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Message from the Director

By Dr. Martha Shulski

The HPRCC has entered the New Year with a running start, particularly in the areas of educational outreach and applied research. Engaging with the public is always a fun and exciting activity for HPRCC staff and the first quarter of 2015 proved to be no exception. The third installment of the Climate Masters of Nebraska course was held in Lincoln – the 10-week adult education course on climate change (read more about this course on page 5). In addition, the HPRCC participated in five outreach events in eastern Nebraska, all focusing on observing weather and climate. Target ages for these events ranged from elementary-age students to adults. In the area of applied research, results from three projects **in which HPRCC students and staff led or participated** were accepted for publication in peer-reviewed journals during the last quarter. The topics varied in scope and spanned the themes of soil moisture spatial variability, historical climate trends for the U.S. Corn Belt, and development of an index for winter season severity. The latter two were led by graduate students under the supervision of HPRCC faculty and represent components of their respective Ph.D. dissertations. In fact, the work of Dr. Barbara Mayes Boustead on winter season severity was recognized as Honorable Mention for the Lowe R. and Mavis M. Folsom Distinguished Doctoral Dissertation Award at UNL. Dr. Boustead graduated in August 2014 with a Ph.D. in Natural Resource Sciences and a specialization in Climate Assessment and Impacts, and she is currently a forecaster with the National Weather Service in Omaha/Valley. In this issue, you will also find information on how the HPRCC works with one of our key partners – the National Drought Mitigation Center, which is also located at UNL (page 2). You will also learn about our climate monitoring activities and state partners (pages 3-4), get an introduction to one of our applied research projects – Useful to Usable (page 4), and learn more about our outreach events and travel (pages 5-6). Enjoy your stop at *The Prairie Post!*



Meet our Data Quality Technician, Shellie Hanneman



We would like to introduce our longest-standing staff member – HPRCC’s Data Quality Technician, Shellie Hanneman. Shellie started this position with UNL in 1994. She plays an important role with the Automated Weather Data Network (AWDN) by quality controlling data from the network on a daily basis. That’s right – if you’ve ever heard about our two-step quality control process – she is the human component of that! Having an eye to the data is very important because she can immediately alert our weather station technician if any problems arise. Sometimes, wind direction measurements seem incorrect and it turns out that a bird has used

the wind vane as a perch. Birds can bend the wind vane and this will lead to incorrect values. Other times, data fails to come in and she can begin to troubleshoot the issue – was it lightning? Did an animal chew through some wires? It’s never a dull moment in the instrumentation world and Shellie can attest to that with her 20 years of experience working with the data of the AWDN. In her free time, Shellie enjoys swimming, watching NASCAR, and observing wildlife all over the world on webcams.



HPRCC Continues Work with Tribes in the Missouri River Basin Region

HPRCC Participates in Third Workshop with Wind River Tribes

A National Integrated Drought Information System (NIDIS)-sponsored workshop was held in Fort Washakie, Wyoming on the Wind River Indian Reservation in March. This workshop was the third in a series of workshops, the first of which took place in Lincoln in July 2014, while the second workshop was held in Fort Washakie in October 2014. The purpose of the March workshop was to discuss the development and dissemination of a region-specific drought and climate summary, the process of putting together a drought plan for the reservation, and a drought vulnerability assessment of the reservation. HPRCC staff member Crystal Stiles attended this workshop and worked with tribal members to refine the drought and climate summary. This summary included climate and drought conditions in the Wind River Region from the winter months, an update on snowpack and reservoir conditions, and climate and drought outlooks for the upcoming spring. Other institutions/centers represented at the workshop include the National Drought Mitigation Center (UNL) and the North Central Climate Science Center (Colorado State University). The first operational climate summary was released in late March, and hands-on training with tribal members on how to develop it is being planned for this summer.



