



ALBERTA INNOVATES

Research and Innovation Project – Knowledge Transfer Summary

Project Title:	The Castle Watershed: A New Water Resource Assessment Framework for a Sentinel System at the Crown of the Continent
Project No:	2345
Project Lead:	Chris Hopkinson, University of Lethbridge
Partners:	Alberta Innovates, University Lethbridge, University of Regina, Alberta Environment and Parks, Canadian Centre for Remote Sensing, Castle Mountain Resort, Tough Country Communications, Teledyne Optech, Airborne Imaging, LeddarTech
Status:	Ongoing

Project Summary:

The Rocky Mountain headwaters of the Oldman River Basin (ORB) represent land surface areas of disproportionately high water yield, providing approximately 80% of the water supply. The necessity to protect these source waters for downstream municipal, irrigation, recreational uses, and a wide range of ecosystem services is well understood. During the last century, a period of rapid population growth and increasing exploitation of our shared water resource, the montane and alpine headwaters have undergone significant land cover changes, resulting from climatic forcing, wildfire disturbance and anthropogenic pressures.

The project will evaluate historical, contemporary and possible future land cover and climatic changes within the Castle Watershed headwaters of the Oldman River Basin (ORB), and quantify the impacts of these changes to river runoff and water supply. Synergistic field, remote sensing and modeling studies will be conducted to understand terrain and land cover properties in this Rocky Mountain watershed and how they influence hydrology at a scale suitable for operational water resource planning. In particular, some of the challenges to the implementation of accurate runoff simulations will be addressed. Through this study, the project will test and develop a suite of nested active remote sensing distributed snow monitoring methods ranging from in situ LED ranging (Leddar) for local transects, airborne Lidar sampling to model watershed-scale volume, and satellite synthetic aperture radar (SAR) techniques to map regional snow cover. This aspect of the study will also provide better understanding of the linkages between operationally observed snowpack and precipitation data and actual snow volume conditions in headwater watersheds.

Outcomes:

A web site of weather station and energy balance telemetry in the headwaters has been established:
<http://artemis.uleth.ca:8080/CastleMet/index.html>

Links:

[The Advanced Resolution Terradynamics Monitoring System Laboratory \(Artemis\)](#)

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