Wastewater Modelling Report: Forecasting the State of the Pandemic using Wastewater Data

Published on: 2022-12-16

Public Health Agency of Canada has developed a mathematical model for conducting wastewater based forecasting that describes infections of COVID-19 in the community and also considers how infected people shed the COVID-19 virus into the sewer systems and how that shed virus signal is detected and reported. The clinical case and wastewater surveillance data are used to generate forecasts and help understand what is happening in the community.

The next figures show clinical case and wastewater surveillance data for each city during the Omicron wave. In each figure, the panel shows the traditional reported human clinical case data (solid black line) and model forecasts using only wastewater data (blue shaded area).

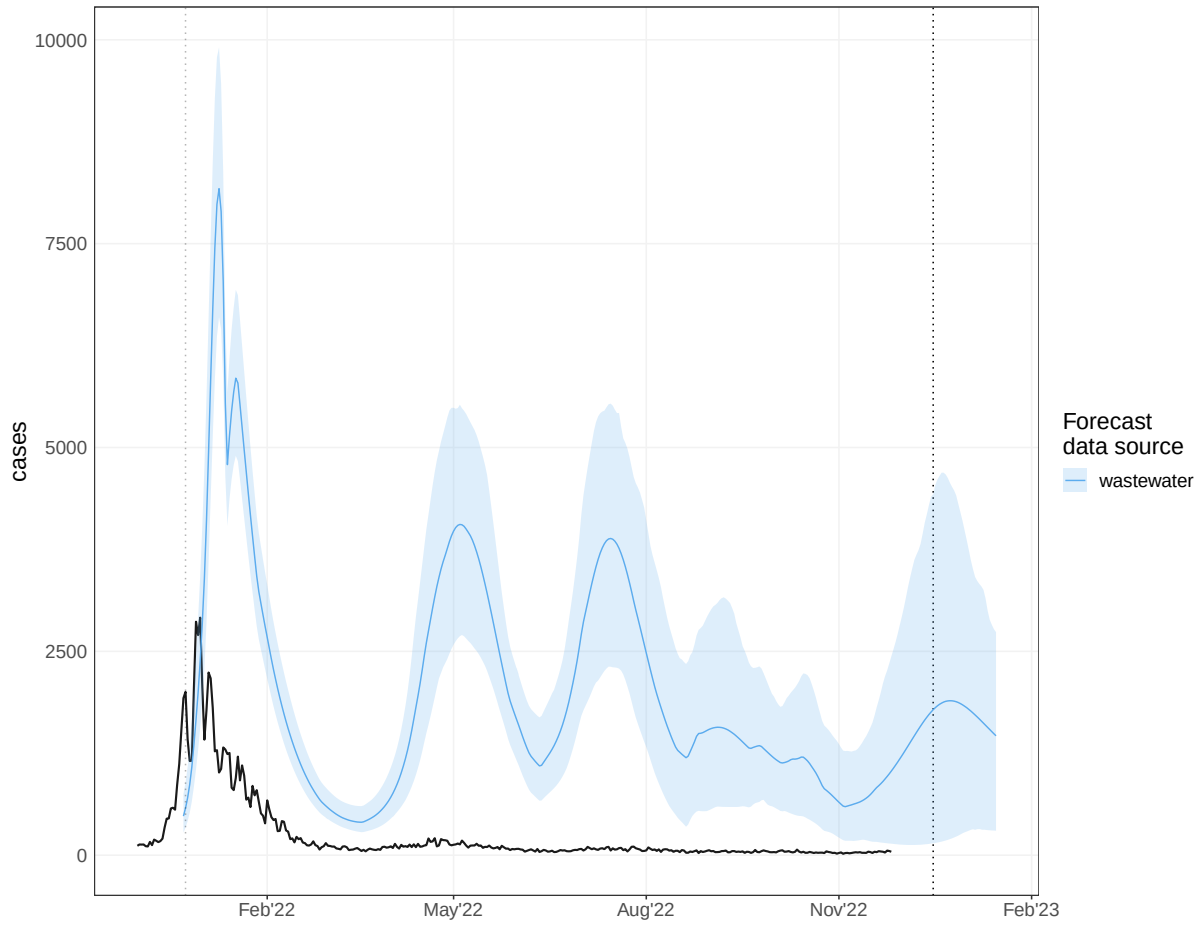
As of November 22, 2022, model forecasts use only wastewater data.

