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2025 CONFERENCE

BUILDING A LASTING LEGACY: OUR CHOICE, THEIR FUTURE

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Te Whanganui-a-tara Wellington

SETAC AU/ACTRA 2025 Conference Abstract Book

Abstracts – Plenary Speakers

Microbial Fallout: Pollution-Driven Evolution, Ecosystem Tipping Points, and the Case for New Risk Endpoints

Prof Nicholas Ashbolt[1], Dr Claire Hayward[1]
[1]CRC SAAFE / Future Industries Institute, UniSA, Mawson Lakes, Australia

Plenary: Nicholas Ashbolt, Chancellor 1, August 28, 2025, 8:45 AM - 9:15 AM

Biography:
Nick Ashbolt holds the Peter Teasdale Chair in Environmental Health Risk Assessment at the University of South Australia and leads the Living Labs program for the Cooperative Research Centre for Solving Antimicrobial Resistance in Agribusiness, Food, and Environments (CRC SAAFE). As an environmental microbiologist, he has pioneered quantitative microbial risk assessment (QMRA) approaches to assess environmental pathogen risks and inform regulatory water quality standards across Australia, Canada, Europe, and the United States. He is a Fellow of the International Water Association and serves as Editor-in-Chief of the Journal of Water and Health, with 288 peer-reviewed papers, 13,400 citations, h-index of 61.

Anthropogenic chemical stressors—including pesticides, metals, pharmaceuticals, and industrial byproducts—are now pervasive in environments. Together with climate change and human-mediated microbial dispersal, they are altering the evolutionary landscape of environmental microbiomes by acting on the “big three” evolutionary forces: genetic drift (via mutation, recombination, and horizontal gene transfer), competition and migration/dispersal. Yet, these dynamics remain poorly addressed in current risk frameworks.

Traditional microbial monitoring focuses on phylogenetic or taxonomic shifts, but such metrics often fail to capture ecological degradation. Mounting evidence shows that erosion of microbial functional diversity—especially in metabolic and biogeochemical processes—would better reflect the loss of ecosystem services in the Anthropocene. Chronic, low-level chemical exposures consistently reduce functional gene richness and redundancy, even when community composition appears unchanged. Core ecosystem functions such as nitrification, sulfur reduction, organic matter degradation, and maintenance of stable host-associated microbiomes in plants and animals are frequently impaired.

These impacts are exacerbated by interactions with free-living amoebae and other protozoan predators, which over the eons have shaped bacterial stress adaptations. Environmental stressors like reactive oxygen species, metals and pharmaceuticals now amplify microbial survival strategies, including SOS responses, biofilm formation, intracellular persistence, and gene transfer mechanisms—processes that evolved before human influence but now drive emerging threats, such as antimicrobial resistance (AMR) persistence and spread.

This ecological perspective reveals the inadequacy of current risk models focused on single chemical concentrations or growth inhibition thresholds. To account for the emergent properties within microbiomes (i.e., not seen in any single species) and to protect microbial function, guideline values must reflect multiple endpoints, including stress response activation, interspecies interactions, and survival associated with environmental hosts— and must consider realistic environmental exposures involving contaminant mixtures that include transformation products. To meet this paradigm shift, regulation will need to address the full spectrum of environmental stressors affecting microbial evolution, resilience, and function. Overall, preserving microbial functional diversity is essential to sustaining ecosystem services and mitigating long-term ecological risks, such as environmental propagation of AMR.

Chemicals, Waste and Pollution Prevention: Advancing Precision in Environmental Toxicology and Chemistry

Bryan Brooks[1]
[1]Baylor University, Waco, United States

Plenary: Bryan Brooks, Chancellor 1, August 27, 2025, 4:00 PM - 4:30 PM

Biography:
Bryan W. Brooks is Distinguished Professor of Environmental Science and Public Health at Baylor University, USA. His research interests include eco-, environmental and comparative toxicology, environmental and green chemistry, chemical assessment and management, harmful algal blooms, and environmental public health practice. Bryan serves as Editor-in-Chief of Environmental Science & Technology Letters (https://pubs.acs.org/journal/estlcu). He is a Catalyst Leaders International Fellow, which is supported by the Royal Society of New Zealand, with Manaaki Whenua Landcare Research. Bryan is a Fellow of the Society of Environmental Toxicology and Chemistry, the American Association for the Advancement of Science, and the Royal Society of Chemistry.

Disparities in effective, efficient and equitable delivery of essential environmental and public health services remain palpable at the global scale, particularly when chemicals and waste management activities are considered. Increasing likelihood of natural disasters, routinely fueled by climate change, presents additional stress on our ability to more sustainably prevent pollution. In an unprecedented development, an Intergovernmental Science-Policy Panel on Chemicals, Waste and Pollution Prevention was recently established to engage current global pollution realities, which contribute to a Triple Planetary Crisis. As this effort proceeds, we must aim to achieve the common environmental protection goals of public health, biodiversity and ecosystem services. Doing so will require non-traditional partnerships and cooperation among disciplines that embrace systems thinking to accelerate precision-based approaches.

Stockholm Convention after 20 Years: Has it reduced exposures to persistent organic pollutants?

Dr Peter Dawson[1]
[1]New Zealand Environmental Protection Authority, Wellington, New Zealand

Plenary: Peter Dawson, Chancellor 1, August 27, 2025, 9:05 AM - 9:35 AM

Biography:
Dr Peter Dawson is employed by New Zealand's Environmental Protection Authority, the Government's chemicals regulator, as Principal Scientist of hazardous substances. He has a PhD in chemistry and has wide-ranging experience in the risk assessment and development of policy and legislation relating to the management of chemicals. Dr Dawson is currently the Chair of the Stockholm Convention POPs Review Committee (POPRC). He has represented New Zealand for many years on the UN Sub-Committee of Experts on the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) and is a member of the HEPA National Chemicals Working Group.

The Stockholm Convention on Persistent Organic Pollutants entered into force on 17 May 2004 with the objective to protect human health and the environment from persistent organic pollutants (POPs).
For a chemical to be considered as a POP, it must not only have the properties of persistence, bioaccumulation, and adverse effects to human health or to the environment (PBT), it must also have the potential for long-range environmental transport.
The Stockholm Convention commenced with 12 POPs listed: nine mostly obsolete pesticides, the industrial chemicals polychlorinated biphenyls, and the unintentionally produced by-products polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans. Subsequently a further 25 chemicals have been assessed by the Convention's scientific body, the POPs Review Committee, and determined to be POPs and agreed to be listed in Annexes A, B, and/or C of the Convention.
The chemicals recently put forward for listing are more complex, in not only the description, scope and identity of the substance, since several are complex industrial mixtures, but also given that many are still in current use with a range of applications, the number of specific exemptions for critical uses and the phase out times needed.
This leads to a number of challenges with identifying these POPs in products and articles in use, and in stockpiles, and how to manage them when the articles become waste.
Global monitoring of POPs provides an indication of the effectiveness of the Stockholm Convention. Overall, monitoring results indicate that regulatory measures targeting POPs have succeeded in reducing levels of POPs in humans and the environment.
However, the third global monitoring report under the Convention identified several key challenges, including limited data for newly listed POPs, many of which are increasingly complex and difficult to detect, as well as inconsistent monitoring approaches and analytical methods, challenges in assessing long-range environmental transport, and limited monitoring of chemical mixtures.
These challenges will be further considered at upcoming meetings under the Stockholm Convention.

Food safety foresight and emerging issues

Dr Vittorio Fattori[1]
[1]Fao, Rome, Italy

Plenary: Vittorio Fattori, Chancellor 1, August 27, 2025, 9:35 AM - 10:05 AM

Biography:
Vittorio Fattori PhD is a Food Safety Officer in the Agrifood Systems and Food Safety Division of FAO, where he is working both coordinating the foresight programme on emerging food safety issues, and providing scientific advice. In particular, some of his focus areas include: evaluating how new trends, and drivers of change can affect food safety in order to proactively respond to risks as well as optimize opportunities; working in the JECFA Secretariat to provide scientific advice on food additives, contaminants and residue of veterinary drugs in food; providing technical guidance on food safety regulatory issues - including emerging issues.

The global agrifood system is undergoing rapid transformations driven by interconnected forces such as the globalization of food supply chains, the escalating impacts of climate change, unprecedented population growth and migration patterns, and evolving consumer dietary preferences. These dynamic shifts are giving rise to novel food safety challenges that demand proactive identification and robust mitigation strategies. In response to this complex and evolving landscape, the FAO has established the Food Safety Foresight Programme to identify, monitor, and analyze emerging trends, critical drivers, and existing knowledge gaps that could significantly influence the safety of agrifood products in the medium to long term. By proactively understanding these potential impacts, the programme aims to equip stakeholders with the necessary insights to effectively address future challenges and opportunities within agrifood systems.
This presentation will delve into the FAO's food safety foresight approach, providing an overview of the major global drivers and overarching trends that are shaping the future of food safety. Their specific food safety implications will be illustrated through examples of key emerging issues. The include the integration of novel food sources and production methodologies alongside their associated technological advancements, the rise of personalized nutrition and its regulatory considerations, the far-reaching consequences of climate change on foodborne hazards, the adoption of new agricultural practices such as the utilization of alternative water resources, the identification and management of emerging contaminants, and the principles of the circular economy as applied to food systems.
Many of these topics are interconnected, particularly as the agrifood systems increasingly prioritize the adoption of more sustainable solutions. In this regard, the presentation will provide details on the FAO work related to environmental inhibitors – substances intentionally applied to reduce the environmental footprint of agricultural activities while simultaneously aiming to improve agrifood production efficiency.

Whiria te muka, whiria te mātauranga, whiria te taura tangata – Weave the rope, thread the knowledge, strengthen the bond

Miss Erica Gregory[1]
[1]Environmental Protection Authority, Wellington, New Zealand

Plenary: Erica Gregory, Chancellor 1, August 26, 2025, 9:55 AM - 10:25 AM

Biography:
Erica Gregory (Waikato-Tainui, Ngāti Maniapoto), Manahautū, General Manager, Kaupapa Kura Taiao, Māori Engagement and Operations, and Regulatory Policy, Te Mana Rauhī Taiao, Environmental Protection Authority. Erica has an extensive background in public sector policy development and implementation. This includes nearly 20 years of experience in facilitating Māori engagement in intellectual property policy development, New Zealand's biosecurity system, regional economic development and environmental decision-making. Erica's focus is on implementing the EPA's Māori engagement programme and mātauranga framework, facilitating a partnership approach to engagement with Māori and delivering on a regulatory policy function for the EPA that is informed by diverse voices.

Whiria te muka is a work programme that enables Te Mana Rauhī Taiao, New Zealand's Environmental Protection Authority, the EPA, to weave mātauranga Māori, indigenous Māori knowledge, into decision-making processes.

Mātauranga is a broad concept that spans things such as Māori cultural concepts, values and practices, health and wellbeing, economic development and sustainable use of resources. It embodies generations of rich cultural knowledge and practice, and can be accurate and precise.

In 2016 Ngā Kaihautū Tikanga Taiao (Statutory Māori Advisory Committee to the EPA) produced a protocol 'Incorporating Māori perspectives into decision making'. This is one of several protocols that the EPA uses to aid decision makers in producing consistent, high-quality decisions.

A three-year Mātauranga work programme commenced in 2017 with a focus on ways of weaving mātauranga into decision-making processes at the operational level as well as more broadly across the organisation.

In July 2020, when the EPA launched its Mātauranga framework, it was the first of its kind to be developed in the natural resources sector. It is a tool to help EPA decision-makers test and probe mātauranga when presented in evidence. To be confident in its decisions, the EPA must be rigorous in the process of reaching them, including with knowledge that may be unfamiliar.

The EPA's focus is on building and maintaining strong relationships with Māori through ongoing discussions about the ways in which we incorporate Māori perspectives including knowledge, culture, values and worldviews into EPA decision-making. It is part of the daily work between the EPA, Ngā Kaihautū Tikanga Taiao, Te Herenga (EPA network of Māori environmental practitioners centred in the regions), and Ngā Parirau o te Mātauranga (kaumātua, elders, group drawn from within Te Herenga, who have tirelessly shared their wisdom and expertise with the EPA for many years).

Food security, consumer preferences and the interaction with environmental inhibitors

Dr John Roche[1]
[1]Ministry For Primary Industries, Hamilton, New Zealand

Plenary: John Roche, Chancellor 1, August 27, 2025, 10:05 AM - 10:35 AM

Biography:
John was appointed Chief Departmental Science Adviser to New Zealand's Ministry for Primary Industries (MPI) in June 2018 to provide independent and strategic science advice to the Director-General and to provide leadership in the wider ministry science areas. He is a member of MPI's Senior Leadership Team and the Chief Science Advisers' Forum. John has over 440 publications and an h-index of 64, research.com ranks John in the top five scientists in New Zealand and the top 250 scientists globally in Animal and Veterinary Sciences. He is also a regular contributor to international science and farming conferences around the world.

Global food and nutrition security is increasingly shaped by consumer-driven demands for environmental sustainability. Rising food demand (projected +50% increase by 2050) is colliding with the need to dramatically shrink agriculture's environmental footprint, as farming and land-use change already produce roughly a quarter of global greenhouse gas (GHG) emissions. These GHG emissions (e.g., methane and nitrous oxide) drive climate change, whose impacts—such as more frequent extreme weather and shifting hydrological patterns—threaten the productivity of crops and livestock. This dual pressure necessitates strategies that reconcile high agricultural productivity with climate and environmental stewardship. Concurrently, consumers worldwide are influencing agriculture through preferences for sustainably-produced food; the rise of carbon footprint labelling exemplifies how consumer choice can encourage food companies and producers to adopt climate-friendly practices.
To address these challenges, environmental inhibitors have emerged as critical tools. In the livestock sector, feed additives act as GHG inhibitors by suppressing enteric methane formation; for instance, 3-nitrooxypropanol (3-NOP) can reduce cattle methane emissions in feedlot systems by around 30% without compromising production. In crop systems, nitrification inhibitors slow the microbial conversion of ammonium to nitrate, keeping soil nitrogen in plant-available, but less soluble form, for longer periods. This practice reduces nitrous oxide emissions and nitrate leaching, thus supporting crop yields with lower environmental losses. The deployment of such inhibitors on farm can enable farmers to maintain (or even enhance) yield, while significantly lowering emissions intensity.
These innovations, alongside broader sustainable farming practices, help balance agricultural productivity with environmental obligations. In summary, integrating GHG and nitrification inhibitors into agriculture—reinforced by consumer demand for sustainability—offers a promising pathway to bolster global food security in an era of climate change and ecological constraints, and ultimately contributes to a more resilient and sustainable food system.

Plastic Particles and Human Health: Addressing Analytical Challenges in Exposure Assessment

Professor Kevin Thomas[1], Jun-li Xu[2], Stephanie Wright[3], Elvis Okoffo[1], Cassandra Rauert[1], Participants of PMBT Workshop, Dublin 2024
[1]The University of Queensland, Woolloongabba, Australia, [2]University College Dublin, Ireland, [3]Imperial College London, UK

Plenary: Kevin Thomas, Chancellor 1, August 27, 2025, 3:30 PM - 4:00 PM

Biography:
Professor Kevin Thomas is Director of the Queensland Alliance for Environmental Health Sciences (QAEHS). Kevin is an environmental health scientist with a particular interest in understanding environmental exposures associated with contaminants of emerging concern (CECs) with the goal of protecting environmental and human health. Kevin also leads the Minderoo Centre- Plastics and Human Health at UQ and is Deputy-Director of the Australian Research Council Industrial Transformation Training Centre for Hyphenated Analytical Separation Technologies (HyTech).

In recent years, the discovery of plastic particles in human tissues has raised important concerns about potential health impacts. This presentation explores the current state of research on plastic contamination in human organs, highlighting key findings and methodological challenges. Studies have reported occurrence of plastics in various tissues, including blood, lungs, brain, and placenta, with potential links to adverse health outcomes such as cardiovascular diseases and neurological disorders. However, the interpretation of these findings is often questioned due to contamination risks and limitations in analytical methods for particles in the size-range of highest concern for tissue penetration. Even newer techniques like pyrolysis gas chromatography mass spectrometry and energy dispersive x-ray analysis paired with scanning electron microscopy, while promising, face challenges in accurately identifying and quantifying plastic particles amidst complex biological matrices. The presentation will discuss the need for accepted protocols, contamination control measures, and comprehensive reporting guidelines to enhance the reliability, and confidence in the reliability, of microplastic research. Furthermore, the presentation will address the biological plausibility in evaluating evidence of detected plastics, considering whether the reported concentrations, particles' sizes and distribution align with established particle migration mechanisms through biological barriers. The importance of transparency in the detection criteria used and their limitations, data sharing and collaboration will be emphasized to ensure robust scientific practices and informed public health policies. By fostering a culture of rigorous standards and transparency, we can better understand human internal plastic particle exposure and inform effective strategies to mitigate its risks to human health.

Abstracts – Oral Presentations

Barium toxicity to stygobionts and groundwater guideline values

Merrin Adams[1,2], Monique Binet[2], David Spadaro[2], Kitty McKnight[2,3], Prof. Grant Hose[3], Dr Stephen Fenton[4], Dr Stuart Simpson[2,5]
[1]Aquatic Ecotox, Newcastle, Australia, [2]CSIRO Land and Water, Lucas Heights, Australia, [3]Macquarie University, Macquarie Park, Australia, [4]Chevron Australia, Perth, Australia, [5]CSIRO Land and Water, Dutton Park, Australia

Session 2A (i): Risk Assessment & Regulation of Metals 2, Chancellor 1, August 26, 2025, 1:30 PM - 3:00 PM

Biography:
Merrin is an aquatic ecotoxicologist and environmental chemist specialising in contaminants in wastewater and aquatic ecosystems. Her expertise includes microalgal and novel bioassays, ecotoxicity assessments, contaminant speciation, bioavailability, and water quality guidelines. Merrin recently authored the ANZG water quality default guideline values for ammonia in freshwaters.

Groundwater ecosystems host a variety of biota including obligate groundwater fauna (stygobionts). Stygobionts have morphological and physiological characteristics that differ from surface water species due to their unique evolution and living environment. However, knowledge on the toxicity of contaminants to stygobionts is limited and guideline values (GVs) derived from the toxicity values of groundwater species to support groundwater contaminant risk assessments do not exist.

This study investigates the risk of barium to stygobionts. In natural waters the dissolution and mobility of barium is controlled by sulfate, and to a lesser extent carbonate, due to the low solubility of barium sulfate (and carbonate) minerals. While naturally present at low concentrations in groundwater, elevated concentrations of barium may occur from anthropogenic activities (e.g. barite in drilling operations) or geogenic sources (e.g. leaching from geological formations).

In this study, stygobionts collected from two sites in New South Wales, Australia, included cyclopoid (2 species) and harpacticoid (1 species) copepods, ostracods, syncarids (3 species), and amphipods. Toxicity was measured as survival over 2, 4, 7, 14, 21 and 28 d in water with varying sulfate concentrations (<1 to 100 mg SO_4/L). When sulfate was present, dissolved barium (<0.45 µm) concentrations decreased rapidly, forming a barium sulfate precipitate in toxicity test solutions. The toxicity of barium to cyclopoids was attributed to dissolved, not precipitated, barium with a no-effect concentration (21-d NEC) of 3.3 mg/L for Mesocyclops sp. and effective concentration to cause 5% mortality (21-d EC5) of 4.8 mg/L for Diacyclops sp. The remaining stygofauna species were more sensitive with toxicity values as low as 0.1 mg Ba/L (expressed as dissolved barium). The derived GVs for barium were similar to, or less than, background concentrations highlighting the complexity of deriving GVs for metals with low solubility and the need for supporting site-specific ecotoxicology studies.

Synergistic Application of UV/Peracetic Acid and Biological Activated Carbon Filtration for Mitigating Organic Micropollutants and Toxicity in Wastewater

Ms Sana Ajaz[1], Mr Frederic Leusch[2], Mr Prasad Kaparaju[1], Ms Mikaela Radke[1], Ms Ruby Micheal[1], Mr Ashraf Aly Hasan[3]

[1]Griffith University, Nathan, Australia, [2]Griffith University, Gold Coast, Australia, [3]United Arab Emirates University, Al Ain, United Arab Emirates

Session 7B: Future-Proofing Wastewater Treatment: Tackling Emerging Contaminants with a Holistic Approach – it's more than just PFAS, Chancellor 6, August 28, 2025, 9:25 AM - 10:55 AM

Biography:

Sana is an environmental scientist and engineer specializing in emerging contaminants in drinking water and wastewater. She is currently a PhD candidate at Griffith University, where her research focuses on the removal of organic micropollutants and toxicity from secondary wastewater using AOP-enhanced biofiltration techniques.

The presence of organic micropollutants (OMPs) in wastewater has become a global environmental concern, particularly as aquatic ecosystems face increasing vulnerability and the demand for water reuse strategies continues to grow. This study investigates the synergistic application of UV/peracetic acid (UV/PAA) oxidation with biofiltration for OMP degradation and toxicity mitigation in secondary-treated wastewater. Over a six-month bench-scale study, secondary effluent was subjected to UV/PAA and a conventional advanced oxidation process (AOP), UV/H_2O_2, for comparison, followed by biological activated carbon (BAC) filtration. Treatment performance was assessed using targeted chemical analysis of common OMPs alongside effect-based bioassays (estrogenicity, cytotoxicity, phytotoxicity, and oxidative stress). Results demonstrated that UV/PAA pretreatment outperformed UV/H_2O_2 in degrading recalcitrant OMPs, achieving notable removal efficiencies for carbamazepine (65%) and diuron (52%). Additionally, UV/PAA significantly reduced photosynthesis inhibition (53%) compared to UV/H_2O_2 (21%). The combined UV/PAA–biofiltration process achieved a 63% reduction in algal toxicity and over 60% reduction in estrogenic load, effectively lowering the estrogenicity risk. Microbial community analysis revealed that biofilters supported the growth of OMP-degrading bacteria, including Pseudomonas, Mycobacterium, and Rhodococcus. UV/PAA pretreatment enhanced the abundance of Acinetobacter and Anaerolinea, species known for degrading estrogens and other OMPs, reinforcing its effectiveness in toxicity mitigation. Interestingly, control biofilters were more effective than AOP-pretreated biofilters in reducing bacterial toxicity. The substantial reductions in estrogenic load, photosynthesis inhibition, and algal toxicity highlight the UV/PAA–biofiltration approach as a promising strategy for protecting aquatic ecosystems, particularly in mitigating issues such as fish feminization. These findings suggest that integrating UV/PAA with biofiltration can serve as an effective, sustainable solution for OMP and toxicity removal in treated wastewater.

The application of effect-based methods (EBMs) for water quality assessment in South Africa (SA): Wakkerstroom, a case study

Dr Natalie Aneck-hahn[1], Dr Magdalena Van Zijl[1], Prof Rialet Pieters[2], Prof Suranie Horn[2], Ms Lizette Swart[3], Ms Hesmarie Pearson[4], Ms Naledi Mmekwa[1], Ms Annika Kruger[2]
[1]University Of Pretoria, Pretoria, South Africa, [2]North West University, Potchefstroom, South Africa, [3]Biotox Lab (PTY) Ltd, Pretoria, South Africa, [4]ToxSolutions Kits and Services, Johannesburg, South Africa

Session 5A: Contaminants of emerging concern 3, Chancellor 1, August 27, 2025, 1:30 PM - 3:00 PM

Biography:

Dr Natalie Aneck-Hahn is the director of the Environmental Chemical Pollution and Health Research Unit in the Faculty of Health Sciences at the University of Pretoria. She has more than 20 years' experience in research on the effects of endocrine disrupting chemicals, effects on human and aquatic health and the use of in vitro bioassays to determine the activity of chemicals and mixtures in water samples. Natalie has been involved in a number of GWRC and WRC funded research projects, the latest being the Toolbox for effect-based methods and the application of EBMs for water quality assessment.

Introduction:

Surface waters can contain a wide range of contaminants of concern (CECs) or micropollutants. These include industrial and agricultural compounds, pesticides, pharmaceuticals, personal care products, plasticizers and microplastics etc. Mixtures of compounds are present in the aquatic ecosystem that can negatively affect human and aquatic health. Chemical analyses cannot assess the combined adverse effects of these low-level complex mixtures (known and unknown). Currently the water quality assessment approaches are inadequate for evaluating the fitness for use. *In vivo* and *in vitro* bioassays assessing biological activity, also referred to as effect-based methods (EBMs), are being applied for water quality assessment. SA developed a toolbox of bioassays in line with those recommended by the Global Water Research Coalition. This toolbox was then tested in case studies sampling water from different sources to determine their robustness and applicability.

Aim:

To apply EBMs to assess the water quality of different water sources in Wakkerstroom, a small town in SA.

Methods:

In vitro and *in vivo* assays (according to the toolbox - WRC project 2020/2021-00348) were applied to a drinking water treatment plant, wastewater treatment plant, ground water and surface water. The *in vivo* assays were classified according to Hazard class I-V. *In vitro* assays were expressed as biological equivalents and effect-based trigger values indicated an acceptable or unacceptable response in a water sample.

Results and conclusion:

The drinking water treatment plant, wastewater treatment plant, groundwater, and surface water samples revealed hazard rankings between Class II and IV in the *in vivo* assays. *In vitro* assays for estrogenic and androgenic activity and oxidative stress indicated biological activity with some samples above the effect-based trigger values. Based on the results from Wakkerstroom there is potential that EBMs are useful to assess water quality and potential risks when applied to the different water sources.

Tackling Pollution through Transdisciplinary and Indigenous Partnership Approaches

Ms Virginia (Jinny) Baker[1], Dr James Ataria
[1]PHF Science, Wellington, New Zealand

Session 1B: Bridging the gap: Collaborative pathways to transformative outcomes in pollution monitoring, mitigation and management 1, Chancellor 6, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Jinny is a senior social scientist, one of the foundation members of the Social Systems Team. Over her more than 20 years working at ESR, Jinny has been involved in a range of environmental and human health projects where her work has supported community engagement in science (e.g. Paritūtū dioxin, Future Foods, Contaminants of Emerging Concern) and enabled cultural and community values to be better understood in risk decision-making. Her current research is focused on transdisciplinary methods and Te Tiriti partnership approaches to orient better models for collective action, leadership and innovation for sustainable change in practice.

This paper presents recent collaborative work in Aotearoa New Zealand that showcases the importance of transdisciplinary (Td) science combined with Indigenous knowledge (IK) in developing effective interventions to address "wicked problems," such as chemical and plastics pollution; whereby humans are complicit and causing the very problems they seek to resolve, and where no single or easy solutions exist. Addressing the complex challenges intrinsic to environmental pollution requires the inclusion of social and cultural knowledge alongside biophysical science inquiry.
The paper reflects on recent work building combined transdisciplinary and Indigenous partnership approaches to understand and reduce the impacts of microplastics and contaminants of emerging concern. We outline the methodology and methods used to facilitate co-design and the co-creation of value in approaches directly involving mana whenua, local government and community partners, and aimed at real-world problem-solving.
The work shows how Indigenous and community partnerships were pivotal, in challenging and disrupting the status quo, and strengthening collaborative capacities and tactical strategies to reduce environmental pollution. Cultural, historical and power dynamics can be hidden and deeply embedded in how we conceptualise pollution, our relationship with environment, our institutional settings, and our capacities to conceptualise solutions. The work shows the combined power of Td and IK approaches in asking for critical reflection on ontological and epistemological aspects, and instilling two-way mutual learning to ensure that the research gives good value for the community and Indigenous partners involved. We highlight steps that can be taken in research inquiry to expand the opportunities for the insights generated to support enduring and transformational social environmental change.

A Methodological Framework for the Assessment of Bioavailable Iron in Fresh Water Samples

Mr Emiliano Balsamo Crespo[1], Prof Amanda Reichelt-Brushett[1], Prof Andrew Rose[1], Dr Ross Smith[1,2]
[1]Southern Cross University, Lismore, Australia, [2]Hydrobiology, Milton, Australia

Session 1A: Risk Assessment & Regulation of Metals in the Asia-Pacific Region 1, Chancellor 1, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
I am a biologist with experience in environmental science and management, and currently finishing a PhD course at Southern Cross University, NSW, Australia. My research focuses on the development and validation of a method to assess iron bioavailability in freshwater samples. My project encompasses aspects of environmental chemistry and toxicology, and delves into the challenges of developing alternatives to traditional approaches when dealing with sparingly soluble metals in water samples. My current work strives for a practical solution to the efficient implementation of the default guideline value for iron in fresh waters within the ANZG regulatory framework.

The draft for the proposed Australian default guideline value (DGV) for iron in fresh waters points out the need for a method to quantify a bioavailable iron fraction. The application of total extraction methods to fresh water samples will likely recover mineralised iron fractions of low bioavailability from suspended solids, increasing the rate of falsely non-compliant results, and affecting the efficient implementation of the proposed DGV. This presentation will describe the work done to establish a methodological framework to assess iron bioavailability, and provide evidence and validation for an analytical method able to describe an operationally defined bioavailable iron fraction. The framework involved testing chemical extraction techniques of easy implementation in industry sector to quantify the most labile iron fractions. A technique involving a 6 h extraction with HNO3 at pH 2 and room temperature was proposed as a suitable method. Furthermore, reproduction tests with *Ceriodaphnia dubia* were conducted to assess the risk of exposure to different iron fractions, and the performance of the proposed method to predict the dose-response relationship. The final step included reproduction assays under co-exposure to freshly precipitated and mineralised iron phases, and the implementation of the pH 2 extraction to validate its performance to predict chronic toxicity. The results support the hypothesis that the bioavailable iron fraction should encompass iron phases of lower crystallinity, and furthermore, the pH 2 extraction is a suitable method to predict the chronic effects of bioavailable iron without the interference of well-mineralised iron phases. Moreover, the analysis suggests that response to well-mineralised phases is not iron-specific, but to suspended particulate material instead, and that these effects should be accounted for in the risk assessment process. A model which includes the bioavailable fraction and suspended solids measurements is discussed as a practical risk assessment approach.

