The National Drought Mitigation Center: Drought Science. Planning Sense

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University of Nebraska-Lincoln

NDMC

NATIONAL DROUGHT MITIGATION CENTER

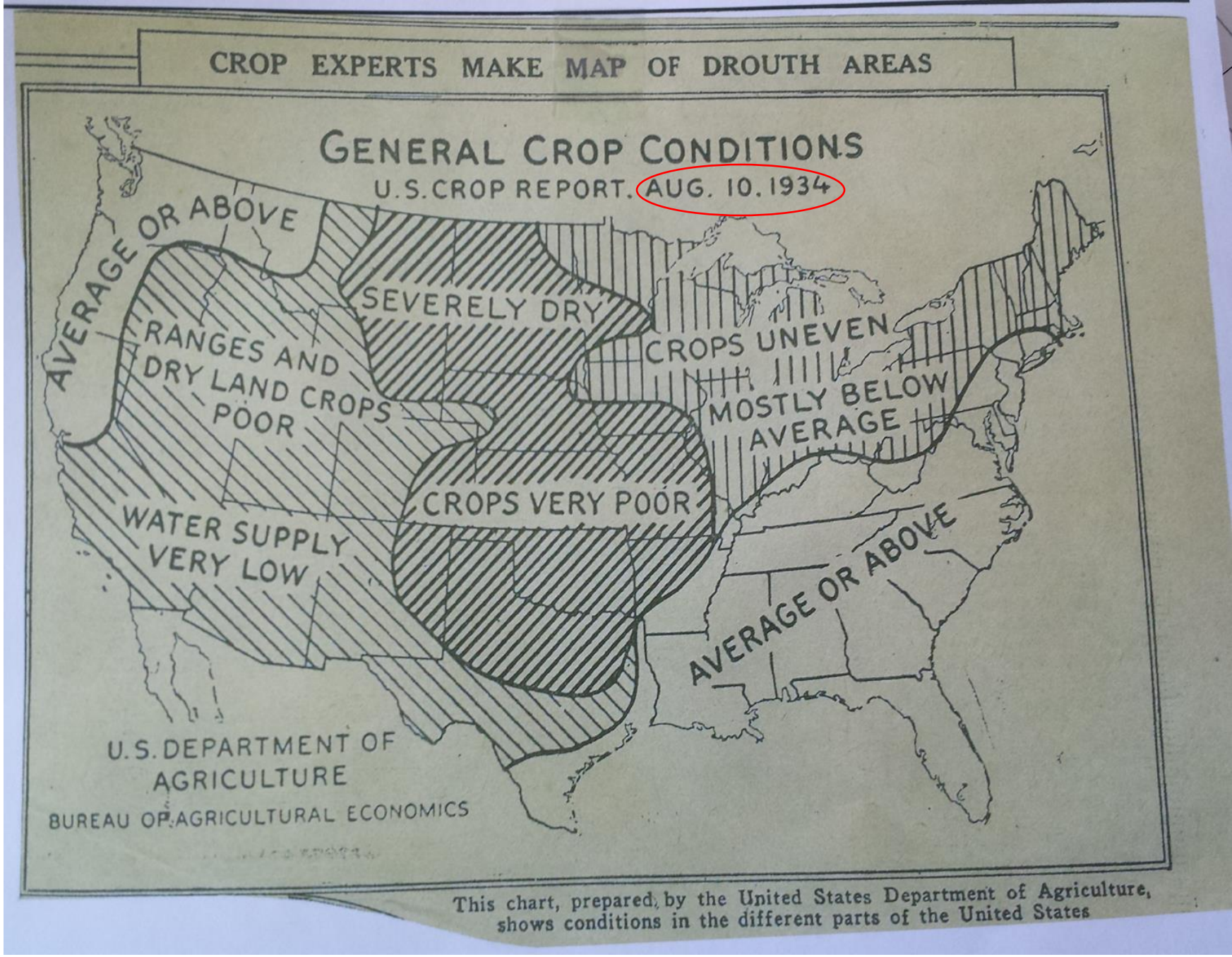
UNIVERSITY OF NEBRASKA

Midwest Regional Climate Center-State Climate Office Workshop
St. Louis, MO

May 8-9, 2024

Is it really a “dry” topic?

Scientists have been trying to monitor, classify, and map drought conditions for quite a long time



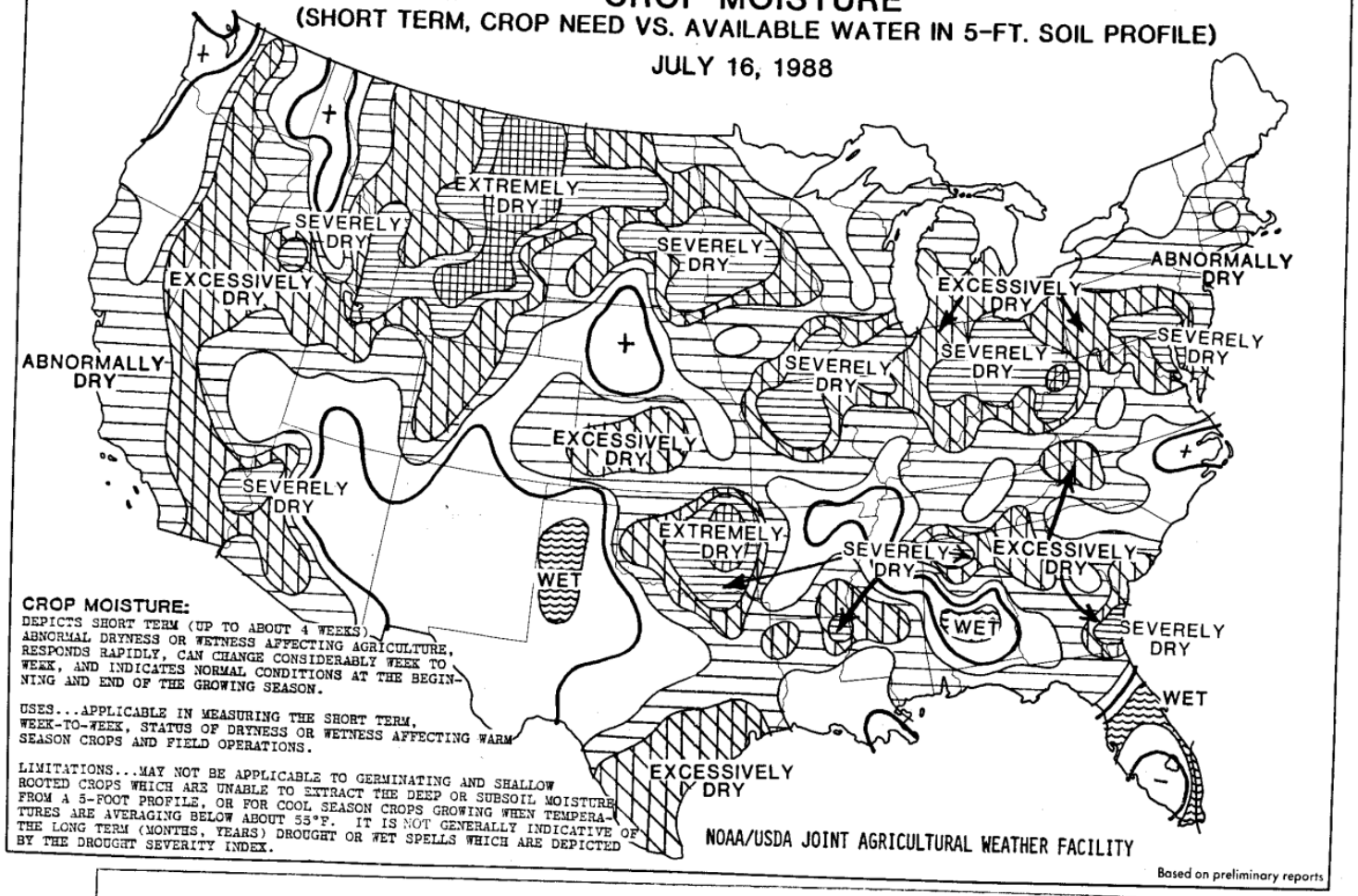
Even into the 1980's, Identifying and Classifying Drought was an ongoing challenge

July 19, 1988 Weekly Weather and Crop Bulletin 3

CROP MOISTURE

(SHORT TERM, CROP NEED VS. AVAILABLE WATER IN 5-FT. SOIL PROFILE)

JULY 16, 1988



CROP MOISTURE:
DEPICTS SHORT TERM (UP TO ABOUT 4 WEEKS) ABNORMAL DRYNESS OR WETNESS AFFECTING AGRICULTURE, RESPONDS RAPIDLY, CAN CHANGE CONSIDERABLY WEEK TO WEEK, AND INDICATES NORMAL CONDITIONS AT THE BEGINNING AND END OF THE GROWING SEASON.

