HPRCC

July 2020

The Prairie Post

Quarterly Newsletter of the High Plains Regional Climate Center

Inside this issue:

Message from the Director

By Dr. Rezaul Mahmood

Hello from Lincoln! Summer has arrived and it is hot and dry. I hope you, your families, and friends are continuing to be safe and healthy. Our staff continue to work remotely due to the COVID-19 pandemic. However, we have maintained full operations and continue to assist our stakeholders and partners. For instance, we have secured grants and published papers (Page 4), conducted webinars (Page 3), and even attended a conference remotely (Page 5)!

The most significant accomplishment for the HPRCC this quarter was the release of our upgraded website in July. This website redesign has been in the making for quite some time now, with all focus areas of the Center coming together to make it happen. The collaboration between the IT staff, who developed the infrastructure, and the services staff, who developed the content, was an accomplishment we can all be proud of. When you go to the site, you will see that it has an updated design and improved functionality, along with some new and upgraded tools! We welcome your feedback on the new site, which can be submitted through our Contact Us page: https://hprcc.unl.edu/contact.php. You can also learn more about the new website on Page 2.

I expect to "see" some of you virtually in the coming months and I am looking forward to it. I also hope that we overcome this pandemic soon. Best wishes and be safe, and thanks for stopping at *The Prairie Post*!

Meet Our New Intern, Grace Campbell

Grace is a senior at Western Kentucky University, pursuing a B.S. in Meteorology, a minor in Agriculture, and a certificate in GIS. This summer, she is working with Crystal and Natalie to develop a soil temperature climatology for part of the HPRCC region using soil temperature measurements at 4 inches. Specific temperature thresholds for common agricultural and horticultural crops will be used for analysis. The goal of this project is to provide a guide for when soil temperature becomes optimal for agricultural and horticultural crop development, especially early in the growing season.

On a personal note, Grace has been to 9 countries! She loves to travel, and her favorite countries so far have been Greece and Austria. She loves to read, especially on other scientific fields and classic literature, and she's been playing the piano since she was a kid. Something unique to her meteorology journey is that she does not have a defining weather moment that spurred her interest. She has also never watched *Twister* in its entirety! She grew up terrified of storms, but at some point, that changed to curiosity and intrigue. She's still trying to figure out what caused that shift!

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Crepuscular rays over a corn field (photo courtesy Crystal Stiles)

Newsletter editor:
Crystal J. Stiles

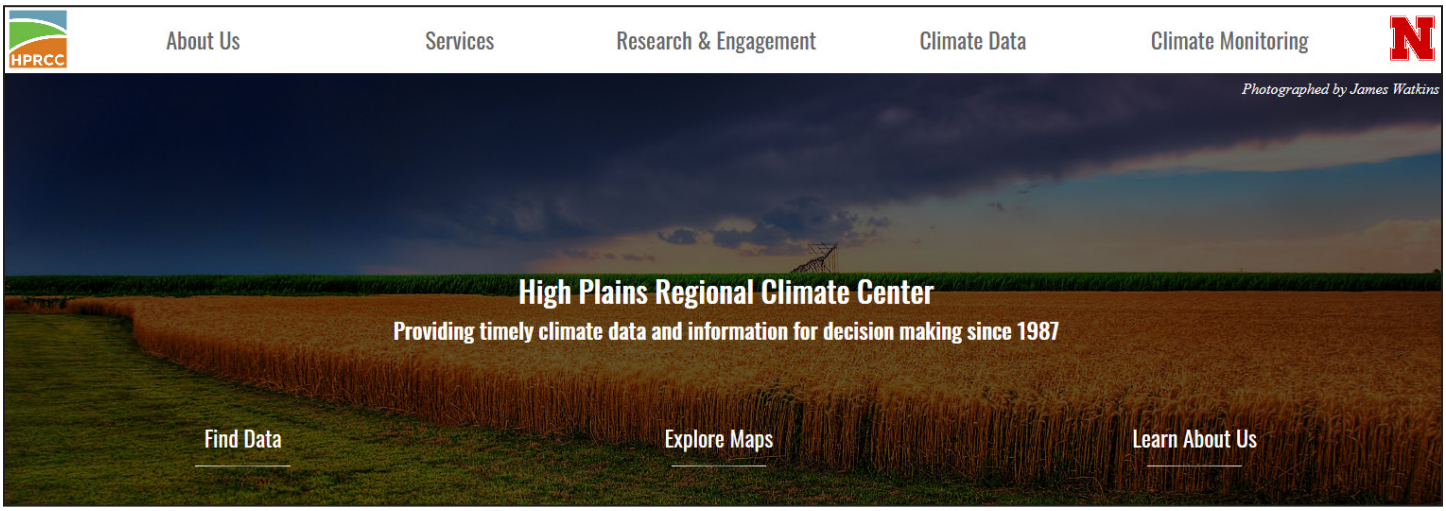
Contributors:
Natalie Umphlett, Rezaul Mahmood, Warren Pettee, Logan Winters, Paul Flanagan, Bill Sorensen, Grace Campbell, Crystal Stiles

