

Simulating cold-region hydrology in an intensively drained agricultural watershed in Manitoba, Canada, using the Cold Regions Hydrological Model

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Supplement1: Land-use split method.

The HRU-definition strategy for applying cropping systems was based on the land-use split method, which divides the land-use type or cropping system into multiple, more specific crop types based on what would be a typical crop rotation for that system. The land-use split method allows for representing crop rotations in the model in a static fashion by distributing the different crops within a cropping system throughout the acreage of the cropping system in a single year¹ (Fig. S1), which facilitates model setup and parameterization. For instance, the “Fall Cereal Cropping System” is comprised of canola, spring wheat, canola, and winter wheat in a four-year rotation (Fig. S1a). Thus, in the four-year rotation, canola is planted 50% of the time (two out of four years), while spring wheat and winter wheat are each planted 25% of the time (one out of four years). The land-use split method distributed this rotation throughout the Fall Cereal cropping system land base within a single year based on the relative percent of each crop (Fig. S1b). Thus, every year, canola, spring wheat, and winter wheat are represented in the model as being planted in 50%, 25%, and 25% of the Fall Cereal acreage, respectively. Once the cropping systems were represented using the land-use split method, the crops were associated to soil types present in the LS-05OG008 sub-catchment. The combination of land use and soil types resulted in the HRUs presented in Table 1 (main text). As indicated in this table, agriculture dominates the land use in the study area with urban areas and natural lands occupying only a very small proportion. This is the first time that the land-use split approach has been used in CRHM for simulation of hydrological processes in agricultural watersheds, allowing a more detailed representation of the agricultural land use that included crop types.

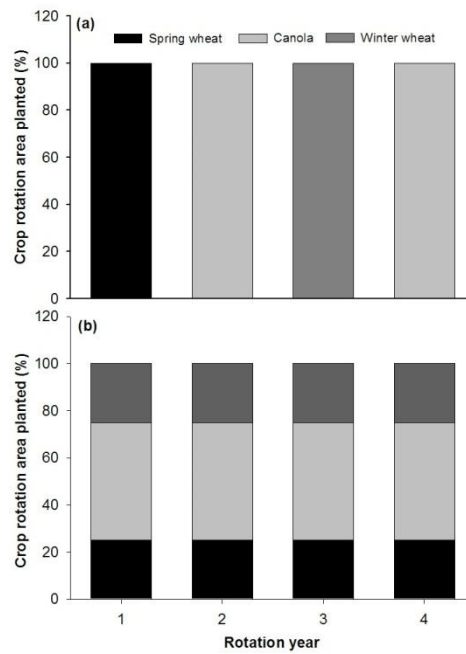


Figure S1. Example of how the Fall Cereal Cropping System rotation 4-year rotation (a) was represented every year in the model using the land-use split method (b).

¹Yang, Q., Leon, L. F., Booty, W. G., Wong, I. W., McCrimmon, C., Fong, P., Michiels, P., Vanrobaeys, J., and Benoy, G.: Land Use Change Impacts on Water Quality in Three Lake Winnipeg Watersheds, *Journal of Environment Quality*, 43, 1690-1701, 10.2134/jeq2013.06.0234, 2014.