

THE SHORT VERSION

A Working Copy of the St. Clair River

A high resolution model of the river from Lake Huron to Port Lambton, tested against official gauges, flow records, drifting buoys and past ice jams

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Cover: the model's surface currents for September 28, 2026, as Lake Huron funnels into the river and down past the Blue Water Bridge. Darker lines are faster water.

Tyler W.

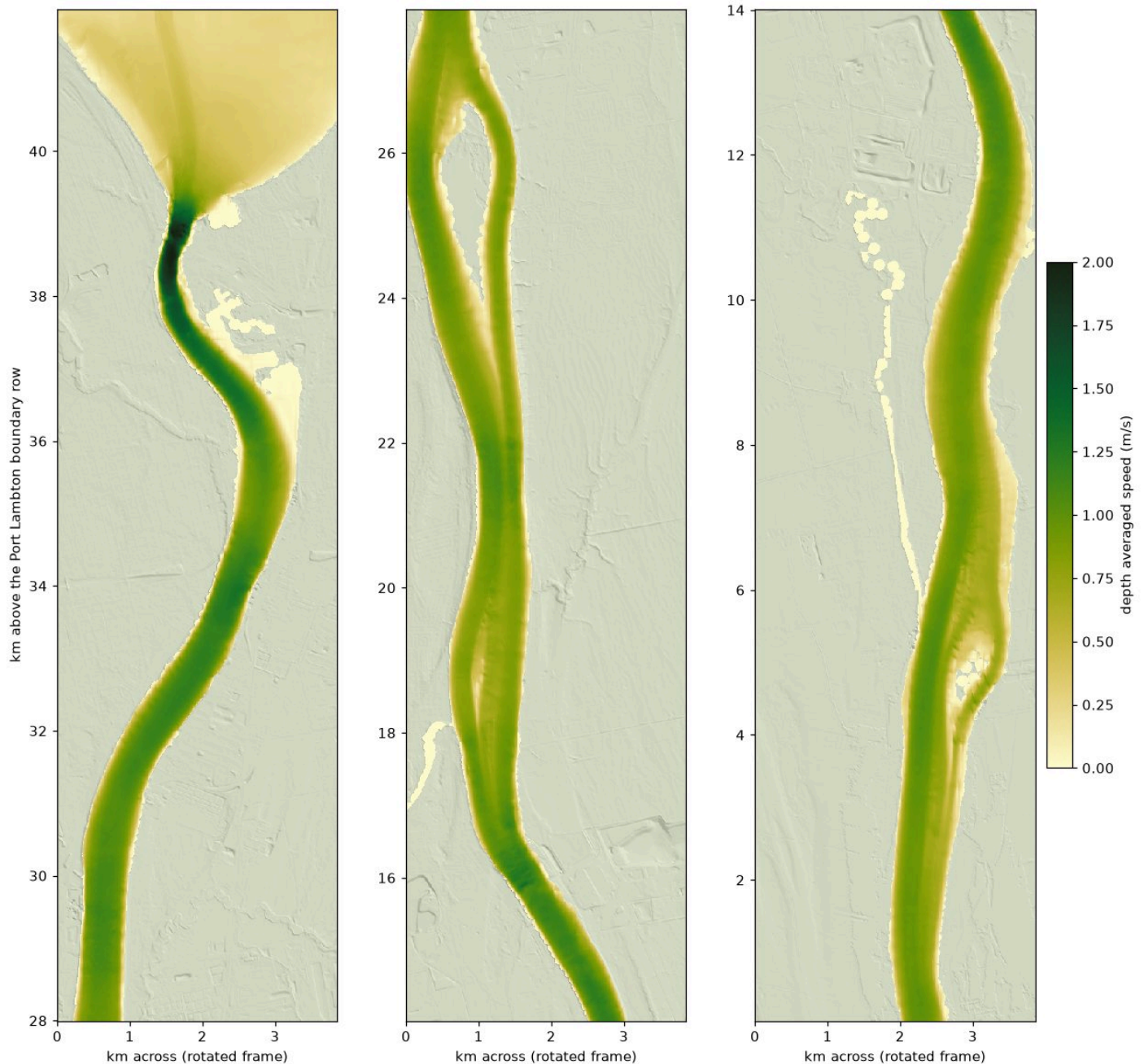
IThero Solutions, Sarnia, Ontario

October 2026 | Independent research experiment, not for navigation



A working copy of the St. Clair River

What it is, how it was tested, and what it can do. IThero Solutions, Sarnia, Ontario. October 2026. An independent research experiment; experimental and not for navigation.



