Saving Lives and Costs: Respiratory Syncytial Virus Wastewater Surveillance to Cost-Effectively Guide Prophylaxis in Ontario, Canada

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Disclosure

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Barry Rodgers-Gray and James O Edwards are employed by the company Violicom Medical Limited, which has received payment from AstraZeneca for work on various projects outside the scope of this study.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Wastewater-Based Surveillance (WBS) in Canada

Federal WBS program

- Public Health Agency of Canada/National Microbiology Laboratory

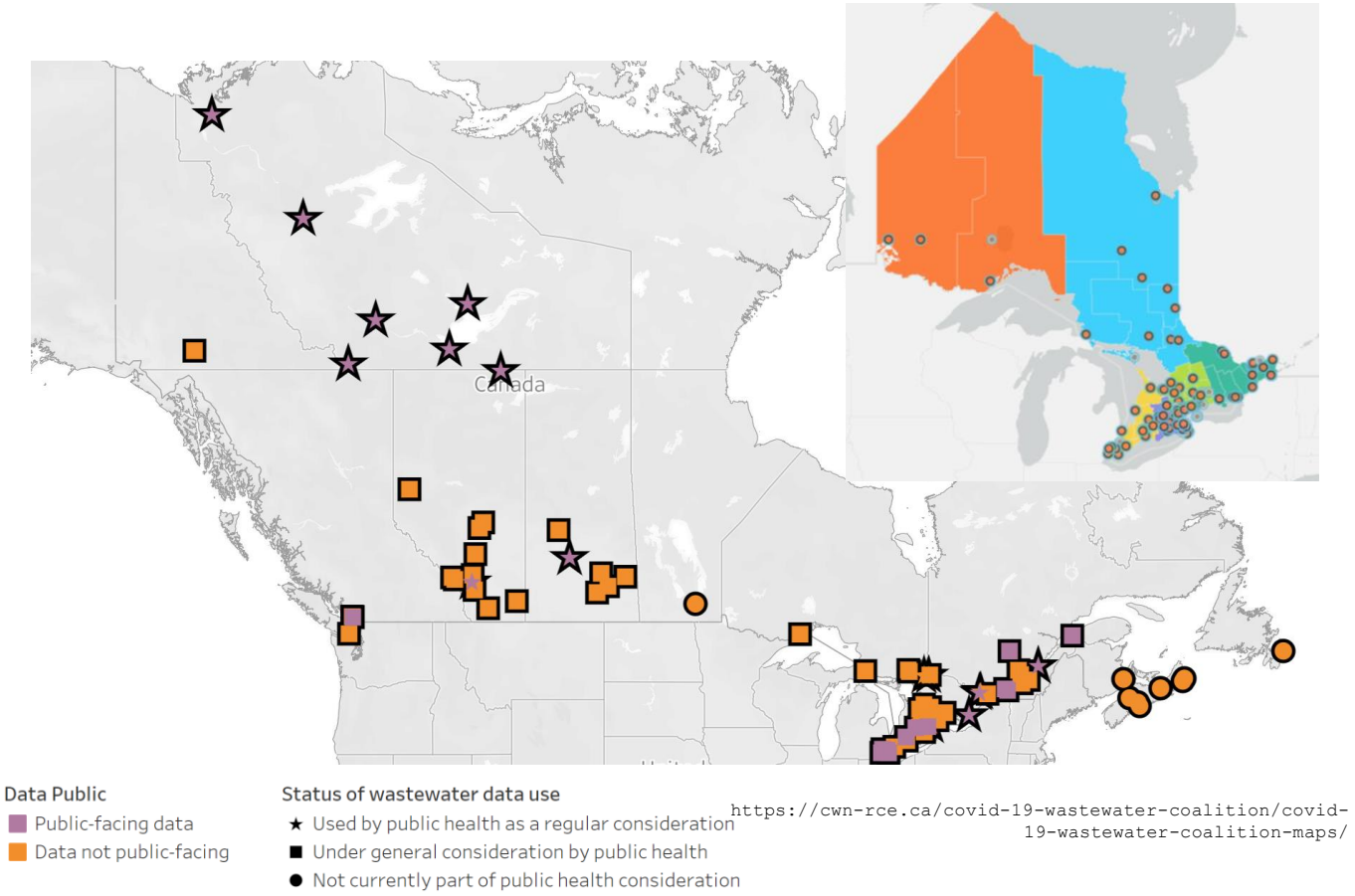
Provincial WBS initiatives (academics)

- Alberta, British Columbia, Quebec and Ontario

Ontario Wastewater surveillance initiative (WSI)

