10-2017

The Prairie Post Quarterly Newsletter of the High Plains Regional Climate Center- October 2017

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October 2017

The Prairie Post

Quarterly Newsletter of the High Plains Regional Climate Center

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Message From The Interim Director

By Ms. Natalie Umphlett

Greetings from *The Prairie Post*! Although the end of the growing season is upon us and the leaves are changing colors, it is hard to believe that this is the last edition of our quarterly newsletter for the year. This quarter, we have exciting new developments in many respects. For the first time in several years, our most-used product, the ACIS Climate Summary Maps, got a facelift. One of the most noticeable changes comes from the addition of several hundred stations, but several new regions were also added to the archive, including the Missouri River Basin and the Corn Belt. These changes are just the tip of the iceberg as the maps will continue to be enhanced in the coming months (see page 3 for more details). In the area of research, our stakeholder engagement specialist, Crystal Stiles, was a co-author on a recently published study about the 2015 Water Year on the Wind River Indian Reservation. This study offers valuable insights into how "micro-drought" conditions can impact local water resource management (see page 5 for more information). We also conducted two hands-on climate summary development workshops – one for tribes of northeastern Kansas/southeastern Nebraska and one for four tribes of the Great Plains Tribal Water Alliance (see page 2). And, to top it off, we submitted a proposal in hopes of expanding our work with tribes in the North Central U.S. Several other projects are well on their way, and we look forward to sharing the outcomes in the coming year. Stay tuned!

Meet Our Intern, Emily Brown

Emily Brown started her internship with us this past May and is currently a sophomore at the University of Nebraska-Lincoln, majoring in Meteorology-Climatology. Emily comes from a pre-engineering high school in Olathe, Kansas and became interested in meteorology when she was young and combatted her fear of thunderstorms by learning more about them through books and TV shows. She has a love for physics, tropical storms, and the impact weather and climate have on people's daily lives. After college, she plans on getting her master's degree and eventually her PhD.

While not at work or studying, Emily enjoys playing soccer, traveling, skiing, watching sports, and writing poetry. She is a member of Citylight Lincoln Church and the American Meteorological Society chapter at UNL. Lincoln, Nebraska has become her new home, but she still likes to visit the Kansas City area to see family, friends, and her cat. Her favorite thing about working for the High Plains Regional Climate Center is being able to learn more about climatology while helping people find the information they need whether it's for research, agriculture, or construction.

Publisher and cover photo information:

Cover photo:
A view of the beautiful landscape near Ashfall Fossil Beds State Historical Park in Nebraska (photo courtesy Natalie Umphlett)

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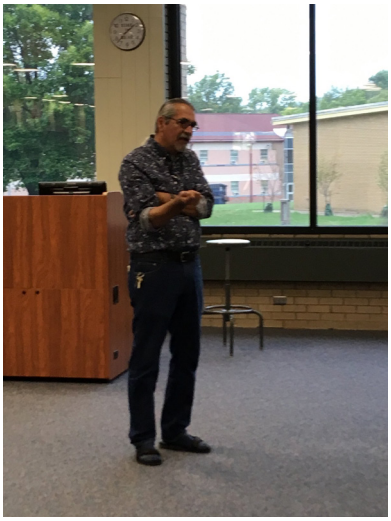
HPRCC Delivers Climate Workshops To Tribes In Kansas, Dakotas

The HPRCC has designed and delivered a number of climate training workshops to stakeholder groups in the Missouri River Basin, including tribes. Over the past few years, tribes in this region have become increasingly interested in developing climate summaries for their tribal lands. A climate summary describes recent historical, current, and near-future climate conditions in a concise and non-technical format that is intended for general public use. This October, the Center was particularly busy as staff gave two workshops to tribes that focused on the production of these reservation- and region-specific climate summaries. An overview of these workshops is outlined below.



