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Thousands of Sandhill Cranes feed on a corn field in the Central Platte River Valley near Alda, NE (photo courtesy Crystal Stiles)

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## Message From The Interim Director

By Ms. Natalie Umphlett

Happy Spring from the HPRCC! As you may remember, we are in the midst of the Center’s 30th anniversary. As I reflect on this milestone, it’s hard to sum up all of the hard work that our faculty, staff, and students have put into making the Center what it is today. Although there have been many changes over the years – the people, the stakeholders, the technology, the climate needs – one thing remains. At the heart of everything we accomplish here at the Center is *data*. From the stacks of books in our climate data library to the terabytes of electronic data on our servers – we have data ready to distribute. By ensuring the flow of information from the collectors to the end users – we have data ready to interpret. From the aggregation of data into easy-to-read maps to giving data historical context to working one-on-one to translate the data into understandable forms – we have data ready to use.

And, this is why this past quarter has been so exciting. Having the opportunity to engage with and learn about the climate needs of so many people of our region helps us to better understand how to transform climate data into useful information. I hope you’ll enjoy flipping through the pages of this edition of *The Prairie Post* and that you stay tuned for more about our upcoming engagements as well.



## Meet Our New Programmer, Warren Pettee



We are excited to announce that we have hired a new programmer, Warren Pettee. Warren is coming to us from the University of North Carolina (UNC) Charlotte where he built and managed their meteorological data network, weather station, and website. His day-to-day work involves utilizing his Python and web programming skills to analyze climate data and develop products. He enjoys presenting data for end users to use, and he especially loves the challenge of bringing that data forward in real-time. He is planning to bring

all of his experience to the HPRCC to ensure our end users continue getting outstanding products online.

Warren is from a rural area north of Greensboro, North Carolina where his family lived on a small farm next to the Dan River. He became interested in meteorology as he was learning about aviation and has been drawn to it ever since. His favorite part of the field is how multidisciplinary it is, which makes it fun to bring his various backgrounds together. Warren obtained his B.S. in Meteorology from UNC Charlotte and will have earned his Earth Science M.S. degree from there in May. On his days off, you can find Warren flying (he has a pilot’s license), fixing things, or taking a quiet hike in the mountains.



## Climate and Wildlife Professionals Take Step Toward Creating Climate Change Threat Tools



Participants discuss how climate impacts plant/animal species during a focus group session. (Photo courtesy Shawna Richter-Ryerson)

State and regional climatologists and fisheries and wildlife professionals know this to be true: Changes in climate are a growing threat to fish and wildlife populations in the Midwest. Higher temperatures. More sporadic and heavier rainfall. Longer periods of frost-free days. Each of these – changes already seen in the Midwest – are altering plant and animal cycles.

Moose are moving north to kill off ticks that plague them; winters in their previous habit no longer remain cold enough long enough to kill them off. Snowshoe hares are turning from white to brown earlier each spring. Birds are migrating sooner, and growing seasons have increased by as much as 10 days across the Great Plains. These examples were just a few that came up during a climate and wildlife workshop hosted at the 77th Midwest Fisheries and Wildlife Conference.

Martha Shulski, director of the Nebraska State Climate Office, and Natalie Umphlett and Crystal Stiles of the High Plains Regional Climate Center, both at the School of Natural Resources at University of Nebraska-Lincoln, spearheaded the workshop intended to help fisheries and wildlife professionals examine how weather and climate information could be integrated into management decisions.

Participants got a crash course in climate (weather is your at-bat; climate is your batting average) as well as in tools available to pull climate data, such as those utilizing the Applied Climate Information System (ACIS). Participants also learned about climate variability and how data shows trends are going up. “Climate change is like you going up an escalator,” Shulski said, “and then the variability, things like El Niño, is you’re jumping up and down on that escalator. You’re going from the stair above you to the stair below you, but you’re still marching up.” Shulski shared data sets and maps that show nighttime low temperatures are increasing, winter and spring seasons are warming faster than historical records show, frost-free seasons have lengthened and the Midwest is wetter overall than the normal set over a 30-year period.

Both the state and regional climate offices can turn this type of climate data into information people can apply to their sector, but they also can give it a historical context, Umphlett said. “We can break down climate metrics and apply it to the specific area you need,” she said. For example, a recent tool created for farmers indicates when the orange wheat blossom midge is likely to hit crops. Given a “trigger” the climate offices can create a suite of tools useful to fish and wildlife professionals to know when action needs to occur. The problem, of course, being which triggers fish and wildlife professionals need to make these decisions.

