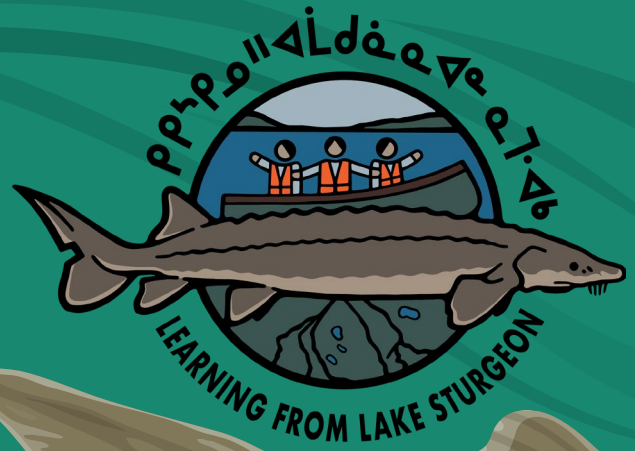


LEARNING FROM LAKE STURGEON



Learning from Lake Sturgeon is a co-created effort to learn more about river ecosystems of the Moose Cree Homeland through scientific research and Moose Cree perspectives, including Elders and youth.

The vision of Learning from Lake Sturgeon is to advance a common understanding of the value of connections — between peoples, lands, and waters — now and in the future.



Learn more about our program, and how you can be part of it!

We make observations about the health and behaviour of namew and the rivers that are their homes. We rely on the Elders Advisory Group to guide our work, and we involve youth in our fieldwork and learning.

learningfromlakesturgeon.ca

We focus on namew (na-may-o, lake sturgeon) because they are important to Moose Cree! And because namew need healthy rivers to thrive. Studying namew is only a small part of understanding how the Moose Cree Homeland is doing. However, if namew are thriving, it is a good sign that the rivers are doing well.



We are studying namew in two rivers of the Moose Cree Homeland, the **Lower Mattagami River** and the **North French River**.

We are working on the Mattagami River because Moose Cree First Nation is a part-owner in the Lower Mattagami Hydroelectric Complex. Most rivers in the Moose Cree Homeland have been disrupted by hydroelectric development. Moose Cree First Nation is using the information we are collecting to find ways to reduce the damage done by the dams.



**Lower
Mattagami
River**



**North
French
River**

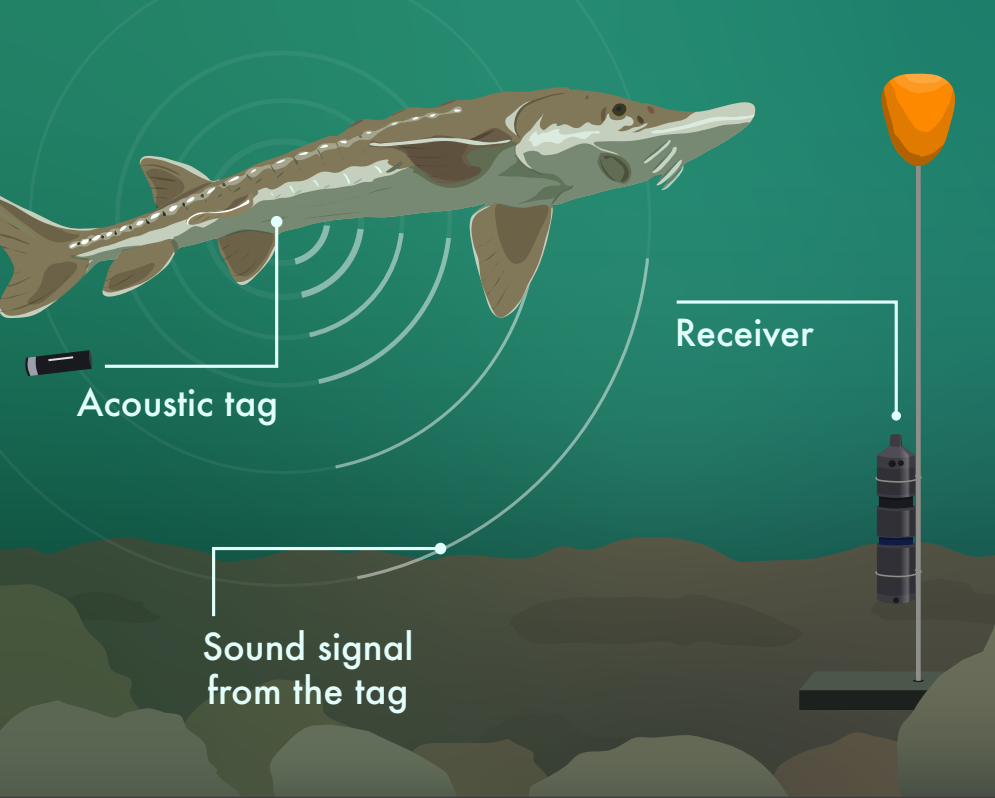


We focus on the North French River because it is the last watershed within the Moose Cree Homeland that is still intact, with no permanent roads, forestry, mines, or dams. The North French River can serve as an important benchmark to compare to other areas that have seen more industrial activity.