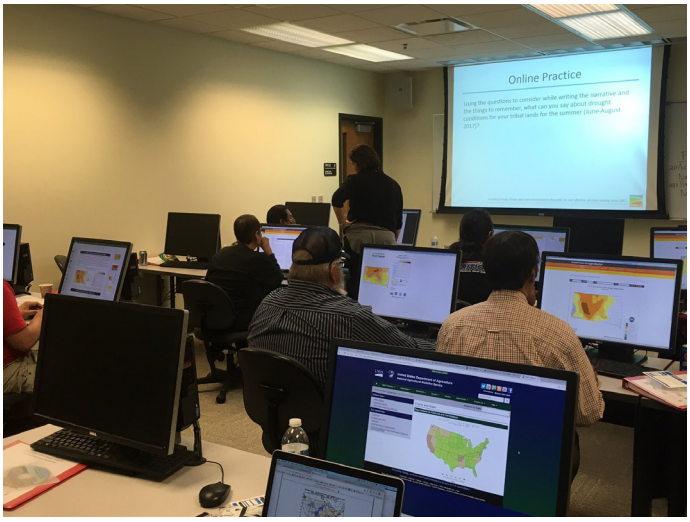
Dr. Dan Wildcat, professor at Haskell Indian Nations University, shows his support for the Kansas Indian Nations Climate Summary Workshop. (Photo courtesy Crystal Stiles)

Kansas Indian Nations Climate Summary Workshop

HPRCC staff members Natalie and Crystal traveled to Lawrence, Kansas to deliver a climate summary workshop at Haskell Indian Nations University. Workshop participants included tribal environmental professionals from four tribes in northeastern Kansas/southeastern Nebraska: Prairie Band Potawatomi Nation, Kickapoo Tribe in Kansas, Iowa Tribe of Kansas and Nebraska, and Sac and Fox Nation of Missouri in Kansas and Nebraska. The HPRCC has been working with these tribes since 2014 when an initial meeting took place in Kansas City, Missouri to learn about the tribes' climate data and information needs. Since then, the Center has collaborated with the tribes and several partners to apply for funding through Bureau of Indian Affairs water and climate proposals, provided climate data training to the tribes, and produced a mockup climate summary for the northeastern Kansas/southeastern Nebraska region where the reservations are located. The tribes received funding to hire interns from Haskell to work on a number of projects, including learning how to produce climate summaries, and the tribal environmental professionals expressed an interest in learning more about them as well. Therefore, the tribes asked HPRCC to give a climate summary workshop in Lawrence, which took place October 5-6. The workshop was successful, and one of the next steps includes creating a listserv for workshop participants and the HPRCC to share climate information.

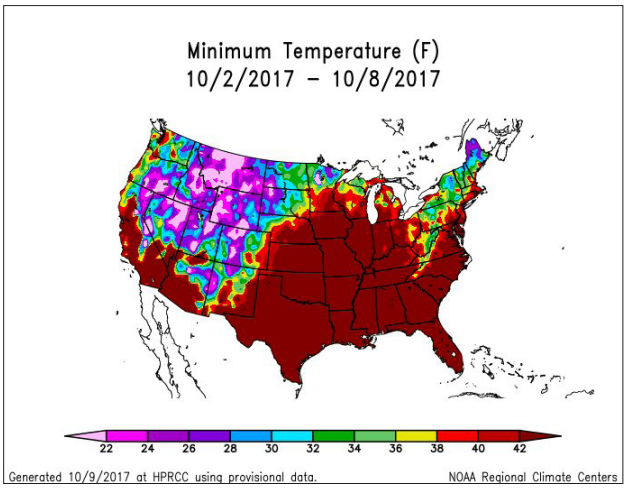
Great Plains Tribal Water Alliance Climate Summary Workshop

