Banff International Research Station

Workshop Program:

Advances in Statistical Methodology for the Analysis of Wastewater Data

November 15-20, 2026

Banff, Alberta

ORGANIZERS

Robert Delatolla (University of Ottawa)

Devan Becker (Wilfrid Laurier University)

Charmaine Dean (The University of Waterloo)

Joan Hu (Simon Fraser University)

Erwin Nagelkerke (National Institute for Public Health and the Environment Netherlands)

Elizabeth Renouf (University of Ottawa)

Margaret Haworth-Brockman (National Collaborating Centre for Infectious Diseases)

Wendy Xie (National Collaborating Centre for Infectious Diseases)

Johanna de Haan Ward (University of New Brunswick)

Ken Peng (University of Ottawa)

Élisabeth Mercier (University of Ottawa)

Nada Hegazy (University of Ottawa)

Sunday November 15

(16:00 - 17:30)
Check In
Begins 16:00 and open 24h at Front Desk - PD Centre

(17:30 - 19:30)
Dinner
at Vistas Dining Room

(20:00 - 22:00)
Informal Gathering
at TCPL Foyer

Monday November 16

(7:00 - 8:45)
Breakfast
at Vistas Dining Room

(8:45 - 9:00)
Introduction and Welcome by BIRS Staff
at TCPL 201

(9:00 - 9:30)
Indigenous Open - Elder Terry Rider
at TCPL 201

(9:30 - 10:00)
Keynote 1: Erwin Nagelkerke
TITLE: WES as a discipline: A Dutch perspective from MDMA to Measles
at TCPL 201

(10:00 - 10:30)
Coffee Break
at TCPL Foyer

(10:30 - 11:00)
Keynote 2 : Masaaki Kitajima
TITLE: Multi-Pathogen Wastewater Surveillance Across Different Settings: Insights from Japan and Beyond
at TCPL 201

(11:00 - 11:30)
Talk 1: Rachel Abbey
TITLE: Moving towards pathogen-agnostic surveillance: designing England’s Environmental Surveillance Programme PRISM
at TCPL 201

(11:30 - 13:00)
Lunch
at Vistas Dining Room

(13:00 - 14:30)
Break the Ice Campus Walking Tour & Art Gallery Visit with Jake
meet at TCPL Foyer at 13:00

(14:30 - 15:00)
Talk 2: Rhonda Rosychuk
TITLE: Investigating Lead-Lag Relationships in Monitoring Disease through Wastewater Testing
at TCPL 201

(15:00 - 15:30)
Coffee Break
at TCPL Foyer

(15:30 - 16:00)
Talk 3: Jacqueline Willmore
TITLE: Integrating wastewater monitoring into local respiratory surveillance for public health action
at TCPL 201

(16:00 - 16:30)
Talk 4: Yassen Tcholakov
TITLE: Finding the right question for each pathogen: working back from public health action to surveillance triggers
at TCPL 201

(16:30 - 17:00)
Talk 5: Emily Somerset
TITLE: An integrated statistical framework for wastewater surveillance and epidemic curve reconstruction
at TCPL 201

(17:00 - 17:30)
Break
at TCPL 201

(17:30 - 19:30)
Dinner
at Vistas Dining Room

Tuesday November 17

(7:00 - 8:45) Breakfast
at Vistas Dining Room

(9:00 - 9:30)
Talk 6: Nada Hegazy, Ken Peng, Johanna de Haan Ward
TITLE: Benchmark-Based Statistical Assessment of Inter-Laboratory Variability in Wastewater SARS-CoV-2 Measurements
at TCPL 201

(9:30 - 10:00)
Talk 7: Alessandro Zulli
TITLE: Wastewater metagenomic sequencing quantitatively tracks virus transmission dynamics
at TCPL 201

(10:00 - 10:30)
Coffee Break
at TCPL Foyer

(10:30 - 11:30)
Panel 1: Modelling Wastewater and Environmental Monitoring Data
Moderator: Joan Hu
at TCPL 201

(11:30 - 11:45)
Group Photo
at TCPL Foyer

(11:45 - 13:00)
Lunch
at Vistas Dining Room

(13:00 - 15:00)
Workshop 1: Knowledge Translation Between Statistics and Public Health
Leaders: Margaret Haworth-Brockman & Wendy Xie, NCCID
at TCPL 201

(15:00 - 15:30)
Coffee Break
at TCPL Foyer

(15:30 - 16:00)
Talk 8: Guillaume St-Onge
TITLE: Sewersheds on the Move: Modeling Aircraft Wastewater Surveillance to Support Public Health Decision-Making
at TCPL 201

(16:00-17:00)
Panel 2: Meaningful Wastewater Surveillance Integration in Health and Public Health Systems
Moderator: Rob Delatolla & Élisabeth Mercier
at TCPL 201

