**CGU HS Committee on River Ice Processes and the Environment**
14th Workshop on the Hydraulics of Ice Covered Rivers
*Quebec City, June 19 - 22, 2007*

# Winter Ice Regime of the Lower Athabasca River

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**Abstract:**
Due to both population and industrial growth, resulting from the rapidly developing oil sands mining efforts in the vicinity of the Athabasca River at Fort McMurray, water supply has become an increasing concern. The Athabasca River is the largest unregulated river in Alberta, and water supply may become a particular issue during the winter months, when discharges are lowest. Since river ice formation processes depend both on flow hydraulics and meteorological conditions, it is anticipated that the winter regime of the river, and consequently its aquatic ecosystems, will be affected by increasing water withdrawals. However, at present, very little is known about the winter regime of this reach. In order to ensure the sustainability of the mining projects and the ecological integrity of the river, it is important to establish the baseline conditions describing the winter ice regime of the Lower Athabasca River. The objective of this study is to document the ice regime of the Lower Athabasca River, and to develop models describing winter ice processes on the river, with the ultimate objective of assessing not only the impacts of additional water withdrawals, but also of potential climate change scenarios on the winter water supply.

This poster reports on the preliminary phases of the study, in which an 80 km reach of the lower Athabasca River, spanning from Fort McMurray to Bitumount, was monitored throughout freeze-up in 2006, during which time, a complete record of water temperature, water level and meteorological data was collected by way of remote monitoring stations. In addition, ice processes were documented by aerial observation, ground photography, satellite imagery, ground penetrating radar and ice core sampling. Details of winter ice conditions and under ice flow hydraulics were also documented, as were the breakup processes. Even though much of the ice processes taking place along the reach are highly two-dimensional, preliminary modeling using River1D, has allowed a valuable estimation of modeling parameters, which in addition to a detailed appraisal of hydro-meteorological conditions and ice cover development, in the midst of numerous tributary inflows, warm water outfalls and large amounts of sediment transport, become the baseline for future endeavours into two-dimensional modeling. The poster reports on the various aspects of the monitoring and modeling program.