Does ionising radiation impact the growth of a tropical marine microalgae? Informing potential risks from offshore oil and gas infrastructure

Alexandra Bastick[1,2,3], Dr Tom Cresswell[1], Dr Jessica Tout-Lyon[2], Dr Darren Koppel[4], Dr Rebecca Fisher[4], Merrin Adams[5], Dr Francesca Gissi[1]
[1]ANSTO, Lucas Heights, Australia, [2]Charles Sturt University, Port Macquarie, Australia, [3]La Trobe University, Albury-Wodonga, Australia, [4]Australian Institute of Marine Science, Perth, Australia, [5]Aquatic Ecotox, Stockton, Australia

Session 4B(i): Toxicants & environmental impacts on wildlife 3, Chancellor 6, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Alex is a PhD student at ANSTO and La Trobe University, and an ATSE Elevate scholar. Her research aims to investigate the impacts of ionising radiation on marine organisms to improve environmental risk assessments and outcomes for offshore oil and gas decommissioning. Alex holds a Bachelor of Science with first class honours from Charles Sturt University. During her Honours research in 2024, Alex investigated the effect of ionising radiation exposure on a species of marine microalgae through chronic toxicity assays.

When offshore oil and gas facilities reach the end of their operational lifespans, they must undergo decommissioning. While current Australian legislation mandates complete removal, there is discussion around the potential benefits of leaving some infrastructure, such as production pipelines, *in situ*. Internationally, repurposed decommissioned structures have been associated with increased biodiversity and fish productivity when used as artificial reefs. However, the potential environmental risks posed by contaminants associated with this infrastructure, including Naturally Occurring Radioactive Materials (NORM), are not well known. During production, naturally occurring radionuclides, such as radium-226 and radium-228, can co-precipitate within scales that sometimes accumulate on the internal surfaces of subsea infrastructure. As a result, elevated levels of radiation may persist in the environment for decades. To appropriately assess the potential risks, high-quality chronic ecotoxicological data for marine species is required. Most of the existing radiation effect data are based on terrestrial and freshwater species, focus on acute exposures, and often lack methodological consistency and modern quality control and assurance procedures. This study aimed to improve the understanding of radiation effects on marine organisms by generating robust, environmentally relevant data. The tropical marine microalgae *Tisochrysis lutea* was exposed to gamma radiation from a sealed Ceasium-137 source in 72-hour chronic toxicity tests. Nickel was used as a reference toxicant, and dosimeters were deployed to quantify the dose rate at each treatment level. Algal population growth was measured using flow cytometry, and Bayesian dose-response modelling was used to assess the inhibition in population growth rate with increasing dose rate. There is a need for further data across a range of marine taxa to support the development of a marine Species Sensitivity Distribution (SSD) for radiation. These data will contribute to a risk assessment framework for managing NORM wastes during offshore decommissioning, addressing key environmental considerations in the oil and gas sector.

Shaping an approach for deriving water quality guideline values for antimicrobials that integrate ecotoxicity and antimicrobial resistance endpoints

Ms Monique Binet[1], Dr Anu Kumar[2], Dr Jenny Stauber[3], Dr Graeme Batley[4], Dr Hsuan-Cheng Lu[5], Prof Nicholas Ashbolt[6,7]
[1]CSIRO, Sydney, Australia, [2]CSIRO, Adelaide, Australia, [3]La Trobe University, Albury-Wodonga, Australia, [4]Environmental Contaminants Research, Sydney, Australia, [5]Griffith University, Gold Coast, Australia, [6]SAAFE-CRC, Adelaide, Australia, [7]University of South Australia, Adelaide, Australia

Session 9B: Identifying 'ecologically relevant endpoints' for microbial processes to inform Environmental Quality Guidelines and One Health approaches 2, Chancellor 6, August 28, 2025, 1:35 PM - 3:05 PM

Biography:
Monique Binet is an ecotoxicologist whose research has focused on the generation of data, methods, and approaches that support the development and use of environmental water quality guidelines. In her current role, Monique manages complex multi-sector projects with academic, government, and industry stakeholders, and develops research projects to progress One Health solutions that aim to reduce the development and spread of AMR in the water sector.

Antimicrobials pose ecological risks in aquatic environments, particularly to cyanobacteria, aquatic plants and green algae, and with the potential to disrupt microbiomes that biota rely upon. Beyond direct toxicity, these chemicals also contribute to the emergence and spread of antimicrobial resistance (AMR), posing risks to human, animal (including wildlife), and plant crop health, particularly through wastewater discharges and water reuse. Despite these concerns, Australia and New Zealand currently lack environmental water quality guideline values (GVs) for antimicrobials. Furthermore, existing guideline derivation frameworks do not currently consider endpoints to protect against AMR. This presentation will describe our approach to deriving environmental water quality GVs that integrate AMR and traditional toxicity endpoints, using a co-design approach involving industry and regulator stakeholders. Through a systematic review of international practices, we evaluated existing approaches to estimate the environmental hazard of AMR and aspects of these were considered for use within the Australian and New Zealand guideline context. The resulting framework, while developed for antimicrobials, may have applicability for other toxicants known to influence AMR, such as other pharmaceuticals, metals, pesticides and plastics. Key to the success of this project was the journey with stakeholders through the co-design process, and elements of this will be presented to showcase how collaborative input shaped the development of a fit-for-purpose framework for deriving environmental water quality guideline values.

Cultural Considerations of Trace Elemental Seafood Safety Following Volcanic Eruption at Whakaari White Island

Mrs Danielle Blackwell[1]*, Nicholas Ling[1], Megan Grainger[1], Kura Paul-Burke[1]†, Sally Gaw[2]
[1]The University of Waikato Te Whare Wānanga o Waikato, Waikato Kirikiriroa, New Zealand, [2]The University of Canterbury Te Whare Wānanga o Waitaha, Christchurch Ōtautahi, New Zealand *Ngāti Tūwharetoa † Ngāti Awa, Ngāti Whakahemo

Session 2B (i): Bridging the gap: Collaborative pathways to transformative outcomes in pollution monitoring, mitigation and management 2, Chancellor 6, August 26, 2025, 1:30 PM - 3:00 PM

Biography:
Ko Danielle Blackwell tōku ingoa
Ko Tongariro te maunga
Ko Ngāti Tuwharetoa te iwi
Ko Te Arawa te waka
Ko Taupō nui a Tia te moana

Te Puia o Whakaari is an active volcano 50km offshore from the North Island, New Zealand. In 2019 Whakaari erupted while 47 tourists were visiting the island tragically resulting in the deaths of 22 people and life-changing injuries to the remaining tourists.

A co-developed PhD research project was created between Te Runanga o Ngāti Awa and The University of Waikato to investigate the potential health problem of contaminated finfish and shellfish by toxic trace elements. This project encompasses traditional Māori knowledge of Ngāti Awa to align with their values and to ensure the outcomes are relevant in the community. The target finfish and shellfish species were selected as they are taonga/culturally significant and span a range of different trophic levels. To work effectively with our iwi partners, we followed customary protocols wherever possible to show respect to the people and the environment. With guidance from Kura Paul-Burke, we held a karakia ceremony to begin our work and invited tangata whenua/people of the land to take part in the collecting of samples during our fishing trips. When this research is completed, we hope to disseminate the results with Ngāti Awa which will help inform tribal elders to help keep their community safe and provide valuable information to inform future iwi-led marine development in Te Moana a Toi.

Managing wastewater for One Health using a holistic approach to maximise opportunities for future investment and innovation

Dr Karl Bowles[1], Dr Mike Williams[2], Dr Monique Binet[3], Fiona Gilbert[1]
[1]Jacobs, Australia, [2]CSIRO Environment, Australia, [3]CSIRO Minimising AMR, Australia

Session 7B: Future-Proofing Wastewater Treatment: Tackling Emerging Contaminants with a Holistic Approach – it's more than just PFAS, Chancellor 6, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Dr Karl Bowles is a Senior Principal Environmental Scientist with Jacobs and Adjunct Associate Professor at UQ QAEHS in Australia. He has over 30 years of experience within consultancy, government, research, and university sectors, providing expert technical advice on the fate, transport, impacts, and risks on a wide range of chemical contaminants. He enthusiastically collaborates and has over 40 publications.

The 20th century saw incredible growth in chemical use, improving quality of life but introducing a myriad of chemicals into wastewater, many with One Health concerns. As wastewater treatment plants (WWTPs) are built or replaced, selecting technologies that meet with current and emerging challenges, while enabling resource recovery is critical. Advanced technologies exist but their high capital and operational costs demand careful consideration of equitable funding mechanisms.

Biosolids bring additional challenges. Primarily recycled through land application for their high nutrient content, biosolids are facing increasing challenges posed by residual chemical (e.g. PFAS, brominated flame retardants) and biological (antimicrobial resistant bacteria and genes, AMR, ARGs) contaminants. Similarly, non-potable reuse of wastewater is increasingly favoured as a climate adaptation strategy but is challenged by the presence of residual contaminants including microplastics and chemicals contributing to antimicrobial resistance.

Furthermore, where technology choice is informed on a case-by-case basis for treating specific contaminants/contaminant classes, this may not address other contaminants present. This necessitates a holistic understanding of contaminant profiles.

We suggest that a systems level approach needs to be adopted to address the current and future challenges for wastewater treatment, to build systems that address multiple aspects of wastewater treatment:

- One Health concerns to be managed
- opportunities for resource recovery of water and biosolids
- available technologies for treating different classes of contaminants
- sources of contaminants and opportunities/limitations for mitigation via regulatory frameworks
- financial and energy implications of these technologies to inform future models of capital and operational funding.

Jacobs and CSIRO collaborated to investigate the issues above. Stakeholders in Aotearoa New Zealand and Australia including water utilities, regulators, water/biosolid users were approached to gain their expert understanding. The aim is to prepare a white paper to stimulate further discussions to inform decisions on technology for the next generation of WWTPs.

A structural basis for the activation of peroxisome proliferator-activated receptor gamma (PPARγ) by perfluorooctanoic acid (PFOA)

Assoc. Prof. John Bruning[1], Dr. Jordan Pederick[1], Dr. Daniel McDougal[1], Dr. Rebecca Frkic[1]
[1]The University of Adelaide, Adelaide, Australia
Session 4A: Contaminants of emerging concern 2, Chancellor 1, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
John B. Bruning is a tenured Associate Professor at the University of Adelaide, where he leads the Laboratory of Protein Crystallography. He earned his PhD from Rice University and completed postdoctoral fellowships at Scripps Research Institute and Texas A&M University, contributing to nuclear receptor research and the Tuberculosis Consortium. Since 2012, Dr. Bruning has established Adelaide's first macromolecular crystallization pipeline and advanced X-ray crystallography for studying human disease. His interdisciplinary research spans protein sensor modulation, allostery, drug design, and protein crystallization methods, with a current focus on the structural mechanisms by which endocrine-disrupting chemicals affect nuclear receptors.

Perfluorooctanoic acid (PFOA) is a widespread environmental pollutant of the perfluoroalkyl substance (PFAS) class that is extremely resistant to environmental and metabolic degradation, leading to bioaccumulation. PFOA exposure has been linked to many health effects including endocrine disruption and metabolic dysregulation, but our understanding of the molecular mechanisms resulting in these outcomes remains incomplete. One target affected by PFOA is the ligand regulated nuclear receptor peroxisome proliferator-activated receptor gamma (PPARγ) which plays a critical role in controlling metabolic homeostasis through regulating processes such as adipogenesis, glucose homeostasis, inflammation and osteogenesis. It has been previously established that PFOA activates PPARγ through binding to the PPARγ ligand binding domain (PPARγ LBD) leading to increased expression of PPARγ controlled target genes. However, the mechanism by which PFOA achieves this has remained elusive. Here, we employed a combination of X-ray crystallography and fluorescence polarization assays to provide a structural basis for PFOA mediated activation of PPARγ via binding to the PPARγ LBD. Using X-ray crystallography, the cocrystal structure of the PPARγ LBD:PFOA complex was solved. This revealed that PFOA occupies three distinct sites, two within the PPARγ LBD and one within the activation function 2 (AF2) on the protein surface. Structural comparison of PFOA binding with previously reported PPARγ:ligand complexes supports that PFOA activates PPARγ by a partial agonist mechanism at micromolar concentrations. Fluorescence polarization assays also revealed that PFOA binding to the AF2 is unlikely to occur in a cellular context and confirmed that PFOA behaves as a partial agonist *in vitro*, weakly recruiting a coactivator peptide to the AF2 of the PPARγ LBD. This discovery provides an advancement in understanding PFOA mediated regulation of PPARγ, giving new insight regarding regulation of PPARγ by PFAS and PFAS substitutes in general and can be applied to the design and assessment of safer PFAS.

Advancements in Biotransformation Pathway Prediction: Enhancements, Datasets, and Novel Functionalities in enviPath

Jasmin Hafner[2], Tim Lorsbach[3], Seastian Schmidt[6], Liam Brydon[1], Katharina Dost[5], Kunyang Zhang[4], Kathrin Fenner[2,4], Jörg Wicker[1,3]
[1]University Of Auckland, Auckland, New Zealand, [2]University of Zurich, Zurich, Switzerland, [3]enviPath, Auckland, New Zealand, [4]Eawag, Dubendorf, Switzerland, [5]Jozef Stefan Institute, Ljubljana, Slovenia, [6]Bayer, Mohnheim, Germany
Session 5A: Contaminants of emerging concern 3, Chancellor 1, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
Liam Brydon presenting in place of Jörg Wicker.

Jörg Wicker is senior lecturer at the School of Computer Science of the University of Auckland and founder and CEO of enviPath Limited. His main research area is machine learning and its application to bioinformatics, cheminformatics, and computational sustainability. Before joining the University of Auckland in 2017, he did a PostDoc at University of Mainz, Germany, and a PhD at Technical University of Munich, Germany. He works in both applied and non-applied machine learning. Currently, he is particularly interested in reliability of machine learning algorithms, adversarial machine learning, and bias, with applications in chemistry, epidemiology, and environmental research.

enviPath is a widely used database and prediction system for microbial biotransformation pathways of primarily xenobiotic compounds. Data and prediction systems are freely available both via a web interface and a public REST API. Since its initial release in 2016, we extended the data available in enviPath and improved the performance of the prediction system and usability of the overall system. We now provide three diverse data sets, covering microbial biotransformation in different environments and under different experimental conditions. This also enabled developing a pathway prediction model that is applicable to a more diverse set of chemicals. In the prediction engine, we implemented a new evaluation tailored towards pathway prediction, which returns a more honest and holistic view on the performance. We also implemented a novel applicability domain algorithm, which allows the user to estimate how well the model will perform on their data. Finally, we re-implemented the whole system and are now able to provide data access and predictions faster and more reliably.

Predator-free islands: assessment and mitigation of human exposure to rodenticides during invasive rodent eradication

Dr Paula Castaño[1], Mr. Chad Hanson[1], Dr. Karl Campbell[2], Mr. Victor Carrión[3], Dr. Penny Fisher[4], Mrs. Emily Ruell[5], Mr. David Will[1], Dr. Shane Siers[5]
[1]Island Conservation, Santa Cruz, United States, [2]Re:wild, Puerto Ayora, Ecuador, [3]Jocotoco, Puerto Ayora, Ecuador, [4]Manaaki Whenua Landcare Research, Lincoln, New Zealand, [5]U.S. Department of Agriculture, Wildlife Services, National Wildlife Research Center, Fort Collins, United States

Session 1C: Predator free islands and conservation - human health risk aspects, Chancellor 4, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Paula is a wildlife veterinarian with a Master's in Conservation Medicine and a background in birds of prey, iguana conservation, and island restoration. She has worked with Island Conservation for over a decade providing technical assistance to government partners and local communities to prevent extinctions and restore Island ecosystems. During this time, she has worked on several island restoration projects with a focus on non-target wildlife and human mitigation strategies implementation and active restoration through native species reintroduction supporting our efforts in Latin America, North America, Southwest Pacific, and other geographies where IC implements island restoration projects with partners.

The use of rodenticides is a common method for eradicating invasive rodents from islands, with eradication projects increasingly being undertaken on inhabited islands or islands used by people to harvest food, as those projects proposed under programs like Predator Free New Zealand 2050. The expansion of eradication projects to inhabited islands requires that all real and perceived human health risks from the projects are socially acceptable or effectively mitigated. When broad-scale use of rodenticide for eradication is proposed on inhabited islands, concerns about the risks of rodenticide exposure to people, livestock, pets, game animals, and marine food resources are usually raised. Before 2022, risk to humans and exposure human pathways were assessed *a priori* for some island eradications. However, no established frameworks existed for consistent and formal approaches to such assessments. To inform the focus of future risk assessments on inhabited islands, our team synthesized the current understanding of potential pathways of human exposure to rodenticides and risk mitigation measures associated with island rodent eradication projects across 95 islands. We characterized human exposure pathways associated with rodent eradication operations on inhabited and garden islands, identified potential mitigation strategies, and assessed their efficacy in addressing real and perceived risks. Our analysis underscored the importance of integrating island communities into risk assessment and mitigation planning through meaningful engagement to enable the scalable implementation of eradications on increasingly complex inhabited island systems while proactively managing exposure risks.

Springtail safari: a field-based assessment of agrichemical use

Dr Jo-anne Cavanagh[1], Ms Grace Mitchell[1], Dr Hadee Thompson-Morrison[1]
[1]Manaaki Whenua Landcare Research, Lincoln, New Zealand
Session 2A (ii): Contaminants in soil: Filling knowledge gaps & enhancing decision making 1, Chancellor 1, August 26, 2025, 1:30 PM - 3:00 PM

Biography:
Dr Jo Cavanagh is an environmental chemist and toxicologist with over 25 years' experience working with soils and contaminants, with a particular focus on the effective use of science for decision-making in New Zealand

In 2023, the New Zealand Environmental Protection Authority (EPA) updated their reassessment of hydrogen cyanamide (HC), a plant growth regulator widely used by the kiwifruit industry for the promotion of bud growth. This reassessment identified a high in-field risk for springtails that was considered to remain non-negligible even with risk mitigation measures in place using standard risk assessment modelling for soil-dwelling organisms. Central to this modelling was laboratory chronic toxicity data for springtails (*Folsomia candida*) as no field data was available. This prompted a field study to provide preliminary information on the potential effects on Collembola and other soil invertebrate populations arising from the spray application of hydrogen cyanamide in a kiwifruit orchard. In scoping this study, it also became evident how little is known or recognised about the role of soil fauna – beyond earthworms – in agricultural systems in New Zealand, despite them being an essential component of virtually all terrestrial ecosystems.
This presentation outlines the findings of the pilot trial, and how it was used in the EPA decision-making process. We also present some perspectives on the challenge of assessing the impacts of agrichemicals on soil biota, and balancing that with the production benefits of agrichemical use.

Mining impacts on biogeochemical processes: Insights from the Ranger Uranium Mine

Dr Andrew Harford[1], Dr Lisa Chandler[1], Dr Kate Montgomery[1], Assoc. Prof. Anthony Chariton[2], Dr Chris Humphrey
[1]Dept Of Climate Change, Energy, The Environment and Water, Darwin, Australia, [2]Macquarie University, Sydney, Australia

Session 8B: Identifying 'ecologically relevant endpoints' for microbial processes to inform Environmental Quality Guidelines and One Health approaches 1, Chancellor 6, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
I am a Principal Research Scientist at the Office of the Supervising Scientist conducting research and monitoring into the impacts of uranium mining in the Alligator Rivers Region. We use an integrated creek monitoring program to predict and measure the potential impacts from mine-water discharges. This involves the use of field-based biomonitoring tools and the derivation of water/sediment quality standards using laboratory toxicity tests and field-based observations. We have developed standardised ecotoxicity tests and leading-edge tools for biomonitoring, such as genomics, videography and AI-driven image analysis. I have provided my expertise to collaborative projects to extend the capacity of ecotoxicology.

The Ranger Uranium Mine in the Northern Territory, Australia, is surrounded by the World-Heritage Listed, Kakadu National Park. The Office of the Supervising Scientist was established at the beginning of mining operations to conduct research and monitoring into the potential impacts of uranium mining on communities and ecosystems within the Alligator Rivers Region. A comprehensive research program has investigated the impacts of mine-derived contaminants on various ecosystem components, with the aim of deriving water and sediment quality guideline values for managing mine-water discharges and as targets for closure. Advances in Next Generation Sequencing (NGS) technologies have enabled the characterisation of impacts on microbial communities and their processes. The characterisation of sediment and groundwater biota required the use of DNA-based methods and the studies included analyses of the structure and function of microbial communities. Insightful differences were found in the responses of microbial community structures based on the contaminant type and the environmental matrix. For example, field studies showed that microbes exposed to magnesium sulfate-enriched groundwaters displayed structural community changes at low concentrations of 2 mg Mg/L, while microbes exposed to uranium spiked sediments responded at concentrations of >400 mg U/kg. The effect of these contaminants on microbial functional genes was investigated with metagenomic and metabolic pathway analyses (FAPROTAX), which indicated changes in carbon, sulfur and nitrogen cycling processes. However, the functional inferences being made from structural changes and genomic data warrant testing and validation. Our current soil study aims to validate inferred functional endpoints for nutrient cycling through employing a multi-omic approach with amplicons, metagenomes and metabolomes. The ability to elucidate structure-function relationships will allow the identification of ecologically relevant endpoints, which will be useful for setting Environmental Quality Guidelines and targets for rehabilitation of mine-sites.

Understanding spatial and temporal trends of atmospheric microplastics in laboratories

Honglin Chen[1,2], Professor Kevin Thomas[1,2], Dr Cassandra Rauert[1,2]
[1]Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Woolloongabba, Australia, [2]Minderoo Centre – Plastics and Human Health, The University of Queensland, Woolloongabba, Australia

Session 8A(ii): Particulates, plastics and real-time risks, Chancellor 1, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Honglin Chen received her Bachelor of Science degree in Food Science from the University of California, Davis in 2019 and a Master of Science degree in Environmental Health: Applied Toxicology from the University of Washington in 2021. Her previous work experience has focused on quality control and quality assurance. In July 2023, Honglin joined Queensland Alliance for Environmental Health Science (QAEHS) as a PhD student with a project focused on human exposure and accumulation of plastics.

Inhalation exposure is a significant pathway of human exposure to microplastics (MPs). With an increasing number of studies focus on MPs in indoor environments such as home/dormitory and offices, limited information is known about the spatial and temporal distribution of MPs in a controlled air-exchange environment, particularly a laboratory environment where MP samples are being processed and analysed. This study aims to compare the spatial and temporal distribution of MPs in a general Physical Containment Level 2 laboratory (PC2) and a purposely built plastic-free clean room laboratory. Passive deposition samplers (14 cm × 20 cm glass dishes) were deployed at 5 locations within the PC2 and the clean room laboratories fortnightly. The deposition samples were filtered through glass fibre filters with a pore size of 1 µm and analysed for a wide range of plastics with pyrolysis-gas chromatography-mass spectrometry. Polyethylene, polypropylene, polyethylene terephthalate, Nylon 6, Nylon 6,6, polyvinyl chloride (PVC), and polyvinyl alcohol (PVA) were detected regularly. PVC and PVA were the more abundant polymers at all locations, indicating that the vinyl flooring and use of 3D printers in the area could be primary sources of MP release in the laboratory environment. The total concentrations of polymers ranged from below detection limits to 60 µg/sample/2 weeks. Furthermore, the total concentrations of polymers measured within the clean room laboratory showed lower concentrations compared to the general PC2 laboratory. This result highlights that the combination of positive pressure and regular HEPA filter air recycling within the clean room laboratory effectively removes MPs background contamination. Moreover, it is being investigated further that the concentrations of polymers increased with increased activities within the laboratories. This study highlights possible emission sources of MPs within laboratories and the effectiveness of built for purpose clean room laboratories to reduce background contamination during the analysis of MPs.

Development of Proposed New Perchloroethylene Toxic Optic Neuropathy Toxicity Reference Value and Action Levels

Dr Rhian Cope[1], Dr Antti Mikkonen[2], Dr Kara Fry[2]
[1]SLR Consulting, Canberra, Australia, [2]EPA Vic, Melbourne, Australia

Session 2C: Toxicology of the Visual System, Chancellor 4, August 26, 2025, 1:30 PM - 3:00 PM

Biography:

Dr Cope originally trained as a veterinarian but has spent most of her professional career as a toxicologist. She is a Diplomate of the American Board of Toxicology, a Diplomate of the American Board of Veterinary Toxicology, and a Fellow of the Australasian College of Toxicology and Risk Assessment. Dr Cope has held academic positions at the University of Illinois and Oregon State University. Dr Cope is a former Principal Toxicologist for the Australian Pesticides and Veterinary Medicines Authority and a monographer for WHO JMPR. Dr Cope is currently a Technical Director at SLR Consulting.

Perchloroethylene (PCE) is a widely used chlorinated hydrocarbon solvent. The most sensitive target systems for PCE are the central nervous and visual systems. To support the development of a new proposed health protective toxicity reference value (TRV) and Action Levels (ALs), a protocol driven extant literature search on PCE visual effects was conducted using PubMed and Google Scholar. A total of 17,300 publications were identified, checked and triaged for relevance. Of these, 12 publications were then selected for reliability scoring and further evaluation. Selected studies were rated as Klimisch Score 2 (reliable with restrictions) and ranked low on the Hierarchy of Evidence. The key identified visual effects of PCE exposure included blue-yellow dyschromatopsia associated increases in the color confusion index, effects on pattern reversal visually provoked potentials (pVEPs), and reduced visual contrast sensitivity (VCS). Critically, no study reported progression to red-green dyschromatopsia.

Human occupational exposure dose response data in relation to blue-yellow dyschromatopsia was identified amongst the evaluated studies. This enabled the derivation of a new proposed TRV for this effect of 258 µg/m^3 for 24 hours/day, 7 days/week exposure for ≤ 106 months based on a point of departure (POD) of 7,750 µg/m^3. The limited available data on the effects of PCE on pVEPs indicate that the proposed new TRV will be protective against this effect. However, non-adverse effects on VCS may still occur at exposures below the TRV. Due to a lack of understanding of the adverse outcome pathways for PCE-induced effects on the visual system, and the limited volume and quality of the data, the proposed new TRV carries with it a marked level of uncertainty. It is proposed that this uncertainty can be managed by the use of a series of proposed new ALs that can be used to guide a health protective, public health response.

Dietary exposure assessment – giving context to toxicology

Mr Peter Cressey[1], Ms Tracy Hambridge[2]
[1]PHF Science, New Zealand, [2]Food Standards Australia New Zealand, Canberra, Australia
Session 7A: Food Chemical Risk Assessment 1, Chancellor 1, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Peter Cressey is a Science Leader at ESR. His major expertise is in food chemical exposure and risk assessment, particularly in relation to mycotoxins, natural toxins, environmental contaminants, veterinary drug and pesticide residues and food additives. He has also been involved in studies to assess the burden and cost of foodborne diseases in New Zealand. Peter is currently an active participant in both JECFA and JMPR as an expert for exposure assessment of chemicals in food. He is a Fellow of the New Zealand Institute of Food Science and Technology.

Within the risk assessment paradigm (hazard identification, hazard characterisation, exposure assessment and risk characterisation), exposure assessment is often the main situation specific aspect. Information on the hazard and its dose-response relationship is generally not dependent on the location of the risk assessment but, wherever possible, exposure estimates should be representative of the population of interest. Dietary exposure assessment combines information on food consumption and residue/additive/contaminant concentrations in those foods. Both of these aspects can vary considerably between countries and even between different regions of the same country. Dietary exposure assessment may also consider acute exposures, where the concern is the coincidence of high chemical concentrations with high food consumption levels, and chronic exposures, where the concern is the ongoing, habitual patterns of chemical concentrations and food consumption. This presentation will review the data sources and techniques that underpin dietary exposure assessment at a national and international level and will highlight the pivotal role of dietary exposure assessment in connecting health-based guidance values, such as ADIs, to food standards, such as MRLs.

The Green Fairy

Dr Rosalind Dalefield[1]
[1]Food Standards Australia New Zealand, New Zealand
Session 8A(i): Food Chemical Risk Assessment 2, Chancellor 1, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Rosalind Dalefield PhD DABT DABVT completed a postdoctoral residency at Kansas State University in 1999 and gained her Board certifications in the same year. After a number of years working as a Study Director at contract toxicology laboratories in the USA, she returned to New Zealand and has been a senior toxicologist at FSANZ for 15 years.

Of the eighteen plants listed in Schedule 24 of the Food Standards Code, seven are restricted because of their thujone content. Thujone, a monoterpenoid of wormwood (*Artemisia* species), has been considered the cause of the neurological effects of absinthe. This presentation reviews the social and regulatory history of absinthe, the toxicology of thujone, and the changing regulations related to absinthe, with illustrations from advertisements and from works of obscure and famous painters.

How to Poison the Credibility of Regulators: Responding to Hollywood's Advocacy on PFAS

Dr Craig Dalton[1]
[1]University Of Newcastle, Newcastle, Australia

Session 1B: Bridging the gap: Collaborative pathways to transformative outcomes in pollution monitoring, mitigation and management 1, Chancellor 6, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Public Health Physician with a 25-year history of working with communities and government assessing and communicating infectious and toxicological risks to health. Author of "How NOT to Piss Off a Community – How to work in low-trust environments with integrity and compassion".

Popular media portrayals of per- and polyfluoroalkyl substances (PFAS) in documentaries like "How to Poison a Planet" and films such as "Dark Waters" present communities devastated by PFAS exposure, depicting clusters of cancer cases in alarming concentrations. These dramatic narratives create public risk perceptions that often exceed scientifically established risks by orders of magnitude, without acknowledging uncertainties inherent in the evidence base. This presents a significant challenge for regulatory agencies and government risk communicators who must convey nuanced scientific assessments alongside uncertainties regarding PFAS carcinogenicity in humans. Recent surveys indicate that individuals previously unaware of PFAS exhibit rapidly escalated concern after exposure to even minimal information about these substances. It is possible that psychological impacts from PFAS-related anxiety may now rival or exceed documented physical health effects in some contexts.

