USDA Northern Plains Climate Hub
U.S. DEPARTMENT OF AGRICULTURE

NORTHERN PLAINS CLIMATE HUB
EXTENSION & OUTREACH

UNIVERSITY OF WYOMING EXTENSION

WAFERx
WATER AGRICULTURE FOOD ENERGY RESEARCH NEXUS

Announced February 5, 2014

Learning From Your Neighbor: Climate Resiliency in Agriculture

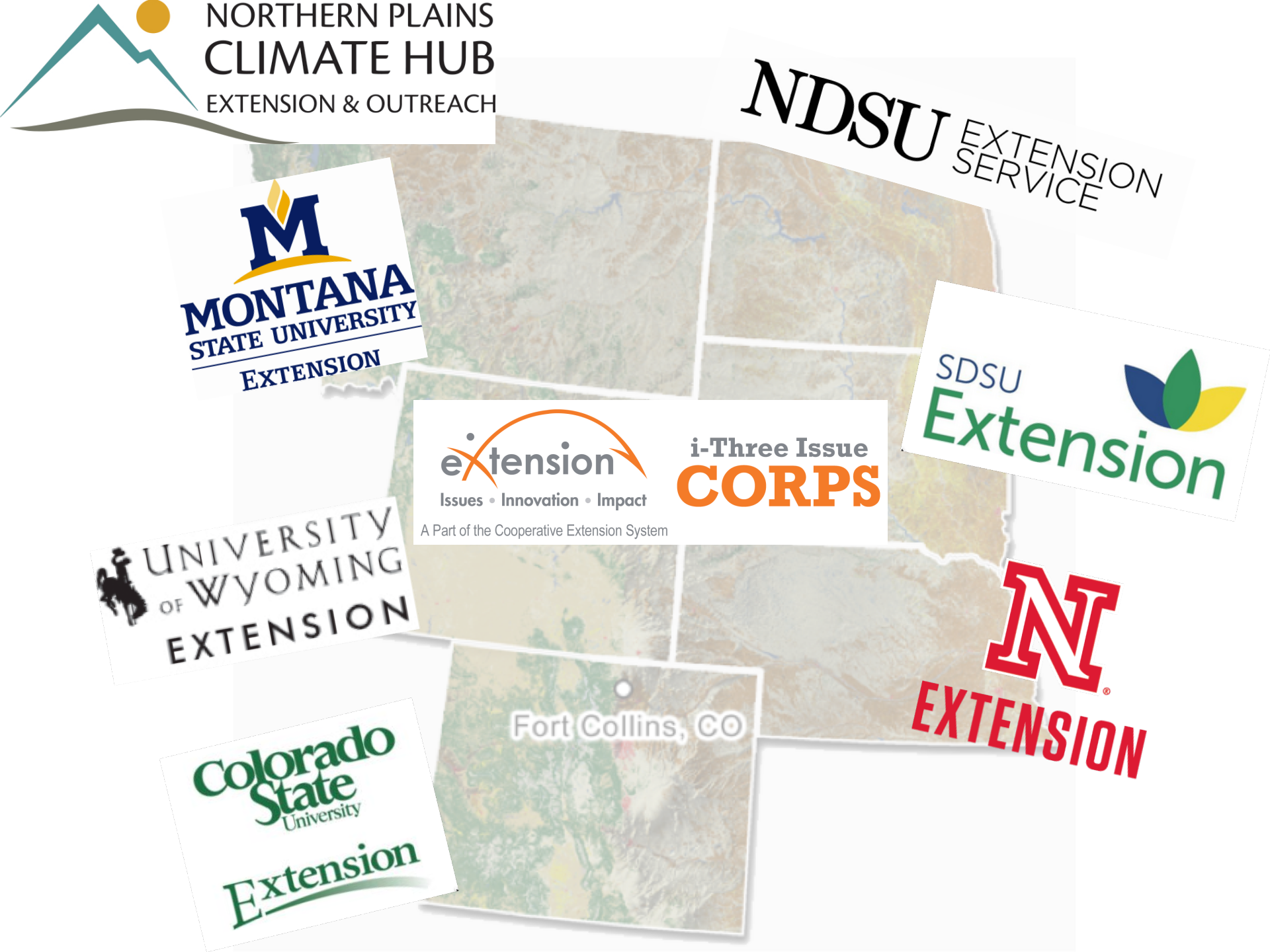
March 26, 2019

Windy K. Kelley
UW-Extension: Weather Variability & Ag Resiliency Specialist
USDA NPCH: Regional Extension Program Coordinator
WAFERx

Climate information benefiting agriculture & forestry

Value of Agriculture in the Northern Plains

Ag producers have and continue to face challenges with increased climate and wx variability and extreme events.


NORTHERN PLAINS
CLIMATE HUB
EXTENSION & OUTREACH
NDSU EXTENSION SERVICE
MONTANA STATE UNIVERSITY EXTENSION
SDSU Extension
extension
Issues • Innovation • Impact
A Part of the Cooperative Extension System
i-Three Issue CORPS
UNIVERSITY OF WYOMING EXTENSION
Fort Collins, CO
EXTENSION
Colorado State University Extension

Learning From Your Neighbor: Climate Resiliency in Agriculture

Learning From Your Neighbor: Climate Resiliency in Agriculture

Working lands are the backbone of our nation – providing food, fiber, fuel, and other values such as ecosystem services (e.g., clean water) and aesthetics such as pristine views. In other words, we all depend directly and indirectly on working lands. These lands and those who manage them face numerous risks year-to-year, season-to-season, and day-to-day ranging from global and national markets to weather and climate – many of these risks are ultimately out of the control of working land managers.

