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Summer 2018

## DroughtScape- 2018 Summer

National Drought Mitigation Center

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SUMMER2018

# DROUGHTSCAPE

QUARTERLY NEWSLETTER

## FEATURE

STUDY REVEALS BREADTH OF  
USDM'S OBSERVER NETWORK

## AROUND THE WORLD

DEVELOPING ASSESSMENT DATA  
FOR MENA DROUGHT

## AROUND THE COUNTRY

SHARING USDM TOOLS FOR DROUGHT18

## ON THE HORIZON

NEW MOU FOR NDMC AND K-WATER



NATIONAL DROUGHT MITIGATION CENTER  
UNIVERSITY OF NEBRASKA

*Drought Science. Planning Sense.*



## About the cover photo

Rain on the horizon south of Anton, Texas on 7/16/2018. Photographer Tim Benson wrote that he "ran into quite a storm" shortly after getting the photo. "It's been that way for a couple months now. We'll have spotty storms drop a half to an inch of precipitation here and there, but no large storm cells over any sizeable area."

Photo by Tim Benson

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### ON THE WEB

drought.unl.edu

### CONTACT US

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## From the director

Summer is in full swing and with it comes the usual uptick in temperature, drought and related impacts. Indeed, hot temperatures have been the story of late, coupled with the active fire season. Speaking of temperatures and drought, a new "Temperature and Drought" assessment has just hit the streets and internet from NOAA's Modeling, Analysis, Predictions and Projections Drought Task Force 2 (2014-17), the latter of which I had the pleasure of co-chairing. You can find that report here:



**Mark  
Svoboda**

[https://cpo.noaa.gov/Portals/0/Docs/MAPP/Reports/2018/TemperatureDrought/Drought\\_TF\\_Temp\\_Drought\\_Final\\_Revised.pdf](https://cpo.noaa.gov/Portals/0/Docs/MAPP/Reports/2018/TemperatureDrought/Drought_TF_Temp_Drought_Final_Revised.pdf). Speaking of fire, you will find a timely article in this edition on page 5.

In this edition, I hope you will check out where we've been and what we're doing globally (pp. 12-14, 16). We have active projects underway in India, North Africa, and the Middle East. Also on the international front, there seems to be a focus on drought risk management with efforts underway through collaborations with the Integrated Drought Management Programme (IDMP), the UNCCD Science-Policy Interface and the UN-FAO led Global Framework for Water Scarcity in Agriculture (WASAG). These efforts are a true testament to the core mission of the NDMC and the ideals of the 10-step drought planning process as laid out by our founding director, Dr. Don Wilhite. It has been quite a journey over the past 20-plus years.

Closer to home, initial findings from our survey of the U.S. Drought Monitor (USDM) listserv network are shared on page 10. As we suspected, the roots run deep, much deeper than just the approximately 450 people directly subscribing to the listserv. As I've maintained since day one of the USDM back in 1999, this built-in validation network is truly a unique strength of the USDM, one that no other product like it around the world has. I would personally like to thank all of you who make this USDM "process" happen and yes, there is room for more!

Finally, for the many of you who have reached out to me and the team in regard to our new NDMC web portal look and feel, thanks. Feedback from many of you drove this process and resultant changes so I am pleased you like what you see! For those of you who haven't had a chance to give it a browse, please do check it out today at: <http://drought.unl.edu>. Let us know what you think.

Please check back with us this fall for the latest NDMC happenings via DroughtScape.

Cheers,

A handwritten signature in blue ink that reads "Mark Svoboda".

## SECOND QUARTER SUMMARY: APRIL TO JUNE 2018

## Drought expands and intensifies in the west and south

BY CLAIRE SCHIRLE

NATIONAL DROUGHT MITIGATION  
CENTER CLIMATOLOGIST

Drought classifications are based on the U.S. Drought Monitor. Details on the extent and severity of drought are online: [droughtmonitor.unl.edu](http://droughtmonitor.unl.edu)

The outlook integrates existing conditions with forecasts from the National Oceanic and Atmospheric Administration's Climate Prediction Center: [www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov)

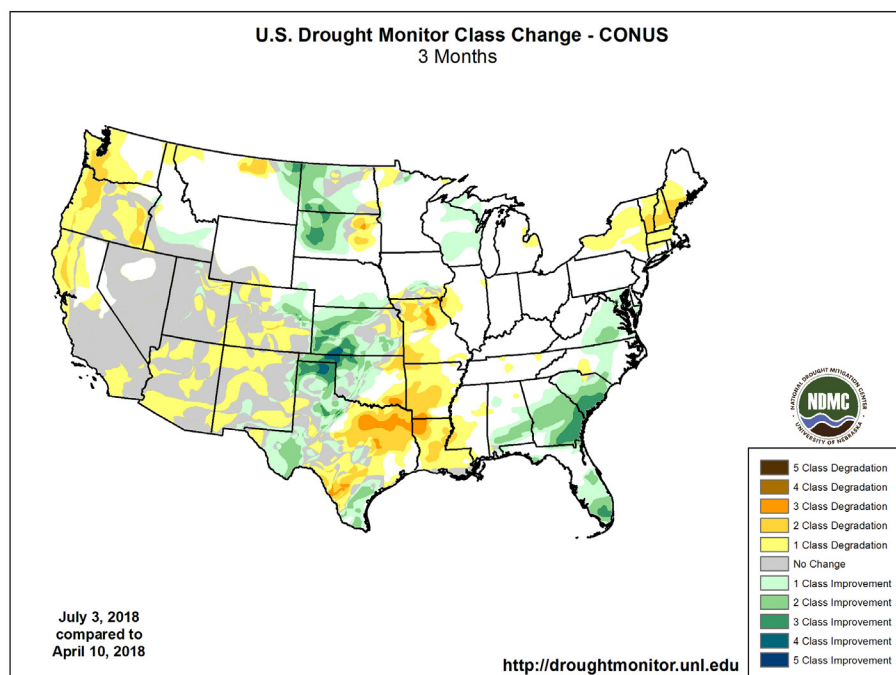
### National Summary

The majority of the United States observed above-average temperatures for the three-month period, with the largest temperature anomalies occurring in the western U.S., Texas and Colorado, where temperatures were 3 to 5 degrees above normal. The exceptions to the warm temperatures were in the northern tier of the U.S. from Montana eastward and Nebraska northward, and in portions of the South and Southeast. In these regions, temperatures were near normal or 1 to 3 degrees below normal. Precipitation amounts varied across the country, with the Southwest having the lowest percent of normal precipitation, generally between 5 and 70 percent of normal, and the Southeast having the largest precipitation surplus, between 130 and 200 percent of normal.

