Drought Risk Atlas Update
New process annually updates millions of calculations

Drought-Smart Indigenous Ag
Partners enhance adaptation for Southwest pueblos

Ranchers review tools
Researchers’ range management tools can aid decisions
Perennial questions for those of us in the drought monitoring business are “How bad is it?” and “How does this drought compare to past droughts?” Those questions are relevant now, as nearly all the western U.S. (including most of the Great Plains) is in drought. Comparing present and past conditions for specific locations across the country is getting easier, especially with the latest update to the NDMC’s Drought Risk Atlas (page 9). The DRA database will contain over 6 billion records and well over 500,000 maps. The last time drought was this bad was 2012–13, and according to the outlook (page 4), this year may well end up rivaling that drought, which was one of the most intense and prolonged since U.S. Drought Monitor records began in 2000. Although the footprint of the current drought has receded incrementally in the past few weeks, impacts (page 5) have been piling up. More recently, heat and unusually strong winds have compounded dry conditions to produce blowing dust and wildfires from New Mexico to Nebraska.

And as I remind people, monitoring drought is the easy part. It’s knowing what you’re going to do about it that is really challenging. New tools help ranchers monitor and plan for drought. The drought center recently held a workshop in New Mexico for researchers to present new tools to ranchers, and for ranchers to share thoughts on what makes a drought planning tool useful (page 10).

Drought-Smart Indigenous Agriculture, a new USDA project just getting underway with the Santa Ana Pueblo in New Mexico, the Southwestern Polytechnic Institute, the Intertribal Agriculture Council and USDA’s Southwest Climate Hub, will help build stronger connections between pueblos in the Middle Rio Grande and the U.S. Department of Agriculture’s Natural Resources Conservation Service (page 12). And anyone can sign up to learn more about the U.S. Drought Monitor process, including how to be involved, at one of three upcoming webinars (page 13).

As always, we recommend listening to your county, state and/or Tribal authorities, including Extension, NRCS, water utilities and fire managers. Stay safe out there and when you need resources on how to plan and prepare for drought, you know where to find us.

Mark Svoboda

Perennial questions for those of us in the drought monitoring business are “How bad is it?” and “How does this drought compare to past droughts?” Those questions are relevant now, as nearly all the western U.S. (including most of the Great Plains) is in drought. Comparing present and past conditions for specific locations across the country is getting easier, especially with the latest update to the NDMC’s Drought Risk Atlas (page 9). The DRA database will contain over 6 billion records and well over 500,000 maps. The last time drought was this bad was 2012–13, and according to the outlook (page 4), this year may well end up rivaling that drought, which was one of the most intense and prolonged since U.S. Drought Monitor records began in 2000. Although the footprint of the current drought has receded incrementally in the past few weeks, impacts (page 5) have been piling up. More recently, heat and unusually strong winds have compounded dry conditions to produce blowing dust and wildfires from New Mexico to Nebraska.

And as I remind people, monitoring drought is the easy part. It’s knowing what you’re going to do about it that is really challenging. New tools help ranchers monitor and plan for drought. The drought center recently held a workshop in New Mexico for researchers to present new tools to ranchers, and for ranchers to share thoughts on what makes a drought planning tool useful (page 10).

Drought-Smart Indigenous Agriculture, a new USDA project just getting underway with the Santa Ana Pueblo in New Mexico, the Southwestern Polytechnic Institute, the Intertribal Agriculture Council and USDA’s Southwest Climate Hub, will help build stronger connections between pueblos in the Middle Rio Grande and the U.S. Department of Agriculture’s Natural Resources Conservation Service (page 12). And anyone can sign up to learn more about the U.S. Drought Monitor process, including how to be involved, at one of three upcoming webinars (page 13).

As always, we recommend listening to your county, state and/or Tribal authorities, including Extension, NRCS, water utilities and fire managers. Stay safe out there and when you need resources on how to plan and prepare for drought, you know where to find us.

