



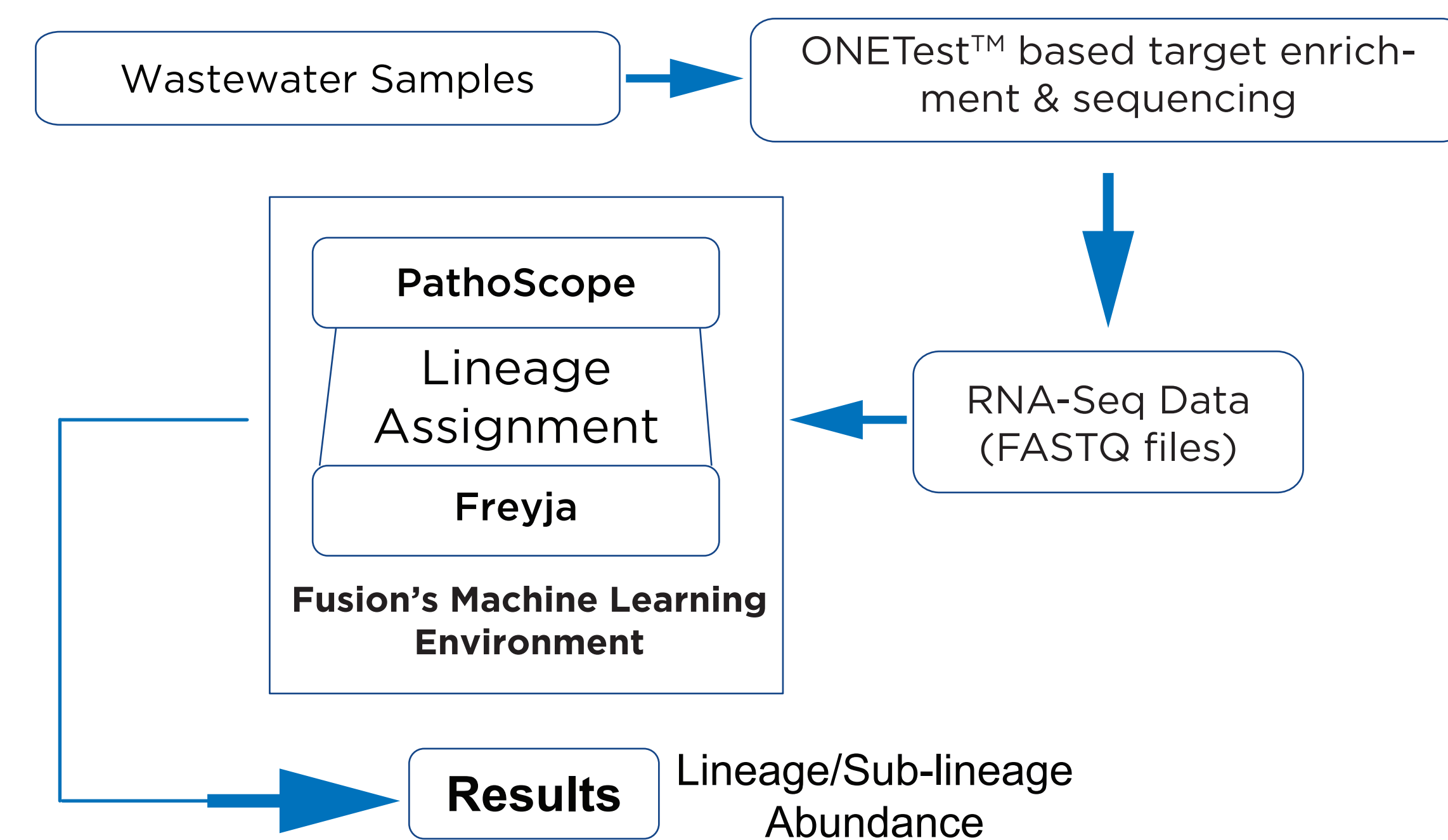
Introduction

The ONEtest™ assay offers full genome capture of the SARS-CoV-2¹ from total nucleic acid extracts and simultaneous sequence characterization of a diverse range of common viruses associated with respiratory infections in wastewater effluent.

