Integrated Water Resources Management in Saskatchewan River Basin: Model Development and Scenario Analysis

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Fragmented water management according to political rather than catchment boundaries

Study Background

- > Climate change: Uncertain water supply and demand(Hassanzadeh et al., 2014; Nazemi & Wheater, 2014)
- Structural limitations of existing Water Resources Management Models (Hosseini Safa, 2016)
- ➤ Water allocation based on 'first-in-time-firstin-right (FITFIR)' system(Wenig et al., 2006)
- Food security: one of the major sources of water for irrigation (Pomeroy et al., 2009)
- ➤ No basin-scale water management model is available which can simulate water allocation from Rocky mountains to Saskatchewan Delta.

Research Purpose

The aim of this study is to integrate water resources components across the entire SaskRB into one modelling platform, in line with the aims of the Integrated Modelling Program for Prediction and Management of Change in Canada's Major River Basins (IMPC), to facilitate Integrated Water Resources Management (IWRM) in the basin.

MODSIM Decision Support system

- A software package developed at Colorado State University for river basin management and decision support. (Labadie, 2006)
- Important Features: freeware, complex river basin configurations, conditional operating rules, water rights and storage contracts, large number of priorities (1-5,000), scenario analysis and customization of MODSIM code.
- Water allocation mechanism: network flow optimization.
- Longest continuously maintained river basin management software package currently available. (Labadie, 2006)