- 60 primary, 50 secondary and 30 tertiary locations for Covid-19 and Influenza

Wastewater Surveillance Sites across Canada



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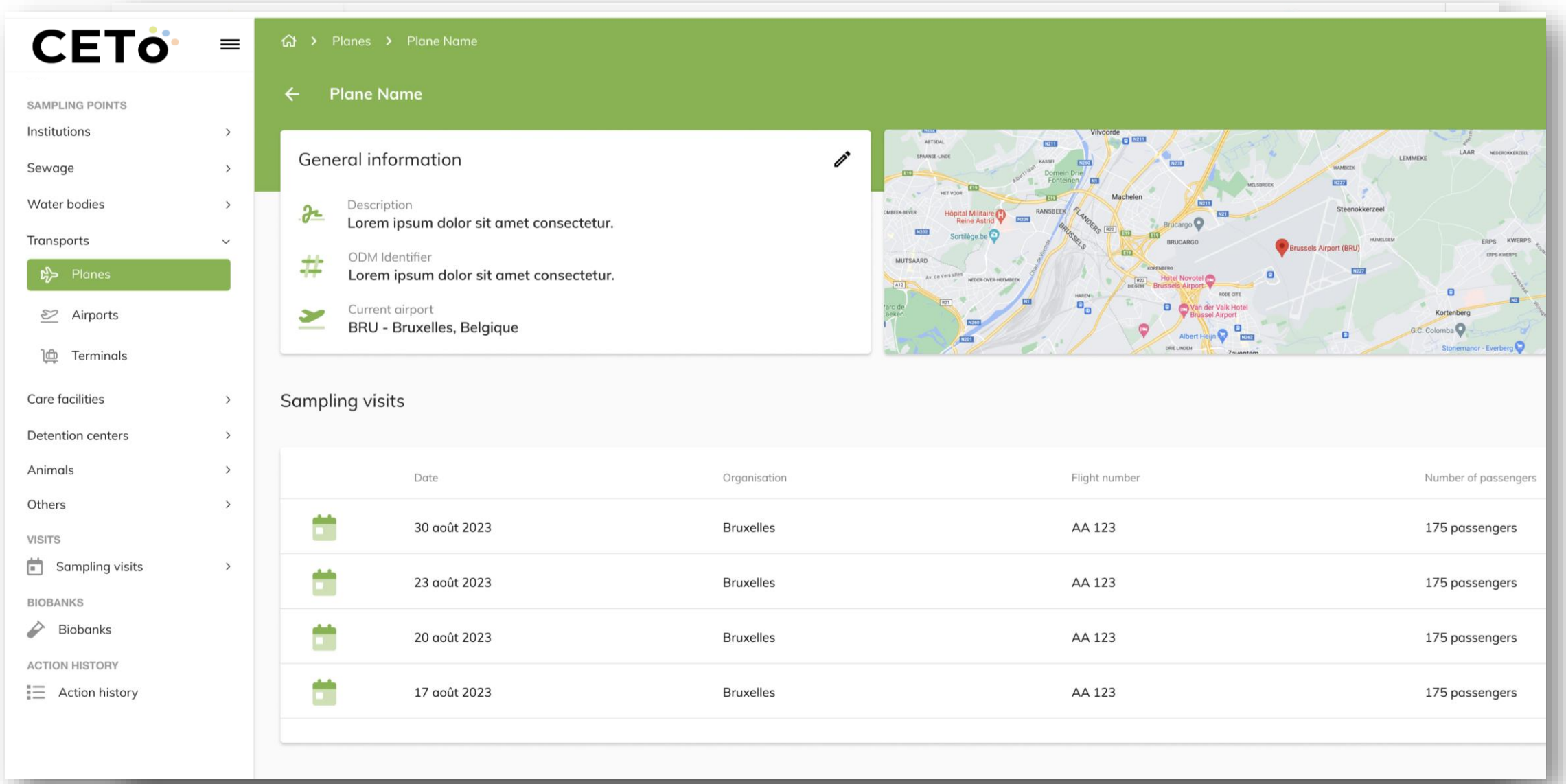
WBS in Canada – Provincial Dashboard



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WBS Data Integration with Health Decision-Making

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WBS Integration - Regional Public Health Units

Wastewater 40%

Influenza	COVID-19	RSV
High levels and similar to last week	Very high levels and increasing since last week	Moderate levels and similar to last week

Percent positivity 20%

Influenza	COVID-19	RSV
0.3%	16.5%	9.8%
Low levels and similar to last week	High levels and similar to last week	Moderate levels and similar to last week

Hospitalization 20%

Influenza		COVID-19		RSV	
0 New	2 Total	31 New	331 Total	11 New	55 Total
Low levels and similar to last week		Moderate levels and decreasing since last week		High levels and increasing since last week	