- Targeted genomic surveillance of wastewater has the potential to effectively and efficiently capture the spread of all respiratory pathogens.
- Existing strategies - of using amplicon sequencing - offer no utility for future pandemic prevention and are often limited to SARS-COV-2 and other known viruses.
- Existing strategies also lack any capability to identify novel viruses and or zoonotic transmission (as what was the case with SARS-COV-2).
- ONEtest™ capture system uses QuantumProbe technology which can capture target genomes with up to 20% genetic distance.
- Allows all the benefits of metagenomic sequencing at 1/4 the cost.
- The entire assay is automated using Hamilton STAR® Robotic System.

Methods

Fusion Genomics' ONEtest™ targeted metagenome assay offers end-to-end workflow from library preparation to analysis.



Pathogen	Type	Target	Target coverage (%)
SARS-COV-2	All known & novel	whole genome	100
Coronaviruses (others)	COV 229E, HKU1, NL63, OC43, SARS, MERS	Spike protein, Nucleo-protein	51 to 91 31 to 80
Influenza virus	Flu A, Flu B	Haemagglutinin, Neuraminidase & Matrix	100, 100, 30
Respiratory syncytial virus*	RSV A, RSV B	Attachment protein (G), Fusion (F)	50, 70
Human metapneumovirus	MPV A, MPV B	Fusion, Nucleoprotein (NP)	98, 88
Parainfluenza 1+3	PIV1, PIV3	Hemagglutinin-neuraminidase, Nucleoprotein	35, 85
Parainfluenza 2+4	PIV2, PIV4	Hemagglutinin-neuraminidase, Nucleoprotein	50, 75
Enterovirus/rhinovirus*	EVA to EVD, RVA to RVC	Capsid protein VP1	40 to 70
Parechovirus	PeV1 to PeV6	Capsid protein VP1	60 to 70
Adenovirus	AdVA to AdVG	Hexon (H), Fiber	45 to 75, 40 to 60
Bocavirus	BoV1 to BoV4	VP1+ NS1 + NP1	30 to 51

