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High Plains Regional Climate Center

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December sunrise over Pueblo, Colorado (photo courtesy National Weather Service Pueblo)

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Message From The Interim Director

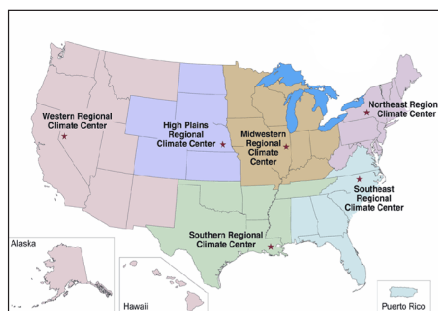
By Ms. Natalie Umphlett



Happy New Year! Welcome to 2017's first edition of *The Prairie Post*. This quarter, we have two new products to share. For the first time, an annual climate summary for the High Plains Region was compiled. It has the same look and feel as our monthly climate summaries, but features an annual overview of climate conditions, final temperature and precipitation rankings for the year, and a description of noteworthy events that occurred (page 3). Another new product is the Automated Weather Data Network (AWDN) Interactive Map (AIM), which provides users with a new way to access and visualize daily, and most importantly, hourly data from the AWDN. Both near real-time and archived data are available through the tool (page 4).

As we look to what's ahead in 2017, this year is shaping up to be a year of engagement. Throughout the year, the Center will be leading a number of workshops and training sessions for several different groups, from tribes to municipal leaders to fish and wildlife professionals. Although each group has its own specific climate-related needs and concerns, the overarching goal for these sessions is to increase the incorporation of relevant local and regional climate information into decision-making. Additionally, these sessions will offer the Center a better understanding of new and emerging needs, which will ultimately help drive enhancements to new and existing climate products and services. You can read more about these sessions on pages 2 and 6.

HPRCC Is Turning 30!



The HPRCC has been providing timely climate data and information to the public for cost-effective decision-making since 1987. This means that 2017 marks the 30th anniversary of the HPRCC! Throughout the year, we will take time to reflect on the many achievements and contributions of the Center. In this edition of *The Prairie Post*, we'll start with a little history lesson. Even though the Center became operational in 1987, the groundwork was being laid long beforehand. In the National Climate Program Act, passed

in 1978, Congress recognized the need for accurate, localized climate information to support government decision-makers and other stakeholders. The Act directed the development of a network of Regional Climate Centers (RCCs) to meet regional climate service needs (see image above). The HPRCC was one of three original pilot Centers and was formally established in 1987 at the University of Nebraska-Lincoln, where it remains today. Stay tuned for the next edition of *The Prairie Post*, where we reflect on the Center's mission to increase the use and availability of climate data and information.



HPRCC Partners For Increased Climate Resiliency Of South Dakota Tribes



Crystal Stiles presents on climate monitoring and drought management on tribal lands at the Great Plains Tribal Water Alliance Spring Conference in April 2016. (Photo courtesy James Rattling Leaf, Sr.)

Through two new federally funded grants, the High Plains Regional Climate Center at the University of Nebraska-Lincoln will be helping four tribes in South Dakota reduce their climate vulnerability.

Through a series of workshops and training sessions, as well as continued technical support, climatologists Crystal Stiles and Natalie Umphlett will provide climate data and information training to the Rosebud Sioux, Oglala Sioux, Standing Rock Sioux and Flandreau Santee Sioux tribes. They also will train individuals to monitor and communicate climate information in a quarterly summary format.

The work is part of nearly \$450,000 granted through the U.S. Department of the Interior Bureau of Indian Affairs Climate Resilience Program to support the Great Plains Tribal Water Alliance; roughly \$40,000 of it will fund the center's work with the tribes.

The kick-off meeting for the two-year project was in November, but the first training workshops will be this spring. HPRCC and other partners on the project will host one in Lincoln in the spring. The intent of the Lincoln workshop is to raise awareness of available climate data and tools and how to use them.

"We'll host labs, and people will actually practice using the tools to get familiar with them," Stiles said.

The next step will be training members from the tribes to interpret climate data and write quarterly climate summaries. Each tribe's summary may include different climate-related data pertinent to their community and region. For example, some may be more concerned with snowpack and runoff, while others may want to focus on precipitation during other seasons.