A story map

Edit

Learning From Your Neighbor: Climate Resiliency in Agriculture

No issues detected × Story not shared ×

The Producers

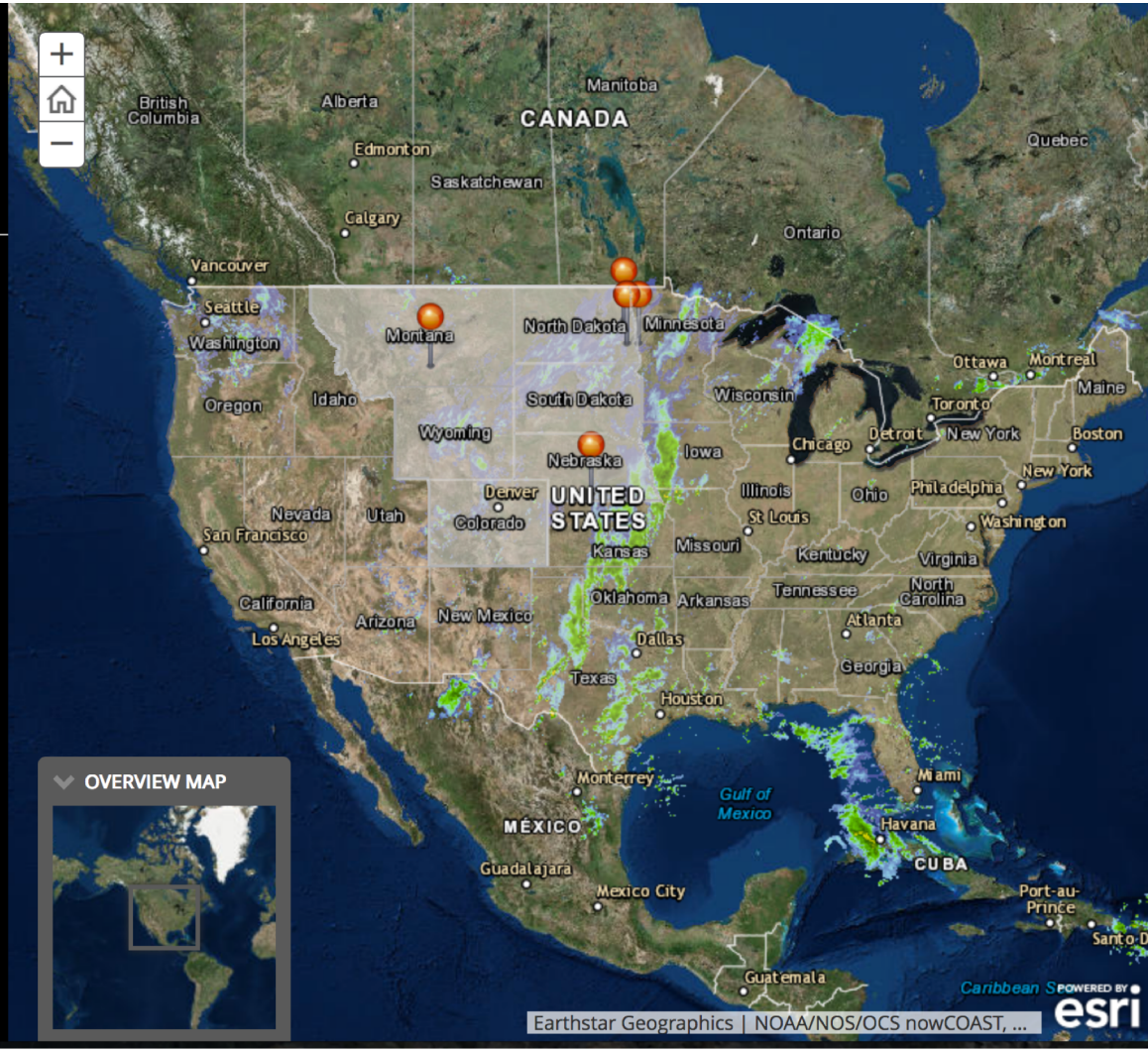
Join us as we meet with and learn from agriculture producers in the Northern Plains about innovative strategies they are implementing in hopes of being more resilient to risks.

They will share their stories about why they adopted different management practices, and associated benefits and challenges of adopting these practices. Some producers will share how these practices have made their operation more resilient, and therefore their livelihood, while others share observations of inter and intra-annual changes in the weather.

Let's Get Started:

- Climate and Weather of the Plains
- Using No-Till to Minimize Extreme Weather Impacts
- No-Till for Moisture Management
- Cover Crops 101

15



The Producers

Join us as we meet with and learn from agriculture producers in the Northern Plains about innovative strategies they are implementing in hopes of being more resilient to risks.

They will share their stories about why they adopted different management practices, and associated benefits and challenges of adopting these practices. Some producers will share how these practices have made their operation more resilient, and therefore their livelihood, while others share observations of inter and intra-annual changes in the weather.

Let's Get Started:

