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The Impact of Wetland Loss

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Wetlands serve important hydrologic, geochemical, and biological functions, and as such wetland conservation and restoration has been regarded as critical for sustainable watershed management. However, due to heterogeneity of landscape and wetland conditions, implementation of wetland conservation and restoration requires a good understanding of watershed hydrologic processes and corresponding water quantity and quality benefits.

Broughton's Creek is a 25,139-ha prairie watershed located in south-western Manitoba that has experienced significant but typical wetland loss and degradation. The purpose of this study was to develop and use a prototype modelling system to evaluate the environmental benefits of prairie wetlands at a watershed scale. The specific objectives were to: 1) use a "hydrologic equivalent wetland (HEW)" concept in the Soil and Water Assessment Tool (SWAT) to develop a prototype modelling system; 2) calibrate and validate the SWAT-based modelling system for the Broughton's Creek watershed; and 3) use the calibrated modelling system to assess the prospective wetland conservation and restoration scenarios in the Broughton's Creek watershed. Additionally, we evaluated the impact of wetland loss on carbon sequestration and waterfowl productivity.

This research determined that wetland loss since 1968 in the Broughton's Creek watershed has resulted in:

- 31 per cent increase in area draining downstream (an additional 12 square miles)
- 18 per cent increase in peak flow within the creek following rainfall
- 30 per cent increase in stream flow
- 31 per cent increase in nitrogen and phosphorus load from the watershed
- 41 per cent increase in sediment loading
- release of approximately 34,000 tonnes of carbon, equivalent to 125,000 tonnes of CO₂ – the annual emissions from almost 23,200 cars
- estimated 28 per cent decrease in annual waterfowl production

Our results indicate that wetland loss needs to be stopped immediately to prevent further deterioration of Canada's agricultural landscapes, water resources and carbon stocks. Additionally, wetland restoration must begin if we hope to improve and maintain agricultural sustainability and the quality of our water supplies for future generations.