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High Plains Regional Climate Center

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One of the many breathtaking views from Pecos National Historical Park in New Mexico (photo courtesy Crystal Stiles)

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Message From The Interim Director

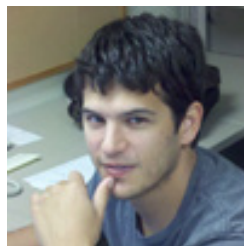
By Ms. Natalie Umphlett

It has been an exciting spring and early summer for the HPRCC. As you may know, the HPRCC is supported by NOAA's National Centers for Environmental Information (NCEI) as part of a three-tiered approach, which emphasizes services that are local, regional, and national in scope. The HPRCC has just secured a new 4.5-year contract to continue our work providing climate data and information to the people of our region. In August, I will be attending a Regional Climate Services Planning Workshop at NCEI in Asheville, NC. This 3-day workshop kicks off the new contract and seeks to identify additional opportunities for collaboration for enhanced regional climate services as part of the long-term goals of the program. Additionally, HPRCC staff are involved in two newly-funded NOAA Sectoral Applications Research Program (SARP) projects – one focusing on climate adaptation planning and one focusing on drought planning. You can read more about these projects and HPRCC's roles on Page 2. It truly is a refreshing and exciting time for the HPRCC!



In other important HPRCC news, long-time staff member, Dr. Jinsheng You, will be departing at the end of this month. Dr. You joined the HPRCC in 2003, under the direction of former director Dr. Ken Hubbard. During his time here, Dr. You has conducted research focusing on quality assurance procedures of climate data. Much of his work focused in the area of soil moisture monitoring. You can check out his most recent work in *Frontiers in Environmental Science*. "A Multi-sensor View of the 2012 Central Plains Drought from Space" was led by Dr. Jun Wang of the University of Nebraska-Lincoln, and Dr. You served as a co-author. We wish Dr. You all the best!

Meet Our AWDN Manager, Jamie Lahowetz

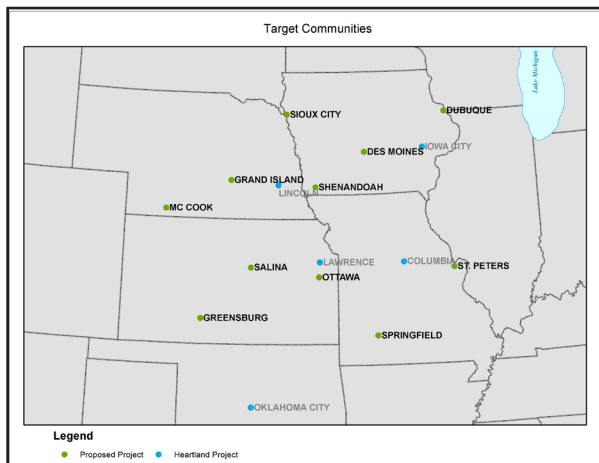


Jamie has been with the HPRCC since 2011 and is responsible for the management and development of the Automated Weather Data Network (AWDN). His tasks include addition and removal of new stations, maintenance of the storage and retrieval system, and corrections to the current data archive. Jamie stays in contact with state mesonets around the region in order to keep data and metadata up-to-date. Jamie has a Bachelor of Science degree in Meteorology/Climatology from the University of Nebraska-Lincoln (UNL). As a student, he participated in a project that was a collaborative effort between UNL and the University of Colorado Boulder that used Unmanned Aircraft Systems to collect data from tornadic storms. This project contributed valuable information to VORTEX2, which was a large effort to improve tornado forecasting by understanding more about how, when, and why tornadoes form. As for hobbies, Jamie likes to paint miniatures, play board games, play guitar, create origami, and spend time with his dog.



Research Update

Two projects in which HPRCC staff are involved were funded by the NOAA Sectoral Applications Research Program (SARP), which is under the Climate Program Office. SARP supports research and activities that address stakeholder needs within key socioeconomic sectors that are impacted by climate-related issues. Read more about these two NOAA SARP-funded projects, as well as other HPRCC projects, below.



