Review of Information Used to Create the US Drought Monitor

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Presented to

U.S. Drought Monitoring Workshop:

Forecasting, Monitoring, and Responding to Drought in the Southeast

February 4, 2020

A Little Background …

JOHN THUNE
U.S. SENATOR *for* SOUTH DAKOTA

Recent Press Releases

After Hearing Constituents' Concerns, Thune Introduces Legislation to Improve Accuracy of U.S. Drought Monitor

"I can't say it enough – no one knows what's needed to improve agriculture policy more than the farmers and ranchers who work the land and raise livestock in South Dakota."

May 23, 2018

WASHINGTON – U.S. Sen. John Thune (R-S.D.), chairman of the Senate Commerce Committee and a longtime member of the Senate Agriculture Committee, today introduced the Improved Soil Moisture and Precipitation Monitoring Act of 2018, legislation that would provide tools and direction to the U.S. Department of Agriculture (USDA) to help improve the accuracy of the U.S. Drought Monitor and require the coordination of USDA agencies that use precipitation data to determine livestock grazing loss assistance and stocking rates. He also introduced legislation to strengthen and improve the Cooperative Observer Program (COOP) of the National Weather Service, of which the Commerce Committee has jurisdiction, in order to support state-coordinated programs that provide data for the Drought Monitor and other weather programs. The COOP system is the nation's largest and oldest weather network and is entirely run by volunteers. Thune introduced these bills after hearing directly from several concerned ranchers at an agriculture roundtable event that he hosted in Rapid City in April 2018.

"South Dakota farmers and ranchers are familiar with working through extreme weather conditions, especially drought," said Thune. "And after the 2016 and 2017 drought conditions in much of Western South Dakota, some of them would probably say they're all too familiar with it and are very concerned about accurate precipitation measurement. I recently heard some of those concerns firsthand, which is what led to the development of this legislation. Together, I'm hopeful that we can make the Drought Monitor a far more effective and efficient tool and, at the same time, ensure USDA programs are using accurate and consistent data in administering programs that are designed to help the agriculture community.

"Thune's Improved Soil Moisture and Precipitation Monitoring Act would:

- Grant the secretary of agriculture the discretion to improve soil moisture monitoring by increasing the number of monitoring stations or by utilizing other appropriate cost-effective soil moisture measuring devices;
- Increase the number of precipitation and soil moisture monitoring stations in any area that has experienced extreme or exceptional drought for any six month period since the beginning of 2016, including South Dakota, and authorizes a $5 million per year appropriation to do so;
- Require USDA to develop standards to integrate data from citizen scientists and to collect soil moisture data; and
- Require USDA agencies to use consistent precipitation monitoring data and drought assessment across the programs that USDA administers."

This eventually became Section 12512 of the 2018 Farm Bill!

Improvements to United States Drought Monitor

Four Basic Components of Section:

1. Coordination amongst USDA, NOAA, and NDMC on enhancing data / improving accuracy of Drought Monitor;

2. Consistency in the use of the USDM to trigger USDA programs;

3. Review of data being used in creating the USDM and the identification of existing data that is not being used; and

4. Making improvements to the USDM based on findings of the data review, including acquisition of new types of data and encouraging citizen science.

SEC. 12512. IMPROVEMENTS TO UNITED STATES DROUGHT MONITOR.

(a) In General.--The Secretary shall coordinate with the Director of the National Drought Mitigation Center and the Administrator of the National Oceanic and Atmospheric Administration to enhance the collection of data to improve the accuracy of the United States Drought Monitor.

(b) Utilization.--To the maximum extent practicable, the Secretary shall utilize a consistent source or sources of data for programs that are based on drought or precipitation indices, such as the livestock forage disaster program established under section 1501(c) of the Agricultural Act of 2014 (7 U.S.C. 9081(c)) or policies or plans of insurance established under the Federal Crop Insurance Act (7 U.S.C. 1501 et seq.).

(c) Review.--Not later than 1 year after the date of enactment of this Act, the Secretary shall conduct a review of--

(1) the types of data currently utilized by the United States Drought Monitor;

(2) the geographic coverage and density of existing data collection sites; and

(3) other meteorological or climatological data that is being collected by other Federal agencies, State and local governments, and non-Federal entities that could be utilized by the United States Drought Monitor.

(d) Improvements.--

(1) In general.--Upon the completion of the review prescribed in subsection (c), the Secretary shall--

(A) seek to expand the collection of relevant data in States or geographic areas where coverage is currently lacking as compared to other States or geographic areas; and

(B) to the maximum extent practicable, develop standards to allow the integration of meteorological or climatological data into the United States Drought Monitor derived from--

(i) in-situ soil moisture profile measuring devices;

(ii) citizen science (as defined in the Crowdsourcing and Citizen Science Act (15 U.S.C. 3724)), including data from the Cooperative Observer Program of the National Weather Service; and

(iii) other Federal agencies, State and local governments, and non-Federal entities.

