

## Summary

This article was written in 2005 by Jeff Babb and Dr Danny Blair of the University of Manitoba Department of Geography.

## Winter roads

Winter roads are an important means by which bulk goods are delivered to many northern and remote communities in Manitoba. Unfortunately, but not surprisingly, the construction and use of these roads is very much at the mercy of the weather. In particular, long-term observations and recent experiences clearly demonstrate that winter road operations are negatively affected by mild winter weather.

Regression analysis was used to investigate the strength and nature of this relationship, using 1986-2001 temperature data and winter road operations data for the Berens River region (long-term winter road data were not available for other regions of Manitoba). For each of the several sections of winter roads in the region, regression models were built to determine how opening dates, closing dates, and durations of winter road seasons are associated with regionally-averaged temperature conditions.

In general, it was found that as much as 70% of inter-annual variation in the opening dates and lengths of winter road seasons in the Berens River region is explained by variation in monthly winter temperatures (e.g., average December minimum temperature, average February maximum temperature). Inter-annual variation in the closing dates is less strongly associated with prevailing temperatures, perhaps because closing dates are more sensitive to non-climatic variables (e.g., demand for roads).

These regression models were also used to investigate how global warming in the 21st Century may impact winter road operations. Temperature projections for the Berens River region were obtained from several General Circulation Models (GCMs), for a variety of scenarios.

On average, the models project winter-month temperatures to rise (relative to 1961-1990) by about 3°C, 5°C, and 7°C by the 2020's, 2050's and 2080's, respectively. Using these temperature projections, the regression models suggest that the average winter road season in the Berens River region will open 3 days later and be 5 days shorter (than now) in the 2020's; will open 5 days later and be 10 days shorter in the 2050's; and will open 7 days later and be two weeks shorter in the 2080's.

The regression models only pertain to the Berens River region, and are based on a relatively small number of years. Furthermore, a relatively simple methodology was used to determine the average GCM temperature projections for the region. Nevertheless, and particularly because there is widespread agreement that global warming will cause Manitoba's winters to warm very substantially, it is clear that global warming over the coming decades and beyond presents Manitoba's winter road operations with a variety of serious challenges.

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