The model uses wastewater data with the following last observation dates for each site:

City	wastewater
Halifax	2022-11-23
Montreal	2022-11-26
Edmonton	2022-11-27
Toronto	2022-11-27
Vancouver	2022-11-27

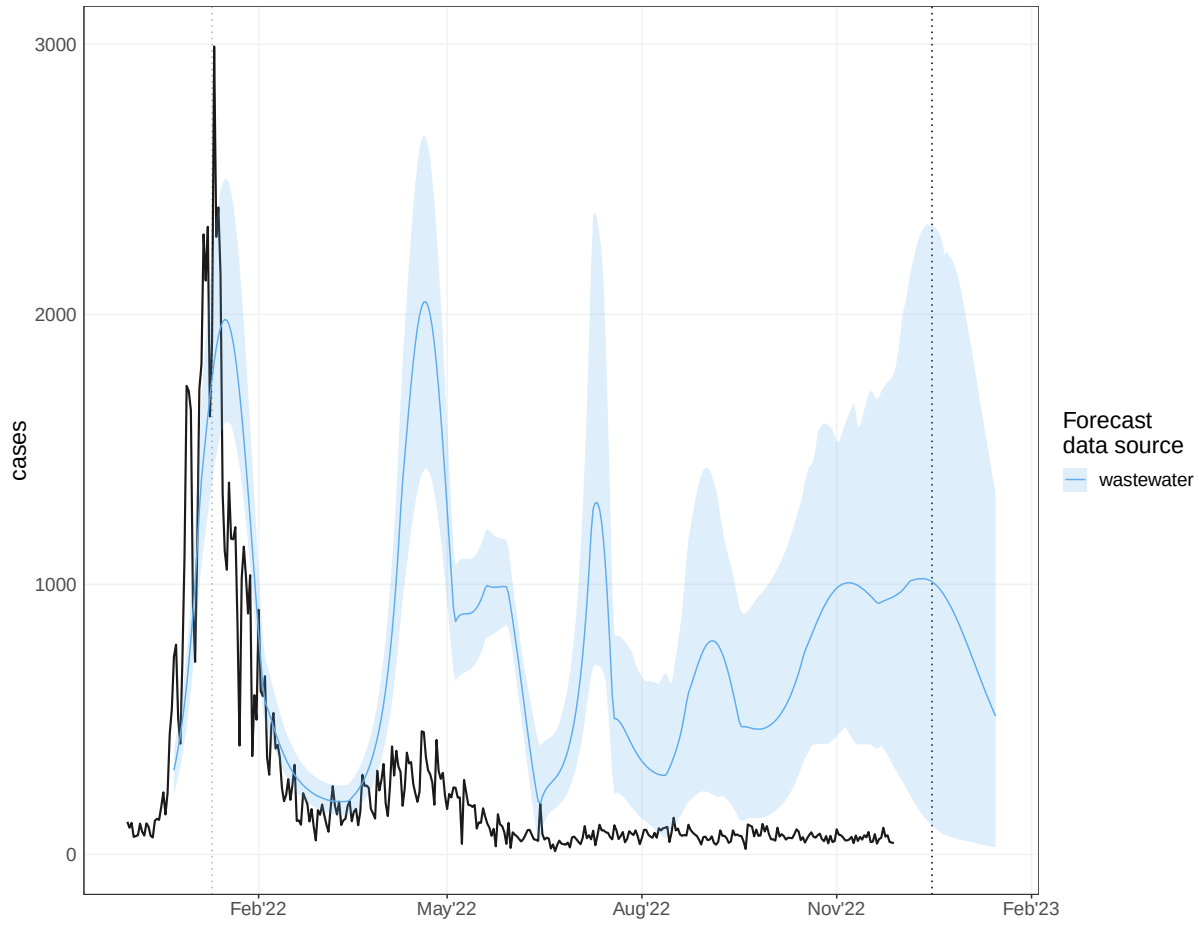
Vancouver

The reported clinical data (black curve) did not identify the summer wave of infection seen in wastewater projections. This suggests an under-reporting of clinical cases. Wastewater-based projections (blue curve) indicate infections will decline in the coming weeks.