(17:00 - 17:30)
Break
at TCPL 201

(17:30 - 19:30)
Dinner
at Vistas Dining Room

Wednesday November 18

(7:00 - 8:45) Breakfast
at Vistas Dining Room

(9:00 - 9:30)
Talk 9: Judith Wong (online)
TITLE: Advancing Wastewater Surveillance: Applications in Singapore, Regional Priorities and Global Efforts
Online at TCPL 201

(9:30 - 10:00)
Talk 10: David Champredon
TITLE: Turning Wastewater Data into Public Health Intelligence: A Modeller's Perspective on Advancing Wastewater-Based Epidemiology
at TCPL 201

(10:00 - 10:30)
Coffee Break
at TCPL Foyer

(10:30 - 11:00)
Talk 11: Mike Parkins
TITLE: Location, Location, Location: The Power and Potential of Near-to-Source Wastewater-based Surveillance
at TCPL 201

(11:00 - 11:30)
Talk 12: Chris DeGroot
TITLE: Where Does the Signal Come From? High-Resolution Sewer Network Modelling Toward Wastewater-Based Epidemiology
at TCPL 201

(11:30 - 13:00)
Lunch
at Vistas Dining Room

(13:30 - 17:30)
Explore Banff National Park
at Banff National Park

(17:30 - 19:30)
Dinner
at Vistas Dining Room

Thursday November 19

(7:00 - 8:45) Breakfast
at Vistas Dining Room

(9:00 - 10:00)
Panel 3: Wastewater and Environmental Monitoring Together with Indigenous Partners
Moderator: Stephanie Guilherme
at TCPL 201

(10:00 - 10:30)
Coffee Break
at TCPL Foyer

(10:30 - 11:30)
Panel 4: Wastewater and Environmental Monitoring Bioinformatics
Moderator: Devan Becker
at TCPL 201

(11:30 - 13:00)
Lunch
at Vistas Dining Room

(13:00 - 13:30)
Talk 13: Charmaine Dean
Title: Collaborative, interdisciplinary work in the statistical sciences and beyond
at TCPL 201

(13:30 - 15:00)
Online Presentations Session 1

i) 13:30 - 13:45 Ella White, Imperial College London, 'From sewers to surveillance: Integrating syndromic and wastewater metrics for gastrointestinal infection surveillance in Wales'
ii) 13:45 - 14:00 Yuxuan Du, University of Texas at San Antonio, 'Computational Advances in Metagenomic Hi-C: From Genome Reconstruction to Wastewater Surveillance'
iii) 14:00 - 14:15 Yi Xiong, State University of New York
iv) 14:15 - 14:30 Rhiannon Punch, Queen's University, 'Temporal dynamics of antimicrobial resistance genes at two adjacent wastewater treatment plants'
v) 14:30 - 14:45 Ryland Corchis-Scott, uWindsor: 'Wastewater and Environmental Surveillance during a Mass Gathering: The 2024 NFL Draft in Detroit, Michigan'

Online at TCPL 201

(15:00 - 15:30)
Coffee Break
at TCPL Foyer

(15:30 - 16:00)
Talk 14: Jude Kong (online)
TITLE: TBA
Online at TCPL 201

(16:00 - 17:00)
Online Presentations Session 2

vi) 16:00 - 16:15 MiaoMiao Liu, University of Tokyo, 'Hybrid Culture-Metagenomic Analysis for Host-Resolved Wastewater AMR Surveillance'
vii) 16:15 - 16:30 Nili Rahmani, Wilfred Laurier University, 'Ensemble Temporal Deep Learning for Mutation Frequencies in Multiple Wastewater Samples'
viii) 16:30 - 16:45 Owais Soomro, uWaterloo, 'Two-stage estimation of SARS-CoV-2 lineage mixtures from wastewater mutation counts'

at TCPL 201

(17:00 - 17:30)
Break
at TCPL 201

(17:30 - 19:30)
Dinner
at Vistas Dining Room

Friday November 20

(7:00 - 8:45) Breakfast
at Vistas Dining Room

(9:00 - 9:30)
Indigenous Close - Elder Terry Rider
at TCPL 201

(9:30 - 10:00)
Talk 15: Devan Becker and Team: Note Takers Summary - Keeping Community Alive
at TCPL 201