The remainder of the project will focus on working with the tribes to operationalize the climate summaries, which will serve as a foundation for creating climate adaptation plans and making timely management decisions and declarations during periods of climate extremes.

"The tribes want to be resilient and self-reliant," Stiles said. "With this training, they will have a climate history they've built on their own through quarterly climate summaries, and they will be able to make their own decisions."

Umphlett added, "It's empowering."

This project, set for completion in fall 2018, fits into climate-related work already underway in the Missouri Basin. HPRCC hopes work with tribes will expand beyond this project, possibly into North Dakota and Montana.

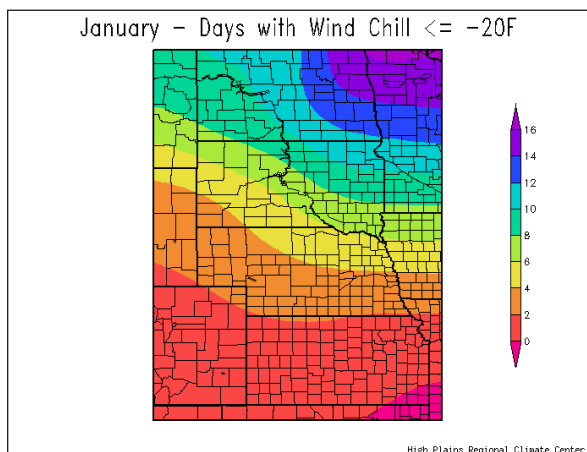
Other program partners on this project include the National Drought Mitigation Center at University of Nebraska-Lincoln; the National Oceanic and Atmospheric Administration, the National Integrated Drought Information System, South Dakota State University, South Dakota School of Mines and Technology, and Louis Berger, an engineering company.

The GPTWA is an independent organization that addresses technical and policy issues regarding tribal water resources and serves as an advisory committee to the Great Plains Tribal Chairman's Association.

Both the HPRCC and NDMC are a part of the School of Natural Resources at UNL.

---Shawna Richter-Ryerson, Natural Resources

Product Highlight: Wind Chill Climatology



Each year across the High Plains region, low temperatures combine with winds to create dangerous conditions for anyone venturing outside, as well as livestock and wildlife. These conditions can be summarized in a wind chill temperature, which takes into account both temperature and wind. Extremely low wind chill temperatures make big headlines, but often, these conditions are quite typical for this region. To give these conditions an historical context, the HPRCC created a winter wind chill climatology based on 57 stations located within and around the plains portion of the High Plains region over a 37-year time period (1973-2010). It includes the number of hours and days in which the wind chill temperature reached particular thresholds for each month of the winter season (December, January, and February) in addition to the season as a whole. Not surprisingly, North Dakota experiences the most frequent and extreme wind chills in the region.

The example map above shows the average number of days in January that the wind chill is equal to or below -20°F. To see the entire suite of maps in the wind chill climatology, please see: <http://www.hprcc.unl.edu/maps.php?map=WindChill>.

To learn more about the study, please see: <https://www.stateclimate.org/journalofserviceclimatology/articles/vol2014no1>.

Product Highlight: Annual Regional Climate Summary

A new product the HPRCC has begun to produce is an annual regional climate summary. For years, the HPRCC has produced monthly climate summaries for the High Plains, but this is the first time an annual climate summary has been put together for the region. The first annual climate summary covers climate conditions, data and rankings, and events from 2016. It has the same look and feel as our monthly summaries, but with some additional features. For example, you will get an overview of climate conditions for the year, as well as information and maps highlighting temperatures, precipitation, snowpack and streamflow, and drought, but instead of an outlook there is an entire page dedicated to noteworthy climate events that occurred around the region during the year. We highlighted the following events in 2016: severe weather on the Plains, the Black Hills drought, flooding in south-central Kansas, the Cottonwood fire, record crop yields, and the Christmas storm. For details on climate conditions in 2016 in the High Plains, check out the summary here: <http://hprcc.unl.edu/climatesummaries.php>.

If you are interested in other regions of the country, all six Regional Climate Centers are now producing annual regional climate summaries. These summaries are sent to the National Centers for Environmental Information (NCEI), which compiles both the monthly and annual summaries to use in their national State of the Climate reports. Follow this link to NCEI's 2016 annual State of the Climate report: <https://www.ncdc.noaa.gov/sotc/national/201613>.