An overarching theme from a 90-minute break out session was that difficult decisions will need to be made by fish and wildlife professionals in the near future. Disruptions in climate already are altering life cycles of species through shifts in watersheds, reduction in snowpack, more and longer droughts, and increasing air temperature. But at the same time, climate is only a part of the equation. State to state water use, altered landscapes and even migration shifts are part of it, too. “These are all complex issues,” Stiles said. “They are not easy to solve.” That’s why the state climate office and the regional climate center plan to continue pursuing partnerships with fish and wildlife professionals. And why that pursuit will be returned. The workshop was just the first in what both groups hope will be the start of partnerships that result in useable tools.

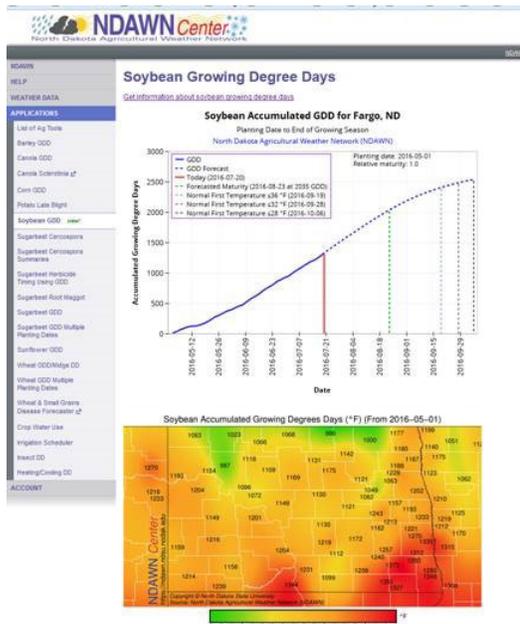
Clay Buchanan, assistant federal aid coordinator for the Michigan Department of Natural Resources who attended the session, sees value in learning more about climate data sources, tools and climate change impacts to be used in natural resource management decisions and looks forward to training opportunities on scaling climate projections to specific needs of state biologists or research scientists.

“The climate workshop was beneficial,” he said. “I learned of the ways other state agencies and organizations were dealing with climate change and what questions they were asking relative to their natural resources and stakeholders. The organizers were exceptionally knowledgeable and interested in meeting the needs of climate data users, too.”

--Shawna Richter-Ryerson, Natural Resources

## Product Highlight: Growing Degree Day Tools

It's springtime in the High Plains, which means the growing season is upon us and producers are busy prepping their fields for planting. There are many climate-related measures available to foster sound decision making based on weather and climate conditions. One of those measures is Growing Degree Days (GDD), which are the number of degrees that the average temperature is above a baseline value. Agricultural-related interests use growing degree days to determine planting times and monitor phenological development. Highlighted below are two new GDD tools for two areas in our region, eastern North Dakota and Kansas.



NDAWN Soybean Application Screen Shot. Cultivar of 1.0 and planting date of May 1 is used. The graphic is downloaded on July 21. The blue line indicates the actual accumulated soybean growing degree days (AGDD). Dashed blue line is the projected AGDD based on normal mean temperatures. Green vertical dashed line shows projected maturity date of August 23, 2016. Blue vertical dashed lines indicate normal first day of 36, freeze and hard freeze dates. The map shows a spatial demonstration of current AGDD of selected cultivar and planting date.

### Soybean Growing Degree Day Model for North Dakota and Minnesota

Researchers at North Dakota State University (NDSU) developed a model to predict the maturity date of soybeans for eastern North Dakota and northwestern Minnesota. According to Adnan Akyuz, State Climatologist of North Dakota, "The new model is just one of the many North Dakota Agricultural Weather Network (NDAWN) online tools available to growers. This model will help growers judge their risks associated with projected soybean maturity and frost dates." Specifically, this model predicts the full maturity date of soybeans, also called the R8 stage. According to Hans Kandel, NDSU Extension Service agronomist, "The R8 stage is defined as 95 percent of the pods on the plant having reached the mature color." Prediction is based on accumulated GDDs from the planting date.

For model predictions, agriculturists can select the relative maturity (RM) for a variety, date of planting, and nearest NDAWN station to estimate the maturity date. The output provides the predicted maturity date, as well as average first day of various frost risks.

Wet or dry conditions may influence how quickly the crop matures in the fall, and therefore, the predicted maturity date for this model may be slightly different, depending on the late-season weather conditions.

The new GDD model can be found at <https://ndawn.ndsu.nodak.edu/soybean-growing-degree-days.html>. This article was adapted from NDSU Agriculture Communication. For the full story, see: <https://www.ag.ndsu.edu/news/newsreleases/2016/june-13-2016/ndsu-develops-soybean-growing-degree-day-model/?searchterm=soybean>.