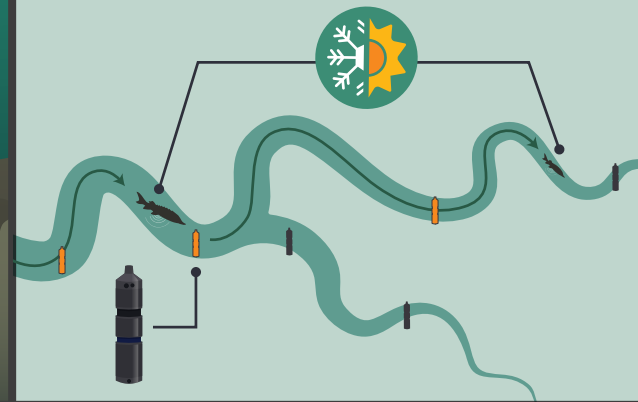


We involve youth in our work!

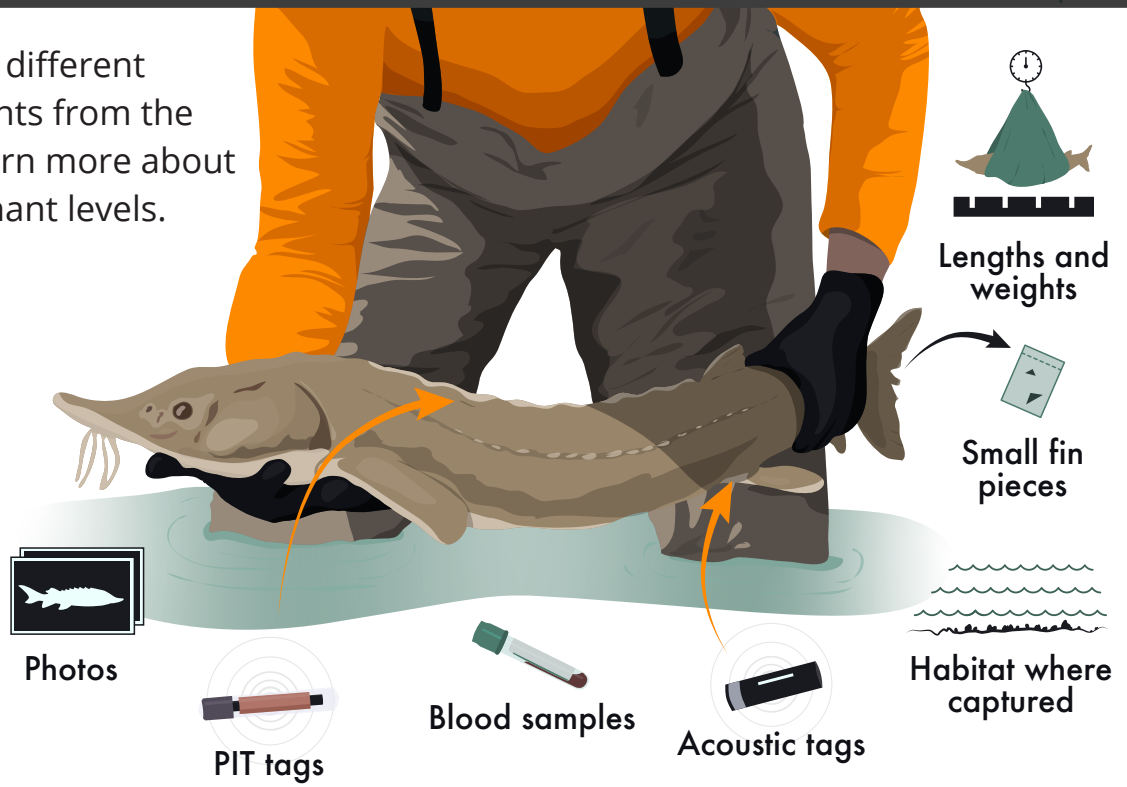
We offer youth the chance to join our field on the rivers, and host other learning activities. Get in touch if you're interested in joining our team!



We have been tracking namew locations within the rivers, and collecting information about their behaviour, using acoustic tags that transmit information from the tagged fish to receivers under the water.



We have also been taking different samples and measurements from the namew we capture, to learn more about their health and contaminant levels.