Record Warmth

The major highlight of the year was the record warmth that occurred throughout most of the High Plains, particularly in the Dakotas. Temperature departures ranging from approximately 2.0-4.0 degrees F (1.1-2.2 degrees C) above normal were experienced across most of the region, resulting in quite a few records for top 10 warmest year. A strong El Niño contributed to above-normal temperatures during the winter across the northern Plains. Warmer temperatures during winter and early spring caused mountain snowpack to melt in Wyoming. While the summer was only slightly warmer than normal, the region experienced much-above-normal temperatures in June due to the occurrence of several heat waves. The warmth of the fall was particularly impressive, as it set several records around the region. Higher temperatures caused precipitation to fall more as rain instead of snow, which brought about a slow start to the snowpack season in the Rockies. However, the warmth extended the growing season by delaying the first fall freeze in many locations, and it also aided with harvest. The greatest below-normal temperature departures came at the end of the year, as several Arctic air masses moved through the region in December and brought some of the coldest temperatures of the year.

Precipitation varied from season to season, but most locations ended the year either slightly below or slightly above normal. However, wet conditions were somewhat more prominent, as there were several top 10 records for wettest year. Flood events were partially responsible for wetness in places such as Wichita, Kansas and Landis, Wyoming. Excessive wetness caused delays in spring planting and the emergence of various crop diseases in South Dakota, Nebraska, and Kansas. It was drier in Colorado and an area including western South Dakota and northeastern Wyoming, but the dryness was not record-breaking. While drought was a problem in a few locations throughout the year, it did not cause major impacts region-wide in 2016. In fact, conditions were favorable enough that corn, soybean, and sugar beet production were projected to hit record highs in 2016 in the U.S.

Temperature and Precipitation Overview

Deviation from Normal Temperature (°F)
1/1/2016 - 12/31/2016

Percent of Normal Precipitation (%)
1/1/2016 - 12/31/2016

Notes: The early spring 2016 melt in snowpack and a period of low precipitation led to 2016 being the High Plains region. Maps produced by the High Plains Regional Climate Center and are available at <http://hprcc.unl.edu/climatesummaries>.



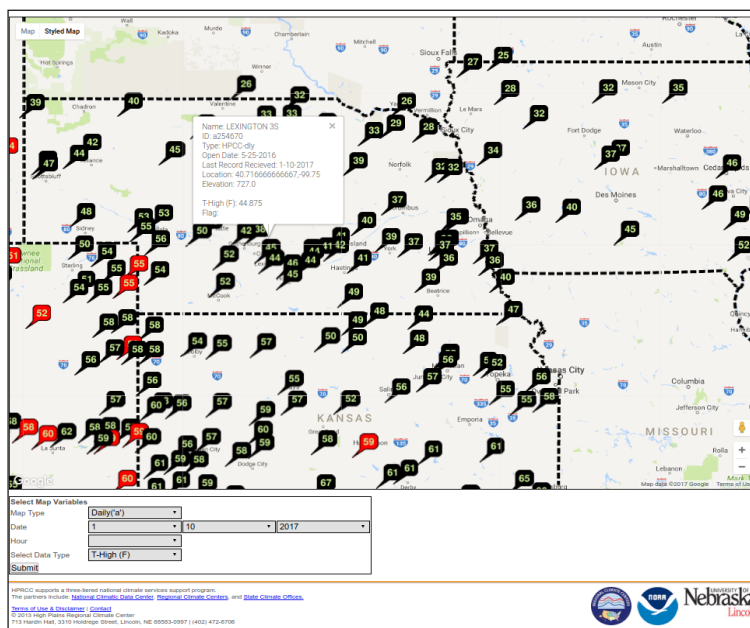
Image at left: A corn field near O'Neill, NE, courtesy of UNL CropWatch.

According to the U.S. Department of Agriculture's National Agricultural Statistics Service, ample rain and moderate temperatures in the Central U.S. led to record-high yield and production for corn and soybeans in 2016.