- Climate and Weather of the Plains
- Using No-Till to Minimize Extreme Weather Impacts
- No-Till for Moisture Management
- Cover Crops 101
- Benefits of Cover Crops

Let's Get Started:

- Climate and Weather of the Plains
- Using No-Till to Minimize Extreme Weather Impacts
- No-Till for Moisture Management
- Cover Crops 101
- Benefits of Cover Crops
- Risks of Cover Crops

Producer Videos:

- Marlin Murdoch - Orleans, Nebraska
  - Climate and Weather
  - Advantages of No-Till
  - Water Management
  - Hybrid Seed & Test Plots
  - Early Experiments in Cover Crops

- Greg Schelemmer - Fromberg, Montana
  - Climate and Weather
  - Why No-Till
  - Soil Improvements

Climate and Weather of the Plains

Climate and Weather of the Plains

The geographic location of the Great Plains creates a scenario for highly variable weather. In the shadow of the Rocky Mountains and thousands of miles from any ocean, the middle part of the U.S. can have some of the most extreme weather in North America. Average precipitation ranges from less than 10 inches in western Wyoming and Montana to over 40 inches in southeast Kansas and Missouri. For Nebraska, the average precipitation ranges from around 12 inches in the west to near 35 inches in the southeast, with a statewide annual average of 22 inches. The driest year on record for Nebraska was 2012, when the average precipitation was 13.36 inches. The wettest year on record was 1915, with an average of 35.50 inches of precipitation.