The whole 42 km model on Sept 28, 2026 (5,928 m³/s), in three panels: Lake Huron at the top of the left panel, Port Lambton at the bottom of the right panel. Colour is the speed of the current; the fastest water is at the Blue Water Bridge.

What it is

IThero has developed a working computer model of the St. Clair River, from Lake Huron at the Blue Water Bridge down to Port Lambton, about 42 km of river. Its riverbed comes from more than fifteen depth surveys by US and Canadian

agencies, its banks from laser maps, and it runs on a single computer here in Sarnia. Every fraction of a second it works out how deep the water is and how fast and which way it moves, everywhere on the river, in cells 10 m and 5 m across.

A picture of a river is easy to make. The point of this work is a model that behaves like the river, with every result set beside an independent measurement, including the tests it failed.

How we know it is right

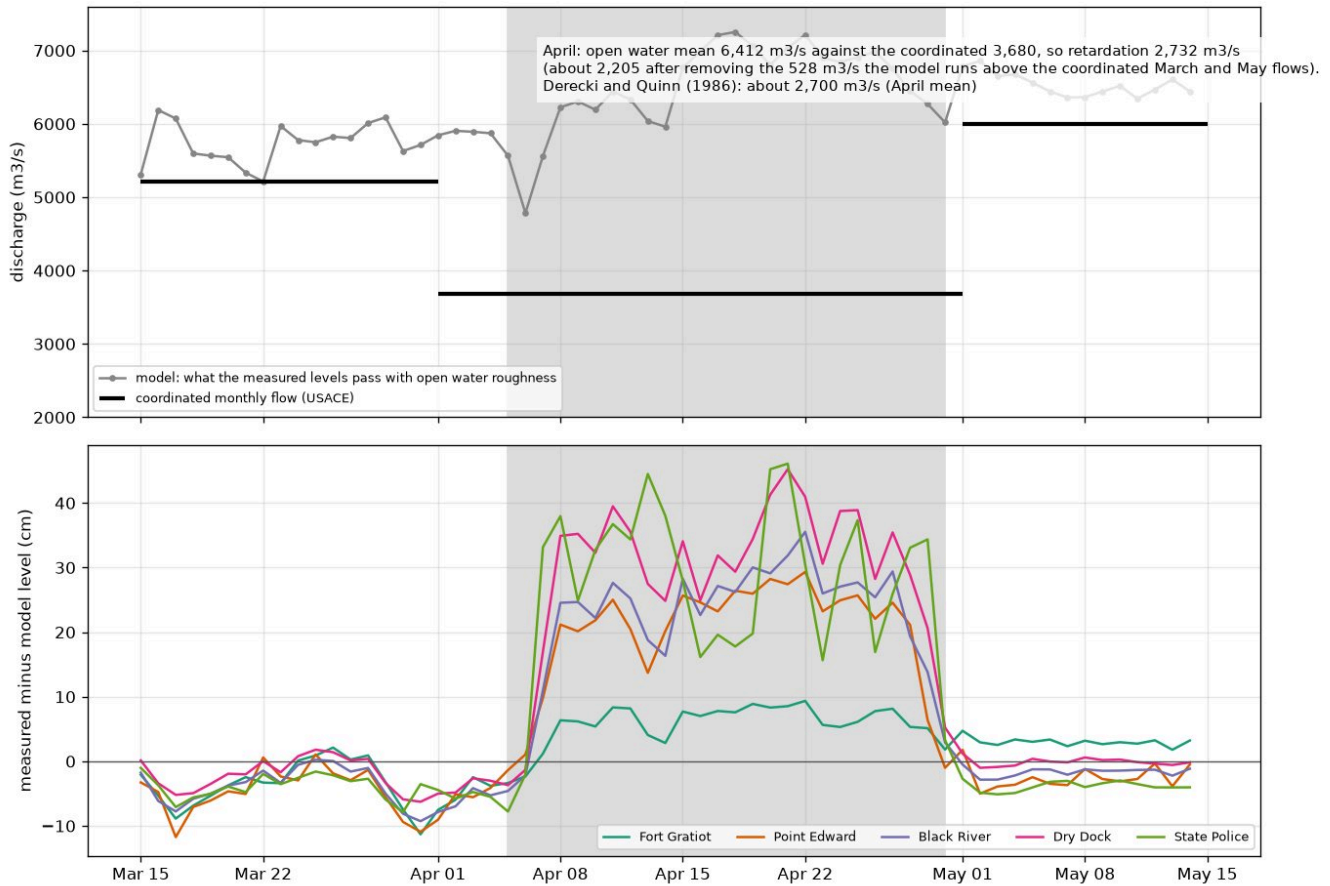
- **Water levels.** Over two weeks (Sept 30 to Oct 14, 2026), driven only by the lake level at the top and the level at Port Lambton, the model followed the five gauges inside the river to within about 2 cm on average, including one gauge it was never tuned on.
- **How much water.** The flow it works out from those levels alone matched the US Geological Survey's measured record to within half a percent over the two weeks, and a boat measurement on Oct 5 to within 1.6%.
- **Islands.** It splits the flow around Stag Island and Fawn Island within about 2 percentage points of US Geological Survey measurements.
- **Currents.** Against a 2002 boat survey of the currents across the river, its speeds were 2% fast on average with a typical miss of 0.1 m/s; a simple estimate that spreads the same flow by depth also passed, with a larger miss of 0.15 m/s, and the model misses the fastest water just below the Blue Water Bridge. Experimental, not for navigation.
- **Far from what it was tuned on.** At a real low flow (November 2012), a real high flow (July 2020) and the October 2000 flow, its water levels stayed within about 4 cm of the gauges.
- **Speed.** Two weeks of river takes under an hour of computing, fast enough to run many scenarios at once or to keep up with the river live.

