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## Drought Information Services for U.S. Agriculture

National Drought Mitigation Center

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# DROUGHT INFORMATION SERVICES FOR U.S. AGRICULTURE

BY THE NATIONAL DROUGHT MITIGATION CENTER  
*AT THE UNIVERSITY OF NEBRASKA-LINCOLN*



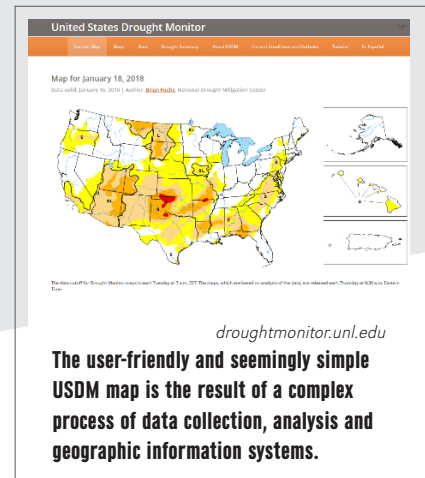
*Front cover image:  
This surreal-looking soybean field near Dayton, Indiana,  
is a victim of the 2012 drought that started in the spring  
and worsened into the summer.*

*PHOTO BY TOM CAMPBELL,  
PURDUE AGRICULTURAL COMMUNICATION*

The U.S. Drought Monitor began in 1999 as an experimental depiction of drought, produced jointly by the National Drought Mitigation Center, the National Oceanic and Atmospheric Administration, and the U.S. Department of Agriculture. It is now the key mechanism for distributing more than \$6.6 billion in relief payments to agricultural producers through the Farm Bill. It also serves as a planning asset for agricultural producers and an essential climate reference across American economic sectors.

Since 2014, a partnership between the USDA's Office of the Chief Economist and the NDMC at the University of Nebraska-Lincoln has focused on refining existing analytical and monitoring tools associated with the USDM and on developing new ones. The major recent accomplishments of that collaboration are highlighted in the pages that follow.

# ENHANCING U.S. DROUGHT MONITOR SERVICES & PRODUCTS



The USDM's weekly display of drought conditions is an important drought early-warning tool for agricultural producers and USDA professionals. Stakeholders that now rely on the USDM include:

- National policymakers who use the USDM as a measure for allocation of relief dollars;
- State governments that refer to the USDM to trigger drought response measures;
- Planners and researchers studying the effects of past droughts;
- Media professionals and educators looking for graphic representation of complex climate interactions.

Accurate production of the drought monitor is essential to these users. Production enhancements have increased efficiency for USDM authors, whose weekly analysis based on input provided by climate professionals, sets or eliminates drought boundaries on maps.

## **ENHANCEMENTS TO SERVICES FOR USDM USERS ACHIEVED THROUGH THE COOPERATIVE AGREEMENTS INCLUDE:**

### **USDAM AND DROUGHT IMPACT REPORTER TUTORIALS**

[drought.unl.edu/archive/Tutorials/USDAM\\_Tutorial/](http://drought.unl.edu/archive/Tutorials/USDAM_Tutorial/)

Providing training opportunities and materials to assist all audiences to make the most of U.S. Drought Monitor data is a NDMC priority — whether the user is working in the field, lab, or halls of Congress. USDAM tutorials explain the history and process of producing the map, and how the map information is used in sectors from fire management to policymaking. Drought Impact Reporter tutorials guide users through

the process of contributing local impact information and reports, data that can then be utilized by USDAM authors.

### **USDAM PRODUCTS IN SPANISH**

[droughtmonitor.unl.edu/es/MapaActual.aspx](http://droughtmonitor.unl.edu/es/MapaActual.aspx)

Ag producers can now access Spanish-language versions of the drought monitor map, narrative and other materials on the website; on Facebook and Twitter; and in printed brochures and planning guides.

# OPERATIONAL SERVICES ENHANCEMENTS FOR USDM AUTHORS ACHIEVED THROUGH THE COOPERATIVE AGREEMENTS INCLUDE:

## PROTOTYPE DROUGHT INDICATOR BLENDS *Figure 1*

The NDMC has used historical gridded data from the Drought Risk Atlas with other inputs to create objective blends — combinations of different indicators — based on legacy inputs from the Climate Prediction Center. A principal components analysis looked at seasonal and regional differences of the blends, using historical data. The results were promising, and with operational inputs, the system is in place to create these blends each week in support of the USDM authors.