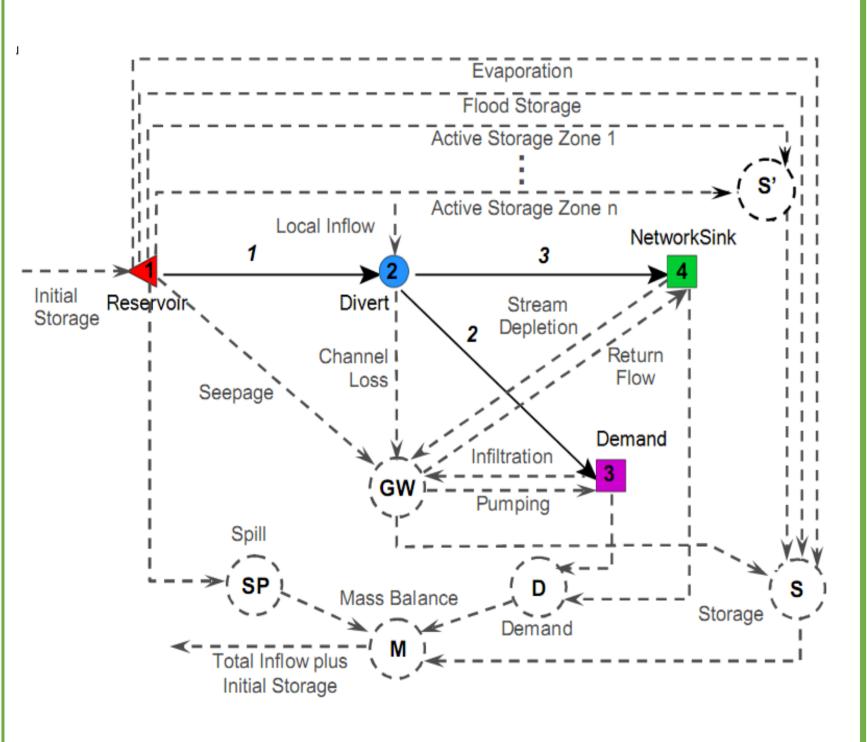
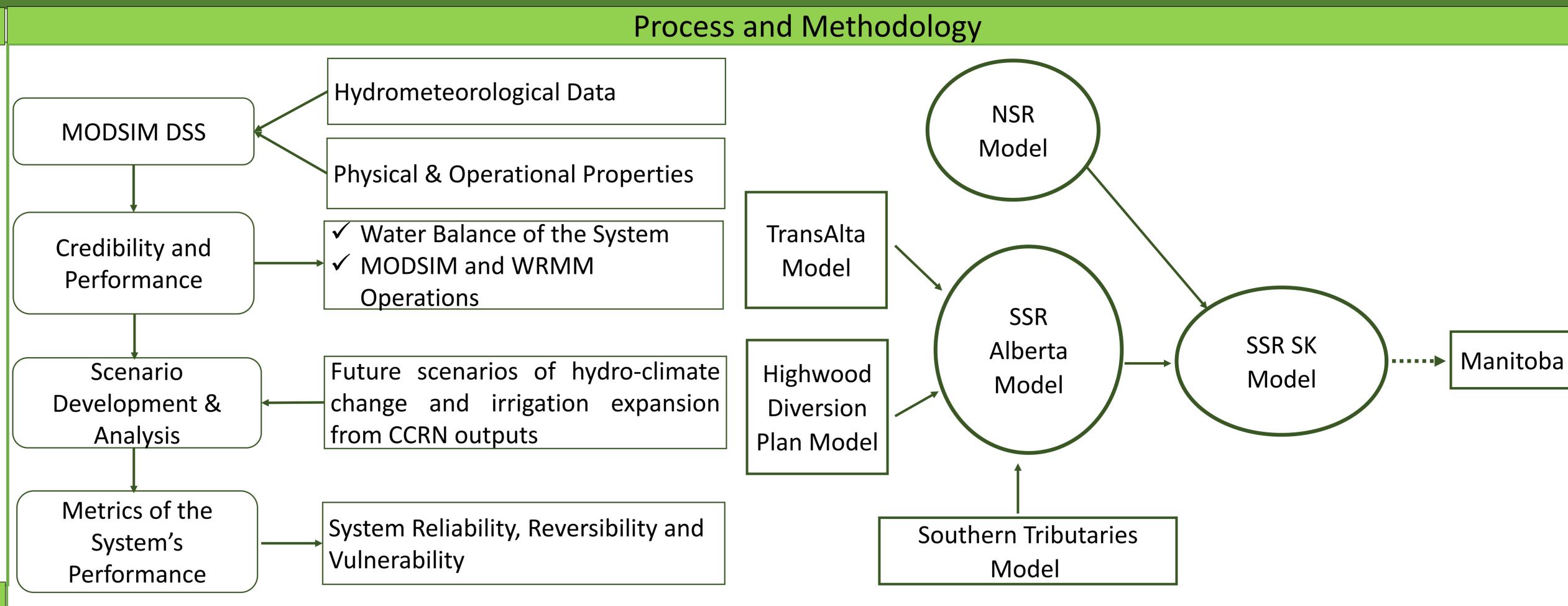
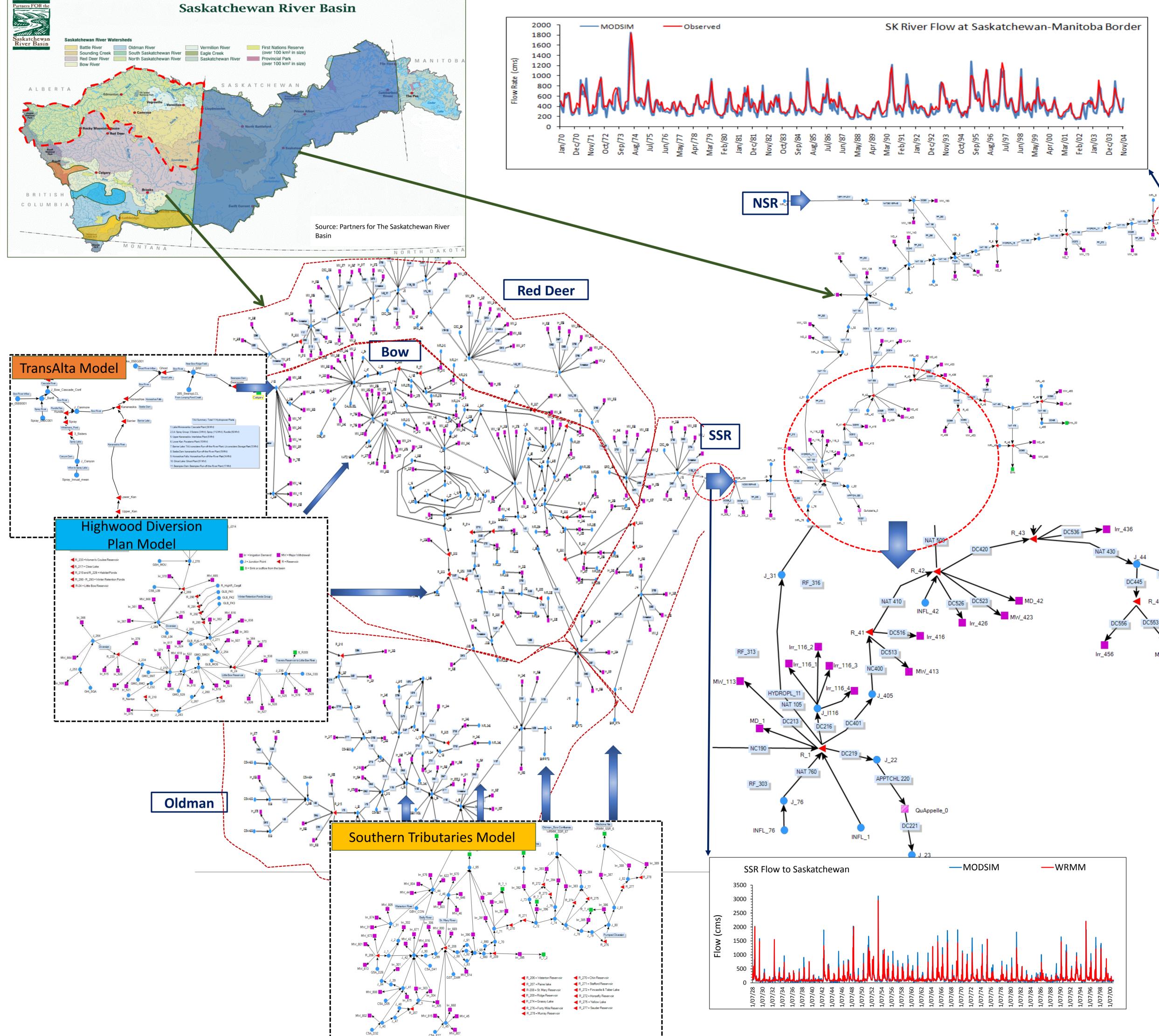


