

DroughtScape

SPRING 2021

QUARTERLY NEWSLETTER

Drought blankets the West

Learn how drought impacts are rippling through the region

Guide for tailored planning

New NDMC interactive guide helps leaders choose best drought scenario exercises

CMOR-Drought

Learn how to submit condition reports and photos (like this one)



DROUGHT SCIENCE

PLANNING SENSE

About the cover

The base of this cholla cactus in La Paz County, Arizona, has been eaten by wildlife, a sign that drought has likely limited nutrient sources. Photo by Kevin Brown.

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From the Director



Mark Svoboda

The start of the 2021 spring in the western U.S. does not bode well for the remainder of the region's dry season. As the wet season in the West comes to a close, the U.S. Drought Monitor (USDM) has never seen this level (20.7%) of exceptional drought (D4) in its 21-year plus history. Attention and concern will also turn to the east as this drought could potentially push out of the West as the hotter summer months approach.

Think about all the ways in which a lack of water can manifest. In the Colorado River Basin, which is experiencing its worst drought in

recorded history, water levels at Lake Powell will be visibly lower this summer. Across much of the West, drought is expected to accelerate the start of the fire season, according to the National Interagency Fire Center. Looking at the Southwest (Arizona and New Mexico) maps of the Grass-Cast tool hosted by the NDMC (grasscast.unl.edu), even if above-normal precipitation fell between April 14 and May 31, much of the area will still produce well below-normal grassland than its 36-year average. You can read about many more recent drought impacts that have been collected by our resident drought impacts specialist, Denise Gutzmer (page 5).

At the NDMC, we want to help communities be better prepared for the range of events that unfold when droughts of this magnitude, or any magnitude for that matter, develop. This issue of DroughtScape features a look at one of our latest products that aids in that process (page 8). The Collaborative Drought Planning Using Scenario Exercises is an interactive guide designed to help planners decide what kind of event to host that will meet their needs and be most engaging to the participants. Whether you are ready to retool an existing drought plan, collaborate with stakeholders to find gaps in a plan or starting the planning process from scratch, our team has experience working with leaders around the country and world who have been in your boat. We've listened to what worked and didn't work for them, and we're putting all of this information in your hands so you can make the best decisions on your planning journey. The guide is helping our latest research assistant, University of Nebraska-Lincoln graduate student Andrew Mwape, as he works with the Nebraska Department of Natural Resources and stakeholders in four Republican River Basin Natural Resource Districts (page 10) to help evaluate current and potential water management practices. We like to keep it real by practicing what we preach at the NDMC!

The Spring 2021 DroughtScape cover image was picked from an ever-growing trove of images submitted via our Condition Monitoring Observer Reports database. The photographer, Kevin Brown, says to look at the stem of the cholla cactus "to see where critters have been eating." Please keep telling us and showing us how drought is affecting you where you live. You'll find info about a new CMOR fact sheet and video tutorial on page 13.

FIRST QUARTER OF 2021 CLIMATE SUMMARY

While drought coverage only slightly decreased, some states experienced first quarter extremes

By Crystal Stiles

Applied Climatologist
High Plains Regional Climate Center &
National Drought Mitigation Center

Drought classifications are based on the U.S. Drought Monitor. Details on the extent and severity of drought are online: droughtmonitor.unl.edu.

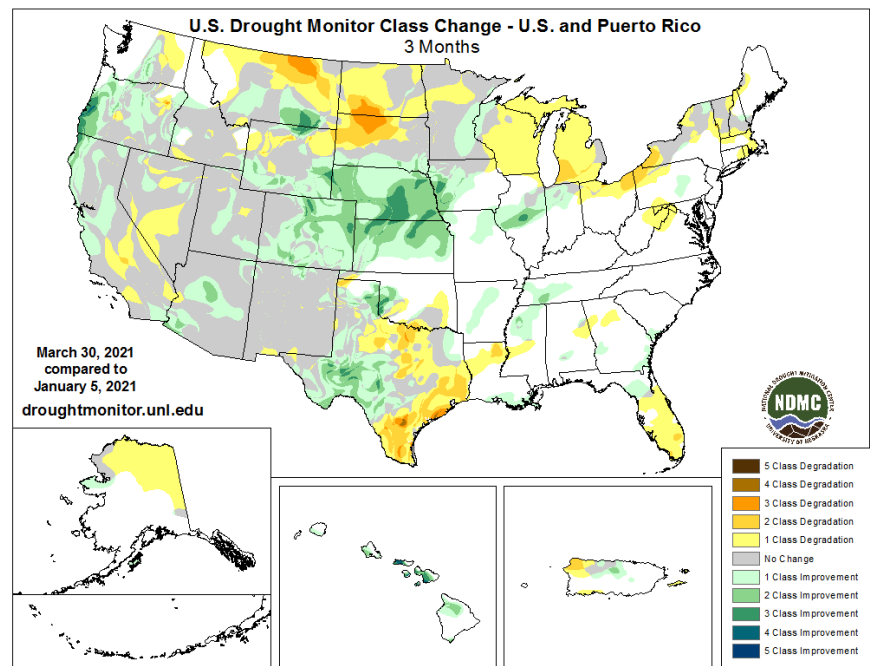
The outlook integrates existing conditions with forecasts from the National Oceanic and Atmospheric Administration's Climate Prediction Center: www.cpc.ncep.noaa.gov.

National Summary

The first quarter of 2021 was warm for the northern Plains and portions of the eastern U.S., while it was cooler throughout the central and southern Plains and much of the West. The majority of Alaska was cool, while temperatures varied across Hawaii and Puerto Rico. The central Plains, parts of the Midwest and the mid-Atlantic were wet while the northern Plains, the Lower 48 and the Northeast were dry. Precipitation varied across Alaska and Puerto Rico, but overall Hawaii was wet. Excessive wetness improved drought conditions in the central Plains, western Texas, along the West Coast and across Hawaii. However, continued dryness caused drought conditions to intensify across the northern Plains and northern and eastern Texas, while abnormal dryness developed in the Great Lakes, as well as across parts of Florida and northern Alaska.