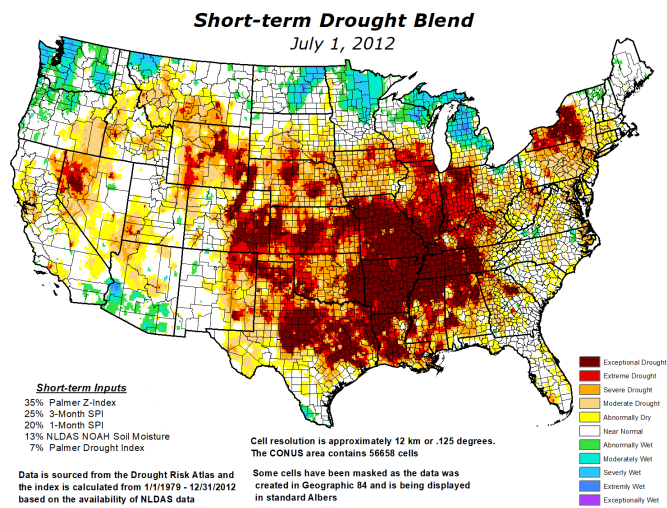
The NDMC also has started collecting several other gridded inputs that could be added to future blends. The data inputs, however, are utilized on their own by the USDM authors in the weekly map production.

## CHANGE MAPS *Figure 2*

[droughtmonitor.unl.edu/Maps/ChangeMaps.aspx](http://droughtmonitor.unl.edu/Maps/ChangeMaps.aspx)

Change maps show where drought has improved or grown worse during various time intervals. With change maps developed by the NDMC, users can easily assess changes in conditions at the regional, state or county level.

Figure 1



[droughtmonitor.unl.edu](http://droughtmonitor.unl.edu)

Gridded blend prototypes, like this one showcased at the USDM Forum, were used to elicit feedback from USDM authors on map display features.

## REDESIGNED WEBSITE FOR EASIER PAGE NAVIGATION

[droughtmonitor.unl.edu](http://droughtmonitor.unl.edu)

The Drought Monitor website, hosted on the NDMC's web servers at the University of Nebraska-Lincoln, generates 7.5 million page views in a typical year. In 2017, the website was updated and redesigned to make viewing and navigating the USDM and associated NDMC webpages easier and more mobile-friendly.

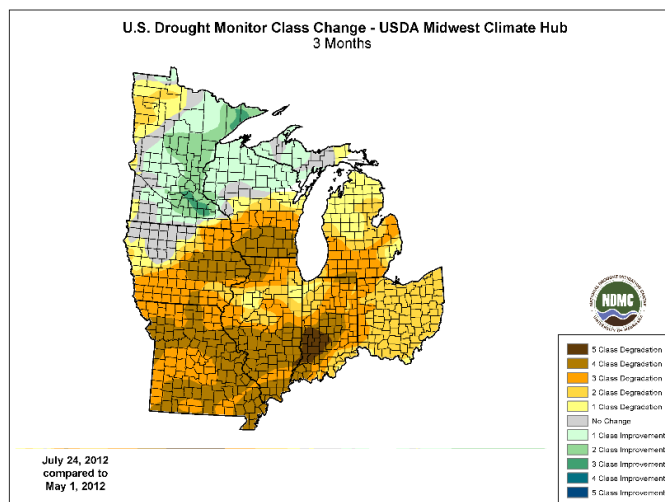
## DROUGHT IMPACT REPORTER ENHANCEMENTS

[droughtreporter.unl.edu/map](http://droughtreporter.unl.edu/map)

The Drought Impact Reporter, a valuable historic archive of the nation's drought impacts, is largely narrative accounts tied to time and place, either from drought observers around the country or media reports. It is a searchable reference of data on topics ranging from total losses across growing seasons to current evolving conditions such as how lack of precipitation is affecting crops. With USDA support, the NDMC:

- Developed a downloadable file or feed that USDA can use to display the agriculture-related impacts on their own products.
- Created a new layer of USDA drought-related Secretarial Disaster Declarations.
- Created agricultural and other sector-specific views of the DIR map by state.

