



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

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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.

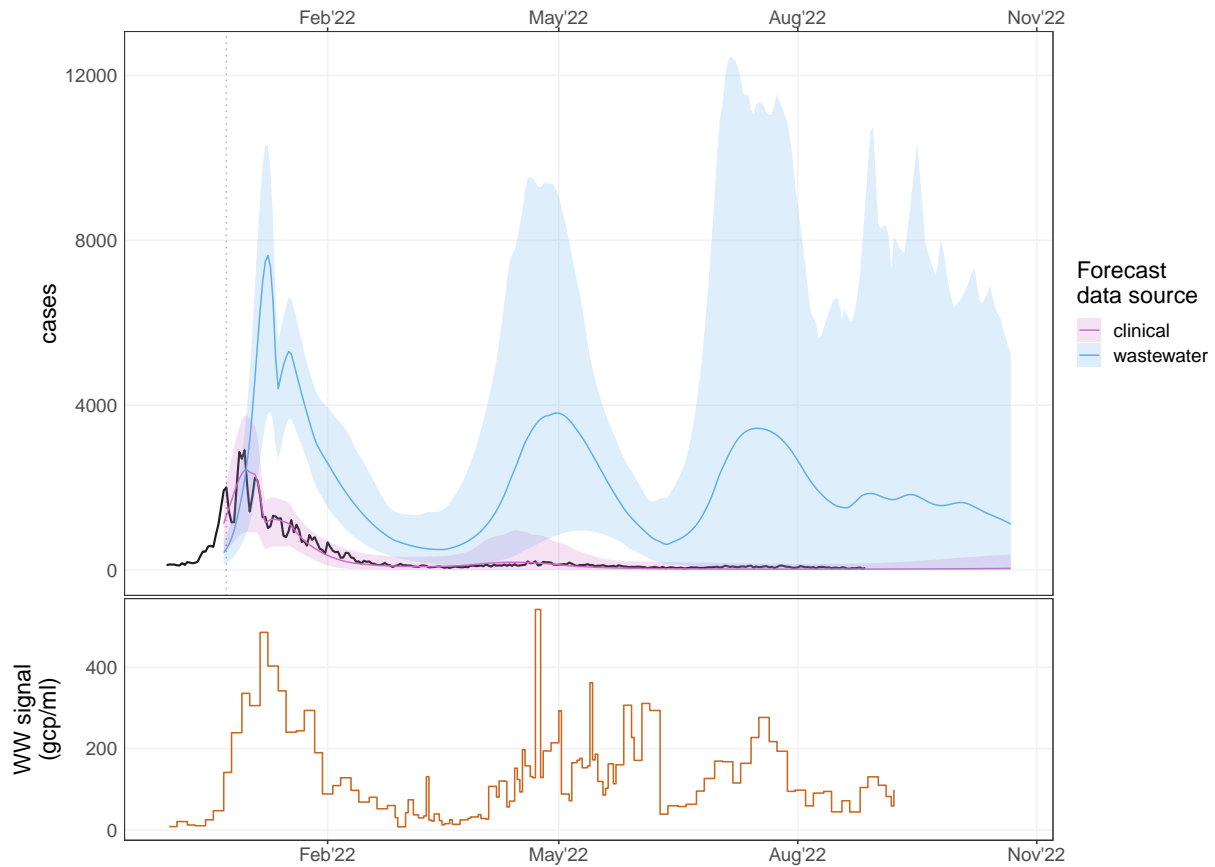
The next figures show clinical case and wastewater surveillance data for each city during the Omicron wave. In each figure, the top panel shows the traditional reported human clinical case data (solid black line), model forecasts using only clinical data (pink shaded area), and model forecasts using only wastewater data (blue shaded area). The bottom panel shows the SARS-CoV-2 signal in wastewater (brown line).

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

City	clinical	wastewater
Montreal	2022-07-05	2022-09-03
Edmonton	2022-09-05	2022-09-04
Toronto	2022-09-13	2022-09-05
Halifax	2022-09-09	2022-09-07
Vancouver	2022-08-27	2022-09-07