(10:00 - 10:30)
Coffee Break
at TCPL Foyer

(10:30 - 11:00)
Check Out
by 11am at Front Desk - PD Centre

(11:00 - 11:30)
Free Time
at TCPL 201

(11:30 - 12:00)
Free Time
at TCPL 201

(12:00 - 13:30)
Lunch
at Vistas Dining Room

BIRS 2026

SPEAKER BIOGRAPHIES

November 15-20, 2026

Rachel Abbey

Dr. Rachel Abbey operates at the forefront of government innovation, leading an ambitious portfolio of work to modernise and enhance pathogen surveillance. With a unique multidisciplinary background, graduating from the London School of Hygiene and Tropical Medicine (LSHTM) in Infectious Disease Control and the London School of Economics (LSE) in Political Economy, she specialises in driving high-impact innovation through hybrid teams across government and academia. Dr. Abbey's key innovation achievements include co-leading the setup of the Cabinet Office-funded environmental surveillance system in England, driving system-wide enhancements, and pioneering AI tooling for biosecurity. Her strategic work to build capability in AI modelling in the UK Health Security Agency (UKHSA) has established a critical foundation in the transition toward pathogen-agnostic surveillance, making her a leading voice on the practical application of AI in public health and national security.

David Champredon

Dr. David Champredon is a Senior Scientist at the Public Health Agency of Canada, specializing in infectious disease modelling to inform public health decision-making. His current work focuses on forecasting seasonal respiratory infections and enhancing disease surveillance by integrating wastewater data into PHAC's modelling systems.

Charmaine Dean

Dr. Charmaine B. Dean is Vice-President, Research & International, at the University of Waterloo.
Prior to joining Waterloo, Dr. Dean served as the Dean of Science at Western University from 2011 to 2017. She also played a major role in establishing the Faculty of Health Sciences at Simon Fraser University, as the Associate Dean of that Faculty, and was the founding Chair of the Department of Statistics and Actuarial Science at Simon Fraser University.
Dr. Dean has received many awards for her work including Fellowships with the Institute of Mathematical Statistics, the Fields Institute, the American Statistical Association and the American Association for the Advancement of Science. In 2023, she was awarded the Statistical Society of Canada Gold Medal. In 2024, she was bestowed the rank of Chevalier in the prestigious Ordre des Palmes académiques by the French government for her work advancing research connections between Canada and France.
Additionally, she has also served as President of the Statistical Society of Canada and serves on several Boards of Directors. She is currently Chair of Council for NSERC (the Natural Sciences and Engineering Research Council of Canada).

Christopher DeGroot

Dr. Christopher DeGroot is an Associate Professor in the Department of Mechanical and Materials Engineering at Western University, where he leads the DeGroot Research Group in computational modelling and its applications to public health and environmental systems. His group develops differentiable simulation tools and sewer network models, including computer-vision approaches to building identification for specifying flow in sewer networks. In the area of wastewater-based epidemiology he is interested in sewer flow modelling and its role in understanding the in-sewer degradation of RNA markers.

Masaaki Kitajima

Masaaki Kitajima is a Project Professor at the University of Tokyo, Japan, where he leads the Laboratory of International Wastewater-Based Epidemiology. He has contributed to advancing wastewater and environmental surveillance in Japan and internationally through methodological innovations, field studies, and collaborations with public health agencies. He has been named a Highly Cited Researcher by Clarivate every year since 2022.

Jude Kong

Dr. Jude Kong is a Professor at the University of Toronto and Canada Research Chair in Community-Oriented Artificial Intelligence and Mathematical Modelling of Infectious Diseases. He directs the Artificial Intelligence and Mathematical Modelling Lab and leads international research networks focused on using AI and mathematical modelling to strengthen pandemic preparedness and public health decision-making, particularly in the Global South.

Erwin Nagelkerke

Erwin Nagelkerke is a policy literate senior data analyst. He obtained his PhD in statistics and latent structural and classification models in the behavioral sciences, focusing on psycho- and sociometric topics. He shifted towards Public Health when joining the Dutch National Wastewater program close to its inception in 2021 at the height of the COVID-19 pandemic. In recent years he became closely involved with an array of national and international WBE / WES projects and initiatives, involved with the technical data methodology, as well as strategy, policy, and developments towards a sustainable infrastructure.

Michael Parkins

Michael Parkins, MD MSc FRCPC is a Professor in the Departments of Medicine and Microbiology, Immunology & Infectious Diseases at the University of Calgary. He is a clinician-scientist who served as Section Chief for Infectious Diseases in Calgary from 2019–2024 and continues to serve as Medical Director of the Southern Alberta Adult Cystic Fibrosis Clinic. He is a co-lead of the Pan-Alberta Wastewater-Based Surveillance Program, with a particular interest in using near-to-source surveillance technologies to track, understand and mitigate public health challenges affecting at-risk and vulnerable populations. His wastewater research interests are as diverse as wastewater itself, spanning A to Z—from Antimicrobial resistance to xylaZine—tracking viruses, bacteria, fungi, resistance genes and chemicals, including substances of abuse.