(2) Authorization of appropriations.--There is to be authorized to be appropriated to the Secretary to carry out this subsection $5,000,000 for each of fiscal years 2019 through 2023.

Improvements to United States Drought Monitor

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3. *other meteorological or climatological data that is being collected by other Federal agencies, State and local governments, and non-Federal entities that **could be** utilized by the United States Drought Monitor.*

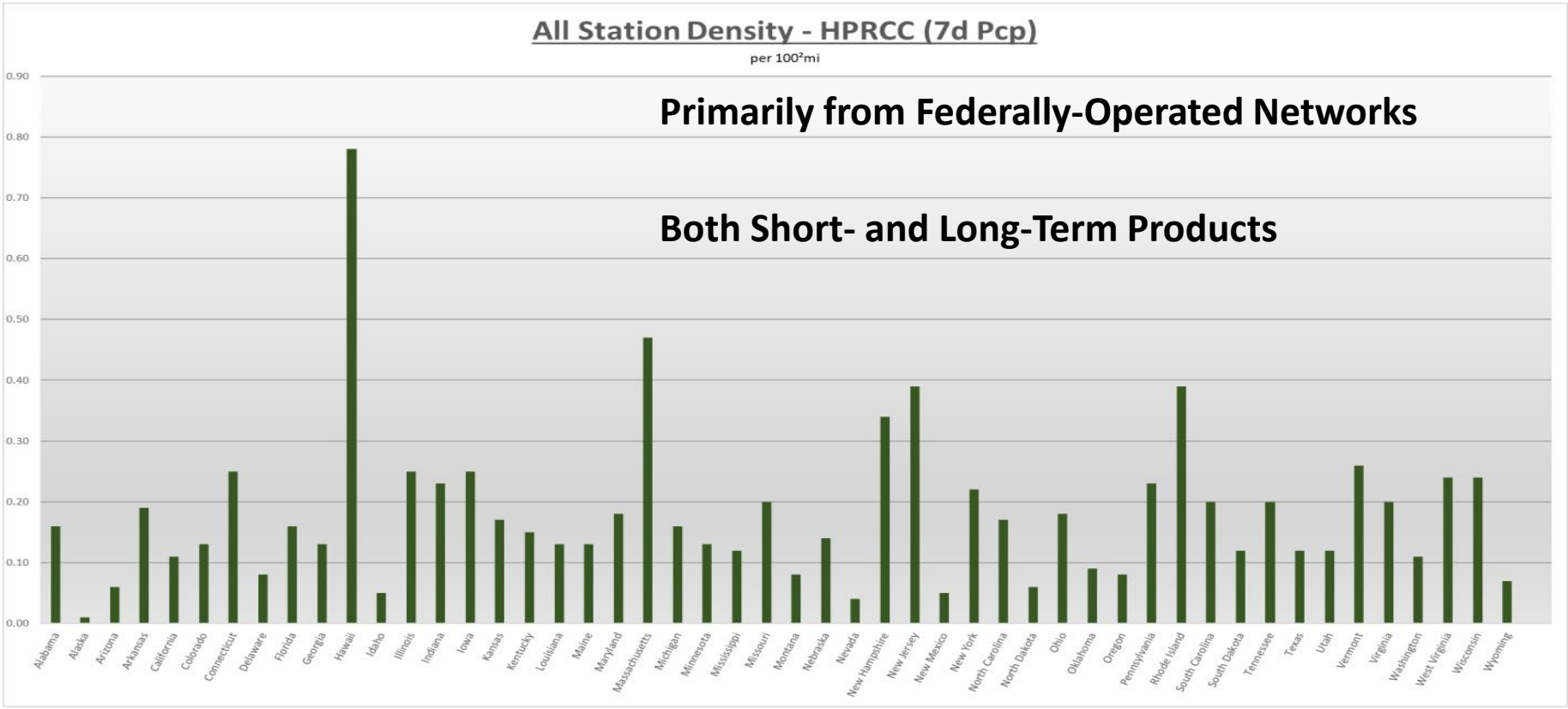
Methodology for Conducting the Year One Review

Interview / surveys were conducted with:

- The **USDM authors**, who identified which data and products used in the creation of the map;
- Providers of those products to gain additional information on origins and related research;
- Operators of several networks *not* providing information to the USDM to identify possible impediments to their participation;
- Members of the USDM user community (primarily State Climatologists); and
- Leadership in other organizations partnering on the creation of the USDM, including:
  - Agencies in the National Oceanic and Atmospheric Administrations (NOAA); and
  - The National Drought Mitigation Center (NDMC).

