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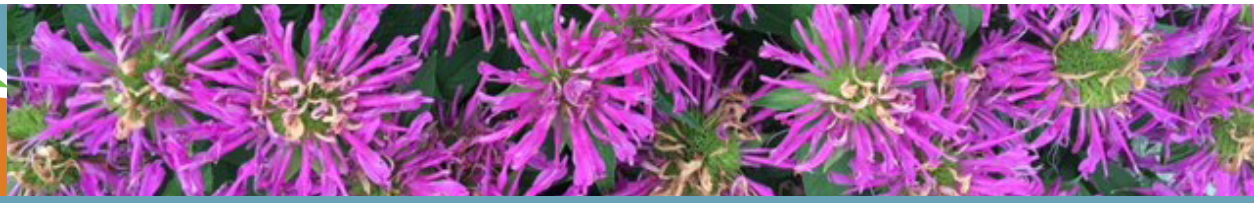

July 2018

The Prairie Post

Quarterly Newsletter of the High Plains Regional Climate Center

Inside this issue:

Message from the Interim Director

By Ms. Natalie Umphlett

Welcome back to *The Prairie Post*! Between hosting workshops, traveling to conferences, and developing new climate tools, this has been a full quarter for HPRCC staff. In this edition of *The Prairie Post*, you can read about an exciting project called GRAINEX (page 2), new climate tools from our partners (page 3), a summary of recent climate conditions (page 4), and our latest travels and upcoming events (page 6). We even have a preview of a new GIS Portal that will be coming out later this summer (page 4)!

In addition to these activities, you will get the chance to learn more about our new director, Dr. Rezaul Mahmood. With Dr. Mahmood starting in July, this will be my last opening message for *The Prairie Post*. I am thankful for the opportunity to lead the Center for the past 2.5 years, but am happy to be able to focus on my role as regional climatologist. It will be exciting to see what new directions we take as a Center and I am confident that under Dr. Mahmood's direction, we will continue to succeed! To learn more about our new director, please see the section below or check out his profile on the HPRCC personnel page: https://hprcc.unl.edu/personnel.php. Thank you for stopping at *The Prairie Post*!

Meet Our New Director, Dr. Rezaul Mahmood

Dr. Rezaul Mahmood joined our staff on July 1st as the 5th director of the HPRCC, also serving as a Professor in the School of Natural Resources at UNL. Rezaul came to us from Western Kentucky University (WKU), where he was a Professor and Associate Director of the Kentucky Climate Center and Kentucky Mesonet. He provided leadership in the development of the Kentucky Mesonet, as well as WKU's High Performance Computing Center and Meteorology Program. His research focuses on mesoscale meteorology, climatology and observations, regional climate, modeling atmospheric impacts of land use and land cover change, modeling impacts of soil moisture on weather and climate, and air quality meteorology.

Rezaul already had several connections to the Plains and UNL before becoming director of the HPRCC. For instance, he served as a Postdoctoral Research Associate for the HPRCC from 1999-2001. And, he leads a National Science Foundation project called "Great Plains Irrigation Experiment," also known as GRAINEX, which aims to better understand impacts of irrigation on climate conditions and land use/land cover (read more about it on page 2). On a personal note, Rezaul comes to Lincoln with his wife, Rawnak, and his son, Onjoy, who is starting high school this fall. Rezaul loves the sitcom *Seinfeld* and would challenge anyone's knowledge of the show! When asked where one would want to retire to, most would say to the beach or the mountains, but Rezaul would say the Plains! Rezaul is excited to be back in Lincoln and directing the HPRCC, and the staff is very happy to have him!

Publisher and cover photo information:

Cover photo:
Bee balm (photo courtesy Natalie Umphlett)

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NSF Grant to Examine Irrigation's Role in Precipitation

A national team led by the University of Nebraska-Lincoln is studying potential links between irrigation, cloud formation and rainfall. Funded by the National Science Foundation, the Great Plains Irrigation Experiment — or GRAINEX — is gathering weather observations in June and July from a 3,600-square-mile region in southeastern Nebraska. The timing allows the team to better understand how irrigation may affect climate conditions at the start of irrigation season in June through late-July when it peaks.