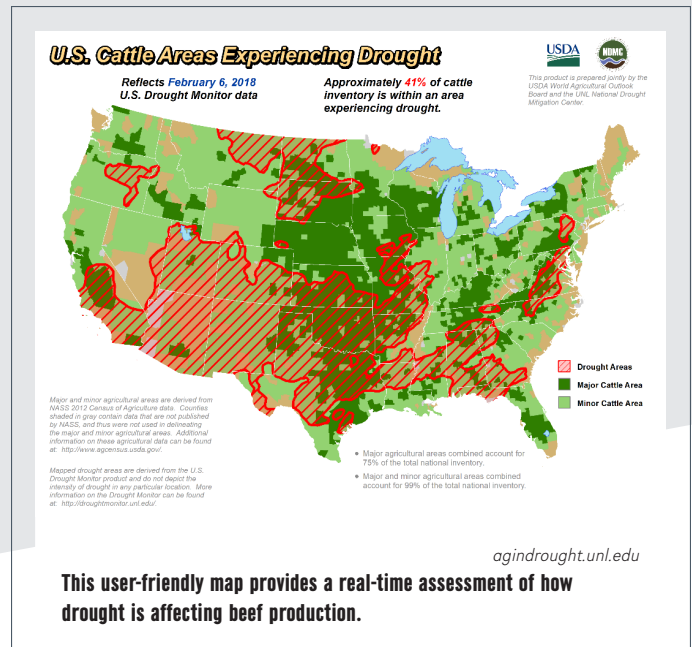
Figure 2



[droughtmonitor.unl.edu](http://droughtmonitor.unl.edu)

U.S. Department of Agriculture Midwest Climate Hub change map for three months between May and July 2012.

# USDA COMMODITIES



The National Drought Mitigation Center's synthesis of U.S. Drought Monitor information with commodities data from the USDA provides ag producers and related stakeholders convenient access to overviews of how drought has affected specific commodities during the past week, over the course of the growing season, or through the years.

## FARM SERVICES AGENCY ELIGIBILITY TOOL DEVELOPMENT

[droughtmonitor.unl.edu/fsa/FsaEligibilityState.aspx](http://droughtmonitor.unl.edu/fsa/FsaEligibilityState.aspx)

The NDMC worked with Farm Service Agency staff to develop an online tool that ag producers could use to determine their eligibility for relief via the Livestock Forage Disaster Program, which uses the USDM as a trigger. Through the farm bill, more than \$6.6 billion has been paid out through the disaster program. This tool is utilized by the FSA headquarters, field offices and stakeholders.

## NORTH AMERICAN LIVESTOCK IN DROUGHT

[drought.gov/drought/data-gallery/us-crops-and-livestock-drought](http://drought.gov/drought/data-gallery/us-crops-and-livestock-drought)

Drought can develop in all parts of the North American continent, and its impact can be devastating to livestock production, supply and trade. The NDMC and the Office of the Chief Economist used continental data to develop a methodology for mapping drought in livestock producing areas. As part of this work, the NDMC:

- Calculated the percentage of North American livestock in drought using the same techniques currently used to identify the percentage of crops affected by drought in the United States. The OCE worked with their counterparts in Mexico and Canada to determine which agricultural data sets to use to best identify sub-regions for specific analysis.
- Worked with the National Centers for Environmental Information to obtain archived North American

Drought Monitor shape files so that historical analyses could be calculated on the percentages of each drought intensity level. The intensity levels of drought for the regions were then determined by the OCE.