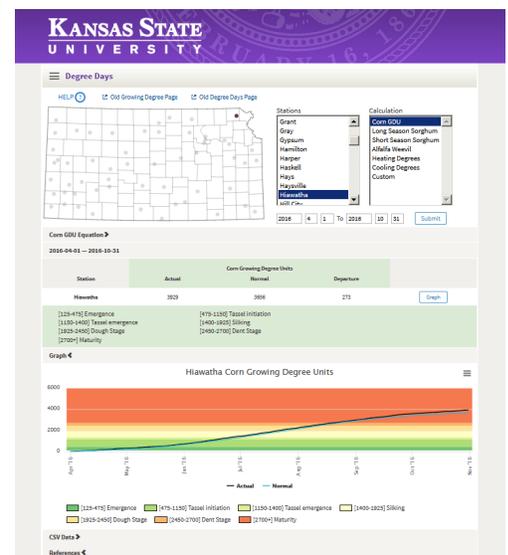
### Kansas State University Degree Days Tool

The Kansas Mesonet has added several new features to their Growing Degree Day tool. Until recently, growing degree day reports were limited to two crops (corn and sorghum) and to the growing season (generally, April through October). The new features of the tool include flexible, user-defined start and end dates, as well as additional calculations for alfalfa weevil, heating degree days, and cooling degree days.

The images to the right show the input screen where users may select their location and calculation of interest, and a graph showing the growing degree day accumulation throughout the last growing season, how that accumulation compares to normal, and also the approximate phenological growth stage of the crop.

To access the tool, or to learn more information, please see:

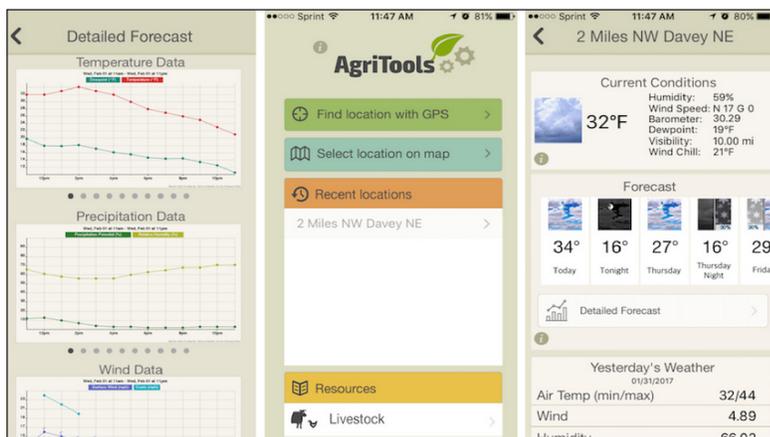
<http://mesonet.k-state.edu/agriculture/degreedays/>.



## Learn More About The Automated Weather Data Network (AWDN)

### AgriTools App Helps Nebraska Producers Make Management Decisions

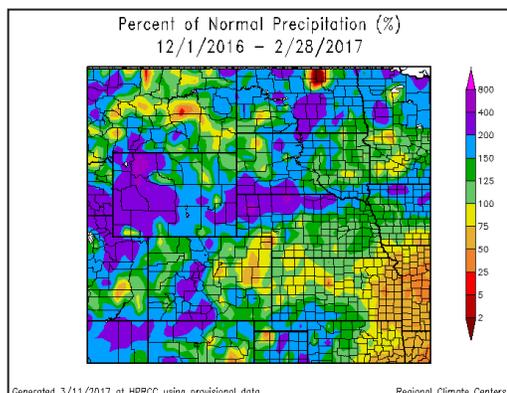
A new app developed by Nebraska Extension can help producers utilize climate and weather data to make management decisions in Nebraska. AgriTools is a free mobile app designed to provide location-specific climate and weather information to agricultural producers. AgriTools features weather data from the National Weather Service, High Plains Regional Climate Center, Nebraska State Climate Office and Nebraska Mesonet weather stations located throughout the state. Forecasts and recent data are provided for any location selected on the map. Data includes yesterday's temperature, wind, soil moisture, soil temperature, evapotranspiration, solar radiation, growing degree days (GDD), and seasonal GDD accumulation.



