

The Nechako IRC Newsletter

An update from Dr. Stephen Déry, Project Leader

Greetings!

With the arrival of September, we enter into the transition to the fall season and the end of the busy field season. September also marks the start of a new academic year at UNBC and a return to classes for many, albeit relying much more on online platforms for course delivery. It is a delight to welcome two additional new graduate students to the IRC team this fall, namely Adam MacDonald and Bruno Sobral (see their biographies later in the newsletter).

Adam is undertaking a Master's of Science degree with a project focusing on establishing spatial and temporal patterns river water temperatures across the Nechako Watershed. This will make use of nearly two dozen water temperature loggers that were deployed during the summer 2020 field season across all of the Nechako Watershed. These data will be supplemented with those from provincial/federal agencies and by a computer model that will allow tracking back in time (since the 1950s) the trajectory of water temperatures across the Nechako Watershed. A key research goal is to establish the relative effects of climate change and flow regulation (e.g. the Summer Temperature Management Program or STMP) on the main stem Nechako River water temperatures, from the Skins Lake Spillway all the way through to Prince George.

For his part, Bruno is joining the IRC team to undertake a Ph.D. degree with the theme of his research being the so-called 'atmospheric rivers'. These events in western North America are often referred to as 'Pineapple Express' storms as their moisture source often lies in the Pacific Ocean near the Hawaiian Islands. The west coast of Canada, including the Nechako Watershed, are influenced by the landfall of these storms, most commonly in September and October. Bruno will develop a climatology of these events, look at the weather patterns accompanying their evolution and landfall, and explore the surface hydrological response post events. This is particularly important for the management of the Nechako Reservoir as a single atmospheric river and its accompanying precipitation can raise water levels by 10 cm or more overnight. Current research suggest these storms will intensify and become more frequent in a warmer, wetter environment so it is critical to assess their past climatology and potential future impacts.

Stephen
Northern Hydrometeorology Group (NHG), UNBC

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Special points of interest

- Stephen gave a presentation to the Kitimat Public Advisory Committee (KPAC) on September 8th, 2020 to provide the group a progress update on the IRC.
- We are in the process of recruiting a new research skills trainee to lead preparation of the Tahtsa Ranges Atmospheric River Experiment (TRARE) field campaign slated for late summer /early fall 2021.
- We are also currently recruiting another post-doctoral fellow who will undertake some hydrological simulations of the Nechako Watershed's hydrology in the context of future climate change..



Natalya at Mt. Sweeney.

Research Manager update

Jeremy Morris

This summer has been a whirlwind of field activity working in the Nechako basin, and we're all proud of the work accomplished at this time. Our field assistants Daniel and Natalya have done a great job deploying instrumentation as far north as Middle River in the Stuart Basin, and as far west as Laventie Creek in the reservoir headwaters region. In addition to this work they conducted a number of maintenance visits to weather stations in the Cariboo Mountains which our group operates. As we shift into fall I look forward to working with incoming group members to ready them for the ongoing research. As for now, we are coordinating another weather station deployment with Rio Tinto at Redfern Rapids on the Eutsuk River between North and South Tweedsmuir Provincial Parks. A map of our current and planned temperature and precipitation sensors is provided in Figure 1 below.

A very special thanks to Darren Haskell, Rosemarie Sam, and James Rakochy of the Tl'azt'en, Nak'azdli, and Cheslatta Carrier Nations, respectively. The support from their field crews has been extremely helpful in our work, and it's been an absolute pleasure to work together. The collaborations with these land guardians and fisheries technicians has yielded immense learning opportunities for our group, and we hope to return these gestures through sharing our research in the watershed. Looking forward to connecting again next field season!