Workshop participants talk about water resources on the reservation. (Photo courtesy Nicole Wall)



Fred Thomas of the Kickapoo Tribe in Kansas shares his concerns about water resources. (Photo courtesy Natalie Umphlett)

Kansas Tribes Visit Lincoln to Talk about Drought Early Warning and Climate Monitoring

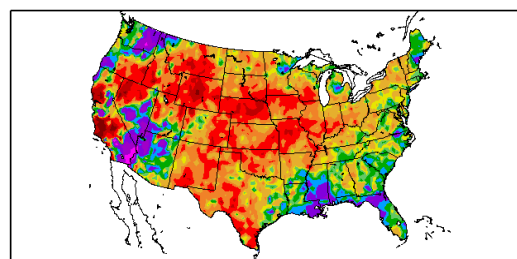
The HPRCC, the National Drought Mitigation Center (NDMC), and NIDIS are also addressing climate monitoring and drought management issues with four Kansas-based tribes: the Kickapoo Tribe in Kansas, Prairie Band Potawatomi Nation, the Iowa Tribe of Kansas and Nebraska, and Sac and Fox Nation of Missouri in Kansas and Nebraska. A NIDIS-sponsored workshop was held in Lincoln, Nebraska in early April to discuss data needs and planning efforts of these tribal nations. Representatives from the Winnebago Tribe of Nebraska also attended the workshop. Tribes were particularly interested in submitting a grant to the Bureau of Indian Affairs to develop a climate summary similar to the one being developed for the Wind River tribes. The capacity of tribal colleges such as Haskell Indian Nations University in Lawrence, Kansas to assist tribes with climate and drought projects was also discussed. Other agencies and institutions who attended the meeting and/or are collaborating on this project include the Kansas Climate Office (Kansas State University), the Kansas Water Office, the Environmental Protection Agency, the U.S. Department of Agriculture, the Bureau of Indian Affairs, and the Center for Disaster Philanthropy.

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Partnership Spotlight: National Drought Mitigation Center

The HPRCC has enjoyed a long history of engaging with the NDMC, which is co-located in the School of Natural Resources at UNL. This engagement has primarily occurred in two areas: data and product delivery and educational outreach. To help the NDMC better monitor current drought conditions and understand drought risk, the HPRCC provides precipitation summaries (see example at right) and, along with the NDMC, has developed an operational Standardized Precipitation Index product for the contiguous U.S. (read about it on Page 4). This information is one of the many pieces that goes into the U.S. Drought Monitor, for example. We have also developed a serially complete dataset for the U.S. that has been used to construct the Drought Risk Atlas – a powerful tool produced by the NDMC that allows users to assess drought risk and historical conditions. In the area of outreach, the HPRCC and the NDMC often partner to support and participate in various public educational events occurring around the region. Furthermore, the two centers are co-investigators on the Climate Masters of Nebraska adult education program in which three 10-week courses have been offered to date. The partnership among the two centers continues to strengthen as needs and opportunities arise. To learn more about the NDMC, please visit: <http://drought.unl.edu>.

Percent of Normal Precipitation (%)
6/1/2012 – 8/31/2012



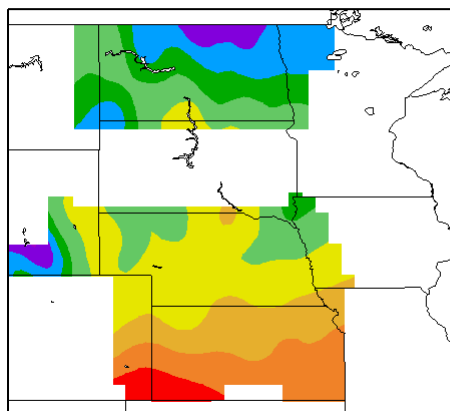
Generated 9/18/2012 at HPRCC using provisional data.

Regional Climate Centers



Learn More About the Automated Weather Data Network

Soil Temperature (F at 4 inches)
4/9/2015 - 4/15/2015



High Plains Regional Climate Center
Generated 4/16/2015 using AWDN data.

AWDN Product Highlight: Soil Temperature Maps

During the spring, many eyes are looking to the soils and checking for when conditions are right to get into the agricultural fields and begin planting. One of our long-standing products is an assessment of soil temperature conditions. Users can view a regional map of temperatures at the 4-inch depth for the previous day and week. The example map to the left shows a shaded 7-day map of soil temperature. The user can also display the data as a dot or line map. These temperature observations are taken under bare soil in order to simulate bare ground conditions. It is always interesting to view this product during the transition seasons as we lose snow cover and warm up during spring or cool down during fall.