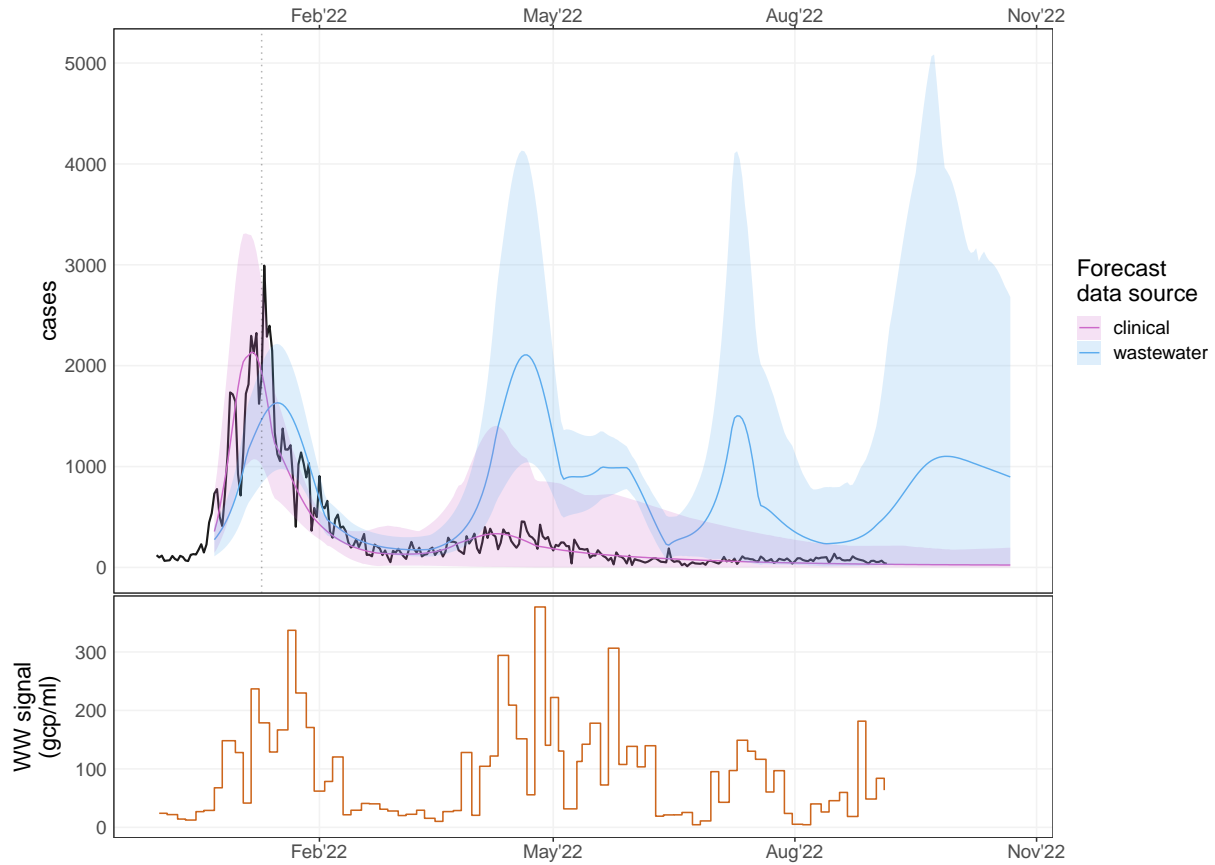
Vancouver

The reported clinical data (top panel, 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 (top panel, blue curve) indicate infections will stabilize in the coming weeks.