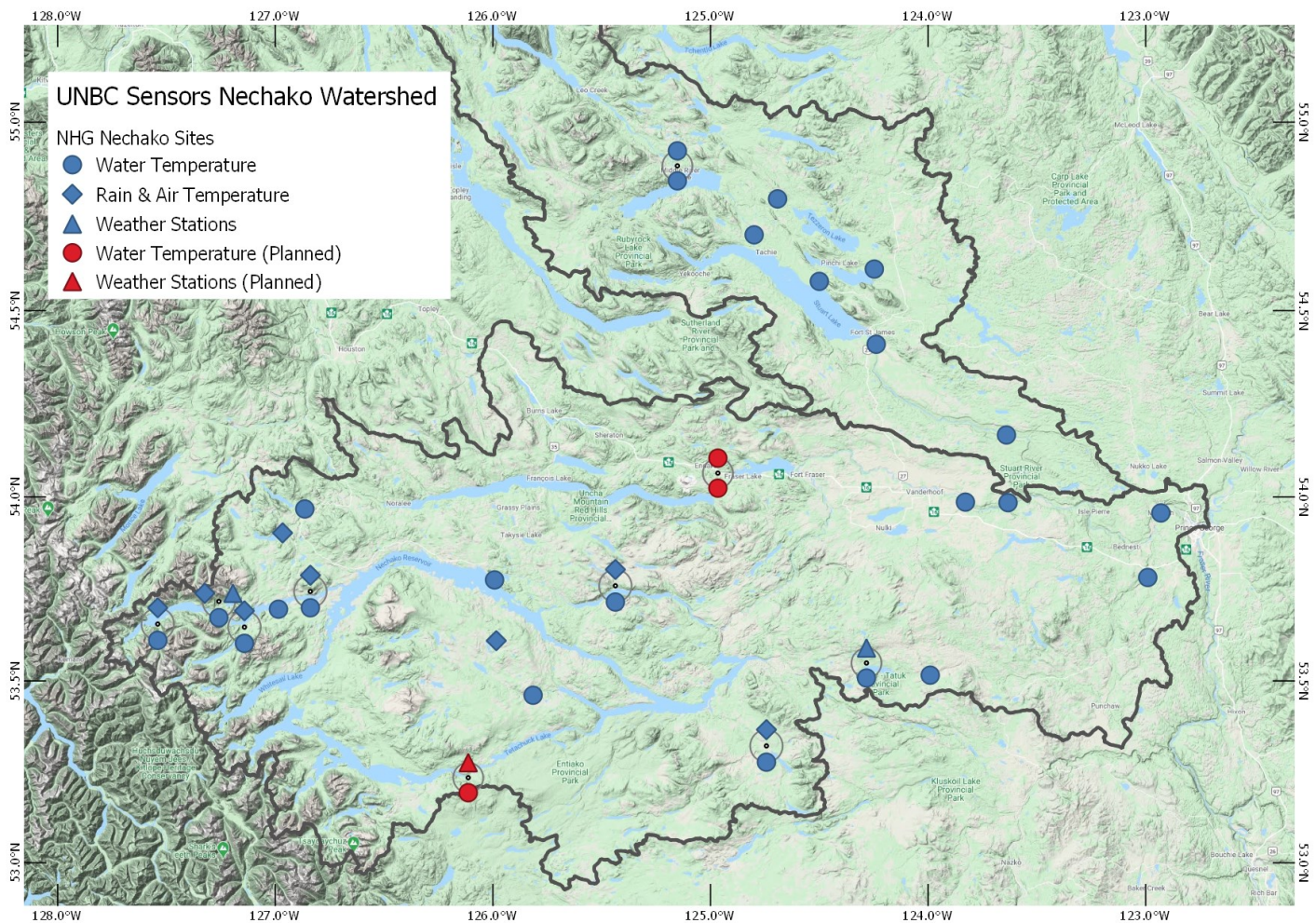


Figure 1. Location of the sensors currently installed, as well as those planned, in the Nechako Watershed

