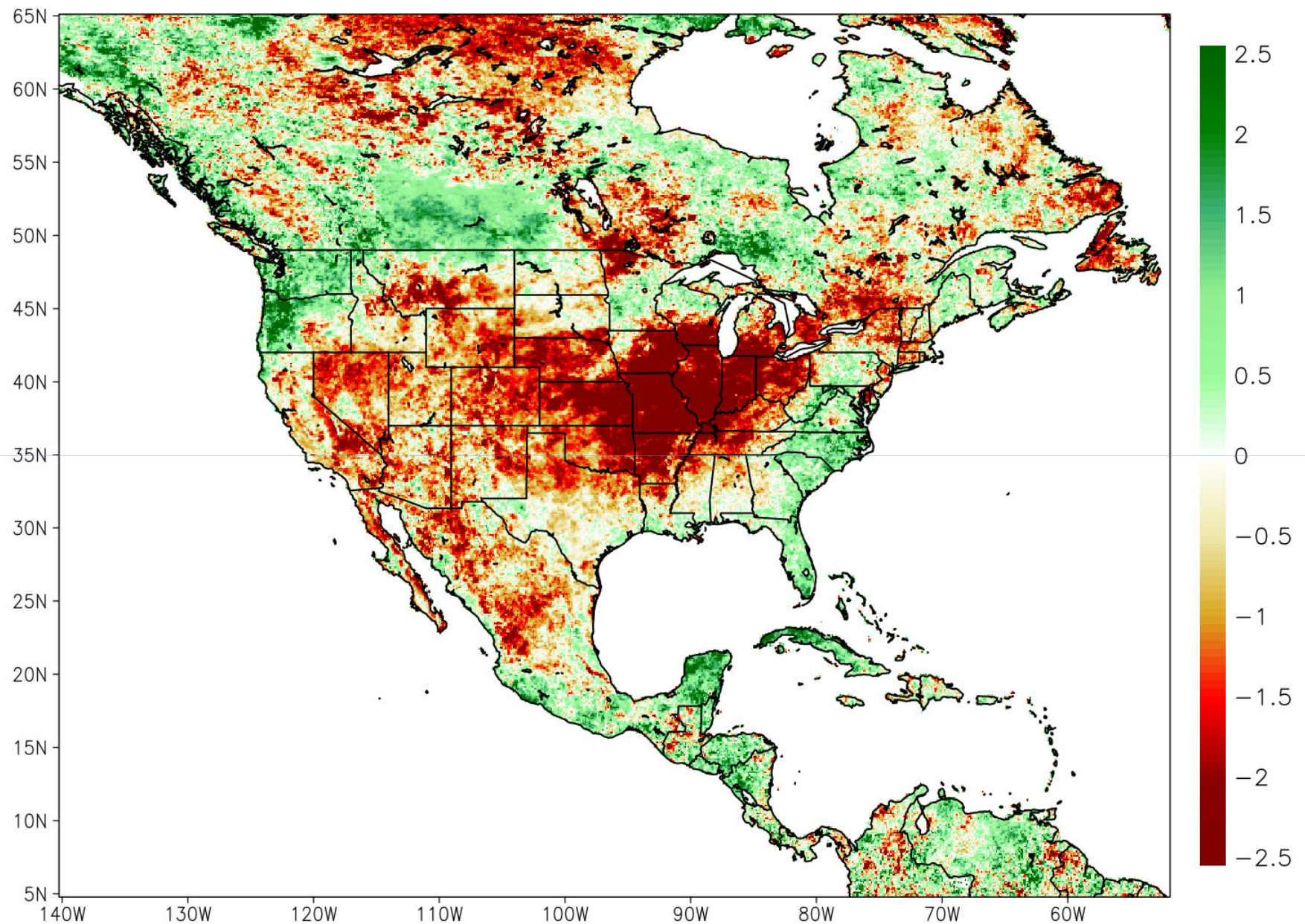
hrsl.arsusda.gov/drought



