

# Wolf Creek Research Basin: Spring 2022



**Aug 3rd, 2022:  
Mark your  
calendars!**

Join us on the evening of Wed, Aug. 3rd for a Stories of Wolf Creek Watershed event held in the group area of Wolf Creek Campground.

More details inside!

## Welcome!

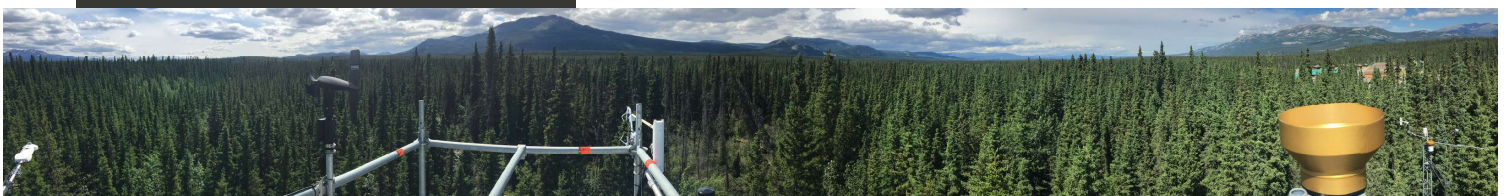
Welcome to the inaugural Wolf Creek Research Basin (WCRB) newsletter! It's an exciting time as we reach our 30 year milestone. Moving forward, we plan to share scientific updates and stories yearly through this newsletter as we work to strengthen our engagement with those who live, work and play in the beautiful Wolf Creek Watershed.

*-Sean Carey, McMaster University*



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# Meet the Students of WCRB

## The role of lakes and wetlands in carbon cycling

### Aliana Fristensky

MSc. Student, McMaster University

Wetlands and lakes are critical areas for carbon storage and processing, yet these landscape features remain poorly understood in subarctic environments. Aliana will investigate how alpine wetlands and Coal Lake influence carbon cycle processes in the Wolf Creek Watershed.

Lakes and wetlands are a ubiquitous part of Yukon's landscape, and Aliana's research will further our understanding of how these 'wet' systems affect biogeochemical cycling in northern alpine ecosystems.



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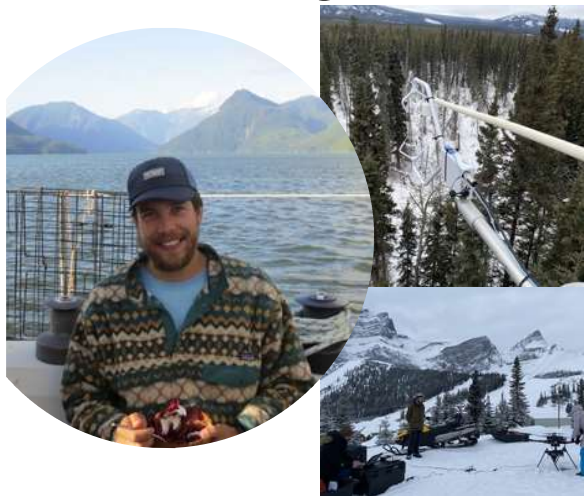
## Snow interception in needleleaf forests

### Alex Cebulski

PhD. Student, University of Saskatchewan

Despite its importance, estimates of snow accumulation remain uncertain across most of western Canada due to the complexity of climate, terrain, and forest structure across this region. Direct observations of snow accumulation are spatially and temporally limited and typically constrained to non-forested environments.

Current models differ in how intercepted snow in the canopy is lost to the atmosphere through sublimation or returned to the basin through unloading and melt. These models stand to be improved through additional snow interception studies across western Canada. This project will include studies at Wolf Creek, YT, Fortress Mountain, AB, and Russell Creek, BC.



## Hydrological connectivity & solute export across Yukon landscapes

### Arsh Grewal

PhD. Candidate, McMaster University

Watershed chemistry studies typically involve a trade off between sampling frequency and extent, particularly in northern regions. High frequency stream chemistry sampling can provide novel insights on temporal patterns of chemical transport, whereas rarely conducted spatial surveys provide information about the landscape drivers of water and chemical cycling. Arsh's work utilizes multiple spatially extensive stream chemistry surveys across WCRB during all seasons of the year in combination with targeted high-frequency measurements. This data will be used to assess the "connectivity" of the headwaters to the Wolf Creek outlet through the use of mixing models, and identify source and sink areas for a variety of chemicals. This project began in summer 2020 and will end in 2022.



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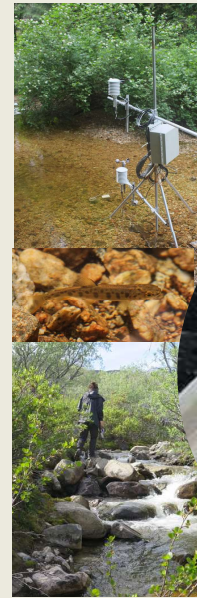
# Meet the Students of WCRB


## Stream temperature and climate change

### Andras Szeitz

PhD. Student, McMaster University

Stream temperature is a crucial water quality variable that strongly influences fish and aquatic insect growth rates, stream ecological productivity, nutrient concentrations, and a slew of other physical and biological processes. Increases in air temperature due to climate change will increase stream temperatures. Climate change is anticipated to cause additional changes to northern landscapes which will also impact stream temperature regimes; in fact, some of these changes have already been observed in Wolf Creek, such as the increase in growth of willow and dwarf birch. Andras' PhD work aims to advance our understanding of how permafrost extent and frozen ground status influences stream temperature, and how the cumulative effects of climate and landscape change will alter stream temperature regimes.