Mark Svoboda
By Curtis Riganti
NDMC climatologist

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

During the first quarter of 2022 (January-March), drought continued to cover much of the western U.S. Drought coverage also expanded across large expanses of Texas and Nebraska and adjacent southern South Dakota. Drought also expanded in southern Louisiana, southern Georgia, and parts of the Florida Peninsula. Drought conditions also worsened across all of Hawaii. Drought conditions improved in central Colorado, northern Idaho, southwest Montana, along the Oregon-Washington state line, northern North Dakota, northern Wisconsin, eastern Missouri, southeast Oklahoma, from northern South Carolina to southern Virginia, and in much of Puerto Rico.

Drought

During the first quarter of 2022, Dec. 28, 2021–March 29, 2022, the coverage of abnormal dryness decreased, though most other drought categories had coverage increases. Moderate drought coverage increased by 2.34 percentage points, from 46.23 to 48.57%. Severe drought coverage increased by 4.24 percentage points, from 30.3 to 34.54%. Extreme drought coverage increased by 2.63
percentage points, from 11.7 to 14.33%. Exceptional drought coverage decreased slightly, dropping from 1.59 to 1.55%. The population living in areas of moderate or worse drought increased from about 99.4 million to about 104.5 million people.

**Precipitation**

Portions of the Great Plains, in particular central and northern Nebraska, southern and western South Dakota, eastern Montana, northeast Wyoming, and central and western Texas and adjacent southeast New Mexico, saw very dry conditions during the first quarter of the year. Parts of the West were also very dry from January through March, perhaps most notably California, after a wetter December occurred there. Very dry conditions extended into southern Oregon, southern Idaho, far western Wyoming, the western half of Utah, and western Arizona. Drier than normal weather also occurred in southern Louisiana and in parts of Georgia, southern and eastern South Carolina, and southeast North Carolina. Wetter than normal weather occurred in parts of central and eastern Colorado and in parts of the Ohio River and Tennessee River valleys.

**Temperature**

Colder than normal weather enveloped the northern Great Lakes/Upper Midwest region during the first quarter of 2022, in particular northern Minnesota, northern Wisconsin, and the Michigan Upper Peninsula. Temperature departures during this period ranged from 4 to 8 degrees below normal. The quarterly temperature anomalies were largely driven by colder than normal weather in January and February, though March temperatures were also a bit below normal. Weather in the southern Great Plains was also colder than normal across the first quarter of 2022, with temperature departures
generally 2 to 4 degrees below normal. These anomalies were generally driven by a much colder than normal February, particularly in Texas and eastern New Mexico. Generally speaking, other regional temperature anomalies of this magnitude were not common across the first quarter, though notably, parts of northern California were a few degrees warmer than normal, as well as parts of eastern Montana and a few spots in the Southeast. Elsewhere, month-to-month variations in temperature tended to even out to within a couple degrees of normal.

**Outlook**

Through the end of July, the National Weather Service Climate Prediction Center is forecasting the development of drought across much of the western Corn Belt, covering most of eastern South Dakota, southern Minnesota, much of Iowa, all of eastern Nebraska, northwest Missouri, and most of eastern Kansas. Drought development is also forecast across the remainder of Colorado and Wyoming, southwest Texas and adjacent far southern New Mexico, south Texas, west-central Texas, the Idaho Panhandle, and northwest Montana. Drought improvement or renewal is forecast in southern and central Arizona, and adjacent far southeast California, as well as in northwest South Dakota, southeast Montana, and western North Dakota. Elsewhere across the western U.S., drought persistence is forecast where drought is ongoing as of mid-April. Drought improvement or removal is also forecast in the Florida Panhandle, southern Georgia, and coastal areas of South Carolina and North Carolina. Drought is forecast to persist in far southern Puerto Rico. Drought persistence is forecast in most parts of Hawaii, except for Oahu, where improvement or removal is forecast.
Impacts follow alarmingly dry start to 2022 for parts of the West, Plains

By Denise Gutzmer
NDMC Drought Impacts Specialist

The bountiful winter storms of late December 2021 did not continue bringing the snow in 2022, and the first three months of 2022 were some of the driest on record in parts of the western U.S. and Great Plains. During this time, 259 impacts were added to the Drought Impact Reporter. Many water restrictions and preparations for another dry year in California were documented with 72 impacts, as was the developing drought in Texas with 58 impacts.