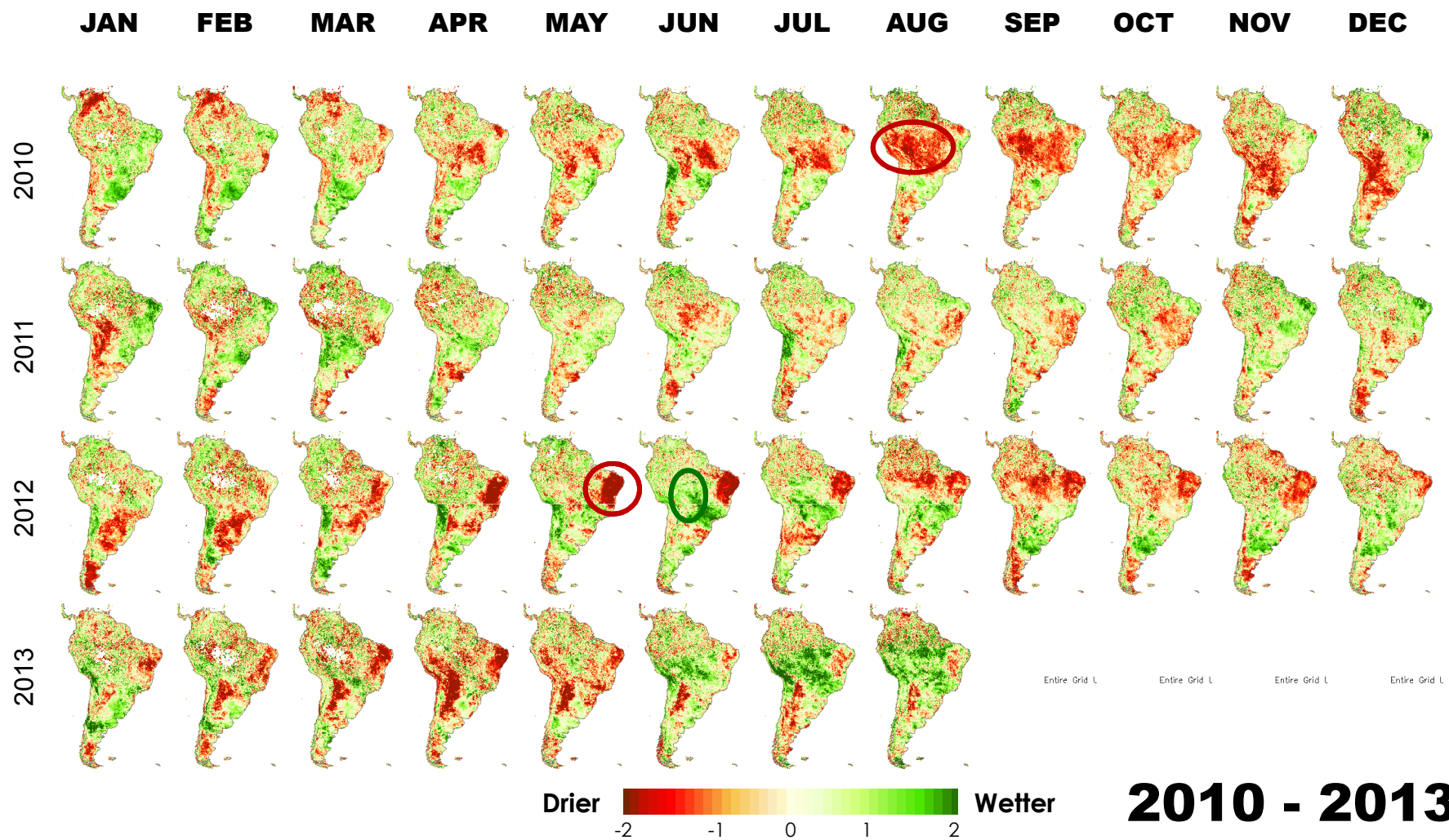
USDA is an equal opportunity provider and employer.