Outbreak 20%

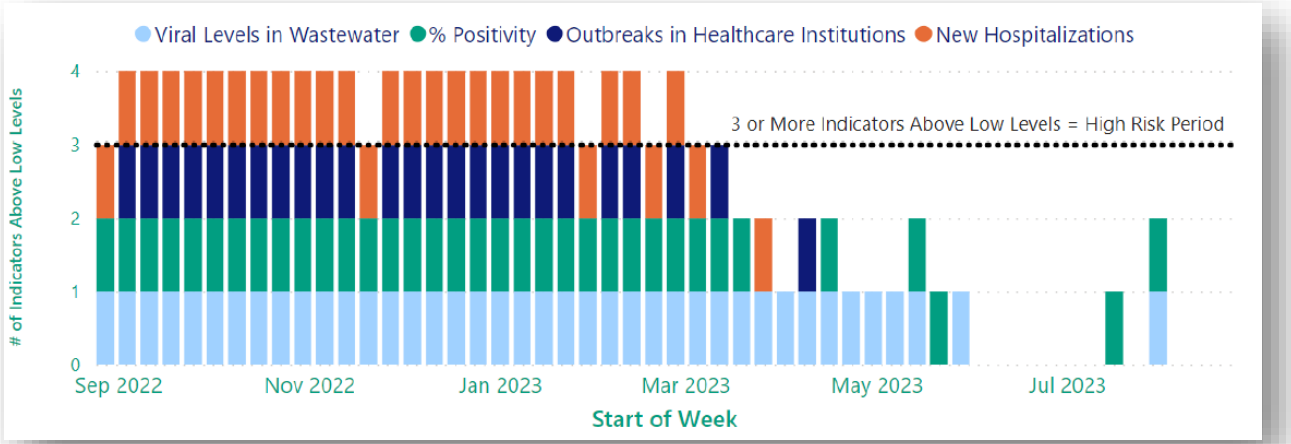
Influenza				COVID-19			Other Respiratory		
0 New	0 Ongoing	1 Total Type A	0 Total Type B	11 New	22 Ongoing	106 Total	2 New	7 Ongoing	31 Total
Low levels and similar to last week				High levels and similar to last week			Moderate levels and similar to last week		

Overall Assessment of Change Since Previous Week

Based on Wastewater, % Positivity, New Hospitalizations, and New Outbreaks in Healthcare Institutions

(Week 44)

Influenza	COVID-19	Other Respiratory
Influenza activity this week was similar to last week	COVID-19 activity this week was similar to last week	Other respiratory virus activity this week was similar to last week



https://www.ottawapublichealth.ca/en/reports-research-and-statistics/flu-report.aspx

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WBS Integration with Provincial Ministry of Health & Hospitals

Respiratory Syncytial Virus (RSV)

- Globally, RSV leads to about 3 million hospitalizations and over 100,000 annual deaths in children under five years of age

Prevention

- Only means of prophylaxis against RSV disease is passive protection with monoclonal antibodies (palivizumab, nirsevimab) and recently active immunization with maternal RSV vaccine