Rezaul Mahmood (left), lead researcher on the GRAINEX project, talks with a student and co-project lead Eric Rappin (right) of Western Kentucky University.

"The study area includes transition from extensively irrigated areas to dry land or non-irrigated areas," said Rezaul Mahmood, lead researcher and director of Nebraska's High Plains Regional Climate Center at the School of Natural Resources. "In other words, the experimental setting provides a unique opportunity to investigate the influence of these two noticeably different land surface and land cover side-by-side." Ultimately, results of the study will be used to better inform agricultural planning and weather forecasting in the United States and around the world.

What science already has proven is that widespread global irrigation is adding significant amounts of water to the land surface and is altering regional land use and land cover. Researchers know these changes can affect local and regional weather development, including cloud formation and therefore rainfall. But the link hasn't been fully fleshed out.

"Prior studies have found that the Great Plains is a hotspot where soil moisture plays an important role in cloud formation and precipitation," said Nick Anderson, a program director in the National Science Foundation's Division of Atmospheric and Geospace Sciences, which funded the research. "Land use change and irrigation due to agricultural activities could be important factors affecting land-atmosphere interactions in this region."

In May, the researchers from six partnering institutions — Nebraska, the Western Kentucky University, the University of Alabama at Huntsville, the University of Colorado Boulder, the National Center for Atmospheric Research, and the Center for Severe Weather Research — started collecting weather observations at five locations in the state.

They have deployed 80 temporary research-grade meteorological stations; are measuring the fluxes of water and energy from six irrigated and six non-irrigated locations; are gathering radar observations of the lower atmosphere, or Planetary Boundary Layer, from three locations; and are adding two surface-based locations capable of observing and collecting data on the daily evolution of the PBL. They also are sending up 600 weather balloons to collect data on the atmospheric pressure, temperature, humidity and wind speed every two daytime hours for 15 days starting July 16. "Several times, I asked myself if I was asking for too much or trying to do too much," Mahmood said, especially once he discovered the trucks hauling helium to the testing sites were too heavy to cross the rural route bridges. "But we want to do good science."

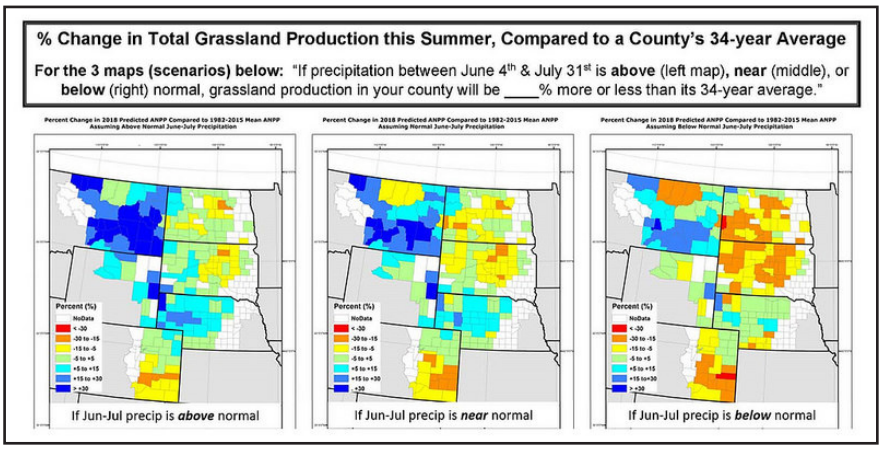
All the data will later be analyzed and used beside modeled applications to determine if and how irrigation is affecting precipitation in the Great Plains. For modeling, the team will use NCAR's supercomputing facility as well as the Holland Computing Center at Nebraska and computational facilities of WKU and UAH.