Learn More About The Automated Weather Data Network (AWDN)

AWDN Product Highlight: AWDN Interactive Map

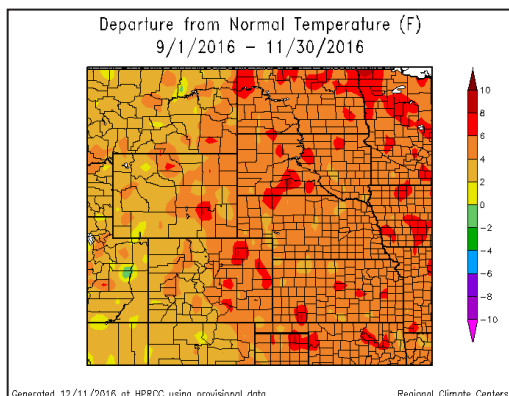
The AWDN Interactive Map (AIM) allows users to visualize data from the AWDN, which is a collection of state mesonet data that provide information on weather conditions for the High Plains. Users can view daily and hourly data, including temperature, precipitation, relative humidity, wind speed/direction, evapotranspiration, soil temperature, and solar radiation. Each day, the database is updated with the most recent data, which allows users to display yesterday's measurements in addition to past years. Once the variable and date/time have been selected, a map is populated with the values of the requested measurement (see example at right). Each measurement is color coded to reflect quality control flags. For instance, black markers indicate no flags, purple markers indicate missing data, and red, blue, and yellow markers indicate that an estimation technique was used. To see the technique used, simply click on the value on the map, and an information window containing the station metadata, data value, and flag will be displayed. Hopefully, this new map interface will help users to navigate the 30+ years of available AWDN data.



The AIM interface is available free of charge and can be accessed here: <http://awdn.unl.edu/aim/>.

If you are interested in downloading data from the AWDN, please contact us for a Classic Online account: <http://www.hprcc.unl.edu/contact.php>.

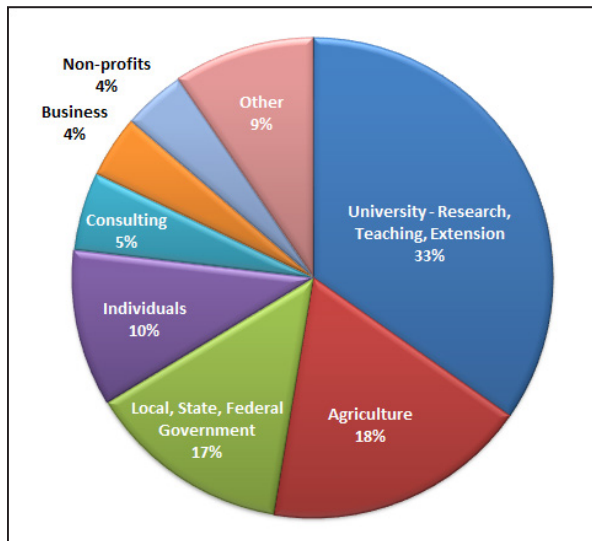
Above-Normal Temperatures Prevalent During Fall, Cold Beginning To Winter



Fall temperatures were 2-6°F above normal across a broad area of the High Plains, leading to some impressive records. For example, Colorado Springs, CO, Pueblo, CO, Salina, KS, and Aberdeen, SD had their warmest falls on record. The warmth extended the growing season by delaying the first fall freeze in many areas, but it also brought about drought expansion and a slow start to the snowpack season. On the other hand, December was quite cool in the region, with temperatures ranging from 6-8°F below normal in parts of Wyoming and the Dakotas. An Arctic air mass dropped into the region around the middle of the month, bringing the coldest temperatures of the year to some locations. A storm system impacted much of the region Christmas Day and the day after bringing a variety of weather types, such as a blizzard, an ice storm, and thunderstorms and tornadoes. Several systems moved through the Rockies during December, allowing mountain snowpack to recover.

It was quite warm with some wet locations throughout the region in 2016. North Dakota experienced the greatest temperature departures, and Bismarck, Fargo, Grand Forks, and Minot had their warmest year on record. Part of the reason for the warmth in this area was one of the strongest El Niños on record was present during the first half of 2016, which contributed to the warm winter experienced by this area. It was also a generally wet year in the High Plains with the lack of widespread drought. Favorable weather and field conditions led to record-high yields for corn, soybeans, and sugar beets in 2016. You can read more about climate conditions in 2016 in the High Plains region in our annual summary by clicking on this link: <http://www.hprcc.unl.edu/climatesummaries.php>.

Services In 2016



Sectors served by HPRCC in 2016.