“Climate and weather has, and will always have an impact on agriculture,” said Tyler Williams, Nebraska Extension educator focused on cropping systems and climate resiliency. “AgriTools arms producers with the climate and weather information they need to make informed decisions.” Access to University of Nebraska-developed mobile agriculture apps and mobile friendly web pages is a feature of AgriTools. Apps such as the irrigation pumping efficiency calculator, irrigation cost calculator, and pesticide record keeping can now be easily located through AgriTools. Another feature of AgriTools is accessibility to decision-aid tools using climate and weather variables. The quick crop water use calculator uses crop type, crop stage and the interpolated evapotranspiration for the location. This provides easy access to estimated crop water use from the field on a mobile device. Additional tools are expected to be developed in the future. AgriTools is currently available on the iPhone only. To download the app, visit <https://itunes.apple.com/us/app/agritools/id943541796>.

--Tyler Williams, Nebraska Extension educator

## Wet Winter and High Mountain Snowpack May Cause Flooding Issues



It was a wet winter throughout the High Plains, with locations across Colorado, Wyoming, and North Dakota having their wettest winters on record. Mountain snowpack was much above-average in the Rockies, causing impacts to ski resorts and wildlife. Above-normal snowpack in the Plains has implications for runoff and flooding in the Missouri Basin this spring, especially in the northern High Plains. The spring convective season has gotten off to an early start, as severe weather has been reported, especially in the southern part of the region. Despite widespread wet conditions, long-term dryness led to drought development in eastern Colorado and much of Kansas. These areas were ravaged with wildfires in March that damaged property and killed people and cattle.

Temperatures were above normal in the southern and eastern portions of the region during winter, while below-normal temperatures dominated to the north and west. Above-normal winter temperatures caused more precipitation to fall as rain instead of snow in some areas, resulting in several locations having one of their least snowiest seasons on record. Ice storms were more prevalent and caused impacts, such as the one that affected southeastern Nebraska and a large part of Kansas in mid-January that downed trees and power lines and created a nightmare for travelers. For most of the region, spring came early this year, as an extremely warm February brought plants out of dormancy. However, plants in the southern part of the region that are further along in their growth stages are especially at risk from damaging freezes, as the median last spring freeze typically does not occur until mid-April. In fact, some freezes have already occurred that may have caused damage to winter wheat and horticulture. You can read more about climate conditions in the High Plains region in our monthly summaries by clicking on this link: <http://www.hprcc.unl.edu/climatesummaries.php>.

## HPRCC, Extension Host National Climate Assessment Workshop



Storm clouds over Northern Barnes County, North Dakota. (Photo courtesy Rick Bohn, U.S. Fish and Wildlife Mountain Prairie Region)

Changes in climate do not necessarily translate into changes to management practices and interactions between sectors remain quite complex.

Those topics were key discussions during the Northern Great Plains Regional engagement workshop for the Fourth National Climate Assessment on Feb. 22 in Rapid City, South Dakota. Three satellite sites for the workshop included one hosted by the High Plains Regional Climate Center and Nebraska Extension at the School of Natural Resources at the University of Nebraska-Lincoln.

The National Climate Assessment is a report produced every four years that summarizes current and future climate change impacts for the United States, broken down by region. The Northern Great Plains Region includes Nebraska, Montana, Colorado, North Dakota and South Dakota. In preparation for the next release of

the NCA, slated for 2018, a series of workshops are being conducted nationwide to gather stakeholders' recommendations for the next report.

Nebraska's workshop brought together people from the five-state region from sectors such as fisheries and wildlife, ecosystems, water resources, and agriculture. Discussions focused on how land, water and energy management practices don't necessarily change when climate changes are observed and how interactions between sectors often are complicated.

Attendees recommended the next report focus on issues unique to the Northern Great Plains region, a divergence from previous versions of the NCA. They suggested including Devils Lake in North Dakota and the Prairie Pothole Region, which spans several northern states. Devils Lake has continued to rise over the last 25 years, swallowing up nearby farmland and communities. Between 1992 and 2011, the lake grew from about 69 square miles to 285 square miles, according to *The Atlantic*, and it continues to grow. The Prairie Pothole Region is one that supports water birds, and changes to climate will affect not only birds, but hunters, communities and the tourism industry, too.

From now through the summer, authors will outline and write the sector- and region-specific chapters. SNR is home to two of the Northern Great Plains chapter authors, climatologists Dr. Mike Hayes and Dr. Martha Shulski, and Inside SNR will continue to report on the NCA4 as it progresses. Public engagement is a key part of the report's process, and there will be additional opportunities for review and comments for those interested in making recommendations. To learn more, click here: <http://www.globalchange.gov/content/how-contribute-nca4>.

To learn more about the NCA4, please see: <http://www.globalchange.gov/nca4>.