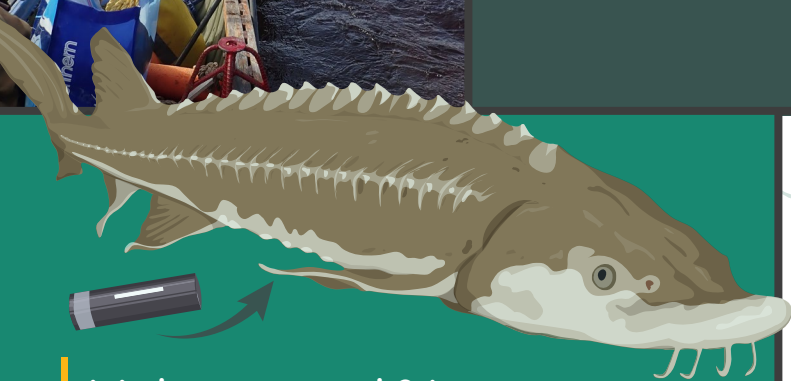
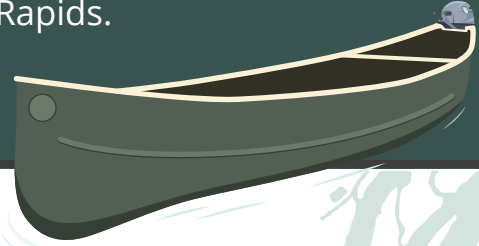


Moose Cree First Nation community members know when and where to catch namew, and how to travel to those places. Community members join our team, and use nets and boats to catch namew, so we can measure and tag the namew, and learn from the fish.



North French River

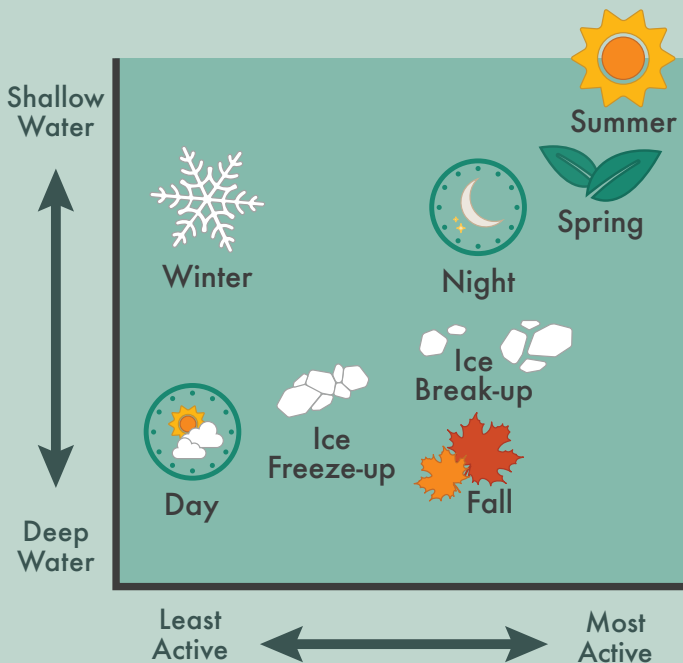
On the North French River, we use Nor-west Canoes because their wood is flexible to slide over rocks. We are only able to travel up the North French River when the water is high, after ice-off, or in the fall after rains. Even then, we use poles to help get past shallow areas like the Long Rapids.



We have tagged 24 namew in the North French River since 2016 and 12 fish have active tags right now!

Did you know?

Along with location, tags provide information on how deep and how active the fish are. These varied across seasons and time of day.