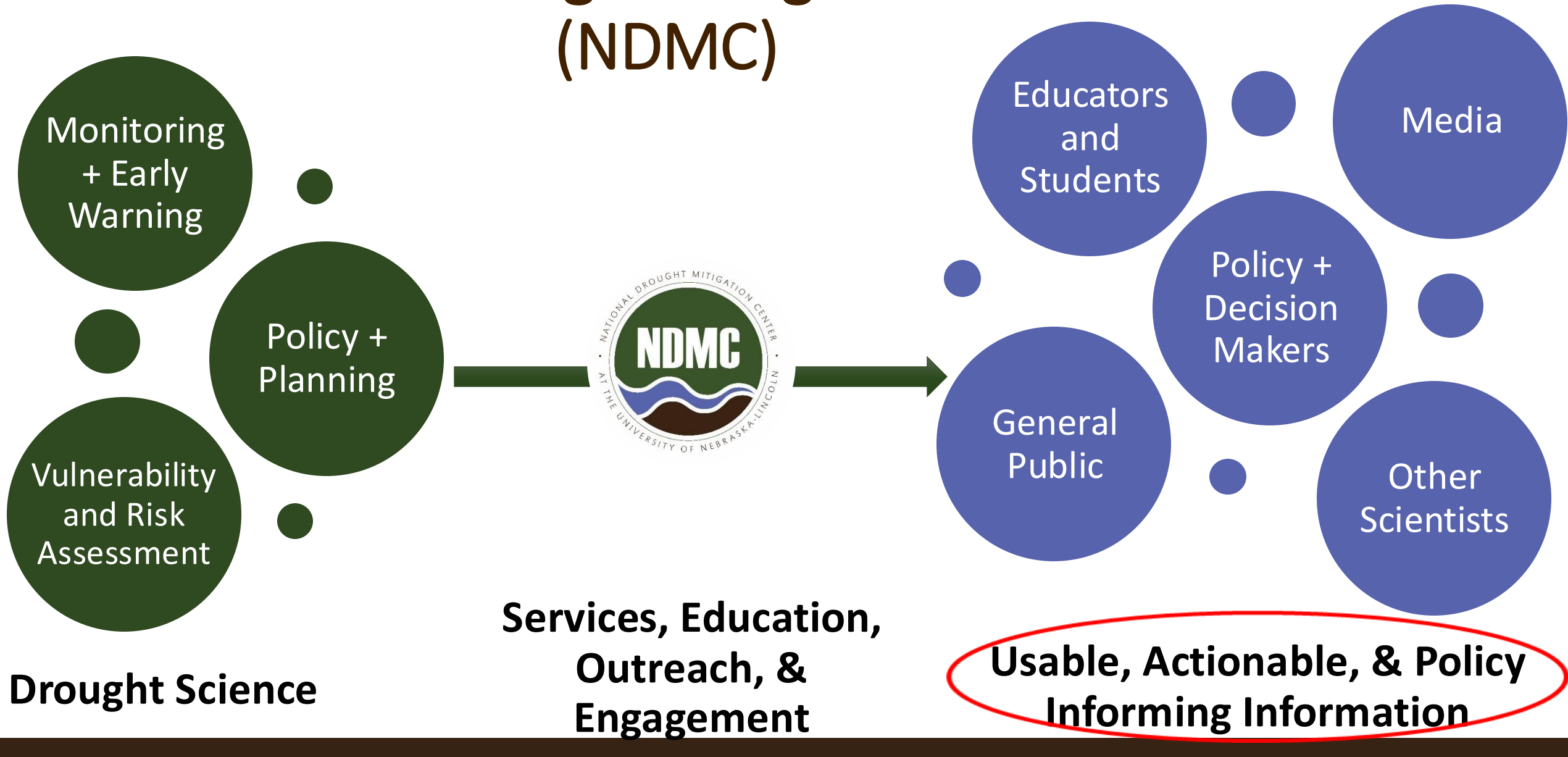
USES...APPLICABLE IN MEASURING THE SHORT TERM, WEEK-TO-WEEK, STATUS OF DRYNESS OR WETNESS AFFECTING WARM SEASON CROPS AND FIELD OPERATIONS.

LIMITATIONS...MAY NOT BE APPLICABLE TO GERMINATING AND SHALLOW ROOTED CROPS WHICH ARE UNABLE TO EXTRACT THE DEEP OR SUBSOIL MOISTURE FROM A 5-FOOT PROFILE, OR FOR COOL SEASON CROPS GROWING WHEN TEMPERATURES ARE AVERAGING BELOW ABOUT 55°F. IT IS NOT GENERALLY INDICATIVE OF THE LONG TERM (MONTHS, YEARS) DROUGHT OR WET SPELLS WHICH ARE DEPICTED BY THE DROUGHT SEVERITY INDEX.

NOAA/USDA JOINT AGRICULTURAL WEATHER FACILITY

Based on preliminary reports

National Drought Mitigation Center (NDMC)



Drought Science

Services, Education, Outreach, & Engagement

Usable, Actionable, & Policy Informing Information

Weekly maps based on USDA's NASS data through NDMC's U.S. Agricultural Commodities in Drought portal

U.S. Agricultural Commodities in Drought

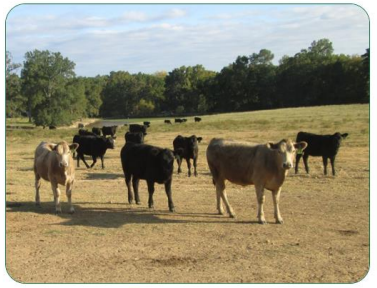
Home | Row Crops | Livestock & Forage | Specialty Crops | Archive | Crop Progress

Welcome to the U.S. Agricultural Commodities in Drought website. This site provides information about the percentage of growing area that is affected by drought for various agricultural commodities according to the U.S. Drought Monitor.

Statistics are calculated each week by overlaying USDM data on drought extent and severity over maps of major and minor agricultural areas for several commodities. Agricultural data are obtained from the U.S. Department of Agriculture National Agricultural Statistics Service Census of Agriculture, which is undertaken every five years. Major and minor agricultural areas are designated based on the intensity of production, the livestock inventory, or the acres harvested in the case of alfalfa and hay. A county is considered in drought if the center point of the county is in a drought area according to the USDM. The statistics presented on this site are calculated for each commodity by summing production across all counties in drought and then dividing that by the total national production for that commodity.