Summary of Data Used:

In Situ Data – Weather and Climate



Temperatures – average temperature and average maximum temperatures, available for:

- 7, 14, 30, 60, and 90 day intervals

Precipitation – observed total, departure from normal, and percent of normal precipitation, available for:

- 7, 14, 30, 60, and 90 day intervals; 6, 9, 12, 24, 48, and 60 month intervals

Standardized Precipitation Index (SPI) – statistically indexed precipitation, available for:

- 7, 14, 30, 60, and 90 day intervals; 6, 9, 12, 24, 48, and 60 month intervals

Summary of Data Used:

Other data used by a majority of the USDM authors:

- *SNOWTEL (Snow Telemetry) – USDA*
- *Streamflow – USGS*
- *Groundwater – USGS*
- *AHPS (Advance Hydrological Prediction Service) blended rainfall product – NOAA*
- *NLDAS (North American Land Data Assimilation System) Soil moisture Product – NOAA/NASA*
- *VHI (Vegetative Health Index) – NOAA*
- *EDDI (Evaporative Demand Drought Index) – NOAA*
- *VegDRI (Vegetative Drought Response Index) – USGS, NDMC, HPRCC*
- *QuickDRI (shorter-term VegDRI) – NDMC, CALMIT, USGS, USDA, NASA*
- *Objective Blends - NOAA*

NOTE: Other products are used less frequently, often as "tie-breakers"

Criteria Used for Inclusion of Data and Products

The severity levels are as follows:

- D0: Abnormally Dry (once per 3 to 5 years) – NOT CONSIDERED DROUGHT
- D1: Moderate Drought (once per 5 to 10 years)
- D2: Severe Drought (once per 10 to 20 years)
- D3: Extreme Drought (once per 20 to 50 years)
- D4: Exceptional Drought (once per 50 to 100 years)

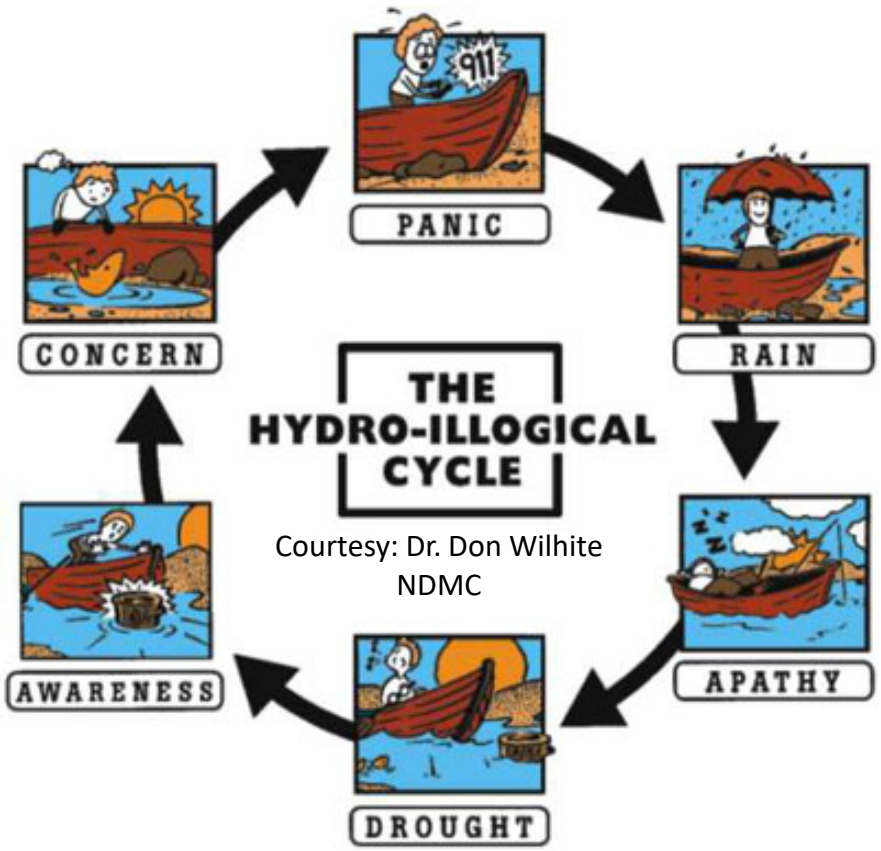
The criteria for selecting datasets and products for this type of depiction are:

- A sufficient period of record to allow computation of percentile rankings, or similar method for determining how a value compares with the rest of the values in the period of record;
- A homogeneous historical record, with few missing data;
- Temporal resolution of at least one day;
- Timeliness of reporting;
- Data, observations, or indices are relevant to drought monitoring;
- Derived indices are based on peer-reviewed methodologies;
- Representativeness of the product regionally or nationally (not just locally); and
- GIS compatibility for any dataset provided to the authors.