Overview

Each year, the HPRCC offers one-on-one consultation and web-based access to climate products and data, as well as monthly, quarterly, and annual climate summaries. Collectively, these services help to address requests from users whose work spans a wide variety of areas, from soil and water conservation to agricultural competitiveness and profitability to natural resources and environmental management.

This year, Center staff fielded over 450 requests from people from 37 states, Washington D.C., and 7 countries. One-third of the Center’s requests were made by university personnel from research, teaching, and/or extension. The vast majority of our research-related requests originate from fields outside of weather and climate, including agriculture, ecology, engineering, and hydrology. The second largest sector served this year was agriculture, which included producers, crop consultants, and industry. Another group of stakeholders we served constitutes federal, state, and local government agencies and personnel. In particular, we serve the National Weather Service offices in our region.

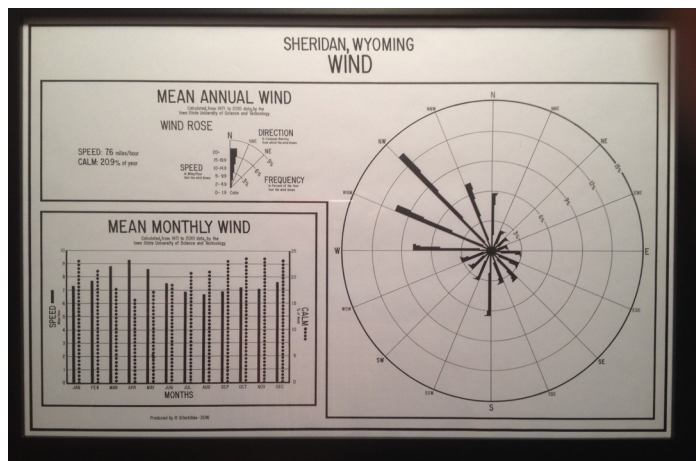
The majority of our services are offered free of charge over the phone, by email, or on the HPRCC website. With over 3.5 million on-line interactive system hits this past year, our Classic Online Service was quite popular. Classic Online provides users with access to daily and hourly data from over 200 automated weather stations across the High Plains region, collectively called the Automated Weather Data Network (AWDN). Major sectors utilizing Classic Online include agriculture, education, engineering, government, and insurance. If you are interested in using our Classic Online Service, which includes weather observations and customized reports for the agricultural sector, please contact us: <http://www.hprcc.unl.edu/contact.php>.

DID YOU KNOW?

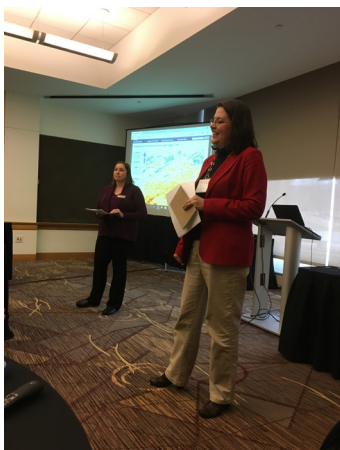
The HPRCC phone line and general email are monitored every day, Monday through Friday, from 8am-5pm, to help you with your climate data needs. Are you a researcher wanting to learn the most efficient way to download temperature and precipitation data for a project? Maybe you are a producer who needs data to fulfill the requirements of the Conservation Stewardship Program? We are accustomed to assisting with a variety of climate service requests, so no matter your need, our staff are here to help you. You can reach our climate services staff at 402-472-6706 or <http://www.hprcc.unl.edu/contact.php>.

Services Highlight

While most climate service requests are routine in nature, sometimes we get very unique requests from our customers. For example, in October we received a request for wind data from Rich Urbatchka, a retired high school math teacher who lives in Sheridan, WY. Rich also has a background in Geography, specifically Cartography, and has a passion for weather. Rich wanted the wind data for Sheridan so that he could construct a wind rose by hand. According to Rich, he enjoys the “crafting” of graphics using “old school” techniques of hand drawing with ink on vellum. We pointed him to the data he needed, and then he got to work on the wind rose. Rich was kind enough to share the final product with us, which is the image at right. Rich has framed this impressive drawing and given it as a gift; we are amazed at Rich’s talents and are delighted we got to work with him!