California embarks on a third year of drought

Dwindling snowpack

After the driest January and February on record, the March 1 snow water content was disappointingly low at 64% of average for the date, according to the California Data Exchange Center. Toward the end of March, California’s major reservoirs averaged about 69% of capacity. Shasta Lake was about half full. The Sierra snowpack was 38% of normal and had largely evaporated.

Water conservation needed

California officials in March asked all residents to increase their water conservation efforts, as reported by the Los Angeles Times. At the end of March, Gov. Newsom told cities and other local water agencies to curb water use and enact stage two of their water shortage contingency plans, but did not order mandatory statewide cutbacks as Gov. Jerry Brown did years ago, per The Sacramento Bee. Newsom in July 2021 asked for water conservation of 15%, to little avail.

Mandatory water cuts

Signaling that this was to be another year of short water supplies, the State Water Resources Control Board sent letters to about 20,000 water rights holders, including farms and cities, in the latter part of March, to warn them to prepare for mandatory cutbacks in a matter of weeks, as reported by The Sacramento Bee. The notices went to rights holders in the Sacramento-San Joaquin Delta and the Russian, Scott, Shasta, Mill Creek and Deer Creek watersheds. In 2021, requests for curtailment came in August. This year, however, the request has come in the spring.

State, federal water projects offer little to no water

The State Water Project allocation in California on March 18 was trimmed from 15% of requested supplies to 5% due to a historically dry start to the year, per the California Department of Water Resources. Initial water allocations for 2022 for contractors of the Central Valley Project indicated that most irrigation districts in the Sacramento and San Joaquin valleys should expect to get no water this year, as reported by The Sacramento Bee. Most cities were to get a 25% allocation, while some will receive just enough to cover “public health and safety needs,” which means 55 gallons per person daily. The Bureau of Reclamation further cut allocations on April 1 so municipal and industrial customers get only that needed for public health and safety.

Rare wildfires during the wet season

California wildfires were increasingly becoming a year-round event as the fire season lengthens, but wildfires during...
the winter wet season were disconcerting. A couple of blazes occurred in February. The first sparked in Orange County near Emerald Bay in the early morning hours of Feb. 10, as reported by Associated Press News. Gusty Santa Ana winds drove the flames, causing several hundred residents to evacuate as 150 acres burned. No homes were lost. This is the second winter wildfire in the Golden State after a blaze burned in January near Big Sur.

Drought intensified in Texas

Wildfires, disaster declaration

Warm temperatures and worsening drought combined to increase the fire danger in Texas this spring. The countryside was also covered with abundant vegetation after last year’s rains, leaving ample fuel to burn, as reported by The Texas Tribune. According to Texas A&M Forest Service, nearly 123,000 acres burned in Texas in March, which is more than the previous three Marches combined. The biggest fire was in Eastland County where more than 54,000 acres burned. On March 18, Texas Gov. Greg Abbott issued a disaster declaration for 11 counties in response to wildfire activity as high winds, low humidity and drought elevated the fire risk, per the governor’s office.

Lack of rain hard for crops, pastures, rangeland

Most of Texas was in serious drought or was at least fairly dry, leading to numerous agricultural challenges, reported AgriLife Today. Some farmers waited for rain before planting, while some crops needed a good rain to help plants grow and develop. Pastures and rangeland needed rain to improve their condition and provide forage for livestock, which were receiving supplemental feed in many districts. Stock ponds in some areas needed rain to refill them. Ranchers were culling cattle in the Southwest and South Texas at the end of the month.

Winter wheat in the Plains

Intensifying drought in the Southern Plains threatened winter wheat from Kansas to Texas as Russia’s invasion of Ukraine also lowered global supplies. More than half of Kansas was in severe drought or worse. Oklahoma and Texas, both big wheat growers, were also mostly in severe or worse drought. A smaller crop could further fuel food inflation. At the start of March, the dryland crop in some areas had not even sprouted yet and was running out of time for growth, per Drovers Cattle Network.

