Colorado's Climate-Related Risks

Many reports document the risks that climate change poses to Colorado. Some of the most significant include:

- A 2014 U.S. government national climate assessment which comprehensively assesses the science of climate change and its impacts across the United States.
- A 2013 regional assessment focused on the six southwestern states of Arizona, California, Colorado, Nevada, New Mexico, and Utah, prepared as an input to the national assessment.
- *Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation (Second Edition - August 2014)*, a report by the Western Water Assessment program at the University of Colorado Boulder for the Colorado Water Conservation Board, and online supplemental data, which is a synthesis of climate science relevant for management and planning for Colorado's water resources, but also is relevant to many others.
- *Colorado Climate Change Vulnerability Study*, a 2015 report by the University of Colorado Boulder and Colorado State University to the Colorado Energy Office, which provides an overview of key vulnerabilities that climate variability and change will pose for Colorado's economy and resources.

These and other reports conclude that:

- Statewide average temperatures are projected to warm by +1.5°F to +4.5°F by 2050 under a scenario with low future emissions of heat-trapping gases, or by +3.5°F to +6.5°F with high future emissions. For later in the century, high emissions are projected to lead to continued further increases, to +5.5°F to +9.5°F. All these values are comparisons to 1971–2000 averages.
- The highest summertime temperatures are projected to increase even more than average temperatures. Both extremely hot days and heat waves could increase in frequency, potentially several-fold if future emissions are high.
- Projections for future total annual precipitation vary from decreases of a few percent to increases of a few percent.
- Because warmer air can hold more moisture, models project that extreme precipitation events will be augmented, even in areas where total precipitation may decrease. In Colorado, heavy storms may increase in winter but not necessarily in summer.
- Most published research suggests that annual streamflows in all of Colorado's river basins could be decreased. Peak streamflows are projected to come earlier in the year, by one to three weeks by mid-century, and late summer flows are projected to decrease.
- The frequency and extent of wildfires in Colorado are projected to increase. Projections range up to a several-fold increase in area burned annually in the state; however, projections based on statistical models may become less accurate the more that temperatures and other climatic factors change. An increase in wildfires likely would lead to more destructive flooding, as burned areas are more susceptible to flooding and runoff of sedimentation and debris.
- Heat-related illnesses and mortality could increase; air quality could be degraded by increases in ground-level ozone, fine particulates, and airborne allergens; and changes in outbreaks and the spread of infectious diseases could occur, but it is extremely difficult to predict these changes.
- Other risks include possible increases in the conditions suitable to outbreaks of tree-killing insects; potentially more frequent losses of crops from increasingly severe future droughts; increased road maintenance needs and road closures from heat-related problems; and adverse effects on skiing from less snow and on rafting, fishing, and other recreation activities from earlier and faster runoff and lower flows.

Figure 1 on the next page, prepared by the Rocky Mountain Climate Organization, illustrates Colorado's historic statewide temperatures, taken from instrumental readings, and the projected future statewide average temperatures, from the *Climate Change in Colorado* report described above.

