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TOLD THROUGH SEDIMENT CORES

Stories of Lake Nipigon

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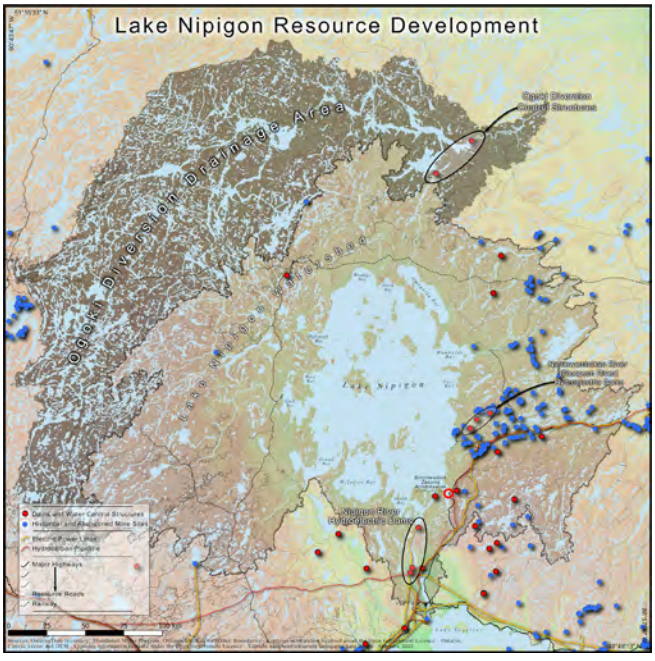
IN THE 1920s, University of Toronto researchers undertook a comprehensive study of the limnology and aquatic ecology of Lake Nipigon, a large (38th largest globally) headwater lake that flows into Lake Superior through the Nipigon River. More than 100 years later, this remains the only comprehensive aquatic ecosystem study ever conducted for Lake Nipigon. Over this time, the basin has been impacted by a plethora of stressors, including hydroelectric power generation, mining, and invasive species. Most notable among them is the Ogoki Diversion, constructed in 1943 to divert the flow of the Ogoki River from the Hudson Bay watershed into the Great Lakes watershed through Lake Nipigon. Water levels on Lake Nipigon are manipulated to influence flows through the Laurentian Great Lakes system, but it is not uncommon for Lake Nipigon to be excluded entirely from Great Lakes watershed maps.





At left: Jackfish Creek prior to the 1943 Ogoki Diversion. *Photo courtesy of Ontario Power Generation.* **Above:** Drone image (2023) of a rotational slide along the banks of the Little Jackfish River just upstream from Ombabika Bay. *Photo by Tim Hollinger.*

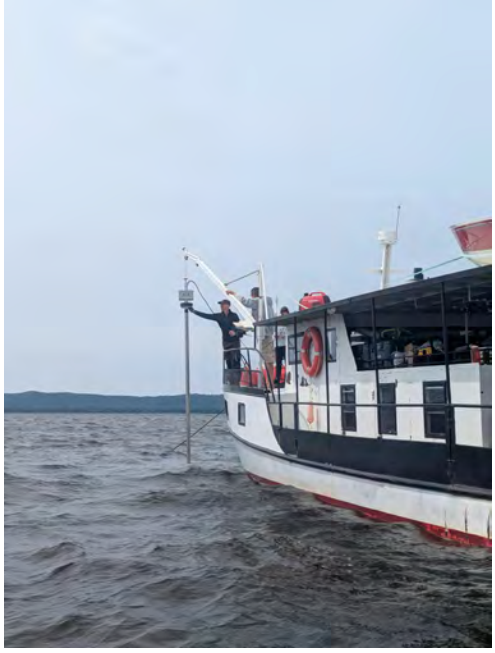
The First Nations of Lake Nipigon have witnessed the impacts of industrial development on the health of the lake but have largely been left out of management decisions and Great Lakes monitoring. This impedes their ability to engage fully in consultation and fulfill their role as rightful stewards of Lake Nipigon. In response, Biinjitiwaabik Zaaging Anishinaabek (BZA – Rocky Bay, one of the six Lake Nipigon First Nations) created an Indigenous Guardians program and partnered with academic researchers at Lakehead University to study the cumulative impacts of past development on Lake Nipigon. These investigations began with a community country foods study, which identified the community's vulnerability to mercury in walleye, and later led to a community-based fish consumption study for mercury in popular fishing spots across Lake Nipigon. BZA's research program then expanded to include a new partnership with York University to use lake sediment cores to learn more about post-colonial ecosystem changes in Lake Nipigon, guided by traditional knowledge.