Researchers on the project include Udaysankar Nair of UAH, Eric Rappin of WKU, and Roger Pielke Sr. of CU Boulder, and the team is working closely with Nebraska State Climate Office, Nebraska Extension, and the State of Nebraska's Natural Resource Districts in the study area. The grant, earned earlier this year while Mahmood served as the associate director of the Kentucky Mesonet & Kentucky Climate Center at WKU, is in the process of being transferred to Nebraska.

Writers: Shawna Richter-Ryerson, Natural Resources; and Tommy Newton of WKU

Grass-Cast: A New Grassland Productivity Forecast for the Northern Great Plains

Every spring, ranchers face the same difficult challenge - trying to guess how much grass will be available for livestock to graze during the upcoming summer. In May, a new Grassland Productivity Forecast or "Grass-Cast" has published its first forecast to help producers in the northern Great Plains reduce this economically important source of uncertainty.



Grass-Cast maps are updated every two weeks to incorporate newly observed weather data and emerging trends in grazing conditions.

This new, experimental grassland forecast is supported by the U.S. Department of Agriculture's (USDA) Agricultural Research Service (ARS), Natural Resources Conservation Service (NRCS), and the National Drought Mitigation Center (NDMC). Other collaborators include Colorado State University and the University of Arizona.

Grass-Cast uses more than 30 years of historical data about weather and vegetation growth - combined with seasonal precipitation forecasts - to predict if rangelands in individual counties are likely to produce above-normal, near-normal, or below-normal amounts of vegetation for grazing.

Grass-Cast's accuracy improves as the growing season unfolds, so it should be consulted more than just once during the growing season. Grass-Cast maps are updated every two weeks to incorporate newly observed weather data and emerging trends in grazing conditions.

Grass-Cast provides ranchers and land managers with a range of what productivity might be in the upcoming growing season relative to their own county's 30-year history. Ranchers and land managers will need to combine the forecast information with their knowledge of local soils, plant communities, topography, and other conditions as part of their decision-making process. Grass-Cast also gives ranchers a view of rangeland productivity in the broader region to help with larger-scale decision-making, such as determining where grazing resources might be more plentiful if their own region is at risk from drought.

Since Grass-Cast cannot tell the difference between desirable forage species and undesirable forage species, it is important for producers to know what proportion of a pasture is occupied by weeds, and how well those weeds respond to rain (or lack of rain) compared to the desirable species. Producers should monitor these different vegetation types to see if one is responding to the weather better than the other and adjust Grass-Cast's productivity estimates accordingly. Grass-Cast does not directly account for local management practices, such as grazing intensity in previous years. Producers should therefore adjust Grass-Cast's estimates accordingly.

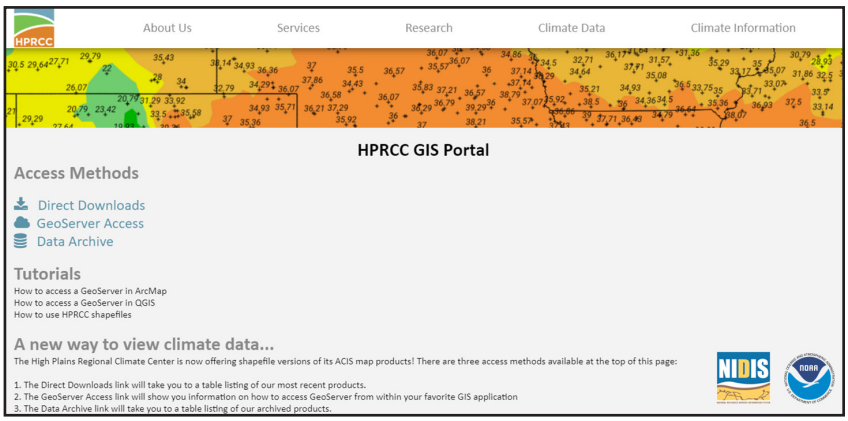
Producers should not rely on Grass-Cast as a sole source for making management decisions. Similarly, public land managers should not use Grass-Cast as a sole source of information for setting stocking rates, determining turnout dates, or for other aspects of lease agreements, allotments, or permits.