### Drought

The nationwide coverage of drought remained nearly constant at about 25 percent throughout the late spring and early summer, but the existing area of exceptional drought in the Oklahoma Panhandle shifted westward into the Four Corners region by the end of June. Drought developed and expanded in the Northeast and Pacific Northwest, and

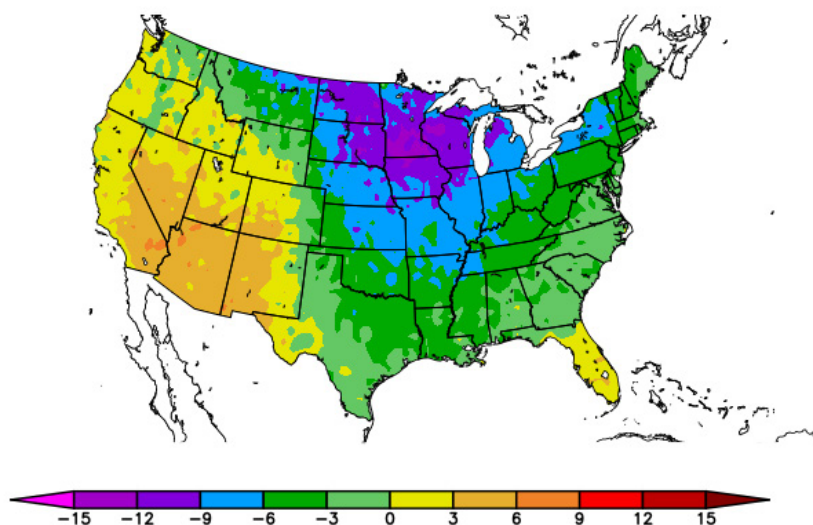
Continued on page 4



### National Drought Mitigation Center

*Drought expansion and intensification in parts of the West, South and Northeast and drought removal in the Southeast and western Kansas and Oklahoma.*

### Departure from Normal Temperature (F) 4/1/2018 - 4/30/2018



Generated 5/20/2018 at HPRCC using provisional data.

NOAA Regional Climate Centers

### High Plains Regional Climate Center

*Very cold temperatures compared to normal in the High Plains and Midwest during the month of April.*



Continued from page 3

in Missouri, Arkansas, Louisiana and eastern Texas. In contrast, drought was eliminated in the Southeast and the western Dakotas and alleviated in western Oklahoma and Kansas thanks to precipitation amounts that were 110 to 200 percent of normal.

The West had a 5.11 percent increase in drought coverage between April and June, from 43.02 percent to 48.13 percent, as well as the development of exceptional drought over the Four Corners. In the South, moderate drought coverage increased by 10.46 percent, while in the Southeast, drought coverage was dramatically reduced from 26.31 percent to none. The number of people affected by drought rose from approximately 60.1 million people at the beginning of April to about 66.5 million people at the end of the quarter and the population in exceptional drought increased from approximately 125,000 to 1.1 million people.

### Precipitation

During the late spring and early summer, precipitation was below average or much below average in the Four Corners region, Southern

California, and portions of the southern Plains and South. Precipitation in the Southeast, and in portions of the High Plains and Midwest, ranged from above average to much above average. Northern Virginia saw record-breaking precipitation, with

precipitation totals around 400 percent of normal for May and June.

### Temperature

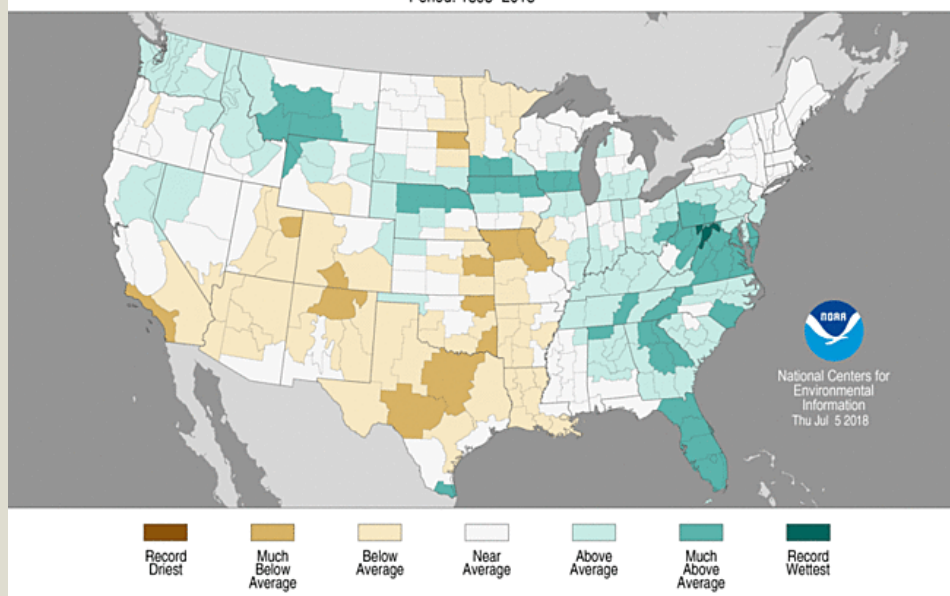
In April, the eastern two-thirds of the country was primarily cooler than normal. A large portion of the High Plains and Midwest was much colder than normal, with temperatures generally between 6 and 15 degrees below normal. Wisconsin and Iowa saw their coldest Aprils on record. Meanwhile, states in the West generally saw warmer than normal temperatures, mainly between 3 and 6 degrees above normal.

The pattern dramatically shifted in May. States in the eastern part of the country, including the Midwest and High Plains, saw record-breaking warmth with temperatures 8 to 10 degrees above normal, while the West saw temperatures within 2 degrees of

### Divisional Precipitation Ranks

April–June 2018

Period: 1895–2018



### National Oceanic and Atmospheric Administration

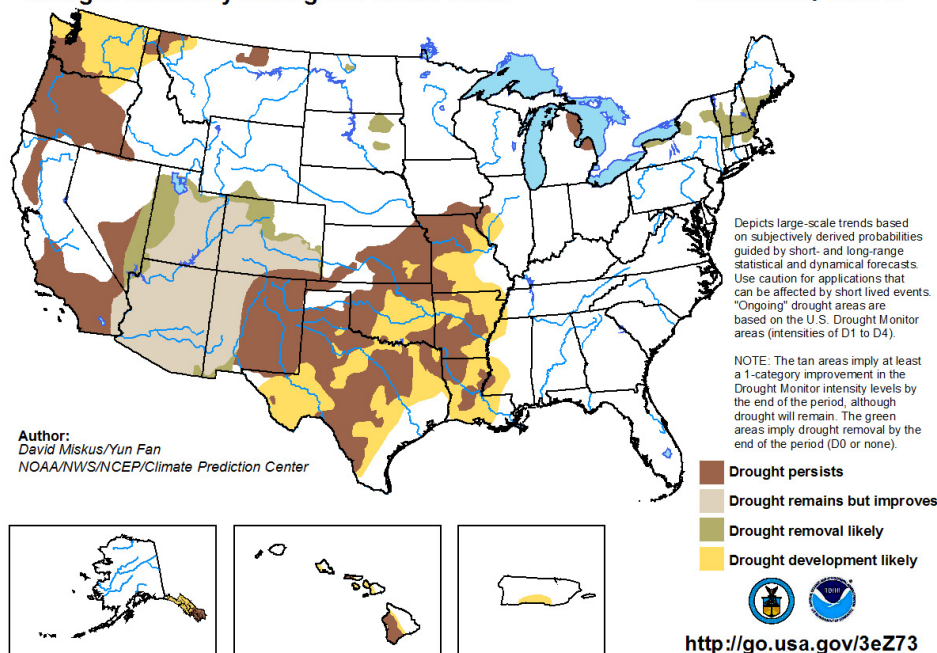
*Precipitation was generally above average or much above average in the Midwest and Southeast and below average or much below average in parts of the West and South.*