This presentation contrasts popular media narratives with government risk communication on PFAS to examine the widening gap between public perception and current scientific understanding. This disconnect undermines trust in regulatory institutions, potentially exacerbating psychological distress among community members uncertain about whom to trust or what information is reliable. Furthermore, this perception gap may distort societal resource allocation for health and environmental protection and generate unwarranted stigmatization with attendant economic consequences. While environmental advocacy films have proliferated since "Erin Brockovich" popularized the genre, research on their influence on chemical risk perception remains surprisingly limited.

We will explore potential response strategies ranging from developing alternative narratives based on IARC monographs that are more relatable to a community through to a proposal for collaborative movie reviews produced by professional societies such as ACTRA and SETAC. The discussion aims to identify approaches that maintain scientific integrity while acknowledging legitimate community concerns and rebuilding regulatory credibility in an era of competing information sources.

Quantifying Small Antifouling Paint Particles in Sediments by Pyrolysis-Gas Chromatography-Mass Spectrometry

Mr Gabriel De la Torre[1], Dr. Elvis Okoffo[1], Dr. Cassandra Rauert[1], Dr. Alistair Grinham[2], Dr. Kevin Thomas[1]

[1]Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, 20 Cornwall Street, Woolloongabba, QLD, 4102, Brisbane, Australia, [2]Fluvio Pty Ltd., Australia

Session 4C(ii): Micro- and nanoplastics: Environmental emission and sources, human exposure, & potential health implications 1, Chancellor 4, August 27, 2025, 11:00 AM - 12:30 PM

Biography:

PhD student at the Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Australia. Researcher at Universidad San Ignacio de Loyola, Peru. My research interests are micro/nanoplastics, antifouling paint particles, polar science, and marine pollution. I am also an Antarctic researcher and conservationist.

The release of antifouling paint particles (APPs) from maritime activity poses a significant yet poorly investigated source of contamination in coastal environments. Recent studies showed that separating and identifying these particles from the sediment matrix is challenging and limited to large-size fractions (>500 µm). This study aimed to develop and optimise a method to extract, detect, and quantify APPs of any size from complex environmental matrices using accelerated solvent extraction (ASE) followed by pyrolysis-gas chromatography-mass spectrometry (Pyr-GC-MS). Rosin was detected as a binder across all APPs and selected as a marker, while methyl abietate was selected as a quantifier. Dichloromethane (DCM) dissolved all APPs at room temperature, confirming the suitability of developing a solvent extraction method. Eight-point calibration curves were constructed for methyl abietate using different paint brands and a rosin standard with R2 values ranging from 0.977-0.994. For the extraction of APPs, spike experiments with a rosin standard were conducted with an optimised ASE method (180 °C and 1500 psi). The recoveries of rosin ranged from 95-135%, depending on the spike concentration. Sediment samples were obtained from a local marina and analysed using the developed method to preliminarily validate its effectiveness. Methyl abietate was detected and traced back to the presence of APPs. Additionally, a range of potential natural interferences were tested in the analysis. The study demonstrated the suitability of Pyr-GC-MS for the quantitative detection of APPs in complex matrices, ultimately overcoming previous challenges reported in the literature.

Assessment of *Amphibola crenata* as a bioindicator of estuarine trace element pollution using biochemical and physiological endpoints

Dr Nuwan De Silva[1,2], Prof. Islay D. Marsden[2], Prof. Sally Gaw[3], Prof. Chris N. Glover[2,4,5]
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Session 2A (i): Risk Assessment & Regulation of Metals 2, Chancellor 1, August 26, 2025, 1:30 PM - 3:00 PM

Biography:
I am a Freshwater Scientist at the Environment Canterbury Regional Council in Christchurch, New Zealand. My work is driven by a deep passion for environmental monitoring and protecting our precious freshwater ecosystems. I provide scientific advice on environmental matters related to aquatic environments, including rivers, lakes, and estuaries. Through my role, I contribute to evidence-based decision-making that supports sustainable management and conservation of freshwater resources in the Canterbury region.

To assess its utility as a bioindicator of estuarine contamination, *Amphibola crenata*, a pulmonate mud snail, was collected from 17 estuaries in New Zealand. Whole-body soft tissue trace element concentrations were measured via quadrupole inductively coupled plasma mass spectrophotometer (Q-ICP-MS) and were found to be significantly positively correlated with sediment trace element profiles for arsenic, copper and lead. Snails from polluted estuaries generally displayed higher ammonia excretion rates, elevated whole-body soft tissue catalase activity and lipid peroxidation compared to snails from reference sites. Across all sites haemolymph glucose was positively correlated with the tissue burdens of arsenic, copper, nickel and zinc, while haemolymph protein was negatively correlated with arsenic, cadmium and zinc soft tissue concentrations, indicative of altered energy metabolism associated with trace element contamination. Overall, sites were distinguishable by application of the array of measures employed. Our findings suggest that gastropods have significant value as bioindicators of estuarine health.

Addressing Agent Toxicity in Community Risk Assessment for Lord Howe Island Rodent Eradication

Dr Bob DeMott[1], Dr. Belinda Goldsworthy[2], Dr Joseph Rodricks[1]
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Session 1C: Predator free islands and conservation - human health risk aspects, Chancellor 4, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Bob DeMott is a board-certified toxicologist who practices in the areas of risk assessment for product registration and stewardship and for contaminated lands. He has completed pesticide risk assessments on behalf of the Australian Department of Health and commercial registrants in the US. Dr. DeMott led a risk assessment addressing Lord Howe Island community concerns related to a rodent eradication program involving anticoagulants. He has also directed risk assessments incorporating specialised exposure scenarios important to Ngāi Tahu, Yawaru, and Port Hedland community members.

There was a full-time residential community on Lord Howe Island throughout the successful rodent eradication program completed there. Bait pellets containing the second-generation anticoagulant brodifacoum were used for this program. The Office of the Chief Scientist and Engineer, NSW commissioned a human health risk assessment and incorporated outreach to community members to identify specific questions and concerns about exposure scenarios and the toxicity of the rodent control agent. In addition to adult and pre-school child residential receptors typical in risk assessments, community members identified primary school age children going barefoot and pregnant women engaged in outdoor activities such as trekking in baited areas as locally important receptor scenarios. In addition to typical evaluation of long-term exposure to potential residues, community members requested that the acute exposure scenario of toddlers or school age children consuming bait pellets be evaluated and addressed. This necessitated characterising and explaining differences between recognized acute effects and potential chronic endpoints accounted for in long-term exposure scenarios. Separate acute and chronic reference doses were included. For chronic risk characterisation, typical hazard indices (HI) were used for comparability and consistency with standard agency guidance – all were below 1. To characterise risks of acute effects using a familiar, readily understood metric, comparisons to the reference dose were presented in terms of the number of bait pellets that would have to be ingested, e.g., a 15-kg child would have to ingest more than five of the specified bait pellets to reach the threshold for anticoagulant effects. The risk characterisation also discussed the availability of monitoring for anticoagulant effects via prothrombin time testing done routinely at the island hospital and the specific, reliable antidote, Vitamin K, being on hand due to therapeutic use of warfarin for cardiovascular conditions by island residents.

Antimicrobial resistance: A global health crisis with complex environmental dimensions

Professor Erica Donner[1]
[1]CRC SAAFE, Adelaide, Australia

Session 9B: Identifying 'ecologically relevant endpoints' for microbial processes to inform Environmental Quality Guidelines and One Health approaches 2, Chancellor 6, August 28, 2025, 1:35 PM - 3:05 PM

Biography:
Erica Donner is Research Director of Australia's Cooperative Research Centre for Solving Antimicrobial Resistance in Agribusiness, Food, and Environments (SAAFE CRC), and a Research Professor in the Future Industries Institute at the University of South Australia. She is an interdisciplinary environmental scientist specialising in systems-based contaminants analysis, risk assessment and management, especially in relation to water and food production systems.

Antimicrobial resistance (AMR) is one of the most pressing issues facing humanity this century. It's a complex threat that is projected to cost the global economy US$100 trillion by 2050, impacting agricultural productivity, food security, and the health of humans, animals, plants, and environments. Recent analysis shows that more than 39 million people will die from antibiotic-resistant infections between now and 2050. Antimicrobials and other drivers of AMR are used and released in myriad ways to diverse environments. As the world mobilises to mitigate the complex threat of AMR, the importance of integrating the environmental dimensions into a One Health approach to tackle the issue is increasingly emphasised. Yet how to best do that is much debated. The One Health concept recognises the inherent interrelatedness of human, animal, plant, and environmental health and has important implications for environmental management. For example, it is evident that water, wastewater, and biosolids are important connectors in the complex web of AMR sources, amplifiers, and receptors, and there is a growing evidence base showing that improvements in water, sanitation, and hygiene management can significantly reduce the critical threat of AMR by limiting its development and spread in the environment and reducing infections and the need for antimicrobials. This presentation will demonstrate the multifaceted nature of One Health AMR, highlight some of the key challenges in assessing AMR associated water quality risks, and show why the environmental dimensions of AMR are central to mitigating this pressing global One health crisis.

Changing the rules to keep New Zealanders safe - the role of re-assessments in chemical management

Dr Joanna Dowle[1], Dr Shaun Presow[1]
[1]Environmental Protection Authority, Wellington, New Zealand
Session 9C: Regulatory science, policies, and evidence-based decisions, Chancellor 4, August 28, 2025, 1:35 PM - 3:05 PM

Biography:
Dr Joanna Dowle did her PhD in marine natural products chemistry at Victoria University of Wellington, followed by two post-doctoral studies in peptide and protein synthesis at the University of Chicago and the University of Auckland. Joanna joined the EPA in 2020 and is currently a Senior Advisor in the EPA's Hazardous Substances Re-assessments Team.

Under the Hazardous Substances and New Organisms Act 1996 (New Zealand's hazardous substance legislation), approvals do not expire. To make changes to an approval such as updating its classification or controls (rules) for its use, or to revoke an approval where the risks cannot be appropriately mitigated, requires a process called a "reassessment". The amendment of group standards (which allow for the control of multiple substances with similar classifications and use scenarios) undergoes a similar process.

This talk will discuss the current (or recently completed) re-assessments and group standard amendments being undertaken at the EPA, and the science behind these projects:

- the proposal to ban the organophosphate chlorpyrifos, which is being considered for listing as a persistent organic pollutant (POP) under the Stockholm Convention
- the reassessment of chlorthal-dimethyl (DCPA) after recent evidence of effects on foetal development in pregnant workers or bystanders
- the review of 6 herbicides that are used in or on water to control invasive aquatic weeds
- the recent amendments to the cosmetic products group standard to align it with the EU cosmetic regulations
- current work on the tattoo ink and permanent makeup group standard.

Advancing the registration of norbormide as an alternative to broad-spectrum rodenticides

Professor Charles Eason[1], Dr Lee Shapiro[2], Mr Duncan MacMorran[3], Dr Dave Rennison[4], Mr Karl Smith[5], Prof Margaret Brimble[4]
[1]Lincoln University, Lincoln, New Zealand, [2]Boffa Miskell Ltd, Auckland, New Zealand, [3]IPC Ltd, Auckland, New Zealand, [4]University of Auckland, Auckland, New Zealand, [5]TCC (NZ) Ltd, Auckland, New Zealand

Session 1C: Predator free islands and conservation - human health risk aspects, Chancellor 4, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Professor Charles Eason, Lincoln University, NZ has a background in toxicology and pharmacology and the development of medicines and pest control products. He specialises in the challenging area of vertebrate pesticide toxicology and product registrations.

Rodent control and eradication is dependent on anticoagulants such as brodifacoum which is highly effective but bioaccumulative leading to secondary poisoning. These features were highlighted on Rat Island in 2011 with high mortality of eagles following an eradication campaign. To register an alternative rodenticide that could reduce reliance on brodifacoum requires commitment. Norbormide is an older agent which is rapidly metabolised, has unique attributes, being 100 to 150-fold more toxic to rats than to birds, most other mammals, including humans, and justifies this investment. Its contractile effect on rat peripheral arteries and the lack of this effect in other species explains why this compound is uniquely toxic to rats. A historical database circa 1965 in over 50 species demonstrated species specificity. These early studies were not carried out in accordance with recent test guidelines. Standard Organization for Economic Cooperation and Development (OECD) guideline studies have now been completed to focus on data-gaps in chemistry, genetic toxicology, non-target toxicity, general ecotoxicity and environmental fate. To date norbormide has been shown to lack genotoxicity in OECD 471, 487 and 490, *in-vitro* studies. It lacked irritancy in OECD 404, 406 and 407. Further OECD studies (OECD 207 and OECD 487) are yielding results consistent with historical data that reported LD50 ranges, following oral administration for Norway rats, between 5.3 and 15.0 mg/kg. The lack of toxicity (i.e., LD50 > 1,000 mg/kg) previously reported in five bird species and numerous mammalian species, including rhesus monkeys, is being further clarified by ecotoxicology studies in birds, earthworms, fish and *Daphnia* (OECD 223, 207, 202 and 203). Field efficacy data, generated with baits containing a consistently palatable form of norbormide, and results from safety testing will be presented. These studies all demonstrate very low or no risk to human and environmental health.

Metal bioaccumulation in a tropical river food web in northern Australia

Ms Isabel Ely[1], Dr Larissa Schneider[2], Professor Stephen Garnett[1]
[1]Charles Darwin University (CDU), Darwin, Australia, [2]Australian National University (ANU), Canberra, Australia

Session 7C(ii): Ecotoxicology & environmental monitoring in challenging environments, Chancellor 4, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Isabel is an Environmental Scientist based in Darwin, NT. With a background in animal biology, she is completing her PhD research at Charles Darwin University, investigating the impact of toxic metals on the aquatic biota of tropical systems. She uses food web interactions to determine pathways of metal exposure in the environment, which can affect traditional communities relying on bush food. Isabel is keen on the integration of Indigenous knowledge into the research of water pollution, where ecological processes and cultural values could be compromised.

Between 1954 and 1971, an estimated 1 million L/day of waste was released into the Finniss River, where the Rum Jungle Mine (NT, Australia) is located. Acids, metals, and radionuclides killed all biota in the 15 km of the Finniss River downstream of the mine site. After several years of rehabilitation efforts, the river ecosystem gradually improved. The present study employed the ICP-MS analysis to determine concentrations of copper, manganese, zinc, arsenic, lead and cadmium, and δ13C and δ15N isotope ratios to establish trophic links of the food web. Suspended organic matter (SOM), detritus and 37 species, including algae, plants, molluscs, aquatic insects, crustaceans, and fish, were collected. We used a baseline at the lowest $\delta^{15}N$ value and assumed a 3.4‰ increase per trophic level. As a typical wet and dry tropical Australian river, the Finniss River food web was found to be diverse and omnivory widespread. Metal concentrations varied significantly across trophic levels for all elements analysed, indicating that trophic level plays a significant role in metal accumulation. Primary consumers (mussels and crustaceans) displayed the highest metal concentrations among the biota, likely reflecting dietary assimilation from detritus and decomposing organic material. Secondary and tertiary consumers (vertebrates) exhibited comparatively lower and more consistent concentrations of metals. Results suggest that food sources (SOM and detritus) and autotrophs (algae and plants) served as primary metal reservoirs and influenced overall metal cycling. Mussels and crustaceans are critical monitoring organisms for the Rum Jungle rehabilitation. Biomagnification appears limited based on the lower detection concentration in top predators when compared to their prey. No biomagnification of metals through the aquatic food web was detected. However, high baseline concentrations in primary producers and detritivores indicate persistent environmental exposure, which can impact ecosystem stability and recovery.

Assessment of Microplastic Pollution in Snow: A Study from a High Mountain National Park in Türkiye

Bayan Fatma Nur Eraslan[1,2], Dr. Cassandra Rauert[2], Prof. Dr. Eftade O. Gaga[1]
[1]Eskişehir Technical University, Eskişehir, Türkiye, [2]Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Brisbane, Australia

Session 4C(ii): Micro- and nanoplastics: Environmental emission and sources, human exposure, & potential health implications 1, Chancellor 4, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Fatma Nur Eraslan is a PhD candidate in environmental engineering at Eskişehir Technical University in Türkiye. She is currently in Australia as a visiting PhD researcher for one year at the Queensland Alliance for Environmental Health Sciences (QAEHS), University of Queensland. Her research focuses on developing green and effective methods for airborne microplastic sampling and analysis using Py-GC/MS. She has participated in a few national and international field studies on air pollution. Passionate about laboratory work and mentoring, she aims to establish her own research group in Türkiye to foster international collaboration and innovation in environmental science.

Atmospheric microplastics (MPs) can travel long distances through wind, rain, and snow, eventually depositing via wet (rain, snow, fog) and dry deposition. The aim of this study was to identify and characterize MP pollution and its distribution in Uludağ, a mountain ski resort actively used for winter sports, by combining both visual identification techniques and pyrolysis gas chromatography mass spectrometry. A total of fifty samples were collected from four different regions (the ski slope start, the ski slope end, the camping area, and the summit) of a route on the mountain. Sampling involved three methods: surface snow, fresh snow, and core snow collection. The distribution of MPs across all sampling locations was determined using the surface snow and fresh snow samples collected. Moreover, the distribution of MPs vertically through the snow bank was investigated using the core snow samples collected at the summit. The camping area had the highest MP concentrations in surface snow samples, followed by the summit, and ski slope start. Most polymer types had the highest concentrations at the summit's deepest position (80–100 cm), indicating that MPs may have moved down towards the soil surface by snowmelt infiltration. Furthermore, the findings of the study indicated that PET (Polyethylene terephthalate) was the most prevalent MP type in all samples, followed by PE (Polyethylene) and PVC (Polyvinyl chloride). The findings indicate that MPs are ubiquitous and may be influenced by human activities, such the use of polymer-based products and equipment.

He kākano ahau: Learnings of an Indigenous emerging scientist on delivering impact for Māori

Miss Grace Feltham[1]
[1]PHF Science, Christchurch, New Zealand

Session 1B: Bridging the gap: Collaborative pathways to transformative outcomes in pollution monitoring, mitigation and management 1, Chancellor 6, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
He uri ahau nō Te Awa Tupua
Ko Te Āti Haunui a Pāpārangi te iwi
Ko au te awa, ko te awa ko au

Grace holds an MSc in Environmental Science, a BSc in Chemistry, and a BA in Te Reo Māori. She is a kaipūtaiao / scientist in the Māori Impact Team, working across a number of kaupapa within the He Wai Māpuna programme. Her mahi spans lab, field, and community-based work, focused on delivering quality science led by mātauranga Māori that provides clear outcomes for partner communities.

Māori knowledge and interests relating to the hauora (health) of people and environment are wide ranging and have far-reaching implications for the delivery of environment-based science in Aotearoa. The ability of scientists and science institutions to meaningfully engage with Māori has been inconsistent and often relies on the leadership of a small number of Māori science leaders. While initiatives such as Vision Mātauranga have created the space for Māori-led innovation in science, feedback on the success of these initiatives has been mixed.

The Māori Impact Team at the Institute of Environmental Science and Research (ESR) works directly with iwi to deliver health and environment-based science. Our focus extends beyond the common approach of 'engagement' with Māori and instead aims to grow the distinct local knowledge of Māori communities through the strategic delivery of modern science and technology which aligns with their needs, and aspirations.

In this presentation I will discuss my key learnings to date as an emerging Indigenous scientist, including the common challenges I have observed for scientists working in Indigenous spaces. I will share my insights into what makes for successful iwi-scientist partnerships through specific case studies from our Māori Impact research programmes.

Embracing open and transparent research practices in behavioural ecotoxicology

Kate Fergusson[1], Marlene Ågerstrand[2], Tomas Brodin[3], Rhiannon Eastment[1], Malgorzata Lagisz[4], Erin McCallum[3], Gabriel Melhado[1], Marcus Michelangeli[5], Kyle Morrison[4], Shinichi Nakagawa[4], Rose O'Dea[6], Shiho Ozeki[1], Dominique Roche[7], Eli Thoré[8], Jake Martin[9], Bob Wong[1], Michael Bertram[3]
[1]Monash University, Melbourne, Australia, [2]Stockholm University, Stockholm, Sweden, [3]Swedish University of Agricultural Sciences, Umeå, Sweden, [4]University of New South Wales, Sydney, Australia, [5]Griffith University, Brisbane, Australia, [6]University of Melbourne, Melbourne, Australia, [7]Carleton University, Ottawa, Canada, [8]University of Namur, Namur, Belgium, [9]Deakin University, Waurn Ponds, Australia

Session 5B(i): Enhancing evidence synthesis in ecotoxicology 2, Chancellor 6, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
Kate is a PhD Candidate from Monash University, Melbourne, Victoria. Her research primarily focuses on investigating the ecological impacts of pharmaceutical pollution in fish, including behaviour, physiology, and morphology. She is also interested in evidence synthesis and exploring open science practices in behavioural ecotoxicology.

Animal behaviour has been shown to be a sensitive, powerful, and ecologically meaningful endpoint in assessing the impacts of exposure to chemical pollutants. Accordingly, there has been a rapid recent growth in behavioural ecotoxicology research, as well as an increased focus on incorporating behavioural data into applied environmental protection efforts. Despite this, there has to date been no concerted effort to assess the extent to which open and transparent research practices have been adopted in the field of behavioural ecotoxicology. Improved reproducibility of studies, reduced bias, and the elimination of fraud are just some of the benefits the scientific community gains from increased uptake of open and transparent research practices. Moreover, embracing these practices would be beneficial to behavioural ecotoxicology because a portion of the research in this field is used to inform environmental risk assessments and chemical regulation. Here, we aimed to examine the use of open and transparent research practices in behavioural ecotoxicology. First, we provide an overview of the key factors related to open and transparent research practices, along with how and why they should be adopted in behavioural ecotoxicology. We then conducted a systematic review using a sample of 300 behavioural ecotoxicology papers published between 2022 and 2024, to assess the current use of open and transparent research practices in this field. Finally, we discuss the importance of open and transparent research practices in the context of adopting behavioural endpoints in applied environmental protection efforts. Improving accessibility and reproducibility of research in behavioural ecotoxicology is a crucial step towards better protecting wildlife and ecosystems in a rapidly changing world.

Monitoring chemical exposure and effect in sea turtles using novel cell-based bioassays

Dr Kimberly Finlayson[1]
[1]Griffith University, Southport, Australia

Session 5C(ii): Alternative approaches to animal testing, Chancellor 4, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
Dr Kimberly Finlayson is an ecotoxicologist and marine biologist, with expertise in sea turtles, primary cell establishment, and cell-based bioassays. Her work focuses on establishing ethical alternatives to assess the effects of chemical contaminants in wildlife, particularly sea turtles, cetaceans and dugongs.

Sea turtles are exposed to, and accumulate, chemical contaminants from the marine environment. Cell-based techniques have increasingly been applied to sea turtles to better assess the effects of these contaminants. These techniques can be used to assess the effects of environmentally relevant mixtures and concentrations of organic contaminants to which turtles are exposed by extracting contaminants from turtle blood and testing the toxicity of extracts on sea turtle cells. This technique was used to assess spatial and temporal changes in chemical exposure and effect in foraging sea turtle populations throughout Queensland. Differences in chemical exposure between foraging grounds were detected, highlighting foraging populations that may be at greater risk. Temporal changes in chemical exposure were also detected. Importantly, these results also include a measure of effect, providing more information than chemical analysis alone. These results demonstrate this technique can be applied to regular monitoring of chemical contaminants and highlight the importance of ongoing monitoring to comprehensively assess chemical risk in sea turtles.

Marine guideline values for the oil spill control agent Slickgone EW

Ms Florita Flores[1], Dr Heidi Luter[1], Dr Rebecca Fisher[2], Dr Joost van Dam[3], Dr Paul Irving[4], Dr Andrew Negri[1]

[1]Australian Institute of Marine Science, Townsville, Australia, [2]Australian Institute of Marine Science, Crawley, Australia, [3]Australian Institute of Marine Science, Casuarina, Australia, [4]Response Intelligence Associates, Canberra, Australia

3C(ii): Contaminants of emerging concern 1, Chancellor 4, August 26, 2025, 4:10 PM - 5:40 PM

Biography:

Florita Flores is an Experimental Scientist at AIMS, specialising in tropical marine ecotoxicology, with a strong focus on corals. With over 15 years' experience her research explores innovative ways to assess impacts of climate change and pollutants, including pesticides and hydrocarbons, to coral reef organisms. This work is integral to understanding and mitigating the effects of pollutants on tropical marine environments by providing data to support the derivation of water quality guidelines and risk assessments. With her expertise in coral physiology, her recent endeavours include improving techniques to upscale coral aquaculture to support reef restoration efforts.

The continued extraction and transport of oil at sea increases the risk of accidental spills and discharges. Although large oil spills are infrequent, they can cause extensive and long-lasting damage to marine habitats and wildlife. In Australia, 15 oil spill control agents are currently registered for use in marine waters, including the chemical dispersant Slickgone EW. However, there are no default guideline values (GV) established for this product. This study developed a Species Sensitivity Distribution (SSD) based on combining: (1) new toxicity data for 7 tropical marine species across five taxonomic groups, including a tropical coral and sponge; and (2) existing toxicity data, increasing the species and taxonomic groups to 14 and seven, respectively. Preliminary no-significant-effect-concentrations (NSECs) were derived from concentration-response relationships for the 14 species, ranging from 0.1 to 1160 mg L-1 Slickgone EW, with the gastropod *Nassarius dorsatus* being the most sensitive and the rock oyster *Saccostrea commercialis* the least sensitive–demonstrating high variability in sensitivity. Larvae of the coral *Acropora kenti* were 5-times more sensitive to Slickgone EW than the larval sponge *Ianthella basta*. Protective concentration values were derived from the SSD. These are the first GVs for Slickgone EW derived in accordance with Australian and New Zealand criteria, providing a more robust foundation for risk assessments related to its use in marine oil spill response.

Identifying microbial indicators of pollution in freshwater urban constructed wetlands

Anna Flynn[1], Mark Osborn[2], Vincent Pettigrove[1], Jeff Shimeta[2], Sara Long[1]
[1]Aquatic Environmental Stress Research Group, RMIT University, Bundoora, Australia, [2]School of Science, RMIT University, Melbourne, Australia

Session 8B: Identifying 'ecologically relevant endpoints' for microbial processes to inform Environmental Quality Guidelines and One Health approaches 1, Chancellor 6, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Anna Flynn is a final year PhD candidate with the Aquatic Environmental Stress Research Group (AQUEST) at RMIT University, Australia. Her PhD research is looking at detecting changes in microbial community structure and function using eDNA, as a sensitive indicator of pollution exposure in freshwater wetlands. Anna graduated from RMIT with a Bachelor of Environmental Science (Distinction) in 2020 and a BSc Honours in Biology (First Class) in 2021. Her key interests include environmental sustainability, conservation, and marine & freshwater biology.

Freshwater ecosystems are under significant threat from anthropogenic pollution. Currently, there is a lack of consideration for impacts on microbial taxa in environmental quality guidelines, as well as an absence of microbial indicators that could complement and enhance the scope of current biomonitoring analyses. Environmental DNA is expanding the field of aquatic monitoring with the ability to assess large biological profiles quickly and reliably, and providing knowledge of how contamination affects ecosystems down to a microbial level. Improved understanding of what contamination is present in waterbodies and how it is affecting all aspects of ecosystem functioning enables better targeted mitigation measures. Our research explored the impacts of three major contaminants on sedimentary microbial assemblages, assessing the variation in assemblage structure and the identification of potential bacterial bioindicator taxa. We used lab-based microcosms to assess the impact of metal contamination on microbial communities from clean and contaminated ecosystems, and field-based microcosms to compare responses to exposure from metal, pesticide, and pharmaceutical contamination. Our results showed significant variation in microbial community structure that was correlated with contamination levels. The lab-microcosms identified significant assemblage change over a temporal and concentration gradient in response to metal contamination, and between microbes from uncontaminated and contaminated ecosystems. Seven bacterial families were identified as possible diagnostic indicators of metal contamination. The field-microcosms identified significant variation between the three contaminant types and identified potential bacterial indicators that could be diagnostic for either one, two, or all three of the contaminant types. We also discuss the ideal taxonomic resolution for the assessment of community-level variation and the identification of bioindicator taxa that have potential to be used in ecosystem health assessments.

A Hybrid Multisampler with Tandem Quadrupole Mass Spectrometer to Solve Solvent Effect in PFCAs and its Precursor FTOHs Analysis

Dr Chris Fouracre[1], Zhihui Lin[2], Jianzhong Li[3], Chunye Sun[4], Winnie Hung[5]
[1]Agilent Technologies Australia, Mulgrave, Australia, [2]Agilent Technologies China, Guangzhou, China, [3]Agilent Technologies China, Beijing, China, [4]Agilent Technologies China, Shanghai, China, [5]Agilent Technologies China, Hong Kong, China
Session 4A: Contaminants of emerging concern 2, Chancellor 1, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Chris Fouracre has been with Agilent since October 2002. He began his career as a service engineer for both gas and liquid phase instruments and mass spectrometry and then moved to LCMS applications in 2006. Currently Chris is the LCMS Product Specialist for ANZ. Chris graduated with a Ph.D. in Organic Chemistry from the University of Sydney then spent a year at the Max Planck Institute for Polymer Research in Mainz, Germany, as a postdoctoral research fellow working on organic polymer chemistry. He then spent four years as a practising analytical chemist in government (ASDTL) and private-sector laboratories (Chemika).

According to the pre-treatment steps recommended in BS EN ISO 23702-1:2023 <Leather — Per- and polyfluoroalkyl substances Part 1: Determination of non-volatile compounds by extraction method using liquid chromatography, methanol was ultimately used as the main diluent for the sample solution. However, during the analytical process, significant solvent effect issues often arise when methanol diluent is applied to the sample.

To address these solvent effect issues, this article combines the Agilent 1260 Infinity III Hybrid Multisampler and employs a tandem quadrupole mass spectrometer to establish a method for the simultaneous analysis of perfluoroalkyl carboxylic acids and their precursor fluorinated alcohols in consumer products, aiming to meet daily high-throughput detection needs.