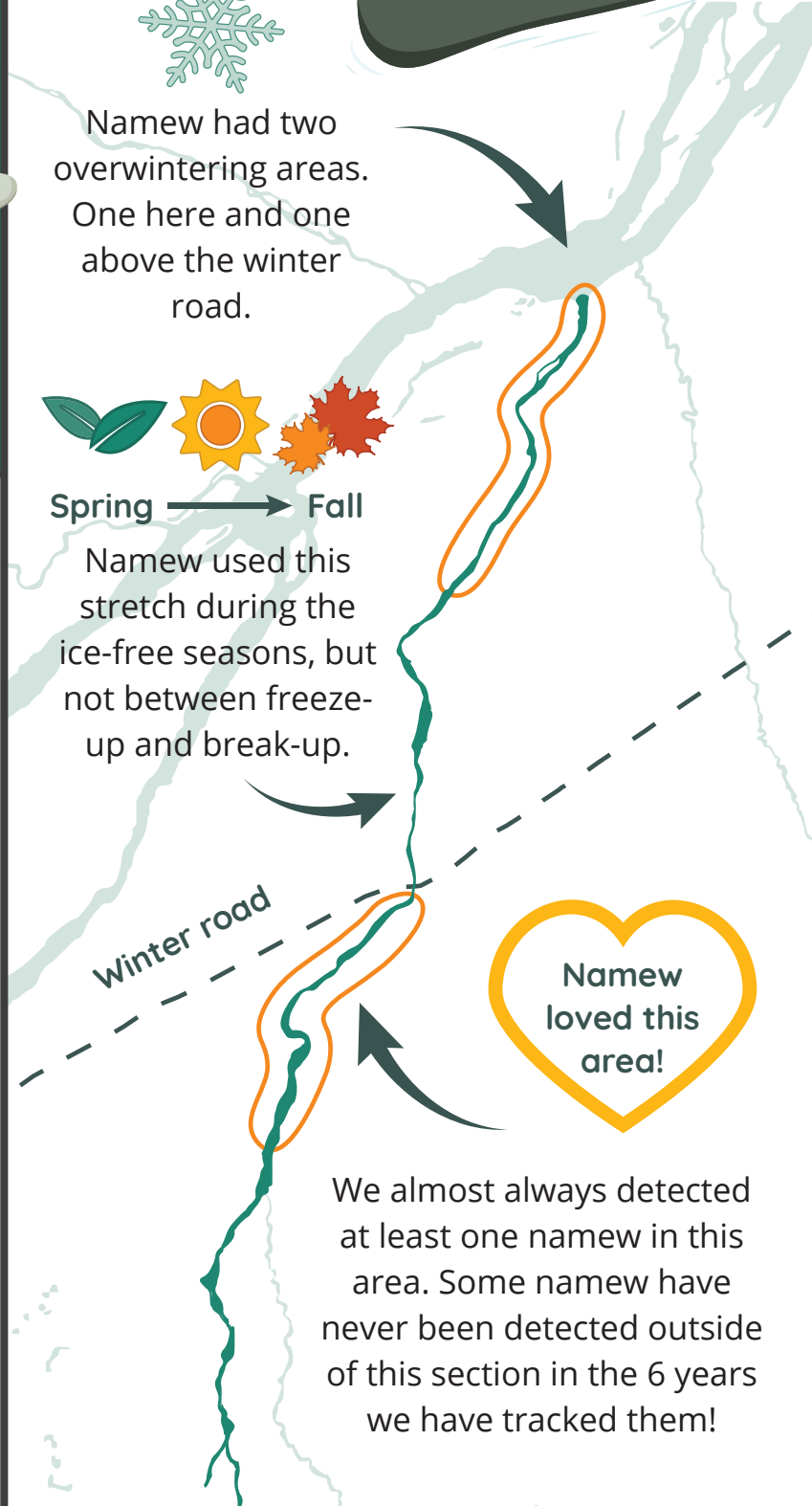


Nomew had two overwintering areas. One here and one above the winter road.



Spring → Fall

Namew used this stretch during the ice-free seasons, but not between freeze-up and break-up.



We almost always detected at least one namew in this area. Some namew have never been detected outside of this section in the 6 years we have tracked them!

Lower Mattagami River

On the Lower Mattagami River, we use a bigger fishing boats, with bigger motors. We need the power and size of these bigger boats to overcome waves and wind on the reservoir, and rapidly flowing water above and below the hydroelectric dams.

The water levels can change very quickly below the hydroelectric dams, and we need to always pay attention in order to stay safe.



One fish tagged below the Kipling dam was caught near Moose Factory — a journey of almost 200km!

Kipling GS
Harmon GS

Smoky Falls GS

Little Long GS

Adam Creek Spillway

We are finding that many fish are moving through the spillways at the dams.



We have tagged 62 namew in the Lower Mattagami River since 2016, and 40 fish have active tags right now!

Most of the fish tagged above the dams in the Lower Mattagami River stay up the river, away from the reservoir.

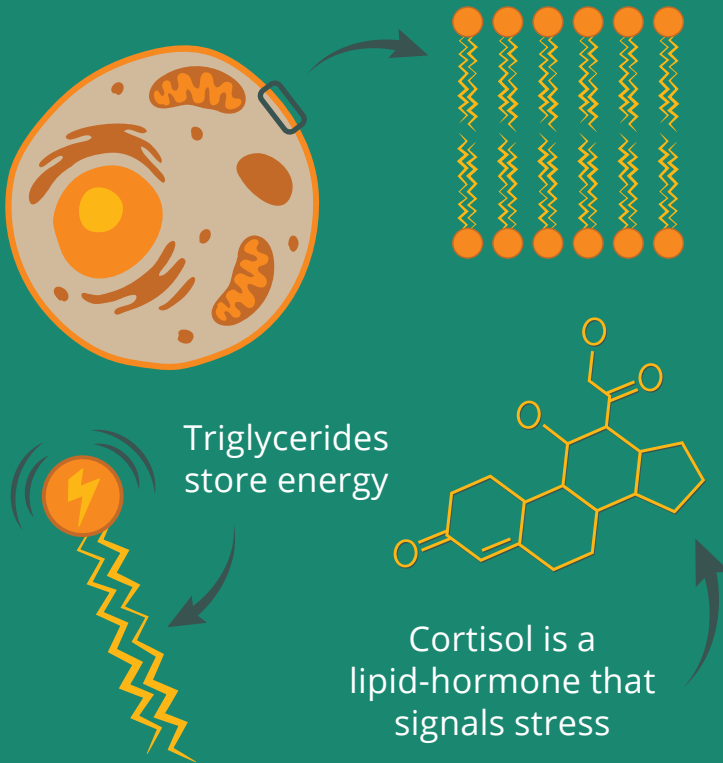
One of the ways we measure namew health from blood samples is by measuring biomolecules:

All living things, from single cells to the largest mammals, contain biomolecules.

Biomolecules are like beads on a string, that come together to make beautiful living works of art given to us by the earth. Together, biomolecules combine like beads to form unique patterns and shapes that tell us the story of each living organism in a one of a kind way.

