Blueberry River First Nations participants in the CABIN field practicum training for ecosystem health assessments.

Blueberry River First Nations, Living Lakes Canada and World Wildlife Fund-Canada teamed up to complete training and monitoring of river sites for ecosystem health assessments across BRFN territory.

Joanna Chipesia of the Blueberry River First Nations collecting benthic invertebrates via the CABIN protocol for ecosystem health assessments.

All photos: Raegan Mathison, Living Lakes Canada

The Quality of Our Water

Working with the community to improve our waters.

BY NICOLE TRIGG

THE BLUEBERRY RIVER FIRST NATIONS (BRFN) Traditional Territory is located in the Peace Region of B.C., roughly a one-hour drive north of Fort St. John. Once a pristine landscape with abundant fresh water, wildlife, and forests, the territory is now experiencing the serious long-term environmental and social impacts of decades of intensive resource extraction.

A 2016 report co-authored by Ecotrust Canada and the David Suzuki Foundation based on B.C. government data found that almost 70 per cent of Blueberry traditional territory was covered by active petroleum and natural gas tenures, with almost 75 per cent of the territory lying within 250 metres of an industrial disturbance (including clear cuts, oil and gas wells, processing plants, roads, dams, and other infrastructure developments). More than 80 per cent lies within 500 metres of such disturbances.

In response to Blueberry's subsequent water quality concerns stemming from these cumulative impacts, Environment and Climate Change Canada (ECCC) referred the band to Living Lakes Canada. With the mandate to enhance the protection, restoration, rehabilitation and health of watersheds in B.C. and across Canada, Living Lakes Canada builds capacity through community-based water monitoring (CBWM) and facilitates cross-sector collaboration and research to support progressive decision-making for improved water stewardship. One such collaboration is the STREAM project, a partnership between the University of Guelph, ECCC, World Wildlife Fund-Canada (WWF-Canada), and Living Lakes Canada.

STREAM (Sequencing the Rivers for Environmental Assessment and Monitoring) is a national community-based water monitoring initiative that works with interested parties—including Indigenous and non-Indigenous communities, water stewardship groups, academia, all levels of government and industry—to collect data for health assessments of Canadian waterways.

STREAM uses an adapted version of the Canadian Aquatic Biomonitoring Network (CABIN) protocol developed by ECCC that involves the collection of benthic macroinvertebrates (benthics are strong indicators of water quality due to their high sensitivity to pollutants and other factors that impact aquatic ecosystem health). Benthic samples are then analyzed using the new technology of DNA metabarcoding developed by the University of Guelph.

WWF-Canada's Watershed Reports set the stage for STREAM. The 2017 report found data deficiency was an issue in 15 of Canada's 25 watersheds and that 110 of 167 sub-watersheds were lacking the data necessary to assess watershed health. Then, in early 2019, the University of Guelph received a $2.6 million grant from Genome Canada to support DNA metabarcoding sample analysis for Canadian watersheds over three years, effectively launching STREAM. The goal of the project is to collect 1,500 samples from 15 nationally distributed watersheds—five watersheds per year—through CBWM.

Planning for the first STREAM field season was already underway when Living Lakes Canada was contacted by BRFN, and the decision was made to include the Peace-Athabasca Basin as one of the priority watersheds for Year 1 of the project in order to deliver CABIN and DNA metabarcoding training to the Nation.

"We were originally planning for the Liard Basin (northeast B.C.) as one of the first five watersheds for 2019, but at the time there were no requests for training coming from groups in that region, so we changed the watershed to accommodate BRFN," said Living Lakes Canada STREAM program manager Raegan Mallinson.

Living Lakes Canada and WWF-Canada travelled to Blueberry territory in late August, where the need for water monitoring was immediately apparent. Dangerous sour gas leaks occur on a regular basis and, during site reconnaissance for the course, a hydrogen sulphide gas detector was worn by the band's restoration specialist. Locating tributaries for training was challenging due to high water levels caused by unseasonably heavy rains. The tributaries that were appropriate ran turbid, providing insight into the land-use disturbances in the area.

"The community members spoke about times when they used to swim in these creeks, and remember the waterways running clearer," said Mallinson.

Outfitted in hip waders, the 15 Blueberry Nation participants were nonetheless in high spirits and eager to hop in the streams to learn the kicknet procedure to collect the benthics, and how to perform stream health assessments and open-source data inputs. The diverse group was comprised of BRFN fisheries technicians, the band's restoration specialist, Guardians, elders and youth. The vastness of the territory meant hours of travel time to get from site to site. Over the course of the training, four sites were sampled on Upset Creek, Blueberry River, and Fox Creek.

It was an impactful experience working with BRFN and we look forward to continuing the relationship into the coming years.

"The participants were confident carrying out the monitoring," said Mallinson. "We learned so much from being on the land with the participants. BRFN showed us how strong a community can be when they work together; they taught us about loyalty to each other and the land, and they shared their hopes and struggles. It was an impactful experience working with BRFN and we look forward to continuing the relationship into the coming years."

Blueberry River First Nations launched legal action against the Province of BC in 2015 for the cumulative impacts of resource development in their traditional territory. A decision by the courts is expected mid-2020. In the interim, Blueberry are aiming to set up their own CABIN CBWM program as part of a new Guardian program that is currently in development.

"We are scoping development of water quality monitoring in the watersheds around the BRFN reserve and expect our STREAM training to play an integral part. Benthic macroinvertebrates are ubiquitous and critical indices of water quality. We are looking forward to answering our research question about the scope and breadth of impacts on aquatic systems in our territory," said Jane Calvert, the BRFN Lands & Resources Manager.

"The optimism, perseverance and motivation of BRFN to set up their CABIN CBWM program is really encouraging," said Mallinson. "We are now exploring options to deliver additional training."

In October 2018, Living Lakes Canada and WWF-Canada worked with the Kaska Dena Council in B.C.'s Liard Basin to expand their Dane Nan Yé Dāh Guardian Program by starting a freshwater monitoring program on the Liard River that included benthic collection. This training was one of the initial pilot training programs and monitoring projects for STREAM.

Community-based water monitoring is growing across Canada. Results from a national scan conducted by Living Lakes Canada, Simon Fraser University and the University of Acadia in 2016 revealed that CBWM had grown three-fold within 10 years.

"Communities are engaging in cross-sector collaborations to build local water monitoring programs in order to better understand the health of local watersheds," said Living Lakes Canada Executive Director Kat Hartwig. "By piloting new technology that can potentially help provide faster, more accurate and cost-effective results, STREAM is aiming to support decisions that protect the water-based ecosystems on which we all depend." WC

Nicole Trigg is the communications coordinator at Living Lakes Canada.

To learn more about STREAM visit **stream-dna.com**