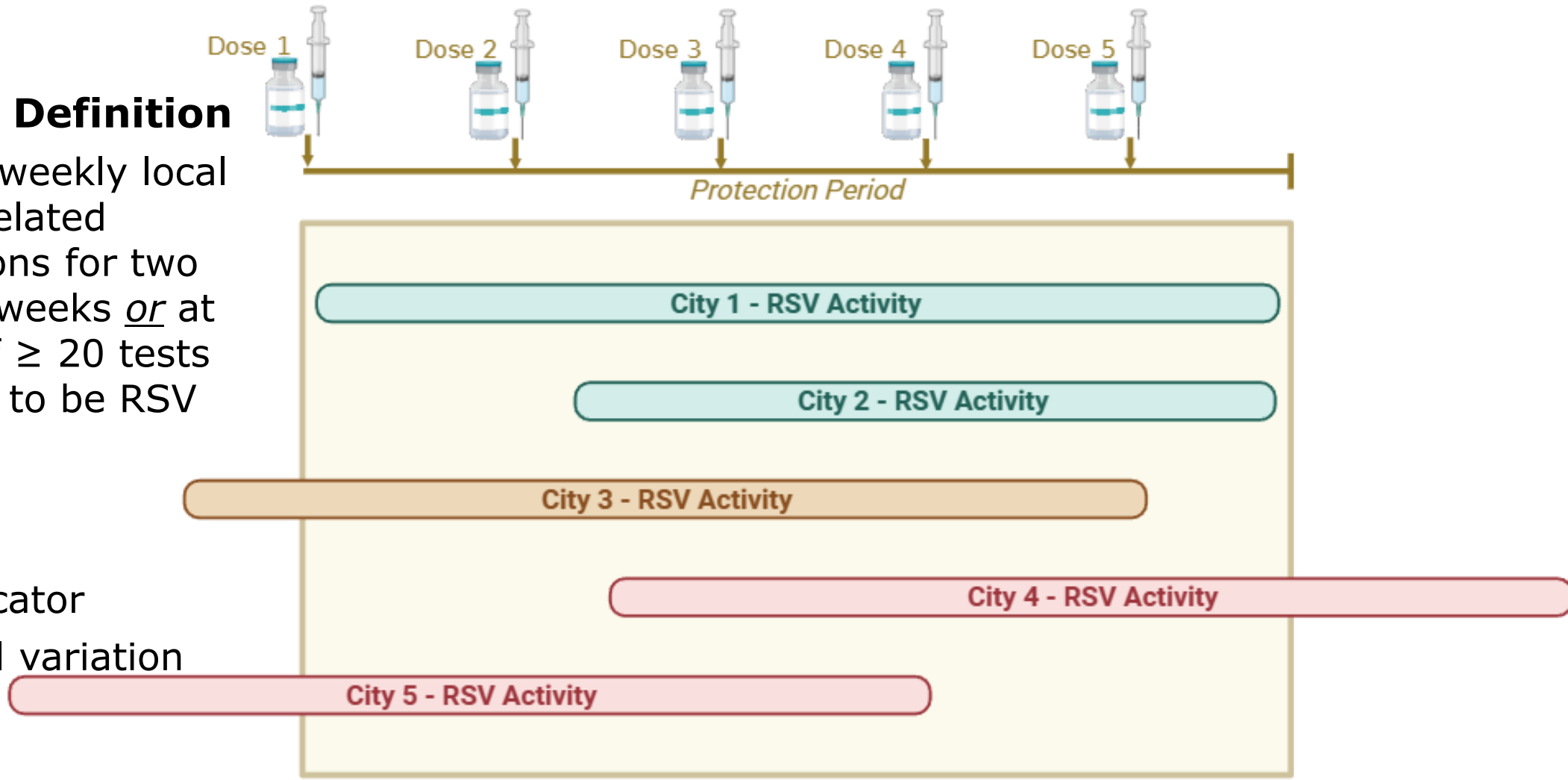
RSV Immunoprophylaxis Provincial Administration

Season Start Definition

- At least two weekly local infant RSV-related hospitalizations for two consecutive weeks *or* at least 10% of ≥ 20 tests are reported to be RSV positive.

Drawbacks

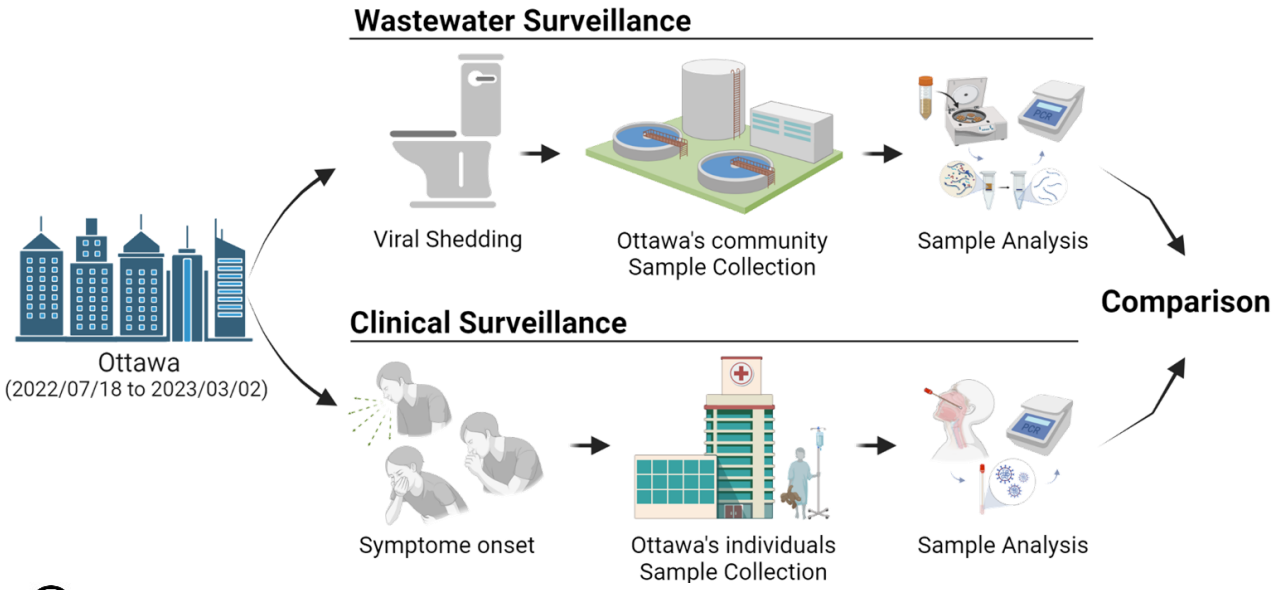
- Lagging indicator
- Geographical variation