Target communities for the municipal climate adaptation planning project. (Map courtesy Natalie Umphlett)

Increasing the Capacity for Municipal Climate Adaptation Planning in the Lower Missouri River Basin States

Over the past couple of years, the HPRCC has worked alongside city managers, planners, and other climatologists to understand climate information needs for different municipality departments in select cities in the Midwest and Great Plains. Preliminary results showed that each location had unique concerns regarding a variety of issues ranging from heat and cold waves and their impacts on human health, to cooling degree day requirements and energy needs, to heavy precipitation event frequency for runoff and water management impacts. This project was quite successful and a team of researchers at UNL came together to seek funding to expand the pilot. Senior project personnel include Dr. Martha Shulski (Nebraska State Climate Office), Natalie Umphlett (HPRCC), Tarik Abdel-Monem (University of Nebraska Public Policy Center), Dr. Zhenghong Tang (UNL – Community and Regional Planning Program), and Frank Uhlarik (City of Lincoln).

The goal of the project is to produce climate information products based on engagements, surveys, and focus groups with municipal staff in the lower Missouri River Basin states (Iowa, Kansas, Missouri, and Nebraska). HPRCC staff will be analyzing and interpreting climate data and information for the participating communities, as well as developing a web-based interface to house this information. The two-year project was funded for \$207,842.

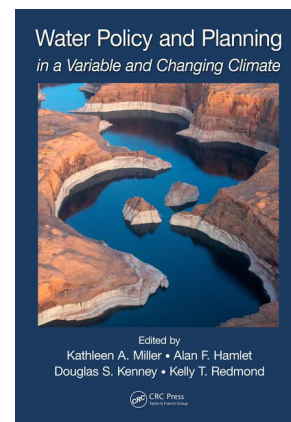
Drought Planning Using Community Threat and Hazard Identification and Risk Assessment

The overall goal of this NOAA SARP-funded project is to use climate data to develop, test, and disseminate a decision-support model which applies the Threat and Hazard Identification and Risk Assessment (THIRA) process to drought scenarios using climate and hydrological data. HPRCC applied climatologist Dr. Crystal Stiles is a co-Principal Investigator of this project. Other senior project personnel include Dr. Denise Bulling (Lead PI, University of Nebraska Public Policy Center (NUPPC)), Dr. Deborah Bathke (co-PI, National Drought Mitigation Center), and Dr. Lisa PytlikZillig (co-PI, NUPPC). Crystal's role is to provide content expertise at a THIRA workshop and help develop a drought scenario, including providing expertise on NOAA and HPRCC data products that will be used in the scenario. She will also aid in the dissemination of project deliverables and will take the lead in disseminating deliverables via HPRCC's website and newsletter. This two-year project was funded for \$284,588.

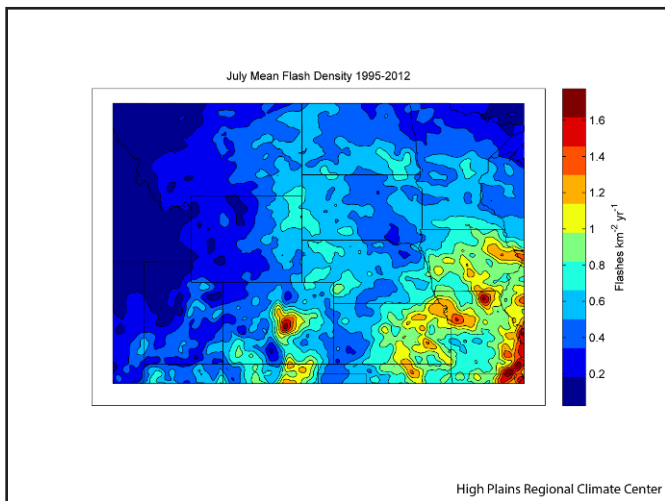
HPRCC Staff Member Co-Publishes Book Chapter

Crystal was a co-author of a chapter in the newly released book, *Water Policy and Planning in a Variable and Changing Climate*. This book is part of the series Drought and Water Crises, edited by Dr. Don Wilhite. The chapter that Crystal co-authored provided an overview of how drought is addressed at various levels of government, using examples from the western U.S. Crystal was able to draw from examples of drought planning by transboundary river basins from her dissertation research to address this topic. See below for the full citation of the book chapter.