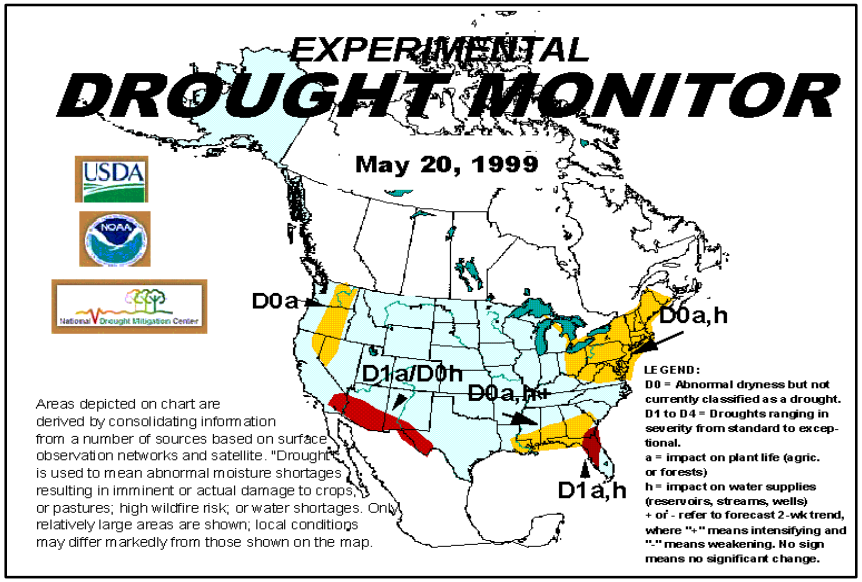
Possible Pathways for Obtaining More Data

- Make public the requirements for inclusion of products into the USDM so that data providers may have an opportunity to participate in the process.
- Assess all sources of NOAA data for potential inclusion into the USDM (i.e., assess data systems containing mesonet data such as MADIS).
- Develop a vetting process for remotely sensed and modeled products for inclusion into the USDM.
- Identify which products are used most heavily by the USDM author of record for each authoring shift to allow state and regional contributors to better understand their local drought depiction.
- Develop methodologies to allow data with limited periods of record to be used in the USDM process.
- Establish a Data Depository to allow the USDM authors to access information in a uniform manner.
- Survey authors to identify which other sources of data they favor inclusion in the Data Depository or to identify opportunities for creating new products.
- Convene meetings of USDM leadership at regular intervals to review issues impacting the production of the maps and related products.
- Identify potential other products that can be used in addition to the USDM in determining program eligibility, based on actual losses.