Results

ONEtest™ Platform Identifies Common Respiratory Pathogens in Wastewater Samples

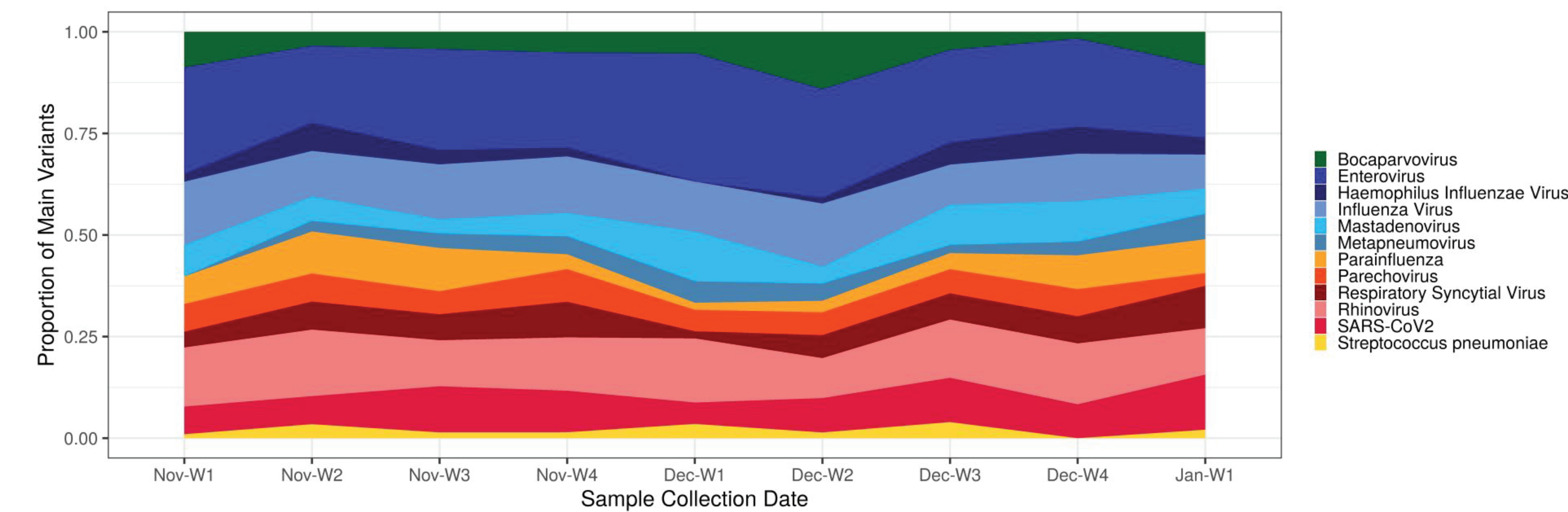


Figure 1. Proportion of respiratory pathogens identified from the Toronto Airport wastewater samples

SARS-CoV-2 Frequency Varies Across Different Locations At The Toronto Airport

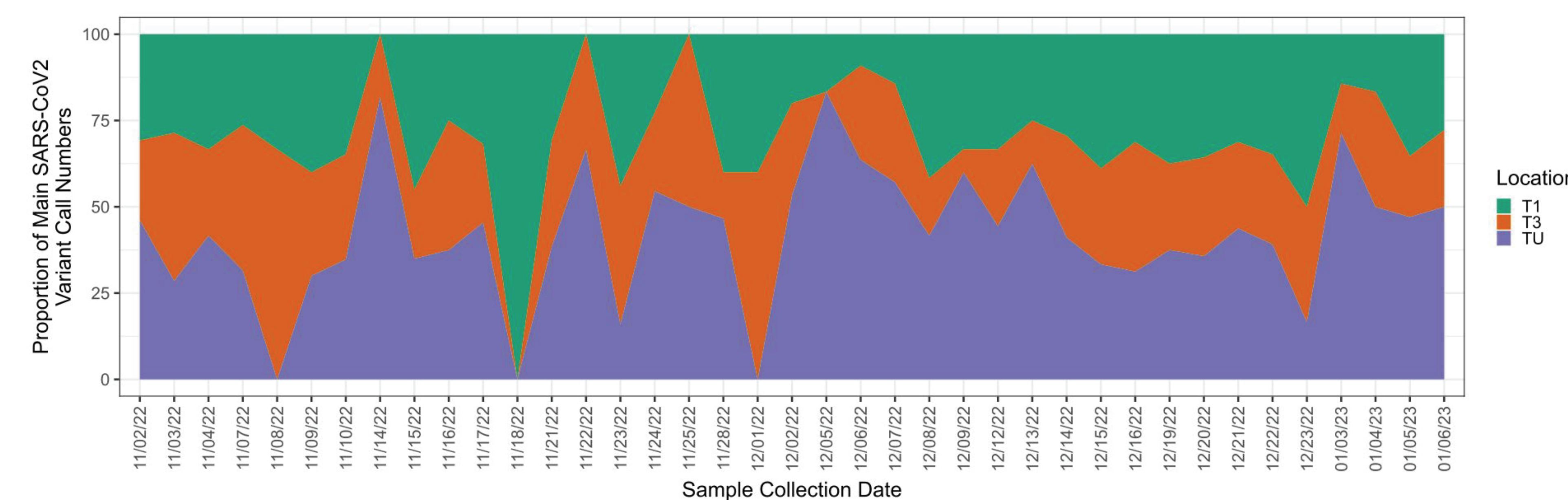


Figure 2. Proportion of major SARS-CoV-2 variants detected across different locations at the Toronto Airport