WBS for RSV Provincial Disease Management

2022 - 2023 Study Objectives (complete)

- Quantify early detection of RSV WBS community transmission
- Assess capacity of WBS to identify onset of the pediatric RSV season



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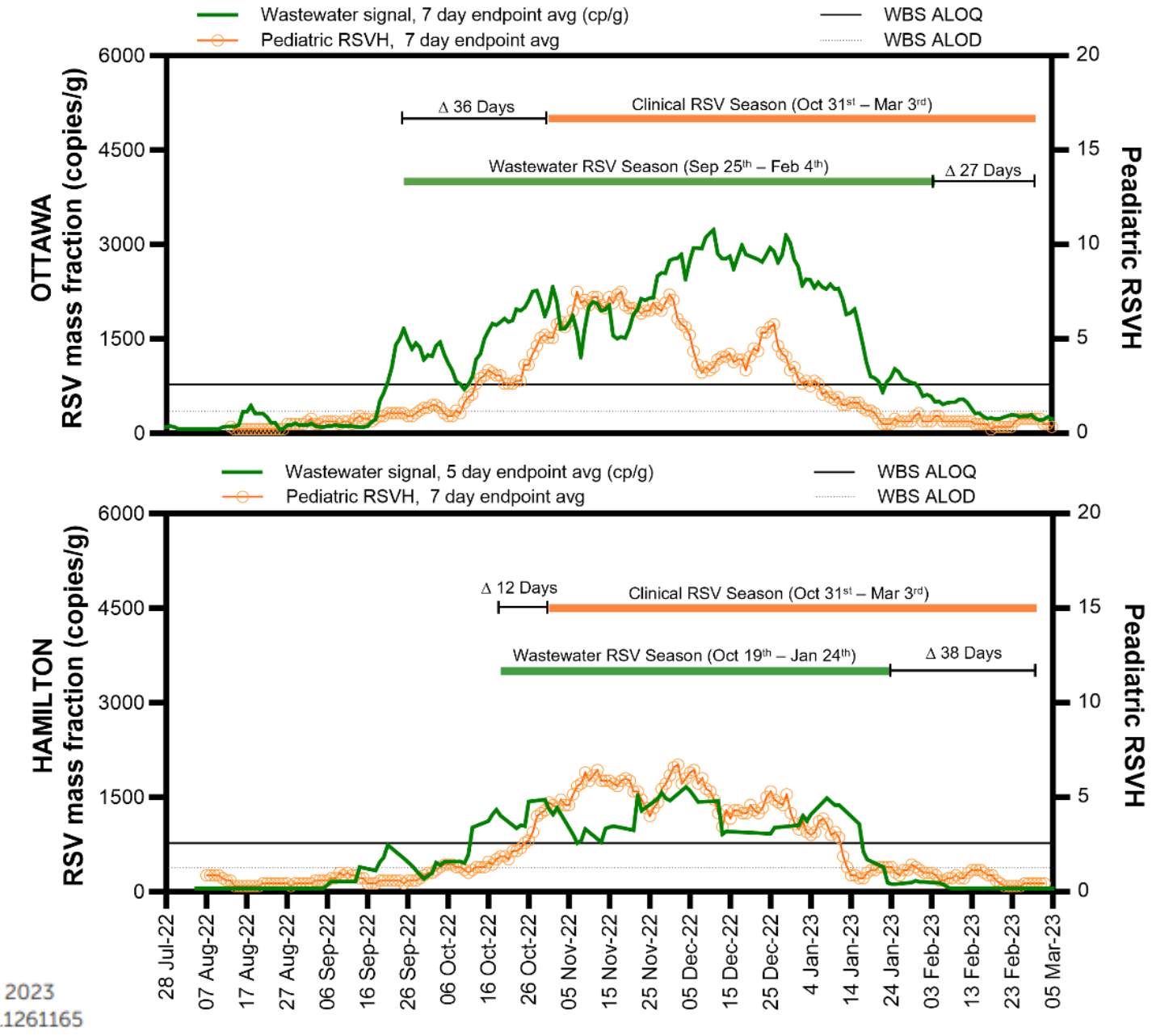
2022 - 2023 Onset of Pediatric RSV Season

WBS identifies earlier RSV season start date

- Criteria: one week of consecutive endpoint average WBS RSV (copies/g) measurements above limit of quantification (ALOQ)