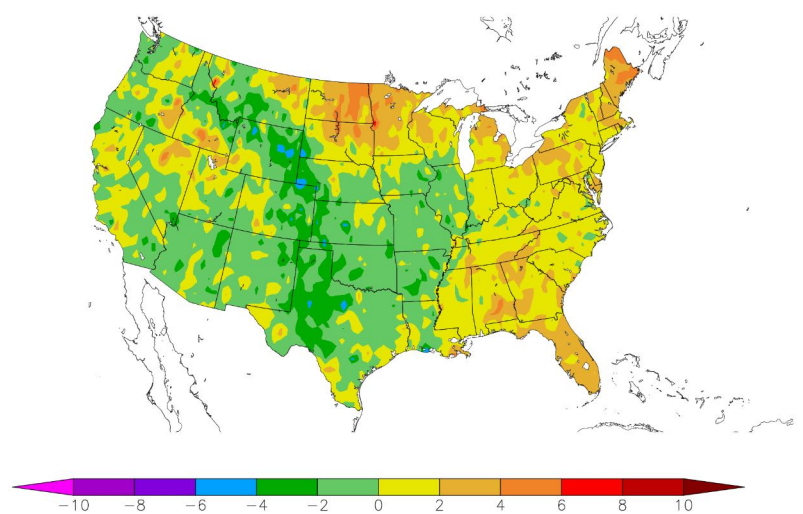
Drought

Overall, drought coverage decreased slightly during the January-March period for the U.S. and Puerto Rico. According to the March 30 U.S. Drought Monitor, almost 37% of the country was experiencing drought (D1-D4), which was a decrease of fewer than two percentage points since the beginning of January. A lack of snowfall in the northern Plains caused drought to expand and intensify, with extreme drought (D3) being introduced to



The greatest improvements in drought conditions occurred in the central Plains, portions of the southern Plains, along the West Coast and across Hawaii. Areas experiencing the greatest degradations in drought conditions included the northern Plains, northern and southern areas of Texas and parts of the Great Lakes region.

Departure from Normal Temperature (F) 1/1/2021 - 3/31/2021

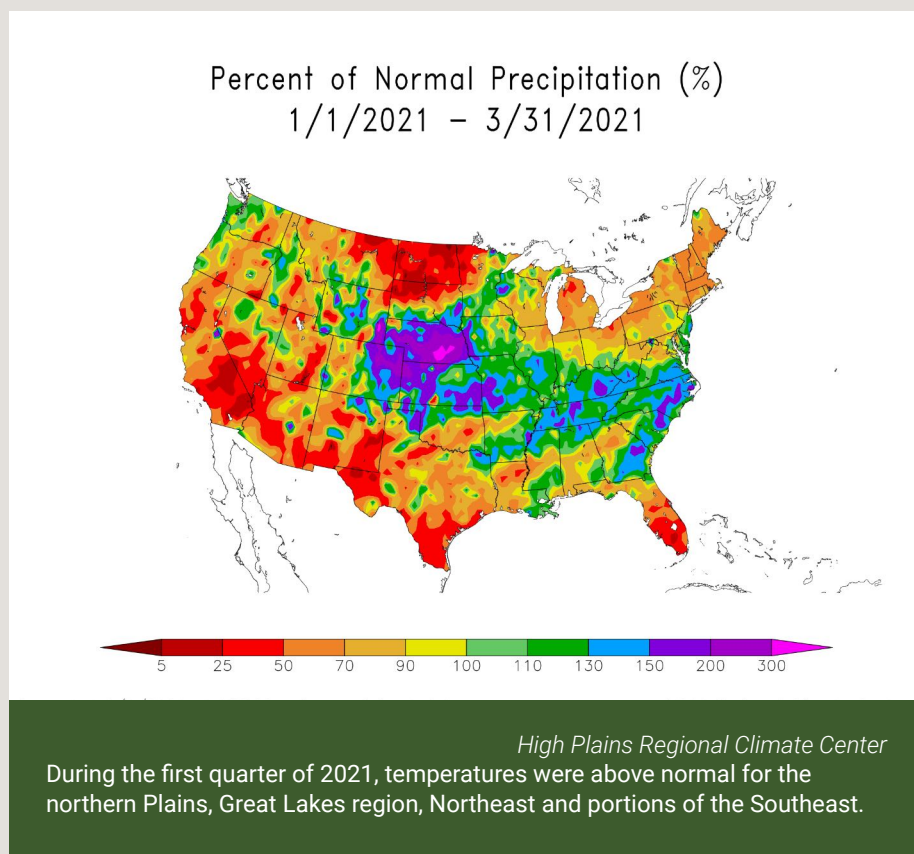


High Plains Regional Climate Center
January-March was wet throughout the central Plains, portions of the Midwest and the mid-Atlantic region. Meanwhile, dryness was present along the southern tier of the Lower 48, as well as across the West, the northern Plains and the Northeast.

the Dakotas and a small area of eastern Montana. Another area that experienced degradations was eastern and southern Texas, where drought intensified quickly during March due to mounting precipitation and soil moisture deficits. Areas that experienced developing abnormal dryness (D0) during this period included the Great Lakes region, the Florida Peninsula and northern Alaska. However, several areas had improvements in conditions from January-March. A series of heavy snow and rain events passed through the central Plains, bringing widespread improvements to Nebraska, Kansas and Colorado. Central and eastern areas of Nebraska and Kansas were free of drought and abnormal dryness by the end of March. Conditions also improved in western Texas, thanks to heavy precipitation in January. Conditions gradually improved throughout the period along the West Coast in Oregon and northern California with ample precipitation falling during January and February. Finally, conditions broadly improved across the Hawaiian Islands after heavy rainfall was received in March.