Agricultural Statistics, Monitoring and Management Information by Crop Type

Row Crops



Livestock & Forage

Speciality Crops

U.S. Agricultural Commodities in Drought Archive

The U.S. Department of Agriculture produces maps and statistics each week showing how much and where drought is affecting production areas for each commodity. This report is available back to 2012.

https://agindrought.unl.edu/

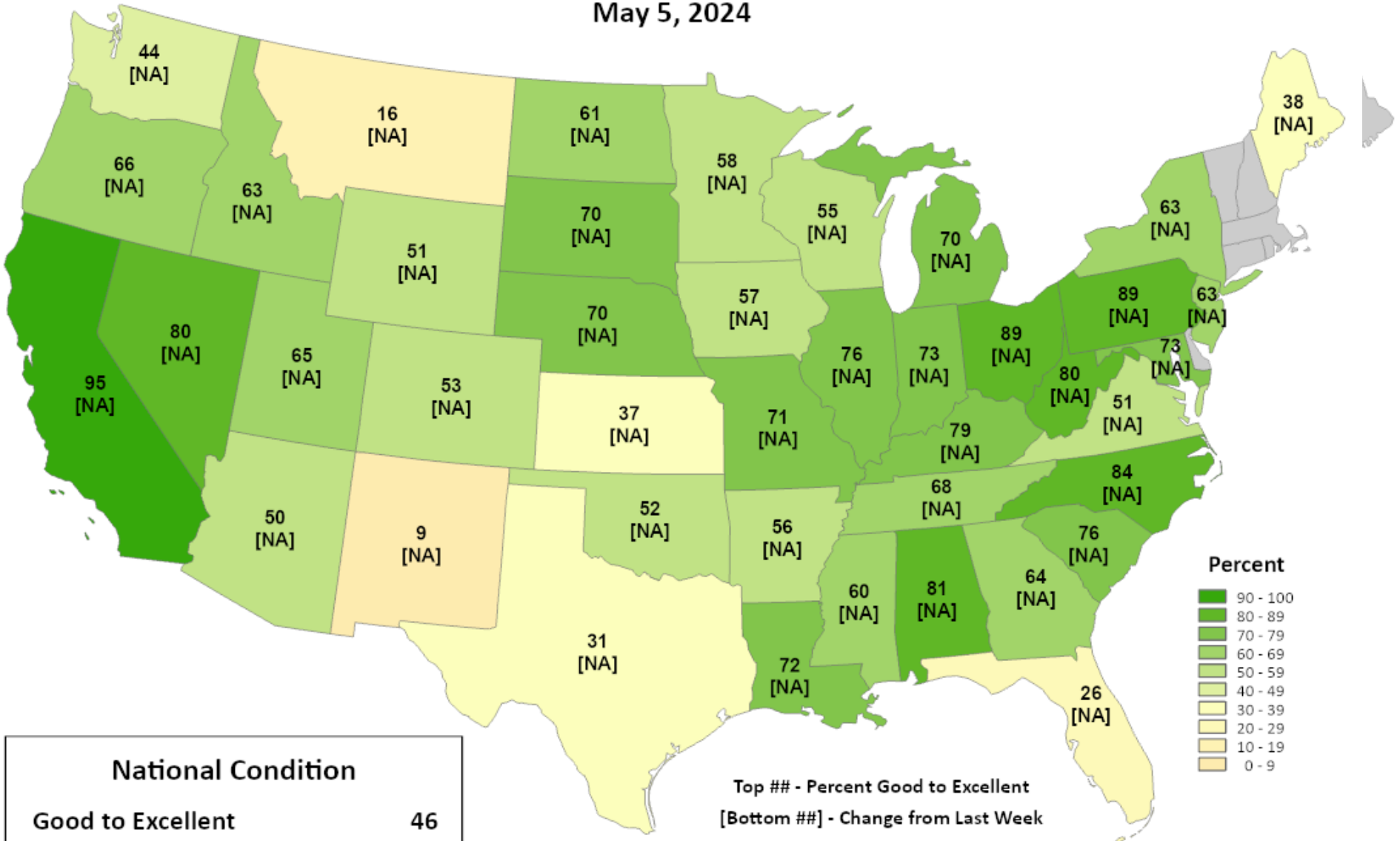
United States Department of Agriculture

This product was prepared by the USDA Office of the Chief Economist (OCE) World Agricultural Outlook Board (WAOB)

Pasture and Range Conditions

Percent Good to Excellent

May 5, 2024



National Condition	
Good to Excellent	46
Change from Last Week	NA

Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.

National Drought Mitigation Center, University of Nebraska

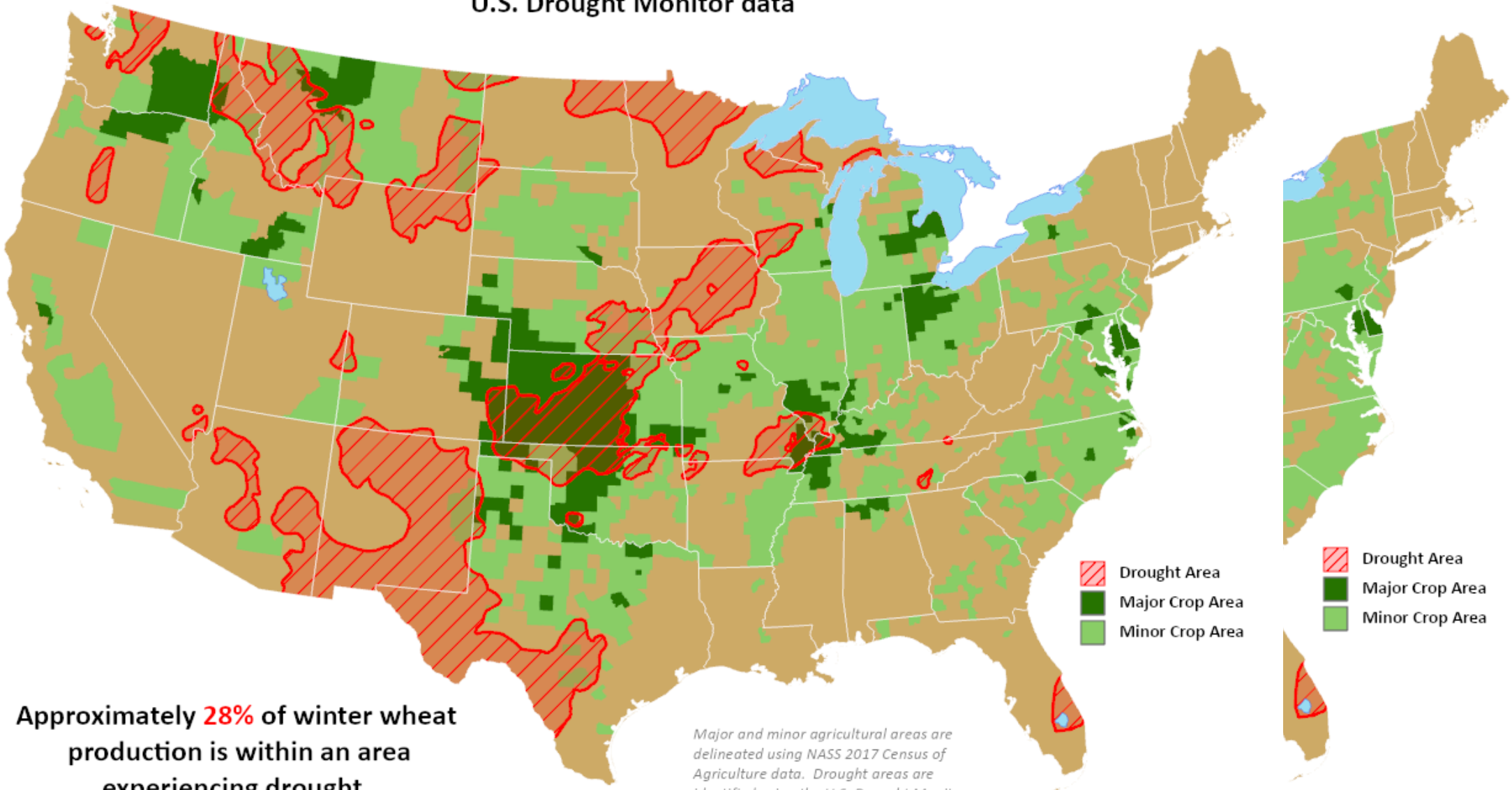
University of Nebraska Lincoln

USDA United States Department of Agriculture

This product was prepared by the USDA Office of the Chief Economist (OCE) World Agricultural Outlook Board (WAOB)

Winter Wheat Areas in Drought

Reflects April 30, 2024
U.S. Drought Monitor data



Approximately 28% of winter wheat production is within an area experiencing drought.

Major and minor agricultural areas are delineated using NASS 2017 Census of Agriculture data. Drought areas are identified using the U.S. Drought Monitor product.