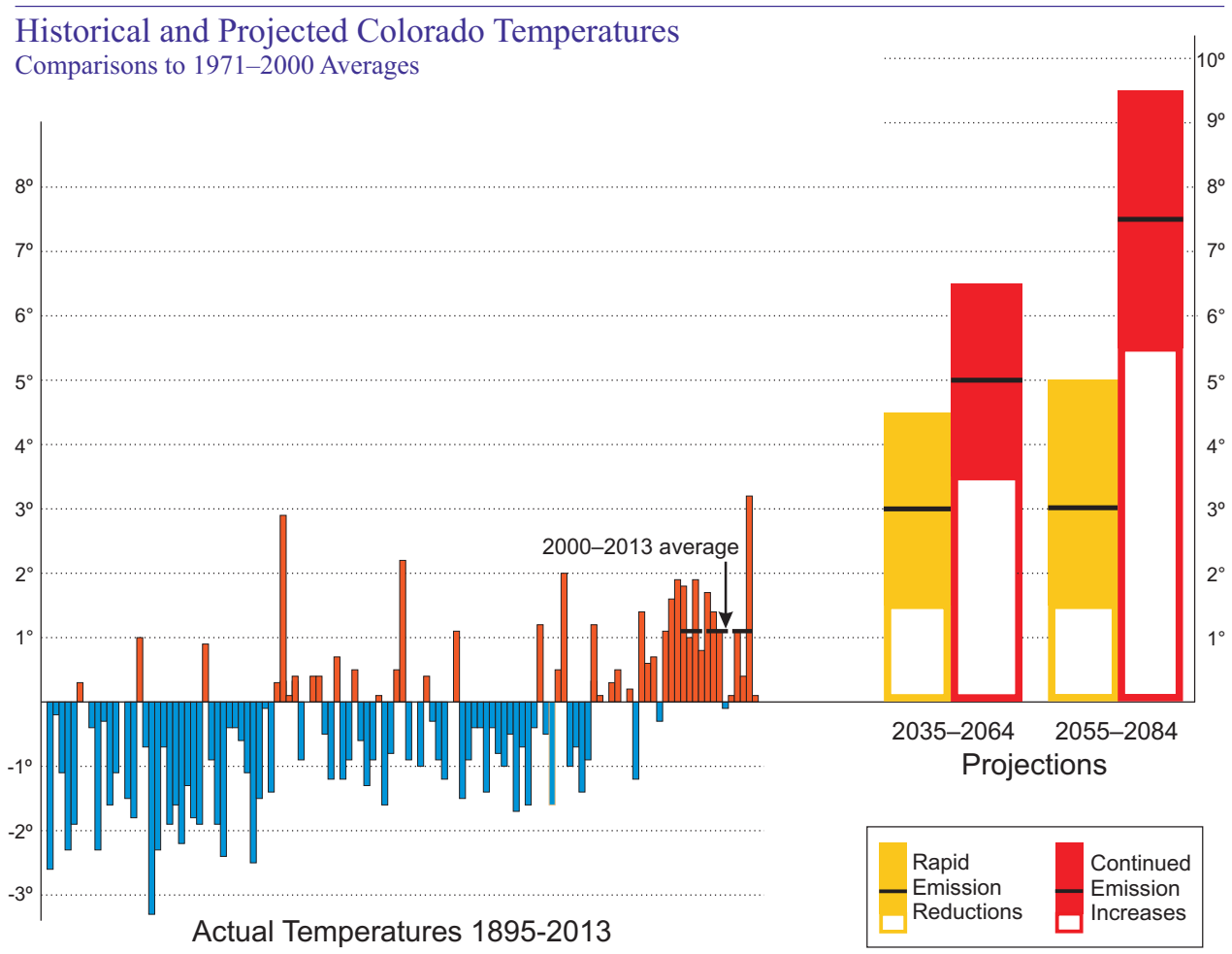

Figure 1. On the left, average statewide Colorado temperatures compared to 1971–2000, in degrees Fahrenheit. Temperatures in 2000–2013 averaged 1.2° higher. On the right, projections of statewide temperatures, again compared to 1971-2000, for two future periods, each with one scenario of rapid reductions in heat-trapping pollution (known as "representative concentration pathway," or RCP, 2.6) and another of continued increases as in recent years (RCP 8.5).The solid colors show the 10th to the 90th percentiles of projections from 23 climate models for RCP 2.6 and 34 for RCP 8.5; the black lines show the averages. Historical data from the National Oceanic and Atmospheric Administration (NOAA), analysis by the Rocky Mountain Climate Organization (RMCO); projections from Western Water Assessment (WWA), University of Colorado at Boulder, using Coupled Model Intercomparison Project (CMIP5). [xx] Figure by the Rocky Mountain Climate Organization.

Figure 2 below illustrates changes in extreme temperature, showing historic and projected occurrences of 95° days in Fort Collins, one location where the frequency of hot days has been studied.