Precipitation

The central Plains, portions of the Midwest and the mid-Atlantic were wet during the January-March period, as precipitation ranged from 110%–300% of normal. Nebraska had its second-wettest January-March on record, and it was the eighth-wettest for Kansas. Elsewhere, this period was rather dry, especially in the northern Plains and across southern Florida and parts of the Southwest where precipitation was less than 50% of normal. For North Dakota, it was the driest January–March ever recorded. March was a month of extremes for precipitation in the Lower 48, as precipitation exceeded 300% of normal in portions of the central Plains while the northern Plains, the Pacific Northwest and much of the southern U.S. received no more than 25% of normal precipitation. While Nebraska had its second-wettest March and Kansas and Tennessee both had their



fourth-wettest March, it was the second-driest March ever recorded for Montana and North Dakota.

Temperature

The January-March period was quite warm for the northern Plains, the Northeast and portions of the Southeast, with temperature departures 2–6 degrees above normal. For Maine, it was the seventh-warmest January-March on record. Meanwhile, below-normal temperatures could be found throughout the central and southern Plains, with some areas experiencing departures of 2–6 degrees below normal. Elsewhere in the contiguous U.S., temperatures were near normal. However, average temperatures for this period masked the extremes that occurred. For instance, much of the Lower 48 had a warm January followed by a cold February. March was warm for the central and eastern states, while the West was cool.

Outlook

The Climate Prediction Center's Seasonal Drought Outlook indicates that drought is expected to persist

through June throughout much of the West, the northern and southern Plains and in Puerto Rico. Further drought development is likely in the West, including pockets of California, Arizona, Wyoming and Colorado. Drought is also expected to further develop throughout the central and southern Plains. Drought may also develop across a large portion of the Florida Peninsula. However, drought removal is likely in small pockets of the Pacific Northwest, the Midwest, the South, the Northeast and across Hawaii. ○

MONTHLY DROUGHT AND IMPACT SUMMARIES

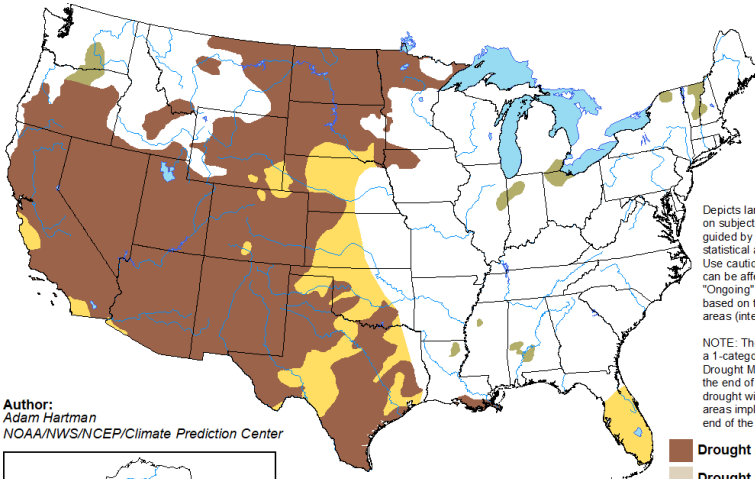
For a more detailed review of conditions, please visit:
drought.unl.edu/Publications/MonthlySummary.aspx

U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for March 18 - June 30, 2021
Released March 18

Drought is expected to persist in the West, portions of the Plains and in Puerto Rico, while further drought development is likely in additional areas of the West and the Plains as well as Florida. Drought is expected to be removed in areas of the Pacific Northwest, Midwest, South, Northeast and Hawaii.



Author:
Adam Hartman
NOAA/NWS/NCEP/Climate Prediction Center

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

- Drought persists
- Drought remains but improves
- Drought removal likely
- Drought development likely



<http://go.usa.gov/3eZ73>



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Drought continues in West, limiting water supplies in California

By Denise Gutzmer

NDMC Drought Impacts Specialist

The NDMC added 192 impacts in the first quarter of 2021 as the western U.S., the Dakotas and Texas remained in drought. Texas had 56 impacts, such as short hay supplies and struggling winter wheat. California had the second most, with 35 impacts, coming out of its second consecutive dry winter with reduced water supplies. Colorado, New Mexico and North Dakota followed with 26, 19 and 19 impacts listing agricultural and water concerns.

Texas grains struggling, hay supplies short

Western and southern Texas were dry during the first quarter of 2021, while drought developed in the central part of the state. Small grains struggled throughout much of

the state due to dry conditions, according to a U.S. Department of Agriculture report noted by [World-Grain.com](#). Hay supplies tightened in parts of Texas where drought persisted, as reported by [KLTV](#). Hay imports from Colorado, New Mexico and Oklahoma were limited compared to past years due to drought in those states.

A bitter cold spell mid-February increased the hay demand as producers fed more hay during the arctic temperatures. By March, hay supplies tightened further due to increased feeding and also due to producers stocking up in case drought persisted through the spring, according to [KLTV](#). Prices were firm to \$10 higher per ton in parts of the state. The scarcity of hay in the region led Texas producers to purchase hay from as far away as Montana, as reported by [Bloomberg Green](#).

Low snowpack in California, limited water supplies

California endured a second consecutive winter of low snowpack, diminishing water supplies for the state. Snowpack in the Sierra Nevada was 60% of normal snowpack for the date on March 31 with an average snow water equivalent of 16.9 inches. The Sierra snowpack typically supplies 30% of the state's water, but water supplies will clearly be short in 2021.

Near the end of March, the California State Water Board sent notices to 40,000 water users, including small farms and big cities, to alert them to prepare for cuts in water deliveries, the [San Francisco Chronicle reported](#). This is the first step before ordering an end to water draws.

California's state and federal water projects both made dire announcements about water deliveries on March 23 as the winter season brought scant precipitation, leaving water supplies short for the coming year. Water deliveries for the Central Valley Project, which were initially set at 5%, were delayed with no date set for water release. The State Water Project revealed a reduction in water allocation to 5%, down from the 10% initial allocation announced in December 2020.