High Plains Regional Climate Center
713 Hardin Hall
3310 Holdrege Street
Lincoln, NE 68583-0997

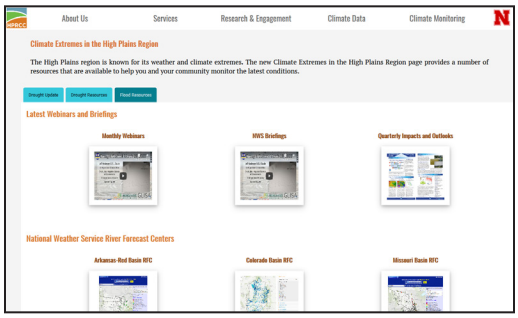
Follow us on Twitter!
@HPClimateCenter

Phone: (402) 472-6706
Fax: (402) 472-2946
Web Address: www.hprcc.unl.edu
E-mail: www.hprcc.unl.edu/contact.php

HPRCC Launches Upgraded Website



The HPRCC website received a major update in July! The update includes a visual overhaul across the entire site, along with a few new tools and features. Rest assured that while the appearance of the site has drastically changed, the overall navigation has remained the same, with the exception of the Station Tool and Tribal Dashboards, which now have new links. Below you will find information on some of the updates and new additions to the site.



Climate Extremes Page

Weekly drought updates now have their spot in the sun, thanks to the new Climate Extremes page. This page provides region-focused resources for drought and flooding, and it includes a dedicated tab for the weekly drought update, which we have been producing on a regular basis for several years. This page was created due to a request from our state partners in the region after experiencing devastating flooding in 2019. Explore the Climate Extremes page to discover resources, and build resilience to drought and flooding in your part of the region! https://hprcc.unl.edu/climate_extremes.php

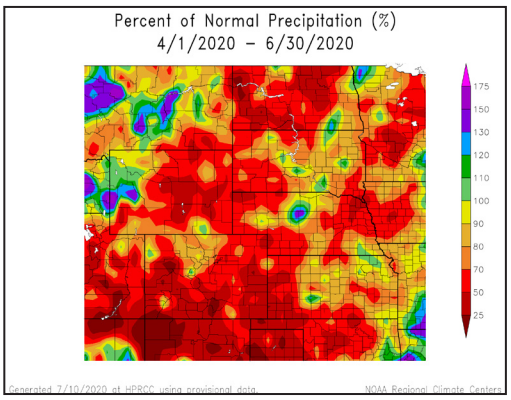
Station Data Explorer Tool

The latest addition to HPRCC's digital toolset is the Station Data Explorer! This tool allows you to create graphs using data from any station in ACIS, for any time period available. Best of all, each graph is linkable, allowing you to save or share the graphs after creating them. The Station Tool now links to the Station Data Explorer when it shows information about a selected station. Look forward to new additions to the Station Data Explorer as HPRCC staff work on new visualizations and variables that can be included! https://hprcc.unl.edu/stationtool/explore.php

We want to hear from you!!