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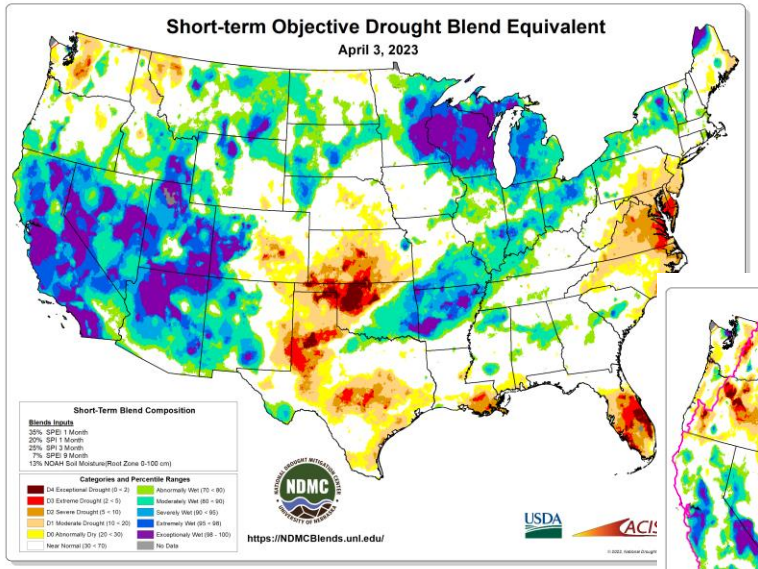
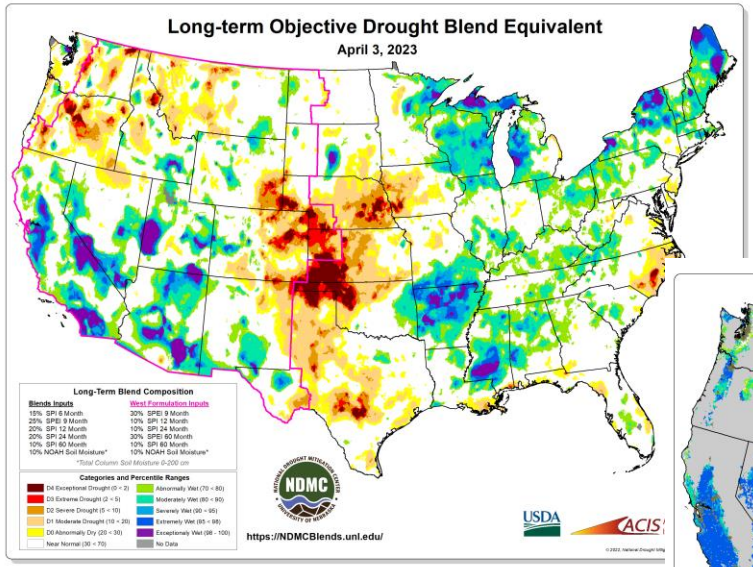
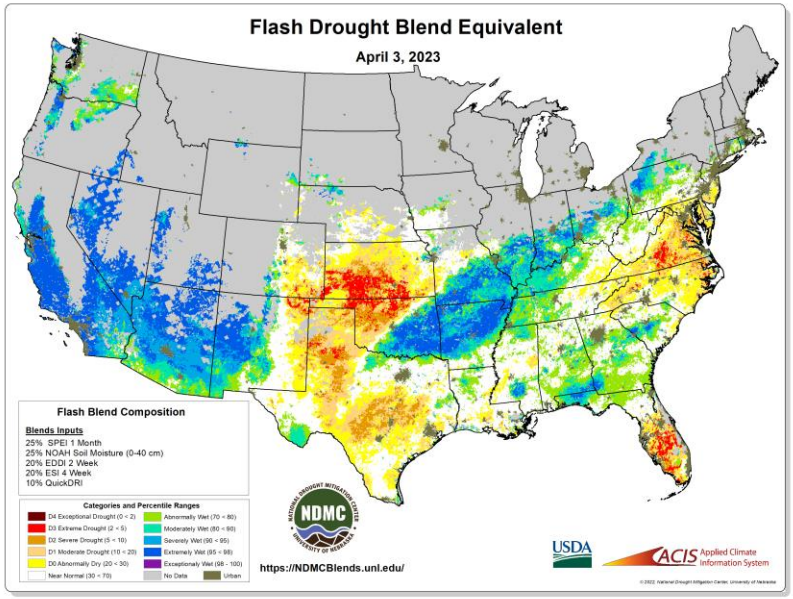
Rise of the Machines (AI/ML/DroughtNET)!! Higher resolution gridded blends at the NDMC





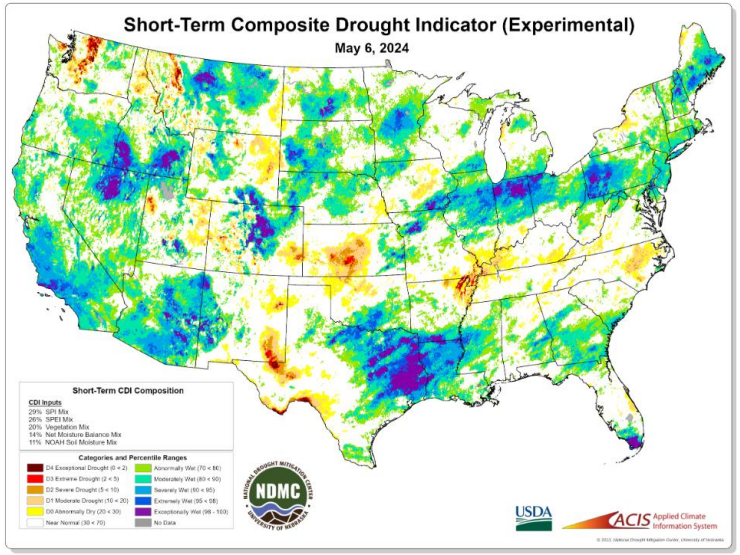


The New Breed of High-Resolution Composite Drought Indicators (CDI's)

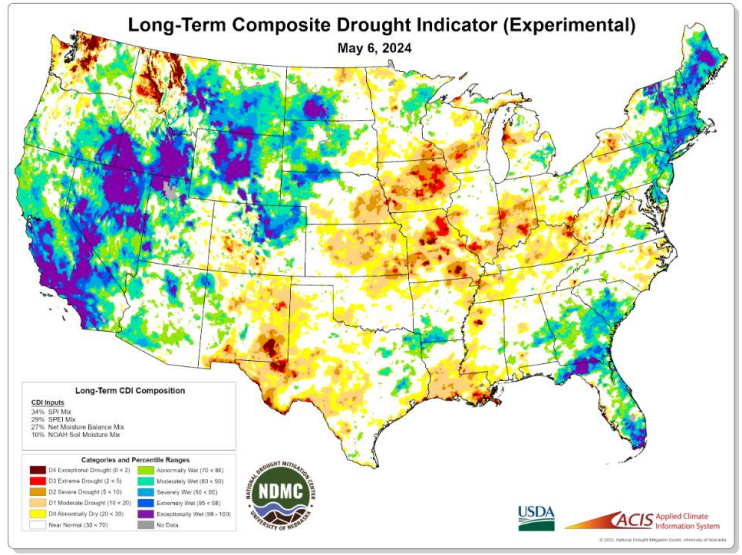
https://ndmcblends.unl.edu/Home.aspx

NDMC Composite Drought Indicators

If you have any questions, comments, or feedback on the objective blends, please email the NDMC at: **DroughtMonitor@unl.edu**



Download Map



Download Map

About

The weekly composite drought indices (CDI's) are calculated using a combination of inputs. For more detailed information please visit the Metadata page.