What it can do

Spills. If something spills into the river, how long until it reaches the drinking water intakes downstream? We ran all 15 release points of NOAA's official spill tables plus two real 2009 dye releases, 17 spills at once. For spills at the surface the model's arrival times match NOAA's tables to within a few minutes on the median. Against the three real 2009 dye releases, the model's first arrival was 44 to 56 minutes late. Rerun with the faster surface current, two of the three arrived within 14 minutes and the third 21 minutes late.

The Port Huron Float Down. Where do people on tubes end up when the wind blows? With a west wind of about 30 km/h, most of the floaters in the model are pushed onto the Canadian shore. We checked the drift against 173 real floats that US scientists released in the river in October 2000: after 10 minutes the model's float is a median of 40 m from the real one, after half an hour 118 m, and it reaches each kilometre down the river at the same time to within seconds on the median. (Those floats hung a bucket under the water, so how strongly the wind pushes a person on a tube is still untested.)

Ice jams. Using nothing but routine gauge records, the model finds the ice jams of January 2019 and February 2021 on the days they were reported, and sizes how much water they held back: about 1,950 cubic metres per second at their peaks, a third of the river. For the record jam of April 1984, the scientists who studied it put the shortfall at about 2,700 cubic metres per second over the month; this model, driven by the 1984 gauge levels, finds between about 2,200 and 2,730 held back, and dates the jam April 7 to 29 against the published April 5 to 29.



The April 1984 ice jam: the model's open water flow against the coordinated record, and the gauge levels rising as the jam held the river back

The riverbed. Where does the water push hardest on the bottom? Strongest from the bridge to the first bend, 8 to 13 Pa, the same as measured in a 2009 international study, which also found, as this model does, that river flow alone does not move the gravel bottom; ship propellers are the likely reason a gravel bar below the bridge creeps downstream.

A 3D look at the bridge. A full 3D model of the bridge reach (7 million water cells, 2 m across) shows the surface water running about 14% faster than the river's average speed, the number the Float Down drift relies on.

