

## MEMORANDUM



**Date:** May 7, 2020  
**To:** Alan Searcy  
**From:** Russell Clayshulte, Manager  
**Re:** Summary of Climate Model

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The Bear Creek Watershed Association (BCWA) has 14-member communities that provide drinking water, wastewater and stormwater services within the Bear Creek Watershed. The Association conducted two climate change risk assessments using the U.S. Environmental Protection Agency's (EPA) Climate Resilience Evaluation and Awareness Tool (CREAT). BCWA used their assessments to build on existing modeling and monitoring efforts to better understand how climate change threats could affect utility operations and watershed health within the upper watershed above Evergreen and within the lower watershed above Bear Creek Reservoir. Each model assessment provided similar climate change threats, adaptations, and risks but with different management options.

BCWA included several expected climate change threats in their assessments that targeted existing and emerging water quality and quantity issues. Increasing temperatures from climate change could present regulatory and treatment challenges for water and wastewater utilities, in addition to affecting the health of sensitive fish species in the watershed. Minimal temperature increases of 1 to 2°F would present issues for the cold-water fisheries in the upper watershed. Additional concerns include water supply issues from drought, as well as water quality issues from wildfires and subsequent flooding. Previous flooding events have resulted in significant sedimentation of Evergreen Lake that diminished the reservoir's capacity.

BCWA considered how climate change may increase the severity or frequency of these threats, and assessed the risks of water quality or quantity conditions that would challenge their ability to maintain a reliable supply, to treat the incoming raw water and to protect the health of the watershed ecosystem. The two projected scenarios used CREAT-provided data for moderate conditions with a stormy future and hotter and drier conditions with a stormy future looking out to 2050, which was the model higher probability predicted future condition. This end year of the assessment aligns with the planning horizon of a state water plan. BCWA included annual and monthly data in their scenario 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. The upper watershed can expect a temperature increase 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. This data can inform the potential severity of future climate change threats, which are predicted to increase by about 26% within the upper watershed and a 28.6% increase in 100-year storm within the lower watershed by 2050. The models predict more frequent and more intense storm events. This will increase flooding threats. BCWA also considered the 5-, 10-, 15-, 30-, 50- and 100-year storm events in their assessment.

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 —the 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

The CREAT models predict the watershed between 2020 – 2050 will become significantly hotter on average with an increased potential for drier conditions. The lower Bear Creek Watershed Model predicts an average 6.12°F increase in annual temperature in Middle Bear Creek 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.