

## FACT SHEET

### Understanding and Assessing Climate Change: Implications for Nebraska

#### Report Goals

The goal of this report is to inform policy makers, natural resource managers, and the public about:

1. the current state of the science on climate change;
2. the latest projections for ongoing changes over the twenty-first century; and
3. potential impacts for Nebraska of those changes.

#### Overview: Key Points

- Scientific evidence confirms that human activities are the primary cause for the warming that the planet has experienced, especially in recent decades.
  - broad and overwhelming consensus within the climate science community.
  - any debate restricted to precisely how these changes will play out and what actions are needed to adapt to and mitigate these changes.
- The magnitude and rapidity of the projected changes in climate are unprecedented, compared to natural climate change and variability.
- Natural forcings have always occurred and continue today, having produced climate change and variability throughout the earth's history; only recently have anthropogenic forcings become large enough to significantly affect the climate system.
- Multiple lines of observational evidence show that the earth's climate is changing on global, regional, and local scales and is warming overall.
  - temperature change represents only one aspect of a changing climate.
  - changes in rainfall, increased melting of snow and ice, rising sea levels, and increasing ocean acidity are only a few of the other key indicators.

#### Past and Projected Changes in Nebraska's Climate: Key Points

- Nebraska has experienced an overall warming of about 1°F since 1895, with warming trends that are highest in winter and spring and for the nighttime lows than for daytime highs. Since 1895, the length of the frost-free season has increased by 5 to 25 days across Nebraska.
- Projected temperature changes for Nebraska range from an increase of 4-5°F (low emission scenarios) to 8-9°F (high emission scenarios) by the end of the twenty-first century.
  - the largest uncertainty in projecting climate change beyond the next few decades is in the greenhouse gas emission scenarios assumed and not because of climate model uncertainty.
- Under both low and high emissions scenarios, the number of high temperature stress days over 100°F is projected to increase substantially in Nebraska.
  - the number of warm nights is expected to increase by an additional 20-40.
- There is no observed trend in mean annual precipitation across Nebraska.
  - increase in heavy rainfall events has been observed for portions of Nebraska.
  - flood magnitude has been increasing because of this increase in heavy precipitation events.
- Little change in total annual precipitation is projected for Nebraska.
  - increasing trend in heavy rainfall events is expected to continue.

- Soil moisture is projected to decrease by 5-10% by the end of the century, if the high emissions scenario ensues. This can lead to enhanced drought conditions for Nebraska.
- A major concern for Nebraska is the large projected reduction in snowpack for the Rocky Mountains.
  - summer flows in the Platte and Missouri rivers critically depend on the slow release of water as the snowpack melts and could be greatly reduced in coming years.
- The advent of large-scale irrigation in Nebraska since the 1960s has kept the summertime climate in Nebraska cooler and wetter than it otherwise would have been.
  - if reduced water availability curtails irrigation, the effects of global warming will be exacerbated.
- Projections are for increasing drought frequency and severity because of the combination of increased temperatures and increased seasonal variability in precipitation.

### **Implications of Projected Climate Changes in Nebraska: Key Points**

- To address the implications of changes in climate, experts in the principal sectors of importance to Nebraska were invited to prepare commentaries for this report. These commentaries raise serious concerns about how the projected changes in climate will impact Nebraska, and they provide a starting point for discussions about the actions that we should take to adapt to the changes in each sector. The key sectors chosen for inclusion were
  - water resources;
  - energy supply and use;
  - agriculture;
  - forests;
  - human health;
  - ecosystems;
  - urban systems, infrastructure and vulnerability; and
  - rural communities.

### **Summary**

- This report documents many of the key challenges that Nebraska will face as a result of climate change. Imbedded in each of these challenges are opportunities. A key takeaway message from the report is that, with this knowledge in hand, we can identify actions that need to be implemented to avoid or reduce the deleterious effects of climate change in Nebraska. Action now is preferable and more cost effective than reaction later.