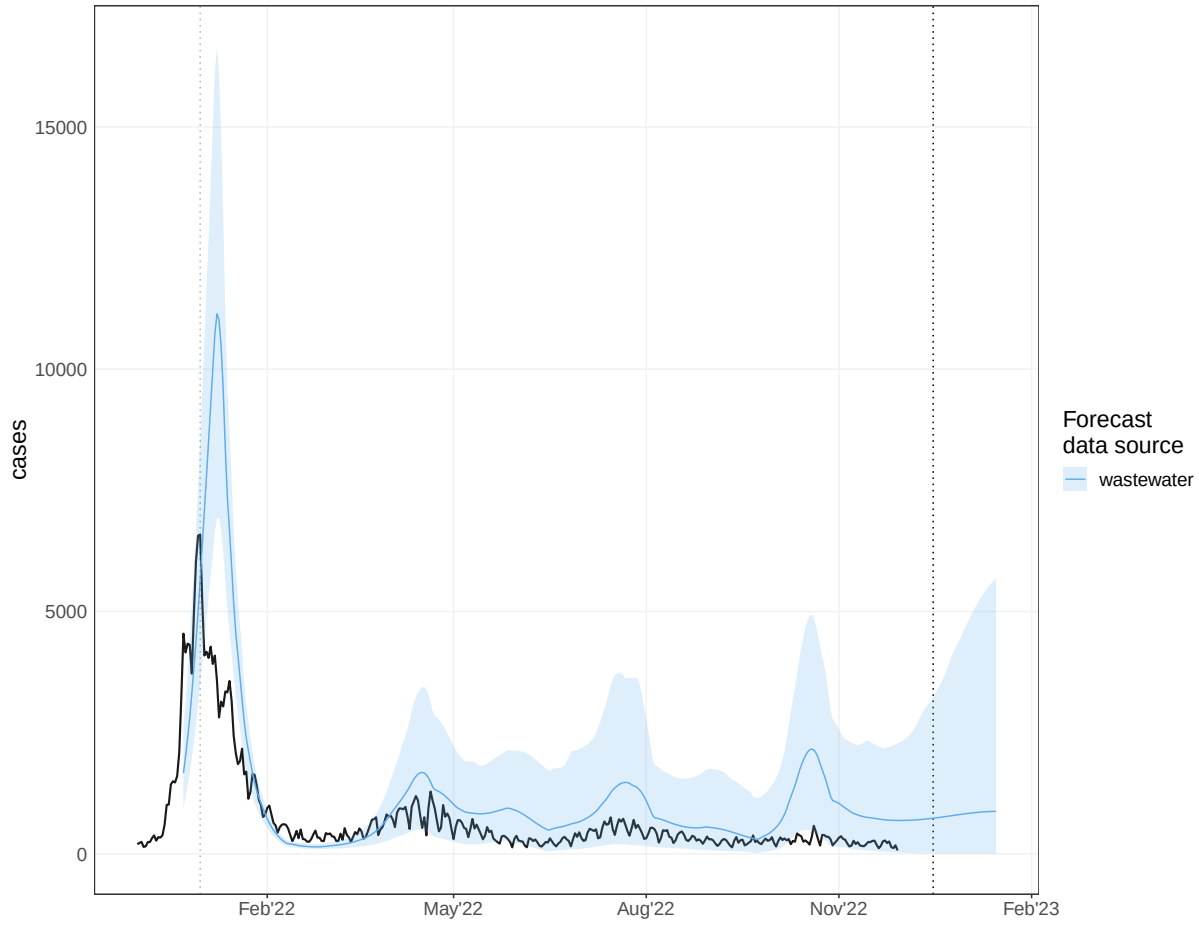
Edmonton

The modelling using the wastewater signal suggests a wave of infections occured during the summer. However, these cases were largely under-reported through clinical surveillance, as shown by the difference between reported clinical cases (black curve) and case projections based on wastewater signals (blue curve). Wastewater-based projections indicate infections will decline over the next few weeks.



