ADAPTING TO CLIMATE CHANGE
GREAT PLAINS

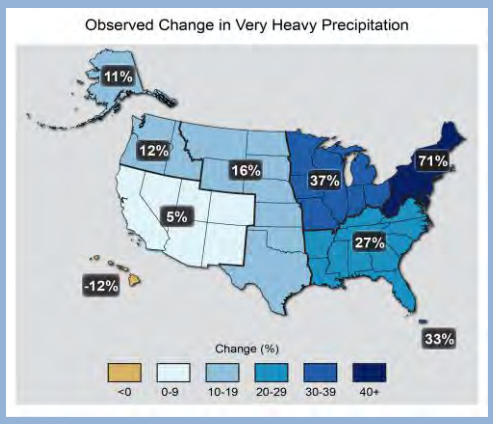
The Great Plains is projected to experience higher temperatures, increased precipitation, and more frequent and intense storms, with a generally hotter southern area and colder northern area. These projected changes pose challenges to communities as they protect water and waste infrastructure, protect air quality and public health, and protect wetlands. Many communities are building resilience to the risks they face under current climatic conditions. This fact sheet provides examples of communities that are going beyond resilience to anticipate and prepare for future impacts.

Moving Beyond Resilience to Adaptation

Climate change adaptation goes beyond resilience by taking actions to address future risks. Adaptation refers to how communities anticipate, plan, and prepare for a changing climate.

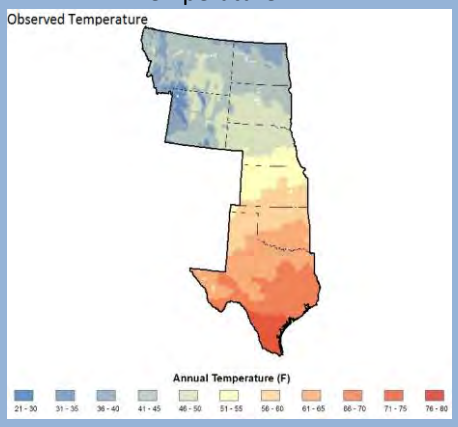
Observed and Projected Changes in the Great Plains

Intense storms have increased



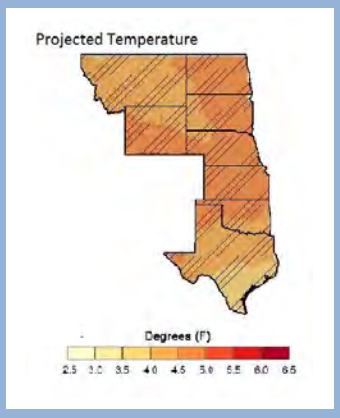
The Great Plains experienced a 16% increase in the amount of precipitation falling in very heavy events (the heaviest 1%) from 1958 to 2012.

Average Annual Temperature



This map shows the average annual temperature (°F) from 1981 to 2010 in the Great Plains.

Average Annual Temperature Increases



The Great Plains is projected to experience an increase in the average annual temperature (°F) for 2041 to 2070 compared to 1971 to 2000 under a high emissions scenario.

Protecting Critical Community Infrastructure

Future projections for less total annual rainfall, less snowpack in the mountains, and earlier snowmelt mean that less water will likely be available during the summer months, especially in the northern areas. This will make it more difficult for water managers to satisfy water demands throughout the course of the year. Key vulnerabilities include:

- Higher temperatures due to climate change can affect the amount of water in watersheds. Water system managers may need to adjust operations as surface water quantities change.
- Climate change can result in changes in water quality. Water system managers may need to use alternative treatment methods to meet water quality standards as the climate changes.
- Intense storms and droughts due to climate change can effect soil moisture (shrinking when dry and swelling when wet), posing risks to the structural integrity of water infrastructure.

Adaptation in Action

In Helena, MT, the Missouri River and the TenMile Creek are the surface water sources for 85% of the city's water. The TenMile Creek has been the primary year-round water source and the Missouri River has been a summer water source. The TenMile Creek is becoming more vulnerable due to increased drought and forest fires. The city recognized "… the possible vulnerability of the system to a long-term warming trend …," i.e., climate change. Therefore, Helena will switch these two water sources. The Missouri River will become Helena's major year-round source and the TenMile creek will become a supplemental summer water source. Both water treatment plants are being upgraded to handle the different quantities and qualities of water flowing through the plants, so that Helena can continue to provide reliable water services under future climatic conditions.

Maintaining Air Quality and Public Health

Increased temperatures can exacerbate existing air quality concerns, including the prevalence of ground-level ozone. Public health officials, emergency responders, and community leaders will face challenges to protect public health, especially for people most vulnerable to these impacts, including the elderly, very young children, those with pre-existing medical conditions, and low-income communities. Key vulnerabilities include:

- Higher temperatures can worsen ground-level ozone, affecting those with respiratory and heart conditions.
- More frequent and intense heat waves can result in increased heat stress, illness, and death.
- More frequent wildfires can degrade air quality and threaten human life.

Adaptation in Action

In Dallas, TX, more frequent heat waves, combined with the urban heat island effect, are already degrading air quality and have led to several deaths. The city developed its Sustainable Skylines Initiative with EPA and is increasing tree cover and vegetation to provide shade and natural cooling. Using cool roof technologies, including green roofs, white roofs, and more reflective roofing helps reduce heat absorption. Adding cooler and more porous pavements helps the city manage stormwater runoff.

White roof at Dallas, TX, public school

Protecting Cold Water Fisheries

Climate change is affecting wetlands in the northern tier of the Great Plains. These wetlands help recharge the High Plains Aquifer System, the major source of drinking water for people living in the region. In the southern tier of the Great Plains, climate change-induced sea level rise may increase the erosion and loss of coastal wetlands, which provide shellfish and habitat for animals, remove pollutants, and reduce flooding. Key vulnerabilities include:

- Warmer temperatures due to climate change can increase evaporation and accelerate snow melt, leading to low stream flow, which, in turn, can degrade coldwater fish habitat.
- Along the Texas coast, more frequent and intense precipitation, as well as sea level rise, may exceed the engineering design of solid and hazardous waste management systems, risking damage to nearby and downstream ecosystems.
- Warming ocean temperatures can cause increased algal blooms and northward shifts in fish and shellfish populations that depend on colder water temperatures, disrupting coastal ecosystems.

Adaptation in Action

The Wyoming Game and Fish Department's Wetlands Conservation Strategy identifies climate change and drought as "extreme" concerns for state wetlands' health. The mountainous Laramie Plains Wetlands Complex, an area of more than 100,000 acres, stores water for drinking and supports cold water fisheries. Among the recommended adaptation strategies are to analyze wetland functions to better determine their unique qualities and potential for conservation easements. Other strategies include establishing water-harvesting features, e.g., such as windrows and shrub stands to accumulate drifting snow, and on wetland construction sites, grade surface contours to capture runoff and direct it into wetlands. Reconnecting fragmented habitats can raise the water table and sustain healthier wetlands which are crucial to cold water fisheries.

Laramie Plains Wetlands Complex-Wyoming (USGS)

For a comprehensive view of projected climate changes in your region, consult:

- ***Climate Change Impacts in the United States: The Third National Climate Assessment***
- ***EPA's Climate Change Adaptation Resource Center***

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