Visit the Grass-Cast website for the latest maps, an introductory video, program contacts, and other resources: http://grasscast.agsci.colostate.edu/.

-Story by Dannele Peck, Director, USDA Northern Plains Climate Hub and Sharon Durham, Public Affairs Specialist, Agricultural Research Service in Climate, Animals (Click here for the web link to the story: https://www.usda.gov/media/blog/2018/06/13/grass-cast-new-grassland-productivity-forecast-northern-great-plains.)

Coming Soon - GIS Portal

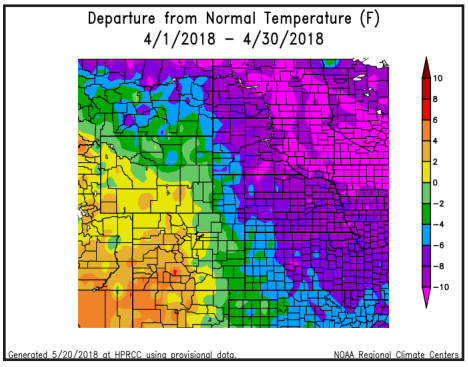
If you have ever wanted to create a customized ACIS Climate Summary Map, the wait is almost over! Later this summer, the HPRCC will be releasing a new GIS Portal, which will allow access to shapefile versions of our popular ACIS Climate Summary Maps. These shapefiles will allow users to create custom regions, apply different color schemes, and incorporate other datasets into the map.

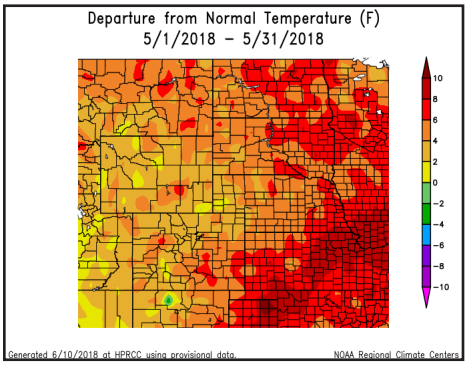


The GIS Portal (see image at right for a screen shot) will allow access to the shapefiles in two ways – one is through direct downloads on the website and the other is through a GeoServer. The direct download option will be easily accessible to anyone wanting to create a customized ACIS Climate Summary Map, while the GeoServer will allow for more sophisticated access for those who may want to use the data on a regular basis. In addition to the data itself, step-by-step tutorials are being integrated into the GIS Portal. If you are interested in testing the shapefiles before the official release, please contact Warren Pettee at warren.pettee@unl.edu.

Funding for this project was provided by NOAA's National Integrated Drought Information System (NIDIS).

A Drastic Temperature Change





The biggest climate story from the past three months was the rapid change from cool conditions in April to warm conditions in May and June. April temperatures were 6-10°F below normal in the eastern High Plains, which caused soils to stay frozen longer and a delay in the start of the growing season. Then, conditions turned around dramatically, with May temperature departures ranging from 4-8°F above normal in the same region. Temperature records went from one extreme to the other in some locations. For instance, Aberdeen, South Dakota went from having its 2nd coolest April to its 3rd warmest May on record. Memorial Day Weekend was especially hot, as the excessive heat caused pavement to buckle in Omaha, Nebraska, and it was blamed for cattle deaths in South Dakota. Above-normal temperatures continued into June, with numerous locations breaking into the top 10 warmest of Junes. While the rapid warmup helped producers catch up on planting, crops progressed rather quickly in June, and especially warm nighttime temperatures have corn producers worried about negative impacts on yields.