Our website redesign has been in the works for quite some time now, with the goal of improving the functionality of the site for our users. Do you have comments on our new website? Did you find a bug that we should know about? We encourage you to contact us with your feedback! The best way to reach us is through our Contact Us page, linked here: https://hprcc.unl.edu/contact.php

Overview of Regional Climate Conditions



Drought Conditions Develop and Spread Across the Region

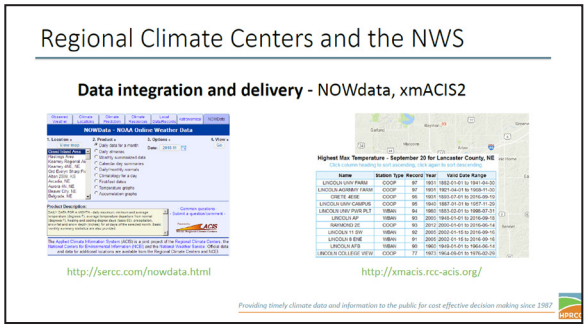
Wintry weather persisted into early June in parts of the High Plains region this year. There were some locations that had their snowiest season on record, including Boulder, Colorado. As the spring season continued, precipitation amounts were below normal for a large portion of the High Plains. Above-normal temperatures in portions of the area did not help the drought situation. The warm temperatures, combined with below-normal precipitation and high winds during May and June, led to further development and intensification of drought conditions. Portions of Colorado and Kansas have been particularly dry. For instance, over a third of Colorado was experiencing extreme drought (D3 on the U.S. Drought Monitor map) by July 1st. Rainfall deficits also began to increase across other areas of the High Plains, such as Bismarck, North Dakota, which had its 6th driest January-June period. The dry conditions have had a variety of impacts to the region. In portions of Colorado and Kansas, ranchers have begun auctioning off cattle due to the poor conditions. Winter wheat was also heavily impacted in that area as well. The dry conditions did, however, allow farmers to get ahead of schedule in getting corn and soybeans planted in the spring.

To learn more about the current state of the climate in the High Plains, check out our monthly, quarterly, and annual climate summaries here: https://hprcc.unl.edu/climatesummaries.php.

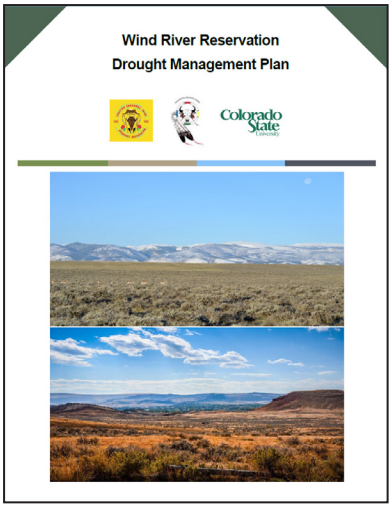
Services Staff Gather Needs, Assist with Drought Planning

Climate Services Webinars Conducted with NWS Partners

In May, HPRCC staff conducted a series of webinars for National Weather Service Climate Services Focal Points who serve the High Plains region. The webinars featured an overview of recent applied climate projects, a sneak peek at our newly released website, and open discussion time to provide updates. Although in-person meetings are always preferred, this was a great way to catch up on recent activities across the region.



The webinars were part of a Regional Climate Center and National Weather Service Climate Services Partnership project, where we aim to build and strengthen the relationship between these organizations through a coordinated response to the climate needs across the region. A special thank you goes to the NOAA Central Region Collaboration Team for hosting the webinars.



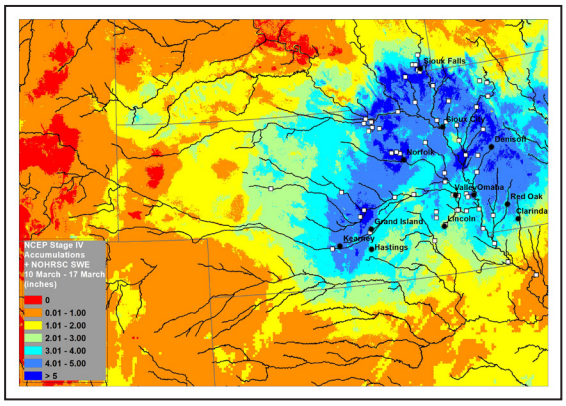
Wind River Drought Management Plan Completed

The HPRCC was a collaborator on a Bureau of Indian Affairs-funded project to develop a drought management plan for the Wind River Reservation in Wyoming. HPRCC staff contributed mostly to the monitoring section of the plan, which included providing input on a table of drought indices and indicators that are/can be used in the region. The Wind River climate dashboard, which was developed by HPRCC staff, was included as a key monitoring tool in the plan (check out the dashboard here: https://hprcc.unl.edu/tribal-dashboards/windriver.php).