Lake Powell fell below critical level

Lake Powell fell below 3,525 feet above sea level in mid-March and was below 25% of capacity, as reported by Colorado Public Radio in Centennial. The 3,525 mark is important because it is the critical threshold for the reservoir, threatening the ability of Glen Canyon Dam to generate hydropower and provide power for Wyoming, Utah, Colorado, New Mexico, Arizona, Nevada and Nebraska.
Below 3,525 feet exists a 35-foot buffer for emergency response to prevent Lake Powell from falling below the minimum pool elevation of 3,490 feet, the lowest point at which hydropower generation can occur. Snowmelt was expected to bring the reservoir level up again above the critical level.

Low runoff in the Missouri River basin

February runoff in the upper Missouri River was 78% of average due to below-average snowpack and dry soils, according to the Omaha World Herald. Mountain snowpack was about 80% of normal.

Drought conditions were expected to persist in the Central Plains through the spring, leading to below-normal runoff for the Missouri River in 2022 as reported by Vermillion Plain Talk in South Dakota. Runoff is expected to be well below normal below Sioux City for the 2022 water year. The 2022 calendar year runoff forecast above Sioux City, Iowa, dropped from 21.7 million acre-feet in February to 20.4 MAF on March 1, a reduction of 1.3 MAF, amounting to 79% of normal.

Hydropower will be reduced with the lower river levels. The six mainstem power plants generated 448 million kWh of electricity in February, compared to typical energy generation for the month of 624 million kWh. Based on current projections, the Missouri River’s annual power production will be 7.4 billion kilowatt-hours (kWh), while the average is 9.4 billion kWh.

MONTHLY DROUGHT AND IMPACT SUMMARIES

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

NDMC ON THE WEB

Follow us on Twitter @DroughtCenter
Find us on Facebook @DroughtCenter
Subscribe to Dry Horizons go.unl.edu/ndmc-dry
Tune in on YouTube go.unl.edu/droughtflix

DROUGHT IMPACT REPORTER

To view all impacts and reports, please visit: droughtreporter.unl.edu
The University of Nebraska honored Mark Svoboda, director of the National Drought Mitigation Center, with the President's Excellence Award, announced in April. The awards recognize faculty across the NU system whose work has had a strong impact on students, the university and the state.

“Faculty are part of the lifeblood of any great university and the University of Nebraska system is fortunate to have some of the world’s best serving across our four campuses,” said Ted Carter, president of the NU system. “The teaching, research and outreach that these faculty do on a daily basis has a transformational impact on students, our communities, and economic growth and prosperity in Nebraska and beyond.

“It’s an honor to lift up and celebrate their work.”

Svoboda received the Innovation, Development and Engagement Award, which recognizes faculty who have extended their academic expertise beyond the boundaries of the university, enriching the broader community.

Svoboda works closely with federal, tribal, state, basin, local and international officials and governments on drought monitoring early warning information systems, drought risk management planning and collaborative research. He is the co-founder and served for 17 years as one of the principal authors of the weekly U.S. Drought Monitor. His work with the core team of the Western Governors’ Association led to the development of a report and recommendations on creating a National Integrated Drought Information System for the United States. He is currently a member of the World Meteorological Organization/Global Water Partnership Integrated Drought Management Programme’s Advisory Panel.

Svoboda is internationally known for his drought monitoring/early warning and risk management work and has been a keynote speaker, principal investigator, consultant, advisory board member, or an invited expert for activities in more than 65 countries, regions and organizations.

Adapted from a story by Melissa Lee, NU system
Streamlined process facilitates timely 2021 update of Drought Risk Atlas

Millions of calculations go into the annual update of the Drought Risk Atlas, a tool that helps people compare present and past drought conditions for specific locations. Thanks to a new, mostly automated process, calculations based on data through 2021 are being added four months into 2022, shortly after quality-controlled data is available.

The National Drought Mitigation Center, based at the University of Nebraska-Lincoln, first launched the Atlas in 2014 with data through 2012, and subsequent updates were labor-intensive, occurring at irregular intervals.