The United States Drought Monitor

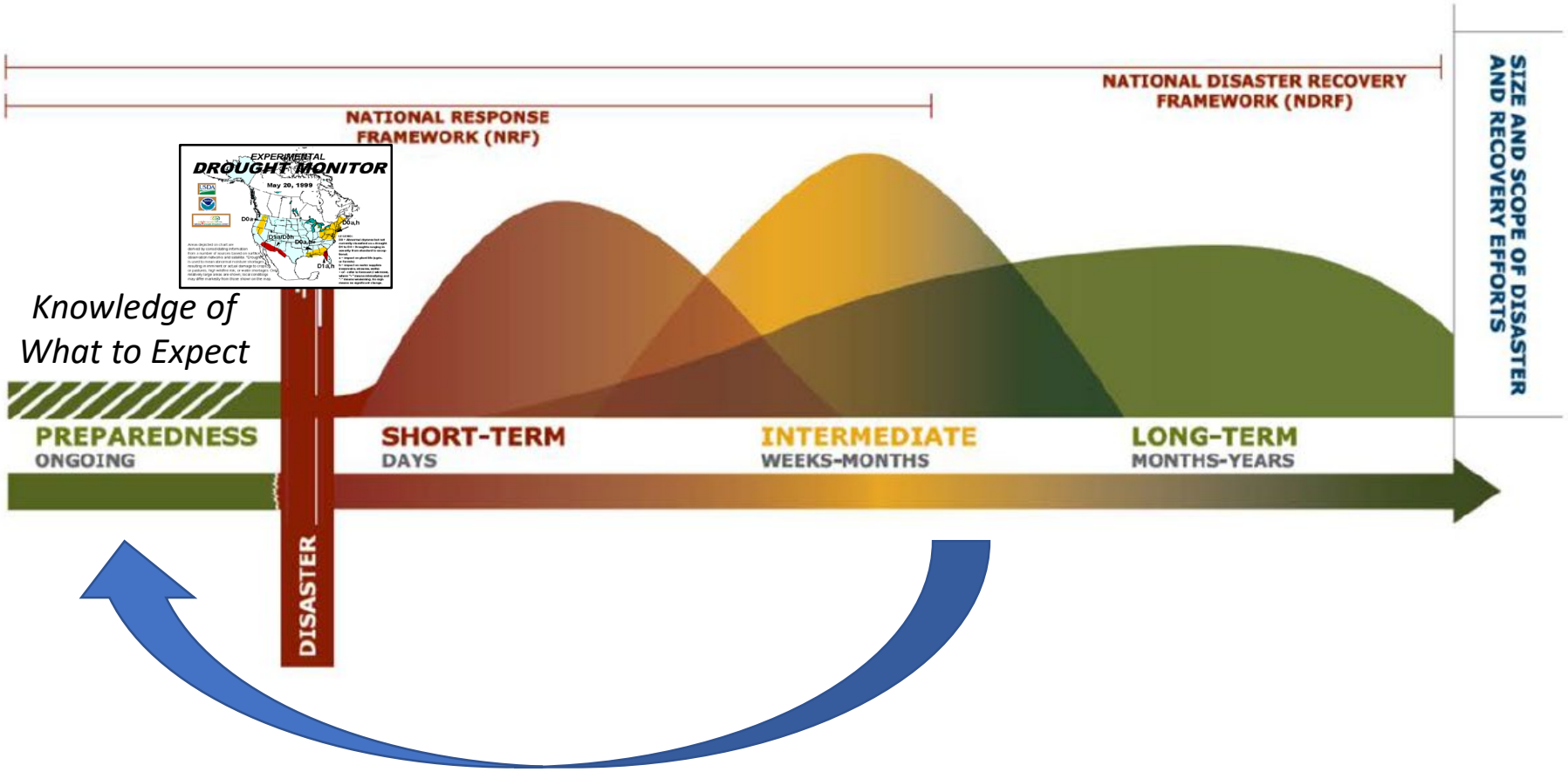


Courtesy: Dr. Don Wilhite
NDMC



- Main objective: develop a “climatology of drought” for use as a planning tool for the purpose of develop drought mitigation plans
- Original partnership between USDA, NWS / Climate Prediction Center, and the National Drought Mitigation Center
- First product released in May of 1999 (Experimental to Operational in 3 months!)

*Preparing for Natural Disasters



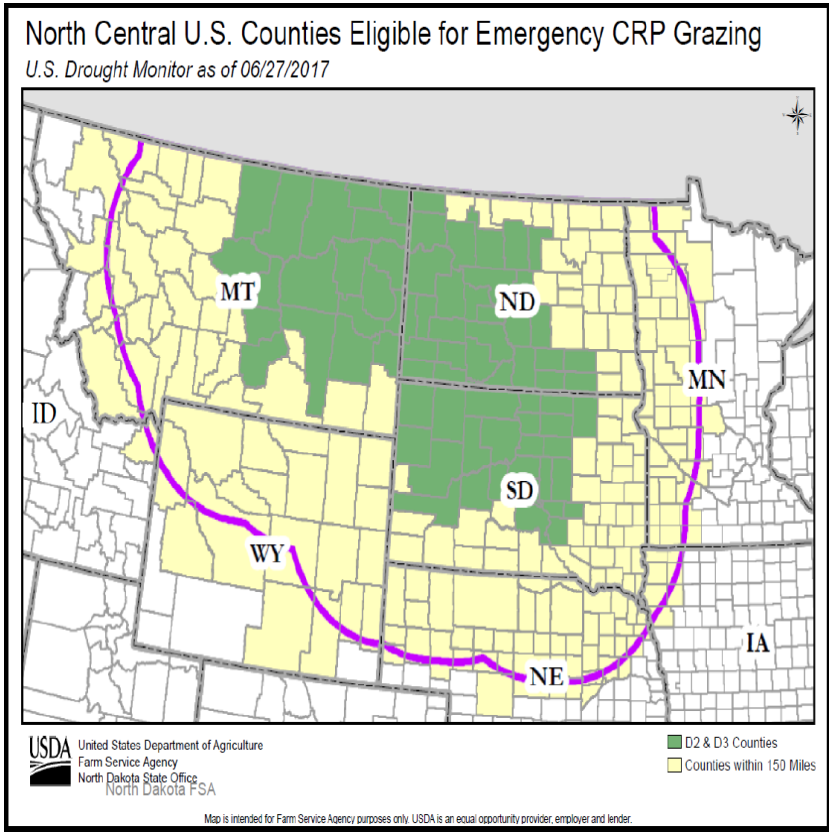
***National Disaster Recovery Framework (FEMA)**

Critical Elements to National Preparedness (FEMA)

Prevention	Protection	Mitigation	Response	Recovery
Planning				
Public Information and Warning				
Operational Coordination				
Intelligence and Information Sharing		Community Resilience	Infrastructure Systems	
Interdiction and Disruption		Long-term Vulnerability Reduction	Critical Transportation	Economic Recovery
Screening, Search, and Detection			Environmental Response/Health and Safety	Health and Social Services
Forensics and Attribution	Access Control and Identity Verification	Risk and Disaster Resilience Assessment	Fatality Management Services	Housing
	Cybersecurity	Threats and Hazards Identification	Fire Management and Suppression	Natural and Cultural Resources
	Physical Protective Measures		Logistics and Supply Chain Management	
	Risk Management for Protection Programs and Activities		Mass Care Services	
	Supply Chain Integrity and Security		Mass Search and Rescue Operations	
			On-scene Security, Protection, and Law Enforcement	
			Operational Communications	
			Public Health, Healthcare, and Emergency Medical Services	
			Situational Assessment	