Rhonda Rosychuk

Dr. Rosychuk is a senior biostatistician and Professional Statistician (Statistical Society of Canada, American Statistical Association) in the Division of Pediatric Infectious Diseases in the Department of Pediatrics at the University of Alberta. She joined in 1999 and became a full professor in 2011. She holds several research grants and has extensive research experience. Her research activities include statistical methods development, epidemiological studies, and collaboration/consultation with clinical colleagues. She is an Adjunct Professor in the Department of Mathematical and Statistical Sciences at the University of Alberta, an Adjunct Professor in the Department of Statistics and Actuarial Sciences at Simon Fraser University, and a member of the Women and Children's Health Research Institute in Edmonton, Alberta, Canada. She is the Lead Biostatistician for the Canadian Emergency Department Research Network. Dr. Rosychuk also serves as the President Elect for the Statistical Society of Canada.

Emily Somerset

Emily Somerset is an Assistant Professor, Teaching Stream, in the Department of Statistical Sciences at the University of Toronto. Her doctoral research developed statistical methods for wastewater-based disease surveillance, integrating wastewater measurements with traditional surveillance data to reconstruct epidemic curves.

Guillaume St-Onge

Guillaume St-Onge is an assistant professor in the School of Electrical Engineering and Computer Science at the University of Ottawa. His research focuses on mathematical and computational methods to model contagion dynamics on networks, with applications to real-time epidemic forecasting, pandemic preparedness, and global sentinel surveillance.

He completed an M.Sc. and Ph.D. in Physics at Université Laval. Before joining uOttawa, he was at Northeastern University, first as a postdoc and then as a Research Assistant Professor in the Department of Physics, with affiliations at the Roux Institute and the Network Science Institute.

Yassen Tcholakov

Dr. Yassen Tcholakov is a public health physician, Head of the Clinical Department of Public Health in Nunavik, and Assistant Professor in the Department of Global and Public Health at McGill University. His work focuses on infectious disease surveillance, outbreak response, and tuberculosis elimination in Inuit communities of northern Quebec. He has helped develop wastewater and environmental surveillance approaches adapted to remote communities. He also brings over a decade of global health policy and advocacy experience, including work with the World Medical Association and with the World Health Organisation, addressing health equity and pandemic preparedness. Drawing on local practice and international experience, he explores how surveillance systems can connect pathogen-specific questions and surveillance signals to timely, proportionate public health action.

Jacqueline Willmore

Jacqueline Willmore is an infectious disease epidemiologist with Ottawa Public Health. Her team maintains a public dashboard that integrates wastewater surveillance with other indicators of COVID-19, influenza, and RSV activity in Ottawa. She supports various local research projects in wastewater surveillance when she’s not investigating outbreaks or tracking enteric, zoonotic, vector-borne, and vaccine-preventable diseases.

Judith Wong

Dr Judith Wong is a Director in the Economy, Sustainability and Technology Directorate at the Prime Minister’s Office Strategy Group, where she contributes to Whole-of-Government strategic planning on economic, sustainability and technology issues. Her work includes identifying emerging priorities, shaping national policy directions, and coordinating agencies to translate strategy into action.

She previously led multidisciplinary scientific teams at the National Environment Agency and Singapore General Hospital. Her expertise spans risk assessment and surveillance of vector-borne and microbial diseases, biosurveillance, clinical diagnostics, wastewater-based epidemiology, and regional capacity-building. Judith also helped establish Singapore’s Wastewater-Based Epidemiology Programme, which grew from a research initiative into a national surveillance system covering more than 500 locations countrywide.

Alongside her public policy role, Judith remains actively engaged in public health and scientific research through adjunct and professional appointments. She is an Adjunct Associate Professor at the Centre for Outbreak Preparedness, Duke-NUS Medical School; a Principal Scientist at the National Environment Agency; and a consultant to the World Health Organization Regional Office for South-East Asia.

Alessandro Zulli

Alessandro Zulli is a Research Scientist at SecureBio and a Research Affiliate at Stanford University, where his work focuses on using wastewater to detect and track pathogens before they spread widely. He earned his PhD in Chemical and Environmental Engineering at Yale, where he co-led one of the earliest demonstrations that SARS-CoV-2 RNA in wastewater tracks community infection dynamics and built Connecticut's wastewater surveillance program covering 1.3 million people. At Stanford, he led the development of WastewaterSCAN's high-throughput metagenomic sequencing program across 30 U.S. locations, coordinated national public health responses to measles detections in wastewater, and identified a recombinant avian influenza strain from environmental samples. At SecureBio, he leads CASPER, a pathogen-agnostic wastewater metagenomics network spanning 15 states and 52 treatment plants, and develops AI agents to triage sequencing hits for expert review. He also leads Zephyr, a pooled nasal swab biodefense program in Boston that has scaled from pilot to more than 10,000 samples, extending early-warning surveillance directly to the community and informing local and federal public health partners. He has authored dozens of peer-reviewed publications on environmental pathogen surveillance.