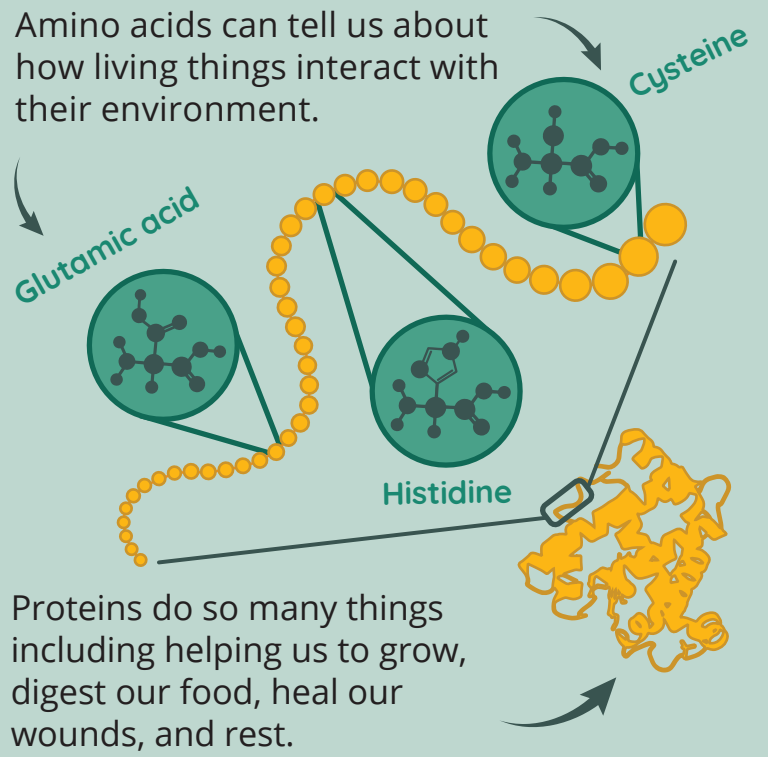
Lipids, amino acids, and proteins are all types of biomolecules

Phospholipids form membranes that enclose cells and protect their contents.

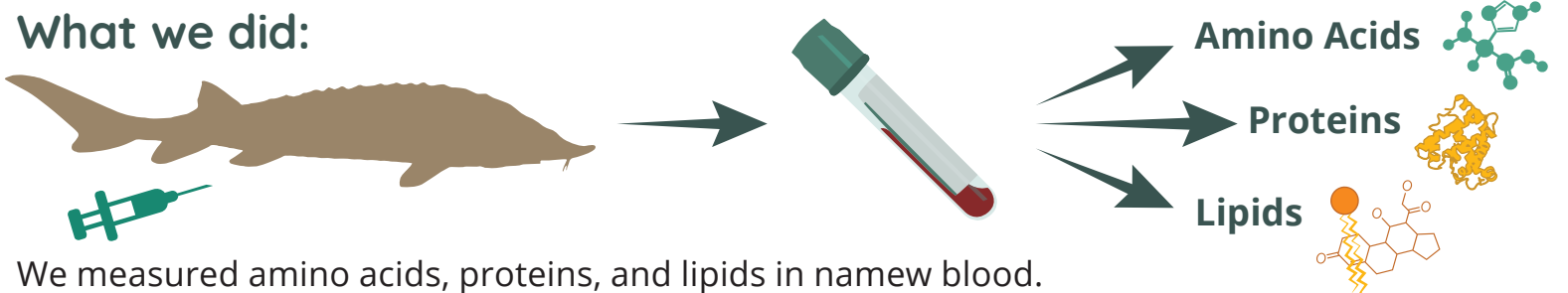


Amino acids are biomolecules that are beaded into thousands of unique proteins.

Amino acids can tell us about how living things interact with their environment.



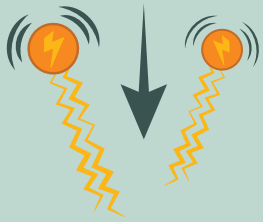
What we did:



We measured amino acids, proteins, and lipids in namew blood. What we learn from the biomolecules will tell us about their health.

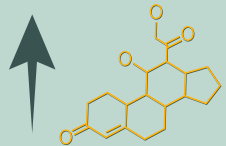
What we learned:

Lipids taught us about the health of the namew above and below the dams...



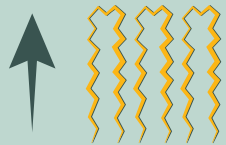
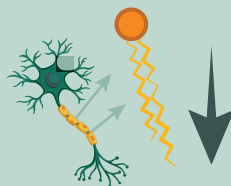
Triglycerides that store energy were lower in namew caught in between the Smoky Falls and Harmon dams.

Relative to the other areas we studied, in namew below the Kipling dam:



Cortisol that signals stress was higher.