### U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for July 19 - October 31, 2018

Released July 19, 2018



### National Weather Service Climate Prediction Center

*Drought improvement and removal is expected in the Four Corners region and Northeast, while drought is expected to persist and expand in the southern Plains, South, and Pacific Northwest.*

Continued on page 5



### MONTHLY DROUGHT AND IMPACT SUMMARIES

For a more detailed review of conditions, please visit

[drought.unl.edu/newsoutreach/monthlysummary.aspx](http://drought.unl.edu/newsoutreach/monthlysummary.aspx)

Continued from page 4

normal. Temperatures in June were 2 to 6 degrees warmer than normal for the majority of the country, excluding small portions of the West and the Northeast, where temperatures were 0 to 4 degrees below normal.

## Outlook

The current seasonal drought

outlook through the end of October shows drought improvement in the majority of the Four Corners region, with removal likely in northern and western Utah, northern Colorado, and small portions of southern Arizona and New Mexico. This is mainly attributed to the anticipation of an active monsoon season. Drought removal is also likely in portions of

the Northeast and Dakotas. The area of drought in the southern Plains and South is expected to persist and expand into the currently drought-free areas of Texas, Oklahoma, Missouri, Arkansas and Louisiana. Drought is also expected to persist in California and Oregon and develop throughout the state of Washington.

## IMPACT SUMMARY: APRIL TO JUNE 2018

# Drought dry down fuels fires in west

BY DENISE GUTZMER

NATIONAL DROUGHT MITIGATION  
CENTER DROUGHT IMPACT SPECIALIST

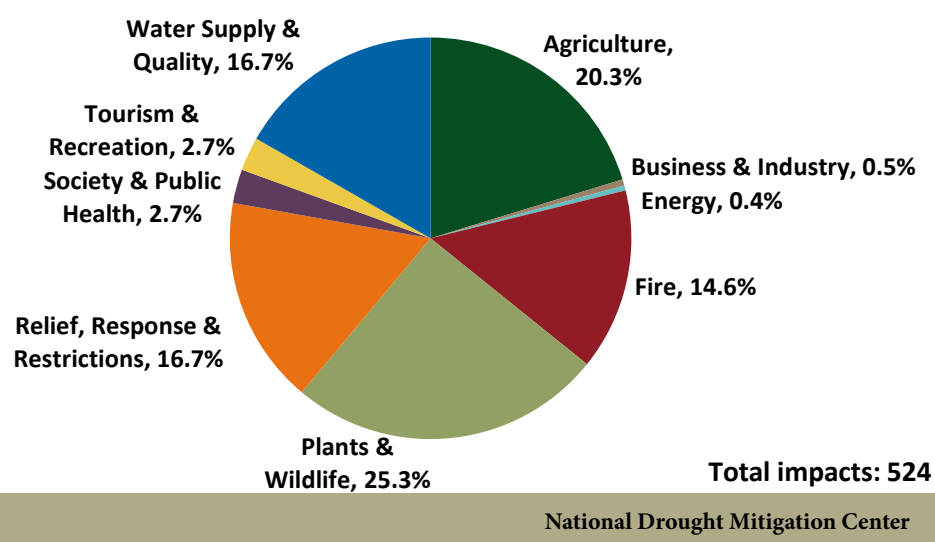
The relatively dry winter set the Southwest up for a challenging summer, with drought intensifying, drying the landscape and increasing the fire danger. Water supplies from snowmelt were low, leaving the entire Colorado Basin on the dry side as inflow to its reservoirs neared extreme lows.

The NDMC added 524 impacts to the Drought Impact Reporter during the second quarter of 2018, with 224 of those impacts coming from the Community Collaborative Rain, Hail and Snow (CoCoRaHS) network as observers documented changes in their backyards. The state with the most impacts was Texas with 123, while Colorado and New Mexico followed with 97 and 82 impacts, respectively. Most of the Texas impacts were about agriculture, plants and wildlife, while Colorado and New Mexico dealt with more fire restrictions in addition to impacts to plants and wildlife.

## Texas agriculture

The drought areas of the Lone Star State shifted during spring and early summer, with the western regions affected early on, and parts of northern and eastern Texas seeing drought as summer arrived. Livestock sales picked up in parts of the Panhandle and South Plains because of poor rangeland and pasture conditions. Toward the end of June, hay yields were low in many parts of the state and hay supplies were low.

Impacts in the Drought Impact Reporter, April - June 2018



CoCoRaHS observers noted many instances of stressed vegetation turning brown for lack of rain.

["Texas Crop and Weather Report – June 5, 2018," by Adam Russell, The Bryan-College Station Eagle \(Texas\), June 5, 2018](#)

["Texas Crop and Weather Report," Texas A&M AgriLife \(College Station, Texas\), June 26, 2018](#)

## Water, fire issues gripping the Southwest

### Low snowpack in Colorado led to poor runoff

Thin snowpacks in the mountains left rivers and streams flowing lower than usual, with peak flows coming earlier and lower than normal. Mountain snowpack was 66 percent of normal on April 5, and stream flows were forecast to be half of normal. The flow of the Colorado River peaked weeks early just before

mid-May and lower than normal in Colorado at the Utah state line. The flow was about 8,500 cubic feet per second, ranking in the five lowest flows in 85 years of record. With river flows being so low, water restrictions were widespread in the southern part of the state.