Because drought is a description of dryness at one time compared with the same location at other times, adding another year of data means recalculating the entire period of record. “Every time you change datasets, you have to recalculate millions of calculations,” said Brian Fuchs, NDMC climatologist and Monitoring program area lead.

Updated calculations are time series charts, heatmaps and tables for precipitation, temperature, Standardized Precipitation Index, Standardized Precipitation and Evapotranspiration Index, Palmer Drought Severity Index, self-calibrating Palmer Drought Severity Index, U.S. Drought Monitor, drought periods, the Standardized Streamflow Index, frequencies and trends. Still to come later this year are interpolated maps of each drought index that will further facilitate comparisons.

Now, instead of emailing contacts at federal agencies for data updates, the NDMC is continuously connected with data feeds. The streamlined process ingests climate data daily from the Applied Climate Information System network and streamflow data from the U.S. Geological Survey’s Hydro-Climatic Data Network (HCDN) and replaces estimated values with verified data as it becomes available. The new workflow was developed with support from the National Integrated Drought Information System. The NDMC updated the Atlas in 2019 with data through 2017, and in 2021 with 2020 data as a test of the new process. The 2022 update is the first routine use of the new process.

The Drought Risk Atlas uses only data from about 4,000 stations with the most complete and continuous or nearly continuous records, each with a minimum of 40 years of records but many with much more. Its high-quality local information is of use to people planning for drought, Fuchs said, and also to actuaries, insurers and others who calculate the effects of drought in different places.

Visit the Drought Risk Atlas: droughtatlas.unl.edu
Ranchers and researchers are collaborating on how predicting forage production can lead to sustainable management, even during drought. At a meeting of the Society for Range Management, Feb. 7 in Albuquerque, N.M., a National Drought Mitigation Center workshop introduced eight new decision-support tools and asked ranchers to reflect on how such tools could be of greatest use.

“What a tool developer understands as useful information and what users recognize as usable in their decision-making context may not align,” the organizers note in the project report. Organizers of the session were Tonya Haigh, NDMC social science coordinator, and Julie Elliot, with the U.S. Department of Agriculture’s Natural Resources Conservation Service in Colorado.

Workshop attendees watched five-minute introductory videos about eight different tools: South Dakota Drought Tool, North Dakota Drought Calculator, MyRAINge Log, Grass-Cast, New Annual Forage Production Scenario Tool, PhenoMap, Rangeland Analysis Platform and FuelCast. Then a panel of five ranchers discussed how they could use the tools in decision-making, and attendees had a chance to ask questions.

Following are some of the key takeaways.

Ranchers said that no tool could substitute for having boots on the ground – walking through pastures, taking photos and otherwise documenting conditions. But for those who do not have the benefit of long experience, tools can be a resource to understand long-term forage production patterns and help set critical decision-making dates. Although the assembled ranchers did not think it was likely that the tools would be the
sole basis for decision-making, some said the tools could help flag problems by forecasting low forage production or directing attention to locations to monitor in person. Advisors and agency-based land managers may make greater use of some of the tools, which can provide a way to “see” more lands than what they can personally inspect.

Ranchers and the workshop audience identified features that make decision-support tools usable for their purposes. They liked being able to track their own precipitation and other data, and to collect data offline with a smartphone and sync it. Some liked to run “what if” scenarios, and being able to compare data with what they see on the ground. And they liked simple and intuitive maps as well as the option to export data into a spreadsheet or summary report.

Panelists emphasized the importance of building a long-term resilient ranching operation, which helps reduce the effects of drought and other adverse events, rather than just focusing on how they would react to drought. Elements of long-term resilience that they stressed prioritized soil health and management flexibility. Healthier soil holds more water and grows more grass. A rangeland management specialist suggested reconceiving drought planning as part of profit planning or sustainability planning.

Assisting with workshop facilitation were Maddie Goebel, NDMC social science researcher, and Grace Campbell, NDMC and University of Nebraska-Lincoln School of Natural Resources graduate student.