Samples have been pre-treated according to BS EN ISO 23702-1:2023 and the analysis was performed on an Agilent 6475 TQ with the use of an Agilent 1260 Infinity III Hybrid Multisampler. Water containing 5mM ammonium acetate and Acetonitrile were used as the aqueous mobile phase A and Organic solvent phase B. For TQ analysis, two primary mass transitions per compound were used for the dMRM acquisition.

The separation of 50 PFAS can be rapidly achieved within 18 min at the optimized UHPLC condition. With the use of Agilent 1260 Infinity III Hybrid Multisampler, 20 µL PFAS standard in method solvent was injected to initial mobile phase (mobile A: B = 9: 1). Early-eluting compounds, such as PFBA, achieved good peak shape which greatly mitigated the impact of solvent effect. Excellent linearity and repeatability for all compounds was achieved ($r^2>0.99$; RSD of retention times<0.1%, n=6; RSD of peak area<10.0%, n=6).

A new method to mitigate sample solvent effects without decreasing injection volume and eliminate the need to reconstitute samples.

Thallium in Kale: A Case Study in California Illustrates the Potential for Toxicity from Dried Kale Chips

Jefferson Fowles[1]
[1]Ministry for Primary Industries / New Zealand Food Safety, Wellington, New Zealand
Session 7A: Food Chemical Risk Assessment 1, Chancellor 1, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Jefferson Fowles is Principal Advisor in Toxicology for New Zealand Food Science and Risk Assessment at the Ministry for Primary Industries (MPI). Holding a Ph.D. in Toxicology from Oregon State University, his prior roles have included serving as staff and senior toxicologist with the California Department of Public Health, Bayer CropScience, Lyondellbasell, and the Institute of Environmental Science and Research.

Thallium is a toxic, tasteless, and odourless metal with exposure possible via ingestion, inhalation, or skin contact. Despite its toxicity, health-based thresholds remain poorly defined; the U.S. EPA withdrew its reference dose of 0.05 µg/kg/day in 2009, and no regulatory limits exist for thallium in food in New Zealand or internationally. In response to a 2023 JECFA data call, thallium has been included in the 2024/25 New Zealand Total Diet Study in Infants and Toddlers.

A 2022 investigation by the California Department of Public Health linked elevated urinary thallium and neurological symptoms in a family to consumption of commercial dried kale chips containing 2.1 mg/kg thallium. Thallium bioaccumulates in kale via soil uptake, and dried kale products may concentrate thallium to toxic levels. One child had a urinary thallium level of 10.5 µg/g creatinine—well above the NHANES 95th percentile of 0.4 µg/g. Estimated exposure from a single 28 g serving/day was ~3 µg/kg/day. Symptoms improved and urinary levels normalised after discontinuation.

Results from the New Zealand Total Diet Study will inform future risk assessments and are expected mid-2026.

Developing acute copper and zinc guideline values for freshwaters in Aotearoa New Zealand

Dr Jenni Gadd[1], Dr Chris Hickey[2]
[1]Hydrotoxy Research, Auckland, New Zealand, [2]RMA Science, Hamilton, New Zealand
Session 1A: Risk Assessment & Regulation of Metals in the Asia-Pacific Region 1, Chancellor 1, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Jenni Gadd is an environmental chemist with experience in working in urban waterways to assess the sources and effects of contaminants, especially metals. She has been involved in deriving freshwater and marine copper and zinc guideline values under the Australian and New Zealand guidelines. She is currently working as Lead Water Scientist at Auckland Council, but is presenting here in her capacity as an independent consultant.

Copper and zinc are common freshwater contaminants, often elevated in urban waterbodies receiving stormwater. These inputs are typically short-term (hours to days in duration) so acute guideline values (GVs) are most appropriate for assessing ecological risks of these short-term exposures. As the Australian and New Zealand guidelines (ANZG) do not provide acute GVs, New Zealand Government's Ministry for the Environment commissioned the development of acute GVs for Aotearoa.

Because metal toxicity depends on water chemistry, bioavailability models were essential in developing the acute GVs. A key step in the derivation was to determine which of the existing models (e.g., hardness regression, multiple linear regressions, biotic ligand models) would be most appropriate for Aotearoa species and waters. Acute toxicity testing of a sensitive native species (Cladocera, *Daphnia thomsoni*) in waters of differing chemistry, was used for model evaluation. This evaluation used existing data for cross-species validation for native and all species, and assessed model applicability across toxicity data and natural waters.

Single multiple linear regression (MLR) models based on pH, hardness and DOC were selected, based on their ease of use, predictiveness and applicability in Aotearoa waters. Acute GVs were derived from the commonly reported EC50 values, normalised to a standard water chemistry and then converted to EC10 values. Using EC10 values in the species sensitivity distribution provides protective thresholds, rather than effect thresholds. Acute GVs are provided at varying levels of species protection, and can be adjusted for site-specific water chemistry using a simple equation based on pH, hardness and DOC. Each GV is based on large datasets (>60 species) across seven or eight taxonomic groups and including many native species. They are expected to be widely applicable and will complement the chronic GVs in assessing risks from both short-term and long-term exposures to metals - examples will be discussed.

Revisiting genotoxicity studies: case of Bromoform

Mr Abhishek Gautam[1]
[1]PHF Science, Christchurch, New Zealand

Session 7A: Food Chemical Risk Assessment 1, Chancellor 1, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Abhishek works as Senior Scientist - Risk Assessor at ESR in the Risk Assessment, Food and Social Systems group. He has a Bachelor's and Master's degree in science (Pharmacy) and has 8 years' experience working in consulting, FMCG and government administration. He is also a European Registered Toxicologist (ERT). Abhishek specialises in hazard assessment, risk assessment and exposure assessment of industrial chemicals, agrichemicals (pesticides and biocides) and consumer products. He also has experience in the classification of chemicals for human health hazards according to global regulations such as the EU, CLP and GHS.

Almost half of New Zealand's greenhouse gas emissions come from agriculture. Methane makes up the majority (71%) of these emissions and comes from farmed livestock, such as sheep and cattle. Reducing methane is essential for New Zealand to meet its national and international targets. This issue has gained significant attention over the past few years and considerable efforts have gone into developing new options to help reduce agricultural greenhouse gas emissions. One of the key research areas is development of methane inhibitors to suppress the methane producing microbes in an animal's gut. The red seaweeds, *Asparagopsis taxiformis* and *A. armata* are effective at inhibiting methane production in ruminants, mediated by the bioactive, bromoform. Discrepancies exist in hazard classification of bromoform. IARC concludes bromoform is not classifiable as to its carcinogenicity to humans; the US EPA classifies it as a probable human carcinogen. This led to revisiting genotoxicity studies for bromoform and their conformance to the current OECD test guidelines.

The analysis of the studies revealed that many did not meet the current OECD test guideline requirements, due to factors such as overly high doses, insufficient response or lack of a demonstrated dose-response. This presentation will review the body of *in vivo* and *in vitro* genotoxicity testing of bromoform to determine what can be concluded concerning the genotoxicity of bromoform.

Oxidative stress biomarkers in wastewater influents as potential indicators of community health and wellbeing

Professor Sally Gaw[1], Tino Berl de Plazes[1], Dr Jake O'Brien[2], Professor Kevin Thomas[2], Andrew Chappell[3], Kaitlyn Phung[3], Glen Rowland[1], Dr Matt Hobbs[1]
[1]University of Canterbury, Christchurch, New Zealand, [2]Queensland Alliance for Environmental Health Sciences, Brisbane, Queensland, [3]ESR, Christchurch, New Zealand

Session 7B: Future-Proofing Wastewater Treatment: Tackling Emerging Contaminants with a Holistic Approach – it's more than just PFAS, Chancellor 6, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Professor Sally Gaw is an environmental chemist at the University of Canterbury. Her research focusses on human exposure to contaminants and understanding how everyday life contributes to environmental contamination. She has an unhealthy interest in determining what information can be obtained from monitoring wastewater.

Real time indicators of community health and wellbeing are essential to determine and monitor community health and evaluate public health measures. Wastewater-based epidemiology using endogenous biomarkers excreted in urine and faeces may provide an aggregate and non-biased measure of community health and wellbeing within a defined wastewater catchment area. Isoprostanes (IsoPs) and prostaglandins are produced by oxidation of essential fatty acids and are used clinically as markers of oxidative stress in people. Oxidative stress contributes to the development of chronic inflammatory diseases. A range of potentially modifiable factors including lifestyle choices, diet, exercise, and exposure to toxicants influence the production and excretion of biomarkers of oxidative stress. In this proof-of-concept pilot study, we determined free concentrations of the isoprostane 8-iso-PGF2α, and the prostaglandin PGE2 in wastewater influent from 12 small (1000-9999 residents) and medium communities (10,000 – 29,999 residents) over a 6-month period. Concentrations of 8-iso-PGF2α were below the limit of detection, whereas PGE2 was detected in 12% of influents at concentrations between 7.0 ng/L – 27.4 ng/L. Higher concentrations of PGE2 were detected in influent from medium communities compared to small communities. The range of daily mass loads of PGE2 for the communities sampled was 1.3 mg/d/1000 people – 5.0 mg/d/1000 people. A presence versus absence analysis was performed for PGE2using health and wellbeing indicators. There was no significant difference between the level of deprivation (NZDep2018) and access to environmental bads, environmental goods, and green and blue spaces for communities where PGE2 was present or absent. Further work is underway to refine the analytical method to measure total 8-iso-PGF2α and PGE2 concentrations.

Strengthening the EPA's approaches to the assessment of wide dispersive chemicals

Dr Eugene Georgiades[1]
[1]EPA New Zealand, Wellington, New Zealand
Session 9C: Regulatory science, policies, and evidence-based decisions, Chancellor 4, August 28, 2025, 1:35 PM - 3:05 PM

Biography:
Eugene Georgiades is a Principal Adviser – Hazardous Substances at the New Zealand Environmental Protection Authority. Eugene completed his PhD in marine ecotoxicology in 2004 at RMIT University in Melbourne, Australia. After a post-doc in Canada, he joined the New Zealand government and has worked on a variety of environmental risk assessments ranging from hazardous substances (e.g., pesticides and veterinary medicines) to aquatic biosecurity (e.g., vessel biofouling, ballast water, aquaculture, ornamental fish). Eugene's current role is to ensure that EPA staff are providing sound, science-based risk assessments.

Aotearoa New Zealand has a small market share for chemicals and the EPA is a small regulator. To conserve limited resources, pragmatic solutions that are harmonised with other regulators are preferred. However, there needs to be confidence that the environment is still being protected and that recommended controls are fit-for-purpose.

Since the implementation of the HSNO Act, delivery of a consistent and consolidated approach to environmental fate and ecotoxicological modelling has been particularly challenging given the breadth and complexity of topics covered. This includes predicting environmental concentrations in multiple environmental compartments (e.g., surface water, groundwater, and soil) and assessing effects on a wide range of organism types (e.g., aquatic and soil organisms, birds, bees, and non-target arthropods). Adding to this complexity is the exponential growth in regulatory approaches to environmental risk assessment over the past two decades. This increased level of complexity is reflected across all environmental compartments and has far reaching influences including the data required to support these assessments.

This presentation discusses the current constraints faced by a small regulator and our work to improve the assessment of wide dispersive chemicals in Aotearoa New Zealand and the efficiency and effectiveness of EPA processes.

Lord Howe Island Rodent Eradication Program – Community Health Concerns

Dr Belinda Goldsworthy[1], Dr Robert DeMott[2], Dr Joseph Rodricks[2]
[1]Environmental Risk Sciences (enRiskS), Newcastle, Australia, [2]Ramboll Health Sciences, Tampa, USA

Session 1C: Predator free islands and conservation - human health risk aspects, Chancellor 4, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Dr. Belinda Goldsworthy has more than 20 years' experience in the contaminated sites industry and specialises in human health and ecological risk assessments. Belinda has assisted with the development of national contaminated land and risk assessment guidance for Australia, Singapore and Hong Kong. She has extensive experience providing human health and ecological risk assessment training for health and environmental regulators, industry bodies and universities.

In 2019 a rodent eradication program was undertaken on Lord Howe Island (LHI) in NSW, Australia. It was ultimately successful for removing mice and rats introduced to the island that were responsible for the extinction of species endemic to LHI. This program involved aerial and ground baiting (i.e., distribution of a cereal pellet with the active ingredient brodifacoum) within the LHI settlement and the wider non-populated areas.
The LHI community, approximately 400 residents, obtains drinking water from groundwater and rainwater, and consumes home-grown produce and local seafood. The community also relies heavily on tourism and while the residents recognised biodiversity benefits of rodent eradication, the community was concerned about potential health risks and how the program would impact their way of life and livelihoods short-term and long-term.
A human health risk assessment (HHRA) was commissioned by the NSW Office of the Chief Scientist and Engineer to assess potential risks to the health of LHI residents from exposure to brodifacoum in the rodent pellets. Engagement with the community occurred over two dedicated time periods: 1) listening sessions prior to preparation of the HHRA and 2) following release of the HHRA results. The aim of engagement prior to preparation of the HHRA was to obtain information relating to how residents could be exposed to brodifacoum, given their unique lifestyle, and to listen to their concerns so they could be addressed in the HHRA. This approach proved to be an important part of framing the HHRA because it identified additional exposure scenarios unique to LHI residents and tourists. Anxiety and stress from implementation of the program was also identified as a health concern to residents. The HHRA findings were presented to the community that allowed interactive engagement and provision of immediate responses to their questions and concerns.

Functional omics insights into per- and polyfluoroalkyl substances (PFAS) exposure in different marine turtle taxa

Miss Sarah Green[1,2], Dr Aleicia Holland[2], Dr Kimberly Finlayson[3], Dr Jason Van De Merwe[3], Prof David Beale[1]

[1]CSIRO, Brisbane, Australia, [2]La Trobe University, Albury-Wodonga, Australia, [3]Griffith University, Gold Coast, Australia

Session 5B(ii): Environmental omics applied to ecotoxicology & eco-surveillance, Chancellor 6, August 27, 2025, 1:30 PM - 3:00 PM

Biography:

Sarah is a second-year PhD student at La Trobe University whose research investigates the molecular effects of per- and polyfluoroalkyl substances (PFAS) exposure in seagrass and marine turtles using proteomic, metabolomic, and lipidomic approaches.

Per- and polyfluoroalkyl substances (PFAS) are persistent anthropogenic chemicals that contaminate marine ecosystems and pose risks to wildlife. PFAS contamination is widespread and threatens sea turtles through both waterborne and dietary exposure. The degree of PFAS exposure and risk of bioaccumulation differs between sea turtle species, due to differences in their dietary niches. PFAS bioaccumulation is concerning as the effects of low-level compounds and complex mixtures on wildlife remains understudied. This study quantified 72 PFAS compounds and used targeted and untargeted omics techniques to investigate the biochemical impact in three marine sea turtle species; green turtles (*Chelonia mydas*), hawksbill turtles (*Eretmochelys imbricata*) and loggerhead turtles (*Caretta caretta*), from Capricorn Bunker, Australia. Blood samples of all three species contained low levels of multiple PFAS compounds, with elevated components of perfluorobenzylphosphonic acid (PFBPA), methyl perfluorohexane sulfonamidoacetic acid (MeFHxSA) and 8:2 fluorotelomer carboxylic Acid (8:2 FTCA). The most dominant constituent for all three species was 8:3 fluorotelomer carboxylic Acid (8:3 FTCA). Although the ∑PFAS burden was similar across species, their specific PFAS profile varied. Notably, the detectable presence of emerging and replacement PFAS compounds where toxicological data is limited, such as hexafluoropropylene oxide trimer acid (HFPO-TA) identified in hawksbill turtles, raises environmental concerns. The biochemical signatures varied across species and the integration of the omics revealed distinct correlations between proteins, lipids and metabolites. Among the strongest metabolic signals were perturbations to purine metabolism and the regulation of uric acid. These findings demonstrate the importance of screening a broad panel of PFAS compounds, particularly as the elevated compounds identified in these species are not yet widely regulated, nor monitored. This work contributes a deeper understanding of PFAS bioaccumulation and its biological impact in sea turtles and highlights how omics-based ecosurveillance tools can support risk assessment and the biomonitoring of wildlife.

Applying a screening approach and mixture-based considerations to human and ecological risk assessment of pesticide contaminated groundwater

Dr Sarah Guy[1], Dr Andrew Pearson
[1]Tonkin + Taylor, Christchurch, New Zealand

Session 8C: Bridging the gap: Enhancing decision making in regulatory science, Chancellor 4, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Sarah is an environmental scientist at Tonkin + Taylor, specializing in contaminated land and water, environmental chemistry and human health risk assessment. Sarah works on a broad range of projects involving contaminated land, groundwater and surface water assessment, drinking water catchment risk assessment and human health risk assessment. Sarah's project experience includes investigation design, desktop studies, field work and laboratory analysis. Sarah has scientific research experience and has completed a multidisciplinary PhD project spanning analytical environmental chemistry, laboratory-based experiment, dietary surveying and applied toxicology (quantitative risk assessment).

Post closure of a former pesticide manufacturing site, a full review was completed of groundwater contamination to characterise risk to offsite public water users, and marine and freshwater ecological receptors. Current and historical groundwater monitoring records were compiled providing a wide range of chemicals of interest from former site operations. All the chemicals of interest were then screened against established criteria for recreational water users, aesthetic parameters and ecological risk criteria and a margin of exposure approach applied to quantify the potential risk. Presence of chemical groupings with shared modes of action for possible human toxicity and for ecological risk, for example multiple herbicides in the synthetic auxin group, required applying a potency-based mixtures approach to understand the cumulative risk. The resulting risk assessment was used to inform application of an annual groundwater monitoring programme and setting of dynamic trigger values to manage future risk but also acknowledge that with the site now non-operational contamination levels will decrease over time. This talk will cover the theory and application of the screening and mixture assessment approach, as well as detail the resulting management and its implications for further investigations on the site and applicability to groundwater assessment elsewhere.

Defining Meaningful Environmental Endpoints for Antimicrobial Resistance: Moving Beyond MICs to Assess Minimal Selective Concentrations for Key Endpoints

Dr Claire Hayward[1], Professor Nicholas Ashbolt[1]
[1]University Of South Australia, Adelaide, Australia

Session 9B: Identifying 'ecologically relevant endpoints' for microbial processes to inform Environmental Quality Guidelines and One Health approaches 2, Chancellor 6, August 28, 2025, 1:35 PM - 3:05 PM

Biography:
Dr Claire Hayward is a Postdoctoral Research Fellow at the University of South Australia, specialising in environmental antimicrobial resistance (AMR). Her work focuses on AMR risks in water systems, including the development of a Bayesian Network model to support cross-sectoral AMR management. With a background as a qualified Environmental Health Officer, Claire's research bridges microbiology and public health, addressing critical control points in wastewater, drinking water, and food systems. Her PhD investigated biofilms and plumbing-associated infection risks, with a strong emphasis on real-world application to improve public health outcomes.

Antimicrobial resistance (AMR) is increasingly recognized as an ecological threat, yet risk assessments remain narrowly focused on human clinical endpoints. To effectively manage AMR in aquatic and terrestrial ecosystems, we must establish meaningful environmental endpoints that capture microbial community disruption, functional losses in nutrient and carbon cycling, and increased disease susceptibility across plants, animals, and their microbiomes. This presentation advances the case for using dysbiosis, microbial functional shifts, and keystone species health as sentinel indicators of AMR impact.

Minimal selective concentrations (MSCs)—the lowest concentrations of antimicrobials that select for resistance—are currently defined by growth inhibition metrics for clinical isolates in pure culture, which fail to capture broader ecological consequences. Microbiomes have emergent properties not seen in individual species, that emerge through cross-population interactions such as gene exchange. Hence, we propose that MSC assays must evolve to include endpoints that include stress responses, biofilm enhancement, horizontal gene transfer potential, and altered microbial community structure. Emerging tools in metagenomics, transcriptomics, and functional profiling now enable tracking of AMR gene dynamics and their cascading effects across microbiomes.

We highlight emerging methods from microbial ecology and ecotoxicology—such as metagenomic profiling, functional gene assays, and host-microbiome health indicators—that could inform more ecologically meaningful MSC determinations. Case studies from aquatic systems illustrate how AMR may contribute to disease susceptibility in seagrasses, fish, and other keystone species by disrupting microbial symbioses. Without such ecologically meaningful thresholds, AMR management will continue to underestimate its environmental burden.

Addressing this gap requires interdisciplinary collaboration between environmental toxicologists, microbiologists, and policy-makers to develop standardized, scalable assays and risk thresholds. As AMR continues to spread across interconnected water systems, identifying ecologically relevant endpoints is essential for aligning environmental protection with One Health goals.

Exploring *in silico* strategies for advancing early-stage development of pest-selective toxicants

Dr Erica Hendrikse[1], Dr Natalie Forsdick[1], Dr Wanting Jiao[3], Brian Hopkins[2]
[1]Manaaki Whenua - Landcare Research, Auckland, New Zealand, [2]Manaaki Whenua - Landcare Research, Lincoln, New Zealand, [3]Victoria University of Wellington, Wellington, New Zealand
Session 5C(ii): Alternative approaches to animal testing, Chancellor 4, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
Erica Hendrikse is a researcher from Manaaki Whenua - Landcare Research. Her interests include wildlife toxicology and species variation in toxic responses.

Current approaches for managing invasive vertebrate species in New Zealand (e.g. rats, stoats, and possums) rely heavily on the use of toxicants, such as anticoagulants. While effective, these toxicants often pose risks to non-target wildlife and are subject to increasing regulatory restrictions. This underscores the urgent need for novel, species-specific vertebrate toxicants that are both effective and environmentally responsible.

To meet this challenge, early-stage vertebrate pesticide development must prioritise compounds that are lethal to pest species but harmless to native or valued non-target species. While toxicant development has traditionally relied on animal testing, we wanted to explore the use of New Approach Methods (NAMs) as alternative approaches. Toxicant susceptibility can vary due to interspecies differences in relevant proteins. Therefore, we explored the use of in silico comparative genomics methods to identify protein differences that may be relevant to toxicant sensitivity. By extracting and comparing protein sequences across the genomes of New Zealand's pest, native, and agricultural species, we seek to predict species-specific toxicant responses, informing toxicant development.

Our findings highlight both the potential and limitations of this NAMs approach. While promising for early hazard identification and prioritisation, challenges remain around data complexity, predictive accuracy, and the identifying orthologous proteins in under-characterised species. Nevertheless, this strategy holds significant potential, both for toxicant development and for enhancing environmental risk assessment, and supports the broader vision of replacing, reducing, and refining animal use in toxicology.

Bioaccumulation and biodistribution of legacy nuclear contaminants in metamorphosing tadpoles at the Savannah River Site, South Carolina

Ms Danielle Hill[1,2], Ms Kathryn Quinlin[3,4], Dr Tom Cresswell[5], Dr William Bennett[2,6], Dr James Beasley[3,4], Dr Chantal Lanctot[1,2]

[1]Australian Rivers Institute, Griffith University, Southport, Australia, [2]School of Environment and Science, Griffith University, Southport, Australia, [3]Warnell School of Forestry and Natural Resources, University of Georgia, Athens, USA, [4]Savannah River Ecology Lab, University of Georgia, Aiken, USA, [5]Australian Nuclear Science and Technology Organisation (ANSTO), Lucas Heights, Australia, [6]Coastal and Marine Research Centre, Griffith University, Southport, Australia

Session 4B(i): Toxicants & environmental impacts on wildlife 3, Chancellor 6, August 27, 2025, 11:00 AM - 12:30 PM

Biography:

Danielle is a Scientist with NSW DCCEEW's Environmental Forensics Ecotoxicology team and PhD candidate conducting ecotoxicology research with the Australian Rivers Institute at Griffith University and ANSTO. Her research uses radioisotope tracers to investigate the bioaccumulation and effects of trace metals on aquatic organisms that go through metamorphosis.

Nuclear and conventional power generation has resulted in the presence of legacy contaminants, including radionuclides and mercury, in the environment through intentional and accidental waste disposal and release. These contaminants are persistent in aquatic ecosystems, and understanding their bioaccumulation and biodistribution in aquatic organisms is essential to determine their ongoing effects. The Savannah River Site in South Carolina is a United States Department of Energy superfund site, where legacy contamination remains from nuclear activities and industry waste runoff in the 1950's. Amphibians are commonly used as bioindicators due to their importance in, and movement between, aquatic and terrestrial ecosystems. They may be particularly vulnerable to these contaminants due to their permeable skin and juvenile aquatic life stages. As amphibians go through metamorphosis, which involves remodelling and degeneration of tissues, there is also the potential for transference of contaminants between tissues. To investigate the accumulation of contaminants during metamorphosis, a field study was conducted with Southern Leopard frog (*Lithobates sphenocephalus*) tadpoles placed in enclosures within a contaminated effluent canal marked for future sediment remediation. Tadpoles were sampled at pre- and post -metamorphosis from the effluent canal and a reference site and then analysed for Cs and trace metals including mercury. A subset were also preserved for x-ray fluorescence microscopy (XFM) analysis at the Australian Synchrotron to determine changes in biodistribution of contaminants between stages. This field study aids our understanding of the biokinetics and biodistribution of legacy contaminants, as well as implications for transference of contaminants between aquatic and terrestrial ecosystems.

Metal Management: Characterising Native DOM Super-Producers to Feed a DOM-Metal-Mixture-Bioavailability Model

Dr Aleicia Holland[1], Karen Thompson[2], Amelia Shepherd[2]
[1]La Trobe University, Wodonga, Australia, [2]NIWA, New Zealand

Session 2A (i): Risk Assessment & Regulation of Metals 2, Chancellor 1, August 26, 2025, 1:30 PM - 3:00 PM

Biography:
Dr Holland is an aquatic ecotoxicologist with expertise in dissolved organic matter.

This collaborative project between NIWA, iwi, engineering advisors, and ecotoxicology experts, is exploring nature-based solutions to reduce the bioavailability and toxicity of metals (copper and zinc) in freshwater. The focus is on optimally applying dissolved organic matter (DOM) derived from New Zealand native plants, either through targeted planting, rain gardens and/or other green infrastructure.
DOM "fingerprints" for 5 native species: Manuka (*Leptospermum scoparium*), Karamu (*Coprosma robusta*), Pohutukawa (*Metrosideros excelsa*), Koromiko (*Hebe stricta*), and Kōwhai (*Sophora molloyi*) were derived using a number of different tools. Significant variations in the composition, characteristics and proton binding ability of DOM leached from leaves of the five plants were noted. Dissolved organic matter (DOM) from leaf leachates of Koromiko and Karamu exhibited the lowest humic content and high protein-like substances, suggesting a significant presence of smaller molecules. Manuka and Kōwhai leachates, contained DOM of a high molecular weight with high amounts of aromatic humic-like substances (both fulvic and humic acids). DOM leached from the leaves of Pōhutukawa represented a more mixed pool of molecules of varying aromaticity and molecular weight. Differences in the abundance of dominant functional groups (hydroxyl, carboxylic, phenolic) were also noted and proton binding capacities ranged between 14 – 28 mmol/g C suggesting that DOM produced from these five plants species likely differ in their ability to decrease metal toxicity and bioavailability. These results were also supported through Cu, Zn and Cu/Zn mixture toxicity tests using an alga and a microcrustacean (refer to presentations by Thompson et al. (oral) and Shepherd et al. (poster)) which showed toxicity varied in response to presence of different DOM.
This data will contribute to the development of a draft DOM-metal-mixture-bioavailability model to screen plant material for use in nature-based solutions. The model will be validated using additional plant matter identified by iwi and end-users.

An improved method for deriving default guideline values for metals in freshwaters in Australia and New Zealand

Dr Aleicia Holland[1], Dr Jenni Gadd[2], Professor Jenny Stauber[1], Professor Rick Van Dam[3], Erin Smith[4], Adam Ryan[5], Ellie Middleton[6], Angela Slade[7]
[1]La Trobe University, Wodonga, Australia, [2]Hydrotoxy, New Zealand, [3]WQadvice, Australia, [4]Copper Development Association, USA, [5]International Zinc Association, USA, [6]NiPERA, USA, [7]Slade Technical Services, Australia

Session 1A: Risk Assessment & Regulation of Metals in the Asia-Pacific Region 1, Chancellor 1, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Dr Aleicia Holland is an aquatic ecotoxicologist.

Freshwaters differ in their water chemistry, including pH, hardness (amount of calcium and magnesium ions) and the concentration of dissolved organic carbon (DOC). Such differences can affect the toxicity and bioavailability of metals and should be considered when deriving and applying water quality guideline values (GVs). Models for the derivation of bioavailability-based GVs in Australian and New Zealand freshwaters have been developed and for copper (DOC adjusted) and nickel (pH, calcium, magnesium and DOC adjusted). Previously, the draft default GVs (DGVs) were provided at a high bioavailability 'index' condition, however, this condition may not be representative of natural waters in either country. An improved approach, using existing water chemistry data to establish the DGVs at a representative water chemistry, has now been employed as part of a new tiered assessment framework.
Water chemistry data from over 10,000 freshwater monitoring sites across Australia and New Zealand were collated. These data were used to calculate bioavailability-adjusted protective concentration values (BAPCx: PC99, PC95, PC90, PC80) for each metal for each relevant sample. Over 115,000 BAPCx values were calculated for copper for Australia and 16,000 for New Zealand. Calculation of nickel BAPCx values required matched datapoints for pH, calcium, magnesium and DOC. BAPCx values for nickel were derived for 20,780 matched datapoints for Australia and 10,364 for New Zealand.
The DGVs were selected from the 5th percentile of probability distributions for the BAPCx values for each state/region, with the BAPCx value for the most sensitive state/region selected as the DGV. This approach aims to protect 95% of waters in each country, following the same approach used in the European Union. For copper, the selected DGVs are the same for Australia and New Zealand, whereas for nickel the DGVs differ, as the New Zealand water chemistry data indicated higher bioavailability for nickel.