Smith, K.H., C.J. Stiles, M.J. Hayes, and C.J. Carparelli, 2016: Support for Drought Response and Community Preparedness: Filling the Gaps between Plans and Action. In *Water Policy and Planning in a Variable and Changing Climate*, K.A. Miller, A.F. Hamlet, D.S. Kenney, and K.T. Redmond, eds., CRC Press – Taylor and Francis.



Product Highlight: Lightning Climatology



An exciting, new product was released this spring on the HPRCC website – a lightning climatology. Nearly 20 years of data from the VAISALA National Lightning Data Network were used to create the lightning climatology, which helps visualize the spatial and temporal distributions of lightning strikes. Monthly and annual maps of mean flash density, broken into positive and negative flashes, are available specifically for the Missouri River Basin region. Not surprisingly, the maps show that the majority of lightning activity in the region occurs in the spring and summer months in southern areas of the region. The maps do highlight some lesser known features, such as the Denver Convergence-Vorticity Zone (DCVZ). As seen in the image to the left, there is a bullseye of lightning activity in central Colorado in mid-summer. This activity corresponds to the DCVZ, an area of increased thunderstorm activity due to the geographical features

in the area. Check out the lightning climatology here: <http://www.hprcc.unl.edu/maps.php?map=Lightning>.

DID YOU KNOW?

The HPRCC maintains a data feed to the National Centers for Environmental Information (NCEI) that supplies climate data for the past 4 days collected from various climate networks, including the NWS Cooperative observer network and U.S. airport stations. NCEI incorporates this data into their GHCN-D dataset on a daily basis. The data includes stations from the entire U.S. and its Territories. The Pacific Islands were targeted this spring to ensure inclusion of all stations submitting data electronically on a daily basis. Data from over 5,800 stations are typically transmitted every day. Data are transmitted to NCEI twice a day and the values are used to help track potential issues with station data collection and quality assurance of the data.

Partnership Spotlight: Quarterly Climate Impacts And Outlook Collaboration

Each quarter, the HPRCC, along with the NOAA Central Region Regional Climate Services Director, takes the lead in the creation of the Quarterly Climate Impacts and Outlook for the Missouri River Basin. The report is a quick 2-page look at the previous season that provides an overview of recent climate conditions, significant events and their impacts, and an outlook for the upcoming season. (The image to the right is a screen shot of the June 2016 Quarterly Climate Impacts and Outlook for the Missouri River Basin.) Depending on the conditions, there will be special coverage for events like drought, floods, or frost/freeze occurrences.

Towards the end of each season, partners from all around the region come together via conference calls to discuss their local conditions and the climate events that had the most impact on their local area. This “boots on the ground” information is invaluable and makes the report more robust. Regular contributors to the report include state climatologists, extension personnel, the National Weather Service, the U.S. Army Corps of Engineers, the North Central Climate Science Center, the Northern Plains Regional Climate Hub, the Natural Resources Conservation Service, and the U.S. Geological Survey. A more detailed list with links to each of these groups is available on each report. An archive of the Missouri River Basin reports is available here (be sure to select “Quarterly” under Select Report): <http://www.hprcc.unl.edu/climatesummaries.php>. This report is one of a series of reports from all across the country. You may find other regions’ reports here: <https://www.drought.gov/drought/resources/reports>.

Quarterly Climate Impacts and Outlook
Missouri River Basin
June 2016

National - Significant Events for March - May 2016

U.S. Selected Significant Climate Anomalies and Events May and Spring 2016

Highlights for the Basin

Regional - Climate Overview for March - May 2016

Missouri River Basin Temperature and Precipitation Anomalies
March 1 - May 31, 2016

