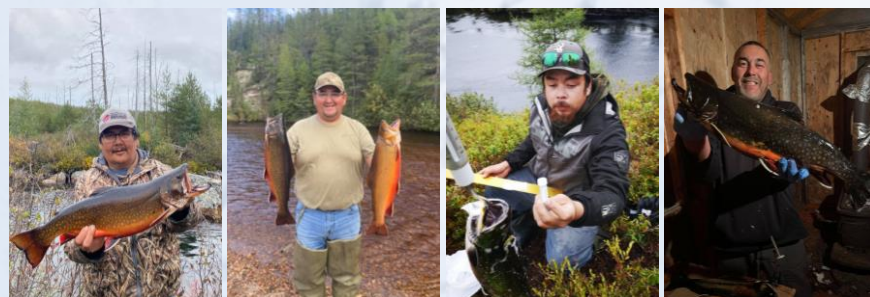




Field sampling with Cree partners from inland lakes

We would like to thank fishing guides from the Cree Nation of Mistissini for their invaluable assistance with sampling Brook (Speckle) Trout in spawning rivers last fall. The samples collected in the rivers will allow our team to assess climate change adaptation and estimate the proportion of Brook Trout harvested each year throughout Mistassini Lake that originate from each river. Pictured left to right: Norman Neeposh, Richard Isheroff, Johnathan Linton, Leslie Mianscum.



Mistassini Lake Brook Trout

The Brook Trout, aka Speckle, (*Salvelinus fontinalis*) of Lake Mistassini is also well known for evolving a variety of migratory strategies ('ecotypes'), which is rare in the species. The two ecotypes, outflow and inflow, after breeding in their respective rivers, mix in parts of the lake as their life cycles overlap with fishing harvest. A previous study confirmed a genetic difference between the two ecotypes, and a genome-level study was performed to clarify the difference between the two in terms of adaptive evolution. The FISHES team were able to identify a significant difference in genes related to ovarian development and the development process between ecotypes. These differences can provide important implications in terms of sustainable fisheries management. We are currently conducting a number of studies to further our knowledge on genomic divergence between the two ecotypes and how these ecotypes contribute to the annual harvest and productivity of not only Mistassini but also in neighbouring lakes as well. This will provide critical data for future management through Cree Nation of Mistissini and the Nibiischii Corporation.



James Bay Coast

In July and October 2021, our team collaborated with local CTA officer (Sanford Diamond), EMR officer (Félix Boulanger) and local fishermen (Jeremy Hester, Daryl Hester, Harrison Stephen, Bernard Diamond) to sample summer-run ciscoes, *Kaachikaasuk-names* (left picture), from Nottaway River and fall-run ciscoes (right picture), *Nuutaamesanio-names*, from Rupert and Nottaway River. The samples collected in these two rivers will help understand the morphological and genetic differences between those two types of ciscoes. In other words, we want to understand how and why those populations of ciscoes have evolved to return to their natal rivers at different timing. To answer this question, we have taken pictures of every cisco we sampled to identify morphological features that are different between *Kaachikaasuk-names* and *Nuutaamesanio-names*. Then, we have collected a tissue sample to proceed to genetic analysis. We expect to get some preliminary results by the end of this year, stay tuned!

