**Sensitivity of extreme streamflow to wetland drainage and restoration over the Canadian Prairies**

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This study assesses the sensitivity of extreme annual and monthly streamflow to wetland drainage and restoration in small basins over the Canadian Prairies, using a virtual basin modeling approach created through the Cold Regions Hydrological Modelling platform (CRHM) for six biophysical basin classes that typify most of the region. The model represents wind redistribution of snow, energy balance snowmelt, infiltration to frozen soils, Penman-Monteith actual evapotranspiration, soil and groundwater dynamics and fill-spill of surface depressions that often form wetlands. Wetland loss induced by agricultural drainage was represented by scenarios that progressively reduced the depression area (and storage capacity) by increments of 10%, while wetland restoration policies were represented by expanding the existing depression area by increments of 10%, up to 40% to reflect historical distributions of depressional area as indicated in the pothole till basins. Climate forcing for the virtual basin models used historical observations (1964–2005). Model simulations showed that, on average, annual peak discharge and April streamflow volume had the largest sensitivities to wetland drainage and restoration in the pothole pond dominated basin classes. For these basins, a 10% loss of depression area resulted in a 13% increase in the annual peak discharge and April streamflow volumes, whilst those increases were 4% or less in other basin classes. Every 10% gain in depression area by restoration resulted in an 8% decrease in the annual peak discharge from the pothole till basins, contrasted by a 3% decrease from the high elevation grasslands basins. Over the whole Prairie region, drainage of all wetlands resulted in annual peak discharge rising by 21–140%; whilst wetland restoration to the historical sizes, reduced the annual peak discharge by 4–32%. In a wetter climate scenario (+20% precipitation), the fractional increase in annual peak discharge caused by per 10% wetland drainage was only half of that for baseline climate; whilst temperature warming resulted in larger peak streamflow sensitivity to wetland drainage. In contrast, the effectiveness of wetland restoration in reducing high flows was magnified in wetter scenarios but reduced in warmer scenarios. Assessments in this study provide insights into hydrological impacts of wetland changes in the Prairies, and will inform wetland management for flooding control and agricultural development under a changing climate.