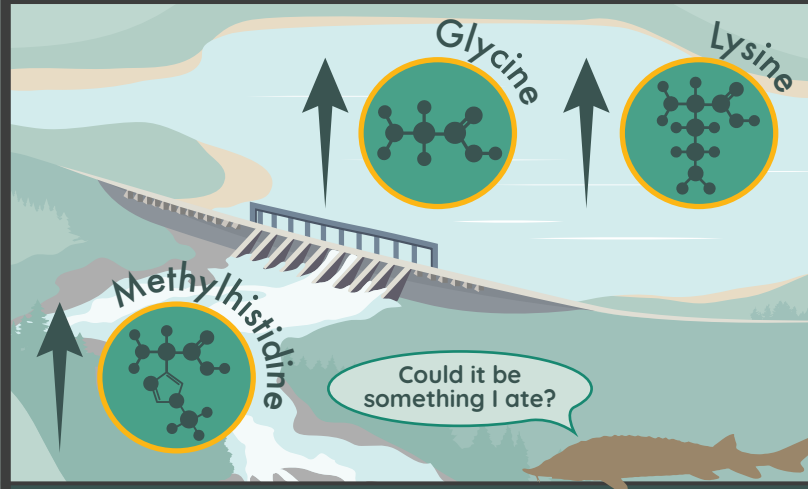
Sphingomyelins that protect nerve cells were lower.



Ceramide that is an important part of the skin's protective barrier was higher.

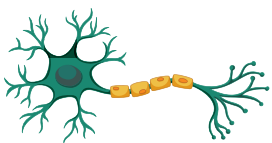
We identified amino acids that were altered in namew plasma (blood):

We found that some amino acids involved with building connective tissues, energy use, and nerve signals were higher in namew either above or below the hydroelectric dams.



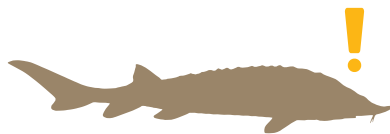
We are still working to understand what this means for the health of namew.

We measured more than 1300 proteins in namew plasma (blood). More than 500 proteins were different in plasma from namew at each sampling location. We found that many of these proteins were related to the these biological processes and functions:



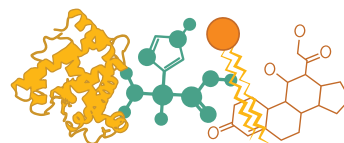
Nervous System Development:

Differentiation of brain and spinal nerve cells



Response to Stimulus:

A change in state or activity as a result of a stimulus



Metabolic Processes:

Making and breaking biomolecules



Locomotion:

Self-propelled movement

What could all of this mean for the health of namew?

Namew blood contained many biomolecules which let us know that they are likely eating different food above the dam, between the dams, and below the dams.

Namew also have higher stress, and use more energy for locomotion and growth below the Kipling dam.

Hello my two-legged relatives, our lives are connected by water and our blood! Our lives speak through our blood.

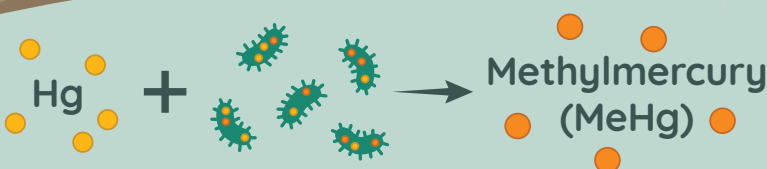
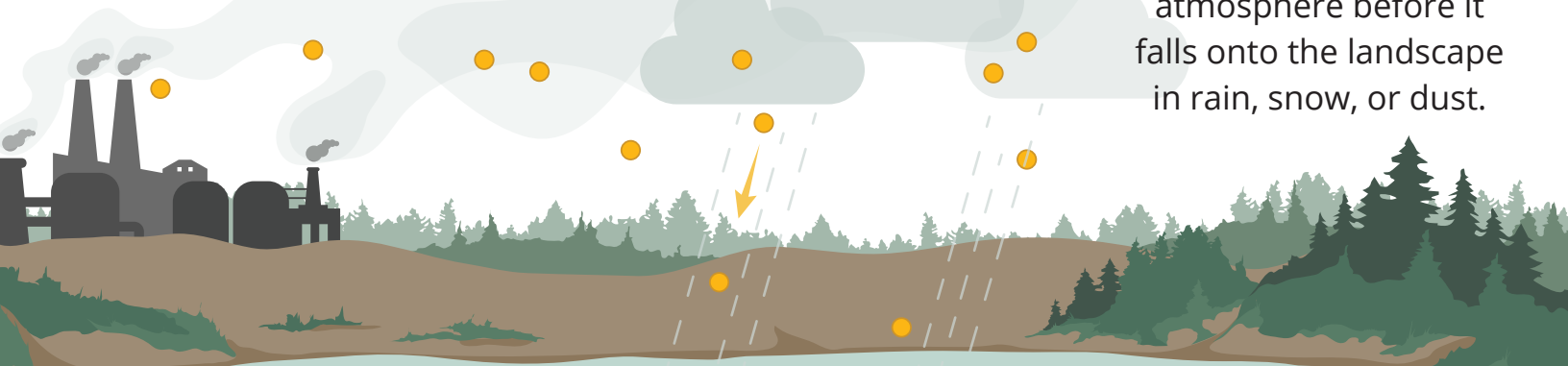


Mercury in the North

Mercury (or Hg for short) is a pollutant that can be found in fish all across the world. That's because mercury can travel far and build up in the environment.