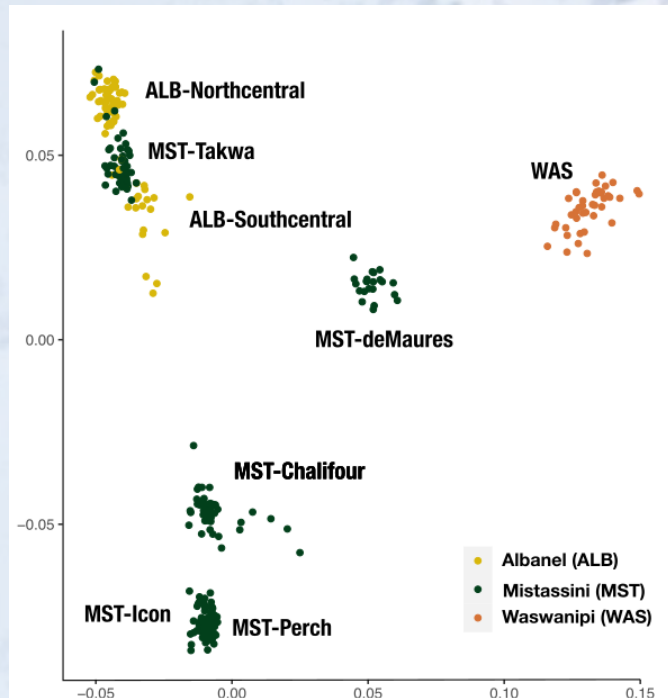




Mistassini, Alanel & Waswanipi Walleye

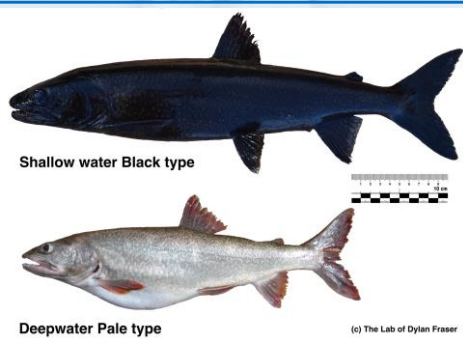
Walleye is another important species for commercial, sport and Indigenous subsistence fisheries. With the help from our local partners, we collected tissue from fish in five spawning locations in Mistassini (MST) for our genomics study. FISHES collected tissue from mixed-stock walleye harvests from lake Alanel (ALB) and along the Waswanipi (WAS) river to investigate genetic structure for the first time in these locations. Identifying genetically distinct fish groups will assist our genetic stock identification in mixed-stock harvests.

Preliminary results indicate four genetic groups in MST, two in ALB and a single genetic group in WAS. In the figure to the right, walleye sampled from various locations (coloured dots) form groups based on genetic relatedness. Interestingly, fish from the ALB groups are closely related to fish from the Takwa river in MST which most likely reflects historical connectivity. Further analyses are underway to confirm these results.



Mistassini Lake Trout

Lake trout inhabiting Lake Mistassini have been known to have various morphs. Our recent work indicates that these Lake Trout consist of a lot of hybrids which appear to be morphologically-biased towards either the intermediate form or one of the parental types. Pure (genetically) individuals show clear differences in morphology and ecology. Among them, the cluster with the black morph, found in shallow water, was in sharp contrast to the cluster with the small body-sized pale morph found in the deepwater (who exhibit a slower growth rate). The next step is to examine how the multiple lineages of lake trout diverged, and which genes contributed to their differences. Since hybridization is closely related to the prosperity and extinction of species, this study can assist in the conservation and management of Lake Trout inhabiting Lake Mistassini.



Outreach

Over the winter months, the FISHES team, including principal investigators from both genomics and the social sciences, as well as our partners from the Cree Nation of Mistissini, hosted a panel discussion on the co-development knowledge with Indigenous communities to facilitate sustainable fisheries management at Concordia University. Additionally, the FISHES project and early genomic results were also shared at both the Ontario and Quebec chapters of the American Fisheries Society annual meetings.



As we approach the spring 2022, we are looking forward to a final and successful fish sampling campaign with our FISHES partners. Please look for our next newsletter in November 2022 for more updates and results!

FISHES Eeyou Istchee newsletter team

	Dylan Fraser Professor		Raphaël Bouchard PhD candidate
	Sozos Michaelides Postdoctoral fellow		Badrouyk Chamlian MSc student
	Hyung-Bae Jeon Postdoctoral fellow		Kia Marin Research Associate
	Hari Won Postdoctoral fellow		

Thank you to our Cree partners for supporting and collaborating on this research!