Recent And Upcoming Travel And Activities



Crystal and Midwestern RCC Director Beth Hall facilitate a session on climate tools at the DEWS meeting in Cincinnati. (Photo courtesy Tonya Bernadt)

Great Plains Tribal Water Alliance (GPTWA) Fall Conference, Rapid City, SD (November 28-30)
Crystal attended the GPTWA Fall Conference to discuss the HPRCC's role in the new climate change adaptation grants awarded to the Rosebud Sioux Tribe by the Bureau of Indian Affairs. The project team also took the opportunity to meet and kick off the projects. Stay tuned for updates as these projects ramp up in the spring!

Midwest Drought Early Warning System (DEWS) Meetings, Champaign, IL and Cincinnati, OH (December 5-8)

Crystal helped plan and facilitate regional meetings of the Midwest DEWS for Illinois/Indiana and Kentucky/Ohio. These meetings were intended to bring together stakeholders to discuss strategies for addressing various aspects of drought and how they affect those states. Similar meetings were held for Iowa/Missouri and Minnesota/Wisconsin. A report is forthcoming to summarize the outcomes of these meetings.

Weather & Climate Decision Tools for Farmers, Ranchers & Land Managers Conference, Gainesville, FL (December 5-7)

The goal of this conference was to highlight and discuss state-of-the-art weather- and climate-related decision support tools for agriculture. Natalie attended and provided an overview of stakeholder engagement activities of the USDA-funded Useful to Usable (U2U) project as well as demonstrated available climate and agricultural tools during a tools café session.

Upcoming: Midwest Fish and Wildlife Conference, Lincoln, NE (February)

The HPRCC and the Nebraska State Climate Office are co-hosting a workshop titled, "Integrating Weather and Climate Information into Management Decisions" as part of the Midwest Fish and Wildlife Conference. The workshop aims to increase the capacity of fish and wildlife professionals to identify, access, and understand local and regional climate information sources salient to decision making.

Upcoming: U2U Annual Meeting, Davenport, IA (February)

The 5-year USDA-funded Useful to Usable (U2U) project is coming to a close, and Natalie will be attending the final project meeting that will take place in February. The meeting will provide an opportunity to learn about the results of the final project evaluation and will allow for reflection and discussion of lessons learned. Additionally, opportunities for continued collaboration will be explored. <http://agclimate4u.org>

Upcoming: Nebraska Planning Conference, Kearney, NE (March)

Natalie will be presenting at the 2017 Nebraska Planning Conference the first week of March. This conference is held annually and provides training and continuing education for professional planners.

Upcoming: Utilizing Climate Data to Inform Municipal Planning and Increase Resilience Workshop, Lincoln, NE (March)

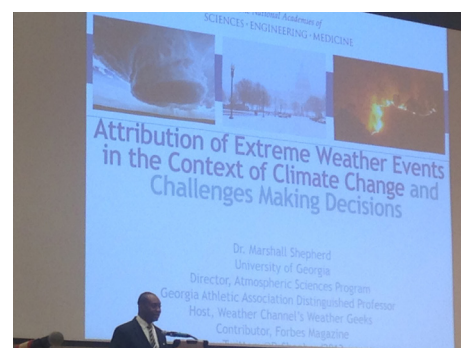
In March, the HPRCC is co-hosting a 2-day workshop on municipal climate adaptation with sustainability directors, engineers, planners, and water resource managers. Topics will include the state of municipal planning, a review of climate data available to municipalities, and opportunities for participants to share resiliency work being done in their communities.

Upcoming: THIRA Workshop, Platte River Basin, NE (April)

The HPRCC will co-host a FEMA Threat and Hazard Identification and Risk Assessment (THIRA) workshop in Nebraska in April that will focus on drought. This workshop is part of a NOAA Sectoral Applications Research Program (SARP)-funded project. The project is utilizing climate data from the Platte River Basin in Nebraska to develop and implement a decision-support model for drought planning using the THIRA process. To learn more about this project, go to: <http://droughtthira.unl.edu/>.

Upcoming: NOAA Central Region Annual Team Meeting, Seattle, WA (April)

The annual meeting of the NOAA Central Region Collaboration Team will take place in April in Seattle, WA. Natalie will be attending in order to explore opportunities for collaborating with partners within NOAA in both the Central and Western Regions.



Dr. Marshall Shepherd from the University of Georgia presents at the decision tools workshop in Gainesville, FL. (Photo courtesy Natalie Umphlett)