Individual and interactive effects of particulate copper and common carp (*Cyprinus carpio* L.) on prokaryotic and eukaryotic benthic assemblages

Dr Sajida Saqira[1], A/Prof Anthony Chariton[1], Professor Grant Hose[1]
[1]Macquarie University, Sydney, Australia

Session 5B(ii): Environmental omics applied to ecotoxicology & eco-surveillance, Chancellor 6, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
Grant is an aquatic ecologist and ecotoxicologist. His research examines the response of aquatic ecosystems, invertebrate and microbial communities to environmental change. His team has expertise in invertebrate taxonomy and using eDNA to characterise the composition and function of aquatic ecosystems and combines these with field surveys and laboratory manipulative experiments to identify correlative and causal links to community change. His current research focuses on the ecology of groundwater ecosystems and assessment of ecosystem health, ecological risk assessments and ecotoxicology for groundwater biota and the roles of stygofauna in providing ecosystem services.

Freshwater ecosystems are ecologically and economically vital yet are under unprecedented pressure from anthropogenic stress. The ability of these systems to maintain ecological processes in the face of stressors relies on the sensitivity and tolerance of species, as well as the magnitude, number, type and interaction of stressors. Copper (Cu) is a common metal contaminant of freshwater environments, and in isolation can significantly impact ecosystem structure and function. In Australia and many parts of the world, common carp (*Cyprinus carpio* L.) are a widespread pest species that directly and indirectly affect aquatic ecosystems. The aim of this study is to explore the direct and indirect effect of multiple stressors in outdoor experimental ponds. Specifically, we examined the long-term, individual, and combined effects of Cu-contaminated sediment (low and high concentrations) and common carp (*C. carpio*) on benthic structure using lentic freshwater mesocosms. Changes to benthic communities were characterised using environmental DNA (eDNA) metabarcoding targeting prokaryotes (16S rDNA) and eukaryotes (18S rDNA). In isolation, both copper treatments (low = 48.5 mg/kg and high = 407 mg/kg) distinctly changed both the benthic prokaryotic and eukaryotic communities when compared to the control. On their own, the effects of carp were less pronounced than were the effects of Cu. However, the community composition of Cu-contaminated ponds changed further with the addition of carp. The prokaryotic and eukaryotic communities responded differently to the stressor regime, thus highlighting the complexity of multiple stressor effects in natural systems and the need for research to disentangle their relative impacts.

Machine Learning for Predicting Environmental Mobility Based on Retention Behaviour

Mr Tobias Hulleman[1,2], Dr. Saer Samanipour[3], Prof. Paul Haddad[2], Dr. Cassandra Rauert[1,2], Dr. Elvis Okoffo[1,2], Prof. Kevin Thomas[1,2], Dr. Jake O'Brien[1,2]
[1]Queensland Alliance for Environmental Health Sciences, Woolloongabba, Australia, [2]ARC Training Centre for Hyphenated Analytical Separation Technologies (HyTECH), Hobart, Australia, [3]Van 't Hoff Institute for Molecular Sciences (HIMS), University of Amsterdam, Science Park, The Netherlands

Session 8C: Bridging the gap: Enhancing decision making in regulatory science, Chancellor 4, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Tobias got his Master's in analytical chemistry at the University of Amsterdam. His thesis there was focused on the use of chemometrics in analytical chemistry, computational mass spectrometry and on the better understanding of the number of chemicals of emerging concern that have been analysed so far in the environment. In 2024 he started his PhD at the University of Queensland with QAEHS within the HyTECH (Hyphenated analytical Separation Technologies) project. He is working on developing methods for the non-targeted high-resolution mass spectrometric characterization of highly mobile and highly persistent contaminants.

Very persistent and very mobile (vPvM) substances pose a threat to the environment and human health. These chemicals may persist in aquatic systems, where they can move very easily and quickly due to their affinity for water rather than adsorbents such as soil. Currently, the partition coefficient between organic carbon and water (Koc) is used to classify chemicals as very mobile, mobile or non-mobile. However, the lack of experimental log Koc data for most chemicals presents a major limitation. With thousands of new chemicals entering the market-and therefore our exposome-every year, there is a growing need for advanced cheminformatics tools to prioritize such chemicals of concern.

Since reverse-phase liquid chromatography (RPLC) experimental data is much more abundantly available, it was used as a marker for environmental mobility. The organic modifier fraction at elution for each chemical was used to assign mobility labels to the 146,902 chemicals used from an RPLC dataset. To relate the structure of chemicals to their mobility, the 881 PubChem fingerprints were computed for each chemical. A random forest classification model was then developed to predict the mobility of chemicals based on their retention behaviour and implicit molecular structure from fingerprints.

The model resulted in an accuracy (i.e. F1 score) of 0.86, 0.76, and 0.94 for very mobile, mobile, and non-mobile classes, respectively, in the test set. It was then applied to all REACH registered chemicals (n = 64,498). The model classified 18% of the registry as very mobile, 26% as mobile and 56% as non-mobile. Using the OPERA predicted log Koc for the registry resulted in 31% being classified as very mobile, 31% as mobile and 38% as non-mobile. Previous studies have only been able to assign the estimated mobility to around 20% of REACH. The method in the present study could greatly help in prioritizing new chemicals with unknown physio-chemical properties as only a SMILES is required to get an estimation of mobility.

Addressing key questions in deriving species sensitivity distributions: Insights from recent studies

Dr Yuichi Iwasaki[1], Dr Miina Yanagihara[2,3], Dr Kyoshiro Hiki[4], Dr Masashi Kamo[1]
[1]National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan, [2]KWR Water Research Institute, Nieuwegein, the Netherlands, [3]Ehime University, Matsuyama, Japan, [4]The University of Tokyo, Tokyo, Japan

Session 9C: Regulatory science, policies, and evidence-based decisions, Chancellor 4, August 28, 2025, 1:35 PM - 3:05 PM

Biography:
Yuichi Iwasaki is a senior researcher at the National Institute of Advanced Industrial Science and Technology (AIST), Japan. His research focuses on ecological risk assessments of chemical substances, particularly metals, through field biological surveys in rivers and statistical modeling approaches, such as species sensitivity distributions. He is especially interested in linking what aspects of ecosystems we aim to protect with how risk assessment and management are practically implemented.

Deriving species sensitivity distributions (SSDs) and estimating hazardous concentrations affecting 5% of species (HC5) plays a crucial role in setting scientifically defensible environmental quality benchmarks. However, several key questions remain insufficiently explored in SSD estimation: What statistical distribution should be selected when deriving SSDs? Does model averaging improve the accuracy of HC5 estimates? Is it possible to extrapolate chronic or saltwater SSDs from acute or freshwater data? And what is an appropriate assessment factor to apply? In this presentation, we share findings from a series of studies that address these questions (Yanagihara et al. 2024, Ecotoxicol. Environ. Saf.; Iwasaki & Yanagihara 2025, Environ. Toxicol. Chem.; Hiki & Iwasaki 2020, Environ. Sci. Technol.; Yanagihara et al. 2022, Environ. Toxicol. Chem.; Kamo et al. 2022, Ecotoxicol. Environ. Saf.).

Measuring PFAS in Cosmetics: Analytical Perspectives and Results

Dr Jacob Jaine[1]
[1]ALS Global, Hamilton, New Zealand

Session 3C (i): Contaminants in consumer products and cosmetics, Chancellor 4, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
Dr. Jaine is research scientist for ALS Global. His specialty is in novel residue testing problems, particularly the application of high-resolution mass spectrometry for non-targeted analysis. His work involves measuring a wide range of compounds from pesticides to biomarkers in sample types including foods, soils, and biological materials, and most recently PFAS in cosmetics.

Perfluorinated and polyfluorinated alkyl substances (PFAS) are a broad class of synthetic fluorochemicals which are increasingly recognised as toxic, bioaccumulative, and persistent. Unfortunately, they are encountered ubiquitously in everyday life, in the foods we eat, the air we breathe, and the consumer products we use. Legislation to ban PFAS in cosmetics has recently been passed in numerous places, including New Zealand.

In this talk we discuss a range of topics relating to PFAS quantitation. Firstly, we discuss some definitions and examine the type of PFAS which can be found in cosmetics compared to other sample types. Secondly, we discuss how these PFAS can be measured in cosmetics, including the techniques which can be used, the information they provide, some of the associated challenges with this testing, and offer some comments on interpretation of results with respect to regulation. Finally, we present preliminary results of a survey conducted by our laboratory of PFAS in market cosmetic samples from both New Zealand and abroad.

The Contaminated Sites We've Shut Down

Mrs Ruth Jarman[1], Mrs Jackie Wright[1]
[1]Environmental Risk Sciences (enRiskS), Melbourne, Australia
Session 3A: Contaminants in soil: Filling knowledge gaps & enhancing decision making 2, Chancellor 1, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
Ruth has over 19 years' experience in providing practical high-level advice on toxicology and human health and ecological risk assessment to assist those in the environmental and contaminated land Industries. She is a Registered member of ACTRA and will never ever buy an apartment in a development with a basement.

In the day where every site is an "emergency", we provide an overview of three contaminated sites which were emergencies. Our presentation will provide a summary of the preceding events, identified risks, actions taken, and recommendations.

Burnley Street
This site comprised an occupied multi-storey development with basement car park. Shortly following occupation, trichloroethene (TCE) concentrations of 0.14 mg/m^3 were reported in indoor air in the basement. Dual contamination entry points to the basement (vapour and water seepage) were identified. The development was subsequently retrofitted with a vapour mitigation system (VMS), informed by proactive and intensive indoor air monitoring. Challenges faced included the occupation of the building and the need to control two vapour entry points.

High Street
The Audit for this site specified a VMS due to the presence of dense non-aqueous phase liquid (DNAPL) in groundwater. However, there was minimal consideration of what this VMS would look like at this time. The builder subsequently signed a contract without understanding the required VMS. The "fully tanked" basement car park started to leak immediately as groundwater levels recovered post dewatering. Challenges faced included the presence of a basement car park in contact with DNAPL, where health risks were potentially unacceptable with any seepage.

Grattan Street
enRiskS became involved in this site when the assessment consultant e-mailed us soil vapour sampling results collected during the construction of the basement as "…the petroleum hydrocarbon concentrations looked a bit high". These results indicated significantly elevated concentrations of benzene and methane, where there was the potential for flashing and unacceptable acute risks to construction workers. Works onsite ceased while management measures were implemented, and a VMS designed and installed at the site. Challenges faced included the need to re-design the building to include a VMS and short timelines.

New Approach Methods as a solution to contaminants of concern in composts

Dr Julia Jasonsmith[1], Dr Kevin Wilkinson[2], Dr Anthony Boxhall[3], Johannes Biala[4], Chris Lee-Steere[5]
[1]Murrang Earth Sciences, Canberra, Australia, [2]Frontier Ag & Environment, Bendigo, Australia, [3]Science into Action, Melbourne, Australia, [4]Centre for Recycling of Organic Waste & Nutrients, Brisbane, Australia, [5]Australian Environment Agency, Canberra, Australia

Session 8C: Bridging the gap: Enhancing decision making in regulatory science, Chancellor 4, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Julia is an environmental chemist with a PhD in Earth Sciences. Her interests centre on how chemicals move through ecosystems and their influence on the environment. Julia has core expertise in a broad range of fields including agriculture, catchment management, pollution, and contaminated lands, and is driven to find optimal solutions which enhance ecosystem health and agricultural productivity. Julia is a Certified Environmental Practitioner and an honorary staff member at the Australian National University's Fenner School of Environment and Society.

Compost products are manufactured from a variety of residential and commercial organic wastes, including manures, food scraps, grass clippings, and green waste. Each of these feedstocks has the potential to contain different chemicals of concern. For example, composts can sometimes be contaminated with herbicides present in green waste, resulting in significant damage when the compost is used by home gardeners. Yet, many chemicals of concern are not even listed in the compost quality standard--“AS4454: composts, soil conditioners, and mulches”.

One aim of the federally funded Revision of AS4454 -- Composts, Soil Conditioners and Mulches project was to identify contaminants of concern in composts, soil conditioners, and mulches, and to identify an approach to managing these chemicals now and into the future that was acceptable to industry and government. We first researched the extent of chemical contamination in these products, finding that not only were many chemicals not listed as contaminants of concern in AS4454, it was not practicable for such chemicals to be listed with justifiable limits. Robust thresholds for these chemicals cannot be introduced to the AS4454 standard at a rate that keeps pace with the identification of new contaminants of concern. New approach methodologies, including effects-based monitoring, suspect- and non-target screening, and omics approaches, were identified as a potential solution to this problem offering a means of identifying potential hazards within compost first, then working back to the drivers of the hazard. This differs from the current approach that uses concentration-based criteria as proxies for risk. We undertook extensive stakeholder engagement to assess the potential acceptability of novel assessment methodologies as a solution to address the contamination issue, finding considerable interest from both industry and government.

The Mystery of the Tainted Aquifer: Using Emerging Contaminants and Environmental Isotopes to Unmask the Sources of Groundwater Pollution

Professor Oliver Jones[1]
[1]RMIT University, Melbourne, Australia

Session 2B (i): Bridging the gap: Collaborative pathways to transformative outcomes in pollution monitoring, mitigation and management 2, Chancellor 6, August 26, 2025, 1:30 PM - 3:00 PM

Biography:
Oliver (Oli) Jones obtained his PhD from Imperial College London in 2005. He worked at the University of Cambridge and the University of Durham before moving to Melbourne in 2012 to get "a few years" experience working abroad. Oli's research tracks environmental pollutants and assesses their effects on biological systems. He has an h-index of 43 and 9742 total citations. Oli is keen to communicate science to the public. He has featured widely on TV, radio, and newspapers and can also be found promoting science on social media. Outside the lab, Oli enjoys running and has completed over 30 marathons.

Wastewater treatment plants purify wastewater before it is returned to the environment. Even after treatment, however, wastewater may contain various contaminants, including nutrients (usually nitrogen and phosphorus) and organic pollutants (e.g. endocrine disruptors and pesticides). These compounds can leak into groundwater via old and/or damaged infrastructure, leaching from biosolids storage areas and/or release of effluents. Remediating such pollution is complicated because similar contaminants and impacts can come from other sources, such as agriculture. It is often very difficult to distinguish the source of such contamination, especially where wastewater treatment plants are in agricultural areas.

This study was a collaboration between RMIT University, South West Water and ANSTO. Stable and radioactive isotopes were analysed in conjunction with Contaminants of Emerging Concern (CECs) to generate unique fingerprints of pollution. These were then combined with hydrogeological and nutrient measurements to successfully distinguish the impact on groundwater of a wastewater treatment plant in southeast Victoria (Australia) from that of local agriculture. The data indicated a complex set of co-mingled plumes, reflecting different inputs over time.

The radioactive isotope tritium provided a sensitive indicator of recent (post-1990s) leakage, suggesting WWTP infrastructure had, at some point, leaked treated or partially treated effluent to the underlying groundwater. This was corroborated by water stable isotopes, which showed a clear demarcation between background groundwater and on-site wastewater. The CECs, particularly the carbamazepine:simazine ratio, provided a means to further distinguish wastewater impacts from other sources, with groundwater down-gradient of the plant reporting elevated ratios compared to those up-gradient. Distinctive CEC ratios in impacted groundwater close to the WWTP and further down-gradient are interpreted to represent a change in composition over time (i.e., recent vs. legacy contamination), consistent with the site development timeline and possible changes in effluent composition resulting from infrastructure upgrades.

How effective are immobilisation strategies for reducing ecological and human exposure to PFAS in AFFF-impacted soil?

Professor Albert Juhasz[1], Mahima Seeborun[1], Ruby Jones[1], Carina Herde[2], Michelle Cavallaro[2]
[1]University of South Australia, Adelaide, Australia, [2]South Australian Health and Medical Research Institute, Adelaide, Australia

Session 3A: Contaminants in soil: Filling knowledge gaps & enhancing decision making 2, Chancellor 1, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
Albert is a Research Professor at the Future Industries Institute, University of South Australia. His research is focused on the impact of legacy and emerging contaminants on environmental and human health.

Immobilisation agents are often used to reduce PFAS leachability in AFFF-impacted soil although few studies have assessed their effect on exposure reduction for ecological and human receptors. Using AFFF-impacted surface soil (n = 8; ∑28 PFAS = 1,280-8,130 ng g-1; PFOS = 740-7,000 ng g-1) from southern and eastern Australia, changes in PFAS exposure were assessed in pre- and post-treated soil following the addition of a carbon-based soil amendment. In addition to utilising a standard leaching procedure (ASLP), invertebrate bioaccumulation (*Eisenia fetida*) and surrogate human bioassays (Sprague-Dawley rat) were employed for the evaluation of immobilisation efficacy and changes in exposure pre- and post-treatment. In unamended soil, PFOS was highly leachable (21.5-185 µg l-1) and bioavailable to ecological and human receptors. Biota-soil accumulation factors ranged from 12-44 while PFOS relative bioavailability (incidental soil ingestion pathway) ranged from 45-107%. However, following treatment of AFFF-impacted soil with a carbon-based soil amendment (5% w/w), PFOS leachability was reduced to 0.01-0.57 µg l-1 (≥ 99.1%), biota-soil accumulation factors were reduced to 0.2-0.6 (≥ 95.7%) while PFOS relative bioavailability was reduced to 5.1-24.5%. These results highlight that an immobilization strategy was able to significantly reduce PFOS bioavailability and exposure through multiple lines of evidence.

Lessons from the coalface: risk assessment techniques from heavy industry

Dr Victor Kabay[1]
[1]Cleanaway, Melbourne, Australia

Session 1B: Bridging the gap: Collaborative pathways to transformative outcomes in pollution monitoring, mitigation and management 1, Chancellor 6, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Victor Kabay is an environmental risk management specialist with over 20 years' experience in consulting, state government, industry and academia. He currently works as a National Senior Environmental Advisor for Cleanaway, specialising in risk, assurance and investigations. He has been appointed as an honorary fellow of the University of Melbourne in acknowledgement for his ongoing support to research and teaching at the University.

Have you ever heard of a causal tree? Or an ICAM investigation? Or the HOP principles? These are just some of the risk assessment techniques that are routinely used in heavy industry (i.e. mining, oil & gas, waste management, construction, etc). Heavy industry deals with significant risks every single day and they have developed many techniques to help assess and mitigate them. Only problem is: most of the time everyone outside of industry has never heard about them!
Such techniques are constantly being developed and refined, so that some of them have not had the time to become popularised among consultants, academics, government employees and other professionals. In particular, recent development have seen an increasingly "human" approach that recognises the fascinating role of psychology in risk management to help improve the way we manage risks at the interface between hazards and humans.
This presentation will introduce some tried-and-true risk assessment and management techniques in the hope that they could be used more broadly in other risk-based disciplines. It will just be a brief introduction but is intended to provide the audience with a starting point to point them in the direction of techniques that may be useful to them in their day-to-day work. The talk will also provide a simple framework to help understand how risk appetite varies between the spheres of government, consulting and industry.

New Insights into Pesticide Residues in New Zealand Soil

Dr Melanie Kah[1], Grace Goodwin[1], Karin Müller[2], Annette Rosenbom[3], Matthew Taylor[4], Grant Northcott[5]

[1]The University of Auckland, Auckland, New Zealand, [2]The New Zealand Institute for Plant and Food Research Limited, New Zealand, [3]Rambøll Denmark A/S, Denmark, [4]Waikato Regional Council, New Zealand, [5]Northcott Research Consultants Ltd, New Zealand

Session 2A (ii): Contaminants in soil: Filling knowledge gaps & enhancing decision making 1, Chancellor 1, August 26, 2025, 1:30 PM - 3:00 PM

Biography:

Melanie Kah is an Associate Professor in the School of Environment at Waipapa Taumata Rau | University of Auckland, New Zealand. She studied soil science and agronomy (University of Lorraine, France) before developing her expertise in the exposure assessment of contaminants in the UK (University of York, FERA), Austria (University of Vienna) and Australia (CSIRO).

Pesticides are widely relied upon in modern agriculture, but this reliance has been accompanied by concerns over adverse effects on human and environmental health. NZ has over 350 pesticide active ingredients registered for use, and use per hectare of cropland is estimated to be higher than the global average. Despite this, information on the occurrence of pesticide residues in soils is almost non-existent. As such, this research aimed to assess pesticides in NZ soils and identify usage and pesticides of highest concern. Samples were taken from 93 sites across the Auckland and Waikato regions over six land use types and analysed for 191 pesticides. Pesticide residues were found in 69% of samples, and mixtures were found in 58% of samples. The most commonly detected pesticides were glyphosate, p,p'-DDE, AMPA, p,p'-DDT, and boscalid. Glyphosate and AMPA were dominant in terms of the total concentration, accounting for 83% of the content of pesticides observed across all sites. Pesticide content in soil did not show significant relationships with either pesticide or soil properties. Pesticides were detected across all land use categories, with horticultural sites having the highest number of detections and concentrations. Risk Quotients indicated possible harm to earthworms for four compounds, while NZ Environmental Exposure Limits were consistently exceeded (24 total detections). Additive Risk Quotients indicated high risk to earthworms at six sites, which also contained high levels of heavy metals, further compromising soil health. Further monitoring of pesticides in soils is crucial to assess the issue at the national scale.

Arsenic, cadmium, lead, antimony bioaccessibility and relative bioavailability in legacy gold mining waste

Dr Farzana Kastury[1], Mrs. Julie Besedin[2], Dr. Aaron Betts[3], Dr. Richmond Asamoah[1], Ms Carina Herde[5], Mr. Pacian Netherway[4], Jennifer Tully[3], Dr. Kirk Scheckel[3], Dr. Albert Juhasz[1]
[1]Future Industries Institute/University of South Australia, Mawson Lakes, Australia, [2]RMIT University, Melbourne, Australia, [3]United States Environmental Protection Agency, Cincinnati, United States of America, [4]Environment Protection Authority Victoria, Melbourne, Australia, [5]South Australian Health and Medical Research Institute, Adelaide, Australia

Session 3A: Contaminants in soil: Filling knowledge gaps & enhancing decision making 2, Chancellor 1, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
I am a passionate environmental scientist at the Future Industries Institute, University of South Australia (UniSA), focusing on contaminant exposure assessment, remediation and toxicology. I completed a BSc. from the University of New South Wales in 2014 and a PhD from UniSA in 2019. After completing two postdoctoral fellowships at UniSA (2020 – 2022) and Columbia University (USA) as a Fulbright Scholar (2022-2023), I accepted a position at UniSA as UCL Santos Research Fellow. My current research investigates exposure assessment methods for emerging and legacy contaminants and develops cost-effective immobilization strategies. I also investigate up-cycling waste plastic for synthesizing materials for remediation.

Bioaccessibility and relative bioavailability of arsenic (As), cadmium (Cd), lead (Pb) and antimony (Sb) was investigated in 30 legacy gold mining wastes (calcine sands, grey battery sands, tailings) from Victorian goldfields (Australia). Pseudo-total As concentration in 29 samples was 1.45–148-fold higher than the residential soil guidance value (100 mg/kg) while Cd and Pb concentrations in calcine sands were up to 2.4-fold and 30.1-fold higher than the corresponding guidance value (Cd: 20 mg/kg and Pb: 300 mg/kg). Five calcine sands exhibited elevated Sb (31.9–5983 mg/kg), although an Australian soil guidance value is currently unavailable. Arsenic bioaccessibility (n = 30) and relative bioavailability (RBA; n = 8) ranged from 6.10–77.6% and 10.3–52.9% respectively. Samples containing > 50% arsenopyrite/scorodite showed low As bioaccessibility (<20.0%) and RBA (<15.0%). Co-contaminant RBA was assessed in 4 calcine sands; Pb RBA ranged from 73.7–119% with high Pb RBA associated with organic and mineral sorbed Pb and, lower Pb RBA observed in samples containing plumbojarosite. In contrast, Cd RBA ranged from 55.0–67.0%, while Sb RBA was < 5%. This study highlights the importance of using multiple lines of evidence during exposure assessment and provides valuable baseline data for co-contaminants associated with legacy gold mining activities.

Where Do Tyre Particles Go? Quantifying and Identifying Tyre Wear Particles in Balcony Road Dust

Ms Simran Kaur[1], Cassandra Rauert[1], Kevin V. Thomas[1]
[1]Queensland Alliance for Environmental Health Sciences - QAEHS (The University of Queensland), Brisbane, Australia

Session 7C(i): Contaminants of emerging concern 4, Chancellor 4, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Simran Kaur is a PhD candidate at the Queensland Alliance for Environmental Health Sciences (QAEHS) at The University of Queensland (Woolloongabba, Australia). Her research focuses on tyre wear particles, tyre additive chemicals, and conventional microplastics. Simran applies advanced analytical techniques, such as pyrolysis-GC-MS, to investigate emerging sources of plastic and tyre-related pollution in water, sediments, and balcony dust. Her work aims to improve our understanding of environmental and human exposure pathways from often overlooked or underexplored sources of plastic contamination.

Tyre wear particles (TWPs) are globally recognised as one of the largest sources of microplastics in the environment. They are generated through mechanical abrasion between tyres and road surfaces (Kole et al., 2017) and are of increasing concern due to the presence of chemical additives incorporated during tyre manufacturing, which may leach into the environment (Klöckner et al., 2021; Rauert et al., 2022). Once emitted, TWPs can be transported via wind and runoff to adjacent environments, contributing to environmental contamination and potential human exposure. This study investigates the presence and distribution of TWP in residential balcony dust, which is an underexplored but potentially important route of human exposure in urban areas. Thirty-one home balconies, located at varying distances from local and major roads and highways, were sampled to determine whether proximity to traffic influences TWPs accumulation. Dust was collected using pre-wetted wipes (MilliQ-filtered water) over a 30 × 30 cm² area of balcony flooring. Samples were analysed using pyrolysis-gas chromatography/mass spectrometry (Py-GC/MS), targeting 4-vinylcyclohexene (4-VCH), styrene-butadiene (SB) dimer, and SBB trimer as tyre polymer markers. Results revealed that the total concentration of TWPs on balconies ranged from 0.13 to 47.99 mg/m². High TWP concentrations were observed on balconies located within 100 meters of a major road. In this study, wind speed and semi-enclosed balcony orientation were the most influential factors affecting TWP accumulation. These findings suggest that both local balcony characteristics and broader proximity factors, such as distance to major roads, may influence TWP transport and distribution. These findings highlight the potential for tyre wear particles to be transported into residential environments and demonstrate the relevance of balcony dust as a pathway for human exposure in urban settings, justifying further investigation into their fate, transport, and associated health risks.

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Collaborative Action Against Waterway Contamination

Dr Claudette Kellar[1], Dr Sara Long[1], Dr Jackie Myers[1], Dr Erica Odell[1], Dr Rhys Coleman[2], Dr Vincent Pettigrove[1,3]
[1]AQUEST, RMIT University, Bundoora, Australia, [2]Research and Modelling, Melbourne Water, Docklands, Australia, [3]RMIT Europe, Spain

Session 1B: Bridging the gap: Collaborative pathways to transformative outcomes in pollution monitoring, mitigation and management 1, Chancellor 6, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
I have over 20 years' experience in freshwater ecology. I am currently a senior research fellow at AQUEST, RMIT University and manage a number of projects, including the Aquatic Pollution Prevention Partnership (A3P) projects, that investigate the effects of pollution on freshwater systems and deliver cost effective tools for waterway managers. My main research focus is to describe the impact of pollutants on aquatic macroinvertebrates and to combine chemistry and biology to identify causes of ecosystem stress using a multiple lines of evidence approach. Other areas of research include macroinvertebrate community ecology, effects of environmental stressors, environmental impacts and assessment.

Aquatic ecosystems, particularly those in urban and rural areas, are often ecologically impaired due to various catchment factors such as industrial pollution, agricultural runoff, urban development, and climate change. Untangling the effects of pollution from these various influences is complex but essential for effective management. Collaborative research partnerships between researchers and waterway managers can play a crucial role in understanding and prioritizing pollution management activities to achieve meaningful management outcomes.
The Aquatic Pollution Prevention Partnership (A3P) is a collaborative research initiative between RMIT University and Melbourne Water. This partnership aims to advance applied research to reduce pollution in waterways and bays across Greater Melbourne. It fosters knowledge exchange that integrates research findings with broader scientific activities, primarily focused on Melbourne Water strategic priorities but also supporting the broader needs of the water industry in Melbourne and beyond. This integration is vital for developing strategies that are both scientifically sound and practically applicable, ensuring that research not only contributes to academic knowledge but also translates into real-world environmental improvements.
Our applied research focuses on understanding the causal factors contributing to aquatic impairment, major sources of pollution and identification of management actions most likely to protect and improve waterway health. Where possible, ecological impacts are determined based on multiple lines of evidence. These lines include assessing chemistry, conducting laboratory toxicity testing, and observing *in situ* faunal alterations. This presentation will showcase case studies illustrating the collaborative efforts of A3P and how the research delivers better management outcomes for urban and rural waterways around Greater Melbourne. A special focus will be on how such a partnership can work together to mutually benefit all stakeholders and enhance management outcomes for the waterways.

Inclusion of microbial endpoints in site-specific Risk Assessments, Environmental Guidelines and Remediation Targets for Antarctic soils

Dr Catherine K King[1], Dr Jane Wasley[1], Prof Belinda Ferrari[2]
[1]Australian Antarctic Division, Hobart, Australia, [2]University of New South Wales, Kensington, Australia

Session 8B: Identifying 'ecologically relevant endpoints' for microbial processes to inform Environmental Quality Guidelines and One Health approaches 1, Chancellor 6, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Cath is a Principal Research Scientist at the Australian Antarctic Division with 30+ years' experience in ecotoxicology and environmental risk assessment. Cath leads, designs and implements multidisciplinary research on impacts of human activities and effects of environmental stressors including local contaminants and globally transported pollutants on marine and terrestrial communities in Antarctica. Her research has focused on determining sensitivities of native species/communities to contaminants including metals and hydrocarbons, with the ultimate aim to develop site-specific Environmental Quality Guidelines and Remediation Targets for Antarctic/sub-Antarctic regions. Her research directly contributes to evidenced-based decision making, informing management and protection of the Antarctic environment.