Colorado snowpack low, agricultural difficulties

Snowpack was below normal in Colorado for much of the winter, raising concerns about water supplies across the state. A mid-March snow storm brought Colorado to 91% of its median snowpack for mid-March, but river basins west of the Continental Divide remained as low as 19% below normal, per [Colorado Public Radio](#). Streamflow forecasts were



Nearly 76% of North Dakota was experiencing extreme drought (D3) as of the April 20, 2021, U.S. Drought Monitor. Photo by Slope County, North Dakota, producer Kevin Thompson.

considerably reduced for endangered fish this year, according to the [Grand Junction Daily Sentinel](#). The Colorado Basin River Forecast Center predicted April-July water supplies just 60-85% of normal in parts of the basin. Given the low soil moisture since 2020 was the second-driest year in Colorado's recorded history, it was expected that the soil would absorb much of the moisture from this year's snowpack and reduce runoff.

The March moisture was very welcome in northeast Colorado, where livestock producers had been culling more than normal, as reported by the [Prowers Journal](#). The moisture also helped winter wheat in northeast and east central Colorado that was dying from drought, per [Kiowa County Press](#). The wheat began to green up, but development remained behind schedule. Emerging winter wheat in southeast Colorado was notably behind due to dry conditions, but also benefitted from recent snow and rain. Low irrigation supplies were a concern in the Southwest, and feed supplies were very short in the San Luis Valley.

Grim water shortages in New Mexico

Most of New Mexico was in exceptional drought during the first quarter of 2021 as winter storms failed to deliver much moisture, presenting problems for water supplies. Low flows on the Rio Grande River, low reservoirs and New Mexico owing water to Texas all meant poor water outlooks for farmers relying on the river for water. For irrigation districts on the Rio Grande River, the start to the season was delayed, deliveries were to be very low, and the seasons were to end early, per the [Las Cruces Sun News](#). Farmers will likely have to reduce crops or pump groundwater, which can damage some crops.

Livestock and crops were also in jeopardy. Ranchers were forced to provide supplemental feed for livestock, according to the [Associated Press](#). Hay supplies were limited and stock water sources were depleted, leading ranchers statewide to cull herds.

The wheat crop was suffering in several counties from lack of moisture.

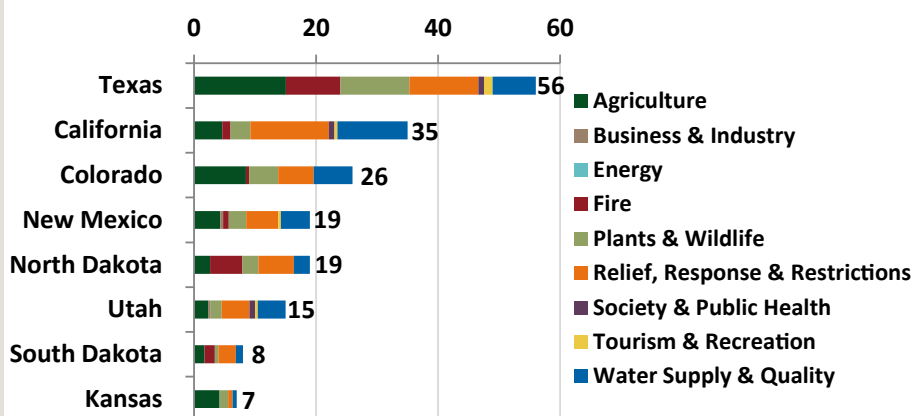
The Albuquerque Bernalillo County Water Utility Authority voted on March 17 to declare a Stage One Drought Watch as most of the state was in exceptional drought, as reported by [KRQE](#). During a Drought Watch, water waste fines double and the Water Authority expands its education and outreach efforts in order to prevent excessive water use.

Limited forage growth in North Dakota, early fire activity

The dry winter brought little precipitation to ease drought in North Dakota and by the end of March, a sizeable area of extreme drought covered the western half of the state. North Dakota forage production was expected to be down 20%-25% even with normal spring precipitation, according to North Dakota State University Extension's range specialist, as reported by [Williston Herald](#).

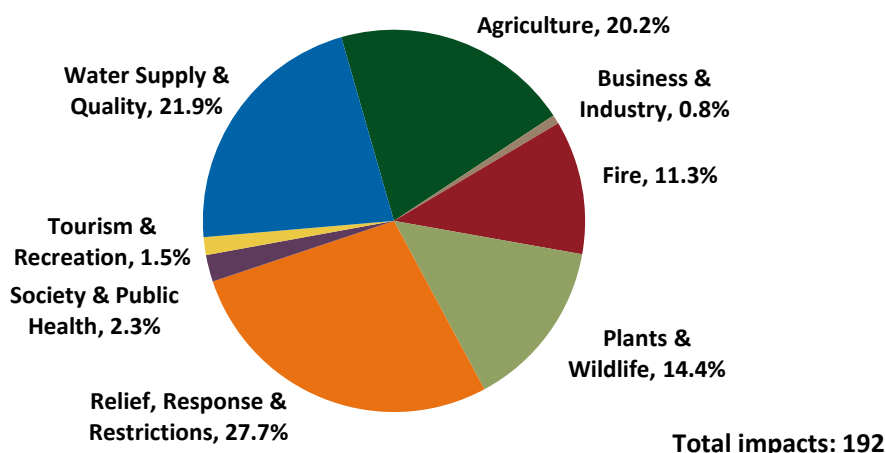
Dry, warm conditions brought an early start to the wildfire season in North Dakota. Toward the end of March, 37 of the state's 53 counties had some type of restriction on outdoor burning, according to [The Bismarck Tribune](#). Eighty wildfires

Impacts in the Drought Impact Reporter, January - March 2021



The scarcity of hay in Texas led some producers to purchase hay from as far away as Montana. The Lonestar State had 56 reports in the Drought Impact Reporter for January-March 2021.