Year 1 of the HPRCC's project with the Great Plains Tribal Water Alliance is coming to an end, and it was a busy one with the delivery of two climate workshops and the development of four climate summaries for each of the tribes in the Alliance: Flandreau Santee Sioux Tribe, Rosebud Sioux Tribe, Oglala Sioux Tribe, and Standing Rock Sioux Tribe. In the July 2017 edition of *The Prairie Post*, you may have read about the climate data training workshop the HPRCC and the National Drought Mitigation Center put on for the Alliance. After this introductory training, Center staff put together mockup climate summaries for each of the four reservations, and the tribes were given an opportunity to provide feedback at a project-sponsored Drought Vulnerability Assessment workshop in August (read more about this workshop on Page 6). Then, Natalie and Crystal put on a workshop for the Alliance that focused on how to put the climate summaries together, which took place October 17-18 in Lincoln. By the end of the workshop, participants had learned how to put together a complete climate summary, as they were given ample time for hands-on practice in a computer lab. Several individuals were successful at putting together a climate summary during the workshop. One of the next steps includes conducting follow-up webinars with each of the tribal technical teams to help them prepare for contributing to a fall climate summary, which would be released in December. The HPRCC will work with the tribal technical teams throughout the next year to slowly transition the production of the summaries to the tribes.



GPTWA Climate Summary Workshop participants practice obtaining data and maps from the U.S. Drought Monitor site. (Photo courtesy Natalie Umphlett)

Product Highlight: Updates To Our Popular ACIS Maps



In this minimum temperature map from October 2-8, 2017, you can easily track a cold front moving across the country.

Over the past 6 months, our Applied Climate Information System (ACIS) maps have been getting an overhaul! Most of the changes have been internal, but you have probably noticed several subtle changes too. The overhaul was required because of the modernization of the data service we use. There were a few new stations added because of this, but there have been many visual changes in the process. The first improvement you might have noticed was the clearer fonts and bolder state boundaries. The political boundaries aren't just clearer, they're new! Previously there were some counties that have since split or combined, but the new maps use the latest shapefiles for county boundaries. Otherwise, there are new coverage areas available on our website, including the Missouri River Basin and the Corn Belt.

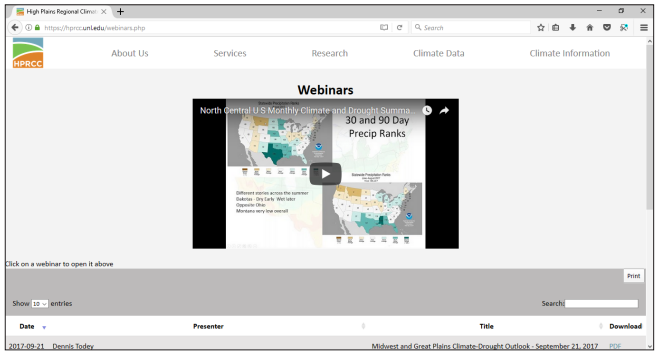
We have also added two new product suites to our maps: Maximum and Minimum Temperature. These maps will show you the maximum or minimum temperature recorded for the time period specified. To provide additional utility to the minimum temperature maps, you'll notice there are clear color distinctions on a fixed scale. Between 32°F and 34°F, the colors change from blue to green to show freezing, and between 28°F and 30°F, there is a change from purple to blue to show the hard freeze line. The fixed scale makes the minimum temperature suite useful for tracking freezing conditions in the early season.

DID YOU KNOW?

As of October 2017, the HPRCC has nearly 250,000 (that's a quarter of a million!) Applied Climate Information System (ACIS) maps in our archive! Get maps of precipitation, temperature, Standardized Precipitation Index (SPI), and Heating and Cooling Degree Days for a variety of timescales and locations. Peruse the maps here: https://hprcc.unl.edu/maps.php?map=ACISClimateMaps.

