



BEAR CREEK WATERSHED

Fact Sheet 70 Climate Model Middle Bear Creek Watershed March 2020

The Bear Creek Watershed Association protects and restores water and environmental quality within the Bear Creek Watershed from the effects of land use.

Clear Creek County
Jefferson County
City of Lakewood
Town of Morrison
Aspen Park Metropolitan District
Conifer Sanitation Association
Conifer Metropolitan District
Denver Water Department
Evergreen Metropolitan District
Forrest Hills Metropolitan District
Genesee Sanitation & Water District
Geneva Glen
Jefferson County School District
Kittredge Water & Sanitation District
Tiny Town Foundation, Inc.
West Jefferson County Metro District

The BCWA used the EPA CREAT assessment model tool to build on existing modeling and water quality monitoring data and other assessments to better understand how climate change threats could affect utility operations and watershed health. BCWA included a number of climate change threats (e.g., drought, flood, change in storm frequency, timing of snow melt, reduced water quality) in our assessment that would present both water quality and quantity issues through 2050 (State Water Plan horizon) within the lower Bear Creek Watershed. Predicted increasing temperatures from climate change could present regulatory and treatment challenges for members.

The Bear Creek Watershed Association conducted a *climate change risk assessment* using the U.S. Environmental Protection Agency's (EPA) Climate Resilience Evaluation and Awareness Tool (CREAT). CREAT provides data for historical and projected climate conditions that users can incorporate into scenarios to help them understand how threats are driven by climate change. BCWA evaluated the upper Bear Creek Watershed (UBCW) from Evergreen Lake to Mt. Evans and the lower watershed below Evergreen Lake to Bear Creek Reservoir (MBCW) (including a portion of lower Bear Creek to Wadsworth in Lakewood). BCWA built multiple scenarios by selecting different anticipated future conditions defined by changes in annual average and monthly temperature and precipitation, as well as intense precipitation events and hot days that may exacerbate the climate-related threats of concern. While all Global Circulation Models (GCMs) project warming, the projected changes in precipitation vary by region or even parts of a watershed. Some models project wetter conditions for a given location and others project drier conditions. The models also vary in the changes in the magnitude of intense precipitation events; some project stormier conditions than others. CREAT averages the projected data from climate models to provide data for warmer and wetter, hotter and drier and moderate future conditions.

Since the watershed is mostly snowpack-fed, BCWA has concerns about drought, increased surface water temperatures, changes in snowmelt timing and the potential impacts to water availability in the future. Multiple studies and reports for Colorado predict average annual temperatures increasing by a minimum of 2.5°F, with summers warming by 5-7°F and winters by 3-5°F by 2050. Warmer temperatures mean changes in evaporation and soil moisture, reducing snowmelt runoff in each of Colorado's river basins. More precipitation is expected to fall as rain rather than snow, and the state's high-elevation snowpack (source of much of the state's water supply) could decline by 20 percent and melt earlier than in the past. These state-wide results are consistent with the CREAT model predictions for the Bear Creek Watershed.

BCWA included annual and monthly data in their UBCW and MBCW Models to gain a better understanding of the changes in temperature and precipitation patterns throughout the year. Temperatures in March, July, November, and December are critical for snowfall and snowmelt, and temperatures in the winter and shoulder seasons are of the highest concern for temperature-driven water quality events. Based on the UBCW Model (Fact Sheet 56), the upper watershed can expect temperature increases from 5.18°F to 6.12°F with much earlier snow melt (17-45 days) and drier summer/fall seasons with an increased drought threat and more frequent and intense storm events.

Model predictions from the MBCW Model shows a potential increase in severity of future storm events of 14% (5-year event) to a 22% increase in 30-year storms within the lower drainage by 2050. The models predict more frequent and more intense storm events.

The MBCW Model predicts significantly hotter on average with an increased potential for drier conditions. The MBCW model predicts an average 6.12°F increase in annual temperature in the lower drainage and at Bear Creek Reservoir by 2050. As with all climate modeling there is an understanding that future conditions can vary from predictions. However, planning for the expected changes of hotter and drier is a prudent management strategy. The results of a CREAT assessment provide information the BCWA can use for long-term watershed water quality planning processes.

The MBCW Model Predicts 5.18 - 6.12°F increase in average annual temperature in the lower Bear Creek Drainage and at Bear Creek Reservoir by 2050

The MBCW Model predicts by 2050 of a high probability for hotter and drier conditions with 3-12% less summer precipitation.