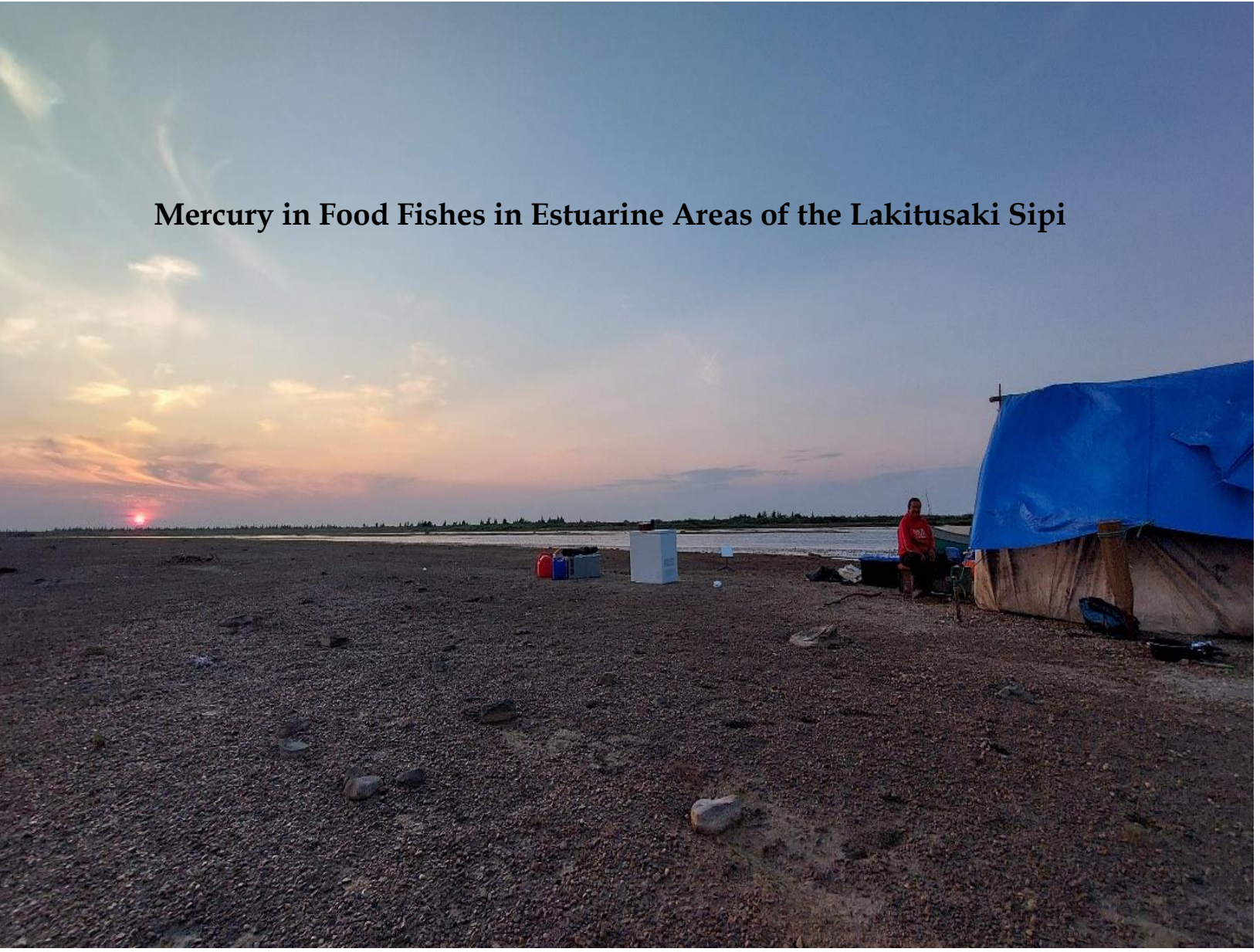
Mercury in Food Fishes in Estuarine Areas of the Lakitusaki Sipi