The plan was completed in May and has been presented to the Wind River Water Board and Tribal Councils for adoption. The project was a collaboration between the Eastern Shoshone and Northern Arapaho Tribes, Colorado State University, HPRCC, the National Drought Mitigation Center, NOAA/National Integrated Drought Information System, and the Wyoming Established Program to Stimulate Competitive Research (EPSCoR).

HPRCC Secures Several Grants, Publishes Research this Quarter

Applied research is one of our key activities at the HPRCC, and our staff have been very busy with this task during the past quarter! Collectively, we were awarded three grants and published two papers on our work. These grants and publications are highlighted below. To learn more about our research and engagement projects, visit our projects page: https://hprcc.unl.edu/projects.php. To peruse our publications, visit our publications page: https://digitalcommons.unl.edu/hprcc/.



From Flanagan et al. 2020: Liquid precipitation and snow water equivalent totals for 10-17 Mar 2019. The white squares represent river gauges that set near-flood-stage records during the March flood event.

Grants

The HPRCC was awarded two subcontracts with tribes that applied for grant funds from the Bureau of Indian Affairs Tribal Resilience Program. One subcontract is with the Oglala Sioux Tribe in South Dakota, focused on water resource issues on tribal lands. In particular, staff will conduct a workshop for tribal resource managers with the Great Plains Tribal Water Alliance member tribes that focuses on water resource and flooding tools and information. The desire for this project stemmed from the flooding that impacted tribal lands in the North Central U.S. in 2019. The other subcontract is with the Ute Mountain Ute Tribe in southwestern Colorado. HPRCC staff will conduct a workshop on developing climate summaries for the three Ute tribes in this region. Crystal and Natalie are co-leads of the HPRCC portion of these projects. Stay tuned for more information!

Rezaul and his Ph.D. student Kierstin Blomberg received a fellowship from the Daugherty Water for Food Global Institute (https://waterforfood.nebraska.edu/). This fellowship will allow Kierstin to continue her work on the impacts of irrigation on the atmosphere, including precipitation. This research is part of Kierstin's doctoral dissertation.

Publications

Led by Paul, several HPRCC staff and UNL faculty as well as members of the Omaha/Valley National Weather Service office authored an article on the surface and atmospheric conditions which led to the devastating March 2019 flood in Nebraska, Iowa, and South Dakota. This article was recently published in the *Bulletin of the American Meteorological Society*. The Map Room publication details how a warm, wet, early winter, followed by frigid temperatures and record-breaking snow in late winter, led to extreme water conditions in the region prior to the bomb cyclogenesis and heavy rainfall event on March 12-14th, 2019.

Flanagan, P. X., R. Mahmood, N. A. Umphlett, E. Haacker, C. Ray, W. Sorensen, M. Shulski, C. J. Stiles, D. Pearson, P. Fajman, 2020: A Hydrometeorological Assessment of the Historic 2019 Flood of Nebraska, Iowa, and South Dakota. *Bull. Amer. Meteor. Soc.*, 101, E817–E829, https://doi.org/10.1175/BAMS-D-19-0101.1.

In May, Crystal and Natalie published an article with Mitch Cottenoir, former Tribal Water Engineer for the Eastern Shoshone and Northern Arapaho Tribes of Wind River, in the *Journal of Indigenous Research*. The publication outlines the process of co-developing and co-producing quarterly climate summaries with the tribes for the Wind River Reservation and surrounding area. The journal is open access, so the article is free to download.

Stiles, Crystal J.; Umphlett, Natalie A.; and Cottenoir, Mitch (2020) "Building Adaptive Capacity in Tribal Communities of the Missouri River Basin to Manage Drought and Climate Extremes: A Case Study from the Wind River Indian Reservation," *Journal of Indigenous Research*: Vol. 8 : Iss. 2020, Article 3. Available at: https://digitalcommons.usu.edu/kicjir/vol8/iss2020/3.

Dinwoody Lake, Wind River Reservation, Wyoming. (Photo courtesy Crystal Stiles)

Recent and Upcoming Activities

A Doppler on Wheels observing development of the planetary boundary layer, cloud cover, and convection as part of the GRAINEX project. (Photo by Rezaul Mahmood)

UNCA Guest Lecture, Remotely (April 20)

In April, Natalie recorded a lecture on climate change for an Introduction to Environmental Science course at the University of North Carolina Asheville. She presented on the basics of climate change and provided some examples of how climate change is impacting various animals, like sharks, bears, and sea turtles.

