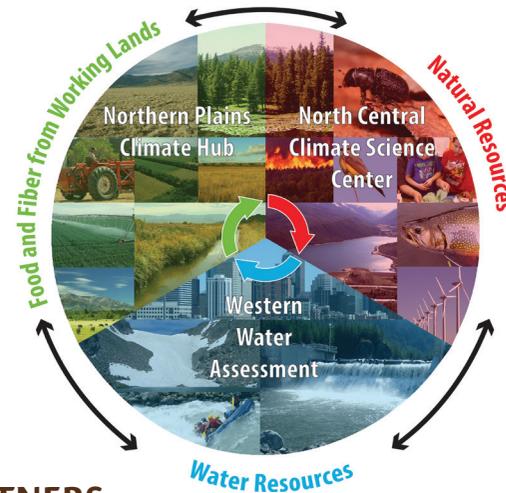




USDA NORTHERN PLAINS CLIMATE HUB
Climate information benefiting agriculture and forestry



PARTNERS

USDA Agencies:

- Agricultural Research Service
- Animal and Plant Health Inspection Service
- Farm Service Agency
- Forest Service
- National Agricultural Statistics Service
- Natural Resources Conservation Service
- Risk Management Agency
- Rural Development

Other Agencies/Organizations:

- 1862 Land Grant Universities' Cooperative Extension Services and Agricultural Experiment Stations:
 - » Colorado State University
 - » Montana State University
 - » North Dakota State University
 - » South Dakota State University
 - » University of Nebraska
 - » University of Wyoming
- National Agroforestry Center
- Department of Interior: North Central Climate Science Center
- NOAA RISA: Western Water Assessment
- High Plains Regional Climate Center
- National Drought Mitigation Center
- National Integrated Drought Information System

USDA NORTHERN PLAINS CLIMATE HUB

Dannele Peck (Director)
 1701 Centre Avenue
 Fort Collins, Colorado 80526
 970-744-9043
 dannele.peck@ars.usda.gov

<http://www.climatehubs.oce.usda.gov/northernplains>

USDA is an equal opportunity provider, employer, and lender.



Robust and healthy agricultural production and natural resources under increasing weather variability and a changing climate



United States Department of Agriculture
Northern Plains Climate Hub

The Secretary of the US Department of Agriculture announced the 10 Climate Hubs in February 2014. The mission of the Climate Hubs is to develop and deliver science-based, region-specific information and technology with USDA agencies and partners:

- to agricultural and natural resource managers
- that enable climate-informed decision-making,
- and provide access to assistance in implementing those decisions.

LEARN WHY THE CLIMATE HUBS FORMED



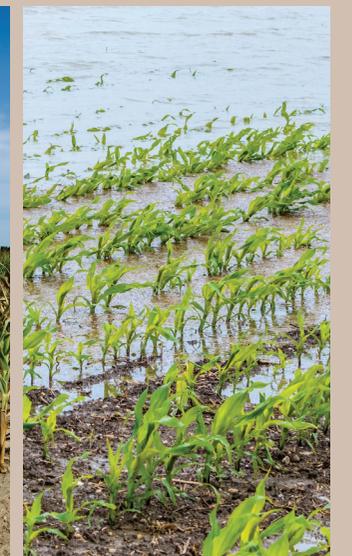
OBSERVED WEATHER VARIABILITY AND CHANGING CLIMATE

The Northern Plains has experienced increased weather variability and climatic changes throughout the 20th and early 21st centuries. The following are examples of observed changes, which pose risks and opportunities to agricultural production:

- Increased atmospheric carbon dioxide (CO₂) concentration
- Increased length of frost-free season
- Increased frequency of extreme events (e.g., droughts, heat waves, downpours)
- Increased nighttime temperatures
- Northward shift in plant hardiness zones
- Earlier and faster snowmelt-driven runoff, resulting in reduced summer streamflows



Tony Campbell, Shutterstock



Lisa S., Shutterstock

M. Reeves, CWI Russell Wildlife Refuge, MT

VULNERABILITY

Agricultural producers are dealing with increased risks associated with weather variability and changing climate.

VULNERABILITIES

Livestock:

- Reductions in livestock performance due to higher temperatures and greater pest abundance on livestock
- Increases in non-native invasive plants which alter pasture or rangeland, community composition, nutrient cycling, and fire risk

Croplands:

- Operational challenges for reservoir storage to provide irrigation water when needed for crop growth
- Higher nighttime temperatures during critical grain filling periods, which can reduce yields

Forests:

- Longer, hotter growing seasons increase wildfire risk
- Increases in pests, water stress, and invasive species enhance susceptibility to disease and mortality



To learn more visit: <http://goo.gl/0Xg5ej>

ADAPTATION

Adaptation is a process of preparing for and responding to changes in climate by adjusting management in ways that harness benefits or reduce anticipated effects.

ADAPTATION STRATEGIES

The USDA has identified a number of practices that land managers can use to adapt to or mitigate the effects of increased weather variability and a changing climate to make their operations more resilient.

Livestock:

- Adaptive grazing management
- Grass-banking
- Livestock operation flexibility

Croplands:

- Plant more water-efficient varieties
- Precision planting, fertilization, and irrigation
- Protect and enhance soil health

Forests:

- Plant diverse, pest tolerant and drought resistant species
- Prescribed fire and thinning of coniferous forests
- Proactive pruning/maintenance of urban trees to reduce risk from extreme events

Hereford cattle on ARS Fort Keogh Livestock and Range Research Laboratory near Miles City, Montana. • Photo by Keith Weller



MITIGATION

Mitigation activities reduce the amount of greenhouse gases in the atmosphere by capturing and storing them (e.g., in soil) or reducing emissions.

MITIGATION STRATEGIES

The USDA has identified 10 Building Blocks for Climate Smart Agriculture to reduce greenhouse gases in the atmosphere. The 10 incentive-based Building Blocks are:

- Soil Health
- Conservation of Sensitive Lands
- Livestock Partnerships
- Promotion of Wood Products
- Stewardship of Federal Forests
- Grazing and Pasture Lands
- Energy Generation and Efficiency
- Private Forest Growth and Retention
- Nitrogen Stewardship
- Urban Forests



David Keto, UW Extension



To learn more visit: <http://goo.gl/Kqtw5V>



TO USE AURASMA

- 1 • Download and install the free Aurasma app from Play Store or iTunes Store to your phone or tablet.
- 2 • Click on Aurasma icon.
- 3 • Type "UWAG" in the Search box at the top of the screen. Click on the UWAG channel, then choose Follow.
- 4 • Click on the open square symbol at the bottom of the screen. Point your phone or tablet at the image that has the Aura icon and watch the magic! Double-clicking enlarges the video to full screen and enables watching the video away from the Aura image.