Use the Drought Monitor as a Trigger for USDA Programs

Ad Hoc Trigger: The Conservation Reserve Program (CRP)



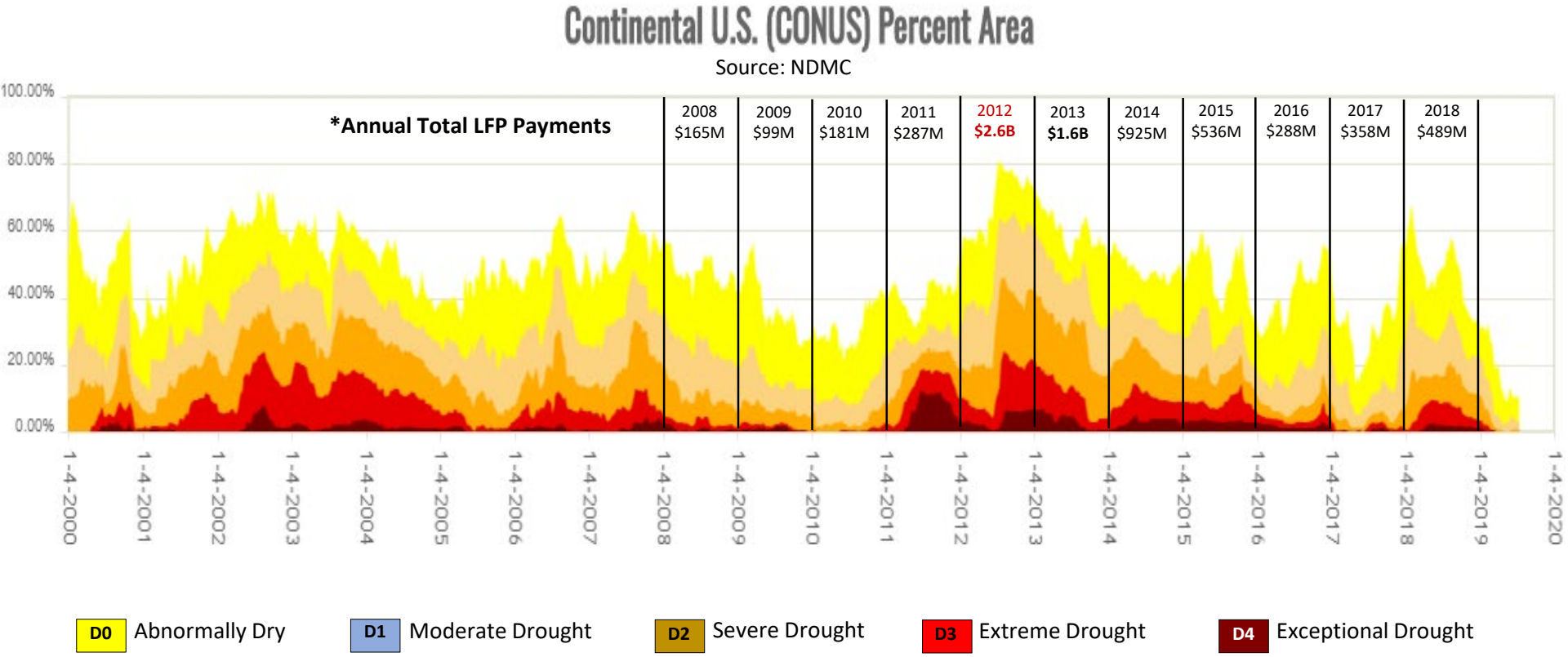
On June 29, 2017, the Secretary of Agriculture expanded the emergency grazing of CRP (Conservation Reserve Program) to counties in which any part of their border lies within 150 miles of a county approved for emergency grazing, as indicated by the **US Drought monitor (D2 or higher)** in Montana, North Dakota or Montana.

USDA programs using USMD map as a trigger:

- Livestock Forage Disaster Program (LFP);
  By Law!
- Emergency Assistance for Livestock, Honeybees and Farm Raised Fish Program (ELAP);
- Fast-Track Secretarial Disaster Declarations; and
- Emergency Loan Programs.