Product Highlight: Climate Webinar Archive

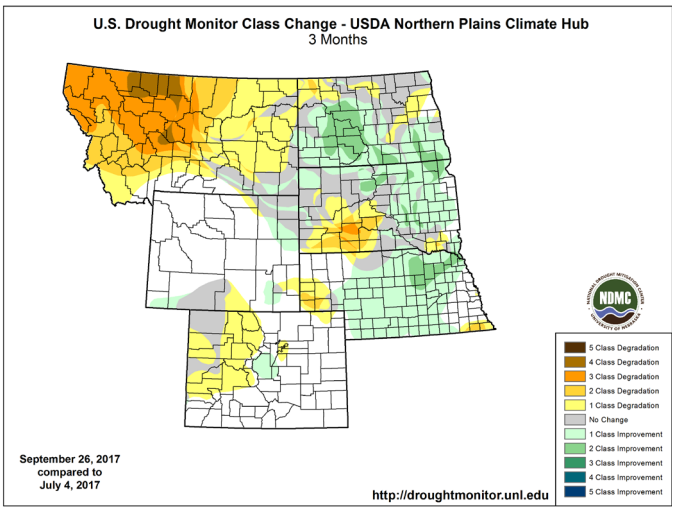
Need a way to keep up with the latest conditions and outlooks? You should check out the North Central U.S. Monthly Climate and Drought Summary and Outlook webinar series. Webinars are held the 3rd Thursday of every month at 1pm Central and provide an overview of current conditions, impacts to various sectors, and outlooks for the upcoming months and seasons. Each webinar has a different guest speaker, which is usually a climatologist from a state, regional, or national entity housed within the region. To register for upcoming webinars, please see: https://register.gotowebinar.com/register/7395763081104006913.



Webinars are recorded, so if you happen to miss one, you can always get caught up at a time that is convenient for you. Recordings, along with PDF versions of the presentations, are typically posted one day after the live event. HPRCC's website houses the full archive of webinars, which extends back to July 2012. There are currently 74 webinars in the archive! To access the archive, please see: https://hprcc.unl.edu/webinars.php.

The North Central U.S. Monthly Climate and Drought Summary and Outlook webinar series is led by Doug Kluck of NOAA's National Centers for Environmental Information and is a collaborative effort between NOAA, the Regional Climate Centers, the National Drought Mitigation Center, the American Association of State Climatologists, and the USDA Midwest Climate Hub.

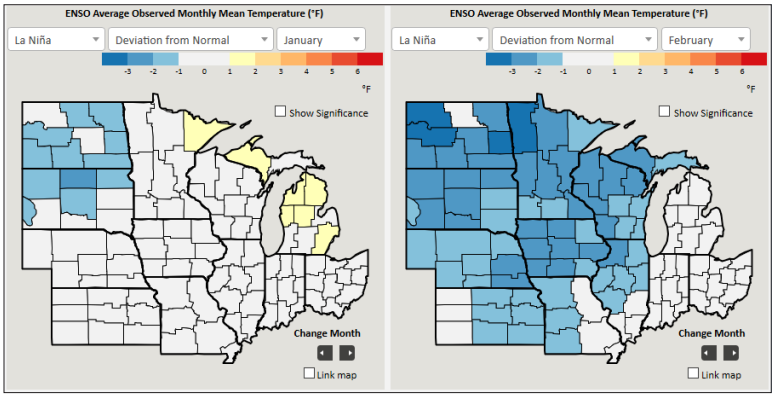
Northern Plains Drought Peaked, Then Improved During Late Summer/Early Fall



The biggest climate story from the past three months was the intensification and subsequent improvement of drought conditions in the Northern Plains. The drought peaked in July according to the U.S. Drought Monitor, with nearly one-quarter of Montana and almost half of North Dakota experiencing extreme drought (D3) or exceptional drought (D4) by the end of the month. Then, heavy rains in August and September cut precipitation deficits and helped green up pastures and replenish water supplies. However, the rainfall came too late in the growing season to be beneficial to many crops, such as spring wheat, corn, and soybeans.

On August 21st, portions of the High Plains were treated to an extremely rare event - a total solar eclipse. This event drew an enormous amount of attention across the country, as total solar eclipses do not pass through the U.S. very often. Thousands of people traveled to the High Plains to witness this event, as the region was an attractive venue for viewing due to its low population and often clear skies. The path of totality passed through the heart of Wyoming and Nebraska, as well as extreme northeastern Kansas. Total solar eclipses impact the weather locally. The rapid decrease in solar radiation leads to a decrease in temperature, which in turn increases the relative humidity. Weather stations in the path of the eclipse captured these changes in the weather in the moments before, during, and after the eclipse. For instance, the air temperature decreased as much as 9°F in the path of totality in western Wyoming. NOAA put together a website where you can learn more about how the eclipse impacted climate at the U.S. Climate Reference Network (USCRN) stations, which can be found here: http://www.atdd.noaa.gov/crn-eclipse/.