Annual precipitation does not tell the whole story. The timing of the precipitation and temperature patterns make a big difference in the impact on crop production. More than 75% of Nebraska's annual precipitation comes during the growing season (April – September), and this is

Annual precipitation does not tell the whole story. The timing of the precipitation and temperature patterns make a big difference in the impact on crop production. More than 75% of Nebraska's annual precipitation comes during the growing season (April – September), and this is when it is most critical for crop production. Since 2000, Nebraska has had three growing seasons in the top 10% driest and two in the top 10% wettest (out of 121 years). We also had three years in the top 10% of the warmest growing seasons since 2000 and 1993 is the most recent year to be in the top 10% coolest.

It may be obvious that precipitation can be highly variable, but there is some concern that this variability will increase in the future. According to Wilhite, et al. 2014, a decrease in soil moisture of 1-10% (varies by emissions scenario) is projected by the end of the 21st century. These changes reflect the combined effect of increasing temperatures and seasonal changes in precipitation. Wilhite, et al. also mention that the Great Plains has seen a 16% increase in heavy rainfall events from 1958-2012. Both these scenarios create difficulties for crop production, especially when you need to be

Using No-Till to Minimize Extreme Weather Impacts

Using No-Till to Minimize Extreme Weather Impacts

The Great Plains region is not a stranger to extreme weather, and too much or too little rain is often a problem when managing agricultural land. No-till management is one option for adapting to the impact highly variable and highly destructive weather can have on crop production.

No-Till Management

No-till farming in Nebraska is nothing new, but this management system is not widely used. According to a statewide survey in 2004 (date of last state-wide survey), 27% of all crop acres in Nebraska are managed under no-till, but that number is expected to be much higher now.

No-till uses a systems approach to crop production where crops are grown with minimal soil disturbance and the soil is kept covered with crop residue to conserve soil and water. Continuous no-till and crop rotation, intensity, and

No-Till for Moisture Management

Precipitation is often the limiting factor in crop production in non-irrigated or limit-irrigated fields. Conserving this moisture can be critical to the success of the crop. Compared to fields without residue cover, no-till farming not only reduces the erosion potential with residue cover, it also reduces evaporative losses with residue cover. A four-year study conducted in North Platte, Neb., by the University of Nebraska – Lincoln (UNL) showed that residue cover saved more than 2.5-5.0 inches of water per year and corn yields were 17-25 bushels higher and soybean yields were 8-10 bushels higher than in bare-soil plots.

Excess precipitation can also be a factor when it results in saturated soils, ponding, or erosion. Long-term no-till management reduces runoff and increases infiltration rates by creating better soil structure. In a UNL rainfall simulator demonstration near Sidney, Neb., more than 3.75 inches of water was applied in 90 minutes to no-till soils before runoff started. In comparison, runoff started

Using Cover Crops

Thanks to the many partners, especially the ag producers, who made this project possible.

https://bit.ly/2RD3VCX

Windy K. Kelley
UW-Extension
wkelley1@uwyo.edu
307.367.4380

Dannele Peck
USDA Ag Research Service
dannele.peck@ars.usda.gov
970.744.9043

@USDAClimateHubs
@windyranges
@PeckAgEc

https://climatehubs.oce.usda.gov/northern-plains

Issued in furtherance of extension work, acts of May 8 and June 30, 1941, in cooperation with the U.S. Department of Agriculture. Glen Whipple, director, University of Wyoming Extension, University of Wyoming, Laramie 82071.

WAFERx: Thank you for support from the National Science Foundation RII Track-2 fec 1632810.