

FROM THE CORNBELT TO THE NORTH WOODS: UNDERSTANDING THE RESPONSE OF MINNESOTA WATERSHEDS TO CLIMATE CHANGE

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Abstract

Climate change predictions based on general circulation models focus on atmospheric dynamics often with a cursory assessment of on-the-ground hydrologic processes, such as evapotranspiration, runoff and groundwater recharge. An alternative, complementary approach focusing on past watershed responses to climate change using USGS streamflow and climatic data helps to characterize real-world watershed responses to climate change in the recent past. Using a water budget framework we have assessed streamflow and climate trends over the past 30-100 years to document how different regions of Minnesota have responded to climate change in the recent past providing insight into potential future responses.

Changes to the rainfall-runoff process and the timing of hydrologic events are key to understanding streamflow response, as are landscape scale changes to ET. For example, in Minnesota peak streamflow occurs in April or May. However the precipitation peak occurs between June and August at the height of the plant growing season, resulting in a lower rainfall-runoff ratio. Consequently, future increases in spring rainfall would impact streamflow more than summer or winter precipitation increases.

In addition to the timing of hydrologic events, the magnitude, duration and frequency of streamflow changes will be discussed and how the responses may vary by region. Different aspects of streamflow change will influence sediment and nutrient transport, stream geomorphology and aquatic biota in different ways. These issues will be examined in more detail using case studies from different Minnesota regions.

At the end of the session workshop participants will discuss information and ongoing research related to climate change, adaptation and management in Minnesota and what is available by region. Discussion will focus on connecting people to facilitate information exchange and planning efforts. Next steps will be discussed to facilitate coordination amongst university, government, and private partners doing climate change work related to water management.