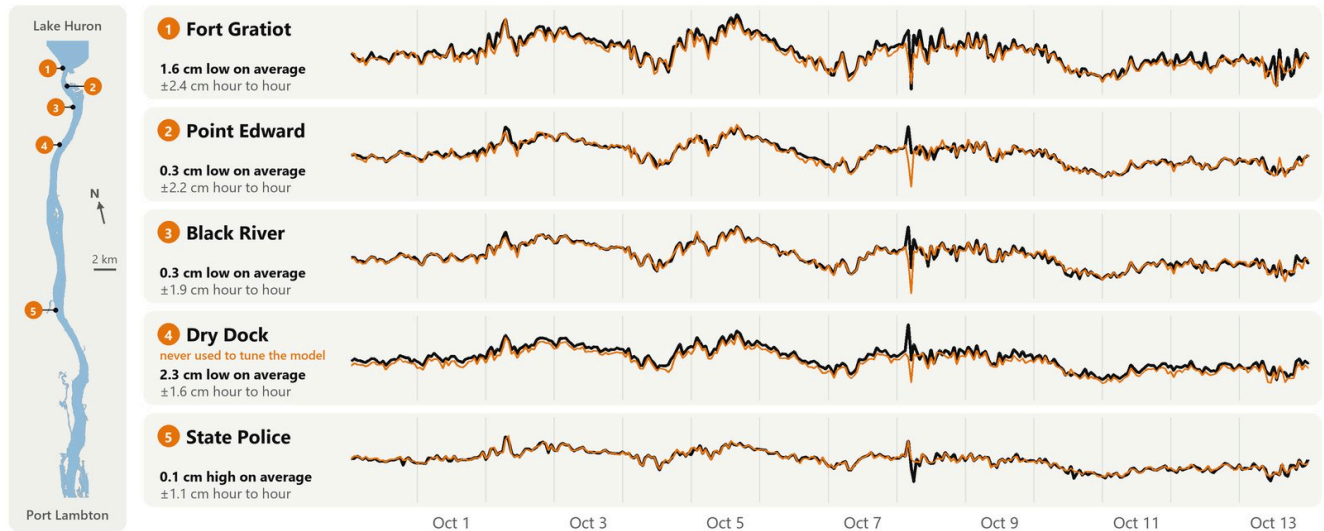
The river right now. The same model can take the latest public gauge readings and show what the river is doing at this moment: on its first live run the current under the Blue Water Bridge was 1.65 m/s (3.2 knots). Experimental, not for navigation.

The model versus five official gauges

St. Clair River water levels, hour by hour, Sept 30 to Oct 14, 2026

— Measured at the gauge — Computer model I 10 cm

Within 2.3 cm on average at all five gauges



Computer model of the St. Clair River. Data: NOAA, Fisheries and Oceans Canada, USGS.

IThero IThero Solutions, Sarnia

Two weeks hour by hour, Sept 30 to Oct 14, 2026: water levels measured at five gauges (black) against the model (orange)

What is not finished, said plainly

- The finer 5 m version had a fault where the lake meets the river; it was found and fixed on Oct 20 and retuned on Oct 21. Over the full two weeks it follows the gauges about as closely as the 10 m version, not more closely: its average errors are slightly larger, up to 3.0 cm at the gauge it was never tuned on.
- The 3D bridge model loses about 5 cm too much water level through the reach, because its walls are built of small steps; smooth walls are the fix.
- The live river view runs on demand. Replayed hour by hour over the week of Oct 14 to 20, it stayed within 2.3 cm of the gauges on average and within 1% of the measured flow, at about 9 seconds of computing per hour; running it on a schedule waits for the go ahead.
- Ice is modelled as extra roughness in each reach, not yet as individual ice cover; the river delta below Port Lambton is not in the model yet.

Who and with what

By Tyler W., IThero Solutions, Sarnia. Data from NOAA (CO-OPS, GLERL, nautical charts and surveys), the US Geological Survey, the US Army Corps of Engineers, the Canadian Hydrographic Service, the Water Survey of Canada, Natural Resources Canada, Environment and Climate Change Canada and USDA NAIP aerial imagery. Built with the help of artificial intelligence. Every number in this summary traces to the full lab reports, which record the tests that failed as well as those that passed and credit the published research the work builds on.