All administered by the Farm Services Agency (FSA)

Application of the USDM in Triggering USDA's LFP



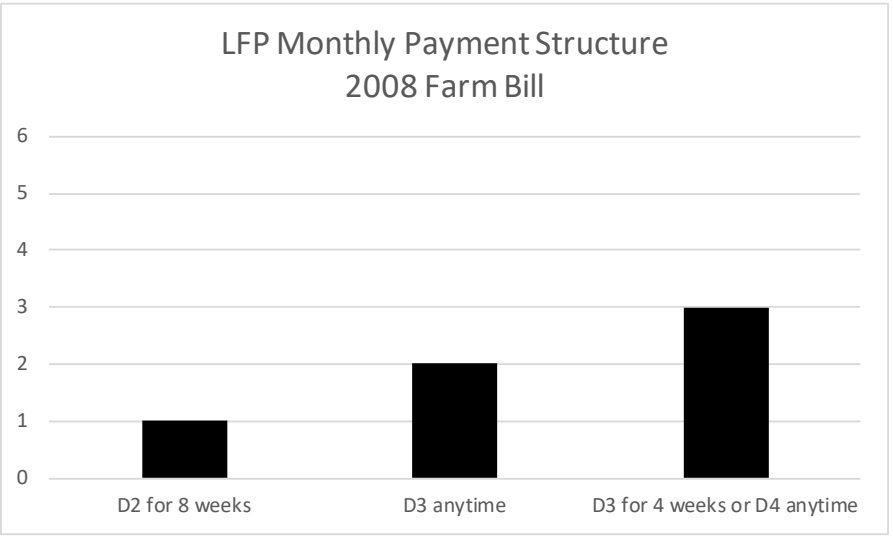
D0 Abnormally Dry | D1 Moderate Drought | D2 Severe Drought | D3 Extreme Drought | D4 Exceptional Drought

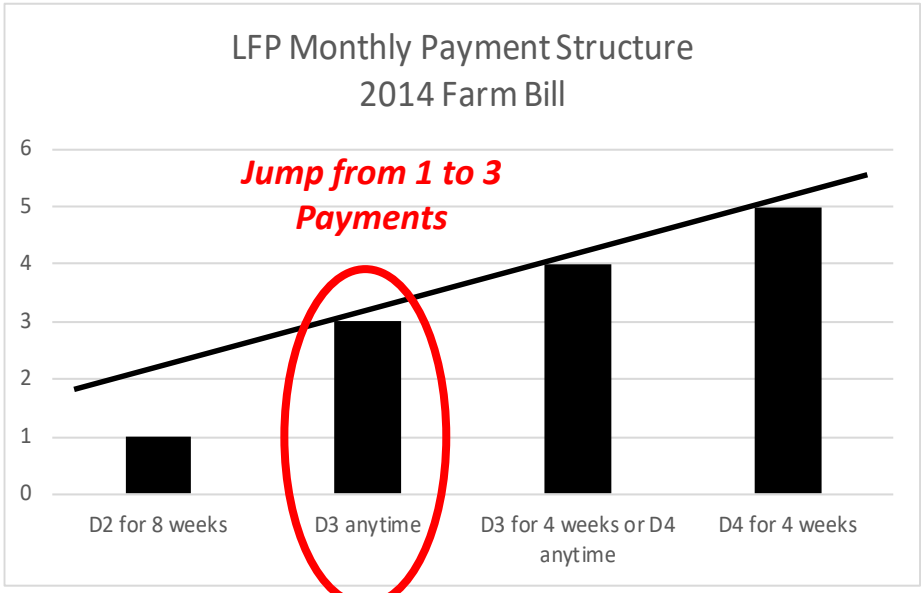
Over $7 Billion in assistance to farmers under the Livestock Forage Disaster Program (LFP) alone since 2008 Farm Bill

