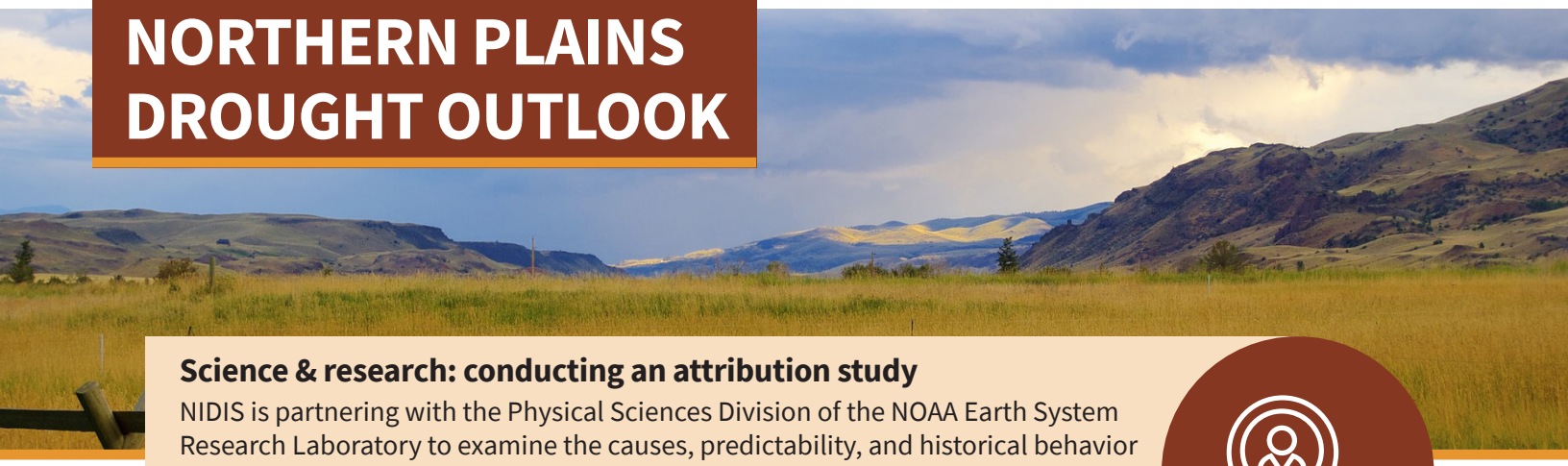
2018 EXPERIMENTAL NORTHERN PLAINS DROUGHT OUTLOOK

National Integrated Drought Information System
Drought.gov



Science & research: conducting an attribution study

NIDIS is partnering with the Physical Sciences Division of the NOAA Earth System Research Laboratory to examine the causes, predictability, and historical behavior of this and other droughts over the Northern Plains. Drought in the Northern Plains is understudied relative to other regions of the United States, and this study will help to lay a foundation of understanding of what aspects of the region's droughts are predictable.