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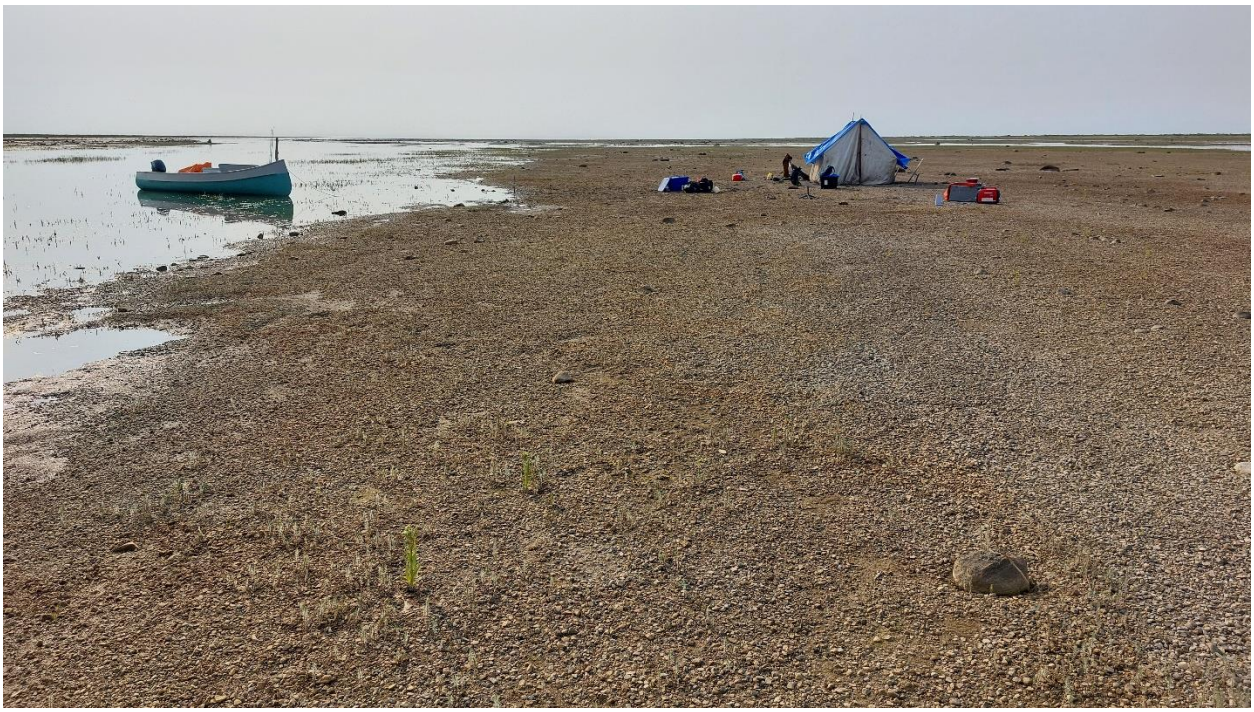
Mushkegowuk Council

Abstract

The Lakitusaki Sipi (Lake River) flows into Weeneebeg (James Bay) about 150 kilometres north of Attawapiskat, Ontario. In the 2026 study masamekos (Brook Trout) living at the mouth of the Lakitusaki Sipi were found to have a median concentration of methylmercury of 0.63 ppm (parts per million)

Introduction

Mercury is the contaminant in fishes that is most commonly of concern in Mushkegowuk Territory. This study was the second conducted by Mushkegowuk Council looking at mercury levels in food fishes in estuarine areas that are traditionally harvested by communities. This study of the Lakitusaki Sipi follows a study of three river estuaries in Winisk First Nation that were tested in 2024. Both these studies were financially supported by Canada's Department of Fisheries and Oceans.



Materials and Methods

In February of 2026, Robbie Koostachin and James Tegler snowmobiled from Attawapiskat north about 160 kms to ice fish in the Lakitusaki Sipi. We caught 30 masamekos and an epaxial tissue sample was taken from the fish ~ 20x20x30mm. These tissue samples were then placed in individual polyethylene bags along with a tag indicating the fish's length and weight. These samples were frozen and packed with ice and sent to the Biotron Laboratory at Western University where DMA (Direct Mercury Analysis) analysis of the tissue was performed to

determine the total mercury and methylmercury levels. Some readers may question why summer and winter photos of the area are in this report. The initial sampling trip was in July of 2025 but due to the testing lab analyzing the samples incorrectly, another trip was needed.





Results

Masamekos Tissue Analysis				
Tag Data	Total Fish		THg ppm	MeHg ppm
	Fork Length mm	Weight grams		
BT-1	390	482g	0.528	0.503
BT-2	406	624g	0.425	0.396
BT-3	378	454g	0.451	0.386
BT-4	344	170g	0.498	0.474
BT-5	377	454g	1.746	1.870
BT-6	462	794g	0.678	0.651
BT-7	342	369g	0.377	0.340
BT-8	339	340g	0.685	0.669
BT-9	363	369g	0.616	0.583
BT-10	340	340g	0.482	0.419
BT-11	447	624g	0.441	0.381
BT-12	394	539g	0.753	0.664
BT-13	409	680g	0.720	0.678
BT-14	384	510g	0.542	0.503
BT-15	408	624g	0.557	0.497
BT-16	342	312g	0.921	0.825
BT-17	377	397g	0.727	0.650
BT-18	503	1106g	1.015	0.896
BT-19	364	369g	0.594	0.617

BT-20	351	369g	1.198	1.120
BT-21	407	595g	0.610	0.532
BT-22	327	284g	0.513	0.511
BT-23	392	539g	0.618	0.643
BT-24	423	624g	1.244	1.279
BT-25	420	624g	0.707	0.704
BT-26	396	482g	0.664	0.647
BT-27	388	567g	0.447	0.430
BT-28	383	454g	0.799	0.687
BT-29	378	482g	0.448	0.433
BT-30	396	539g	1.004	0.969