ONEtest™ Platform Identifies the Emerging SARS-CoV-2 Variants

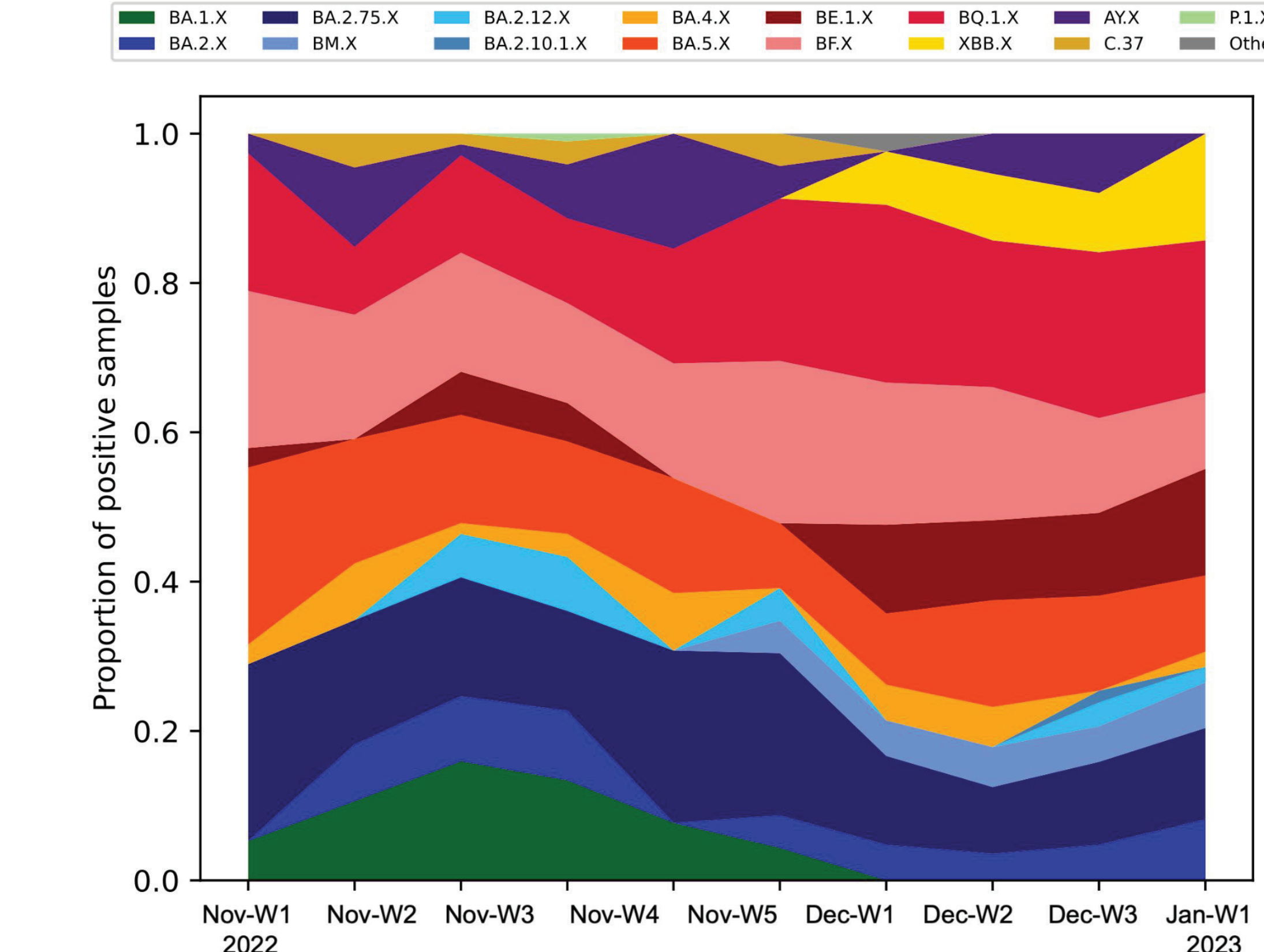


Figure 3. Proportion of SARS-CoV-2 positive samples over time.