3-Month Precipitation and Temperature Outlook
Valid for July - September 2016

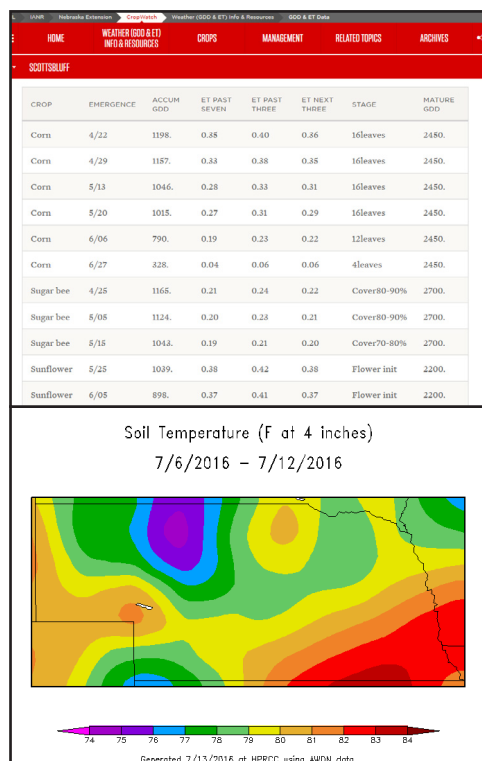
U.S. Seasonal Drought Outlook
Valid for July - September 2016

MO River Basin Partners

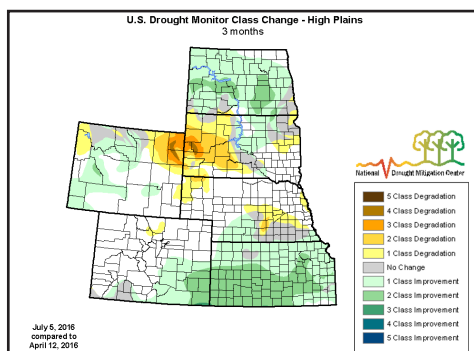
Learn More About The Automated Weather Data Network

AWDN Product Highlight: Providing Data for UNL CropWatch

The HPRCC works cooperatively with University of Nebraska Extension to supply climate data and products to their online publication, CropWatch (<http://cropwatch.unl.edu>). CropWatch provides resources on crop production and pest management for Nebraska producers and crop consultants. HPRCC supplies Growing Degree Day data and estimates of crop water use and evapotranspiration (ET) using data from the Nebraska Mesonet (<http://cropwatch.unl.edu/gdd-etdata>). These data are used to facilitate irrigation scheduling in the state. The image at the top right shows a summary of Growing Degree Days and crop water use for various crops from the Scottsbluff mesonet station, updated on July 12th. HPRCC also supplies precipitation maps and data updated daily from the NWS COOP network (<http://cropwatch.unl.edu/cropwatchprecipitation>). Maps include total precipitation, as well as percent of normal and departure from normal, and are available for Nebraska and the High Plains region for the last 7, 30, 60, 90, and 180 days. A table of data has a select list of stations for each climate division and provides total precipitation, percent of normal and departure from normal for the last week, current growing season, and current water year. Finally, HPRCC provides soil temperature maps and data for the last week and day at 4 inches, which is provided by the Nebraska Mesonet (<http://cropwatch.unl.edu/cropwatchsoiltemperature>). The data are based on a 30-year average for comparison to typical timing. These data are used to help determine when to plant in the spring. The image at the bottom right shows Nebraska soil temperatures for the week ending July 12th.



Spring Ended Cool And Wet; Summer Began Warm And Dry



April was a very wet month for most of the High Plains. The wet conditions caused delayed planting in South Dakota and Nebraska, while farmers in Kansas and Nebraska were concerned about wheat rust. The abundance of moisture provided drought relief and snowpack recovery in the Bighorn Mountains of northern Wyoming. Warm temperatures in March caused mountain snowpack in the Missouri River Basin to peak in early April, which was about two weeks earlier than normal.

Wet conditions continued into May in southwestern Wyoming, eastern Nebraska, and eastern Kansas, while it dried out significantly in northeastern Wyoming and the Black Hills region of South Dakota. Flooding was reported in Lander, Wyoming, as well as in and around the Wind River Indian Reservation. It was an active month for severe weather as well. Very large hail fell in Lincoln, Nebraska on the 9th, damaging homes and vehicles. On the 24th, a tornado outbreak occurred in southwestern Kansas where a supercell produced numerous tornadoes. Excessive rainfall and early melting of mountain snowpack caused streamflows to run high, especially on the Platte River in Nebraska.