Summer field work; IRC Program of Research Deployment Campaign

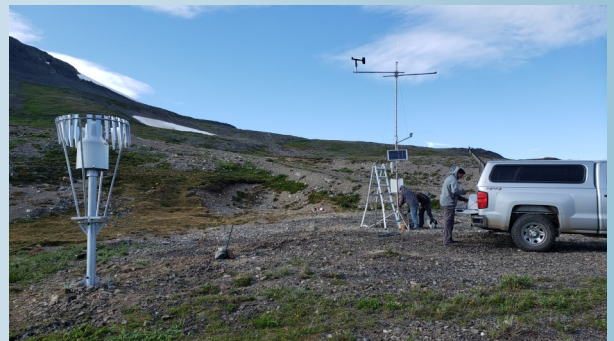
Daniel Scurfield IRC Field Technician

This summer, as part of my position as a field technician with this project, I traveled across a vast part of BC's Nechako watershed. During this time I, along with other members of the research team, situated nine tipping bucket sites to measure precipitation, 23 stream temperature logger sites and a weather station in areas ranging from the Middle River north of Stuart Lake to the Eutsuk River in the southern portion of the reservoir. The deployment of all of these components of our summer field season had a slow and late start due to extremely high water levels in the local streams and rivers.



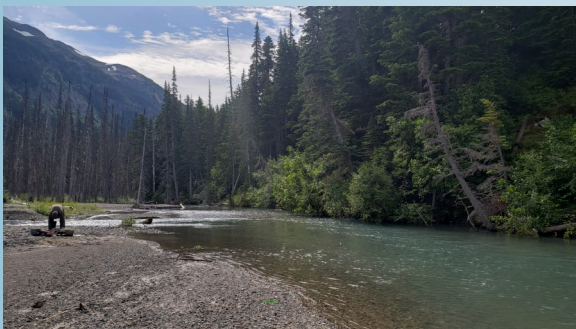
Installing a data logger on the Necoslie River near Ft. St. James

We began our work in mid July where we focused our attention to the Stuart River watershed. With the help of Tl'azt'en and Nak'azdli field technicians, Natalya Klutz, Jeremy Morris, IRC Research Manager, and I had deployed seven stream temperature loggers into streams and rivers in the Stuart watershed. Towards the end of the month, Stephen, Jeremy, Natalya and I set out to the north end of the Nechako reservoir to set up a weather station, and several tipping buckets and stream temperature loggers. The first day of travel, we deployed a tipping bucket tripod at the Nadina River spawning channel. The next day the whole party worked a 14 hour day setting up a weather station on Mt. Sweeney near the Huckleberry mine, as well as an OTT Pluvio2 all-weather precipitation gauge and a tipping bucket rain gauge. On the third day Jeremy and Natalya met a boat piloted by one of our colleagues from the Cheslatta Carrier Nation to take us to the south end of the reservoir to deploy three stream temperature loggers and two tipping buckets. During this time, Stephen and I drove to sites on the north end of the reservoir where we set up three tipping buckets and two stream temperature loggers. On the way back to Prince George, we set up both a tipping bucket and stream temperature logger at Cheslatta Lake.



Completing the set up of the Mt. Sweeney weather station

In August Natalya and I took the Cheslatta barge across to the southeast end of the Nechako reservoir where we installed a stream temperature logger in the Chelaslie River, and a tipping bucket nearby. While out on the reservoir, we also deployed two additional stream temperature loggers and a tipping bucket tripod at the east end of the reservoir. We were also able to collect data from our previously deployed instruments in the Tatuk Lake area in between visiting new sites.



Installing a data logger on Laventie Creek

Most recently, we returned to the Mt. Sweeney weather station to install a cell modem, communicating quasi-real time data. This trip also included reinforcing weather station guy wire anchors for the heavy winds and winterizing the Pluvio2 so it can collect snow precipitation data this upcoming winter. During the travel we were able to download data from all of the tipping bucket rain gauges and stream temperature loggers on the north end of the Nechako reservoir ensuring instruments are performing adequately.

On behalf of the summer field crew, I'd like to extend thanks to the folks that helped us from the Tl'azt'en, Nak'azdli, and Cheslatta Carrier Nations. We could not have done the work that we were able to do without them. It was a pleasure to work with each and everyone who assisted us as they knew the rivers and area so well. They were a great group, we all learned a lot and we shared many laughs.