["Mountain snowpack shrinks to 66 percent of normal, feds sound drought alarm," by Bruce Finley, The Denver Post, April 5, 2018](#)

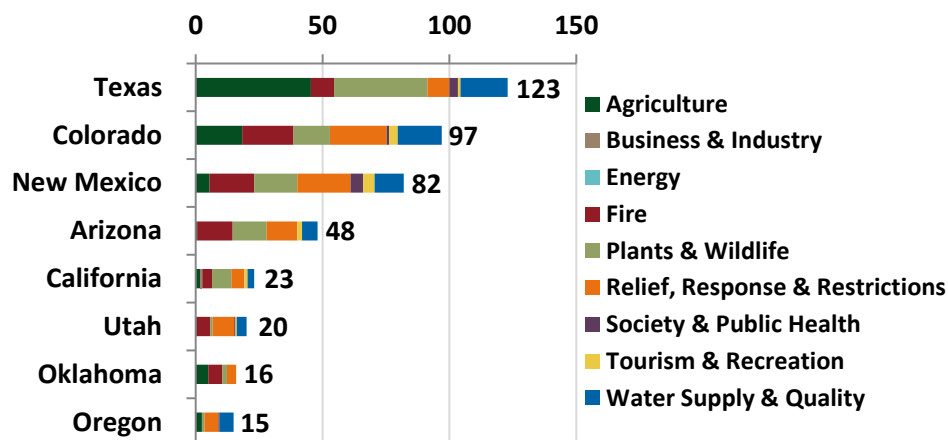
["River's peak more of a bump," by Gary Harmon, The Grand Junction Daily Sentinel \(Colo.\), May 12, 2018](#)

Agricultural impacts and water shortages were worse in southern Colorado. Livestock producers were hauling water for livestock and running out of forage, with some producers opting to sell cattle, according to

Continued on page 6



## Impacts in the Drought Impact Reporter, April - June 2018



National Drought Mitigation Center

user and CoCoRaHS observers. Cattle liquidation was underway in southeastern Colorado also.

“... Area ranchers are starting to destock. Feed is getting harder to find locally. Desperation point has been reached.”

CoCoRaHS Report from Station #Ordway 1.3 E on 6/25/2018 from Crowley County, Colorado

### Colorado wildfires

With the fire danger and the heat of summer ramping up, many fires broke out and charred thousands of acres as numerous counties adopted fire restrictions. The 416 wildfire northeast of Durango began on June 1, burned more than 51,000 acres and was 37 percent contained a month later on July 2. The heightened fire danger led officials to close the San Juan National Forest on June 12 until rains from Hurricane Bud brought enough moisture to lower the fire danger, allowing the forest to reopen on June 21.

Another wildfire, the Spring Creek fire, began on June 27 and quickly grew to become the third largest fire in Colorado's history.

[“San Juan National Forest to close Tuesday because of fire danger,” The Associated Press, Fort Collins Coloradoan \(Colo.\), June 11, 2018](#)

[“San Juan National Forest near Durango reopens as officials urge caution amid dry conditions,” by The Associated Press, Fort Collins Coloradoan \(Colo.\), June 21, 2018](#)

[416 fire on InciWeb](#)

[Spring Creek fire on InciWeb](#)

[“Colorado wildfire update: Spring Creek fire set to become 2nd largest in state history,” by Kieran Nicholson, The Denver Post, July 9, 2018](#)

### New Mexico

Much of the Southwest was dealing with the same issues that were plaguing Colorado—fire and firework restrictions, forest closures, wildfires and water shortages. Water supplies were alarmingly short in New Mexico where the Rio Grande River and the Pecos River were running dry, posing enormous challenges for farmers and wildlife. Water levels in the Elephant Butte Reservoir and Caballo Reservoir fell low enough to trigger a Rio Grande Compact provision that prohibited the storage of additional water in upstream reservoirs. In eastern New Mexico, low water levels at a tiny fraction of normal, where water still flowed, prompted New Mexico Game & Fish to stock fewer fish on the Pecos River and take the remaining fish elsewhere.

[“NM drought worsening despite recent rainfall,” by Ollie Reed Jr., ABQJournal Online \(Albuquerque, N.M.\), May 25, 2018](#)

[“‘This is really bad’: Flows in Pecos River are tiny,” by T.S. Last, ABQJournal Online \(Albuquerque, N.M.\), May 18, 2018](#)

### Fire, fireworks restrictions in Arizona

Water supplies in Arizona were sorely lacking and the fire danger was high from the lack of rain, leading to a flurry of fire and fireworks restrictions. Even desert vegetation was suffering as numerous cities scrapped their fireworks display plans and prohibited the sale and use of fireworks. The drought was intense enough to warrant stricter fire restrictions across the state and the closure of several national forests, as occurred throughout the Southwest.

[“3 Arizona cities cancel 4th of July fireworks shows, citing fire danger,” by Nathan J. Fish, Arizona Republic, AZCentral.com & KPNX-TV NBC 12 Phoenix, June 25, 2018](#)

### Limited water supplies, fire restrictions in Utah

Drought conditions were worst in southeastern Utah, where limited water supplies led to water and fire restrictions. Plant growth was stunted and grasses did not turn green as usual in the spring, increasing the fire danger. The Forest Service in Moab prepositioned its firefighting resources in mid-June to be able to mount a quick response.

Fire restrictions on state-owned lands began on June 28 when Gov. Gary Herbert announced a ban on open fires and fireworks. He also urged caution with campfires and fireworks, given the hot, dry conditions. Firefighters were battling nine blazes across the state in late June.

[“La Sals: Record high fire vulnerability,” by Nathaniel Smith, The Moab Times Independent \(Utah\), June 14, 2018](#)

[“As Fire Season Ramps Up, Gov. Herbert Announces Fireworks Ban On State Lands,” by Nicole Nixon, KUER-FM 90.1 \(Salt Lake City\), June 28, 2018](#)

### DROUGHT IMPACT REPORTER



For more detailed reports, visit [droughtreporter.unl.edu](http://droughtreporter.unl.edu)

## Turn your tweets into science using #drought18

### WANTED:

*#drought18 tweets with photos and descriptions of drought where you live, work or play in the U.S.A.*

As dry weather set in across the Northern Plains in 2017, social media tweets were sometimes the first indication of water shortages. When drought intensified, farmers, ranchers and others began using #drought17 on Twitter along with descriptions and photos showing how drought was affecting their operations.

As 2018 arrived, the drought remained in some areas of the U.S., and only the hashtag number changed.

Seeing the potential in this unofficial citizen science network of drought observers, the National

Drought Mitigation Center decided to reach out to Twitter users, and ask for their help in gathering photos and descriptions about the 2018 drought in areas throughout the U.S. Photos and observations using #drought18 or related hashtags will be monitored by the Drought Center to compile information about the location, intensity and effects of drought across the country.

"I don't think we have even touched the surface of using social media to better inform us," said NDMC climatologist and U.S. Drought Monitor author Brian Fuchs. "This is something we can do more systematically and promote. We can give people an opportunity to relay information about drought conditions

in their area, and let them know we'll be looking for it."

The Drought Monitor is a widely used map that displays the location and extent of drought in areas across the United States. The color-coded drought designations on the map are based on measurable data, including precipitation, temperature, streamflow and snowpack, as well as observations of drought impacts gathered from a variety of sources. Climatologists and other drought observers across the country study both kinds of data for their region, and make recommendations to the member of their network who compiles or "authors" the map for that week.