The pattern switched to very warm and dry in June, and as a result, drought expanded across the region, especially in western South Dakota/northeastern Wyoming. The worsening of drought conditions in this area is evident in the U.S. Drought Monitor 3-month class change map above. Excessive heat and high humidity in June created sultry conditions, prompting several heat advisories to be issued across the region. Even high-elevation locations in Colorado and Wyoming reached 100°F, which is rather uncommon. Producers were concerned about crops, as excessive heat and lack of precipitation caused topsoil to dry out quickly, and visible stress to crops was evident.

According to the Climate Prediction Center, the El Niño ended in May and ENSO-neutral conditions were present in the Pacific. The 2015-2016 El Niño was one of the strongest El Niño events on record. La Niña is favored to develop during summer 2016, with approximately a 55-60 percent chance that La Niña conditions will be present during fall and winter. A La Niña Watch has been issued, which means conditions are favorable for the development of La Niña conditions within the next six months.

Outreach And Stakeholder Engagement Activities

NIDIS Working Groups Meetings

Crystal attended two meetings that were held in Lincoln in late April by the National Integrated Drought Information System (NIDIS) that relate to the NIDIS Working Groups. Crystal is active in supporting and engaging in NIDIS-related activities across the Missouri River Basin and Midwest regions. The Working Groups are as follows: Observations and Monitoring, Predictions and Forecasting, Interdisciplinary Research and Applications, Education and Public Awareness, Engaging Preparedness Communities, and the U.S. Drought Portal. These meetings brought together several people with a vested interest in drought and working with NIDIS to address one or more of these Working Group themes. The purpose of the meetings was to provide updates on current and future Working Group activities, as well as to solicit feedback for the forthcoming updated NIDIS Implementation Plan (link to current plan: <https://www.drought.gov/drought/documents/national-integrated-drought-information-system-implementation-plan>).

CoCoRaHS Webinar

In May, Natalie had the privilege of giving a presentation for the CoCoRaHS WxTalk Webinar Series. The series started in 2011 and consists of monthly hour-long interactive presentations from experts in weather, climate, and related fields. This year, each Regional Climate Center (RCC) will be giving a presentation on the weather and climate of their particular region. Each webinar is recorded and an archive is available. If you missed Natalie's talk, "The Weather and Climate of the Plains: The Land of Extremes," and want to learn more, you can see her presentation here: <http://www.cocorahs.org/Content.aspx?page=wxtalk48>. You can also register for future webinars here: <http://www.cocorahs.org/Content.aspx?page=wxtalk>.

CoCoRaHS WxTalk Webinar Series



UNL Chancellor Ronnie Green kicks off the Climate Change for Elected Officials Seminar. (Photo courtesy Natalie Umphlett)

Climate Change for Elected Officials Seminar

Legislative Resolution 455 was adopted by the Nebraska State Legislature earlier this year, which calls for the creation of a special committee that will examine climate change-related impacts on the State of Nebraska. Among other duties, this committee will be responsible for creating a framework for a state climate change plan. As a first step, state senators gathered at the Nebraska Innovation Campus for a one-day seminar on climate change. Representatives from various Nebraska-based organizations gave short presentations on the services they could provide in support of the committee. Natalie provided handouts and gave a presentation highlighting the HPRCC's many products and services.

Big Red 4H Outdoor Nebraska Summer Camp

In June, Natalie and Crystal conducted fun weather and climate activities with six high school students who were attending the Big Red 4H Outdoor Nebraska Summer Camp in Lincoln. The students took a walk to the newly upgraded Nebraska Mesonet station at the pecan orchard on UNL's East Campus where they learned about the various instruments. The students enjoyed taking temperatures of objects in the sun and the shade with infrared thermometers to compare their results, as it was a very hot day!

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Nebraska Extension 4H Clover College

Also in June, Crystal helped Nebraska Extension Educator Tyler Williams lead several activities for about 20 students at the 3rd-6th grade levels who attended the 4H Clover College and have particular interests in weather and climate. The kids had the opportunity to participate in several fun activities, such as generating "lightning" creating a cloud in a jar, sharing their favorite weather stories and, like the high school students mentioned above, taking the temperature of objects outside on a very hot day. They were really shocked to learn that the dashboard of Tyler's car measured nearly 180°F!