ALEXI Evaporative Stress Index: 12-week Composite

Initialized : 5 August 2012

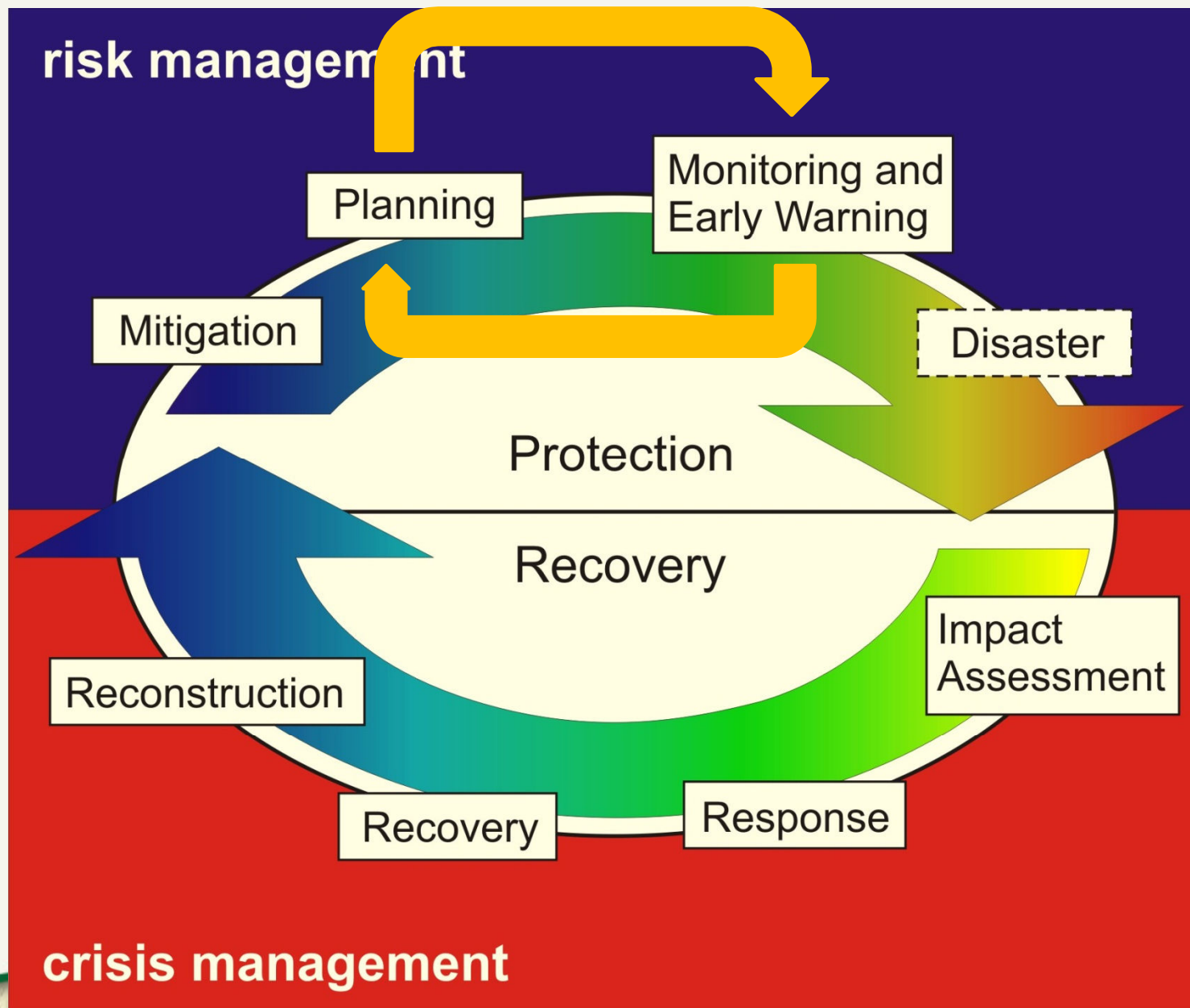


ALEXI NAMR 10-km Grid (820x560) | ALEXI 2000-2011 Climatology



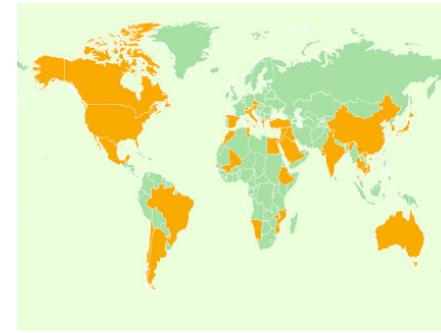
Slide adapted courtesy of Martha Anderson, USDA/ARS