Impacts in the Drought Impact Reporter, January - March 2021



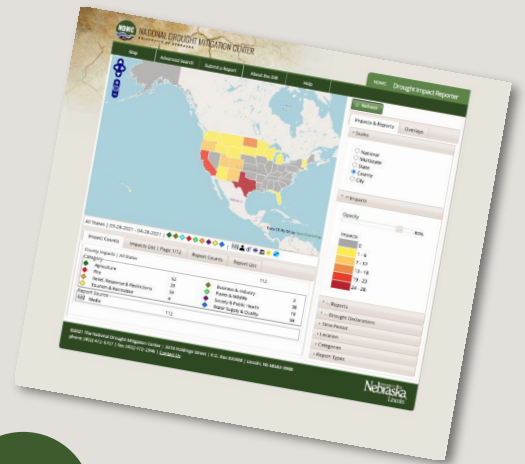
The January-March 2021 Drought Impact Reporter recorded 192 total impacts last quarter, with relief, responses and restrictions accounting for nearly 28% of all reports.

had already burned more than 24,000 acres, according to the North Dakota Forest Service. The fire activity in 2021 already exceeded the roughly 11,500 acres burned in all of 2020.

Parts of Upper Colorado River drought plan activated

Continued drought and poor snowpack led to a bleak outlook for the Colorado River basin. Parts of the 2019 Upper Colorado River Basin drought contingency plan were put into effect as forecasts for the river appeared bleak, per Arizona Public Media. The 24-month study released in January by the Bureau of Reclamation indicated that Lake

Powell could fall below an elevation of 3,525 feet above sea level in 2022. That elevation was designated as a critical threshold in the drought plan to preserve the ability to generate hydropower at Glen Canyon Dam. The minimum probable forecast triggers enhanced monitoring and coordination and monthly planning calls with state-designated point persons. ○



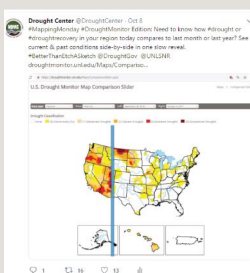
DROUGHT IMPACT REPORTER

To view all impacts, please visit:
droughtreporter.unl.edu



Dry, warm conditions brought an early start to the wildfire season in North Dakota, and they have also led to blowing dust storms that in some areas of the state, like Foster County, can be seen for miles. Submission from Condition Monitoring Observer Reports user Jeff Gale in Foster County, North Dakota.

NDMC ON THE WEB



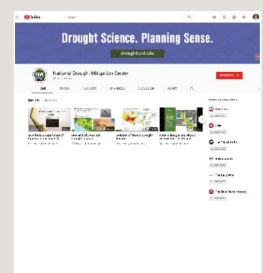
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New interactive guide helps drought planners pick best scenario exercises for different group events



By Cory Matteson

NDMC Communications Specialist

No matter where you live, water is not a limitless resource. In times of drought, community and regional water managers must often make decisions on how water is allocated to protect everything from the economy to agronomy to public health. To help with the decision-making process, many communities have put drought plans in place. And over the past decade, as communities have developed or updated those drought plans, water management leaders have increasingly started or furthered the conversation among stakeholders by bringing them to the table to consider realistic what-if scenarios.

Those scenarios are often either a workshop, a tabletop exercise or a game. To know which type of exercise is right for your community, it helps to consider what you want to get out of it, said Deborah Bathke,

education coordinator for the NDMC. To help leaders through that decision-making process, the NDMC recently released the interactive guide, Collaborative Drought Planning Using Scenario Exercises, thanks to funding from the [North Central Region Water Network](#) and [North Central Regional Center](#) for Rural Development. It is available on the Drought Center's website at drought.unl.edu/scenarioguide/Overview.aspx.

"The NDMC team that created this interactive guide has first-hand experience working with our partners and community leaders to design workshops and host events that help address the challenges they face at any stage of the drought planning or review process," Drought Center director Mark Svoboda said. "Their knowledge, as well as invaluable feedback from numerous drought planning event participants, can be found throughout the guide. We think it will

help organizers make informed decisions as they decide how to best hold their own drought planning events."

NDMC staff collaborated with federal, state and community partners to evaluate the design, function and success rates of holding different types of events to address drought planning in its different stages. Differing in complexity, cost, size and scope, the events are more effective when a community is able to tailor them to fit their goals, Bathke said. The first stage of research was funded through the National Integrated Drought Information System (NIDIS).

"Since drought planners began using scenario exercises to help develop or hone their communities' strategies for dealing with droughts, we've found that different types of exercises best lend themselves to different audiences, different budgets and different stages of planning," Bathke said. "A community that's just beginning the planning process might want to invite experts to host a workshop to discuss drought issues and impacts that are likely to affect that region and build a conversation about priorities and policies from there. A community that has a plan in place might want to hold a tabletop exercise, where those plans are evaluated, and attendees develop deeper understandings of their roles when it's time to act on them. And

"The NDMC team that created this interactive guide has first-hand experience working with our partners and community leaders to design workshops and host events that help address the challenges they face at any stage of the drought planning or review process."

– Mark Svoboda, NDMC director

games that simulate drought conditions and responses can drive any number of conversations.

“This guide is a user-friendly, interactive tool that can be used to help figure out what the best type is for the group you’re looking to bring to the table and helps guide you through the process of developing a drought-based scenario exercise from start to finish.”

Through case studies of previous events, testimonials from participants, analysis from experienced facilitators and more, the guide examines the three major types of drought scenario exercises – workshops, tabletop exercises and games. It provides detail on the investments in time and dollars required to conduct them, walks you through the five phases to consider when planning an exercise, and shares results that have been reported by those who have hosted or participated in them. The guide is not meant to serve as a how-to manual, Bathke said, but rather as resources that help users tailor a drought scenario exercise to the unique needs and resources of their circumstances.

“This guide is a user-friendly, interactive tool that can be used to help figure out what the best type is for the group you’re looking to bring to the table and helps guide you through the process of developing a drought-based scenario exercise from start to finish.”

– Deborah Bathke, NDMC education coordinator

Each community has its own set of resources to manage, and each type of exercise plays to different strengths, said the guide’s co-author and NDMC education and outreach specialist, Tonya Bernadt.

“When we started to facilitate or help host drought tournaments and other exercises in the early 2010s, leaders from other communities would contact the Drought Center and ask us if we could help them design an event,” she said. “Some of those communities had the resources available to host multi-day tournaments and hire consultants to design realistic simulations of potential drought conditions, which allowed attendees to see how different actions would impact different stakeholders and

the water supply in general. Others had tighter budgets but an interest in building community conversation around drought planning. There are ways to build conversations, and drought plans, no matter what level or resources you have, and this guide helps explain the range of options.”