Data Manager update

Justin Kokoszka

The CAMnet database continues to be developed. Currently, we are conducting quality control on historical data, using a quality control script developed in-house, to ensure consistent quality control measures over the entire weather station network. The quality assured data will be integrated into our database hosted in PostgreSQL, an open-source object relational-database system. Both quality assurance and data integration are being performed for each station individually. A station specific equipment inventory will follow.

In addition to the CAMnet database, we are developing a database for members of the Northern Hydrometeorology Group (NHG). The NHG database will enable shared use of common datasets, including those developed in-house, and will reduce duplicate datasets amongst members.

A tale of two summers: Contrasting the summer of 2020 precipitation across the Nechako Watershed with southeastern BC

Rajtantra Lilhare, UNBC Post-doctoral Fellow

So, were you thinking that it was a wet and cold summer in the Nechako this year? We were thinking the same thing and did some checking. We looked at this year's summer precipitation and temperature records against the 30-year average (1981-2010) across four

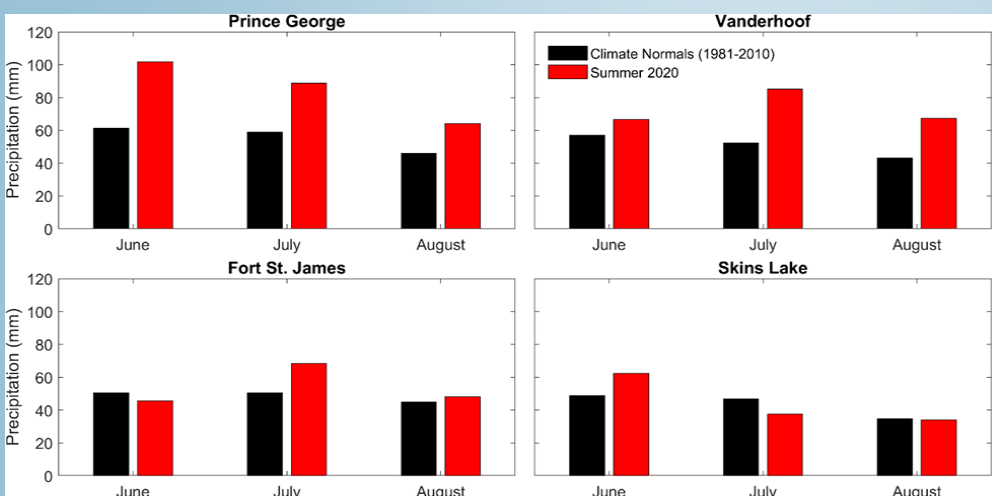


Figure 2. Comparison of the 2020 summer precipitation and 30-year average (1981-2010) for four locations across the Nechako Watershed.

locations within the Nechako watershed. The summer of 2020 was indeed particularly wet in the lower Nechako system at Prince George and Vanderhoof, but less so in the upper watershed at Skins Lake and in the Stuart Watershed at Fort St. James (Figure 2). Prince George experienced 153% of the normal summer rainfall and was 1.5°C cooler relative to the 30-year averages, while Vanderhoof, west of Prince George, received 144% of the normal summer rainfall and was 0.8°C cooler than the 30-year averages. However, Fort St. James and Skins Lake received only 111% and 103% of the normal summer rainfall, and were 0.7°C and 0.8°C cooler, respectively.

This difference may have been a result of a low pressure trough that hung over the eastern Pacific and northern BC longer than usual this summer that tipped the scale in favour of cooler and wetter conditions in the northern part of BC. Consequently areas in southern BC, such as Kootenay National Park near Invermere, were drier and warmer this summer with 41% of the normal summer rainfall, and temperatures that were 1°C warmer than average (Figure 3).

Is that what things are going to look like in the future? Our [past analyses](#) using projected future climate data have shown that overall, we have seen increases in air temperature across the Nechako Watershed. Increases in air temperature are, however, most pronounced outside of the summer. We also have noted increases in summer precipitation, albeit to a smaller degree. So in sum, we can expect warmer summers than in the past, but we'll also likely encounter cool and wet summers as part of natural climate variability.