Frequency of SARS-CoV-2 Variants Varies Across Different Locations At The Toronto Airport

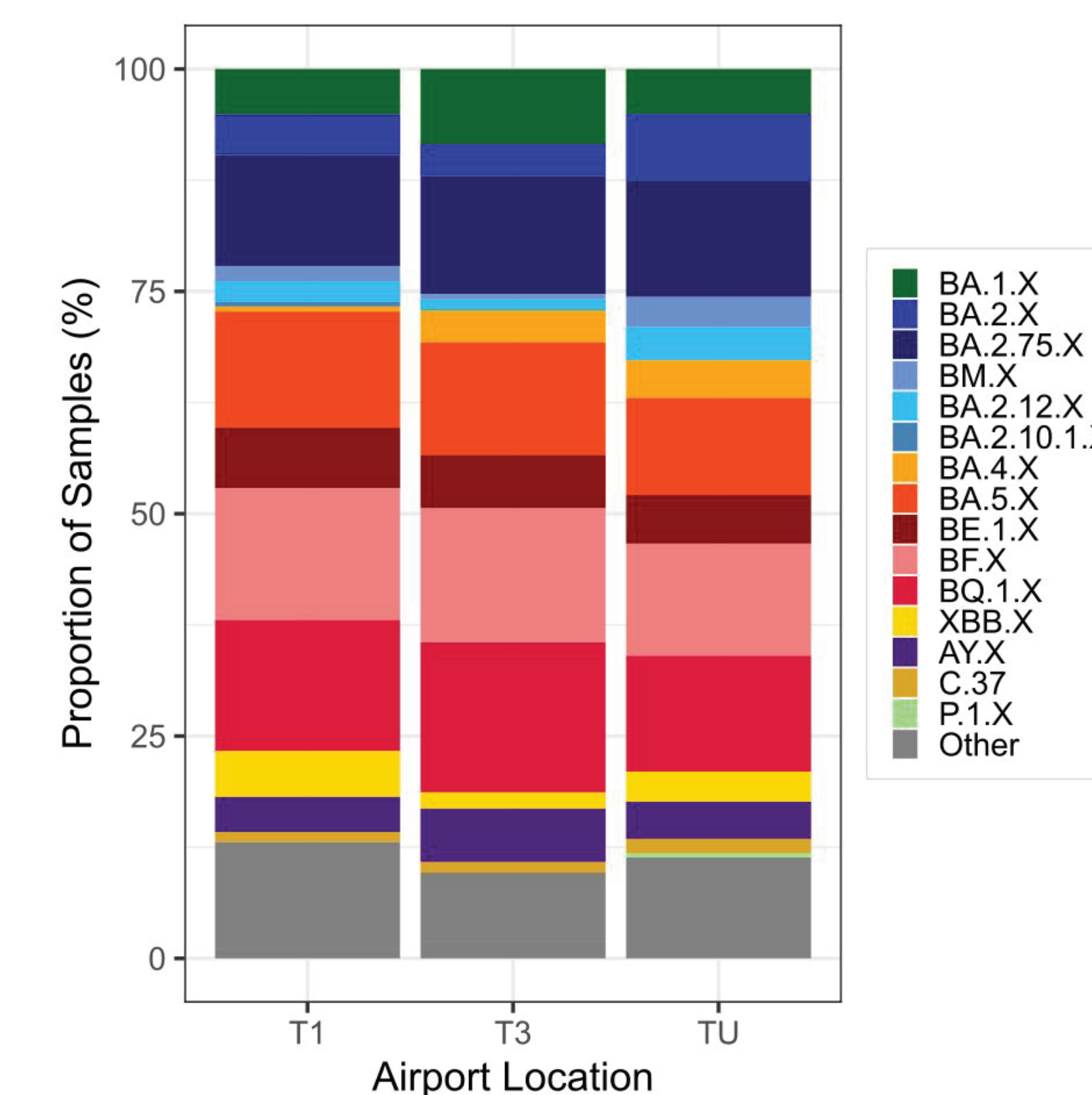
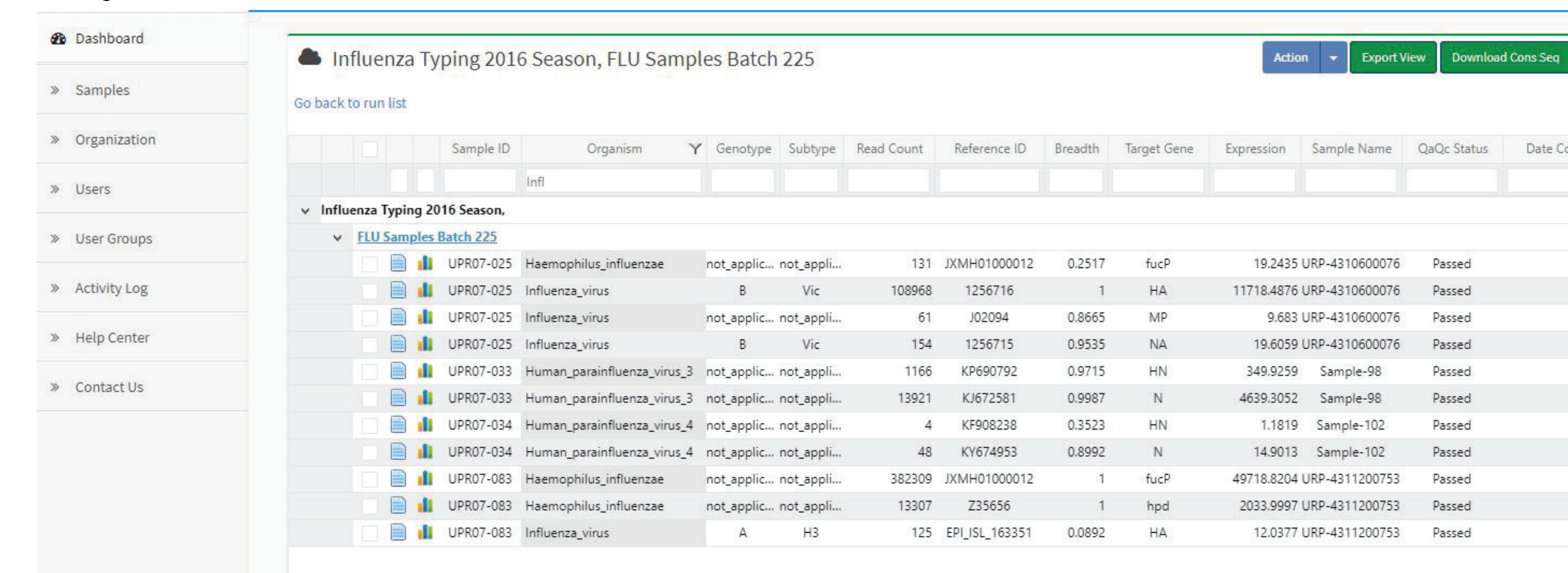


Figure 4. Proportion of SARS-CoV2 positive samples identified across different locations at the Toronto airport.

Fully Automated FusionCloud™ Allows Instant Visualization Of Results



Conclusion

Wastewater surveillance offers a unique opportunity to understand potential pandemic threats and generate actionable public health information

- This approach provides tools to potentially support public health and safety by connecting airport wastewater surveillance with global surveillance.
- It can also act as a warning system for public health agencies and government organizations to prevent future pandemics.
- Fusion's targeted metagenomic approach combined with its analysis pipeline has shown to be sensitive in detecting main upper-respiratory pathogens in wastewater samples collected at Toronto Airport.
- Results show that the main circulating variants of SARS-CoV-2 can be detected in the airport samples.

Future Work

Offer the ONEtest™ as a service for wastewater testing across North America

Assess airport wastewater surveillance data for predicting pandemic trends across national and international transit hubs

References

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