NWS Webinar on 2019 Flooding, Remotely (May 5)

In May, Natalie, along with NOAA's Central Region Regional Climate Services Director Doug Kluck, provided a webinar on the extreme wetness of 2019 in the Missouri River Basin. This webinar was largely based on a report covering the record-setting precipitation and flooding events of 2019 that was released in April: https://hprcc.unl.edu/pdf/2019Extremes.pdf.

National Center for Atmospheric Research Presentation, Remotely (May 12)

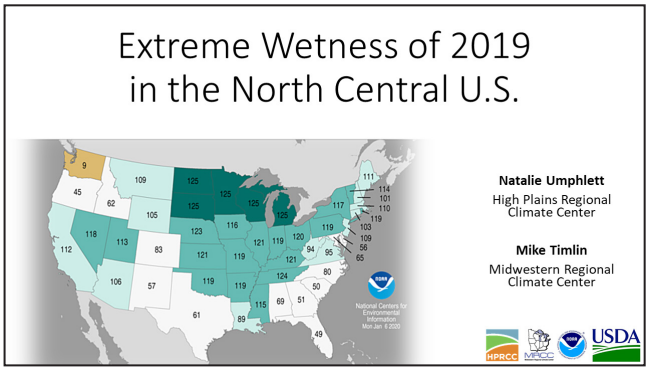
Rezaul gave an invited talk for the Earth Observation Laboratory at NCAR. This talk was focused on initial results from the Great Plains Irrigation Experiment (GRAINEX) (https://www.eol.ucar.edu/field_projects/grainex). The field campaign was carried out in Nebraska during the 2018 growing season. Rezaul discussed impacts of irrigation on near-surface meteorology such as changes in heat fluxes, moisture distribution, heat content, and changes in the development of the Planetary Boundary Layer.

WERA 1012 Meeting, Remotely (May 19-20)

The annual Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS)-sponsored conference on volunteer precipitation measurements took place with the help of technology and an energized and enthusiastic community. Bill attended the many web-based presentations on measurement, data visualization, and infrastructure.

American Association of State Climatologists Annual Meeting, Remotely (June 5, 12, 19, 26)

In lieu of an in-person meeting this year, the AASC met via Zoom on Fridays in June (termed "State Climate Fridays"). Crystal, Natalie, Rezaul, Paul, Jamie, Warren, and Bill participated in the meetings. Natalie, along with Mike Timlin of the Midwestern Regional Climate Center, co-presented on the extreme wetness in the North Central U.S. in 2019. HPRCC staff also had a meeting with representatives from each state climate office in our six-state region to provide updates on recent activities. We hope that we will be able to resume our in-person gatherings next year in Portsmouth, NH.



Title slide of Natalie and Mike's presentation for the AASC meeting.

Upcoming: SNR Seminar Series (July)

Our Ph.D. student Kierstin Blomberg and M.S. student Emilee Lachenmeier will be presenting at the School of Natural Resources (SNR) Summer Seminar Series. Their talks will be based on their doctoral dissertation and M.S. thesis research. Kierstin will be presenting "Modeling Irrigation Impacts on Atmospheric Conditions during the 2012 Historic Drought," while Emilee will be presenting "Impacts of Irrigated Agriculture on the Near Surface and Planetary Boundary Layer Atmosphere: Preliminary Results from the GRAINEX."

Upcoming: SciComm 2020, Remotely (August)

Natalie will be attending the SciComm 2020 conference. This conference brings together communicators from across the country in order to share and learn effective ways to communicate science. If you are interested in attending, please see: http://www.scicommcon.org/.

Upcoming: National Tribal & Indigenous Climate Conference, Remotely (September)

The Inaugural National Tribal & Indigenous Climate Conference, initially slated to be held in late August/early September in St. Paul, MN, will instead be held virtually in mid-September. The conference will be hosted by the Institute for Tribal Environmental Professionals and is being funded by the Bureau of Indian Affairs. Crystal and Natalie plan to attend and have submitted an abstract to present on recent tribal engagement activities at this meeting.