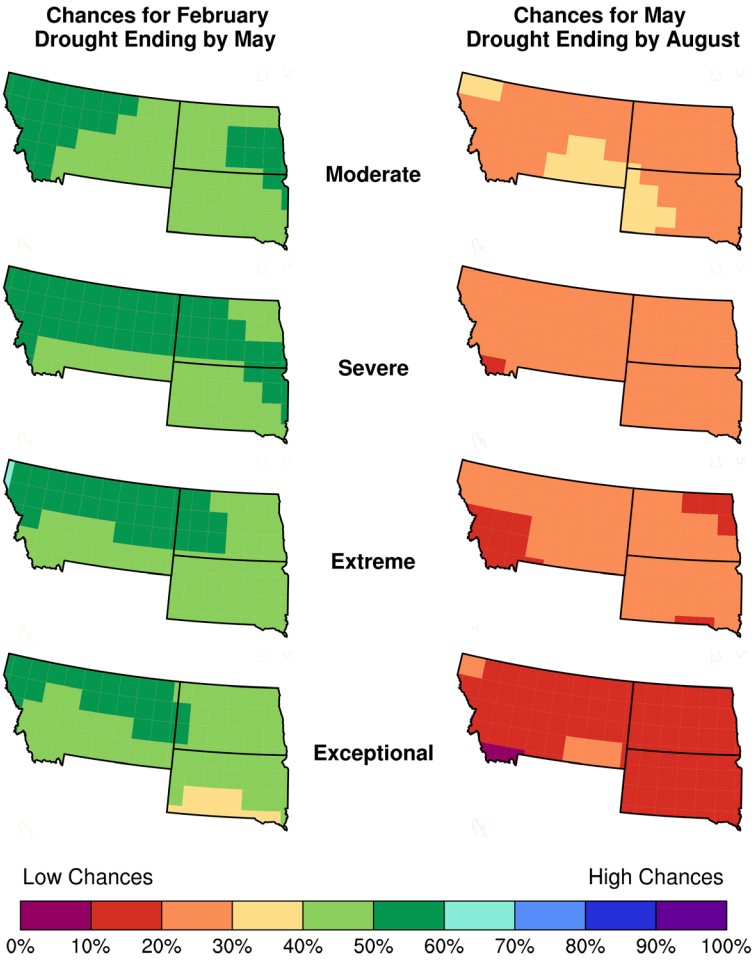


Fig. 1. Chances of drought demise from four levels of drought intensity estimated using 4000 years of climate model simulations.

Springtime: The Greatest Chance for Drought Termination

The chances of drought termination or demise during spring (March-May) are greater than during summer (June-August) over the Northern Plains. For much of the region, there is between a 40-60% chance for a drought of any intensity in February to end during spring. By contrast, there is only a 20-30% chance for a moderate, severe or extreme drought in May to end during summer. For an exceptional drought in May, the chances for a drought to end in summer is less than 20%.

The reason that drought demise becomes more likely during spring, as opposed to during summer, is because less precipitation is required to replenish soil moisture. It is also important to note that evaporation during spring is half that of summer. During spring, precipitation in the 50th and 70th percentiles is sufficient to end a drought, whereas during summer higher percentiles (70th-80th) are required.

The chances of drought termination are greater during March-May than during June-August.

Weak La Niña to ENSO-neutral conditions are forecast for spring. Historically, these conditions lower the risk for drought conditions during the spring.

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ENSO Conditions: Spring 2017 versus Spring 2018

The footprint of the El Niño-Southern Oscillation (ENSO) is expected to be different during the spring of 2018, compared to the spring of 2017. A brief emergence of El Niño-like conditions during the spring of 2017 occurred simultaneously with rainfall deficits at the onset of the Northern Plains drought. Though brief, El Niño could have partially driven these rainfall deficits, given that El Niño is related with an increased risk of extreme dry springs over the Northern Plains[1].

As of February 2018, and unlike in February 2017, La Niña prevails and is forecast to transition to ENSO neutral conditions later this spring. This lowers the risk for continued drought conditions during the upcoming spring compared to last year.

[1] https://www.esrl.noaa.gov/psd/enso/climaterisks/

The chances of drought demise are estimated based on 4000 years of climate model simulations[2] since the observations alone do not provide an adequate sample from which to estimate robust drought statistics. The climate model effectively captures the seasonal cycle of precipitation, evaporation, and temperature across the Northern Plains. Drought is defined by soil moisture deficits, given the importance of the agriculture over the Northern Plains. The drought classification adopted here follows the U.S. Drought Monitor soil moisture percentiles[3].

[2] 40 simulations of the CAM5-CLM4 climate model with prescribed boundary conditions between 1916-2015: https://www.esrl.noaa.gov/psd/repository/alias/facts

[3] http://droughtmonitor.unl.edu/AboutUSDM/DroughtClassification.aspx

Have questions about the attribution study? Please contact:

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Overarching questions to be addressed by NOAA's Physical Sciences Division in the attribution study:

- What are the characteristics of past droughts in the region (in order to put this drought into the appropriate historical context)?
- What were the physical drivers of this drought, and how did they deviate from past droughts?
- Did climate change make this drought more intense?
- What are the sources of predictability for droughts in this region, and can they be applied to constrain the probability of drought demise during spring of 2018?