*Source: USDA Farm Services Agency

Application of the USDM in Triggering USDA's LFP

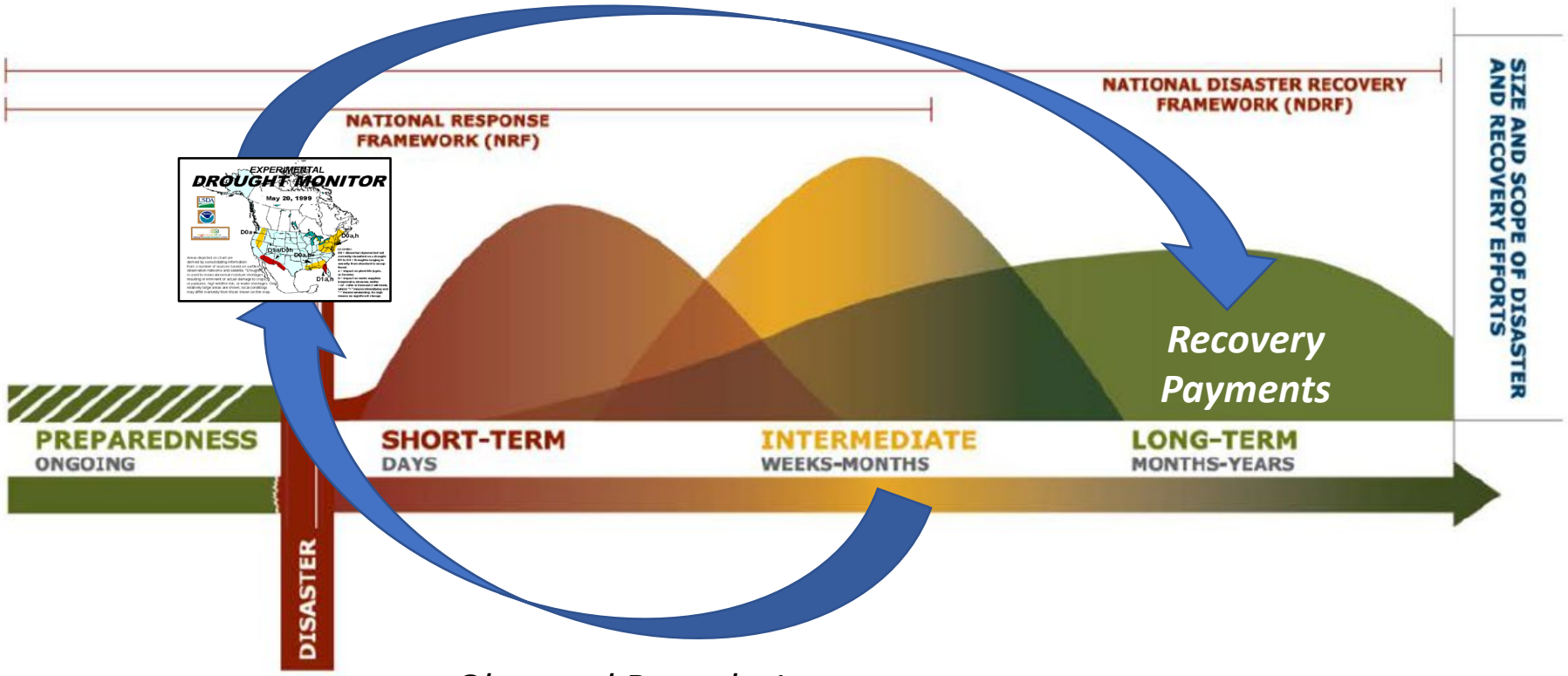
*Payment Structure





*Payment = 1 supplemental feeding per head of livestock

*Preparing for Natural Disasters



Observed Drought Impacts

***National Disaster Recovery Framework (FEMA)**

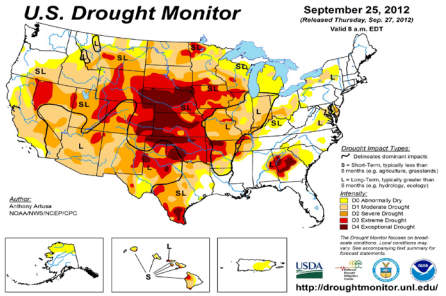
From Section 12512:

(b) Utilization.--To the maximum extent practicable, the Secretary shall utilize a consistent source or sources of data for programs that are based on drought or precipitation indices, such as the livestock forage disaster program established under section 1501(c) of the Agricultural Act of 2014 (7 U.S.C. 9081(c)) or policies or plans of insurance established under the Federal Crop Insurance Act (7 U.S.C. 1501 et seq.).

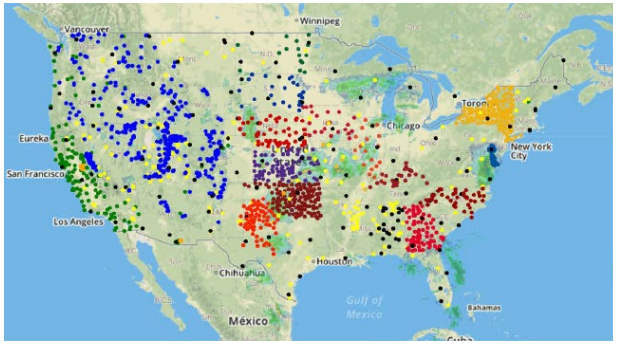
US Drought Monitor + … ?

In Summary

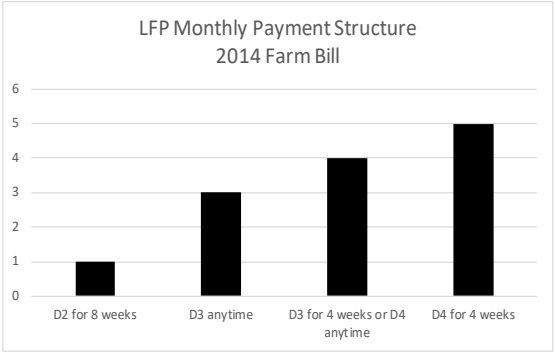
- Review of information used to create the USDM was conducted, and possible new sources of data were identified;



- Some confusion exists as to how new sources of information may be incorporated into the making of the USDM; and



- USDA, NOAA, and, NDMC leadership needs to be more engaged in the process of coordinating the needs of the USDM authors and those impacted by its operational use.



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