Fuchs cautioned that more reports about drought impacts does not automatically translate into a change on the map, but, he said, as a U.S. Drought Monitor author, "It guides my eyes to where I should be looking deeper into the data."

Social media users interested in contributing descriptions or photos to #drought18 should make sure that the location in their user profile is up to date. They can also contribute to the #drought18 knowledge base by providing photos and observations about drought via the Submit A Report tab on the Drought Impact Reporter, or by becoming a CoCo-RaHS observer.

The National Drought Mitigation Center, based at the University of Nebraska-Lincoln, hosts and maintains the U.S. Drought Monitor website and associated data and works with individuals and communities to develop their preparedness for drought.

—NDMC Communications





## 2018 MOISST workshop

**BY SUZANNE PLASS**

NATIONAL DROUGHT MITIGATION  
CENTER COMMUNICATIONS SPECIALIST

If you're the state with the most irrigated acres in the country, you might have more than 9 million acres' worth of reasons for your state's university to host a workshop on development of a National Soil Moisture Network.

And you might have a few reasons more if your university were also home to the National Drought Mitigation Center, and the web host of the U.S. Drought Monitor.

Those reasons and others made the School of Natural Resources at the University of Nebraska-Lincoln a natural gathering place this past June for the annual meeting of the community of soil scientists, climatologists and spatial science researchers that developed around the Marena, Oklahoma In Situ Sensor Testbed, or MOISST.

"This is a tight community and the who's who of soil moisture were on hand at UNL to talk about what needs we have for this type of data," said Mark Svoboda, climatologist and NDMC director. "Soil moisture levels and drought go hand-in-hand, yet until recently there was very little in the way of data available. Now that these networks have become more established, we can begin to study the data, integrate them into our models and tools, and use the data to verify models and remotely sensed data." Initial presentations at the three-day event centered on the workshop theme "From Soil Moisture Observations to Actionable Decisions." Researchers from federal agencies, non-governmental organizations and universities shared their data on topics ranging from creating a crowd-sourced sensor to advances in satellite remote sensing. The final day of the workshop was devoted to development of a national soil monitoring network and included discussions about defining the priorities of the network, identifying the primary audience and customers among diverse user groups, and

determining the administrative entity for information produced by the network.

Svoboda was pleased with what the conference participants had accomplished during a few short days. "A clear outcome from this meeting was that there is a lot of great soil moisture related research and work being done across the country at a variety of scales," he said. "Now, the challenge is how do we best coordinate efforts and work toward standards in measuring, collecting and deriving applications and products that are usable by decision makers and the research community? An idea to establish an Executive Committee for a National Soil Moisture Network was born and in fact follow-on efforts have already spun up. All of these efforts will lead to better data and value added products, which will allow for a more accurate assessment of drought conditions via our early warning and monitoring efforts, including the U.S. Drought Monitor."

The gathering in Lincoln marked the eighth consecutive year that MOISST colleagues had met to share cutting-edge research and new concepts related to soil moisture monitoring. Additional goals for this year's conference, according to Trenton Franz, UNL hydrogeophysicist and conference organizer, were to highlight new applications of soil moisture data and identify application-oriented research needs, and to stimulate progress towards realizing the vision of the National Soil Moisture Network.

Climatologist and professor Steven Quiring of the Ohio State

Department of Geography said that the value of the meeting goes beyond debuting new research and products. "I look forward to these meetings," Quiring told the audience, "because they bring together collectors, keepers and users of the data."

The MOISST site was established in 2010 to allow testing and evaluation of new technologies for soil moisture monitoring. One project presented at this year's meeting originated in conversations during coffee breaks at a past MOISST workshop hosted by Oklahoma State University. "That's why we take long breaks," quipped Tyson Ochsner, soil physicist and coordinator of the workshops held at OSU.

The agenda and session recordings from the 2018 MOISST workshop are available on the SNR website.

<http://snr.unl.edu/research/projects/MOISST/MOISSTworkshop2018.aspx>



**National Drought Mitigation Center**  
*Christopher Neale, Simon van Donk and Wayne Woldt from the University of Nebraska-Lincoln at the MOISST workshop.*

## Scientists and natural resource managers share data on drought and best management practices



Courtesy of Tania Diaz Camacho, USDA Caribbean Climate Hub

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USDA CARIBBEAN CLIMATE HUB FOR  
TROPICAL FORESTRY AND AGRICULTURE

<https://caribbeanclimatehub.org/drought-workshop-2018/>

A recent workshop on drought impacts in Puerto Rico and the U.S. Virgin Islands focused on the state of the science, sector by sector.

Co-hosted by the USDA Caribbean Climate Hub, in collaboration with the USGS National Climate Adaptation Science Center (NCASC) and the regional Climate Adaptation Science Centers (CASCs), the two-day workshop, May 30-31, welcomed around 50 representatives from agriculture, natural resources, water supply sectors and multiple levels of government at the Botanical Garden of Río Piedras, Puerto Rico.

Workshop participants collaborated to:

1. Identify lessons learned from past drought effects, most recently 2015;
2. Highlight key similarities and differences in terms of impacts between the agricultural, ecosystem and water supply sectors;
3. Identify available data and information for drought monitoring and information gaps to support drought management; and
4. Discuss future drought scenarios and thresholds, and what projected future conditions will mean for managers.

The U.S. Caribbean Drought Workshop was a product of a network-wide initiative by the NCASC and CASCs that aimed to identify what we know about the impacts of drought on ecosystems across the U.S. and how managers can plan for these impacts and adapt to changing conditions. During the first workshops in the series, it became clear that islands such as Puerto Rico, the U.S. Virgin Islands, and the U.S. Affiliated Pacific Islands experience unique challenges related to drought.

To delve further into this topic, NCASC developed two workshops on island drought in 2018, one in Puerto Rico and one in Hawaii. The scope of these workshops covered the ecological impacts of drought and its impacts to agriculture, water supply and distribution, and other key sectors. The workshop brought together

regional drought experts to identify key threats, challenges, and management solutions related to drought.

An important outcome of the U.S. Caribbean drought workshop will be a series of drought-related factsheets specially tailored to the U.S. Caribbean region. The factsheets, currently in development, will summarize the regional impacts of drought on the agricultural, ecological and water supply sectors.

Another important outcome of the drought workshop series is that further steps were taken toward the inclusion of the U.S. Virgin Islands in the drought monitoring that is carried out by the United States Drought Monitor. The USDM currently produces weekly drought maps for the continental United States, Hawaii and Puerto Rico.