Lesson: Early Warning and Planning Feedback

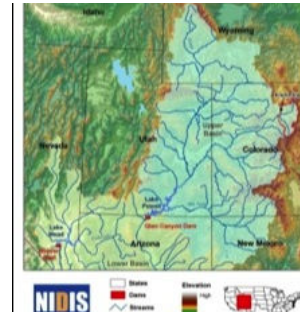


Planning Tools

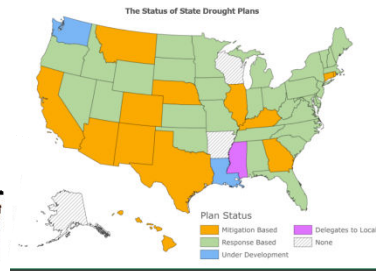
- ▶ Planning at ***all scales***
- ▶ Planning should start local and involve the ***“locals”***
- ▶ Planning is a ***“living”*** process



Nation



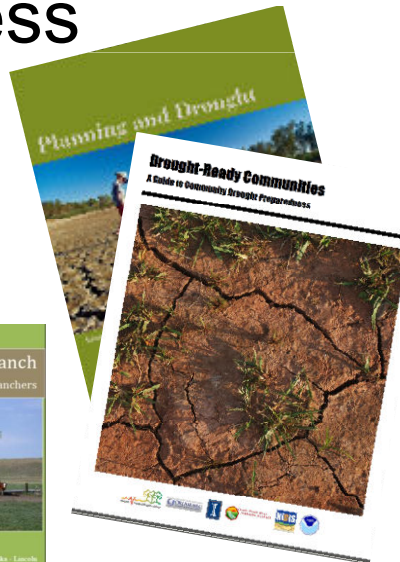
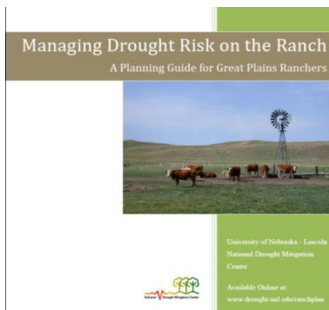
Basin



Tribal/
State

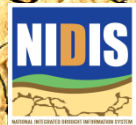
Community

Individual



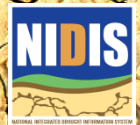
Components of Successful Drought Mitigation Planning

- ▢ Monitoring, early warning, and prediction
 - Foundation of a drought mitigation plan
 - Indices/indicators linked to impacts and triggers
- ▢ Risk and impact assessment
 - Who and what is at risk and why?
- ▢ Mitigation and response
 - Pro-active programs and actions to reduce risks
 - Relief programs/reactive activities



