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**LONG-TERM WATER QUALITY MODELLING TO EVALUATE CLIMATE
CHANGE EFFECTS IN A TEMPERATE WATER SUPPLY RESERVOIR**

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ABSTRACT: Water quality models can play an important role in water resources management by helping scientists and water managers predict the effects of Global Climate Change (GCC) in water supply reservoirs and then design mitigations. In this study we developed a two-dimensional calibrated water-quality and hydrodynamic model of Deer Creek reservoir in Utah that was validated using eleven years of data (2000-2011). Previous work with a short-term water quality model (three years) suggested that the reservoir is sensitive to GCC changes during spring and summer seasons. However, the relatively short-term simulations were performed using data from an anomalous time period when Deer Creek was at its lowest storage capacity due to construction which may have influenced results. This long-term model will offer a defensible base line for assessing GCC effects in Deer Creek both by providing information on longer trends and by reducing uncertainties through calibration over a longer time period. Using a model validated using 11-years of data we evaluated GCC impacts by altering air temperatures, wind speed, inflow rates, nutrients loads and various combinations of these changes selected to study the highest impact scenarios that might occur in the Rocky Mountain Region based on predictions by the Intergovernmental Panel on Climate Change (IPCC). Chemical and biological parameters were used to evaluate GCC effects in Deer Creek. Our studies indicated that the reservoir is sensitive to the worst case scenarios (e.g., higher air temperatures and flows during spring-summer and lower air temperatures and flows during fall-winter season) producing total algal concentrations that will significantly impact Deer Creek's water quality. Other realistic scenarios do not show as significant of impacts and can be potentially mitigated by nutrient budgets and reservoir management decisions. These studies can be used as a base to evaluate and mitigate GCC effects in other temperate reservoirs.

KEY TERMS: Climate change; water quality; temperate reservoir; modeling

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