Since 1980, the average U.S. drought has totaled nearly \$10 billion in damages. The Collaborative Drought Planning Using Scenario Exercises guide provides an overview of the value of drought planning that goes beyond its economic impact and explains effects a prolonged lack of water has on a community’s recreation opportunities, its ecosystem, its infrastructure, its energy supply and more. It offers examples of resource management and relief that were developed when previous groups of stakeholders gathered to address problems that could arise during the often-prolonged natural disaster. And it offers event planners examples and case studies of each type of exercise they might consider hosting, along with worksheets that can help them navigate the selection process.

“The organizers of these events know their communities,” Bathke said. “Exercises can help them identify where their strengths lie, where their vulnerabilities to drought can be improved, and who should be at the table to make key, collective decisions that can save resources, money and stress the next time a drought strikes. The NDMC champions those community organizers, and we believe this guide can help them set up the best events for the people they know will help build better and better drought plans.” ○

Planning Worksheet #1
Select an Exercise Type

This worksheet is intended to help you foster discussions with organizers and partners, weigh selection factors, and discover which exercise types are most compatible with your objectives, planning stage, and capacity. Please note: No worksheet can fully capture all of the unique needs and characteristics of your community or organization. This worksheet can help guide you when selecting an exercise.

Step 1		Step 2		
Using the results from your needs assessment, identify the factors that are relevant to and a priority for your agency or organization.		Fill in all of the circles for each row where you answered yes in step 1.		
Factors	Is this relevant and/or a priority? Yes/No	Workshop	Game	Tabletop
What do you hope to accomplish with the exercise?	Collect or share information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Write a component of your drought plan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Create consensus around a planning challenge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Educate participants about the complexities of drought	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Generate mitigation and response strategies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Evaluate strategies, policies, or procedures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Train staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Discover gaps in resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Improve communication, collaboration, and/or coordination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Practice decision-making or implementing policies and procedures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Who do you want to participate in the exercise?	The public	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Agency or organizational staff with responsibilities related to managing drought or its effects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What level of interaction would you like participants to have with planning experts?	Create opportunities for participants to ask questions or work closely with planning experts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Focus on interactions among participants with minimal interactions with planning experts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The National Drought Mitigation Center recently released the interactive Collaborative Drought Planning Using Scenario Exercises guide, which includes examples, worksheets, case studies and more to help water management leaders choose the right type of event to help groups develop or improve drought plans.

NDMC's Mwape working with stakeholders, state to study drought preparedness in Nebraska's Republican River Basin

By Cory Matteson

NDMC Communications Specialist

Andrew Mwape of Zambia is working with the state of Nebraska and four of its Natural Resources Districts on drought planning for the Republican River Basin. To explain why stakeholders in the region should prepare for drought, he offered a quote from J.R.R. Tolkien: "It does not do to leave a live dragon out of your calculations, if you live near him."

Mwape is a Ph.D. student in the School of Natural Resources at the University of Nebraska-Lincoln, working with the National Drought Mitigation Center and with the state's Department of Natural Resources.

As recently as January, all of Nebraska was in drought. While conditions have eased across much of the state in recent months, Nebraska DNR is taking a proactive approach. In 2019, the state agency entered into an agreement with the NDMC to provide funding for a graduate student to help evaluate current and potential water management practices in the districts. Mwape, a recent Mandela Washington Fellowship honoree from Zambia, was selected from a competitive field to work on the project in Nebraska.

Mwape learned about opportunity, and the Drought Center, when he was hosted at UNL as part of the fellowship program. For Mwape, drought is both a professional and personal concern. While in Zambia, he founded an environmental advocacy organization to encourage sustainability practices in one of the world's most drought-vulnerable regions.

As a Mandela fellow, he wanted to learn about effective policymaking that could lead to



National Drought Mitigation Center research assistant Andrew Mwape is working with the state of Nebraska and four of its Natural Resources Districts (NRDs) on drought planning for the Republican River Basin.

better drought resilience in Africa. During his fellowship, he met someone who had some thoughts on the subject: Donald Wilhite, founding director of the National Drought Mitigation Center. Wilhite told Mwape about the Drought Center and introduced him to another former NDMC director, Michael Hayes. The conversations convinced Mwape that enrolling at UNL and working at the Drought Center would be the best place to continue his studies on drought management.

"Africa is one of the most vulnerable places on the planet when you talk about drought, because of the geographical location and also the economic capacity to bounce back," Mwape said. "It's always interested me to see how I can be of impact in bringing about policies that would equip people and communities to bounce back from drought."

Now, Hayes is one of Mwape's advisors as he works with Nebraska

DNR to develop scenario exercises and identify possible gaps in drought preparedness with stakeholders who live in the Republican River Basin. Through the exercises and planning, Nebraska DNR officials say they intend to help develop better understanding of needs and issues related to storing surface and aquifer water to meet crop-water demands during future droughts.

Andy Pedley, integrated water management analyst with Nebraska DNR, said the efforts to organize basin-wide drought planning exercises and analyze the findings are among the many objectives included in the Republican River Basin-Wide Plan (dnr.nebraska.gov/water-planning/republican-river-basin-wide-plan). The overarching goal of the plan is to balance water demands and supply across the basin, while remaining in compliance with the Republican River Compact (republicanriver.org).

“Africa is one of the most vulnerable places on the planet when you talk about drought, because of the geographical location and also the economic capacity to bounce back. It’s always interested me to see how I can be of impact in bringing about policies that would equip people and communities to bounce back from drought.”

– Andrew Mwape, NDMC Ph.D. student

The Republican River Basin, Pedley said, is one of the drier regions of Nebraska, and tends to be drier from the Upper Republican NRD in the west toward the Lower Republican NRD to the east. Because water resources are shared not just among the four NRDs but also across the state and across state lines, Pedley said that the effort to identify possible drought preparedness gaps should be as thorough as possible. He and Mwape have been working on the project with NRD partners, though those meetings have all been held virtually due to the pandemic. As vaccination rates increase and travel restrictions ease, Mwape and Pedley both said they can envision a day where they visit project partners located in southwestern and southern Nebraska and discuss drought preparedness face to face.