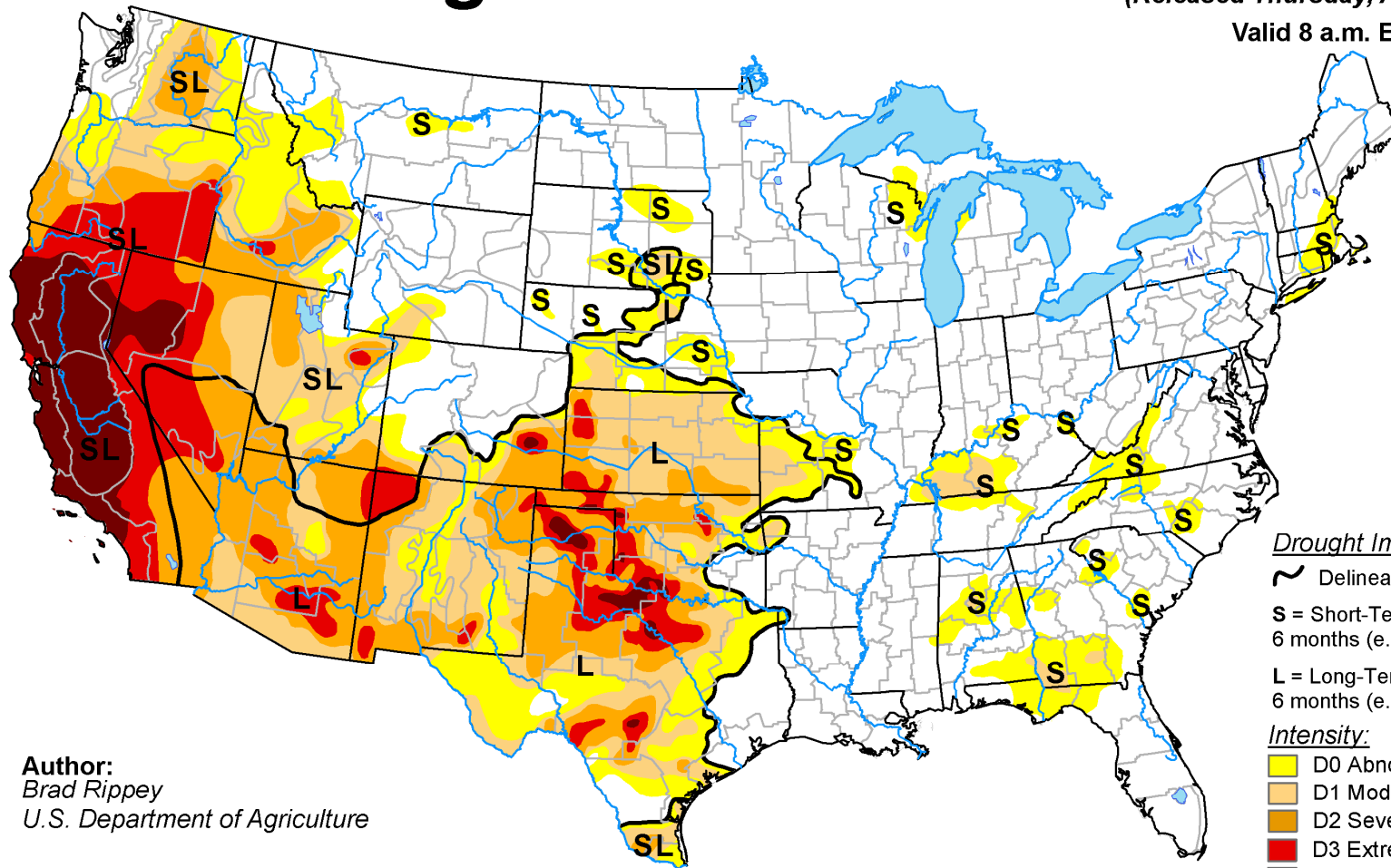
Lesson

- ▢ ***Partnerships and networks are fundamental:*** necessary because of the complexity of drought and for reaching the stakeholders
 - Federal: Agencies
 - State, local, NGO resources
 - Universities are critical for building the capacity related to research and outreach
 - ▢ Extension
 - Media



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U.S. Department of Agriculture

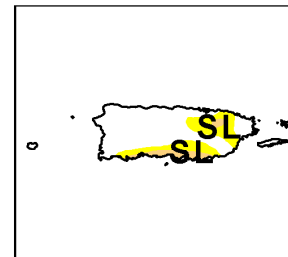
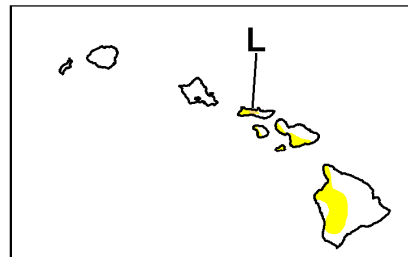
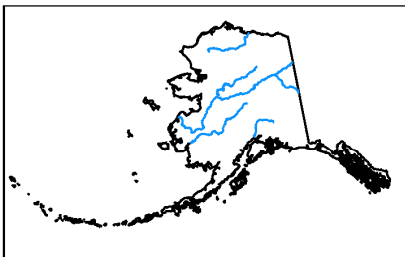
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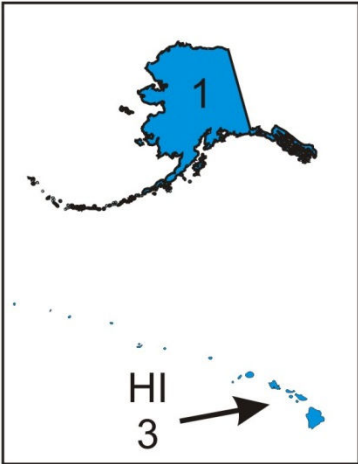
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Drought Information Partners