Archive

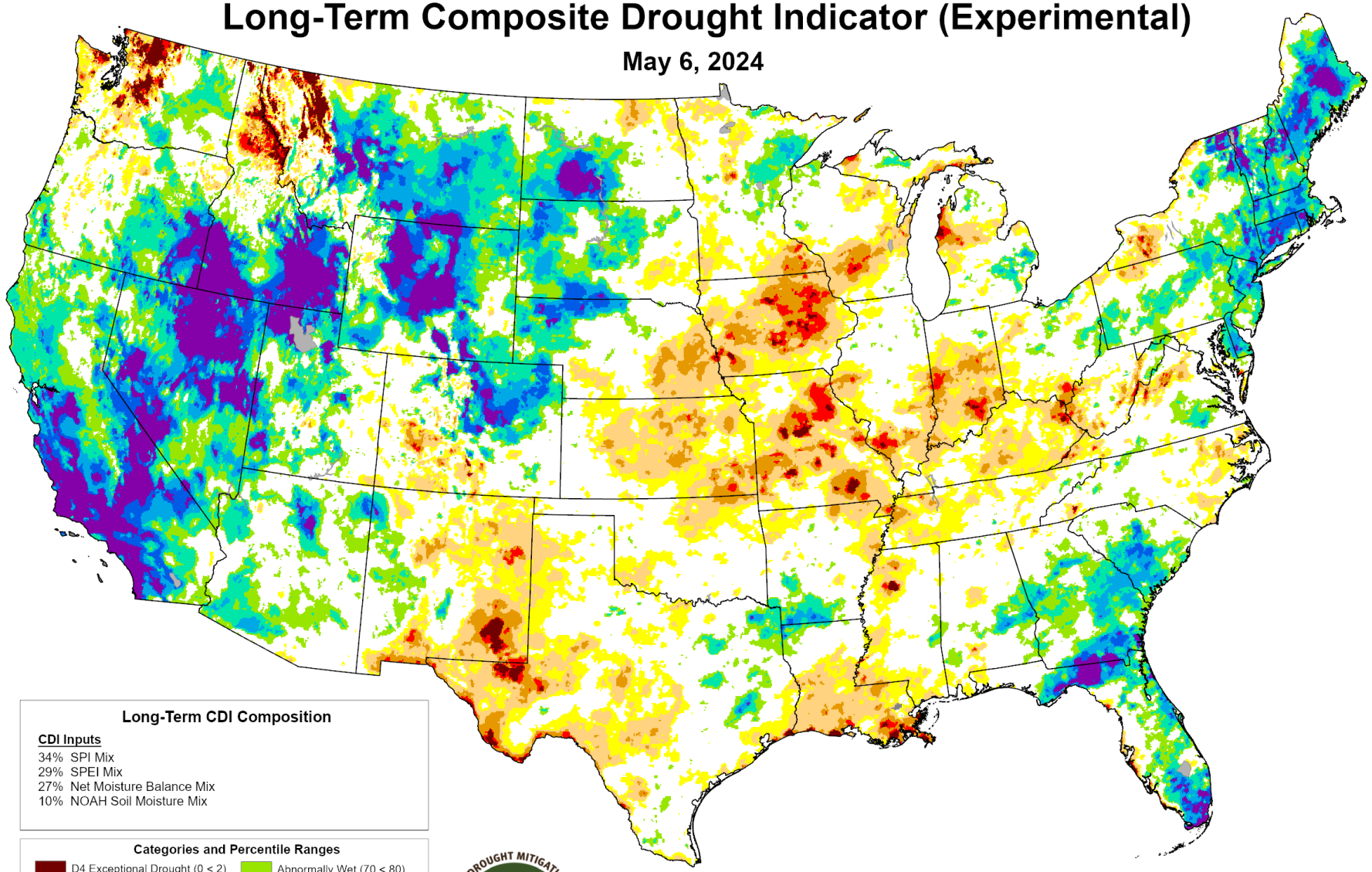
View the composite drought indicator maps for previous weeks

Data

Download the composite drought indicator GeoTiff data files

Long-Term Composite Drought Indicator (Experimental)

May 6, 2024



Long-Term CDI Composition

CDI Inputs
34% SPI Mix
29% SPEI Mix
27% Net Moisture Balance Mix
10% NOAH Soil Moisture Mix

Categories and Percentile Ranges

- D4 Exceptional Drought (0 < 2)
- D3 Extreme Drought (2 < 5)
- D2 Severe Drought (5 < 10)
- D1 Moderate Drought (10 < 20)
- D0 Abnormally Dry (20 < 30)
- Near Normal (30 < 70)
- Abnormally Wet (70 < 80)
- Moderately Wet (80 < 90)
- Severely Wet (90 < 95)
- Extremely Wet (95 < 98)
- Exceptionally Wet (98 - 100)
- No Data

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USDA

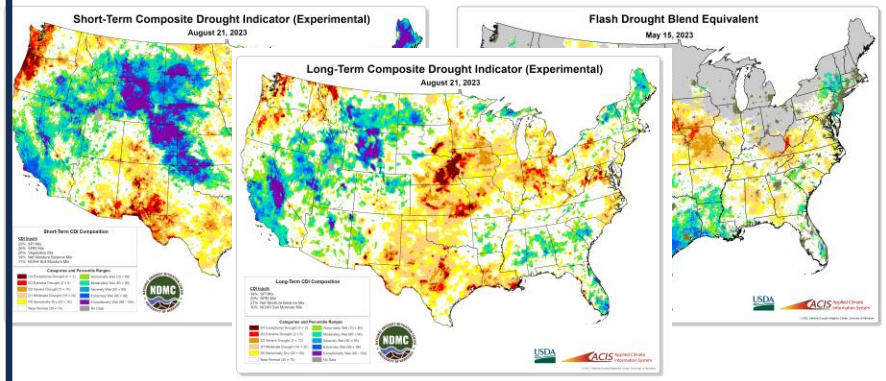
ACIS Applied Climate Information System

A Library of Gridded Data used to make AI/ML based Short- and Long-Term Composite Drought Indicator's (CDI's) as well as Flash Drought CDI's

Library of potential inputs

Supervised AI/ML Process

Weekly output compared to all weeks in the data library



GIS maps of the various CDI's used in weekly Drought Monitoring

Some Thoughts on ML/AI……

- **This is an ongoing process with both an operational and research component.**
- **Validation is difficult: What do you validate results against?**
- **Reliable and operational gridded data are currently limited but increasing.**
- **The current process is not 100% AI/ML as humans are:**
  - Choosing the potential inputs and periods of record in the data library
  - Determining the training data
  - Determining the bounds of the timescales utilized
- **Climate non-stationarity can be addressed in this process:**
  - Defining the period of record used for an indicator.
  - Defining the reference period used.
- **Current output and metadata as well as legacy output can be found at:**
  https://ndmcblends.unl.edu/Home.aspx