While April was fairly dry across the region, May and June brought beneficial precipitation to drought-stricken areas of the Dakotas, western Kansas, and extreme southern Nebraska. In the Upper Missouri Basin, snowfall was plentiful this year, causing streamflows to run high. Due to high runoff and heavy spring precipitation, the U.S. Army Corps of Engineers increased releases on Missouri River mainstem projects to evacuate floodwaters. Meanwhile, water-year deficits continued to accumulate in southern and western Colorado, an area where snowpack was abysmal this year and spring precipitation was scarce. Wildfires have been an issue across these areas; in fact, at the time of this writing, the Spring Creek fire in southern Colorado had burned more than 108,000 acres and was the 3rd largest fire in Colorado's history.

Want to know more about climate conditions in the High Plains? Check out our monthly and quarterly climate summaries here: https://hprcc.unl.edu/climatesummaries.php.

Congratulations to North Dakota for Winning the CoCoRaHS Cup!

From left to right: Brad Hopkins, Greg Gust, and Ryan Knutsvig of NWS Grand Forks, and Adnan Akyuz. (Photo courtesy Adnan Akyuz via Twitter)

Every March, the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) network holds a March Madness competition. But, it has nothing to do with basketball! State CoCoRaHS coordinators are charged with the task to recruit as many new CoCoRaHS volunteers as possible during the month of March. There are two categories for the competition – a traditional count (highest number of observers recruited) and a per capita count (highest number of observers, weighted by population). The winning state in each category receives the "CoCoRaHS Cup" to keep on display until next year's contest. We are proud to announce that the CoCoRaHS Cup has come back to the High Plains this year – North Dakota won the competition for recruiting the most observers per capita! North Dakota is not new to this competition – the state also won the per capita category in 2010 and 2015. Congratulations to North Dakota's State Climatologist and CoCoRaHS Coordinator Adnan Akyuz, and all others who helped bring the cup back to the state!

Want to learn more about CoCoRaHS or be an observer? Check out the website here: https://www.cocorahs.org/.

HPRCC Staff Win Service Awards

Congratulations to Jamie Lahowetz and Natalie Umphlett for earning University of Nebraska-Lincoln service awards! This year, Jamie earned his 5-year award, while Natalie earned her 10-year award. Here's to many more years to come!

HPRCC Staff Conduct Climate and Wildlife Workshop

In May, HPRCC staff conducted a climate workshop for researchers and Nebraska Master Naturalists at the Crane Trust Nature & Visitor Center in Wood River, Nebraska to provide them with an introduction to climate, available climate tools and how to access them, and how to interpret data for their work.

Crystal discusses weather station networks at the Climate and Wildlife workshop held at the Crane Trust Nature and Visitor Center. (Photo courtesy Natalie Umphlett)

"In particular, workshop participants were interested in using climate data for their wildlife research," said Natalie Umphlett, regional climatologist with the HPRCC. "They want to investigate how changes in climate are impacting wildlife."

The link between climate change and impacts on wildlife is a complicated one, but researchers have been documenting changes. For instance, staff at the Crane Trust have noticed shifts in wildlife habitat and changes in bird migration patterns linked to warming temperatures. How that will affect survival rates in the long-term is now being studied. Researchers at the Crane Trust have discovered that Sandhill cranes may not be leaving Nebraska sooner each spring, but they are arriving earlier, and they have observed that two pairs of breeding cranes never went north this winter. While using climate data can help wildlife researchers better understand these changes, knowing what data are available and where to find it can be a challenging first step.

"There are climate tools available that do the analysis and number-crunching for you," said Crystal Stiles, applied climatologist with the HPRCC. "A researcher's time is valuable, so sharing these tools with them allows them to dedicate more of their time to another aspect of their project."

HPRCC staff are eager to provide assistance with obtaining and interpreting climate data and information. Please contact the Center if you have any questions: https://hprcc.unl.edu/contact.php.