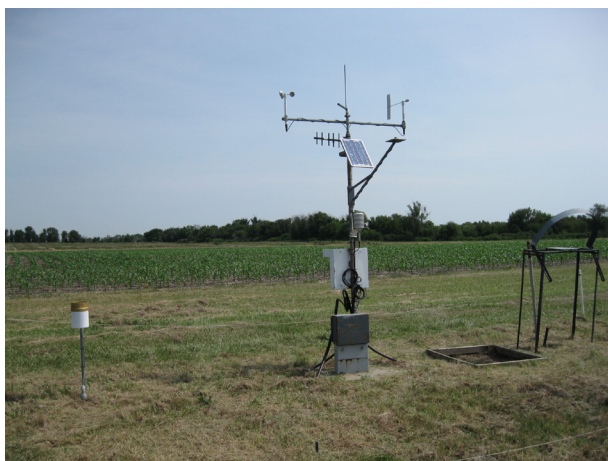
The North Dakota Agricultural Weather Network (NDAWN)

We are fortunate in the High Plains Region to have dense state weather networks, commonly called mesonets, in which automated sensors monitor conditions down to the latest minute. One of our partners is the State Climate Office at North Dakota State University and they run the North Dakota Agricultural Weather Network with 76 stations across the state and a few in neighboring states. On their website, users can

find a wide variety of agricultural related tools, many focused on growing degree days. Also available is a crop water use tool for various crops and an irrigation scheduler. At HPRCC, we assist NDAWN by providing quality control for the data and they provide us with their data for use in regional products. More information on NDAWN and the North Dakota State Climate Office can be found at www.ndsu.edu/ndSCO.

The Genesis of the Nebraska Mesonet

The Nebraska Mesonet was established by UNL in 1981 with grant funding from the National Climate Program Office. Five stations were established in Nebraska to initiate the first network of its kind – four of these stations (Brule, Champion, Dickens, and McCook) were established in southwest Nebraska, an area where water resources are critical given the arid climate (less than 25 inches of precipitation per year), and a fifth site was established at the Agricultural Research and Development Center at Mead. This represents one of a number of agricultural research stations in Nebraska and is home to a myriad of scientific research for irrigated and dryland cropping systems, carbon monitoring, and solar radiation monitoring. As researchers saw how valuable this network could be to have an understanding of weather conditions in agricultural areas, the network has grown to over 65 stations.



One of the five original Nebraska mesonet stations, located at the Agricultural Research and Development Center at Mead. (Photo courtesy Glen Roebke)

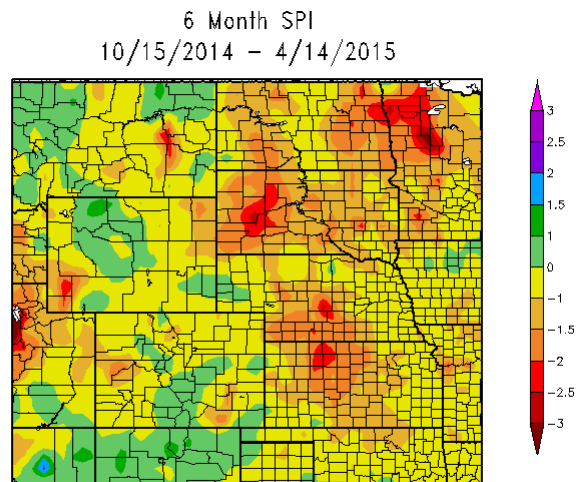


The High Plains Experienced a Warm and Dry Start to 2015

Over the past few months, the High Plains Region has been warm and dry. At the start of the year, only 11 percent of the region was in drought (D1-D4), however by mid-April, drought conditions have expanded to just over 40 percent of the region. Severe drought conditions (D2) emerged in western Colorado due to a combination of higher than normal temperatures and dry conditions. Meanwhile, moderate drought conditions (D1) have expanded across much of Kansas and South Dakota, eastern North Dakota, south-central Nebraska, and southwestern Wyoming due to increasing dryness. These areas have received, at best, only 50 percent of normal precipitation since the start of the year. The wettest month was February and hefty snowfalls caused Boulder, Denver, and Pueblo, CO to have their snowiest February on record. As mentioned above, the region has also experienced higher than normal temperatures and many interesting records have been set over the past few months. For instance, several locations set new records for highest January temperature (e.g. Dodge City, KS, North Platte, NE, and Cheyenne, WY) and highest March temperature (e.g. Grand Island, NE and Rapid City, SD). March also brought the earliest 90°F day on record to some parts of Nebraska, while areas of Colorado had their earliest 80°F day. If you want more information like this for the High Plains Region, be sure to check out the full reports here: <http://www.hprcc.unl.edu/publications/>. You can also find similar information in the 2-page Missouri River Basin Quarterly Climate Impacts and Outlook that we produce. See the latest report here: <http://www.drought.gov/drought/content/resources/reports>.