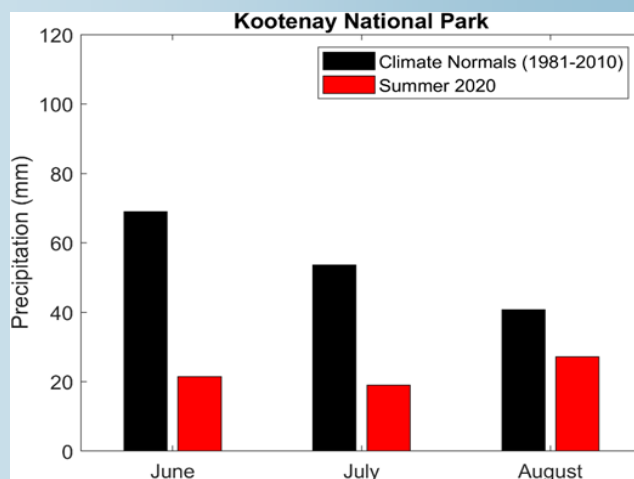


Figure 3. Comparison of the 2020 summer precipitation and 30-year precipitation average (1981-2010) for Kootenay National Park in southeastern BC

New Team Members

We are pleased to add two new members to the IRC team

Bruno Sobral will be joining the NSERC/Rio Tinto Industrial Research Chair team this Fall/2020 to pursue a PhD in Natural Resources and Environmental Studies. While working as a Land Development Analyst for the state of Rio de Janeiro (Brazil) in the past eight years, he has received his Master's degree in Biosystems Engineering (Water Resources) (2017) after graduating in the Environmental and Agricultural Engineering (2010) course, both at Fluminense Federal University (UFF) in Niterói, Brazil. He is trained in flood control, rainfall and drought projects conducted in the Southeast region of Brazil, and will be studying the impacts of atmospheric rivers in the climate variability, and the water security of the Nechako watershed. Bruno's main academic interest is applied hydrology focused on trend detection of climate variables, using data analysis and statistical tests to identify and foresee significant changes in the hydrological cycle.



Adam MacDonald is a graduate student joining the NHG. After gaining his bachelor degree in Forest Ecology and Management from UNBC, Adam is excited to be joining the NHG and starting down a new direction. Adam has spent the last five summers working in the forest consulting industry which has allowed him to acquire important technical and communication skills related to operational forest development. He has also spent considerable time working within the Nechako watershed and has seen firsthand the level of past and current forestry as well as land development and has learned a deeper appreciation for the unique biodiversity of the Nechako ecosystem. With the NHG, Adam will not only be analyzing the temperature data that is currently being collected in the field but also perform some computer simulations on these data to better understand temperature patterns across the Nechako.

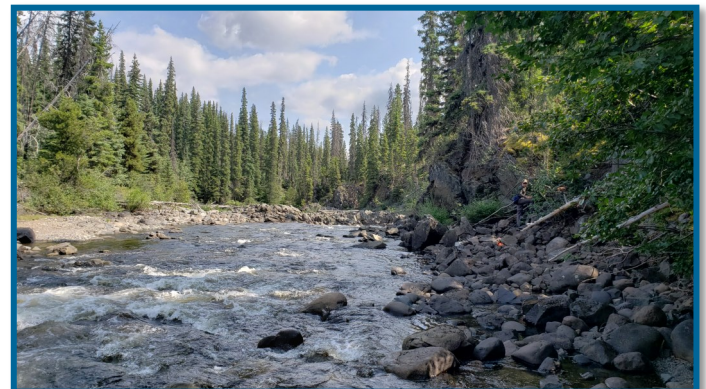
Scenes from the Field



Chedakuz Creek in the south-eastern portion of the Nechako Watershed



Lower Stuart River



Chelasie River in the central portion of the Nechako Watershed

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