- Identified and delivered continental drought indices to the OCE to help determine if any particular index was valuable in determining the movement of livestock

## AGRICULTURAL COMMODITIES IN DROUGHT

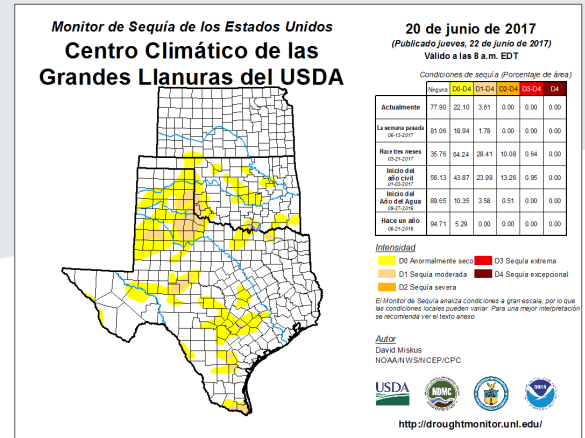
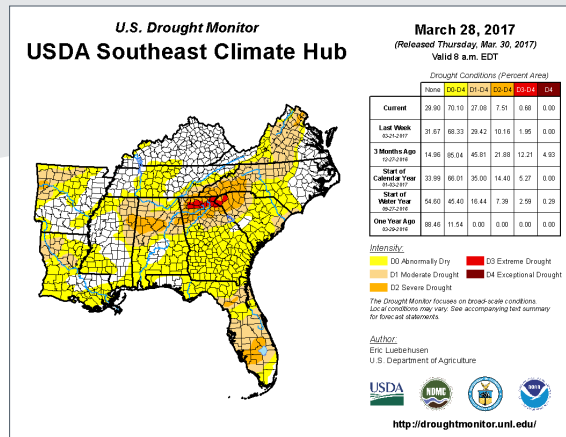
[Agindrought.unl.edu](http://Agindrought.unl.edu)

Ag in Drought, produced by the NDMC and the USDA, provides a real-time assessment of food security by showing the location and percentage of various U.S. agricultural commodities being affected by drought. Data for the percent of crop of livestock area in drought can be viewed in tables, graphs, map overlays or a series of animated maps.

USDA cooperative agreement funding allowed the NDMC to:

- **Create an archive and web delivery system**  
USDA Ag in Drought files are updated and archived each Thursday. They are now available on the website.
- **Update USDA Ag census data**  
For select commodities, the census data was updated to use the new 2012 data.
- **Update the Ag in Drought website**  
The map viewer for the Ag in Drought data has been updated to a new format consistent with USDA use.

# ENGAGING THE USDA CLIMATE HUBS



County-level Climate Hub data is now available in English for all USDA Climate Hubs and Spanish for the Southwest and Southern Plains USDA Climate Hubs.

The strengthening of the USDA Climate Hubs regional networks created an opportunity for the NDMC to collaborate with the Climate Hubs on outreach, events and research relevant to individual service regions that could be replicated in other regions.

## SIGNIFICANT PRODUCTS AND SERVICES DELIVERED THROUGH NDMC PARTNERSHIPS WITH REGIONAL CLIMATE HUBS INCLUDE:

### GRASS CAST

Early in 2017, NDMC, the Northern Plains Climate Hub and Colorado State University began discussions on the development of a forage-estimation tool for the Plains. The tool, now known as Grass Cast, is an experimental model that generates map-based forecasts of grassland productivity, offering a new instrument to a growing toolbox of drought contingency planning resources for grazing lands. Grass Cast was first produced experimentally for the 2017 forage production season, and the results were shared through the Natural Resources Conservation Service and USDA offices in the northern Plains.

### RIO GRANDE WORKSHOPS

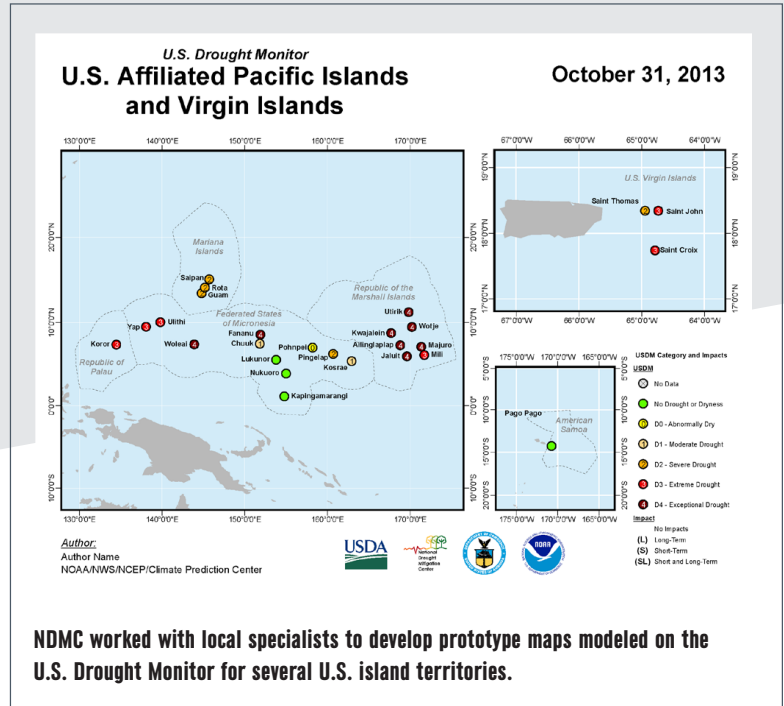
Through collaborations with the Southwest and Southern Plains climate hubs in 2017, the NDMC organized six La Nina Outlook forums and other topical workshops