ENSO Tool: Climate Patterns Viewer



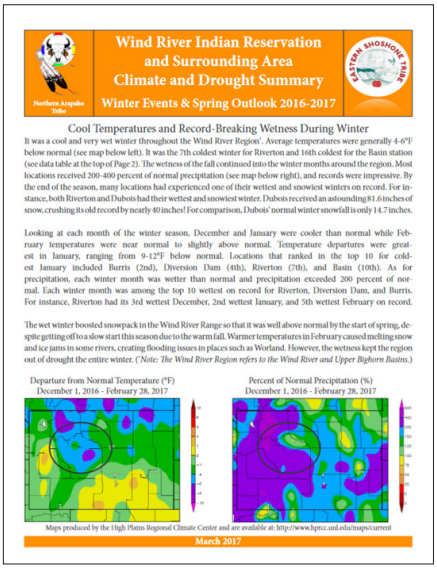
NOAA's Climate Prediction Center has issued a La Niña Watch, which means there are increasing chances that La Niña conditions could develop over the next few months. La Niña conditions develop when sea surface temperatures in the equatorial Pacific are below normal for an extended period of time. Although these conditions occur far away from the United States, they have an impact on the placement of the jet streams. So, what could a La Niña winter mean for the High Plains region? In general, for a typical La Niña winter, the polar jet stream is placed right over the High Plains, making our region the dividing line between colder conditions to the north and warmer and drier conditions to the south.

If you are interested in learning more about how a La Niña can impact the region, there are a number of resources available. For instance, the Climate Patterns Viewer tool, which is housed on the HPRCC's website, offers a historical perspective on how La Niña conditions can impact temperatures, precipitation, and corn yields across the Corn Belt. Although not a forecast, the tool can be used to help make better informed farm management decisions at various times of the year. The images above show the departure from normal temperature for the months of January (left) and February (right) for the Corn Belt region. Historically during a La Niña, much of the Corn Belt has experienced colder conditions in February, with areas of the Dakotas being colder during both January and February.

On the website, users can click on the map to access specific information about their local area, as well as interactive charts. To try the Climate Patterns Viewer yourself, please see: https://hprcc.unl.edu/cpv.php.

As Wind River Project Winds Down, HPRCC Reflects On Project's Success

For the past three years, the HPRCC has been working with the Eastern Shoshone and Northern Arapaho Tribes of the Wind River Indian Reservation (WRIR), as well as several academic and federal partners, to help increase the tribes' resiliency to drought and other extreme events. The Center is a collaborator on the North Central Climate Science Center (NCCSC)-funded project, "The Wind River Indian Reservation's vulnerability to the impacts of drought and the development of decision tools to support drought preparedness," which is ending in November (learn more about the project here: http://nccsc.colostate.edu/revamp/project/wind-river-drought-preparedness). The project was highly successful in a number of ways, which are described below.


Wind River Indian Reservation and Surrounding Area Climate and Drought Summary

Winter Events & Spring Outlook 2016-2017

Cool Temperatures and Record-Breaking Wetness During Winter

It was a cool and very wet winter throughout the Wind River Region. Average temperatures were generally 4-6°F below normal (see map below left). It was the 7th coldest winter for Riverton and 16th coldest for the Basin station (see data table at the top of Page 2). The wetness of the fall continued into the winter months around the region. Most locations received 200-400 percent of normal precipitation (see map below right), and records were impressive. By the end of the season, many locations had experienced one of their wettest and snowiest winters on record. For instance, both Riverton and Dubois had their wettest and snowiest winter. Dubois received an astounding 81.6 inches of snow, crushing its old record by nearly 40 inches! For comparison, Dubois' normal winter snowfall is only 14.7 inches.