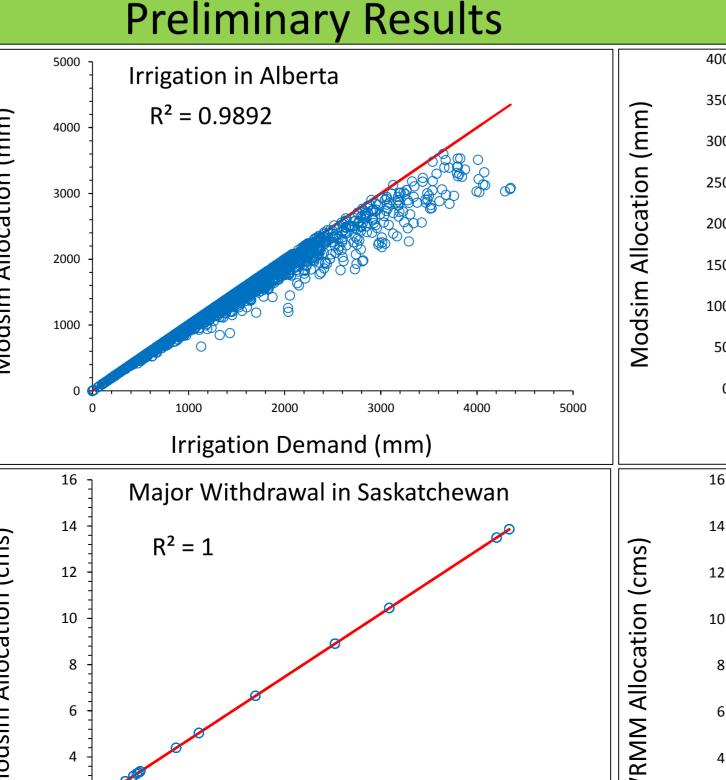
Figure: MODSIM network structure with artificial nodes and links (Labadie, 2006)





Major Withdrawal in Alberta $R^2 = 0.9897$ Major Water Demand (cms) Irrigation in Saskatchewan $R^2 = 0.9991$

Irrigation Demand (mm)



Major Water Demand (cms)

Irrigation in Saskatchewan 350 $R^2 = 0.9992$ 300 250 150 100 Irrigation Demand (mm) Major Withdrawal in Saskatchewan 14 $R^2 = 1$

Major Water Demand (cms)

Future Implications

The model, when fully developed, will provide the platform for Economic evaluation of water management policy and uncertainty analysis of demand and supply

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