Changes in microbial community composition are commonly used in Antarctic site-specific risk assessments as microbes represent the dominant and most biodiverse component of Antarctic soil ecosystems. To ensure effective restoration and environmental protection of contaminated sites in Antarctica and subantarctic Islands where Australia operates research stations, we are developing site-specific Environmental Quality Guidelines and Remediation Targets. While best practice ecotoxicological and statistical modelling methods are used (following Australia/New Zealand Water Quality Guidelines and National Environmental Protection Measure), the generally low diversity of invertebrates and plants in soils in Antarctica, limits the availability of typical toxicity test organisms by which sensitivity data can be generated for inclusion in species sensitivity distribution (SSD) models. This has necessitated the use of non-standard endpoints including microbial processes and community diversity indices alongside more traditional endpoints based on single species tests. Here we present an example of this approach, using data compiled from over a decade of research on the impacts of fuels on sub-Antarctic biota. Four of the 13 most robust and representative sensitivity data estimates selected for inclusion in the SSD were based on microbial endpoints. These included two critical processes (soil nitrification and respiration) and two contrasting community diversity indices (Shannon diversity and acidobacteria/proteobacteria ratio), which showed a range of sensitivities to fuel. We estimated Protective Concentrations for fuel at levels appropriate to the ongoing land use status. Protection of 90% of biota (PC90) is estimated at concentrations not exceeding 72 mg TPH/kg soil, and this value is recommended for use in the assessment of ongoing risk of remediated soils in subantarctic environments. We advocate for the ecological relevance and critical importance of microbes in soils ecosystems, and the necessity therefore for the integrated use of microbial endpoints in contemporary approaches for Environmental Quality Guideline derivation for protection of these vulnerable ecosystems.

Herbicides detected in soils surrounding solitary ground-nesting bee nesting aggregations

Ms Felicia Kueh Tai[1], Dr Grant Northcott[2], Dr Jacqueline Beggs[3], Dr Ashley Mortensen[1], Dr David Pattemore[1,3]

[1]Plant and Food Research, Hamilton, New Zealand, [2]Northcott Research Consultants Limited, Hamilton, New Zealand, [3]The University of Auckland, Auckland, New Zealand

Session 2B (ii): Toxicants and environmental impacts on wildlife 1, Chancellor 6, August 26, 2025, 1:30 PM - 3:00 PM

Biography:

Researcher passionate about bugs, biodiversity, bioprotection, and better science. I'm currently investigating Varroa mite management in honey bees and the impacts of pesticides on native bee populations, combining lab work with field-based research to better understand and protect our pollinators.

There is growing evidence that solitary, ground-nesting bees, representing the majority of the > 20,000 species of bees worldwide, are exposed to a wide range of pesticides. Our knowledge of the extent to which ground-nesting bees are exposed to pesticide residues in soils is limited, hampering our understanding of exposure risks pesticides present to these bees throughout their lifecycle. To address this knowledge gap, surface soils from 24 nesting aggregations of *Leioproctus* spp. and *Lasioglossum* spp. were sampled and screened for 120 insecticides, herbicides, and fungicides that are commonly used in New Zealand, 5 metabolites, as well as 22 acidic herbicides using modified QuEChERS procedures. The pesticide hazard of the soil samples was evaluated using the hazard quotient approach. Residues of pesticides were detected in 45% of the soil samples. A total of eight pesticide active ingredients, including one fungicide and seven herbicides, and two herbicidal metabolites were detected. No residues of insecticides were detected in the soil samples. Overall, our results indicate negligible insecticidal risk to solitary ground-nesting bees via the substrates within which they construct their nests. However, these bees are likely to be exposed to herbicidal and fungicidal residues in the soil, including potentially harmful concentrations of terbuthylazine and picloram (herbicides). Soil remains an underexplored route of exposure for solitary ground-nesting bees, necessitating further research to understand the potential implications of extended contact with pesticides on fitness and population dynamics of this important group of pollinating insects.

Exploring the co-exposure effects of environmentally relevant microplastics and an estrogenic mixture on the metabolome of the Sydney rock oyster

Mr Sazal Kumar[1], Dr Wayne O'Connor[2], Dr Rafiquel Islam[1,3], Dr Frederic D.L. Leusch[4], Dr Steve D. Melvin[4], Dr Geoff R. MacFarlane[1]

[1]School of Environmental and Life Sciences, The University of Newcastle (UoN), Callaghan, NSW, Australia, [2]New South Wales Department of Primary Industries, Port Stephens Fisheries Institute, Taylors Beach, NSW, Australia, [3]Department of Applied Chemistry and Chemical Engineering, Islamic University, Kushtia, Bangladesh, [4]Australian Rivers Institute, School of Environment and Science, Griffith University, QLD, Australia

Session 5B(ii): Environmental omics applied to ecotoxicology & eco-surveillance, Chancellor 6, August 27, 2025, 1:30 PM - 3:00 PM

Biography:

Mr. Sazal Kumar is currently a PhD candidate in Environmental Science at the University of Newcastle (UoN), Callaghan, NSW, Australia. With a research focus on the ecotoxicology of endocrine-disrupting chemicals and microplastics, his doctoral work employs metabolomics to investigate the effects of these contaminants in molluscan models. Over the past ten years, Mr. Kumar has authored 38 peer-reviewed publications, including articles and book chapters, contributing extensively to the monitoring and assessment of heavy metal pollution in diverse environmental matrices and environmental ecotoxicology. Outside of his academic endeavours, Mr. Kumar has a keen interest in cooking, gardening, and natural photography.

In aquatic environments the concurrent exposure of molluscs to microplastics (MPs) and estrogens is common as these pollutants are frequently released by wastewater treatment plants. Therefore, this study aimed to evaluate the independent and co-exposure impacts of polyethylene microplastics (PE-MPs) and estrogenic endocrine-disrupting chemicals (EEDCs) at environmentally relevant concentrations on polar metabolites and morphological parameters in the Sydney rock oyster. A seven-day acute exposure revealed no discernible differences in morphology; however, showed significant variations in polar metabolites across oyster tissues. The altered metabolites were mostly amino acids, carbohydrates and intermediates of the Kreb's cycle. The perturbation of metabolites was tissue and sex-specific, mirroring the distinct physiological functions of various tissues and the disparate responses of female and male oysters to pollutant exposure. All treatments generally showed an increase of metabolites relative to controls – a possible stimulatory and/or a potential hormetic response. The exploration of co-exposure dynamics, both with and without pre-incubation of PE-MPs with EEDCs, revealed that incubation effects are negligible when both type of contaminants are present at low (environmentally relevant) concentrations. The presence of MPs impeded the exposure of adsorbed and free EEDCs potentially due to the selective feeding behaviour of oysters to MPs, favouring algae over similar-sized PE-MPs.

Understanding the impacts from fluoride emissions to local wildlife at an aluminium smelter

Kate Langdon[1], Therese Manning[1], Peter Ramsay[2], James Linfoot[2], Nathan William[2]
[1]Environmental Risk Sciences, Sydney, Australia, [2]Peter J Ramsay & Associates, Melbourne, Australia
Session 3B: Toxicants and environmental impacts on wildlife 2, Chancellor 6, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
Kate Langdon has over 20 years' experience as an environmental scientist, specialising in environmental contaminants and assessing potential risks to human health and ecosystems. Kate's work experience has focused on research as well as providing scientific advice to support policy and regulation of environmental contaminants. Kate has worked for a range of government agencies and now works for Environmental Risk Sciences, which is a dedicated toxicology/risk assessment consulting company.

Aluminium smelters heat alumina in the presence of cryolite and aluminium fluoride to produce metallic aluminium. This process generates gaseous fluoride. With best practice controls, over 98% of the fluoride can be captured, but some fugitive emissions are unavoidable.
A range of potential impacts to wildlife have been reported due to fluoride exposure near aluminium smelters. These include dental issues and osteofluorosis in mammals and plant injury symptoms.

The Alcoa Portland Aluminium smelter has been operating since 1986. The smelter covers approximately 100 ha, containing the smelting operations and associated infrastructure. The smelter is surrounded by a 400-ha land buffer (a requirement under Victorian legislation).
Following the smelter construction, parklands and wetlands were established within the land buffer as part of the 'smelter in the park' initiative to harmonise industrial and environmental activities. Fluoride impacts, including lameness in macropods which had not previously been observed, were reported surrounding the smelter after long term exposure. To reduce exposure to foraging macropods, Alcoa introduced a blue gum plantation in 2000. Koalas entered the plantation and symptoms of fluoride exposure were reported in the following years. In response, Alcoa established a number of management measures to reduce fluoride exposure to koalas (and other animals) surrounding the smelter.

The aim of this project was to review the fluoride emissions from the smelter, review the information in relation to ecological organisms in the area and undertake an ecological risk assessment. The key receptors identified for the assessment were herbivorous mammals, herbivorous birds, and vegetation. As part of this work, risk categories for fluoride concentrations in vegetation consumed by koalas were derived. The outcomes of this assessment were used to further support the management measures implemented by Alcoa and to provide additional information in relation to reducing exposure to koalas and other wildlife surrounding the smelter.

PFAS and pesticides in Australian raptor species: terrestrial biomonitors for a changing climate

Dr Phoebe Lewis[1], Dr Christopher Johnstone[1], Dr Jordan Hampton[2], Dr Judy Clarke[3], John Leeder[5], Dr Matthew Etterson[4], Dr Minna Saaristo[1]
[1]Environment Protection Authority Victoria, Macleod, Australia, [2]School of Veterinary Medicine, Murdoch University, Murdoch, Australia, [3]Tasmanian Museum and Art Gallery (TMAG), Hobart, Australia, [4]US EPA Great Lakes Ecological Research Division, Duluth, United States, [5]Leeder Analytical, Fairfield, Australia

Session 2B (ii): Toxicants and environmental impacts on wildlife 1, Chancellor 6, August 26, 2025, 1:30 PM - 3:00 PM

Biography:
Dr Phoebe Lewis has expertise in persistent organic pollutants (POPs) and emerging contaminants. Her PhD focused on the impacts of POPs and emerging contaminants in Antarctic seabirds, as well as understanding the long-term ecological consequences of bioaccumulation in individual species and populations. She has undertaken field work in remote environments including Antarctica and the deep sea, gathering critical data on the global distribution and fate of these contaminants. Her professional career has spanned both state and federal government organisations, and her research has informed policymakers and effective environmental management strategies aimed at minimising the impact of pollutants on vulnerable ecosystems.

Raptors serve as sentinels for environmental contamination. Per- and polyfluoroalkyl substances (PFAS) pose a growing concern for wildlife health, yet their prevalence and ecological impacts in raptor species remains largely unknown. Here, we provide the first assessment of PFAS tissue concentrations in five Australian raptor species, including the first liver concentrations for *Aquila sp.* globally. PFAS were detected in 40 of the 44 livers, with total concentrations (∑13PFAS) ranging from not detected (nd) to 115.1 ng/g wet weight (ww). PFOS was the most prevalent for all species (88.6% of samples) followed by PFTeDA, PFDA, PFDoA and PFHxS. While contamination levels in Australian raptors were generally lower than their northern hemisphere counterparts, contamination was widespread, suggesting persistent environmental exposure. A significant positive relationship was found between PFAS concentrations and expected basal metabolic rate (BMR), with brown goshawks *Tachyspiza fasciata* and brown falcons *Falco berigora* exhibiting the highest levels. White-bellied sea eagles *Haliaeetus leucogaster* showed higher ∑13PFAS than the comparably sized terrestrial wedge-tailed eagle Aquila audax (W = 178, P = 0.001), likely due to dietary differences. Wedge-tailed eagles *Aquila audax* were assessed as terrestrial biomonitors, revealing widespread pesticide contamination including legacy pollutants (DDE, DDT, dieldrin) and emerging bioinsecticides (Spinosad). Correlations between PFAS and pesticides suggest a potential co-occurrence linked to human activity, with contaminants clustering in areas of higher human footprint. Contaminant burdens in apex predators like raptors offers valuable insights into chemical persistence, biomagnification and long-term ecosystem impacts needed to ultimately support science-based policies that balance effective use with environmental protection.

The effects of micro-plastics on the fitness of marine animals: a meta-analysis

Miss Xinyi Liu[1], Dr. Patrice Pottier[1], Dr. Daniel Noble[1]
[1]Australian National University, ACTON, Australia

Session 4B(ii): Enhancing evidence synthesis in ecotoxicology: Current practices, what we are missing, & how we can improve 1, Chancellor 6, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Xinyi Liu is a Master's student at Australian National University. Her research focuses on the ecological impacts of microplastics on marine animals. Xinyi is currently investigating the effects of microplastic exposure on growth, fecundity and survival of marine organisms and is broadly interested in marine conservation and plastic pollution.

Global plastic production is estimated to produce between 10-40 million tonnes of micro-plastics per year – a quantity that is expected to double by 2040. Existing meta-analyses suggest that micro-plastics have negative impacts on the fitness (growth, survival and fecundity) of marine organisms, yet variations in effects are high, and existing analyses have failed to quantify how micro-plastic concentration and exposure duration influence effect magnitude. Inadequately capturing how effects are moderated by micro-plastic concentration and exposure duration has limited our ability to make predictions in nature while also compromising our understanding of the true global impacts of micro-plastics. We collected > 1400 effect sizes from 67 studies manipulating micro-plastics and ascertaining their effects on growth, fecundity and survival in marine organisms (9 vertebrate and 47 invertebrate species). For the first time, we use multi-level meta-regression models to show that exposure duration and micro-plastic concentration strongly influence the impacts of micro-plastics on marine organisms as predicted. Models considering the median log-transformed concentration and the median log-transformed exposure duration show that average effects are still largely negative (6% reduction in growth rate, 17% reduction in fecundity and 7% reduction in survival rate) in both vertebrates and invertebrates. Importantly, the negative impacts of micro-plastics remain negative even after accounting for publication bias. We show that micro-plastic beads and fibres vary in their effects across traits providing insights into how varying types of plastic production might differentially affect organisms. Our study supports the negative role micro-plastics have on marine organisms and provides predictions on expected effects in nature. Nonetheless, our findings highlight a critical need for more research on the effects of environmentally relevant concentrations of micro-plastics on fecundity and vertebrate animals. Such insights are crucial in understanding the true impacts that micro-plastics will have on aquaculture production, biodiversity and population resilience globally.

Microplastic Mass Inputs from Landfill Soil-like Fractions to Soil Systems: Quantification Approach and Implications for Waste Management Strategy

Ms Fangfang Lou[1], Prof Qunxing Huang[1]
[1]Zhejiang University, Hangzhou, China

Session 3A: Contaminants in soil: Filling knowledge gaps & enhancing decision making 2, Chancellor 1, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
Fangfang Lou is a PhD candidate at the Institute for Thermal Power Engineering, Zhejiang University, China. Her research focuses on the qualitative and quantitative detection of microplastics in environmental samples, with a particular emphasis on method optimization and its application. She is currently undertaking a visiting research placement at the Queensland Alliance for Environmental Health Sciences (QAEHS) in the University of Queensland, further advancing her expertise in emerging contaminant analysis.

Soil-like fractions within landfills represent a significant yet poorly quantified pathway for microplastic (MP) release into surrounding soil systems. Despite the potential to release thousands of tons of MPs, accurate assessment remains challenging due to the complex and heterogeneous matrix, which hampers effective extraction and quantification. In our research, an improved trichlorobenzene-based solvent extraction method coupled with pyrolysis–GC/MS was developed to quantify MPs in solid samples exceeding 10 g per batch without pressurization. This advancement enabled full-size MP recovery, improved analytical throughput, and lowered technical barriers for large-volume solid sample analysis. Subsequently, 98 samples were collected from different typical landfills including both sanitary sites and informal dumpsite, and subjected to systematic analysis, enabling the generation of comparable data. MPs mass-based concentrations ranged from 0.44 to 7.62 g/kg (mass-based) and 0.105 to 1.410 g/m³ (volume-based), with contamination levels influenced by landfill age, regional economic development, and management practices.

Sanitary landfills exhibited faster accumulation rates of MPs due to engineered compaction and sealing conditions. In contrast, the informal dumpsites, though partially buffered by native soil with limited permeability, showed elevated risks of MPs dispersion due to poor surface sealing. Notably, fragmentation appeared shape-related, with fiber MPs forming during later degradation stages—evidenced by an average fiber proportion increase of over 80% from younger to older landfill areas.

Several actionable strategies were recommended: (1) improving plastic waste segregation at sources to reduce landfill MPs accumulation and generation, alongside energy recovery through pyrolysis or combustion; (2) strengthening surface sealing and leachate interception as a remedial measures for existing informal dumpsites; (3) transferring and centrally treating high-risk informal dumpsites where necessary; and (4) implementing targeted dust and runoff control measures during landfill re-excavation. Collectively, this study expands the understanding of MPs behavior in soil-associated waste environments and informs practical strategies for mitigating their long-term ecological risks.

Metal bio-accumulation patterns in Mollusca globally: the influence of life history traits

Allison Luengen[3], Dr Md Rushna Alam[1,2], Dr Scott J. Markich[4,5], Dr Wayne O'Connor[6], Dr Geoff R. MacFarlane[2]

[1]Australian Institute of Marine Science, Darwin, Australia, [2]School of Environmental and Life Sciences, The University of Newcastle, Callaghan, Australia, [3]Department of Environmental Science, University of San Francisco, San Francisco, United States, [4]Aquatic Solutions International, Long Reef, Australia, [5]School of Natural Sciences, Macquarie University, Macquarie Park, Australia, [6]New South Wales Department of Primary Industries and Regional Development, Port Stephens Fisheries Institute, Taylors Beach , Australia

Session 3B: Toxicants and environmental impacts on wildlife 2, Chancellor 6, August 26, 2025, 4:10 PM - 5:40 PM

Biography:

Allison Luengen serves as an associate professor at the University of San Francisco, specializing in the cycling and bioavailability of trace metals. Professor Luengen's work focuses on understanding how methylmercury is accumulated by organisms at the base of the marine food chain. She also examines the transfer of mercury across different environmental compartments, encompassing both marine and terrestrial ecosystems. A central objective of her research is to elucidate the mechanisms of metal accumulation in relation to water chemistry.

Mollusca is a diverse group of animals that are impacted by environmental metal contaminants and are frequently used as bioindicators of metal contamination. The accumulation of metals in molluscan tissues can vary among species, based on the life history traits, a phenomenon that has not been empirically studied until now. In this study, we compiled a dataset of 156 molluscan species from 178 published documents, examining how the accumulation of copper (Cu), zinc (Zn), cadmium (Cd), lead (Pb), and mercury (Hg) varied with life history traits, employing a sophisticated phylogenetic comparative analysis approach. We explored the patterns of metal bioaccumulation in response to environmental metal doses using a bivariate linear model. We also used an ANCOVA model to compare these patterns among different molluscan classes, salinity tolerances, feeding modes, reproductive strategies, ecotypes, and modes of mobility. The analysis revealed a positive linear relationship between soft tissue concentrations of all targeted metals and sediment metal concentrations ($p < 0.05$, $R^2 = 0.04$ to 0.32), supporting the use of molluscs as effective bioindicators of metal contamination. ANCOVA analyses revealed Gastropoda had greater tissue metal accumulation at lower exposure concentrations than Bivalvia and Cephalopoda. Conversely, Bivalvia exhibited higher Cu, Zn, Pb, and Hg accumulation at elevated sediment metal levels, while Cephalopoda displayed the least metal accumulation, regardless of sediment concentration. Tissue Cu accumulation varied significantly among species with different salinity tolerances. Notably, brackish water species exhibited higher Cu, Zn, and Hg accumulation at increased sediment concentrations. No differences in metal accumulation were observed for taxa with different feeding modes, reproductive methods, ecotypes, and mobility patterns, due to variability in metal accumulation and dose among taxa within each group. These analyses demonstrate the influence of biological traits on metal accumulation and have practical applications for selecting the appropriate species for metal biomonitoring.

Beyond Microtox – a bacterial toxicity assay suitable for risk assessment in tropical environments

Dr Heidi Luter[1], Dr Katarina Damjanovic[1], Dr Marie Thomas[1], Dr Rebecca Fisher[1], Dr Lone Hoj[1], Dr Andrew Negri[1]

[1]Australian Institute of Marine Science, Townsville, Australia

Session 8B: Identifying 'ecologically relevant endpoints' for microbial processes to inform Environmental Quality Guidelines and One Health approaches 1, Chancellor 6, August 28, 2025, 11:20 AM - 12:50 PM

Biography:

Heidi Luter is a marine microbiologist and ecologist with >15 years research experience applying molecular techniques to investigate the impacts of environmental stress/contaminants in microbial systems. Her past research was heavily focused on host-associated systems; however, her recent work has shifted more towards the development of tools for microbial ecotoxicology.

Bioassays using bioluminescent bacteria offer a cost-effective and efficient alternative to standard toxicity assays for assessing contaminant risks in the environment, with applications in water quality assessments and effluent screening spanning decades. However, most bacterial bioassays utilise *Aliivibrio fischeri* in a low-throughput format under temperate conditions, limiting their suitability for tropical marine environments. Furthermore, conventional *A. fischeri* assays rely on short exposure periods (e.g., 5, 15, 30 min) and luminescence as the sole toxicity endpoint, reducing their applicability for deriving water quality guideline values. This study aimed to develop a high-throughput, and cost-effective assay using the tropical bioluminescent bacterium *Vibrio azureus* (Lum-31), incorporating toxicity endpoints suitable for both acute and chronic contaminant assessment in tropical marine conditions. Using copper and zinc as reference toxicants, we demonstrated the repeatability of the acute luminescence assay at 15 and 30 min, with increased sensitivity compared to *A. fischeri* assays. In addition, integrating an ecologically relevant endpoint (specific growth rate) and a chronic exposure period (>24 h) enabled comparisons of *V. azureus* sensitivity with other taxa in sensitivity distributions for copper and zinc species. This approach enhances the ecological relevance of the assay and improves its applicability for future ecological risk assessments.

Altered avian sperm morphology around nickel extraction and processing industries in New Caledonia

Mr Max M Gillings[1], Dr Riccardo Ton[1], Mr Daniel Jurd[1], Prof Mark Patrick Taylor[1], Prof Simon C Griffith[1]

[1]Macquarie University, Sydney, Australia

Session 3B: Toxicants and environmental impacts on wildlife 2, Chancellor 6, August 26, 2025, 4:10 PM - 5:40 PM

Biography:

Max M Gillings is a PhD candidate in the School of Natural Sciences at Macquarie University, Sydney. His research focuses on the impacts of environmental toxicants on urban birds and their wider implications for human, animal, and ecosystem health.

Rising global demand for nickel is outpacing our understanding of its impacts on ecosystem health. Although nickel and related elements such as chromium are known to induce oxidative stress and impair sperm function in humans and animals, few studies have investigated these effects in wildlife under realistic environmental conditions. Here, we examine the effects of nickel and chromium exposure on the sperm health of house sparrows (*Passer domesticus*) inhabiting multiple sites around nickel mining and smelting operations in New Caledonia, one of the world's largest nickel producers. We analysed the morphology of 9000 individual sperm from adult house sparrows, focusing on structural abnormalities and sperm size, which we contextualised with environmental data on soil element concentrations. Nickel and chromium concentrations exceeded soil screening thresholds protective of avian health at most sites and were significantly and positively associated with a higher proportion of sperm abnormalities in the head and midpiece. At the site with the highest soil chromium (10300 mg/kg) and nickel (3760 mg/kg) concentrations, we found evidence for systematic head abnormalities in a majority of sperm, ranging from acrosomal damage to deformed nuclei and complete head detachment. The proportion of abnormal sperm declined with distance from the Doniambo Nickel Smelter, the primary source of nickel emissions in New Caledonia's capital of Noumea. Against expectations, sperm length decreased with distance from this emission source, suggesting some degree of morphological plasticity in the sperm of nickel exposed birds. Our findings demonstrate that environmental exposure to nickel and related contaminants has an adverse effect on avian sperm morphology. This has implications for sperm function and reproductive success in a wide range of exposed wildlife inhabiting environments impacted by nickel processing and extraction industries.

Setting guidelines well – do we have a problem?

Ms Therese Manning[1], Dr Jackie Wright[1], Ms Ruth Jarman[1], Dr Kate Langdon[1], Dr Belinda Goldsworthy[1]
[1]Enrisks, Carlingford, Australia

Session 8C: Bridging the gap: Enhancing decision making in regulatory science, Chancellor 4, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Therese Manning has more than 30 years of experience in human health and ecological risk assessment with the NSW EPA and as a consultant at enRiskS. She has extensive experience in health and ecological risk assessment, environmental and analytical chemistry and has also been involved in reviewing and developing guidance documents and has provided training for government staff and at universities.

Setting national guideline values for soil, water, air and biota is a complex process and requires:

- sufficient, reliable, toxicity data
- people with expertise and experience
- sufficient time and resources to do the detailed work necessary.

Australia has detailed guidance explaining how guideline values should be determined. Over time, agreements have been reached amongst state and commonwealth regulators about how to choose appropriate, conservative parameter values to feed into the calculations.

These guideline values influence contaminated land decision making and, therefore, deriving guideline values that are technically robust but also practical to implement is critically important. Guidelines that could be overly conservative are as problematic as ones that are not strict enough. Overly conservative ones result in resources being applied to sites that may not pose a significant risk to people or the environment and mean that such resources are not available for sites that may pose a risk. However, time and funding pressures are now impacting on our ability to do this work well. Recent releases of guidelines for PFAS in Australia (i.e. PFAS NEMP V3, ANZG water quality guidelines and draft NHMRC drinking water guidelines) raise many questions about how we are doing this work. This presentation will provide detailed assessment of some aspects of the various new guidelines for PFAS to highlight the difficulties that we now encounter. This includes how measurement and sampling uncertainty impact on guideline development, lack of access to corporate memory about the history of this process in Australia, and the potential for media and community concerns to pressure regulators and/or influence the derivation of national guideline values.

The Potential of Australian Trees as Groundwater Biomonitors

Dr Sarah Mcdonald[1], Dr Shelley Templeman[1], Mr Chris Williams[1]
[1]JCU, TropWATER, Townsville, Australia

Session 7C(ii): Ecotoxicology & environmental monitoring in challenging environments, Chancellor 4, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Shelley is a senior water quality scientist and ecotoxicologist based in Townsville, North Queensland. Her key research interests lie in understanding the complex interactions between terrestrial and aquatic systems with a 'source to sink' focus on contaminant movement through aquatic systems.

Water quality monitoring is a routine technique for measuring and assessing nutrients, contaminants, major ions, etc in both surface and groundwater systems. Surface water monitoring can generally be undertaken in almost any location where water is present. Groundwater monitoring presents a more complex issue as accessibility is highly constrained and requires expensive techniques (drilling / bore construction) to access aquifers. Aquatic biomonitors are routinely used in surface water monitoring but the use of biomonitors is very restricted in groundwater systems.
We have undertaken a 10-year study using two Australian tree species that are considered to be groundwater dependent to assess their capacity to act as biomonitors of groundwater quality. Leaves from *Eucalyptus crebra* (Narrow-leafed Ironbark) and *Corymbia erythrophloia* (Red-barked Bloodwood) was collected annually from six plots in the dry tropics of North Queensland. Three plots were classified as intercepting background regional groundwater and three plots were classified as intercepting mineralised groundwater quality. Leaf tissue was analysed for major nutrients, major ions and a range of metals.
The results from this study will be explored in context of both groundwater quantity and quality. The challenges and benefits that have arisen from this study will be discussed. Consideration of a number of future opportunities will also be outlined.

The currency of ecosystem services: applications for ecotoxicology

Dr Sarah Mcdonald[1]
[1]TropWATER at James Cook University, Townsville, Australia

Session 8C: Bridging the gap: Enhancing decision making in regulatory science, Chancellor 4, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Dr Sarah McDonald is a Research Officer with the Centre for Tropical Water and Aquatic Ecosystems Research (TropWATER) at James Cook University in Townsville and published research scientist in aquatic ecotoxicology. Her work in this role primarily focuses on evaluating environmental water quality issues associated with mining and other industrial activities as part of applied commercial projects. She also undertakes fundamental research in aquatic ecotoxicology and helps to maintain laboratory cultures of tropical test species.

Ecosystem services are the benefits humans gain from nature, such as clean water, food and shelter. Ecosystems services are increasingly being used to inform outcomes for risk assessments and environmental monitoring programs, especially in systems requiring close integration between ecotoxicology and ecology for ecosystem protection. Although the topic is widely discussed, there is still a gap between the outcomes of ecotoxicological studies and how these serve to evaluate influences on ecosystem services. This is especially lacking for cultural ecosystem services that are provided by Australasian landscapes, with current progress usually focused on water quality, human and livestock health and biological functioning of limited taxa.

This talk will investigate how we might expand ecotoxicological methods to form a basis for measuring ecosystem services, and in turn how this might connect ecosystem goods and services to economic valuation. Specifically, the talk will focus on opportunities to value the resilience and assimilative capacity of ecosystems to intense, stochastic events (e.g., bushfires, floods, infrastructure collapse) as these events form common protection goals in risk assessments.

I will explore how we might collate and integrate environmental toxicology from traditional and emerging methods including predictive modelling tools, remote sensing and eDNA to quantify ecosystem services, and the challenges that need to be addressed in an Australasian context. For illustration, I will provide an example of how these methods may be applied to a regulatory framework in the case of a closed mine site and its continuing remediation efforts and natural resource change.

Can exposure to pharmaceuticals impact animal interactions and survival in the wild?

Dr Marcus Michelangeli[1,2], Dr Daniel Cerveny[2], Dr Anseesh Bose[2], Dr Jake Martin[2,3], Dr Gustav Hellstrom[2], Dr Jack Brand[2], Ms Annika Holmgren[2], Dr Michael Bertram[2], Dr Petter Lundberg[2], Dr Tomas Brodin[2]

[1]Griffith University, Brisbane, Australia, [2]Swedish University of Agricultural Sciences, Umea, Sweden, [3]Deakin University, Melbourne, Australia

Session 2B (ii): Toxicants and environmental impacts on wildlife 1, Chancellor 6, August 26, 2025, 1:30 PM - 3:00 PM

Biography:

I am a lecturer at Griffith University and researcher within the Australian Rivers Institute. My research explores how wildlife adapt to rapid environmental change, with a focus on the emerging threats posed by synthetic and psychoactive chemical pollution. I am particularly interested in how these contaminants (and other environmental stressors) reshape interactions within and between species, driving changes in behavioural individuality and ecosystem dynamics. My goal is to uncover how changes to these ecological interactions affect not just individual survival and reproduction, but also the structure of populations and communities.