Writers: Natalie Umphlett, HPRCC director, and Shawna Richter-Ryerson, Natural Resources

## HPRCC Participates In Nature Learning Night, Weatherfest

The HPRCC was invited to provide an exhibit for Nature Learning Night at Pershing Elementary, held in Lincoln in January. Crystal and Natalie created a new activity that involved taking the temperature of various surfaces with infrared thermometers to demonstrate how land use/land cover change impact the Earth's temperature. The kids especially liked pointing the thermometer at our work lamp, which was extremely hot! It was a successful event, as 250 people were in attendance.

In early April, Natalie and Crystal showcased different rain gauges as well as weather and climate trivia at the 17th annual Central Plains Severe Weather Symposium and Family Weatherfest in Lincoln. Over 2,400 people were in attendance at the event's new home at Nebraska Innovation Campus. The HPRCC has participated each year of the event! For more details, please see: <http://snr.unl.edu/cpsws/>.



Natalie tests the knowledge of Weatherfest attendees with weather and climate trivia. (Photo courtesy Crystal Stiles)

## Recent And Upcoming Travel And Activities



Folks learned about tsunami monitoring at the NOAA Collaboration Team Meeting in Seattle. (Photo courtesy Natalie Umphlett)

### U2U Annual Meeting, Davenport, IA (February 8-9)

Natalie attended the last Useful to Usable (U2U) team meeting to discuss project wrap-up and future directions. Stay tuned for more information in future newsletters!

### Meeting of Mesonets, Manhattan, KS (February 8-9)

Along with the Kansas Mesonet, the HPRCC cohosted a mesonet meeting, which provided an opportunity for discussion of network architecture and opportunities for expanded collaborations. All mesonet operators in the region were invited.

### Missouri River Basin User Forum: Drought Early Warning for the Lower Basin, Nebraska City, NE (March 7-9)

This meeting was held to allow participants to provide updates on drought monitoring and planning activities in the basin. Natalie demonstrated Applied Climate Information System (ACIS) tools, while Crystal presented on tribal projects with Wind River and the Great Plains Tribal Water Alliance. A similar meeting focused on the Upper Missouri Basin will be held in May in Rapid City, SD.

### Nebraska Planning Conference, Kearney, NE (March 8)

Natalie presented on the Center's work with municipal climate adaptation at the 2017 Nebraska Annual Planning Conference in Kearney, NE. Over 40 planners and community leaders were in attendance.

### Utilizing Climate Data to Inform Municipal Planning and Increase Resilience Workshop, Lincoln, NE (March 30-31)

In partnership with the Public Policy Center, the Nebraska State Climate Office, and UNL's Community and Regional Planning Program, the HPRCC helped host a workshop for municipalities. A detailed report of outcomes will appear in the next newsletter!

### NOAA Central Region Collaboration Team Annual Meeting, Seattle, WA (April 3-6)

Natalie attended the annual meeting of the NOAA Central Region Collaboration Team to learn more about the research and activities taking place at the NOAA Western Regional Center in Seattle, WA. Many opportunities for collaboration exist and an exciting year of new projects for the team lies ahead!

### Great Plains Tribal Water Alliance (GPTWA) Spring Conference, Fort Yates, ND (April 4-7)

Crystal attended the GPTWA Spring Conference, "Water & Resiliency: Adapting for our Climate," held on the Standing Rock Reservation. This conference also served as a scoping meeting for the two BIA climate adaptation projects with which the HPRCC is involved, which includes an upcoming climate data training workshop in May/June that will be hosted by HPRCC. More details to come!

### Upcoming: National Adaptation Forum, St. Paul, MN (May)

Natalie and Crystal will be presenting at the upcoming 3rd National Adaptation Forum in Saint Paul, MN. The forum takes place every other year and is a venue where professionals from a wide variety of backgrounds come together to share their knowledge and experiences with climate adaptation.

### Upcoming: WERA 1012 Conference, Estes Park, CO (May)

Bill is attending this conference, which offers 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., its Territories, and Canada.

### Upcoming: American Meteorological Society Conference on Applied Climatology / American Association of State Climatologists Annual Meeting, Asheville, NC (June)

It will be a busy week for Natalie and Crystal as they travel to Asheville, NC to present and participate in both the AMS Applied Climatology conference as well as the annual meeting of the American Association of State Climatologists. Crystal will be discussing her work with drought scenario planning and Natalie will be presenting on her work with municipal-specific climate data analyses.



Standing Rock Sioux Tribal Chairman Dave Archambault gives a keynote address at the GPTWA Spring Conference. (Photo courtesy Crystal Stiles)