The videos on each tool are available as a playlist on NDMC’s YouTube channel, go.unl.edu/droughtflix.
A new partnership led by the National Drought Mitigation Center at the University of Nebraska-Lincoln focuses on enhancing agricultural drought and climate adaptation for Indigenous farmers and ranchers in the Middle Rio Grande pueblos of the U.S. Southwest.

The Santa Ana Pueblo in New Mexico will host the project and provide opportunities for partners to better understand the traditional knowledge and practices of Indigenous farmers and ranchers as well as their needs in adapting to drought. Other key partners include the Southwestern Polytechnic Institute, who will co-develop a student training and internship program with the NDMC, and the Intertribal Agriculture Council, providing technical expertise on conservation planning. The U.S. Department of Agriculture’s Southwest Climate Hub will advise the project, with a goal of helping to close gaps between the needs of Indigenous farmers and the federal agencies that assist all U.S. farmers.

“Indigenous farmers and ranchers in the U.S. Southwest face increasing climate stresses such as longer, more intense droughts, rising temperatures, and shifting growing seasons,” said Tonya Haigh, NDMC social science coordinator, who is leading the project. “Pueblos, Tribes, and individual farmers and ranchers are challenged with building capacity to undertake soil health, grazing, and food security projects to increase resilience and implement climate-smart agricultural systems.”

The two-year project, funded through the NRCS “Conservation Outreach: Equity through Cooperative Agreement” opportunity, will run through spring 2024. The project will include interviews with farmers, ranchers, agricultural enterprises, and natural resource professionals in the Middle Rio Grande Basin Pueblo area, opportunities for student interns from the pueblos to learn about drought agriculture and conservation, and training on drought planning, monitoring, and adaptation as well as writing conservation plans and applying for funding.

Key objectives are to:

- learn about past drought response and adaptation from the standpoint of traditional knowledge.
- assess the drought and conservation planning capacity needs of the pueblos.
- co-design and implement culturally appropriate drought and climate planning technical capacity.
- engage the next generation of farmers, ranchers and natural resource managers through remote internships.
- summarize the project and gather and share feedback on it, for potential broader application.

The drought center works with drought planners across the country and around the world, from individual ranchers to communities, Tribes, states and nations, to reduce vulnerability to drought.

Check the project page for updates. ☑️
U.S. Drought Monitor webinars offer insight into process, opportunity

NDMC Communications

There are three upcoming opportunities for U.S. Department of Agriculture staff members and others to learn more about the U.S. Drought Monitor. Those interested in learning about how the weekly snapshot of drought conditions is made, and what it shows, are invited to sign up for an informational webinar.

The webinars will be May 18, 1 p.m.; June 23, 2 p.m.; and July 14, 3 p.m. All times are Central Daylight Time.

A different author of the USDM will lead each of the webinars and share information about the data that they use to develop the map, and the process that they go through to create it. The authors will also share how USDA staff and others can contribute to the process.

Each webinar will last an hour. Anyone with questions prior to the webinar is invited to contact USDM author Brian Fuchs at the National Drought Mitigation Center by email (bfuchs2@unl.edu) or phone (402-472-6775). Support for the sessions is provided by USDA’s Office of the Chief Economist.

Register:
go.unl.edu/USDM_Info

Visual Drought Atlas

NDMC Communications

The National Drought Mitigation Center and partners are working to create a photographic record of what different landscapes look like in dry, normal and wet years. The NDMC is building on the trained volunteers and archive of Field Days photos developed by CoCoRaHS and the Southern Climate Impacts Planning Program. We encourage volunteers to upload photos over holiday weekends across the growing season, when they may be likely to be out with family and friends. Upload photos here:
go.unl.edu/photoatlas

A user-submitted photo from Feb. 2022 in Cleveland County, Oklahoma.

Mark your 2022 calendars and plan a photo expedition:

- Memorial Day: May 30
- Independence Day: July 4
- Labor Day: Sept. 5

Learn more:
droughtimpacts.unl.edu/Tools/VisualDroughtAtlas.aspx