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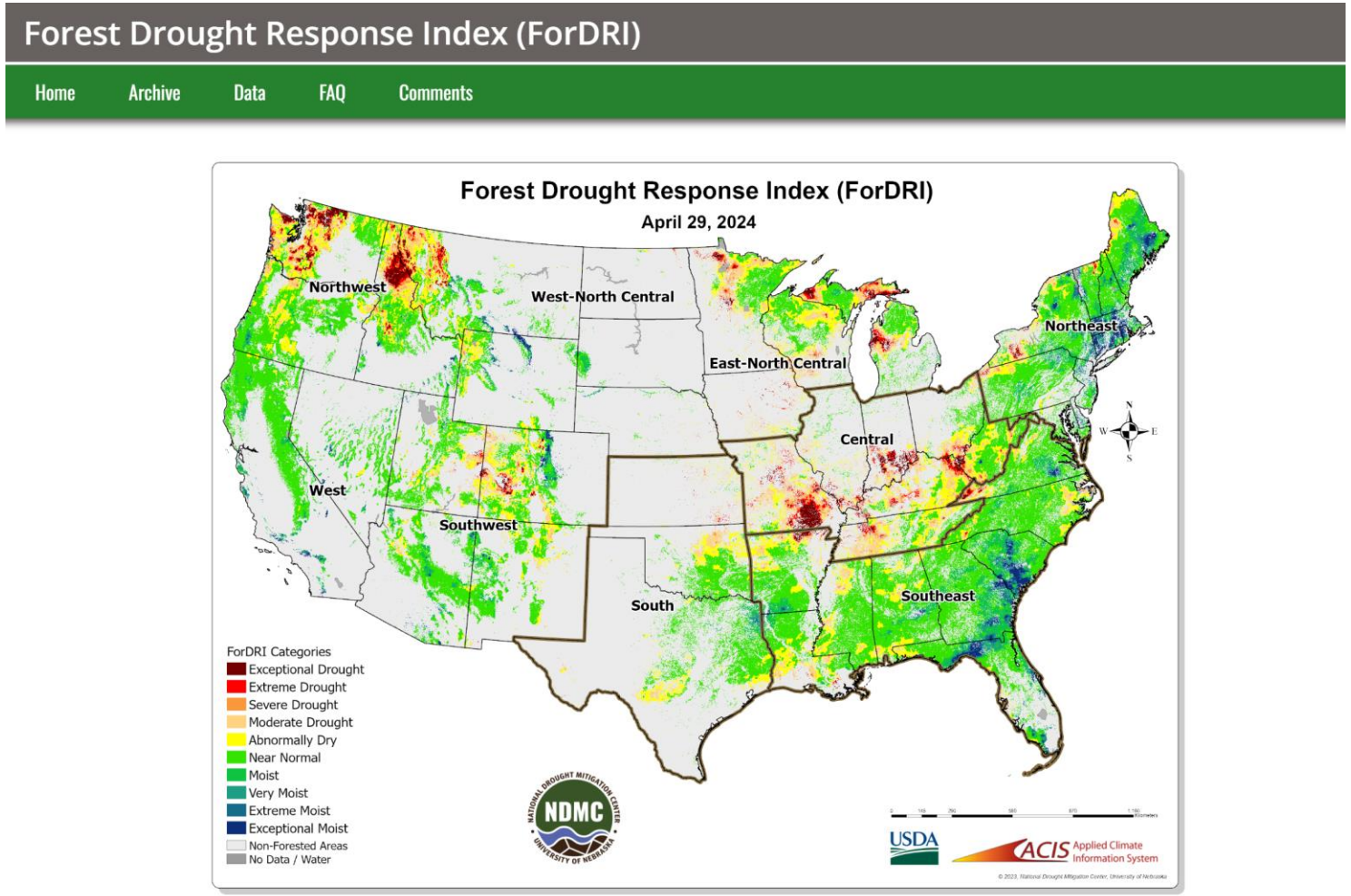
A new tool to monitor drought in forests

Forest Drought Response Index
ForDRI



https://fordri.unl.edu/

How is ForDri made?

- Satellite-derived variables
- Climate variables
- Biophysical variables

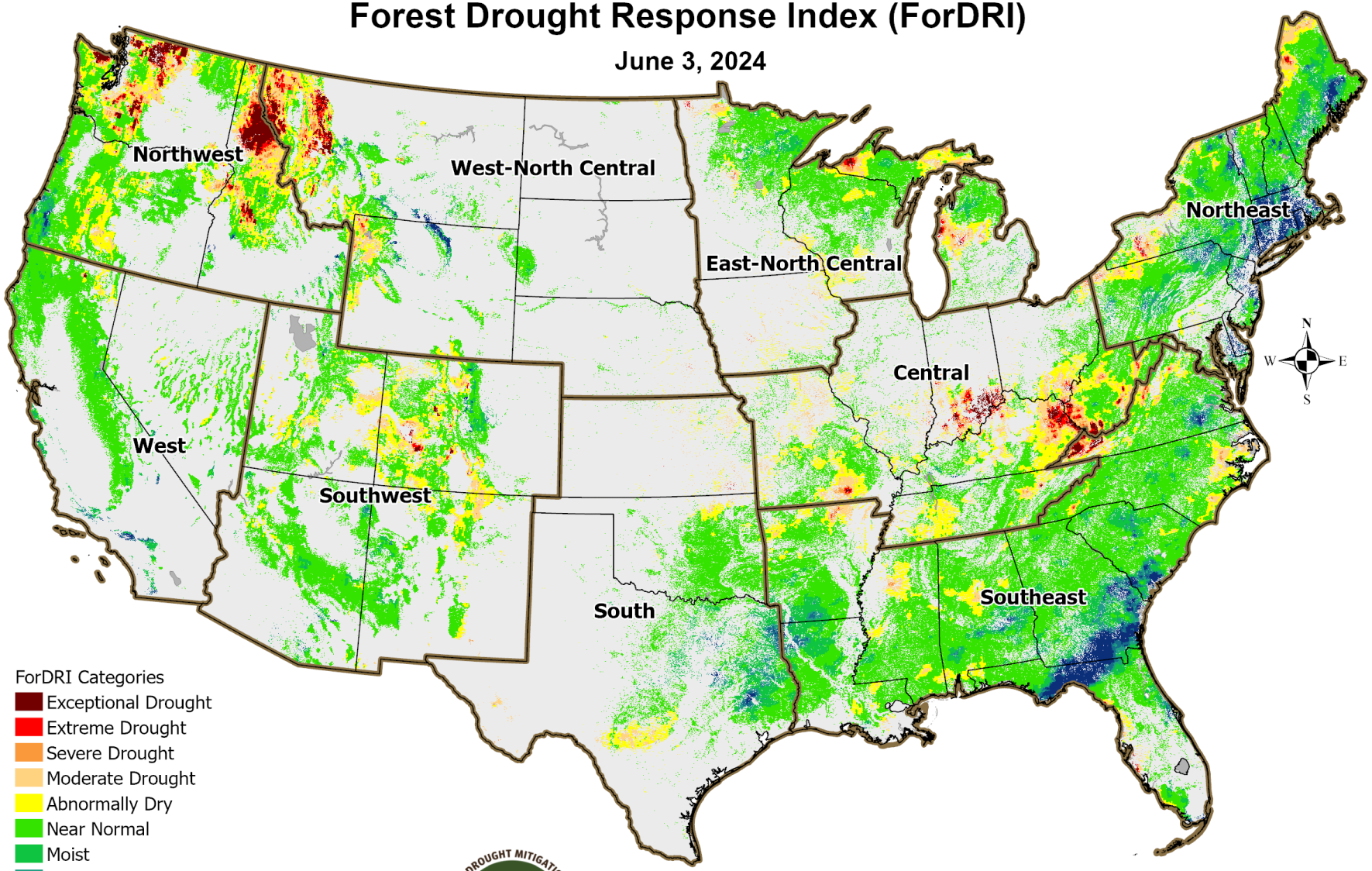
These variables are combined with the national forest type dataset from the USFS to produce a weekly tool to identify and classify levels of dryness and drought in forested ecosystems

https://www.mdpi.com/878518

Tadesse T, Hollinger DY, Bayissa YA, Svoboda M, Fuchs B, Zhang B, Demissie G, Wardlow BD, Bohrer G, Clark KL, et al. **Forest Drought Response Index (ForDRI): A New Combined Model to Monitor Forest Drought in the Eastern United States**. *Remote Sensing*. 2020; 12(21):3605. https://doi.org/10.3390/rs12213605

Forest Drought Response Index (ForDRI)

June 3, 2024



Comments

Question 1

How were you made aware of the ForDRI mapping tool?

- ○ NDMC Website
- ○ Redirected from another website
- ○ Internet search
- ○ University
- ○ Government agency
- ○ Publication
- ○ Non-profit / Industry Organization
- ○ Other (please specify)

(100 character limit)

Question 2

What was your primary purpose for accessing the ForDRI mapping tool?

Question 3

How would you rate the ForDRI mapping tool on each of the following:

Overall appearance of the tool:

Drought Impact and Communication Updates

University of Nebraska Lincoln

Category	
D0	Grass fires increase
	Planting is postponed; forage germinati
	Producers begin supplemental feeding f
	Surface water levels decline
D1	Dryland crops are stunted
	Early cattle sales begin
	Stock tanks, creeks, streams are low; vo
	Wildfire frequency increases
D2	Hydroelectric power is compromised; w
	Pasture conditions are very poor
	Soil is hard, hindering planting; crop yiel
	Wildfire danger is severe; burn bans are
	Wildlife moves into populated areas
D3	Increased risk of large wildfires is noted
	Many sectors experience financial burd
	Need for supplemental feed, nutrients,
	Row and forage crops fail to germinate;
	Severe fish, plant, and wildlife loss repo
	Soil has large cracks; soil moisture is ver
	Water sanitation is a concern; reservoir
D4	Boat ramps are closed; obstacles are ex
	Culling continues; producers wean calve
	Devastating algae blooms occur; water c
	Exceptional and widespread crop loss is
	Exceptional water shortages are noted a
	Extreme sensitivity to fire danger; firewo
	Seafood, forestry, tourism, and agricultu
	Widespread tree mortality is reported; r

Filter by:

State: Texas

Season: Summer

Weeks in Drought: 0 – 500

Date Range: 01/01/2011 to 12/31/2011

USDM Category: D0 D1 D2 D3 D4 None

Filter by impact sector:

Note: The default view is impacts from all sectors. Select a sector to see only impacts from that sector. If you choose multiple sectors, it filters by AND logic.