WBS identifies/confirms geographical variation

- 24-day difference in RSV onset between Ottawa and Hamilton



Adapted from

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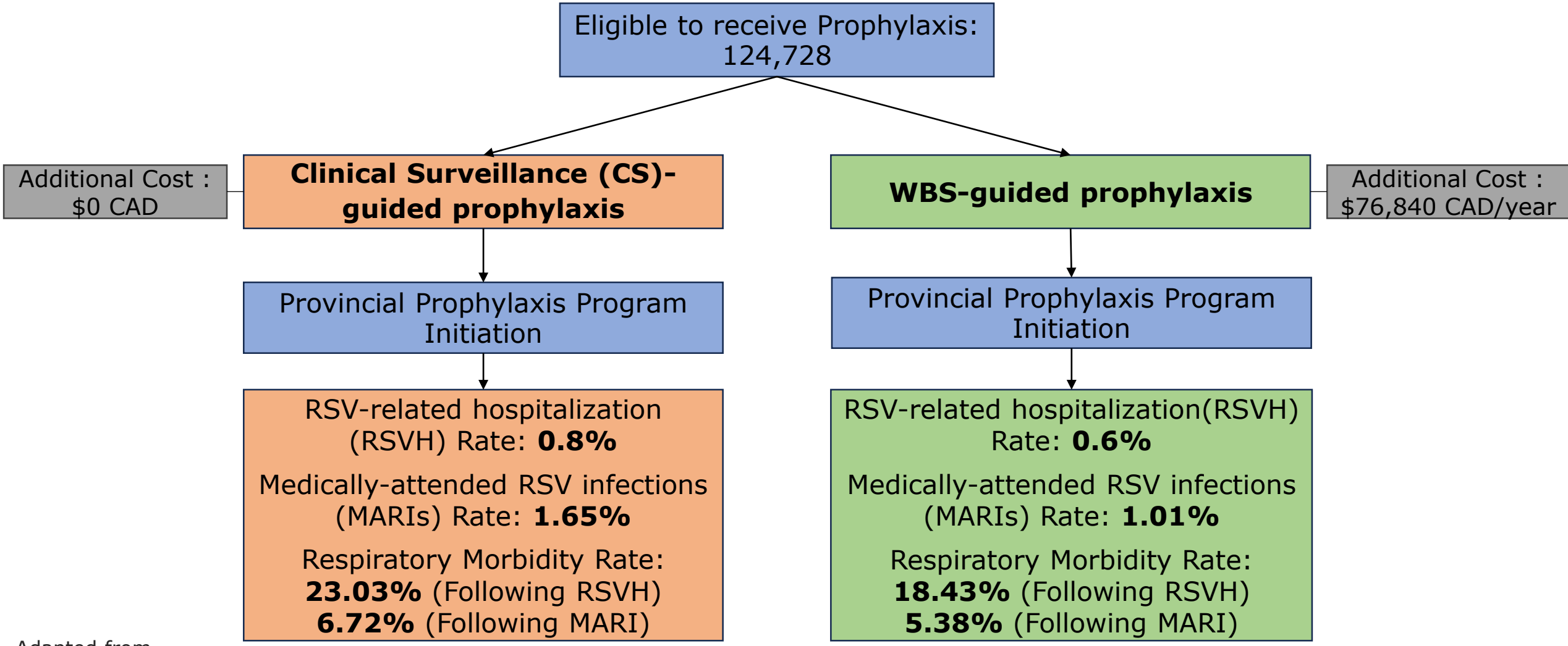
2022 - 2023 RSV WBS Cost Consequence Model



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Thampi et al. (2023, November). Costs and Health Impact of Wastewater Surveillance to Guide Respiratory Syncytial Virus Prophylaxis in Canada, Compared to Clinical Surveillance [Poster presentation]. ISPOR Europe, Copenhagen, Denmark. Retrieved from https://www.ispor.org/heor-resources/presentations-database/presentation/euro2023-3785/129642