Looking at each month of the winter season, December and January were cooler than normal while February temperatures were near normal to slightly above normal. Temperature departures were greatest in January, ranging from 9-12°F below normal. Locations that ranked in the top 10 for coldest January included Burris (2nd), Diversion Dam (4th), Riverton (7th), and Basin (10th). As for precipitation, each winter month was wetter than normal and precipitation exceeded 200 percent of normal. Each winter month was among the top 10 wettest on record for Riverton, Diversion Dam, and Burris. For instance, Riverton had its 3rd wettest December, 2nd wettest January, and 5th wettest February on record.

The wet winter boosted snowpack in the Wind River Range so that it was well above normal by the start of spring, despite getting off to a slow start this season due to the warm fall. Warmer temperatures in February caused melting snow and ice jams in some rivers, creating flooding issues in places such as Worland. However, the wetness kept the region out of drought the entire winter. (*Note: The Wind River Region refers to the Wind River and Upper Bighorn Basins.*)

Departure from Normal Temperature (°F) December 1, 2016 - February 28, 2017

Percent of Normal Precipitation (%) December 1, 2016 - February 28, 2017

Maps produced by the High Plains Regional Climate Center and are available at: http://www.hprcc.unl.edu/maps/current

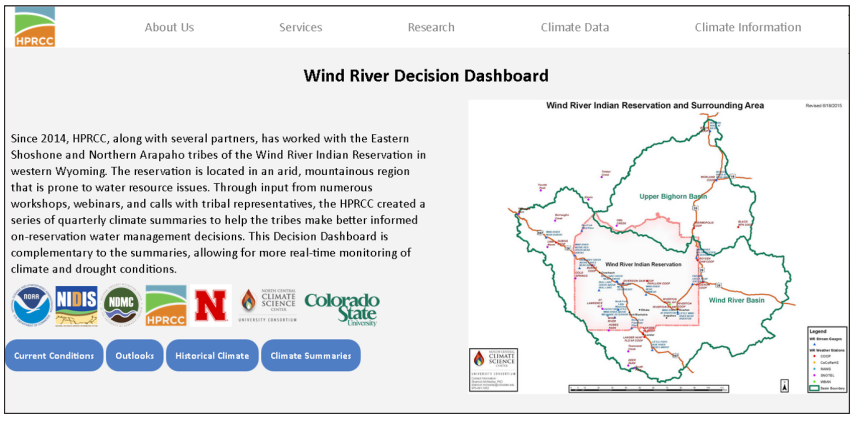
March 2017

Wind River Indian Reservation and surrounding area climate and drought summaries: To date, the HPRCC has co-produced 10 of these summaries with the Office of the Tribal Water Engineer (TWE) at Wind River. The climate summaries were produced quarterly and provided information on seasonal climate conditions, drought and water supply conditions, and seasonal climate outlooks. Three technicians from the Office of the TWE were trained by HPRCC and National Drought Mitigation Center staff on how to put the climate summaries together, and the HPRCC has been transitioning the production of the summaries to the Office of the TWE during the past two years.

Publication on micro-drought at WRIR in 2015: Part of this NCCSC-funded project included conducting research on drought occurrence and impacts on the reservation to inform a drought vulnerability assessment. In 2015, a micro-drought developed that caused a water shortage and the subsequent decision to shut down the irrigation season early. This issue led to the project team investigating the climate conditions surrounding the drought, with the integration of interview data to better understand the conditions that led to the management decisions that were made. Several members of the project team, including HPRCC climatologist Crystal Stiles, turned this research into a publication in *Climate Risk Management* titled, "Anatomy of an interrupted irrigation season: Micro-drought at the Wind River Indian Reservation." The publication is open access and the early online release is available here: https://doi.org/10.1016/j.crm.2017.09.004.

Wind River Reservation Drought Preparedness Team Honorable Mention: In May 2017, the Wind River Reservation Drought Preparedness Team received Honorable Mention for a Climate Adaptation Leadership Award. The award was given out at the National Adaptation Forum in St. Paul, Minnesota. Crystal and NCCSC research scientist Shannon McNeeley accepted the award on the project team's behalf. Learn more about the award and the team's efforts here: http://newsroom.unl.edu/announce/snr/6748/38101.