“I am really impressed with his ability to pick up some of the nuances in the basin without having the firsthand exposure yet,” Pedley said. “I can only imagine how difficult it would be to come from another country and have to figure out what’s going on in a certain part of this new state that you can’t visit. I think he is

doing a great job with the research and the work that he’s doing. He’s very passionate about drought planning.”

Currently, the project is in an information gathering stage. Mwape is finalizing a survey that will be sent to NRD partners. The goal of the survey is to get a clearer picture from on-the-ground stakeholders of impacts they see and experience in times of drought. The survey covers subjects like crop production, municipal water supply, household water usage, fire threats and more.

The project involves engaging farmers, water planners and other stakeholders to find out how droughts have affected them and how they can strategize together to come up with the best possible responses when the next drought occurs, he said.

“Much of the economic activity there is agricultural,” Mwape said. “Drought affects them not only in water aspects, but also their health — their mental health and mental stress. Everybody matters and everybody must play a role in addressing issues of drought. We realized that not only making them aware of the impacts of drought but also engaging them

would be very helpful. They are the ones that live with the droughts.”

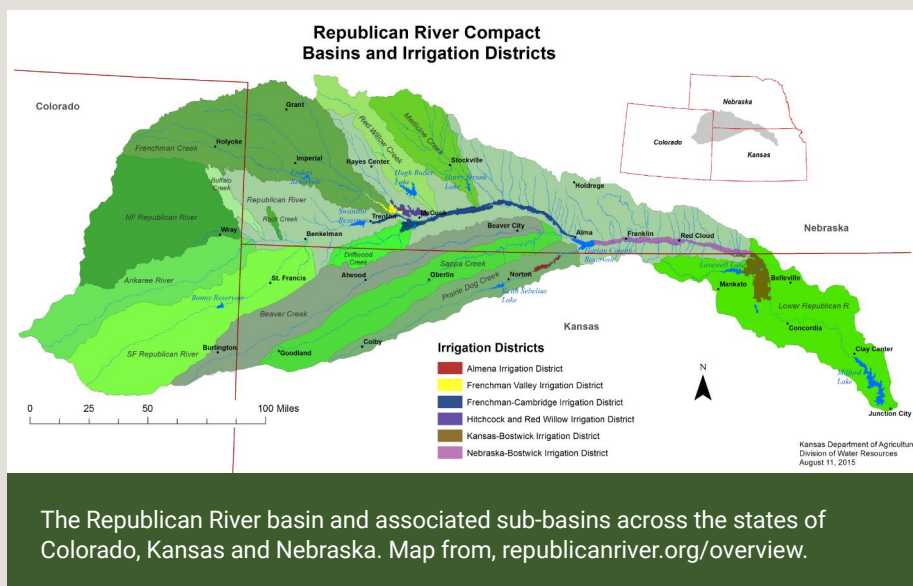
To do that, Mwape is working with his advisors to develop a scenario exercise and bring stakeholders in the four NRDs to the table to assess water management values and drought management strategies. Mwape said that to select the best types of exercises for the NRD stakeholders, he has consulted Collaborative Drought Planning Using Scenario Exercises (page 8), co-authored by another of his advisors, NDMC education coordinator Deborah Bathke.

“To engage the groups who will participate in the drought planning process, we decided on a combination of tabletop exercises and workshops,” Bathke said. “The stakeholders who live and work in these natural resources districts have an advanced understanding of water issues there, and we believe that these exercises will help them focus on what can be updated in existing drought plans and collaborate on making the kinds of challenging water usage decisions that arise during droughts. Andrew has been doing a great job of developing these events, especially given that travel has been restricted due to the pandemic.”

Those results will be assessed, and then, Mwape said, the goal will be to introduce communities in the basin to possible drought management strategies.

“There are some basin-wide plans that already exist but very few people may be aware of that,” he said. “We want to familiarize them.”

Along with Hayes and Bathke, Mwape is being advised by High Plains Regional Climate Center director Rezaul Mahmood. NDMC assistant director Kelly Helm Smith is a project advisor. The two-year project involves working with researchers and academics at the Drought Center and UNL’s School of Natural Resources, government agencies and on-the-ground stakeholders. That is a combination Mwape sought, as he intends to work on drought management issues with similar partners in Africa upon completion of his graduate studies at Nebraska. ○



Decade of growth reflected in reach of North Central Climate and Drought webinar series

NDMC Communications

Since 2011, the National Oceanic Atmospheric Administration’s Central Region Climate Services Director, the U.S. Department of Agriculture Climate Hubs, National Integrated Drought Information System (NIDIS), and American Association of State Climatologists have partnered to provide monthly climate and drought webinar updates to stakeholders who live and work in the North Central U.S.

The North Central Climate and Drought webinar series has grown over the course of the past decade as more users have tuned in to learn about the latest conditions from the Rockies to the Great Lakes. Hundreds of federal, state and tribal government agency staff members, researchers, business and industry

leaders, reporters and more have tuned in to the monthly report, which interprets information about climate and weather events and their impacts, drought, crop status, hydrology, monthly and seasonal climatological outlooks and more into a 45-minute presentation followed by a question and answer session.