Product Highlight: SPI Maps Used for Drought Monitoring

In the January 2015 issue of *The Prairie Post*, we showcased our Climate Summary Maps, which are powered by the Applied Climate Information System (ACIS). In this issue, we would like to introduce you to our Standardized Precipitation Index (SPI) maps, one of our specific ACIS Climate Summary Maps products that was co-developed with the NDMC (see example at right). The SPI characterizes precipitation accumulations over a period of time by statistical comparison to historical accumulations over the same time period. SPI maps are an important climate monitoring tool, especially in the area of drought. These maps are used by authors of the U.S. Drought Monitor, which is co-produced by the NDMC, NOAA, and USDA, to make delineations of drought conditions on the weekly map. HPRCC provides SPI maps for the entire nation as well as for several regions, and you can even drill down to the state level for states that are within and bordering the High Plains Region. Maps are provided over several climatologically relevant time periods, such as the last 30 days, 60 days, 6 months, 12 months, and 24 months, and the maps are updated on a daily basis for all stations meeting the required data criteria. The map on the right is an example of an SPI map that you can produce on our website. From the Climate Summary Maps page, simply choose the SPI product, and then specify the desired timescale, region, and map style. This example shows a shaded 6-month SPI map for the High Plains Region. It illustrates the precipitation deficit that has been developing since the fall for much of the region, especially throughout the Dakotas, central Nebraska, and central Kansas. For more information on this product, please visit: <http://drought.unl.edu/MonitoringTools/DailyGriddedSPI.aspx>.

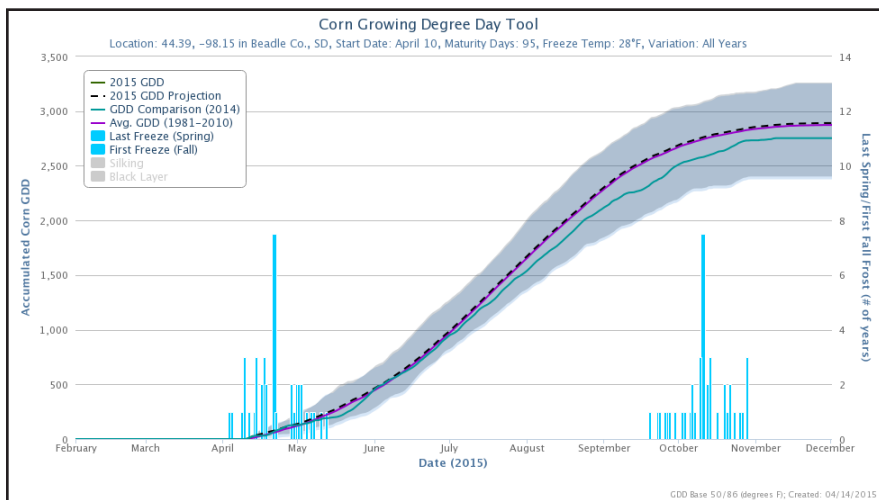


Generated 4/15/2015 at HPRCC using provisional data.

Regional Climate Centers



Research Highlight: U2U Project Provides Decision Support Tools for Farmers



The HPRCC is proud to be a collaborator in the USDA-funded project led by Purdue University called U2U – Useful to Usable: Transforming Climate Variability and Change Information for Cereal Crop Producers. This five-year project began in 2011 and brings together a transdisciplinary team to translate and deliver climate information to users in the agricultural community. Our Center provides climate summary maps for the U2U study region, which is the U.S. Corn Belt. We offer our expertise and knowledge in data capture and delivery to the U2U project team.