for producers and stakeholders in New Mexico and Texas and co-hosted a meeting for ranchers at the Agricultural Research Service Center in Colorado.

### MIDWEST SPECIALTY CROPS

A partnership between the NDMC and the Midwest Climate Hub is working to help producers of specialty crops in Michigan, Ohio, Indiana, Wisconsin, Illinois, Iowa, Missouri, and Minnesota identify and report how changes in weather and climate conditions are affecting crop health, growth and productivity. NDMC developed a survey of producers' weather observations, climate-related concerns and information needs that was presented at regional field days and other events, and made available online. The survey results are being used by NDMC and the MCH to develop resources that meet the unique drought monitoring and planning needs of specialty-crop producers in the MCH service region.

# OUTREACH & WORKSHOPS



**NDMC worked with local specialists to develop prototype maps modeled on the U.S. Drought Monitor for several U.S. island territories.**

The NDMC and USDA also have convened gatherings on special topics where experts discuss their work with a larger audience of concerned stakeholders, industry professionals and other colleagues.

## U.S. VIRGIN ISLANDS DROUGHT MONITOR WORKSHOP AND PROTOTYPE MAP

In 2016, the NDMC began to investigate expanding the weekly drought monitor to include the U.S. Virgin Islands. The center led forums in the U.S. Virgin Islands and Puerto Rico to educate local stakeholders on the drought monitor process and to identify data that could be used to generate the weekly assessment. Using input from USVI partners, the NDMC developed map prototypes, based on the model of the drought center’s work with the U.S. Affiliated Pacific Islands.

## WORKSHOP ON THE IMPLICATIONS OF A CHANGING ARCTIC ON WATER RESOURCES AND AGRICULTURE IN THE CENTRAL U.S.

[go.unl.edu/arcticclimateworkshop](http://go.unl.edu/arcticclimateworkshop)

In response to debate among scientists and policymakers on the implications of climatic changes in the Arctic on mid-latitude weather and climate events, the NDMC and University of Nebraska-Lincoln collaborated with the USDA, NOAA’s National Integrated Drought System, the Department of State, the Daugherty Water for Food Institute and other UNL entities to sponsor “Implications of a Changing Arctic on Water Resources and Agriculture in the Central U.S.” The November 2015 workshop provided a framework for future research, planning decisions, and the identification of possible adaptation and mitigation measures in response to changing climate on the Great Plains

and Midwestern regions of the United States. The workshop report, videos from presentations and associated workshop materials are available at the Arctic Climate Workshop webpage.

The final workshop report contains speaker abstracts and breakout session summaries on potential adaptation and mitigation strategies in response to climate change for the agriculture and water sectors.

This three-day workshop set the stage for follow-up sessions in April 2017 on market-based approaches to drought management.

## WATER MARKETS

[go.unl.edu/wficonference](http://go.unl.edu/wficonference)

To address the need for more efficient management of limited water resources, NDMC and the USDA partnered with the Water for Food Global Institute at University of Nebraska to sponsor three sessions on water markets at the April 2017 Water for Food Security conference. The NDMC sessions on water markets, water market frontiers and water governance engaged key stakeholder groups to explore market-based approaches to managing competing demands for water. Discussions centered on drought risk, regulatory and financial frameworks, informal and formal water market structures currently in practice around the world, and research currently being done on existing water markets and similar markets such as those for carbon.



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