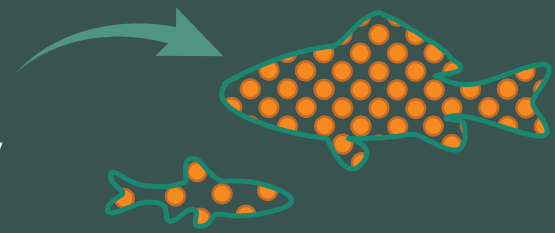
Mercury can get into our atmosphere from far away sources, like coal-fire burning plants or small-scale gold mines. Mercury can come from natural sources too, like volcanoes!

This mercury can travel a long way in the atmosphere before it falls onto the landscape in rain, snow, or dust.



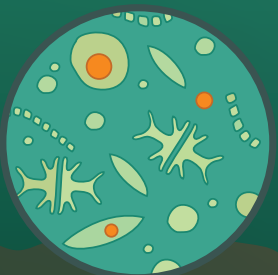
If mercury washes into a lake or river, it can be changed into a harmful type called methylmercury by tiny bacteria.

Then methylmercury can get into the food chain. It is biomagnified in fish because it builds up over time. That's why bigger predators like walleye usually have more mercury in their bodies than smaller bug-eating fish like suckers!



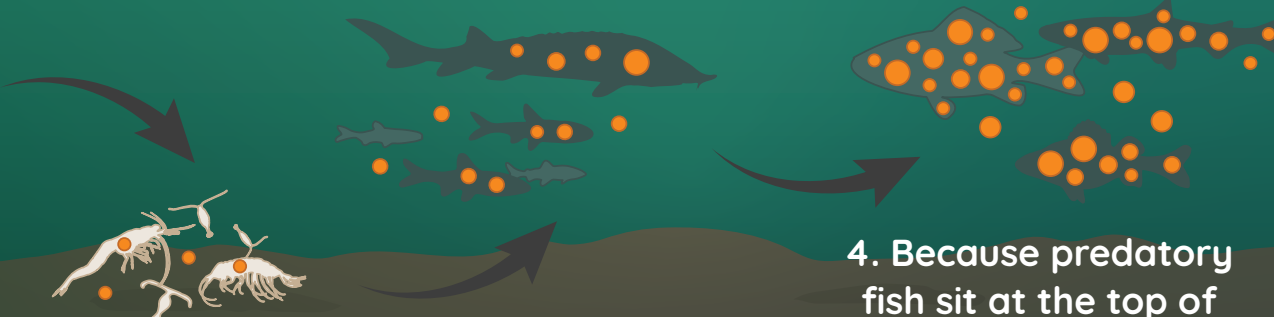
1. Methylmercury can get into small plants and animals at the bottom of the food chain.

3. When bugs are eaten by some fish (like minnows, whitefish, suckers, or namew), the mercury from the bugs passes into the fish.



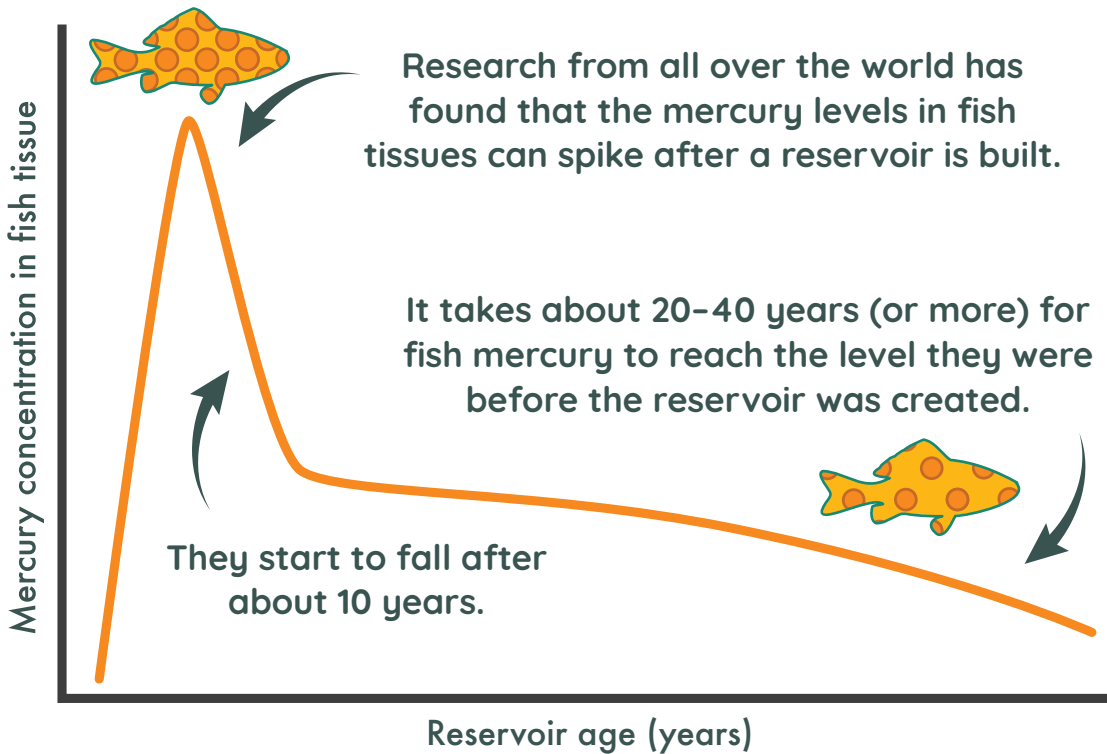
2. When plants and animals are eaten by bugs, the mercury from the plants and animals gets passed into the bugs.