Wind River decision dashboard: In order to assist the technicians with putting the summaries together and help them monitor climate and drought conditions, the HPRCC put together a decision dashboard tailored to the reservation and surrounding area. The dashboard contains resources to monitor climate conditions, including temperature and precipitation maps, streamflow and snowpack information, drought information, and climate outlooks. It also archives the Wind River climate summaries in addition to the Wyoming Drought Impacts and Outlooks. Check out the dashboard here: https://hprcc.unl.edu/windriver.php.



As word of this project spread, it generated interest among other tribes in the Missouri River Basin, which has led to additional projects that address climate monitoring and drought management on tribal lands. You can read more about these related projects on Page 2.

Recent And Upcoming Travel And Activities

A stunning view from Grand Island, NE of the total solar eclipse that occurred August 21. (Photo courtesy Jordan Husney)

Total Solar Eclipse (August 21)

While not technically a work-related activity, HPRCC staff took advantage of being in the path of totality of the total solar eclipse that occurred August 21. While most of the staff stayed in Lincoln, Natalie and Crystal took off to Grand Island, Nebraska in search of clearer skies. Staff took note of rapid temperature changes, 360-degree views of the sunset, and confused wildlife. Everyone enjoyed this rare event!

GPTWA Drought Vulnerability Assessment Workshop, Rapid City, SD (August 22-24)

Crystal attended this workshop remotely to present climate summary drafts to each of the tribes on this Bureau of Indian Affairs-funded project. These drafts served as a starting point for the tribes to work from, as they will eventually produce their own climate summaries. They received training from HPRCC staff on how to put climate summaries together in Lincoln in October. You can read more about this workshop on page 2.

Montana Climate Mini-Summit, Missoula, MT (September 6-7)

The Montana Climate Office and Montana-based National Weather Service offices teamed up to host a 2-day climate services workshop in September. The first day was dedicated to coordinating efforts between the Montana Climate Office and National Weather Service, while the second day focused on understanding the landscape of climate service partners who serve the state of Montana. As part of the second day, Natalie presented on two topics, which included 1) an overview of HPRCC activities and 2) examples of integrated team models. This workshop provided a great opportunity to learn more about Montana-based climate service efforts and will ultimately lead to future collaborations.

CASNR Tailgate, Lincoln, NE (October 7)

The University of Nebraska-Lincoln's College of Agriculture and Natural Resources (CASNR), in which HPRCC is housed, hosts Husker football tailgates every fall to welcome CASNR alumni back to campus and update them on the activities of the College. On October 7, it was the School of Natural Resource's turn to host, so Crystal brought a poster and handed out fliers to tailgaters on HPRCC services. Even though the Huskers didn't pull out the win against the Wisconsin Badgers, a good time was still had by all!

Crystal showcases the HPRCC at the CASNR tailgate. (Photo courtesy Josh Stiles)

Unidata Users Committee Meeting, Boulder, CO (October 16-17)

In mid-October, Warren attended a Unidata Users Committee meeting in Boulder, Colorado. Unidata is a program in the University Corporation for Atmospheric Research, funded by the National Science Foundation, that focuses on accessing and visualizing geoscience data. While there, Warren provided insight on how Regional Climate Centers use, process, and deliver data. He also returned with information on how we can continue to engage members of the scientific community while providing modern services to our stakeholders.

Upcoming: Wind River Project Meeting, Ft. Washakie, WY (November)

The last meeting for the Wind River drought project will take place in November at the Wind River Indian Reservation's headquarters in Fort Washakie, Wyoming. Crystal plans to participate to discuss the transition of climate summary production to the tribal water technicians as well as the decision dashboard developed for the tribes.

Upcoming: GPTWA Fall Conference, Rapid City, SD (December)

The Great Plains Tribal Water Alliance will have its fall conference in December this year. Crystal has been participating in these meetings, which occur both in the spring and the fall, since Spring 2016. The meeting will provide the opportunity for participants of the BIA-funded project to come together and discuss progress and next steps.