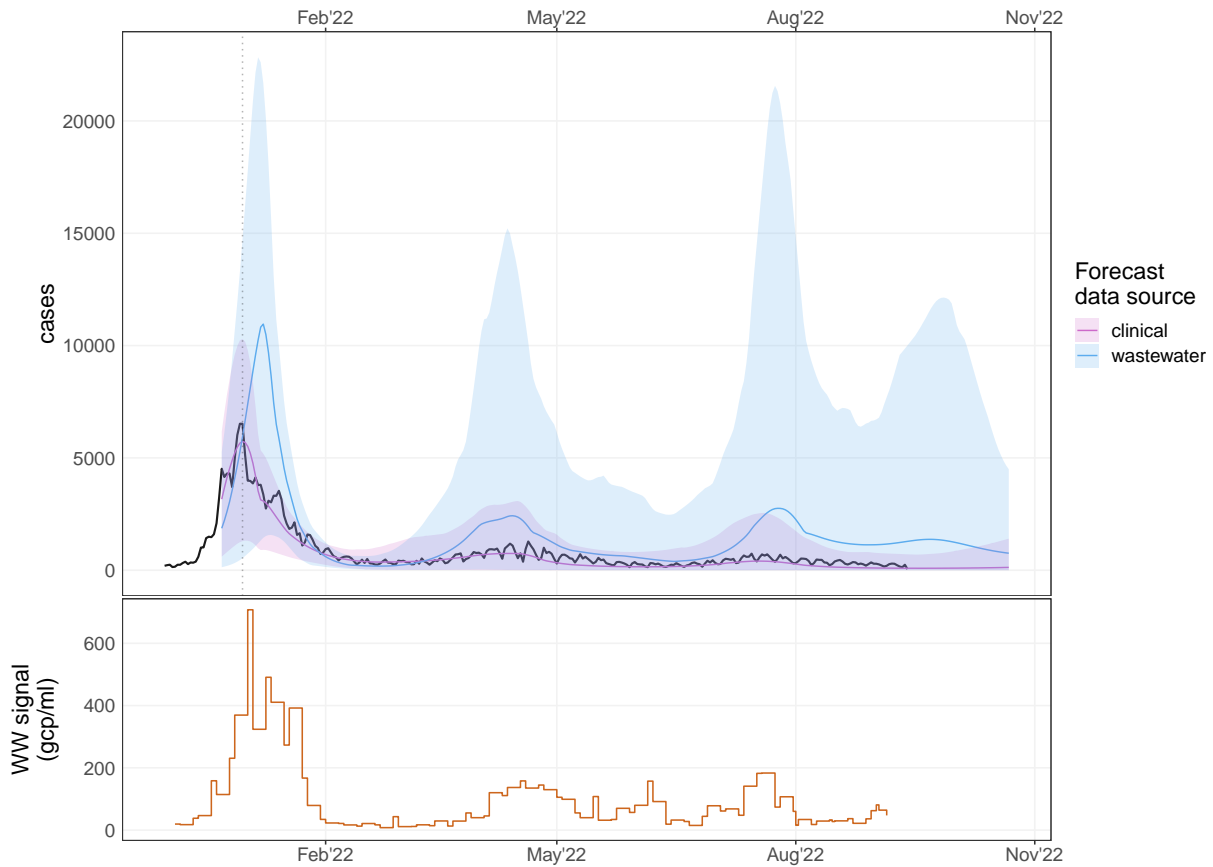
Edmonton

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



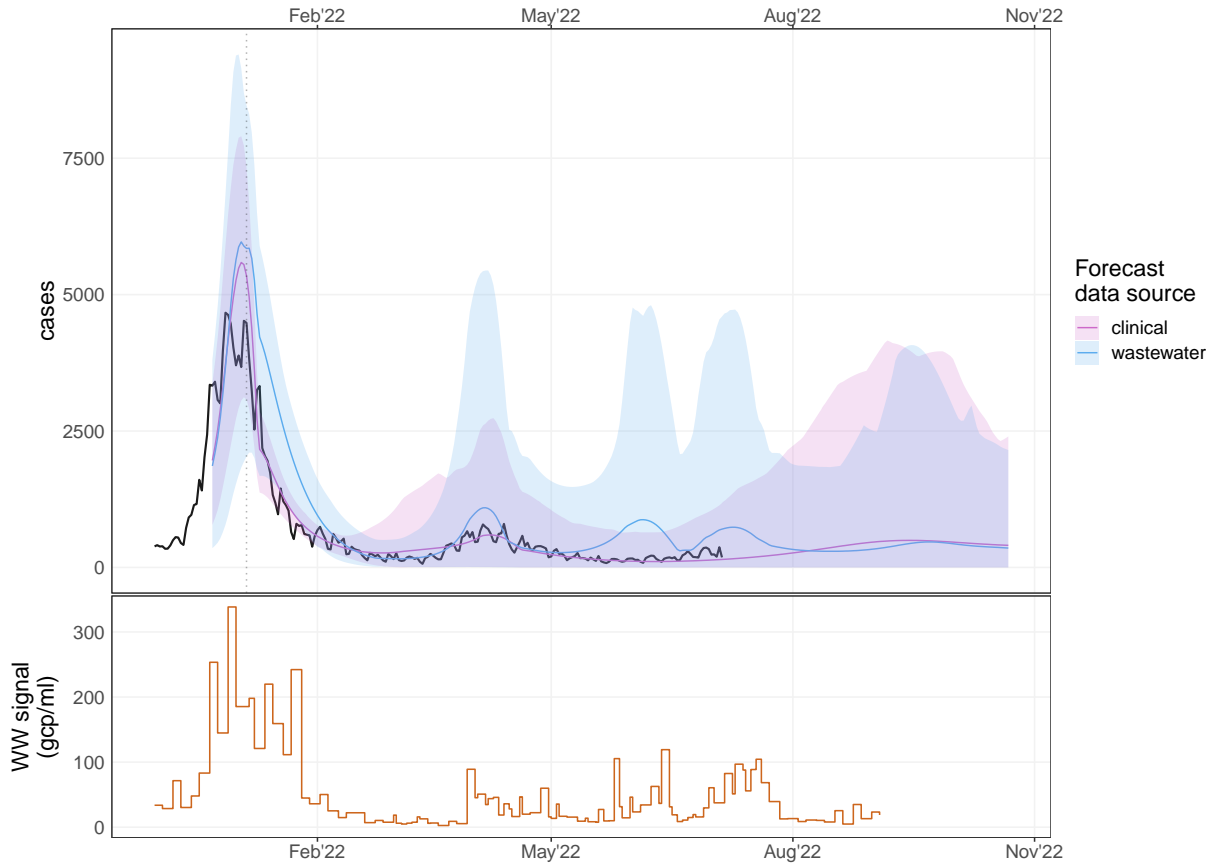
Toronto

Modelling based on wastewater data clearly identifies a summer wave of infection in Toronto (top panel, blue curve and bottom panel, brown curve). This summer wave is less noticeable in clinical surveillance (top panel, black curve), probably due to under-reporting. Wastewater-based forecasts anticipate a low and stable number of cases in the coming weeks.



Montreal

Modelling based on wastewater data clearly identifies a summer wave of infection in Montreal (top panel, blue curve and bottom panel, brown 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 a low and stable number of cases in the coming weeks.



Halifax

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