Courtesy of Tania Diaz Camacho, USDA Caribbean Climate Hub



# US Drought Monitor Data Gathering Network reaches throughout communities and across the nation

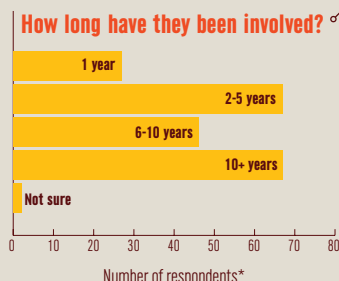
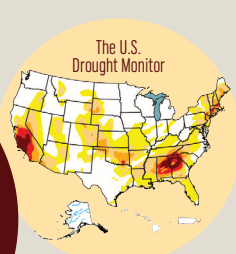
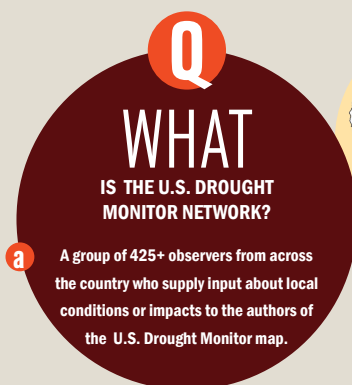
## THE U.S. DROUGHT MONITOR NETWORK

### IMPROVING DROUGHT EARLY WARNING

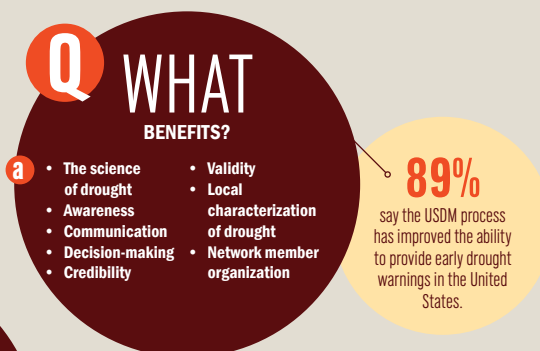
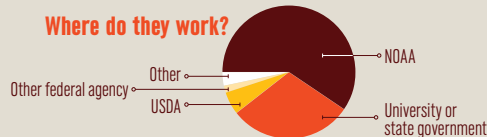
Based on a survey of the network by the National Drought Mitigation Center, with funding by the National Integrated Drought Information System.



NATIONAL DROUGHT  
MITIGATION CENTER  
UNIVERSITY OF NEBRASKA



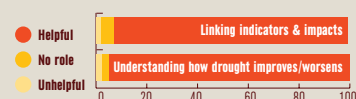
\*209 participated in this survey question



#### Benefits to the nation



#### Benefits to science



\* Each graphic reflects 100 percent of responses; not every participant answered every question.

#### Survey documents five-fold multiplier of extended US Drought Monitor network

One of the most intriguing and hard-to-duplicate aspects of the U.S. Drought Monitor is the network of observers across the country who contribute data and information each week to help identify the location and intensity of drought.

The U.S. Drought Monitor network includes about 450 members of a listserv who provide input about local conditions or impacts to the authors of the map. A 2017 survey of this network shed new light on their participation. The survey found that while some network members participate in the listserv but do not

contribute, over 60% of the network members have provided drought information, impacts, and feedback as weekly U.S. Drought Monitor Maps are being developed. And network members are almost certain to consult local stakeholders about conditions and impacts, significantly extending the effective network of observers.

"Going into this work, we knew we had built an extensive network over the past nearly 20 years, but even I didn't envision just how deep the tentacles go and how far the network reaches," said Mark Svoboda, director of the National Drought Mitigation Center at the University of Nebraska-Lincoln and one of the original authors of the U.S. Drought Monitor.

"That number of 450+ experts really reaches a much broader network, which serves as our eyes and ears on the ground."

The survey, administered by the NDMC with the support of the National Integrated Drought Information System, found that on average, each member of the primary network was in touch with five additional people or groups. Those groups often included decision-makers for local, state or federal agencies, the media, or trade organizations.

Most of the primary network participants are climatologists, meteorologists and hydrologists who

Continued on page 11

Continued from page 10

work with federal, state or academic organizations. Of the 209 network members who responded to the survey:

- 73% have been with their organization for 11 or more years.
- 89% said the map had significantly improved drought early warning in the U.S. They also said that the process improved their access to drought-related data and tools, and that discussions helped improve the nation's ability to identify flash drought and snow drought.
- 90 percent said the map made it easier to communicate about drought.
- 68 percent said it improved their organization's capacity to monitor drought.

The observer network provides credibility and authority to the U.S. Drought Monitor, even though people don't always agree on the depiction of drought.

"This is truly a unique aspect of the U.S. Drought Monitor process that essentially includes a built-in near real-time validation effort," said Svoboda. "That's something that just doesn't exist anywhere else in the world at this level. I see that as being a true strength of our transparent approach. It has enabled the product due to the trust factor and shared ownership with our network participants."

U.S. Drought Monitor authors, affiliated with the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration, and the NDMC, take turns creating the map. Each week, the designated author uses a convergence of evidence

approach to decide where to draw lines on the map, based on the best available data, their own expert judgment, and input from observers. Different sources of objective data don't always tell a consistent story, and it is the author's job to reconcile these differences, in collaboration with observers.

The map, a joint product of the USDA, NOAA and the NDMC, is online at <http://droughtmonitor.unl.edu>.

A two-page infographic just released by the NDMC describes the U.S. Drought Monitor network. The new resource can be found on the NDMC website at [http://droughtmonitor.unl.edu/data/docs/USDM\\_network.pdf](http://droughtmonitor.unl.edu/data/docs/USDM_network.pdf).

A full report on the 2017 survey of USDM network contributors is due to be released in late 2018.

—NDMC Communications

## THE U.S. DROUGHT MONITOR NETWORK IMPROVING DROUGHT EARLY WARNING

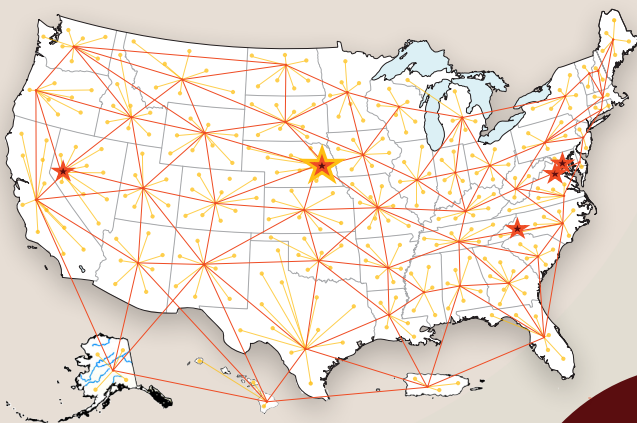
Based on a survey of the network by the National Drought Mitigation Center, with funding by the National Integrated Drought Information System.