- [x] Agriculture
- [ ] Business & Industry
- [ ] Energy
- [ ] Fire
- [ ] Plants & Wildlife
- [ ] Society & Public Health
- [ ] Relief, Response & Restrictions
- [ ] Tourism & Recreation
- [ ] Water Supply & Quality

Submit | Reset Filters

Search Results Below

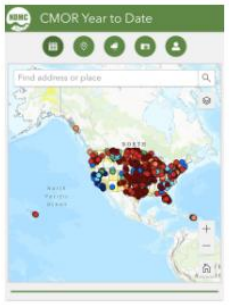
USDM	Start Date	Seasons	Weeks	Sectors	Historically observed impacts
D0	2011-06-11	summer	0	Agriculture	Drought, heat and winds slowed forage growth in North Texas
D0	2011-06-04	summer	0	Agriculture, Water Supply & Quality	Corn and milo manifested drought stress in parts of North Texas
D1	2011-06-11	summer	27	Agriculture	Drought, heat and winds slowed forage growth in North Texas
D1	2011-06-04	summer	26	Agriculture, Water Supply & Quality	Corn and milo manifested drought stress in parts of North Texas
D2	2011-08-24	summer	38	Agriculture, Plants & Wildlife, Water Supply & Quality	Cattle sales continued in South Texas
D2	2011-07-31	summer	34	Agriculture	Drought, high salinity devastating oysters on Texas Gulf Coast

Go.unl.edu/cmor_drought

CMOR Desktop and Mobile Options

CMOR Reports Dashboard for desktop
(Includes reports 2018-present and more filter options)

Map of Reports | Submit a Report



CMOR Reports Map for mobile
(Includes year-to-date reports and fewer filter options)

Map of Reports | Submit on Mobile

For more information on submitting CMOR reports and for getting started using the app, please see the factsheet.

Mobile-friendly dashboard

Coming soon: Reminders to report, information on how reports are used, best practices and more.

Updated how-to videos, with more on the way!

Other Resources

- Frequently asked questions
- Factsheet on how to submit and view reports: In English | En Español
- Help Recruit CMOR Participants (sample press release)
- Social Media Resources for people to submit observations
- Related publications

CMOR Videos

- How to submit a CMOR report – Introduction
- How to Submit CMOR Reports from a Computer

Questions? Please email ksmith2@unl.edu

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New Communication Products (1/2): Inside Drought podcast

Inside Drought

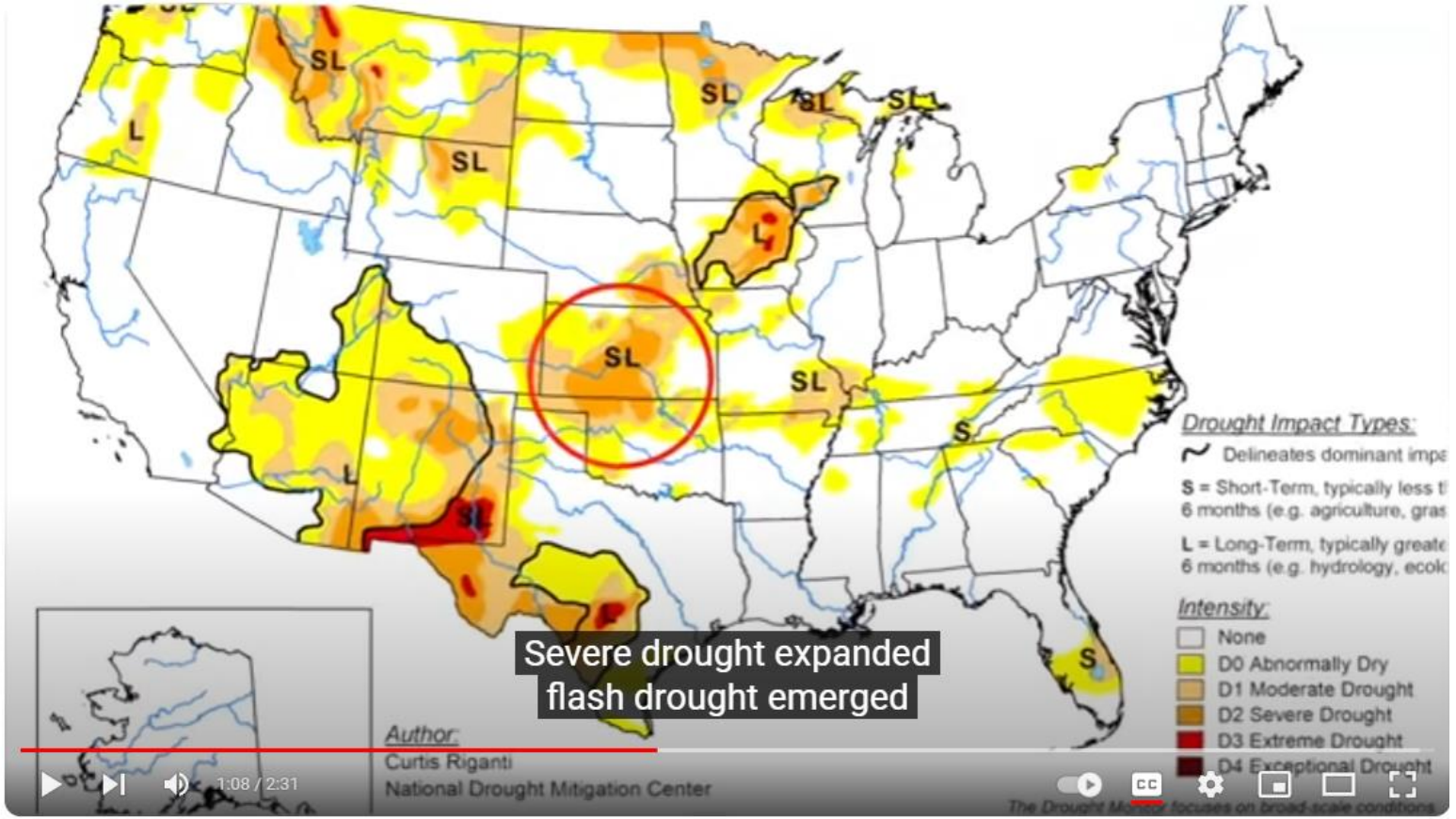
By National Drought Mitigation Center

Experts from the National Drought Mitigation Center discuss drought and current events.
Send us your questions: ndmc.comm@unl.edu.