4. Because predatory fish sit at the top of the food chain, they usually get the most mercury in their diet!



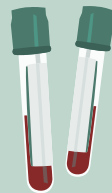
Mercury and hydroelectric dams

Hydroelectric dams can increase mercury in fish too. When some hydroelectric dams are built, they create a reservoir, like the one above the Little Long dam. Once flooded, any mercury that had built up on the landscape is now in the reservoir where it can be changed into methylmercury by the bacteria.



The Little Long reservoir was built in 1963, so it's about 60 years old.

If mercury levels spiked, they have probably dropped down again.



We looked at mercury in namew's blood!



Why blood? Taking a little blood with a small needle means that we could release the fish alive. We wanted to harm the namew as little as possible.



Blood

shows mercury over weeks



Flesh



shows mercury over years

We measured mercury in blood from 47 namew caught in our two rivers.

Good news! Mercury was fairly low in all namew blood samples relative to the benchmarks we looked at. Mercury levels were similar to sturgeon from other parts of Canada.

Plus, mercury in blood can tell us a lot about the recent impact of the hydroelectric dams! Mercury in flesh shows how much mercury a fish has picked up over many years. But mercury in blood only shows the mercury a fish has recently picked up over the past few weeks! So it can help us understand if the hydroelectric dams are increasing mercury levels in namew right now.

The hydroelectric dams aren't raising mercury levels in namew's blood, but they are changing what namew eats!

Like people, fish collect most of their mercury through their diet. So, figuring out what namew eats helps us understand their mercury levels too.

Namew are usually bottom feeders, slurping up bugs and other things along the riverbed. So we also sampled eight different kinds of bugs and crayfish and did some math using the different types of nutrients found in their bodies to try to understand what namew are eating.



MERCURY ↑

Namew from the North French River had the highest Hg levels in their blood. These namew were not eating the crayfish and bugs we sampled.

Namew from above the generating stations on the Mattagami River had the second highest Hg levels in their blood. These namew were eating the crayfish and bugs we sampled – crayfish were Namew's favorite snack at these sites!

Namew from below the generating stations on the Mattagami River had the lowest Hg levels in their blood. These namew were not eating the crayfish and bugs we sampled.

What do you think they are eating?

We need to do more work in the North French River and below the generating stations on the Mattagami River to find out what namew are eating. They may be eating different types of bugs or small fish and their eggs.

We're also studying the bugs!

Bugs are small, but they can tell us a lot about the health of a river or lake! We have found lots of bugs upstream on the Mattagami River, between the dams and above the Little Long reservoir. We also found lots of bugs on the North French River!



Intertidal clams



Damselfly



We did not find many bugs downstream of the Kipling dam, probably because the water levels are so variable. When the water level changes a lot, it's harder for the bugs to make their homes and make more bugs!

We will keep studying the bugs and the water and try to learn more about these beautiful rivers and how they may affect namew's home and diet.

If you have more questions, or want to stay up-to-date as we keep learning more about namew and the rivers of the Moose Cree Homeland, get in touch with us!





Visit our website to learn more,
get updates, and get in touch
to join our program!

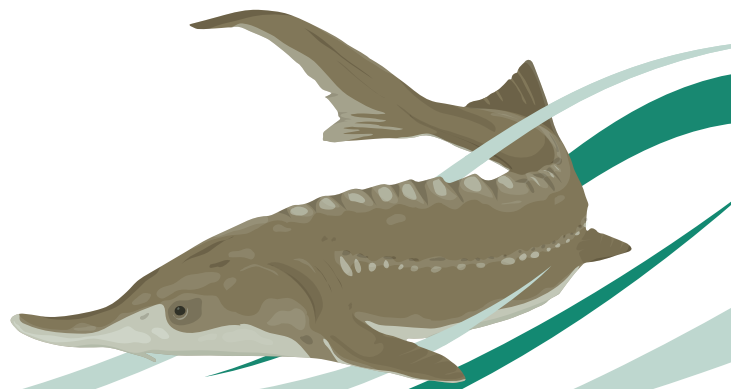
www.learningfromlakesturgeon.ca

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