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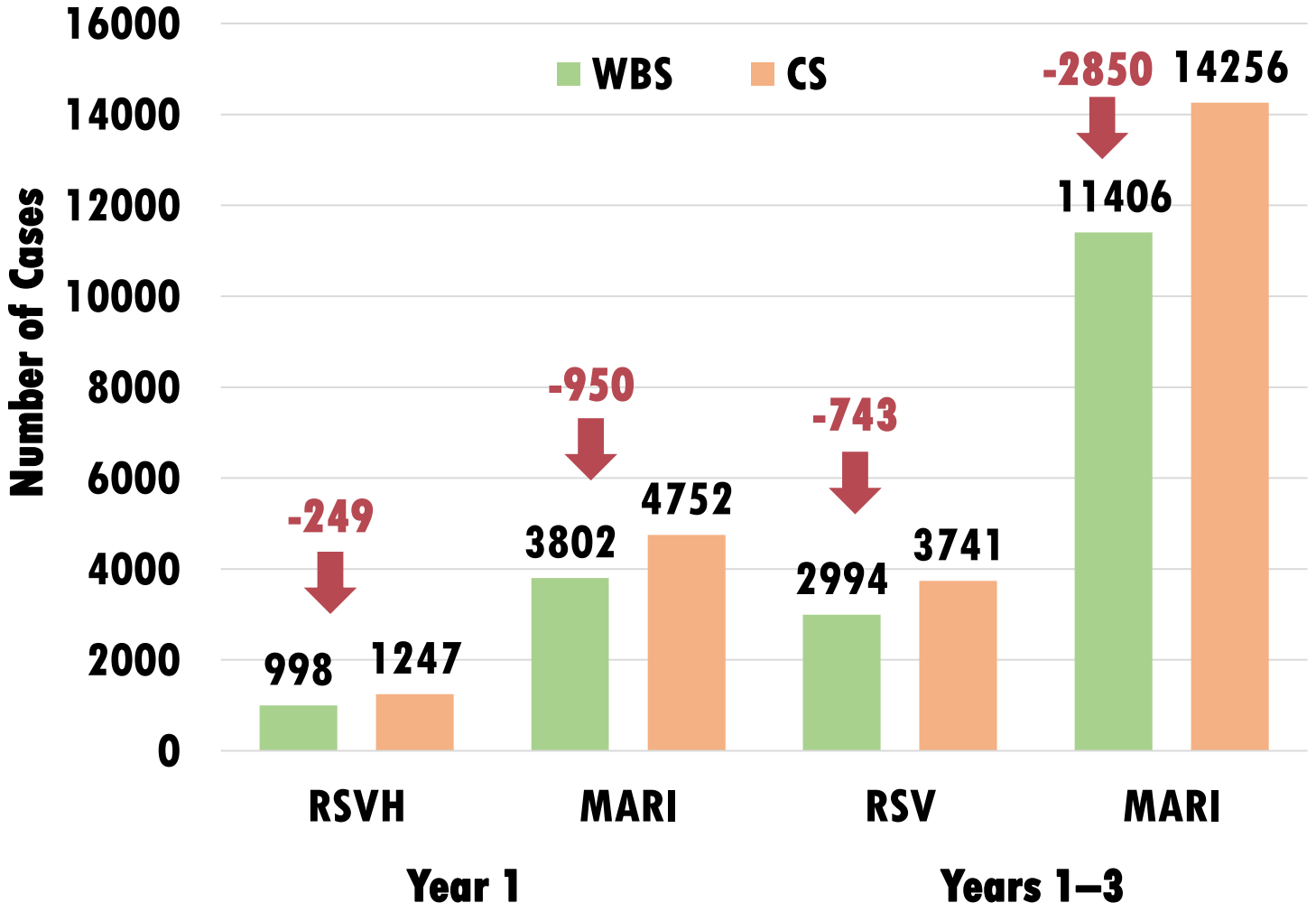
2022 - 2023 RSV WBS Cost Consequence Model

WBS-guided *versus* Clinical Surveillance (CS)-guided prophylaxis

- 249 fewer RSVHs per year
- 950 fewer MARIs per year



CS: clinical surveillance; MARI: medically-attended RSV infection not requiring hospitalization; RSVH: RSV-related hospitalization; WBS: wastewater surveillance

Adapted from

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2022 - 2023 RSV WBS Cost Consequence Model

	Year 1	Years 1–3
	Costs (CAN$)	
WBS	$96,865,669 [$98,262,389]	$264,344,436 [$267,208,596]
CS	$100,378,902	$280,925,634
Savings WBS *vs* CS (%)	**-$3,513,233 (-3.5%)** [-$2,116,513 (-2.1%)]	**-$16,581,198 (-5.9%)** [-$13,717,038 (-4.9%)]

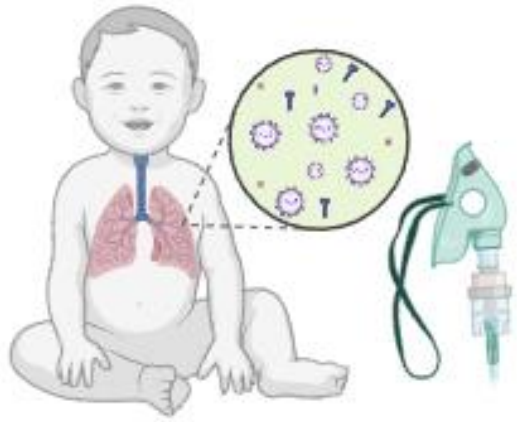
CS: clinical surveillance; WBS: wastewater-based surveillance
[ ] Assumes set up of a new WBS system.