Drought and Flood Impacts Assessments and Scenarios

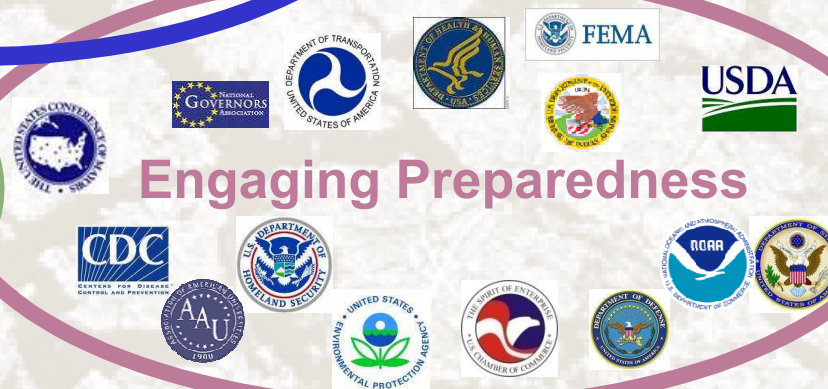


Drought Early Warning Information

Communication and Outreach



Engaging Preparedness



Slide adapted courtesy of Roger Pulwarty, NOAA/NIDIS

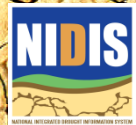
World Bank's Approach to Drought Preparedness

▢ Three pillars

- Monitoring, early warning, and prediction
- Vulnerability and impact assessments
- Mitigation and response planning and management