Listen on Spotify | Send voice message

https://podcasters.spotify.com/pod/show/inside-drought/

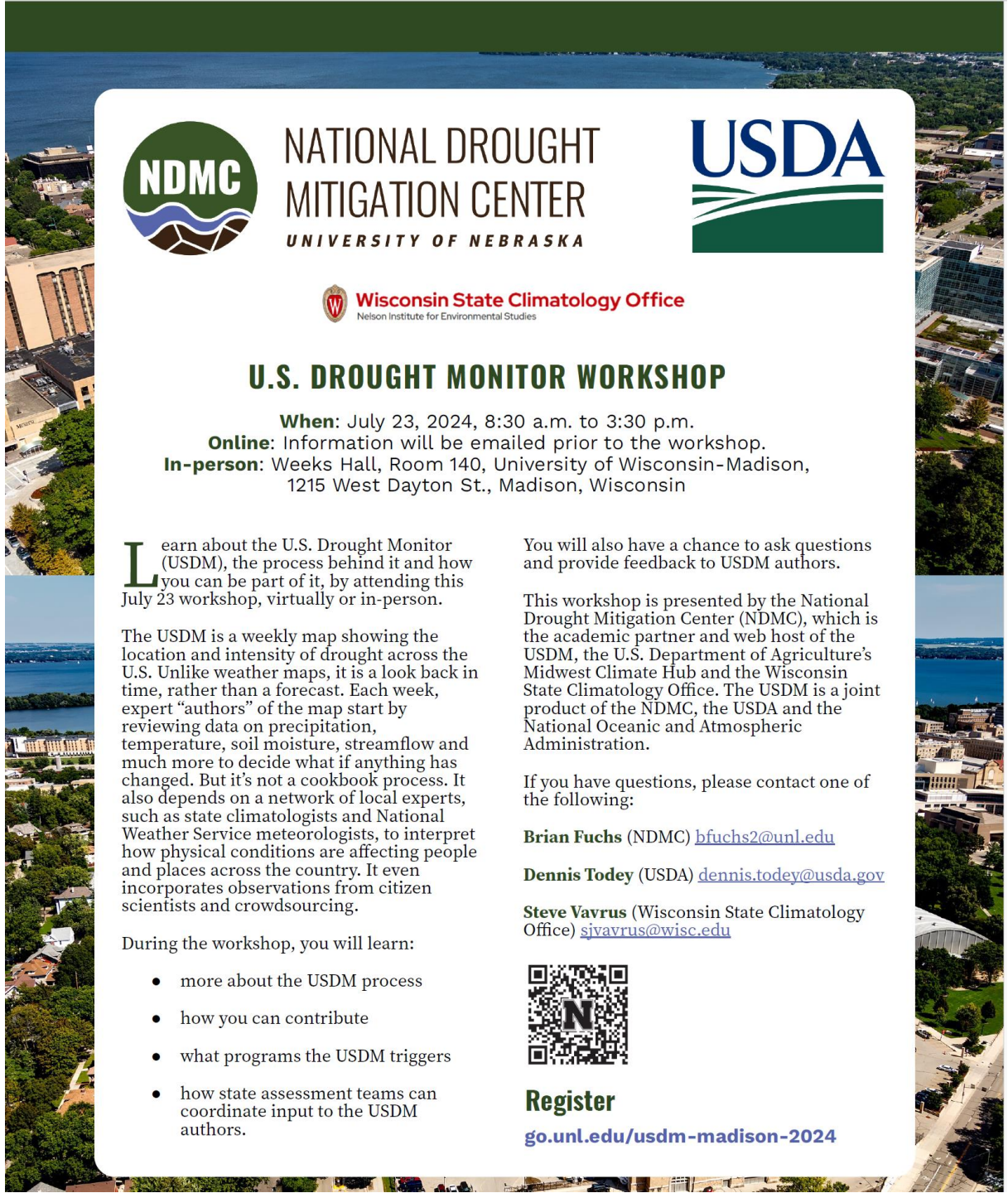
New Communication Products (2/2):
Climate Clip, AI-narrated USDM summary, with visuals



Youtube.com/@droughtcenter

An in-person/virtual U.S. Drought Monitor workshop will take place in Madison, WI later this summer on July 23. Registration and a preliminary agenda are online:

http://go.unl.edu/usdm-madison-2024



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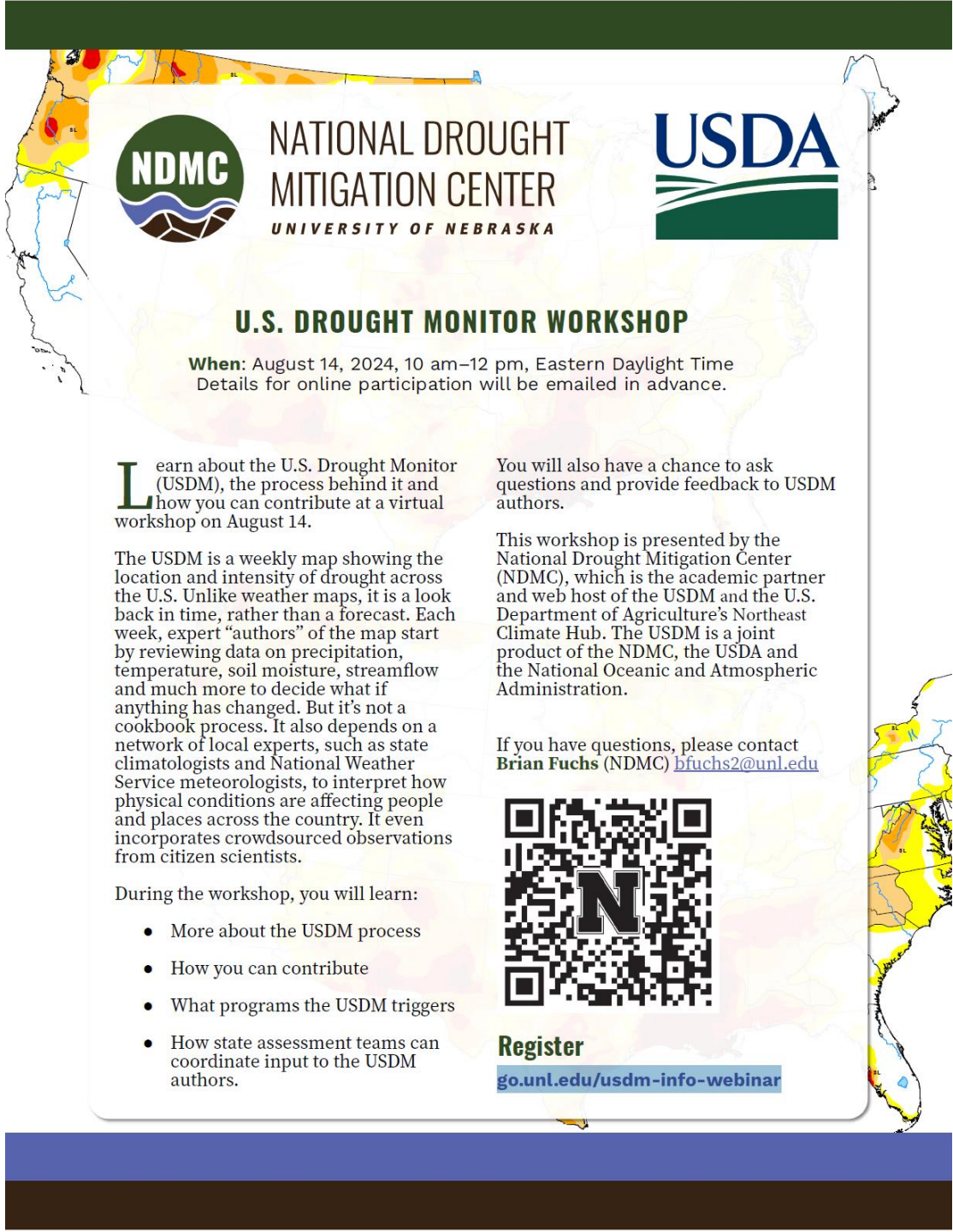
A virtual U.S. Drought Monitor workshop will take place later this summer on August 14, 2024 in coordination with the USDA Northeast Climate Hub. Registration and a preliminary agenda are online:

https://go.unl.edu/usdm-info-webinar



Lessons Learned…

Early Warning and Risk Management Relationship: *A cycle forms…*

- As **monitoring and early warning systems improve**, **the need** for better drought risk management strategies (planning and mitigation) increases
- As **planning and mitigation strategies are implemented**, **the need** for improved drought monitoring and early warning increases
- **Information (value added)** and a ***need for triggers*** drives this cycle

Final Thoughts

- The NDMC is dedicated to developing ***usable*** information and services
  - Involve a variety of networks and incorporating ***user feedback*** at all times in what we do!
- Strong partners and ***collaborations on the ground*** with our stakeholders at all scales (personal, local, watershed, NRDs, state, regional to national + international) has been the key to our success
- Goal is to ***link scientific knowledge w/ the actions*** needed to reduce impacts and future risk through a sound drought risk management process

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Thank You! Any Questions?

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