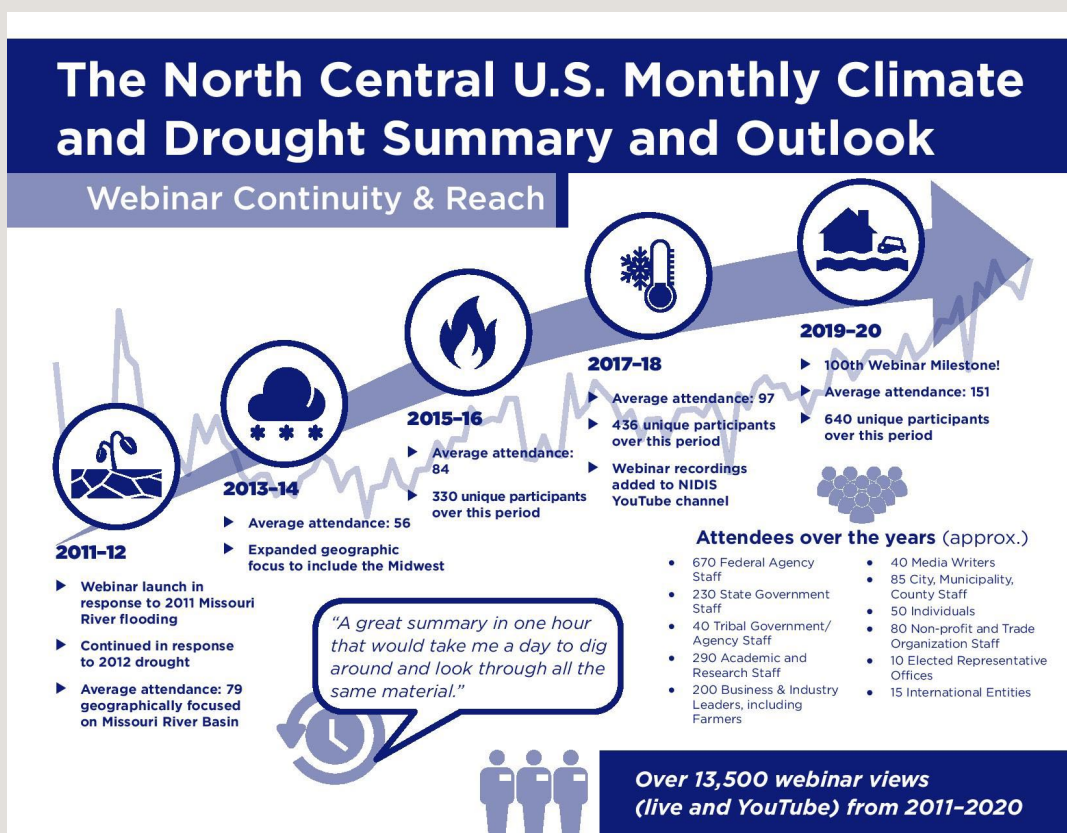
This year, the National Drought Mitigation Center (NDMC) is partnering with the webinar organizers to evaluate the reach and impact of the monthly webinar series. The evaluation began by collecting information about the evolution of the series from its initial years to its growth over time. Statistics about the webinar’s viewership numbers and reach are among the highlights showcased in an infographic that can be

downloaded from the NDMC website.

Some of the notable statistics from the infographic include:

- The webinars have been viewed over 13,500 times either live or on the NIDIS YouTube channel.
- Average webinar attendance has nearly doubled, to 151 people, since its launch in 2011 in response to Missouri River Flooding.
- From 2019–2020, 640 unique participants tuned into all or some of the webinars.

A follow-up survey of webinar participants over the 10-year period is currently underway, so look for additional information about the webinar’s impact later this year. ○



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New fact sheet, how-to video help users learn how to submit CMOR-Drought surveys, photos

NDMC Communications

Drought looks different in different parts of the country, and one way to show how it looks, or how it doesn't look, is through photography. The National Drought Mitigation Center, in partnership with the National Integrated Drought Information System, the U.S. Department of Agriculture and others, encourages people across the U.S. to submit photos and fill out a small corresponding survey on the Condition Monitoring and Observation Reports on Drought (CMOR-Drought) website or via Esri's mobile app, Survey123.

The NDMC recently published a new fact sheet and video tutorial that you can use to teach yourself, and others, how to submit photos and survey responses to CMOR. The information collected from CMOR submissions populates a map of the U.S. created to provide users with a more detailed, and personal, picture of drought across the country. Some CMOR users have become frequent submitters, and the NDMC encourages more users to post quarterly, monthly or even weekly photo updates about conditions in their surroundings. Having a visual frame of reference for how an area looks when it's in exceptional drought, moderate drought or no drought at all provides a key layer of information for drought experts seeking to measure impacts and help people better prepare for them once the next drought occurs.

To view the new fact sheet and video tutorial visit the CMOR homepage at go.unl.edu/cmor_drought. To fill out a CMOR-Drought report, type go.unl.edu/cmor in your browser. If you are using the Esri ArcGIS Survey123 field app, click "Continue without signing in" and type in the link, go.unl.edu/cmor. ○

Getting started with the field app

Reporting on a mobile device is easy. CMOR uses Esri's Survey123 field app. Go to the app store on your mobile device and download the Survey123 field app.

Click on "Continue without signing in."

To take full advantage of the geo-location capabilities, choose "Allow While Using App." This will let it pinpoint your location.

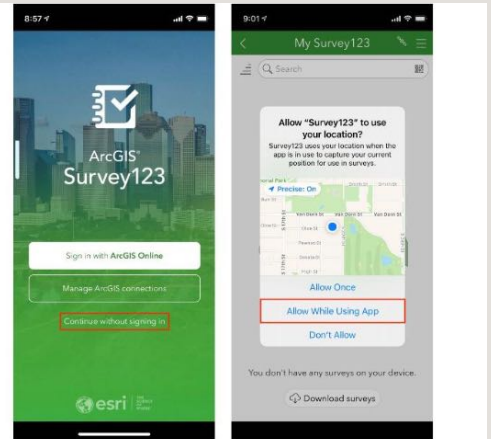


Then, use the link or the QR code:

go.unl.edu/CMOR

which will prompt you to download the survey.

This survey is open to the general public, so you won't need to log in.



go.unl.edu/cmor_drought

A new fact sheet and how-to video are available on the Condition Monitoring Observation Reports on Drought website to help users familiarize themselves with the survey and photo submission process.

How often has it been this dry in your part of the country?

Never Once Twice or more

Let others know by submitting a **Condition Monitoring Observation Report** at

go.unl.edu/cmor_drought

The National Drought Mitigation Center hosts a social media library section on its website with a collection of ready-to-post content designed to encourage more participation in citizen science. View it at go.unl.edu/drought_social.