### The network in action

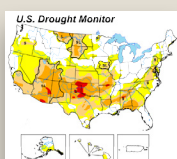
This is a conceptual illustration of how the network of 425+ observers gathers and reports climate information and impacts to authors of the U.S. Drought Monitor map and narrative each week. Observers are in all 50 states and Puerto Rico, a U.S. territory, and they use input from local stakeholders (represented by yellow dots) in their recommendations to the author.

✂ Network of observers   ● Stakeholders   ★ Author location   ★ USDM operational home



### The final product

The U.S. Drought Monitor map is released weekly and is available at: [droughtmonitor.unl.edu](http://droughtmonitor.unl.edu).



## HOW

### DOES IT WORK?

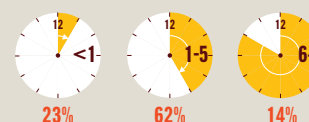
Observers get a working copy of the week's drought map with proposed category changes based on drought indicators by Monday of each week. They provide feedback on its accuracy, and their suggestions are reviewed and if verified are incorporated into the finalized map, released on Thursdays.

Do observers consult stakeholders about conditions?



How many hours do observers spend gathering local input?

When area is experiencing severe or worse drought



Want to know more? Email [droughtmonitor@unl.edu](mailto:droughtmonitor@unl.edu).

## WHO

### CREATES THE MAP?

Authors are from the National Drought Mitigation Center, U.S. Department of Agriculture, National Oceanic and Atmospheric Administration, National Centers for Environmental Information, Western Regional Climate Center, and Climate Prediction Center.



## National progress with regional benefits

*MENA project homing in on goal of regional drought management system*

Jordan, Lebanon, Morocco and Tunisia are nearing the finish line of a project to develop drought monitoring and management systems for their respective homelands in the Middle East and North Africa, with assistance from the National Drought Mitigation Center and USAID.

NDMC staff began working with the MENA-Regional Drought Management System development project team in 2016 to assess regional drought monitoring and management needs and gaps, and to develop a regional Composite Drought Index monitoring tool. In the second stage of the project each country began assessments of their national resources for drought monitoring and management.

In the current and final phase of the project, partners and stakeholders from the four participating countries are utilizing assessment results to develop drought risk management plans for their area. They met in late June at the International Center for Biosaline Agriculture in Dubai to review each team's progress on validating the CDI, and to discuss how vulnerability and impact assessment results could be used in policy and planning development for each country.

Mike Hayes, applied climatologist and professor at the University of Nebraska-Lincoln and former NDMC director, moderated a session on drought monitoring at the Dubai workshop. "I was impressed with how enthusiastic each of the four nations were in thinking about both the monitoring and assessment components," Hayes said. "Each country has put together a really good team. Even though the team members may be from different agencies, they are focused on a common goal."



**National Drought Mitigation Center**  
*Cody Knutson, NDMC (left), meets with Abbas Fayad, a member of the team Lebanon MENA-RDMS project team. Dr. Fayad gave presentations on the status of drought monitoring validation and vulnerability and impact assessment in Lebanon during the workshop.*

Cody Knutson, NDMC planning coordinator, has been one of the NDMC investigators on the project. He said that for vulnerability assessment work, the country teams now have more existing data available to quantify and evaluate the impacts of drought, and are at different stages of the assessment process. "In addition," said Knutson, "they all have unique characteristics and internal and external pressures that make their drought vulnerabilities a dynamic issue to evaluate and address. Nonetheless, the teams are making good progress and have plans for completing the work by early fall."

Knutson was also impressed with the dedication and productivity of the teams, and with the ingenuity each team showed in applying NDMC tools to their country's unique variables related to drought.

"For example, in a training with some of the members of the consulting teams last year in Dubai, I provided a series of steps that are usually taken when conducting a vulnerability assessment," said Knutson. "It was interesting to see the consultants using the same concepts as a basis, but carrying out the work using their own preferred methods,

each in different way. It's always interesting and educational for me to learn how our concepts are carried out in practice. It'll be interesting to do a better comparative analysis of the teams but that may be a little further down the road."

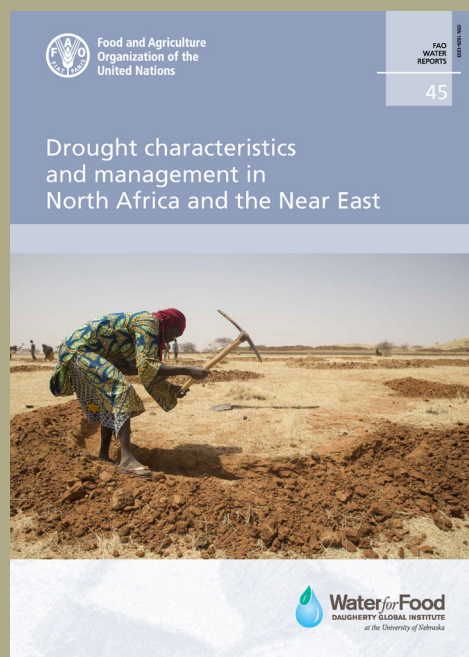
For now, what lies down the road is a meeting this September where policymakers from the four nations will join the consultants from each nation. The consultants will give final reports on their progress in hopes of setting the stage for the next project.

—NDMC Communications

*In addition to NDMC, USAID and ICBA, partners on the MENA-RDMS project include the Center for Advanced Land Management Information Technologies at the University of Nebraska-Lincoln and the Robert B. Daugherty Water for Food Global Institute at the University of Nebraska.*

*Continued on page 13*

## Report released on drought management in North Africa and Near East



Just ahead of *World Day to Combat Desertification* last month, the Food and Agriculture Organization of the United Nations published **Drought characteristics and management in North Africa and the Near East**, one of a series of regional drought studies commissioned by the FAO.

As noted in the report, even water-scarce regions of the world are not immune from drought, and those who live there can benefit from planning for water scarcity, whether that scarcity is due to lack of precipitation or growing demand.

The report is based upon a study conducted by the Robert B. Daugherty Water for Food Institute of the University of Nebraska-Lincoln. Cody Knutson of NDMC on behalf of Water for Food served as an advisor to the report authors.

**Drought characteristics and management in North Africa and the Near East** is available free online.

<https://www.unccd.int/news-events/2018-world-day-combat-desertification-2018wdcd>

In June representatives of the National Water Agency of Brazil (ANA) visited the NDMC to study development and administration of a national drought monitoring system. ANA works with Brazilian states to monitor rivers throughout the country, and to prevent disasters related to flooding or drought.

Their visit to NDMC was hosted by Mark Svoboda, and coordinated by their U.S. host Kevin Grode, of the Omaha, Nebraska office of the U.S. Army Corps of Engineers. The group was photographed during a coffee break stroll through the Maxwell Arboretum on the east campus of the University of Nebraska–Lincoln.