Pharmaceutical pollutants now contaminate most major rivers, lakes, and seas worldwide. Under controlled laboratory conditions, exposure to pharmaceuticals have been shown to alter animal physiology and behaviour at ecologically relevant concentrations. However, how these observed effects manifest in complex natural systems remains unknown. In this study, we combined acoustic telemetry technology with targeted exposure implants to track multiple fish species that were either exposed or unexposed to a mixture of pharmaceutical pollutants. We monitored the fishes' movement, behaviour, and interactions for 34–36 days across three natural, but highly standardised, lakes. Each lake was stocked with 30 roach (*Rutilus rutilus*) and 30 perch (*Perca fluviatilis*) as prey species, and six northern pike (*Esox lucius*) as predatory species. Before releasing the fish into the lakes, we injected them with slow-release pharmaceutical implants containing either a mixture of three pharmaceuticals (fluoxetine, sertraline and venlafaxine; 25ug\L of each drug) or a control implant. These slow-release implants allowed us to chronically expose the study animals throughout the entire experimental timeframe and to examine the consequences for their behaviour, interactions and survival. We found that prey exposed to pharmaceuticals suffered a higher predation rate than control prey. Further analyses revealed that exposed prey were less likely to use artificial shelter sites provided in each lake and had home ranges that overlapped more heavily with areas of higher predator (pike) presence. These results suggest that behavioural changes induced by pharmaceutical pollutant exposure can have direct implications for wildlife survival, even in complex natural systems.

Dynamic PFAS exposure and body burden models provide insights for management of livestock on PFAS impacted farms to ensure food quality and market access

Dr Antti Mikkonen[1], Ms Barbara Astmann[2], Dr Thomas Simones[2], Ms Kara Fry[1], Dr Andy Smith[2], Dr Jen Martin[1]
[1]Epa Vic, Macleod, Australia, [2]Maine CDC, Augusta, USA
Session 7A: Food Chemical Risk Assessment 1, Chancellor 1, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Dr. Antti Mikkonen is a Principal Health Risk Advisor at the Environment Protection Authority Victoria (EPA) with over 17 years' experience in environmental consulting, research, and regulation. He received his Ph.D. in pharmacology and risk assessment from the University of South Australia. His work at EPA is centred around the assessment and management of public health risks from chemicals.

The presence of per- and polyfluoroalkyl substances (PFAS) in the food chain presents an ongoing challenge for risk assessment and risk management. Local food consumption can be a primary route of exposure for some PFAS. PFAS occurrence has been reported in a range of agricultural commodities including cattle and some markets have begun to introduce maximum limits (Europe) to manage public exposure and risk. Exposure assessment and management for consumers are complicated by the lack of validated toxicokinetic modelling approaches to estimate PFAS bioaccumulation in cattle.

Previous studies have shown that bioaccumulation in cattle is influenced by environmental, spatial, weather and temporal factors that necessitate a dynamic modelling approach. This work presents an integrated exposure and dynamic population toxicokinetic (DePopTK) modelling approach that estimates PFAS body-burden in cattle over time based on daily exposure. The exposure model estimates daily intakes of free water, pasture (dry matter) and soil, considering animal growth (and life stage), seasonal variability in pasture grass moisture content, temperature and PFAS concentrations. The one compartment DePopTK model is based on literature data on serum and tissue concentrations from several studies and concentrates on three of the most prominent biosolids- and firefighting related PFAS which accumulate in cattle: perfluorooctane sulfonic acid (PFOS), perfluorohexane sulfonic acid (PFHxS), and perfluorodecanoic acid (PFDA).
The DePopTK model has been applied to beef farms impacted by firefighting activities as well as those with extensive historical application of PFAS-contaminated biosolids to predict PFAS bioaccumulation. It has been used by regulators in Europe, USA and Australia to develop further tools and management strategies to minimise cattle PFAS body burdens (to levels below relevant limits) to ensure market access and food quality.

Regulatory challenges of waste reuse in a circular economy

Dr Antti Mikkonen[1], Ms Kara Fry[1], Mr Nick Huggett[1], Mr Mark Bannister, Dr Barry Warwick[1], Dr Jen Martin[1]

[1]EPA Vic, Macleod, Australia

Session 4C(i): Whole-of-life approach to risk assessment, Chancellor 6, August 27, 2025, 11:00 AM - 12:30 PM

With the push towards a circular economy and reuse of wastes in novel ways, regulators are faced with new challenges and potential risks that require consideration and management. Circular economy and the prevention of harm are not always aligned which can lead to teething issues especially for early adopters of circular economy objectives.

Some of the immediate challenges we are faced with include:

- Applying existing policy to new circumstances (circ econ) especially for reportable priority wastes (RPW).
- When and what information is required to prove that waste has become a product, and how do we identify sham-cycling schemes?
- Identification and management of risk?
- Lifecycle risk assessment – How far into a waste derived product's life cycle can we (and should we) regulate? How do we do this within existing frameworks?
- Chemicals in waste – How do we ensure harmful chemicals associated with RPW remain bound or immobilised in products and can be managed appropriately at their end of life (EOL)?
- Waste derived product specifications – Specifications often lack contaminant limits. It is not feasible to calculate limits for every product, nor every contaminant (especially emerging contaminants). What generic / risk-based approaches are available to help manage this risk?

Other regulators like US EPA and EU are adopting substitution principles like the "like risk for like risk" concept to address some of the above challenges. This presentation will provide an overview of regulatory substitution approaches and discuss the challenges facing regulators to ensure we are approving genuine waste derived product reuses without putting consumers or future generations at risk.

Untargeted Screening of Environmental Samples – Identifying Emerging Pollutants

Dr Courtney Milner[1]
[1]Agilent Technologies, Mulgrave, Australia
Session 4A: Contaminants of emerging concern 2, Chancellor 1, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Dr Courtney Milner has been involved in the Analytical and Environmental testing space for over 30 years working in a wide range of areas. He maintains a strong interest in the continual development of analysis and techniques to enhance the detection and monitoring of contaminants in many matrices.

Modern testing methods for environmental contaminants have become increasingly sensitive and targeted with the continual development of technology. Whilst these enhancements have improved many of these analyses, the increased use of targeted MS/MS techniques increases the risk of missing emerging contaminants. Quadrupole time of flight instruments are well suited to broad screening of complex samples, even with large differences in concentrations offering excellent in-spectra abundance sensitivity and the ability to retrospectively review data should a "new" contaminant of concern be detected.

A challenge this creates is the large quantity of data created and the ability to visualize and recognize possible areas to delve further into. This presentation will discuss how technology such as GC QTOF and LC QTOF coupled with differential SW programs can be used for screening samples and simplifying the identification of compounds of difference within the sample. Examples of how the technology can be utilized to progressively screen, identify and create custom libraries to enhance the monitoring of previously unmonitored components will be highlighted as a critical part of enhancing our analytical methods.

MATES: A tool for evaluating the quality of reporting of meta-analyses

Mr Kyle Morrison[1]
[1]University of New South Wales, Sydney, Australia

Session 4B(ii): Enhancing evidence synthesis in ecotoxicology: Current practices, what we are missing, & how we can improve 1, Chancellor 6, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Hi, I'm Kyle, a PhD student at the University of New South Wales. My primary research interests include research synthesis methods—particularly meta-analysis and systematic mapping—and ecotoxicology, where I explore the impacts of pesticides on fish and aquatic ecosystems.

Meta-analyses, embedded in systematic reviews, are pivotal in today's scientific landscape for reconciling conflicting findings, increasing statistical power, and charting new research directions. However, poor reporting practices that conceal technical details and potential limitations often need to be revised to maintain their reliability. Despite existing reporting guidelines, a comprehensive tool has yet to be tailored to appraise the reporting quality of the quantitative aspects of meta-analysis in environmental sciences. To bridge this gap, we introduce the Meta-analysis Appraisal Tool for Environmental Sciences (MATES), a checklist of items to assess the reporting quality of meta-analyses. To develop MATES, we used an adapted Delphi process involving workshops (11-16 participants), a survey (193 participants), and validation (30 participants). This process resulted in a 14-item checklist, encompassing the environmental science communities' view of important reporting elements. The validation, across 50 meta-analyses, indicated that the tool is repeatable (an average intra-class correlation of 88.97%) and time-efficient (17.00 ± 11.77 min) to implement. To enhance the accessibility and usability of MATES, we created an interactive web-based app that features training and implementation modules https://kylemorrisonisshiny99.shinyapps.io/MATES_shiny/. We also discuss how to interpret the MATES results, potential use cases of MATES and evaluate the development methodology. Overall, MATES provides authors, readers, reviewers, and editors with a reliable and user-friendly tool to assess the reporting quality of meta-analyses in the environmental sciences.

Reasons for (not?) using passive sampling techniques for environmental monitoring

Professor Jochen Mueller[1], Dr Sarit Kaserzon, Dr Rory Verhagen
[1]Qaehs - The University of Queensland, Brisbane, Australia, Australia

Session 8C: Bridging the gap: Enhancing decision making in regulatory science, Chancellor 4, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Jochen leads a research team at QAEHS, UQ. He has worked on passive sampling techniques and various programs that have used passive sampling since his PhD in the early 1990s.

Passive sampling techniques for aquatic pollutants have been developed, calibrated and applied for more than three decades. In the first instance passive sampling techniques can be categorised into equilibrium samplers that aim to measure bioavailable (Cfree) concentrations of pollutants in water (and sediments) and sampling techniques that typically assume first order kinetics aiming to measure time-average concentrations of analytes in bulk water. Passive sampling is based on the accumulation of chemicals in a sampling device which is used to estimate the concentration in the environment where the samplers are deployed. Estimations rely on models, including assumptions and simplified processes, that can lead to uncertainties and errors.
The aim of this presentation is to provide an overview of the passive sampling field and the progress that has been made in the field with a particular focus on kinetic/time integrative sampling techniques. Furthermore, we aim to provide an overview of applications, highlighting how uncertainties in model parameters may limit application, potentially lead to errors in results and inappropriate conclusions (and decisions). We will explore available options for monitoring, the role passive sampling can play to provide relevant monitoring data.

A collaborative pathway to improved vegetation management

Dr Jackie Myers[1], Dr Claudette Kellar[1], Dr Sara Long[1], Dr Erica ODell[1], Mr Tom LeCerf[2], Mr Andy Clark[2], Mr Clint Hendrey[2], Mr Andrew Kleinig[2], Dr Rhys Coleman[3], Professor Vincent Pettigrove[1,4]
[1]Aquatic Environmental Stress Research Group (AQUEST) RMIT University, Melbourne, Australia, [2]Waterways and Catchment Operations, Melbourne Water, Melbourne, Australia, [3]Research and Modelling, Melbourne Water, Melbourne, Australia, [4]RMIT University Europe, Barcelona, Spain

Session 1B: Bridging the gap: Collaborative pathways to transformative outcomes in pollution monitoring, mitigation and management 1, Chancellor 6, August 26, 2025, 11:00 AM - 12:30 PM

Biography:

Jackie is a Senior Research Fellow with RMIT University's Aquatic Environmental Stress Research Group (AQUEST) and the Aquatic Pollution Prevention Partnership (A3P). With over 20 years of experience as an Aquatic Ecotoxicologist, her research focuses on identifying and understanding the effects of anthropogenic and natural stressors on aquatic flora and fauna. Currently, Jackie's key projects include investigating the impacts of climate change on water quality and aquatic ecosystems, understanding toxicant risks in estuarine and marine environments, and assessing the effects of chemical use, such as herbicide spraying, on aquatic ecosystem health.

Glyphosate, a broad-spectrum systematic herbicide, is the most routinely used herbicide by local government agencies and the Water and Natural Resource Management industry as it's considered the most effective and economic solution to control weeds. It's used for the management of weeds along and within waterways, rights of way, industrial areas, and at sites where alternative forms of control (e.g., physical control) are often less successful, practical or economical. However, concern over the human health and environmental impacts of glyphosate use has risen considerably over the past decade and led to many agencies considering the reduction or elimination of glyphosate from their weed control programs. In response, we initiated a collaborative project with a local management authority to explore and review current vegetation management approaches and identify viable alternatives for vegetation management.

Our multidisciplinary study assessed existing practices, examined the environmental risks, and investigated safe and economically feasible substitutes for glyphosate. By integrating research with industry practices, we generated crucial data to enable informed decision-making and practice modification. The partnership is facilitating environmental improvements while maintaining operational efficiency, showcasing how evidence-based approaches can transform business operations and deliver tangible environmental benefits.

This presentation will use our project as a case study to highlight the power of collaboration between researchers and industry in driving meaningful change in vegetation management, benefiting both business operations and environmental health.

Predicting the combined effects of pollution and heat stress to adjust guideline values for tropical marine microbiomes

Dr Andrew Negri[1], Dr Rebecca Fisher[2], Ms Gretel Waugh[1,3], Dr Katarina Damjanovic[1], Prof Nicole Webster[4], Dr Heidi Luter[1], Dr Marie Thomas[1,3]
[1]Australian Institute of Marine Science, Townsville, Australia, [2]Australian Institute of Marine Science, Crawley, Australia, [3]Australian Centre for Ecogenomics, University of Queensland, Brisbane, Australia, [4]Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Australia

Session 8B: Identifying 'ecologically relevant endpoints' for microbial processes to inform Environmental Quality Guidelines and One Health approaches 1, Chancellor 6, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Dr. Andrew Negri is a Principal Research Scientist at AIMS, specialising in coral reef ecotoxicology. His research focuses on pollutants (e.g. pesticides, hydrocarbons, metals) and their effects on reef taxa, including corals and microbial communities. He develops methods to assess pollution and climate impacts on reef ecosystems, providing essential data for water quality guidelines and risk assessments. With over 20 years' experience, including work on coral early life stages, his recent efforts support reef restoration through improved coral aquaculture techniques.

The health and resilience of marine ecosystems are increasingly threatened by the rising frequency of heating events, which further intensify the vulnerability of species and ecosystems to chemical pollution. To effectively prioritise ecosystem protection interventions, it is essential to quantify the individual impacts of each stressor and predict their combined effects. In this study, we developed a cumulative Prokaryotic Sensitivity Distribution (PSD) for marine microbiomes in response to thermal stress over a standard exposure period, analogous to conventional Species Sensitivity Distributions. This approach enabled quantitative predictions of community-level impacts as temperatures exceeded ambient conditions. The microbiome hazard temperature (mHT5), affecting 5% of taxa in the community was 1.5°C above ambient–similar to thresholds impacting the same proportion of eukaryotic marine species and known to trigger coral bleaching–highlighting its relevance for multi-stressor risk assessments. To predict the combined effects of thermal stress and chemical pollution, we combined the thermal stress PSD with a previously derived chemical PSD for the reference stressor copper by applying the multi-substance potentially affected fraction (ms-PAF) model. Expanding the ms-PAF framework to include thermal stress impacts on microbial communities presents a promising strategy for adjusting water quality guideline values for microbiomes to account for heating events, thereby improving the protection of marine ecosystems under multiple stressors.

Heavy metal concentrations in feathers and metabolomic profiles in Pacific black ducks (*Anas superciliosa*) from Southeastern Australia

Dr Damien Nzabanita[1], Dr Hao Shen[1], Mr Stephen Grist[1], Dr Jordan Hampton[2,3], Associate Professor Jasmin Hufschmid[2], Professor Dayanthi Nugegoda[1]
[1]RMIT University, Melbourne, Australia, [2]University of Melbourne, Melbourne, Australia, [3]Murdoch University, Murdoch, Australia

Session 3B: Toxicants and environmental impacts on wildlife 2, Chancellor 6, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
Dayanthi has led the Ecotoxicology Research Group at RMIT University since 2004. Her group has developed novel methods to assess, monitor and evaluate the effect of toxicants and other environmental stressors on aquatic organisms, and ecosystems and has received national and international recognition. She has been a SETAC member since 1997 and was President of SETAC Australasia 2011-2013. In 2018, she set up the Aquatic Prevention Pollution Partnership at RMIT with Melbourne Water with Vincent Pettigrove. She is a lead researcher in the Aquatic Environmental Stress Research Group (AQUEST) and has graduated 40 PhD candidates in Ecotoxicology in Australia.

Heavy metals are cumulative toxicants that frequently create negative health effects for waterbirds, inhibiting contaminated freshwater systems. Although levels of exposure to heavy metals have been well documented for many waterbird species, the adverse effects of exposure remain relatively poorly understood. One emerging field that allows the exploration of such effects is metabolomics. This study aimed to characterize metabolomic profiles with long-term heavy metal exposure in a waterbird species. In 2021, wings from 44 Pacific black ducks (*Anas superciliosa*) were collected by recreational hunters at three sites in Victoria, southeastern Australia. The concentrations of seven heavy metals were measured in feathers and these data were quantified via inductively coupled plasma mass spectrometry and compared with a semiquantitative assessment of 21 metabolites identified in muscle tissues from the same birds via gas chromatography-mass spectrometry. Principal component analysis was conducted to test associations between metabolites, heavy metals, and sites. Mean heavy metal concentrations detected were copper (9.97 μg/g), chromium (0.73 μg/g), iron (123.24 μg/g), manganese (13.01 μg/g), mercury (0.58 μg/g), lead (0.86 μg/g), and zinc (183.95 μg/g; dry wt). No association was found between heavy metals and 17 metabolites, whereas four metabolites were negatively associated with some heavy metals: α-linolenic acid with iron, glucose with lead and manganese, lactic acid with mercury, and propanoic acid with mercury. There were a few differences in the studied metabolites in ducks between the three sites. This study provides a novel approach to combining toxicological and metabolomic data for an ecologically important species from a relatively poorly studied global region.

Expanding the use of portable XRF to monitor lead exposure in an Australian duck species two decades after a ban on lead shot

Dr Damien Nzabanita[1], Dr. Jordan Hampton, Simon Toop, Dr. Andrew Bengsen, A/Prof. Aaron Specht, Jason Flesch, A/Prof. Jasmin Hufschmid, Prof. Dayanthi Nugegoda
[1]RMIT University, Australia, Melbourne, Australia, [2]Murdoch University, Australia, [3]Game Management Authority, Victoria, Australia, [4]Vertebrate Pest Research Unit, Department of Primary Industries, Australia, [5]Purdue University, USA, [6]Game Management Authority, Victoria, Australia, [7]University of Melbourne, Australia, [8]RMIT University, Australia

Session 4B(i): Toxicants & environmental impacts on wildlife 3, Chancellor 6, August 27, 2025, 11:00 AM - 12:30 PM

Biography:

Dr. Damien Nzabanita is an early-career environmental scientist and ecotoxicologist specializing in aquatic contaminants. He completed his PhD at RMIT University, studying the impact of toxicants on Victorian waterbirds. As a Research Fellow at RMIT, he conducts independent research and supports PhD students. Dr. Nzabanita has expertise in analytical techniques and has worked on projects related to heavy metals, microplastics, and persistent organic pollutants in wildlife. He has contributed to several peer-reviewed publications and international conference presentations. He is passionate about mentoring students and actively engages with the environmental science community.

There is growing worldwide recognition of the threat posed by toxic lead for wildlife and humans. Lead toxicity from ammunition has been shown to be a threat to waterbirds across the globe. Lead shot was banned for all waterfowl hunting in Victoria, Australia, in 2002. However, no assessments of lead exposure in Australian waterfowl have been published since the 1990s. Our aim was to estimate contemporary lead exposure via measuring bone lead concentrations in a harvested dabbling duck, the Pacific black duck (*Anas superciliosa*). We collected wings from 77 Pacific black ducks, spanning 2018 (n = 30) and 2021 (n = 47), from nine sites with long-term histories of regular waterfowl hunting. We sought to validate portable X-ray fluorescence (XRF) for this purpose by taking a piece of humerus bone from each bird, and measuring lead concentration (mg/kg), first via non-destructive XRF and then via destructive inductively coupled plasma mass spectrometry (ICP-MS) and validated the relationship via regression analysis. Portable XRF bone lead measurement demonstrated a strong correlation with ICP-MS results using root-transformed regression ($R2 = 0.85$). Greater than 92 % of ducks had only background lead exposure (<10 mg/kg). When compared to historical studies in the same species at similar field sites from the 1990s, lead exposure levels were considerably lower, with mean lead concentrations ~2-fold lower (3.7 c.f. 7.7 mg/kg), and the frequency of birds with severe lead exposure (>20 mg/kg) ~3-fold lower (2.6 c.f. 7.5 %). Our results confirm that portable XRF is a useful option for measurement of bone lead in Australasian waterbird species. Our findings also demonstrate that a ban on the use of lead shot around 20 years ago has been associated with a substantial reduction in lead exposure in at least one species of waterfowl.

A national survey of the occurrence of antimicrobials in wastewater influent, effluent and biosolids

Dr Jake O'Brien[1,2,3], Dr Jakub Maculewicz[1], Dr Xueting Shao[1,4], Prof Jochen Mueller[1], Dr Ben Tscharke[1], Dr Rory Verhagen[1], Mr Naixiang Zhai[1], Prof Kevin Thomas[1], Mr Jinglong Li[1]
[1]The University of Queensland, Brisbane, Australia, [2]University of Amsterdam, Amsterdam, The Netherlands, [3]University of Tasmania, Hobart, Australia, [4]Hainan University, Haikou, China
Session 5A: Contaminants of emerging concern 3, Chancellor 1, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
Jake is a Senior Research Fellow and NHMRC Emerging Leadership Fellow at the Queensland Alliance for Environmental Health Sciences (QAEHS). His main field of interest is in wastewater-based epidemiology, but he also has interest in developing analytical methods for chemicals of emerging concern within biological and environmental samples. Dr O'Brien is a strong advocate for collaborative research having co-authored with more than 300 collaborators worldwide on over 150 publications. Jake is strongly supportive of early career researcher development and is currently the chair of the EMCR@UQ Committee. He is also a Chief Investigator of the National Wastewater Drug Monitoring Program.

Australia is one of the highest per-capita users of antimicrobials in the OECD and usage is rising. Despite this, little is known about their residues in wastewater, their removal efficiencies during wastewater treatment, and their release and potential antimicrobial resistance (AMR) selection risk they pose to the environment from effluent and biosolid reuse. In this study we analysed 102 antimicrobial substances and selected transformation products (TPs) in 50 influent, 47 effluent and 24 biosolid samples from wastewater treatment plants (WWTPs) across Australia. Forty-one antimicrobials and 15 transformation products were detected in the influent with 30 detected in >50% of samples. Concentrations in influent ranged from below limit of detection (LOD) up to 20 µg l−1 for amoxicilloic acid. Thirty-two antimicrobials and 13 transformation products were detected in the effluent with 14 analytes in >80% of samples. Of these, ampicillin, penicillin V, penicilloic V acid, fluconazole, and tazobactam M1 were observed with high median concentrations of >0.2 µg l−1. Thirteen antimicrobials and three transformation products were detected in the biosolids with 10 analytes in >80% of samples. Doxycycline and tetracycline, oxytetracycline and trimethoprim had the highest concentrations in biosolids.

From an influent/effluent removal perspective, thirty-seven analytes were removed at rates >80% post-treatment, whereas quinolones, nitroimidazoles/azoles, lincosamides, and macrolide transformation products were observed with poor removal efficiencies. Some chemicals, such as triclosan were only detected in the biosolids suggesting that their measurement in wastewater influent is insufficient for monitoring their use. Additionally, when measured concentrations in effluent were compared with predicted no-effect concentrations for AMR selection, we found seven antimicrobial pose selection risk for resistant bacteria.

As a snapshot study, our data provide insights into the presence of antimicrobials and AMR implications, but further assessment is required to understand trends in usage, removal mechanisms, and fate of these chemicals in the environment.

Everyday exposure to plastic particles: investigating microplastics and nanoplastics in Australian drinking water and release from plastic products

Dr Elvis Okoffo[1], Ke Shi[1], Dr Cassandra Rauert[1,2], Prof Kevin Thomas[1,2]
[1]Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Brisbane, Australia, [2]ARC Training Centre for Hyphenated Analytical Separation Technologies (HyTECH), Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Brisbane, Australia

Session 8A(ii): Particulates, plastics and real-time risks, Chancellor 1, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Dr. Elvis Okoffo is a Research Fellow at the Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Australia. His research is centred on developing innovative analytical methods to characterize and monitor environmental and human exposures associated with plastics. He has pioneered novel sampling approaches and analytical techniques for the rapid screening and monitoring of various types of plastics, including microplastics, nanoplastics, and biodegradable plastics in environmental samples (e.g., drinking water, wastewater, biosolids, seafood, marine water and sediments, compost, food, road dust, among others).

Microplastics (MPs; >1 µm) and nanoplastics (NPs; <1 µm) are increasingly recognised as widespread contaminants in the human environment, yet comprehensive assessments of their occurrence in drinking water and release from consumer products remain limited. This study investigates the presence of plastic particles in Australian drinking water and their release from commonly used plastic products, including polypropylene (PP) kettles, PP food storage containers, and single-use plastic cups lined with polyethylene (PE) or polylactic acid (PLA). Using an integrated analytical approach combining pyrolysis-gas chromatography-mass spectrometry (Pyr-GC-MS) and particle tracking techniques, we quantified and characterised both MPs and NPs across various sample types. Drinking water samples contained MPs and NPs ranging from 0.3 ± 0.1 to 1.5 ± 0.8 µg/L, with significantly higher concentrations detected in tap water compared to bottled water. Controlled experiments revealed that plastic products can release substantial quantities of particles under typical use conditions. For instance, PP kettles released up to 18.6 µg/L of MPs and NPs during early boiling cycles, with particle release decreasing over time but not eliminated. Similarly, PP food containers and PE/PLA-lined single-use plastics released plastic particles under heat and mechanical stress. Notably, biodegradable PLA-lined items also released detectable levels of nanoplastics, highlighting concerns over assumed environmental safety. These findings offer new insights into real-world exposure pathways to plastic particles through both ingestion and product use, emphasising the need for improved material design, consumer guidance, and regulatory oversight.

Occurrence of synthetic musk fragrances in Australian urban streams in relation to land-use

Dr Tanya Paige[1], Dr Deni Taleski[2], Dr Jason Lu[2], Ms Hao Ngugen[2], Dr Saman Buddhadasa[2], Professor Dayanthi Nugegoda[1], Professor Vincent Pettigrove[1]
[1]RMIT, Melbourne, Australia, [2]National Measurement Institute, Port Melbourne, Australia
Session 5A: Contaminants of emerging concern 3, Chancellor 1, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
Tanya recently submitted her PhD from her research with the Aquatic Environmental Stress (AQUEST) group at RMIT, in collaboration with the Australian National Measurement Institute (NMI) and Melbourne Water. Her work examines the spatial distribution of emerging contaminants, focusing on per- and polyfluorinated alkyl substances (PFAS) and synthetic musk fragrances (SMs) in aquatic ecosystems. She developed novel sampling methods using passive samplers and advanced gas chromatography coupled to tandem mass spectrometry (GC-MS/MS) analysis for SMs. With a strong background in organic synthesis and analytical chemistry, Tanya's professional interests span chemistry, method development, and the intersection of human and environmental health.

Synthetic musks (SMs) are a range of chemicals commonly used in fragranced domestic and industrial products. Several are mass produced and have displayed mobile, persistent, toxic, and bioaccumulative properties. They are typically investigated only in wastewater-impacted environments and rarely included in routine monitoring programs. There is limited understanding of their potential sources from industrial and urban areas, as well as their transport throughout urban aquatic environments. This study examined the associations of SMs with various anthropogenic land-uses using quantitative data from grab samples of surface waters collected at 20 sites across the greater Melbourne area, Australia. Methodology developed and validated at the National Measurement Institute (NMI) of Australia was used to quantify eleven SMs from three classes: polycyclic musks (PCMs), nitromusks (NMs) and macrocyclic musks (MCMs). Two types of passive samplers, including Trimethylpentane Passive Samplers (TRIMPS) and Chemcatchers, were deployed to provide semi-quantitative data. Passive sampling revealed a higher number of targeted SMs (seven) compared to grab samples (four), highlighting the broader presence of SMs in the environment than what is typically detected using traditional sampling techniques. The PCMs - galaxolide, tonalide, cashmeran, celestolide, traseolide, phantolide - and the NM, musk ketone, were detected in urban waterways, with SMs found at 70% of the sites. This study determined that, while wastewater remains an important source of SMs, residential and industrial areas also contribute to urban contamination of a range of SMs. The SMs appear to have transported atmospherically, as evidenced by their ubiquity across the urban area, warranting further investigation into their movement and sources.

Environmental drivers of AMR: investigations of associations of metal contaminants and AMR in agricultural, airstrip and microcosm soil

Dr Barry Palmer[1]
[1]Massey University Wellington, Wellington, New Zealand

Session 9B: Identifying 'ecologically relevant endpoints' for microbial processes to inform Environmental Quality Guidelines and One Health approaches 2, Chancellor 6, August 28, 2025, 1:35 PM - 3:05 PM

Biography:
Barry Palmer is an Associate Professor in the School of Health Sciences, Massey University. Research interests include Environmental influences of Antimicrobial Resistance and Prognostic Biomarkers in Cardiovascular Disease.

Environmental drivers selecting for the development and maintenance of antimicrobial resistance (AMR) are of increasing concern from a One Health perspective. Despite this, the challenges of sampling and modelling environments where contaminants select for AMR mean this is a neglected area of research.

This presentation summarises the findings of investigations by Massey University Environmental Health researchers and collaborators on the association of heavy metal (cadmium, Cd; zinc, Zn) contamination of agricultural soil and antibiotic resistance (ABR) at sites in the Waikato and Wellington regions of New Zealand. Soils from three contaminated sites and one uncontaminated site in Waikato, and a farm airstrip near Wellington with graduated Cd contamination were sampled for the presence and proportion of total aerobic heterotrophic bacteria with metal resistance (HMR) (Cd, Zn and mercury, Hg - a positive control). Soil microcosm experiments determined the range of Cd, Zn or Hg concentrations associated with elevated numbers of ABR bacteria.