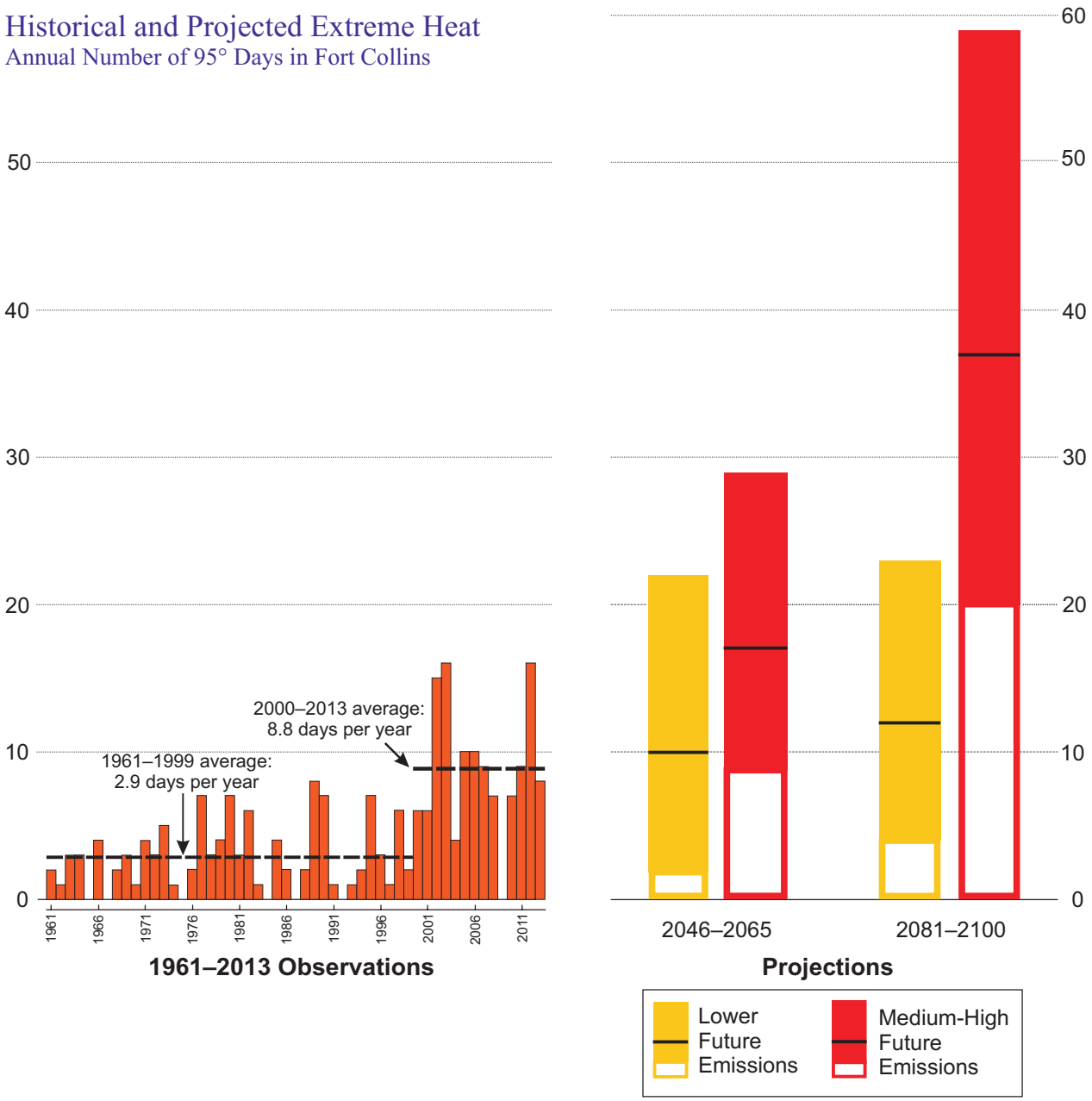

Figure 2. On the left, the number of days per year 95° or hotter in Fort Collins. The average number in 1961–1999 was 2.9 per year, and in 2000–2013 8.8 per year. On the right, projections for two future periods, each with one scenario of lower and another of medium-high future emissions. The solid colors show the 10th to the 90th percentiles of 30 projections of annual 95° days for each period/scenario combination, and the black lines the averages. Data from NOAA and the Coupled Model Intercomparison Project (CMIP3); analysis by the Rocky Mountain Climate Organization.[5]