## National Water Agency of Brazil visits NDMC

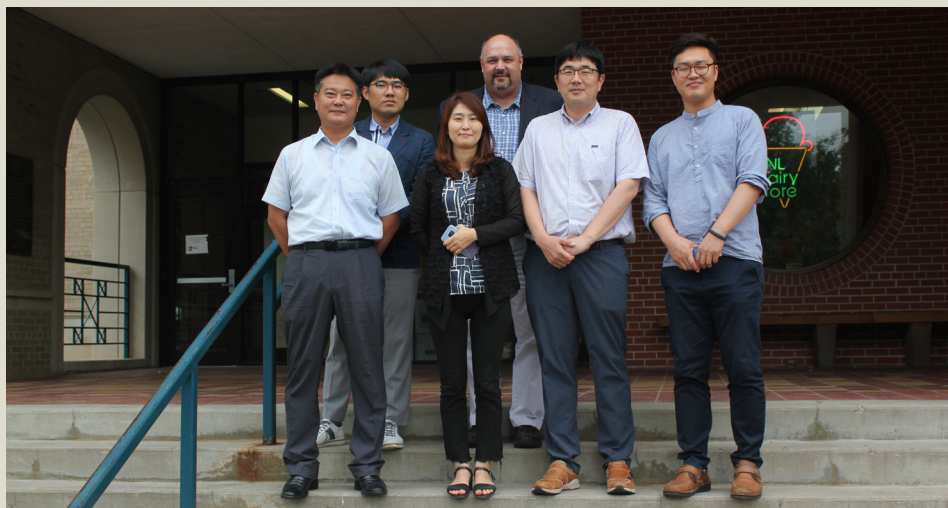


National Drought Mitigation Center

*Pictured from left to right, Antonio Lima, Flávio Troger, Bruna Mendonça representatives of ANA-Brasil; Mark Svoboda, NDMC, and Kevin Grode, USACE.*



## Korean delegations from two agencies attend NDMC Drought Risk Management System Overview workshop



**National Drought Mitigation Center**

*From left to right: Jae-Chan Ahn, National Disaster Management Research Institute (NDMI), Hyeon-Cheol Yoon, NDMI, Hye-Young Kang, Korea Meteorological Administration (KMA), Mark Svoboda, NDMC, Tae-Suk Oh (KMA) and Yong-Seok Gwak (NDMI).*

The National Drought Mitigation Center hosted a Drought Risk Management System Overview workshop for delegations from the Korean Meteorological Administration and the National Disaster Management Research Institute of Korea.

In addition to exchanging information on services and needs related to drought management in both countries, the Korean delegations got hands-on experience managing water resources across sectors during drought while playing NDMC's Water Budget Game.



**National Drought Mitigation Center**

*Visitors from Korea and NDMC staff negotiate for water allotments by sector during drought while playing a water budget game.*





## Des Moines climate hub workshop orients users to latest USDM applications for drought 2018

BY SUZANNE PLASS

NATIONAL DROUGHT MITIGATION  
CENTER COMMUNICATIONS SPECIALIST

When temperatures rise, precipitation dwindles, and moisture in soil and vegetation dissipates, eyes turn toward the U.S. Drought Monitor as a tool to gauge the severity of water scarcity.

To reach the increasing numbers of new USDM users and long-time users interested in new drought tools, climatologists Brian Fuchs and Deb Bathke from the National Drought Mitigation Center, staff from U.S. Department of Agriculture Climate Hubs and other agencies that serve ag producers gathered near Des Moines, Iowa, in June to exchange information about monitoring tools available online through the USDM and share the latest climate stats and outlooks. The Des Moines event was one in a series of outreach workshops Fuchs and other NDMC staff have coordinated with agencies serving ag producers in the central Plains and Southwest who have been affected by drought in 2018.

At the Des Moines workshop Fuchs and Bathke gave presentations on how the USDM methodology for depicting drought developed, and continues to evolve as NDMC researches new ways of synthesizing, analyzing and displaying drought data. Fuchs also provided an overview of the drought impact tools



**National Drought Mitigation Center**  
*Dennis Today, director of the USDA Midwest Regional Climate Hub, discussing the climate outlook for the Midwest region and what to expect for the rest of the summer during the Des Moines, IA Drought Workshop.*

produced by the NDMC, and Bathke demonstrated how to use the USDM's Livestock Forage Disaster Program Eligibility Tool.

The workshops serve a dual purpose of orienting users to the latest drought impact and monitoring resources available from NDMC and giving NDMC staff the opportunity to learn from state and local agencies how they use the USDM to serve their constituents.

Workshop participant Timothy Hall, a hydrology resources coordinator from the Iowa Department of

Natural Resources, told Bathke that the USDM is a great way for him to get conversations started with constituents about specific drought indicators that the drought monitor can only reflect in a broad way.

"With agencies responsible for drinking water availability," said Hall, "sometimes water utilities will ask about a USDM depiction. We'll help them look at their own static water levels in their wells or what their vulnerability is to drought conditions in their drinking water system."

"The USDM kind of raises the consciousness level of people as they think about drought and dryness, and sometimes it helps us to get them to investigate for themselves what is going on in their county," Hall said. "If the USDM isn't exactly the tool they need, it gives us a good inroad to get them to look at other information."

Presentations and documents from NDMC outreach events similar to the Des Moines workshop are available online in the [drought.unl.edu/Education/Outreach.aspx](http://drought.unl.edu/Education/Outreach.aspx) pages of drought.unl.edu.



**National Drought Mitigation Center**  
*A panel made up of FSA, NRCS, NIDIS, CPC and Extension personnel talk about their current responses to drought in the Midwest and the needs and resources they can provide regarding drought and the stakeholders they serve.*





### National Drought Mitigation Center

Holding the newly signed MOU documents are Mark Svoboda, NDMC director (center right), and Jae Young Park, director general of K-water's Water Information Department. Shown with them in the photo are some of the many K-water staff who contributed to the development of the MOU.

## NDMC and K-water make it official

A partnership between the National Drought Mitigation Center on behalf of the Board of Regents of the University of Nebraska-Lincoln and K-water, the national water management agency of South Korea,

was made official on June 1, 2018, in Dae-jeon, Korea, with the signing of a Memorandum of Understanding between the two institutions.

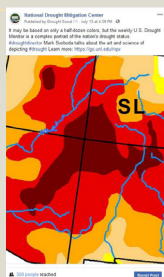
The signing ceremony came at the close of the 2018 International

Drought Forum, held in Dae-jeon. The MOU provides for exchanges of education and training between K-water and UNL, and exchanges of technology and information between NDMC and K-water's drought center.

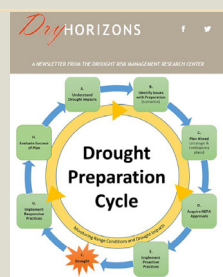
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