WBS Cost per Season

- $0.50 CAD/Child

RSVH Cost per Season

- $15,500 CAD/Child



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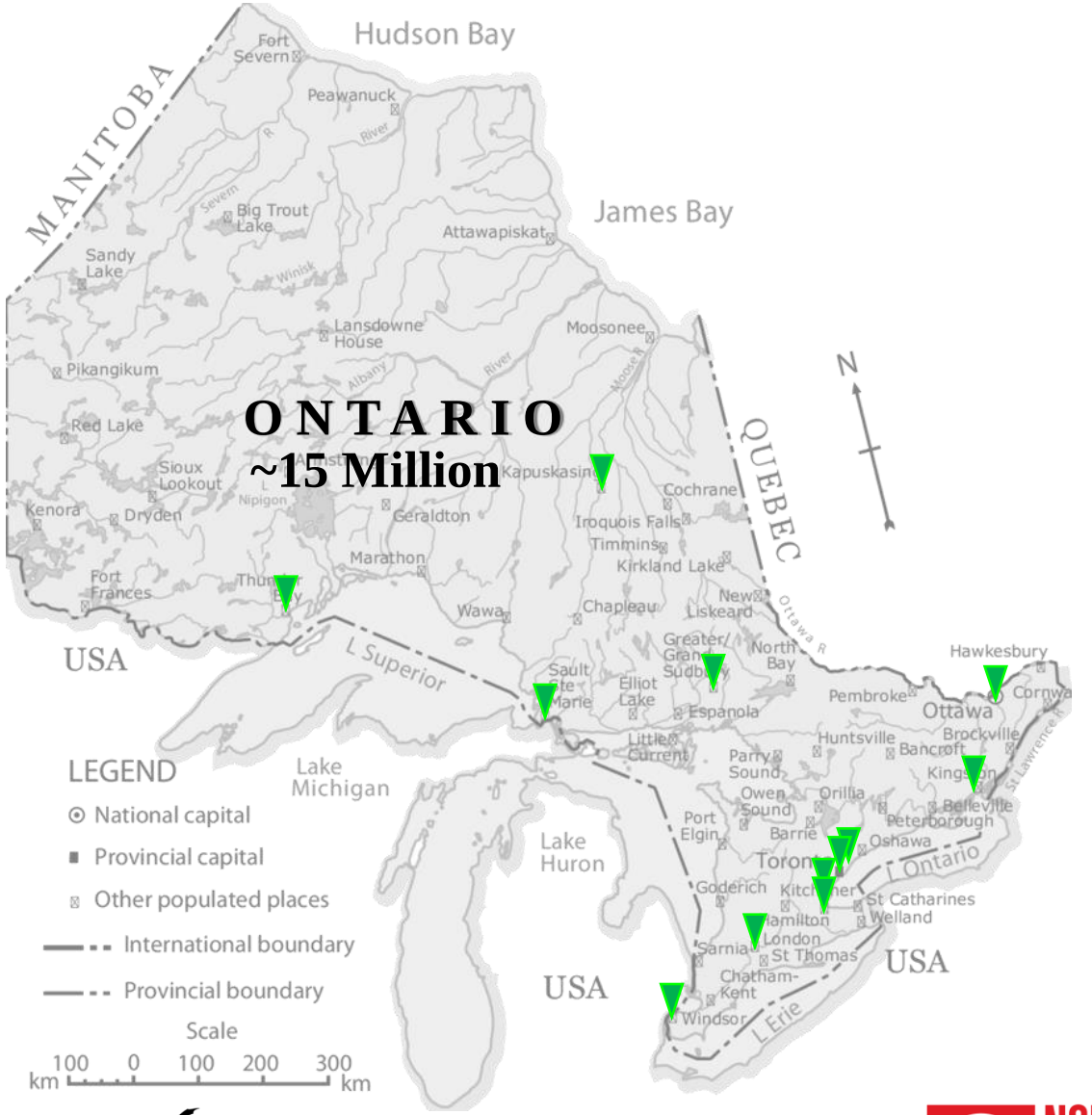
2023 - 2024 RSV WBS Ontario Wide Study

2023 - 2024 Study Objectives (in progress)

- Confirm reproducibility, scalability & generalizability of a uniform start date across 12 locations in Ontario
- Assess if there is geographical variation
- Evaluate the impact of a single versus multiple start dates of the RSV season provincially



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Thank you!

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Dr. Lakshmi Pisharody

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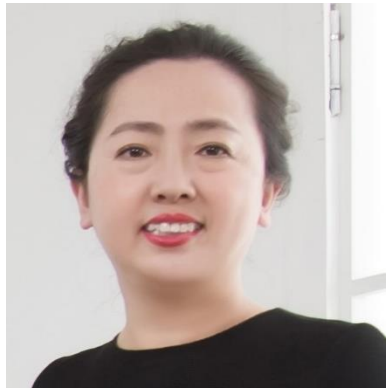

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