Discussion

Omushkego are concerned about environmental changes occurring as developments are planned upstream in the local rivers' drainages. There are plans to build roads, mines and hydroelectric dams in these drainages. This study is one of a number that seek to establish conditions existing prior to development. In this case, we found masemekos in this remote location have a higher mercury content than the Ontario average. The environment in the peatlands is high in organic content and often anaerobic. This favours mercury being methylated and more easily entering the food chain. The largest source of mercury in the environment is from the atmospheric deposition of dust that is the result of long-distance transport. The sources of mercury are mostly anthropogenic currently. Human activity has caused a large global increase in available mercury. Primarily, this has been through the burning of hydrocarbons, mercury released as part of gold mine processing or other industrial emissions. A large proportion of atmospheric mercury also is due to natural processes such as volcanoes. It is estimated at present, roughly two-thirds of mercury emitted to the atmosphere is anthropogenic with one-third coming from natural sources. Human sources of mercury can be direct (e.g., coal-fired power plants, chlor-alkali plants) or indirect (activities causing the re-emission of previously deposited mercury).

Mercury initially comes to the environment as the element mercury. Elemental mercury is much less likely to be biologically active and enter the food chain as compared to mercury that has been methylated. Mercury changes into methylmercury through metabolism by anaerobic sulphur reducing bacteria that methylate elemental mercury to become methylmercury. The factors that affect this conversion process vary greatly depending on the environment. The exact health effects of methylmercury are contentious, but all agree that the rate of biological conversion varies greatly. It is also well documented that disturbances (building dams, agriculture, or even roads) all seem to increase the conversion rate. Once taken up by organisms, mercury will bioaccumulate such that it reaches harmful concentrations in top predators. In humans the most common reason for elevated mercury levels is the frequent (several times weekly) consumption of large fish that eat other fish.

Mercury was initially discovered toxic in Minamata, Japan, in the late 1950s when a factory discharged mercury into the harbour. The first problems noticed were in cats that ate a diet of

mostly fish from the polluted harbour. These fish were high in mercury, and it was damaging the nervous systems of the harbour cats giving them something called *Dancing Cat Disease*. Studies found the cause of this disease was mercury toxicity. It was then quickly noticed that humans were also being affected. The mercury levels in the fish in Minamata, Japan at this time were from 10 – 50 ppm with the highest level found being 178 ppm. More investigation discovered that the dumping of factory waste had accumulated 27 tons of mercury in the harbour. The Japanese Government spent 25 years cleaning up this disaster. The cleanup itself cost over $500,000,000 CAD and over $1,250,000,000 CAD has been paid in compensation to victims. A similar disaster occurred in NW Ontario where from 1962 to 1970 a factory dumped an estimated 9 tons of mercury into the English-Wabigoon river system. The cleanup is still to come, and challenges are significant as the mercury is in sediments of 100s of kilometers of river bottom.

Those suffering from mercury poisoning experience a wide range of health problems. Possible symptoms of methylmercury poisoning include tremors, loss of peripheral vision, "pins and needles" feelings, lack of coordination of movements, impairment of speech, problems hearing, trouble walking or muscle weakness. The levels of mercury in the environment and in humans is monitored closely. Health Canada's acceptable guidance values for total mercury in human hair is 6 ppm for the general adult population and 2 ppm for more sensitive individuals, such as children, pregnant women, and women of reproductive age. New scientific literature suggests that mercury is more harmful than previously understood, with concerns that some negative neurological impacts can be seen at levels above 0.58 ppm in hair in some individuals. One such study used hair from Cree of Eeyou Itschee (the eastern area of James Bay), Québec. The area was of note as the huge Le Grande dam building project had occurred creating several massive reservoirs in the region. Dam impoundments are well known to result in increased mercury levels in fishes. The study found levels in the area residents' hair in 1988 were 6.8 ppm and by 1993/94 had decreased to 3.0 ppm. A later study was later done in nine Cree First Nations communities in northern Québec including the Eeyou Istchee. This study between 2002-2009 found 6.3 ppm in hair sampled in various communities in that area. Much lower concentrations were found in the hair samples in the Western Arctic where there are no reservoirs. Indigenous hair samples taken in 2016 found a mean of 0.60 ppm and a similar 2026 study found mean concentration in hair was 0.46 ppm for total mercury.

Worldwide over the last 50 years, the new releases of mercury by humans have decreased and worldwide measurements have generally shown that environmental mercury is also decreasing measurably. Commercially, Canada presently bans the sale of <u>most</u> fish containing more than 0.5 ppm mercury. Exceptions to this rule are species like tuna, shark, skate and several others that can be sold at concentrations of up to 1.0 ppm. For local consumption recommendations a great source is the Ontario Food Fish Guide that has collected data on mercury in fishes all over Ontario for over 50 years. The Government of Canada's Mercury and Human Health website is also an excellent source of information.

Conclusion

Many studies state that fish are a very nutritious food. Mercury is a toxin in fishes that should be monitored as it can cause significant harm and therefore continued monitoring is advised. It is worthwhile reading the recommended quantities to eat of certain fish. Particularly for pregnant women, infants and young children. You can speak to your local environmental workers for more information and consult the Ontario Food Fish Guide. The more vulnerable members of the population should avoid larger piscivorous fish (fish that eat fish) in particular.

Abandoned Hudson Bay Post on the Lakitusaki Sipi



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