Review of Information Used to Create the US Drought Monitor

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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!
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.
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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.

Agricultural Weather Assessments
World Agricultural Outlook Board
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

Knowledge of What to Expect

Observed Drought Impacts

*National Disaster Recovery Framework (FEMA)
<table>
<thead>
<tr>
<th>Prevention</th>
<th>Protection</th>
<th>Mitigation</th>
<th>Response</th>
<th>Recovery</th>
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<td>Planning</td>
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**Public Information and Warning**

**Operational Coordination**

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

**Economic Recovery**

- Health and Social Services
- Housing
- Natural and Cultural Resources
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

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 USDAM in Triggering USDA’s LFP

*Payment Structure

**LFP Monthly Payment Structure**
- **2008 Farm Bill**
  - D2 for 8 weeks
  - D3 anytime
  - D3 for 4 weeks or D4 anytime

**LFP Monthly Payment Structure**
- **2014 Farm Bill**
  - D2 for 8 weeks
  - D3 anytime
  - D3 for 4 weeks or D4 anytime
  - D4 for 4 weeks

*Payment = 1 supplemental feeding per head of livestock
*Preparing for Natural Disasters

Observed Drought Impacts

Recovery Payments

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