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## Hydrological function of wetlands

### Lauren Bourke

M.Sc. Student, McMaster University

Alpine wetlands in northern landscapes are abundant and critical for runoff regulation and seasonal water storage. Although extensive work has been conducted on the hydrology of temperate wetlands, there has been less focus on how northern wetlands function and regulate their water table, particularly in alpine landscapes.

The aim of Lauren's research is to compare hydrological response and identify water sources for two distinct subarctic alpine wetland types in WCRB. The position of wetlands in the landscape plays a critical role in how wetlands store and cycle water; valley bottom wetlands remain wet and serve as an important dry season reservoir of water, while perched wetlands rapidly dry after initial snowmelt contributions. Lauren's research reveals the distinct dynamics of these systems.

## Influence of vegetation change on water cycling and storage


### Erin Nicholls

PhD. Candidate, McMaster University

As high latitude ecosystems undergo rapid warming, altered precipitation regimes, and shifts in vegetation, there is a pressing need for improved understanding of the role of plants on the storage and fluxes of water in the critical zone. Treeline is moving northward, and shrubs have increased in height, extent, and density. In cold subarctic and arctic regions, there is limited knowledge of how changing species composition and density will affect the timing, magnitude, and sources of evaporated and transpired water.

Erin's research uses eddy covariance towers, sap flow sensors, stable water isotopes, and hydrometric data across Wolf Creek Watershed to evaluate how changes in vegetation will change water cycling and storage. She integrates this work at the basin scale to understand future hydrological regimes.



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# Meet the Whitehorse Crew

## Variability in snow energetics and accumulation

### Tyler de Jong

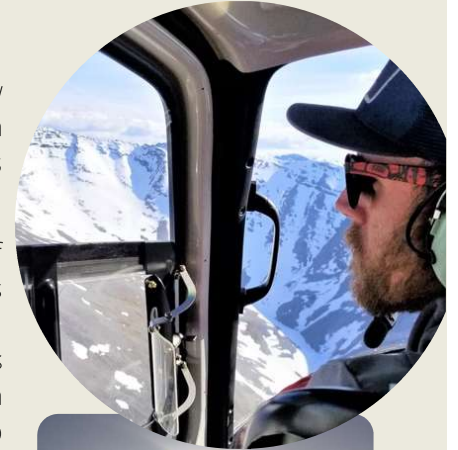
Field Researcher, Mountain Water Futures  
Part-time PhD. Student, McMaster University

Snow accumulation is often overallocated in subalpine shrub zones due to snow entrapment within the vegetation structure. As shrubs increase in size and distribution in alpine areas, and as treeline increases in elevation due to climate warming, it is important to understand how this will impact the overall water balance in these areas.

Tyler's research focuses on assessing the variability in Snow Water Equivalent (SWE) of snowfall (SF) and snow on the ground (SoG) in subalpine zones and evaluates various methods of measuring these variables. Snow energetics are also looked at to get a sense at how snowmelt is influenced by SWE distribution in these areas. His work uses a long-term SWE SF/SoG dataset from 1993 to present, along with modern instrumentation, to assess variability, measurement accuracy, and trends due to climatic and ecological (i.e. shrub expansion) changes.

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## Field Researcher David Barrett

Global Water Futures, McMaster University

Dave is a field researcher with Global Water Futures. Dave has years of experience working in northern, remote regions, collecting hydrometric measurements, and helps coordinate student projects.

Dave and Tyler are based in Whitehorse and conduct year-round hydrometric measurements, water quality sampling, and instrumentation maintenance.



# History of Wolf Creek Research Basin



Wolf Creek Watershed is located on the traditional territory of the Kwanlin Dün, Ta'an Kwäch'än Council and Carcross/Tagish First Nations in the sub-Arctic mountainous headwater region of the Yukon River, near Whitehorse, YT.

Wolf Creek Research Basin (WCRB) was established in 1992 through an agreement between the Department of Indian and Northern Affairs (Water Resources Branch) and Environment Canada's National Hydrology Research Institute. In 1993, the basin was instrumented using Arctic Environmental Strategy and Environment Canada funding by Ric Janowicz and Dr. John Pomeroy. Since its establishment, research in WCRB has supported national and international collaborations, produced >100 scientific publications, supported >50 graduate students, and has transformed our understanding of cold regions environmental processes.

The ongoing objective of the WCRB is to advance our understanding of integrated cold region hydrological, climate and biophysical processes in northern, mountainous environments typical of Yukon. WCRB provides science-based evidence for policy and decision making and acts as a living laboratory to resolve deficiencies in our ability to predict future changes in hydrology, water quality, biogeochemistry and climate. It is one of the longest operation research sites in Canada. Please visit our website for more details on the history of the basin and links to publications.

For more information visit: [www.wolfcreekresearchbasin.ca](http://www.wolfcreekresearchbasin.ca)



# Stories of Wolf Creek Watershed Community Event

Join us at Wolf Creek Campground on August 3rd from 3:00 - 6:00pm to celebrate the land and water of Wolf Creek Watershed!



## Can't make it?

No problem! Please scan the QR code to link to a short survey and opportunity to share your experience in Wolf Creek Watershed



## JOIN US AROUND THE FIRE!

**WHERE:** Group Pavilion in Wolf Creek Campground

**WHEN:** 3-4 pm Poster Discussion with students  
4-6 pm Fireside chats and storytelling

*All ages welcome! Refreshments will be served*



Questions?

Want to know more?

Do you have photos in the Wolf Creek Watershed and surrounding area you would like to share?

Contact Us!

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