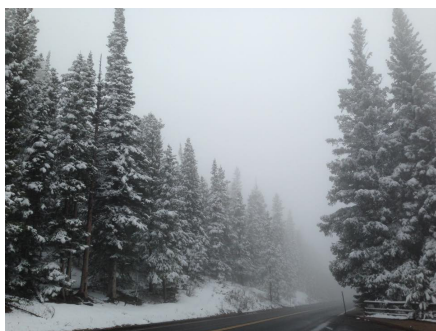


A student takes the temperature of a metal light pole during the Big Red 4H Outdoor Nebraska Summer Camp. (Photo courtesy Crystal Stiles)

Recent And Upcoming Travel And Activities

NWS National Climate Meeting, Silver Spring, MD (May 9-12)

Natalie attended the first-ever national meeting of the National Weather Service's Climate Services Program. The 4-day meeting was well-attended with over 200 National Weather Service staff, including Climate Focal Points and Regional Climate Services Program Managers, as well as staff from National Centers and National Weather Service Headquarters.



The precipitation meeting kicked off with cold and snowy conditions. (Photo courtesy Bill Sorensen)

Managing and Utilizing Precipitation Observations from Volunteer Networks Meeting, Estes Park, CO (May 18-20)

Bill Sorensen attended this conference where about 25 attendees from the climate community throughout the United States and Canada met to discuss climate data measurements, management of volunteer community observers, and education about climate using the data. Topics included rain and snow measurements, drought, water management and resources, and education and outreach using community weather network data. Maintaining quality assurance and education on measurement protocols was a major focus of this year's conference. Expansion of the CoCoRaHS network into the Bahamas was a highlight of the talks.

USDN Heartland Region Annual Meeting, Lincoln, NE (June 9-10)

In June, Natalie attended the Urban Sustainability Directors Network (USDN) Heartland Network Meeting and gave an update on the progress of the newly-funded NOAA SARP project, "Increasing the capacity for municipal climate adaptation planning in the lower Missouri River Basin states."

AASC Annual Meeting, Santa Fe, NM (June 28-July 1)

Natalie, Bill, and Crystal enjoyed another successful annual meeting of the American Association of State Climatologists (AASC), located in beautiful Santa Fe, New Mexico. State Climatologists, staff from Regional Climate Centers and other various NOAA programs, and representatives from several other organizations attended to share updates on climate-related activities and information on new tools and products. Natalie participated in a panel discussion on the regionalization of climate services. Natalie, along with Bethany Perry, coordinator of the NOAA Central Region Collaboration Team, put together a poster about NOAA regional collaboration, while Crystal and Natalie presented a poster on building capacity with tribes in the Missouri River Basin.



Crystal and Natalie pose with their poster at the AASC annual meeting. (Photo courtesy Bethany Perry)

Upcoming: Wind River Drought Preparedness Workshop, Fort Washakie, WY (July)

A workshop is being held to discuss progress of the Wind River drought vulnerability project and specifics on project deliverables. Crystal will be attending to provide updates on the quarterly climate summary produced for the reservation and surrounding areas, as well as to gain feedback on the usability of the summary.

Upcoming: S.T.E.M.-ing into the Future at the Nebraska State Fair, Grand Island, NE (August)

Crystal and Natalie will represent HPRCC at the S.T.E.M.-ing into the Future event at the Nebraska State Fair on August 29th. Booth activities will include learning about rain gauges and testing weather and climate trivia.

Upcoming: ITEP Climate Change Adaptation Planning Course, Nebraska City, NE (September)

The Institute for Tribal Environmental Professionals (ITEP) is hosting a climate change adaptation planning course that will focus on climate change impacts in the central U.S. Crystal will be an instructor for this course. She will talk about developing climate summaries for tribes, and she will assist with other course-related activities.

Upcoming: NWS Regional Climate Services Workshop (September)

National Weather Service climate focal points from the upper Missouri Basin will be making the journey to Lincoln, NE for a 3-day workshop on Regional Climate Services. This will be the second in a series of workshops that will focus on Regional Climate Services, current climate-related regional projects, mesonets in the region, the Applied Climate Information System, and drought resources. Funding is provided by the NOAA Central Region Collaboration Team.