Map of the Lake Nipigon watershed, including the expanded drainage basin arising from the Ogoki Diversion. *Credit: Reg Nelson.*

The Ogoki Diversion

The construction of the Waboose and Summit dams in northern Ontario (see circled area at top right in map) redirected the flow of a roughly 14,000-square-kilometer drainage area of the Ogoki River basin into the Little Jackfish River, which empties into Ombabika Bay at the northern end of Lake Nipigon. This increased the watershed size of Lake





At left: Vibracoring in Ombabika Bay from the BZA research vessel, the *Velma Linda. Photo by Tim Hollinger.* **At right:** Abe Kowtiash, BZA Elder and captain of the *Velma Linda*, fishing for walleye in the Little Jackfish River. *Photo by David Jackson.*

Nipigon by over 60%, and the volume of diverted water was high enough to increase hydroelectric production more than 1,500 kilometers downstream at Niagara Falls. Raised water levels on Lake Nipigon contributed to widespread shoreline erosion and forced the relocation of First Nation communities. Increased mercury concentrations in fish were also of concern, as dams are known to result in higher rates of mercury bioaccumulation, and Ombabika Bay and the Little Jackfish River act as the "Walleye Factory" of Lake Nipigon. BZA Elders also recounted widespread sediment plumes in Ombabika Bay and outwards into the main basin of Lake Nipigon in the years following the construction of the Ogoki Diversion. It has been estimated that up to 9 meters of sediment were deposited in Ombabika Bay near the mouth of the Little Jackfish River, and that 30 million cubic meters of sediment was scoured along the banks of the Little Jackfish between 1943 and 1972. Large rotational slides are still visible on the banks of this formerly small creek channel pictured on the previous page (Ontario Power Generation, 2022). Resolving the legacy impacts of the Ogoki Diversion is a priority for BZA, as further hydroelectric development has been proposed for the Little Jackfish River.

Lakes as storytellers

Lakes hold memories within their sediments. Sediments are continuously settling on the lake bottom, with younger sediments settling over top of older sediments, providing a record of change over time that can be inferred from biological fossils and sediment physical and chemical characteristics. Interpreting the stories told in sediment cores allows us to learn about how Lake Nipigon has changed over time. But Lake Nipigon is not an easy lake to collect sediment cores from. There are no bathymetry maps available to identify ideal coring locations, and navigation on Lake Nipigon can be hazardous to those who are unfamiliar with its waters. Partnership and BZA leadership have been critical to the success of the project. Every summer since 2021, BZA Guardians and university researchers have spent about a week together aboard the *Velma Linda* (BZA's research vessel) traveling around Lake Nipigon collecting sediment cores, sharing knowledge and stories, and building relationships. We've collected "short" sediment cores (20–40 centimeters) from 12 embayments of Lake Nipigon and dated them using radioisotopes (^{210}Pb, ^{137}Cs). These sediment cores span the last roughly 200–300 years of history in southern Lake Nipigon, but only the post-Ogoki period in the northern part of the lake. The extensive amount of sediment released from the Little Jackfish River meant that we had to drill deeper to see what conditions were like prior to the Ogoki Diversion. In 2025, we returned to Ombabika Bay with a more advanced coring device called a vibrating corer and collected two 3-meter-long sediment cores (pictured above, left). The stories that we will be able to tell from the sediment cores eventually can be woven with oral history and archival data to provide a holistic understanding of the health of Lake Nipigon, in support of Indigenous-led stewardship. Lake Nipigon is a jewel within the Great Lakes watershed and should be protected for generations to come.

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