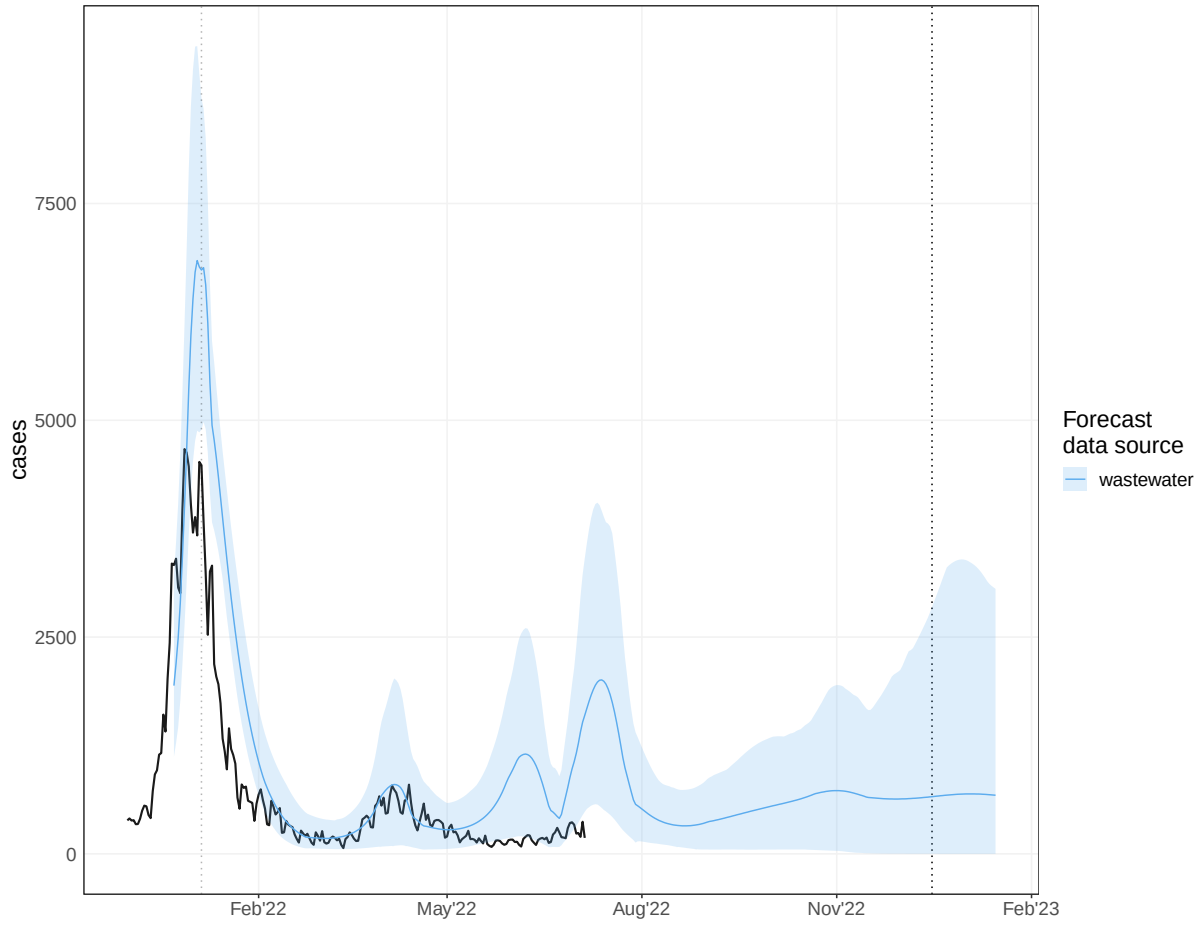
Toronto

Modelling based on wastewater data clearly identifies a fall wave of infection in Toronto (blue curve). This fall wave is less noticeable in clinical surveillance (black curve), probably due to under-reporting. Wastewater-based forecasts anticipates the number of cases to stabilize in the coming weeks.



Montreal

Modelling based on wastewater data clearly identifies a summer wave of infection in Montreal (blue curve). Since May 2022, the reported clinical cases and the wastewater signal do not agree. This is probably caused by under-reporting from clinical surveillance. Wastewater-based forecasts anticipate the number of cases to stabilize in the coming weeks.



Halifax

Modelling based on wastewater data suggests that a large wave of infections occured in Halifax in October 2022 (blue curve). This wave was not identified by clinical surveillance (black curve). The model forecasts this wave will continue to decrease in the next few weeks (top panel, blue curve).