To date, several decision support tools have been developed based on Regional Climate Center data holdings. These tools were not created in a vacuum, rather they incorporate comments and feedback from user focus groups across the region. In particular, the Corn Growing Degree Day (GDD) tool (see example above) puts current growing season conditions into historical context. Users are able to choose their location, GDD start date, freeze temperature threshold, and corn maturity rating. Comparison years can be added in addition to silking and black layer dates. Information such as the likelihood of early and late frost/freeze events and GDD projections when considering seed purchasing and corn hybrid maturity requirements make this tool usable for farmers. Other tools available for the entire Corn Belt include a viewer for historical climate and crop yield data for corn and soybeans, and a viewer for investigating how patterns of climate variability such as El Niño influence temperature and precipitation conditions during the growing season. An HPRCC graduate student has investigated growing season climate trends and a new tool is in the works, so stay tuned for the unveiling of this tool in the summer edition of our newsletter. To keep up with the latest information about the U2U project, we encourage you to visit: AgClimate4U.org.



HPRCC Outreach Events Ramping Up During Spring

Climate Masters of Nebraska Wrap-up

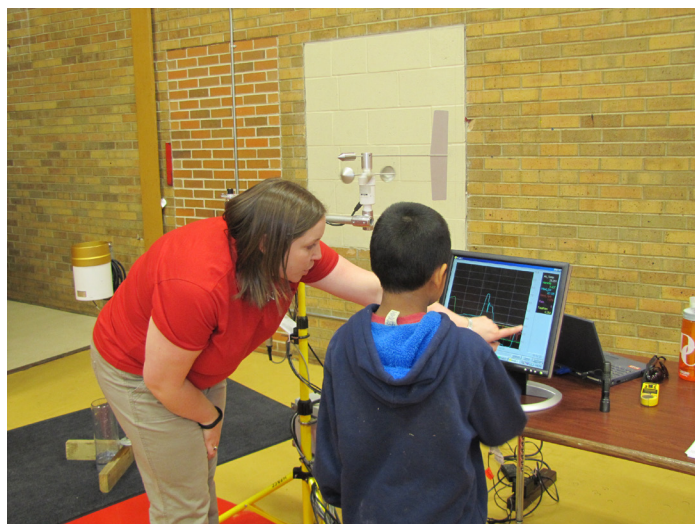
The third Climate Masters of Nebraska course is in the books! Over 25 people from in and around Lincoln participated in the 10-week course. In exchange for the free course, each participant is required to do at least 30 hours of volunteer work in waste reduction, water conservation, or energy reduction. Working in each of these areas ultimately helps reduce the community's carbon footprint. Climate Masters participants are very creative and have developed interesting projects including: holding workshops on cooking with pressure cookers and solar cookers, talking with businesses about directing their usable waste to reuse stores, and starting a local chapter of the Citizens Climate Lobby. Climate Masters is funded through 2017, so stay tuned for information on future classes.

Nature/Science Nights at Walthill, Macy, Lincoln

Crystal, Natalie, and Martha participated in family science/nature night outreach events at schools in Walthill and Macy, Nebraska, both of which are on the Omaha reservation. Crystal and HPRCC intern Judson Buescher participated in a similar event at Pershing Elementary School in Lincoln. They took the mobile weather station to the events so that children and their families could learn about weather instruments and how they measure and record meteorological data.



Participants of the most recent Climate Masters of Nebraska course with special guest Nebraska State Senator Ken Haar (top left). (Photo courtesy Tonya Bernard)



Crystal shows a child a graph generated by one of the weather instruments at the science night in Macy. (Photo courtesy Natalie Umphlett)

Central Plains Severe Weather Symposium

Natalie, Crystal, and Judson talked about weather and climate with community members at the 15th Annual Family Weatherfest and Central Plains Severe Weather Symposium, held on April 11th. This event featured an opportunity to meet local TV weathercasters, explore the Doppler on Wheels (DOW), book signings by authors Bob Henson ("The Thinking Person's Guide to Climate Change") and Nancy Gaarder ("Nebraska Weather"), storm spotter training, presentations on Nebraska weather from the past year, activities for children, and many exhibits and displays. Attendees talked to HPRCC staff about the AWDN, and we demonstrated the mobile weather station. For more information on the Central Plains Severe Weather Symposium, please visit: <http://snr.unl.edu/cpsws/index.asp>.

