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Academic shares deep understanding of groundwater

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DAN MCROBERTS, BANFF

Groundwater is a vital but little understood part of alpine hydrology and can help explain the dynamics of major mountain water

systems, such as the Bow River, a prominent academic told those in attendance at the Parks Canada Research Update held at the Whyte Museum of the Canadian Rockies last Thursday (May 20).

Dr. Masaki Hayashi, a Canada Research Chair in physical hydrology at the University of Calgary, presented the outcomes of a multi-year study of groundwater in the Lake O'Hara basin – results that Dr. Hayashi said have significant implications for our understanding of larger water systems in the Rockies.

“Surprisingly little is known about the hydrology of alpine lakes and rivers,” he said. “Groundwater in the alpine has a major effect on watercourses.”

More specifically, Dr. Hayashi proposed that groundwater, rather than glacial melt, is the source of increased water flows downstream from alpine areas in the late summer and early fall.

In the preliminary stages of his research, Dr. Hayashi and his team were surprised to discover there was more water flowing out of Lake O'Hara than in – between 30 to 70 per cent more.

“That was a revelation to us,” he said, as the imbalance suggested a significant role for groundwater in the Lake O'Hara system. To find out more, he and his student researchers began to study Opabin Creek, and found that groundwater beneath a large terminal moraine in the valley was the main source for the creek. Examining the dynamics of this part of the Lake O'Hara basin proved to be more complex than most hydrological studies.

“Normally, you just go and dig a heck of a lot of holes,” Dr. Hayashi said. “But you can't do that in a national park!” Instead, the researchers had to use some cutting-edge imaging technologies to determine how water was flowing below the moraine, including using magnetic resonance imaging – the same process used in medical diagnostic machines – to discover the exact locations of water molecules.

This made it necessary for the group to spend extensive time in the area, running wires, reading data, and, in the winter time, digging thousands of small holes in the snow-covered Opabin drainage.

The end result of all that toil was to establish that as groundwater flows increased, so too would the outflow from Lake O'Hara, and this would typically occur in the later summer and early fall. While spring snowmelt and summer rain remain the most important source of water for all mountain watercourses, Dr. Hayashi's conclusions suggest that groundwater is the reason for an increase in flow rate at other times of year, rather than the melting of glacial ice. When asked if this suggests a different imperative for water conservation, however, Dr. Hayashi said that there was little to be done.

“I don't think you can do a lot to protect groundwater,” he said. “The key is understanding how it works.”

Dr. Hayashi is not only an expert on the hydrology of Lake O'Hara – his role in ongoing research into the dynamics of the hot springs on Sulphur Mountain has been highlighted in a short video entitled ‘The Hot



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Those in attendance at the Whyte were also treated to a sneak preview of a remarkable video featuring the famous Banff Springs Snail. Shot by videographer Noel Begin, the short film consists of incredible close shots of the snails going about their business in their natural habitat at the Cave and Basin National Historic Site. Heather Dempsey, the public outreach and education officer for Banff National Park, told the Outlook that the video will soon be running on a loop at the Upper Hot Springs.

This Thursday (May 27) is the final research update of the year, and will feature a presentation by Ben Dorsey on wildlife mitigations along the railroad in Banff National Park. Also, Dempsey cryptically promised an opportunity to learn about 'rock snot'. Intrigued? The research updates start at 7 p.m. in the main gallery space of the Whyte Museum.

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