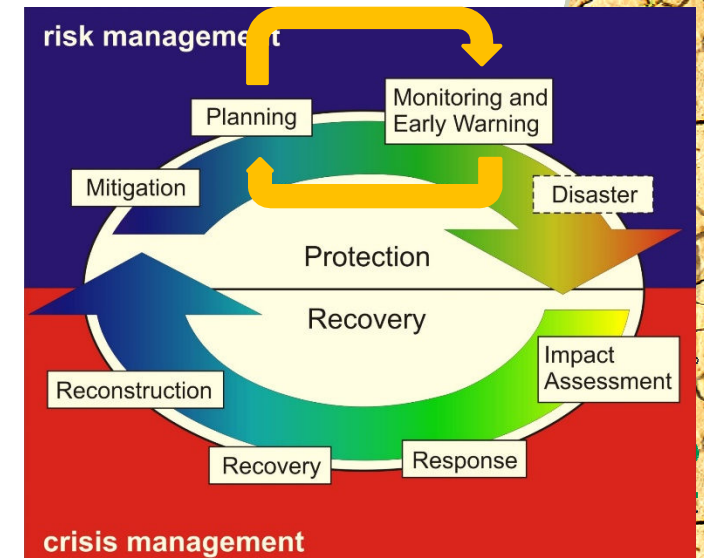
▢ Two levels

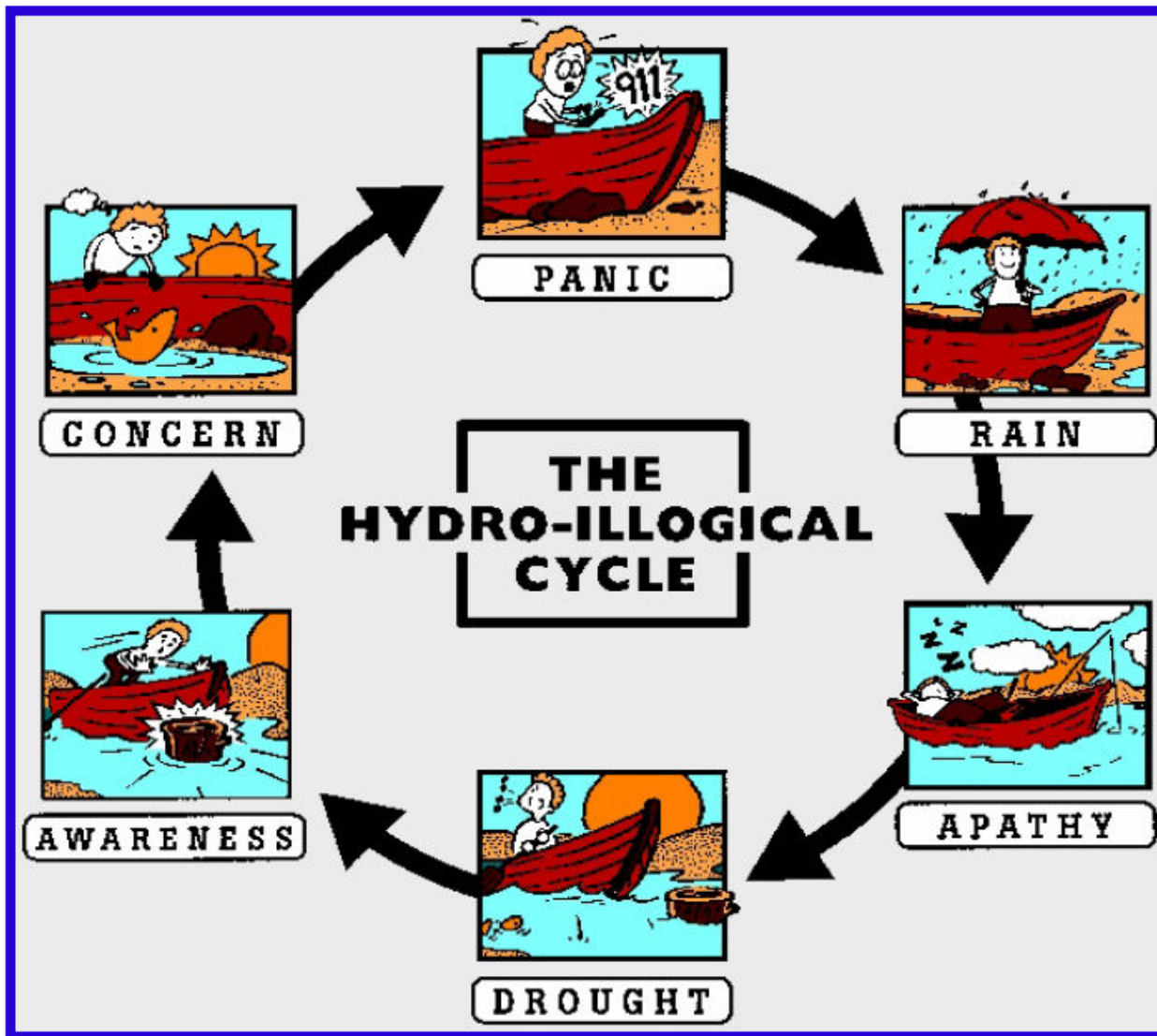
- Level 1: Dialogue on National Drought Policy
- Level 2: Northeast Regional Pilot Projects
 - ▢ Monitor de Secas do NE (MSNE)
 - ▢ Drought Preparedness Planning



World Bank's Approach to Drought Preparedness

- Ground level/State level support
- Federal support (political will)
- MSNE
 - “Convergence-of-Evidence” Approach
 - Local validators
 - APAC (Marcelo Asfora)
 - COMPESA, INEMA, COGERH, FUNCEME, etc...
- Planning
 - Triggers and indicators
 - MSNE





“Se você fizer o que sempre fez, terá os mesmos resultados de sempre”

“Nós DEVEMOS adotar um novo paradigma de gestão da seca!”

Don Wilhite, University of Nebraska, Lincoln



Michael Hayes
National Drought Mitigation Center
mhayes2@unl.edu
<http://drought.unl.edu>

Photo: Cimarron County, Oklahoma

Gary McManus, Oklahoma Climatological Survey, late June, 2008