Visit from Doane College

The HPRCC was contacted by Doane College, located in Crete, Nebraska, to host a group of students in a 'Perspectives in Environmental Public Health' course in late January. Martha, Crystal, and Natalie provided an informational session on HPRCC's products and services as they relate to health, a description of the Climate Masters of Nebraska program, and HPRCC's engagement with tribal communities.

Saline County Regional Severe Weather Seminar

Natalie and Crystal also brought the mobile weather station out to the Saline County (Nebraska) Regional Severe Weather Seminar, hosted by the Saline County Emergency Management, on March 28th. Several hundred people attended this event and learned about storm spotting and highlights from last year's severe weather around the region, which included the twin tornadoes that ravaged Pilger, Nebraska.



Hundreds of people gather to participate in the Saline County Regional Severe Weather Seminar. (Photo courtesy Crystal Stiles)

Recent and Upcoming Travel and Activities

Visit to Washington, D.C. by Regional Climate Center Directors (March 2-4)

Martha spent a week in Washington, D.C. in early March, along with the other directors from the Regional Climate Centers. She met with members of the Nebraska Congressional delegation and NOAA officials to discuss the HPRCC's suite of products and services. This represents a regular trip taken each year in order to engage lawmakers and keep them up to date on regional climate services.



Cherry blossoms in bloom near the Washington Monument, Washington, D.C. (Photo courtesy Fodor's Travel)

13th Annual NOAA Climate Prediction Applications Science Workshop, Las Cruces, NM (March 24-26)

Crystal attended CPASW and presented, "Building Capacity for Climate Monitoring and Drought Management on the Wind River Indian Reservation" to about 100 in attendance. The theme of the workshop this year was, "Climate and Drought Information for Food Resilience, Agriculture, and Water Resources," which brought together a diverse group of people who work in the fields of meteorology, climatology, agriculture, and the private sector.

Useful to Usable (U2U) Annual Meeting, Davenport, IA (May 18-20)

Martha will attend the U2U annual project meeting set to take place in Davenport, IA in May. This represents the end of the fourth year of a five-year project that brings together a team of sociologists, agronomists, climatologists, and agricultural economists. The project team will be discussing decision support tool usage throughout the Corn Belt, as well as finalizing new tool development.

Annual Conference on Managing and Utilizing Precipitation from Volunteer Networks, Estes Park, CO (May 18-20)

HPRCC staff member Bill Sorensen is planning to attend this volunteer weather observer networks conference. The conference's purpose is to offer a forum where attendees can discuss and strategize how to manage, educate, maintain, and improve volunteer weather observer networks used to collect valuable precipitation data in the U.S., Canada, Puerto Rico, and the U.S. Virgin Islands. This includes the National Weather Service Cooperative Observer Network, the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) Network, CoCoRaHS Canada, and other existing local, regional, and state/provincial volunteer networks. This year's conference will focus on recruitment and retention of observers, drought monitoring, and snow water equivalent measurements.

Science Education Partnership Award (SEPA) Summer Camp, Lincoln, NE (June 8-10)

Several HPRCC staff members are helping the University of Nebraska Medical Center develop a summer camp in June for Native American middle school students. The theme of the camp this year is chemistry, and there is plenty of chemistry in the atmosphere! Our role will be to offer activities on weather and climate. We are looking forward to working with an eager group of young minds.

American Association of State Climatologists (AASC) Annual Meeting, Cape May, NJ (June 23-26)

Martha, Natalie, and Crystal are planning to attend the annual meeting of the American Association of State Climatologists, which will be held in June in Cape May, New Jersey, situated on the Atlantic Coast. This marks the 40th year of annual meetings of the AASC. At this meeting, state climatologists, regional climatologists, and other people who work in the field of climate gather together to discuss climate services, which may include climate events, climate impacts, new tools, data issues, and outreach and education. At this meeting, Crystal plans to talk about the tribal engagement in which the



A traditional weather station at the New Mexico Farm and Ranch Heritage Museum, Las Cruces. (Photo courtesy Crystal Stiles)

HPRCC has been involved in the Missouri River Basin Region.