Recent and Upcoming Travel and Activities

Natalie explores the USGS EROS Center near Sioux Falls, SD. (Photo courtesy Natalie Umphlett)

Congressional Roundtable, Sioux Falls, SD (May 8-9)
In May, Natalie participated in a congressional roundtable session, which was hosted by the NOAA Central Region Collaboration Team. The event was held at the USGS Earth Resources Observation and Science (EROS) Center near Sioux Falls, SD. The goal of the roundtable was to increase the awareness of NOAA's activities, specifically in the state of South Dakota. Several topics were discussed, including fire weather, drought, and available weather and climate networks. Natalie gave an overview of regional climate services in support of South Dakota. Attendees included Congressional staffers from the offices of Senator Thune, Senator Rounds, and Representative Noem, members of the NOAA Central Region Collaboration Team, and local and regional partners.

Climate Prediction Applications Science Workshop, Fargo, ND (May 22-24)
Popularly known as CPASW, Natalie and Crystal presented on some of their work at this meeting, which was held at North Dakota State University and hosted by the North Dakota State Climate Office. The HPRCC was one of the meeting's organizers. Natalie talked about the NOAA SARP-funded climate and cities project, while Crystal discussed the two BIA-funded climate capacity-building projects with the Great Plains Tribal Water Alliance.

Wild Weather at Lancaster Extension Education Center's 4H Clover College, Lincoln, NE (June 20)
HPRCC intern Emily co-led a wild weather class with Tyler Williams of Nebraska Extension for the 4H Clover College at the Lancaster Extension Education Office. Kids ranging from 10 to 12 years old learned about cloud classification, the difference between weather and climate, and how forecasts are made. They also visited a weather station and measured wind speed with handheld instruments.

American Association of State Climatologists Annual Meeting, Nebraska City, NE (June 20-22)
The location of this year's AASC meeting made it easy for several HPRCC staff members to attend! Jamie, HPRCC's AWDN manager, attended a mesonet meeting, while Bill helped lead a one-day training on ACIS Web Services. Natalie and Crystal brought posters on our cities and tribal engagement projects. Natalie presented on our upcoming ACIS-based GIS data retrieval portal, and Crystal organized and served on a panel to discuss tribal engagement on climate issues.

Upcoming: High Plains Chapter of the AMS and NWS Conference, Hastings, NE (August)
In August, Warren will be attending and presenting at the 20th Annual High Plains Conference, which is sponsored by the High Plains chapter of the American Meteorological Society and National Weather Association. He will be providing an overview of our new GIS Portal that will be released later this summer.

Upcoming: North Central Extension Water Summit, Keshena, WI (August)
Crystal will be attending this meeting organized by the North Central Region Water Network and hosted by the College of Menominee Nation, which will focus on building collaboration between state land grant universities and tribal colleges and universities. Crystal will present on recent tribal engagement projects and hopes to make new connections for future collaborations.

Crystal participates in a panel on tribal engagement issues at the AASC meeting. (Photo courtesy Natalie Umphlett)

Upcoming: HPRCC Retreat, Lincoln, NE (August)
Each year, HPRCC staff gather to discuss the results of ongoing projects and set priorities for the coming year. With our new director starting this summer, we are hoping for exciting discussions that will lead to new and improved climate services for the High Plains Region!

Upcoming: Kentucky DEWS Kickoff Meeting, Frankfort, KY (September)
As part of her NDMC appointment, Crystal will be helping with a two-year, NIDIS-funded project led by Dr. Stu Foster, State Climatologist of Kentucky, to develop a drought early warning system for the state. Crystal is in a unique position to work on this project because she worked with Stu and several stakeholders on drought issues in Kentucky for her Master's thesis project. Crystal will be attending and helping facilitate the project's kickoff meeting in Frankfort, which happens to be Crystal's hometown!