Antibiotic sensitivity, 16SrDNA and horizontal gene transfer analyses were employed to investigate co-selection for HMR and ABR. In Waikato, Wellington airstrip and microcosm samples, higher levels of bacterial resistance to Cd, Zn, Hg and antibiotics correlated with higher levels of Cd or Zn in soil. Bacterial community structures were altered in soils with high HM levels. Cd resistance genes were transferred from donor bacterial isolates to recipients, and transconjugants were also resistant to Zn and/or Hg and a range of antibiotics. 16S rDNA next-generation sequencing profiling of Wellington airstrip and microcosm samples found changes in HM-exposed bacterial communities. The bacterial phyla Acidobacteria and Chloroflexi differed most in abundance between airstrip subsite samples ($p<0.05$). The proportion of Acidobacteria in the Hg-spiked microcosms was reduced compared to control microcosms. Much remains unknown about the interactions of metals and AMR in soil, but these and other approaches can help illuminate them.

Chemical contaminants in New Zealand agricultural water – charting the food safety implications

Dr Andrew Pearson[1]
[1]Tonkin + Taylor, Wellington, New Zealand

Session 7A: Food Chemical Risk Assessment 1, Chancellor 1, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Andrew is a Technical Director at Tonkin + Taylor specializing in chemical fate, exposure and toxicology. Andrew has internationally recognized capability in risk assessment and exposure modelling, which coupled with a research background in chemical occurrence and behaviour in environmental media supports a strong understanding of the risk assessment and management of chemical contaminants. Andrew is a Certified Environment Practitioner and has 20 years' experience in risk assessment for central government and in consulting.

Globally, water is an ever-precious resource, in particular for agriculture, which draws on over two-thirds of the freshwater used. Climate change and growing populations put pressure on the demand for water and the challenges of water stress. New Zealand, like many other countries, may need to consider alternative, often lower quality, water sources to ensure sufficient supply for food production. One challenge is that the quality of the water used in agriculture has implications for the safety of produced food. Global initiatives to address assessment and management of waterborne hazards to food safety have made good progress for microbial pathogens, and the international focus is now on chemical contaminants.
In New Zealand, our water resources can be impacted by toxic elements from a range of sources including geothermal activity, cyanobacterial blooms, agricultural chemicals and lastly, contaminants in our wastewater and stormwater. Prioritizing which contaminants to assess and manage requires understanding the pathways that lead to accumulation in food and the likely magnitude of the dietary exposure this can cause. The risk can be influenced by how the water is being used; for example, arsenic in rice production is a major global concern. In contrast, in marine aquaculture, arsenic converts to lower toxicity forms. If a waterborne contaminant is a dietary risk, it is critical to understand if it can be managed at the source, through treatment techniques or modifying how the water is used.
Drawing on New Zealand and overseas studies, the presentation will detail which contaminants are reported, or anticipated, to be a potential risk in New Zealand agricultural waters and those that might emerge when using alternative water sources. Lastly, the talk will consider the gaps in understanding, as well as the emerging challenges, such as generation of antimicrobial resistance, as a basis for charting future action.

Intact soil monoliths sampling and experimental setup to assess the fate of a PFAS-fungicide in two soils of north-eastern Italy

Miss Giovanna Piazzon[1], Mr Sebastiano Rocco[1], Ms Alessia Zanetti[1], Dr. Karin Müller[2], Prof. Melanie Kah[3], Prof. Francesco Morari[1], Prof. Paolo Salandin[4], Prof. Nicola Dal Ferro[1]
[1]Department of Agronomy, Food, Natural Resources, Animals and Environment, University of Padova, Padova, Italy, [2]The New Zealand Institute for Plant & Food Research Ltd, Auckland, New Zealand, [3]School of Environment, University of Auckland, Auckland, New Zealand, [4]Department of Civil, Environmental and Architectural Engineering, University of Padova, Padova, Italy

Session 3A: Contaminants in soil: Filling knowledge gaps & enhancing decision making 2, Chancellor 1, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
I graduated with an MSc in Sustainable Agriculture from the University of Padova (Italy). Currently, I am a second-year PhD student in Crop Science at the University of Padova. My research focuses on the dynamics of Plant Protection Products (PPPs) from soil to groundwater and on predicting agroecosystem vulnerability to PPPs contamination at different scales through numerical modelling.

Fluorinated agrochemicals have recently emerged as top-selling plant protection products, due to their high biological activity and chemical stability. Fluopicolide is a PFAS-fungicide widely used in vineyards and horticulture to control downy mildew; however, growing concerns have emerged due to its PFAS-associated persistence and adverse effects on ecosystems and human health. Despite its extensive application, it remains poorly studied, making further investigations necessary to clarify its environmental fate and impact on diverse ecological compartments. With this study, we evaluated the fate of fluopicolide and its metabolite 2,6-Dichlorobenzamide (BAM) in two agricultural soils of northeast Italy, with the aim of evaluating the susceptibility to groundwater contamination.
Four large undisturbed cylindrical samples (0.5 m² area, 1 m height) were extracted from two viticultural sites. These samples were configured as lysimeters, preserving field-representative characteristics while enabling highly controlled conditions during experiments, such as the temperature, total rainfall and rainfall intensity, that were adjusted with rain simulators.
The collected monoliths were equipped with soil moisture sensors, tensiometers and suction cups to collect pore water samples at -10, -30 and -60 cm. Ceramic porous plates were installed at the bottom to collect leachate while simulating free drainage conditions that prevented the seepage face. Fluopicolide was applied to bare soil in May 2024, afterwards a total of 370 soil and water samples were analyzed to estimate fluopicolide and BAM movement and dissipation.
Fluopicolide moved rapidly through all soil profiles, with significant leaching observed especially after intense rainfall that suggested preferential flow movement. Also, the residual concentrations found in the 0-15 cm layer after 45 days indicated its high persistence in the soil. These findings underscore the need for further investigations into the behavior of PFAS agrochemicals and exploration of best practices to mitigate their impact on soil and groundwater resources.

Visual and ocular discomfort/disorder/impairment/disease at work: a new issue or an old one?

Professor Bruno Piccoli[1]
[1]University of Rome Tor Vergata, Rome, Italy

Session 2C: Toxicology of the Visual System, Chancellor 4, August 26, 2025, 1:30 PM - 3:00 PM

Ergophthalmology ("Work and Vision") is a scientific field aimed at analysing, evaluating and designing simple or complex working systems pertaining to the relationship between work and visual performance. It makes use of established knowledge derived from ophthalmology, occupational hygiene and occupational medicine, as well as from technology (physics, engineering, architecture, etc.) and social disciplines (psychology, sociology, etc.). The purposes of Ergophthalmology are mainly the prevention and management of discomfort and disease in order to obtain maximum efficiency and effectiveness of visual function in organised work (ICOH S.C. on Work and Vision https://www.icohweb.org/site/scientific-committees.asp).

Great importance, especially in terms of primary prevention, should be paid to occupational asthenopia, which is defined, in occupational health and safety terms as an association of signs and/or symptoms caused by work-related factors, i.e., environmental factors (chemical, physical and biological) and job-task factors (duration, visual observation distance, lay-out), which, when combined with the ophthalmic characteristics of the subject (refraction, ocular motility, ocular surface, chronical-degenerative pathologies), could favour the appearance or recurrence of a series of ocular and/visual signs and/or symptoms, that in the most serious cases could lead to general disturbances.

Adverse factors for the human eye can be divided across chemical, physical and biological categories. The most relevant are ranked as follows: among the first, VOCs, HCHO, O_3, and NOx; among the second, are lighting (including blue light) and microclimate with the third being, bacteria, fungi, chlamydia and viruses, which can reach the ocular surface via the operator's fingertips.

Ice Station: A multidisciplinary approach to assessing environmental risk of a former Antarctic station buried below the ice

Dr Gwilym Price[1], Dr Cath King[1], Dr Kathryn Brown[1], Dr Daniel Wilkins[1], Dr Rebecca McWatters[1], Mr Greg Hince[1], Mr Greg Lagerewskij[1], Dr Bianca Sfiligoj[1], Ms Kasey Williams[1], Dr Scott Stark[1], Mr Tim Spedding[1]

[1]Australian Antarctic Division, Hobart, Australia

Session 7C(ii): Ecotoxicology & environmental monitoring in challenging environments, Chancellor 4, August 28, 2025, 9:25 AM - 10:55 AM

Biography:

Dr Gwilym Price is a Research Scientist in the Environmental Stewardship Program at the Australian Antarctic Division. His research interests focus on environmental risk assessment and monitoring, the development and implementation of polar-specific remediation processes, and the use of drone technology for environmental assessments and management.

Previously occupied research stations and associated waste sites in the Antarctic present logistical challenges for contaminated site assessments and the determination of ongoing environmental risk to ecological receptors. These challenges are even greater when the sites are encased in ice and snow, such as at the former Wilkes station and landfill sites on the Clark Peninsula, East Antarctica. Adding further complexity is the need to assess environmental risk in the context of current climatic conditions but also under future climate scenarios where long-term trends in temperature, precipitation, snow fall and accumulation will change.

To overcome these challenges a multidisciplinary approach with a multidisciplinary team is required. Such approaches include novel methods of sub-ice waste detection using drone mounted ice penetrating radar and magnetometry, the use of ice bore drilling to measure hotspots and plume migration of volatile contaminants using *in situ* passive vapour sampling, eDNA to investigate biodiversity and ecosystem changes in receiving environments, and targeted direct toxicity assessments with endemic species to predict biological risk and to inform risk prioritisation.

Over the past several decades a series of studies have been conducted to assess and classify the presence of broad scale contamination at the former Wilkes station, investigate contaminant mobility and the impacts of contaminants on the adjacent marine environment. This study aims to consolidate previous work along with contemporary research and assessments to showcase the need for a multidisciplinary approach for the assessment of legacy contaminated sites including stations and waste tips in the Antarctic.

A research synthesis of humans, animals, and environmental compartments exposed to PFAS: A systematic evidence map and bibliometric analysis of secondary literature

Mr Lorenzo Ricolfi[1], Catharina Vendl[2], Jennifer Bräunig[3], Matthew Taylor[4], Daniel Hesselson[5], Gregory Neely[6], Malgorzata Lagisz[7], Shinichi Nakagawa[8]
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Session 4B(ii): Enhancing evidence synthesis in ecotoxicology: Current practices, what we are missing, & how we can improve 1, Chancellor 6, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Lorenzo is an environmental scientist about to complete his PhD at UNSW Sydney. He specialises in evidence synthesis methods to address chemical pollution and sustainability challenges. With experience in academia, international development, and policy-relevant research, he is passionate about translating scientific evidence into actionable, equitable, and sustainable solutions. Lorenzo is the winner of the 2024 SETAC AU Postgraduate Research Publication Award.

Per- and polyfluoroalkyl substances (PFAS) are a class of persistent anthropogenic chemicals raising increasing concern due to their potential adverse effects. This study systematically maps the secondary literature on the biological, environmental, and medical aspects of exposure to 35 fluorinated compounds. We aimed to identify research gaps, assess review quality, and explore interdisciplinary patterns using a systematic evidence-mapping approach.
We included systematic reviews from peer-reviewed journals, pre-prints, and theses, identified through comprehensive database and grey literature searches. Reviews were analyzed through data mapping and narrative synthesis. Methodological quality was assessed using a modified AMSTAR2 checklist, and bibliometric analysis was applied to examine collaboration trends. The protocol was pre-registered (osf.io/2tpn8) and published (Vendl et al., Environment International 158 (2022) 106973). The database is freely accessible through the interactive and user-friendly web application: https://hi-this-is-lorenzo.shinyapps.io/PFAS_SEM_Shiny_App/.
A total of 175 systematic reviews were included, with publication numbers rising steadily and peaking in 2021. Most reviews focused on human health, especially reproductive and developmental outcomes in children. Environmental and animal studies were less common and often methodologically weaker. Animal reviews typically involved lab settings, while wildlife reviews were biased toward birds and fish. Quantitative synthesis methods have been used more frequently in recent years. Strong points included transparency in study selection and conflict of interest disclosures, but many reviews lacked detailed methodological reporting. Bibliometric analysis revealed that most productive authors collaborate nationally rather than internationally, forming research clusters with limited global integration.
This study highlights methodological strengths and limitations, research gaps, and collaboration patterns by mapping existing systematic reviews. The resulting database offers a valuable resource for researchers, regulatory agencies, and stakeholders, supporting evidence-based decision-making and encouraging cross-disciplinary and cross-border collaboration on PFAS-related research.

Green-lipped mussels as a New Zealand ecotoxicology model: Effects of land-derived stressors and temperature on early life stages

Dr Julien Vignier[1], Dr Olivier Champeau[2], Dr Javier Atalah[1], Dr Paul South[1], Dr Jordan Elvy[1], Dr Danny McDougall[3], Dr Andrew Jeffs[3], Dr Danielle Blackwell[4], Dr Louis Tremblay[5], Dr Anne Rolton[1]
[1]Cawthron Institute, Nelson, New Zealand, [2]NZ Environmental Protection Authority, Wellington, New Zealand, [3]University of Auckland, Auckland, New Zealand, [4]The University of Waikato, Hamilton, New Zealand, [5]Manaaki Whenua-Landcare Research, Lincoln, New Zealand
Session 3B: Toxicants and environmental impacts on wildlife 2, Chancellor 6, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
Julien leads the Shellfish Hatchery & Technology Team at Cawthron. A shellfish biologist and hatchery specialist, he applies his R&D expertise, leading major research and commercial projects in areas such as ecotoxicology (stressors affecting bivalve reproduction and early life stages), disease, breeding, cryopreservation, aquaculture production, and the development of systems for emerging aquaculture species.

Global declines in wild mussel populations and production have been linked to the impacts of climate change and pollution. Summer die-offs of mussels (*Perna canaliculus*) and reductions in mussel spat settlement have been reported in the Marlborough Sounds, an important mussel farming area in New Zealand. Naturally occurring contaminants and coastal sedimentation, associated with changing land use, could be contributing to these issues. Our research aims to determine whether trace metals and sediments, alone or combined with temperatures, affect the larval survival and settlement of mussels.
Concentrations of trace elements in surface waters, mussel tissues and sediments were characterized across the Marlborough Sounds. Over a two-year period, diffusive gradients in thin film (DGT) passive samplers were deployed at three locations, to estimate trace metal levels in the water column. Mussel gills and sediment were also collected to complement metal monitoring and conduct sediment toxicity testing. Lead and zinc were the most abundant bioavailable metals detected with strong temporal variability. High concentrations of zinc and lead in waters were strongly correlated with rain events, suggesting land runoff as their main source. Ecotoxicity thresholds affecting *P. canaliculus* embryo-larval development and settlement were determined for these metals and overlapped with levels of lead and zinc found in the field during the reproductive season of mussels. Furthermore, all sediment elutriate preparations were toxic to mussel embryos, with summer temperatures (21°C) compounding adverse effect on embryo-larval development.
We conclude that (1) vulnerable early life stages of mussels are exposed to pulses of toxic metals and sediments following summer rainfalls that trigger mussel spawning events and (2) climate-associated stressors (e.g., marine heatwaves) will exacerbate any toxic effects from land-derived inputs. A better understanding of these complex interactions is essential to prevent further *P. canaliculus* recruitment declines occurring in NZ, and in other mussel species globally.

Small Creatures, Big Contaminants: PFAS uptake in macroinvertebrates

Ms Adele Romagnano[1], Professor Vincent Pettigrove[1,2], Dr Claudette Kellar[1]
[1]RMIT University, Melbourne, Australia, [2]RMIT Europe, Barcelona, Spain
Session 4A: Contaminants of emerging concern 2, Chancellor 1, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Adele Romagnano is a PhD student with the AQUEST research group at RMIT University. Adele's PhD is interested in assessing the impact of emerging contaminants on the Australian native platypus, specifically investigating the role of diet in the platypus' exposure. She is interested in freshwater ecology, particularly macroinvertebrate communities and overall ecosystem health.

Macroinvertebrates are integral to the functioning of aquatic systems through their roles in nutrient cycling and as a primary food source to many aquatic animals. In aquatic environments, macroinvertebrates are frequently exposed to pollutants and can bioaccumulate some compounds. Per- and polyfluorinated substances (PFAS) are ubiquitous in aquatic systems. However, concentrations in aquatic macroinvertebrates are still unknown in Australia, particularly in urban Melbourne, where PFAS concentrations are more prevalent. Therefore, the aim of this study was to measure concentrations of PFAS in aquatic macroinvertebrates within urban streams in Victoria, to determine whether macroinvertebrate communities are exposed to PFAS and the degree of accumulation. Macroinvertebrate samples were collected from twenty-nine sites across Victoria. Sites were selected using published PFAS water and sediment data (Paige et al. 2024) and dominant land use classifications: residential, industrial and non-urban. Land usage was calculated for the entire upstream catchment and at a localised level (range = 4 km). Nineteen of the twenty-five PFAS congeners screened were detected in macroinvertebrates. PFAS were detected in 82% of samples, and only five sites did not have detectable levels. PFOS was the most dominant congener, identified in all PFAS-positive samples (0.13 – 0.76 ng/g ww), while PFOA, PFOSA, PFHxS, PFTeDA, PFDoDA and PFDA were also prevalent among samples. Although there was no correlation between ∑PFAS and the dominant congeners with local land use, there were moderate correlations for some PFAS and land use within the entire catchment. These findings provide an assessment of the PFAS congeners accumulating in macroinvertebrate communities in urban Victorian streams and highlights the potential influence land use may have on PFAS bioaccumulation. With macroinvertebrates being the key prey for larger organisms, the findings can be applied to bioaccumulation studies to assess PFAS's impact on a wider scale.

Comparative analysis of conventional and biodegradable microplastics in composts by pyrolysis-gas chromatography/mass spectrometry and micro-Fourier-transform infrared spectroscopy

Dr Helena Ruffell[1], Dr Elvis Okoffo[2], Professor Kevin Thomas[2], Meike Holzenkaempfer[3], Dr Olga Pantos[4], Professor Brett Robinson[1], Professor Sally Gaw[1]
[1]School of Physical and Chemical Sciences, University of Canterbury, Christchurch, New Zealand, [2]Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Brisbane, Australia, [3]School of Forestry, University of Canterbury, Christchurch, New Zealand, [4]Institute of Environmental Science and Research (ESR), Christchurch, New Zealand

Session 4C(ii): Micro- and nanoplastics: Environmental emission and sources, human exposure, & potential health implications 1, Chancellor 4, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Helena Ruffell has recently completed her PhD at the University of Canterbury, investigating the inputs and impacts of microplastics to productive soils in Aotearoa. Her research focused on the land application of biowastes including biosolids, wastewater, and compost as a source of microplastics. Helena is a keen zero waster with a passion for all kinds of waste minimisation.

Microplastics readily contaminate municipal waste streams, including organic wastes like compost which are applied onto land as a valuable source of nutrients and important circular economy measure. Quantification and characterisation of microplastics studies in compost are limited, due to the significant challenges of extracting microplastics from such a complex organic matrix. Most previous studies have used spectroscopy-based methods like micro-Fourier-transform infrared spectroscopy (μ-FTIR) analysis which offers polymer identification of individual particles, along with information regarding particle characteristics. Pyrolysis-gas chromatography/mass spectrometry (Pyr-GC/MS) is a thermo-analytical instrumental method which provides information regarding the polymer mass in the sample. Few method comparison studies exist between spectroscopic and thermo-analytical methods for quantifying microplastics, and therefore it is unknown how comparable the results are, along with the benefits of either method. This presentation will discuss the quantification and characterisation of microplastics from fifteen compost samples (vermicompost, bulk compost, and bagged compost) sourced from around Aotearoa by μ-FTIR and Pyr-GC/MS to determine if there was agreement between analysis methods for relative abundance and polymer proportion of conventional and readily biodegradable plastics.

Relative abundances of microplastics in composts ranged from 1.15 ± 0.11 to 8.00 ± 0.27 mg/g and 0.48 ± 0.10 to 6.92 ± 1.70 MP/g by Pyr-GC/MS and μ-FTIR, respectively. Polypropylene (40.8%) and polyethylene (29.3%) were the most abundant polymers identified by μ-FTIR analysis, compared to Pyr-GC/MS where polyethylene was predominant (65.7%). Readily biodegradable plastics were detected by both methods, however 14/15 composts contained biodegradable plastics as determined by Pyr-GC/MS compared to only five by μ-FTIR. Polymer mass estimation of μ-FTIR data will also be discussed. Relative abundance and polymer type proportion differed between analysis methods with few similarities conserved. Both methods are complementary and provide useful information about the microplastic content of composts important for regulators to mitigate and minimise microplastic contamination.

A bioanalytical and chemical approach for wastewater discharge: beyond detected chemicals for water quality assessment

Dr Minna Saaristo[1], Dr Phoebe Lewis[1], Dr Peta Neale[2], Dr Hung Tan[1], Dr John Leeder[3], Dr Elissa O'Malley[2], Professor Mark Taylor[1], Professor Frederic Leusch[2]
[1]Epa Victoria, Melbourne, Australia, [2]Australian Rivers Institute, Griffith University, Nathan, Australia, [3]Leeder Analytical, Melbourne, Australia

Session 7B: Future-Proofing Wastewater Treatment: Tackling Emerging Contaminants with a Holistic Approach – it's more than just PFAS, Chancellor 6, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Dr Minna Saaristo is an ecotoxicologist with over 20 years of international experience applying science-based approaches to assess the impact and risks of contaminants of concern on the environment. Dr Saaristo is a Principal Scientist – Ecological Risk and Contaminants at EPA Victoria, and leader of the Emerging Contaminants Program there. Before starting at EPA in 2019, Dr Minna Saaristo was Research Fellow at Monash University for 10 years. She is an internationally recognised behavioural ecotoxicologist, and her multidisciplinary work has revealed pivotal insights into how chemical pollutants affect sexual selection across multiple generations of wildlife.

Targeted chemical analysis is widely used for water quality monitoring but has significant limitations, as it cannot detect unknown chemicals or account for mixture effects. To address these gaps, applying effect-based methods (EBM) are gaining interest. Here, we applied a battery of *in vitro* bioassays to wastewater influent and effluent from four wastewater treatment plants (WWTPs) in Victoria, Australia, as well as surface water upstream and downstream of the WWTPs, to assess the potential risks from mixture effects. The bioassays were complemented with targeted chemical analysis of over 600 chemicals. Our study shows that both the chemical and bioanalysis had higher chemical concentrations and effects in discharged effluent compared to surface waters, confirming WWTPs as key pollution sources. Though most WWTPs were able to remove over 80% of bacterial toxicity, photosystem II inhibition, estrogenic activity and oxidative stress response, one site had poor removal of estrogenic and aryl hydrocarbon (AhR) activity. This site also had a lower median chemical removal efficiency (40%) compared to the other WWTPs (72-88%). Surface water samples downstream of some of the WWTPs exceeded ecological effects-based trigger values (ecoEBTs), suggesting effluent discharge contributing to increased estrogenic and AhR activity, as well as oxidative stress. Despite the large number of detected chemicals, only a small fraction of the observed biological effects could be explained using iceberg modelling, highlighting the presence of unknown bioactive contaminants. These findings underscore the need for integrated chemical analysis with EBM to accurately assess water quality, and improve protection of aquatic ecosystems, worldwide. At SETAC AU-ACTRA 2025 we will be showcasing how EBM can be effectively used in regulatory context.

Combining Passive Sampling and HRMS for Scalable Micropollutant Monitoring Frameworks

Dr Pulasthi Serasinghe[1], Ms Hao Nguyen[2], Dr Saman Buddhadasa[2], Professor Dayanthi Nugegoda[1], Professor Vincent Pettigrove[1]
[1]RMIT AQUEST, Melbourne, Australia, [2]National Measurement Institute, Melbourne, Australia
Session 4A: Contaminants of emerging concern 2, Chancellor 1, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
I am a Research Fellow at AQUEST, specializing in micropollutant analysis and water quality. I hold a BSc (Hons) in Food Science and Technology from UNSW (2019) and earned my PhD in Applied Biology and Biotechnology in 2024. My research explores the detection of emerging pesticides in aquatic environments, with a focus on protecting ecosystems from chemical pollution. During my PhD, I collaborated with the National Measurement Institute to develop innovative sampling and analytical methods. My background spans biosciences, food, agriculture, and environmental regulation, driven by a passion for integrating agricultural and environmental sciences.

The increasing detection of micropollutants such as pesticides, pharmaceuticals, and personal care products in aquatic environments highlights potential risks to ecosystem and human health. These contaminants often occur at low concentrations and with temporal variability, limiting the effectiveness of traditional grab sampling monitoring approaches. This study presents an adaptable, integrated framework designed to enhance the identification, monitoring, and assessment of contaminants of emerging concern (CECs) across water systems. The framework combines chemical prioritization, passive sampling technologies (Chemcatcher® and Polar Organic Chemical Integrative Sampler, POCIS), and high-resolution mass spectrometry (HRMS). A case study focusing on pesticides in the Greater Melbourne region, Australia, demonstrates its effectiveness. Passive samplers deployed at 32 freshwater sites revealed frequent detection of pesticides, including the detection of four previously unreported fungicides. Targeted analytical methods were developed to quantify these compounds at environmentally relevant concentrations, enabling accurate tracking of contamination patterns and seasonal fluctuations. This hybrid approach, integrating passive and grab sampling with advanced analytical techniques, provides a more comprehensive and cost-effective solution for monitoring CECs. Importantly, the framework is scalable and transferable to various geographical and regulatory contexts. It has been applied in several real-world water quality programs, including government-led catchment assessments and urban waterway monitoring projects. Additionally, elements of the framework have been integrated into citizen science initiatives, promoting community engagement and expanding spatial coverage of monitoring efforts. By supporting regulatory decision-making, prioritizing chemicals of concern, and fostering public participation, this framework offers a practical, science-driven model for protecting water resources and public health.

Navigating Uncertainty in Industrial Chemical Risk Assessment: Essential Oils as a Case Study

Dr Malsha Kitulagodage[1], Dr Alexander Shadie[1], Ms Louise Stedman[1], Ms Angela McKinnon[1]
[1]Australian Industrial Chemicals Introduction Scheme, Sydney, Australia

Session 9C: Regulatory science, policies, and evidence-based decisions, Chancellor 4, August 28, 2025, 1:35 PM - 3:05 PM

Biography:
The presenter is a Senior Regulatory Scientist, Australian Industrial Chemicals Introduction Scheme.

The Australian Industrial Chemicals Introduction Scheme (AICIS) helps protect Australians and our environment by assessing the risks of importing or manufacturing (introducing) industrial chemicals and promoting their safe use. We regulate chemicals, polymers, various ingredients used in printing, plastics, mining, construction, paints, adhesives, consumer goods, cosmetics and more. Our regulatory framework depends on making evidence-based decisions and recommendations to risk managers to protect the public, workers and the environment.
Our review of the industrial chemical landscape has highlighted increasing uncertainty and data paucity for unassessed chemicals introduced in Australia. These challenges demonstrate the importance of gathering chemical intelligence and applying new scientific methods to inform regulatory decision making. Several key principles underpin our approach to chemical risk assessment ensuring that it is proportionate to the risk, aligned with best regulatory and scientific practice, is transparent and effective.
We are focusing our regulatory science efforts on developing and implementing advanced assessment methods, trialing new tools and adopting novel approaches to data integration. We work closely with our risk managers to optimise regulatory decision making about the safe use of chemicals. Developing new and fostering existing collaborations with our trusted international and Australian partners enables information exchange on scientific methods and outputs as well as harmonisation of our regulatory decisions where appropriate.
The presentation will share case studies with conference participants to illustrate some of the different risk assessment approaches we use to navigate uncertainty and data gaps to make regulatory decisions. These approaches, which include chemical grouping, read-across, and new assessment methodologies, demonstrate the agility and fit-for-purpose nature of our regulatory framework in protecting public health and the environment, improving worker safety, and providing information to promote the safe use of chemicals in Australia.

Do microplastics increase the toxic effects of Cyanobacterial toxins on the floodplain mussel (*Velesunio ambiguus*)?

Sadia Sharmin[1], Dr Kristine McGrath[2], Dr Anne Colville[1], Dr James Hitchcock[1], Prof David J Booth[3], Prof Simon M Mitrovic[1]

[1]Freshwater and Estuarine Research Group (FERG), School of Life Sciences, University of Technology Sydney (UTS), Sydney, Australia, [2]School of Life Sciences, University of Technology Sydney (UTS), Sydney, Australia, [3]Fish Ecology Lab, School of Life Sciences, University of Technology Sydney (UTS), Sydney, Australia

Session 5C(i): Micro- and nanoplastics: Environmental emission and sources, human exposure, & potential health implications 2, Chancellor 4, August 27, 2025, 1:30 PM - 3:00 PM

Biography:

Hi, I'm Sadia, a PhD student with Freshwater and Estuarine Research Group at the University of Technology Sydney (UTS). My research focuses on the interactions between microplastics and cyanotoxins, and their ecotoxicological impacts on aquatic invertebrates and vertebrates. I'm particularly interested in examining the responses of stress-related genes to assess the environmental risks associated with microplastics and cyanotoxins.

Microplastics (MPs) and cyanotoxins are frequently found together in the eutrophic waters heavily influenced by human activity, and both are recognised for their detrimental ecological effects. Despite their individual impacts, the potential for these two stressors to interact in harmful ways has been largely overlooked. This study addresses that gap by investigating the combined effects of polystyrene microplastics (PS-MPs) and microcystin (MC), a potent toxin produced by the cyanobacteria *Microcystis aeruginosa*, on the floodplain mussel (*Velesunio ambiguus*). In the experiment, mussels were subjected to two concentrations of PS-MPs (0.25 mg/L and 1.0 mg/L) while being fed *Microcystis aeruginosa* over 14 days. We assessed key health indicators, including the algal clearance rate, total haemocyte count (THC), and the expression levels of stress-related genes in both the gills and digestive tissues. The presence of both PS-MPs and MC led to a significant decline in feeding efficiency (reflected in a lowered clearance rate) and a decreased total haemocyte count in the mussels' haemolymph ($p < 0.05$) compared to *Microcystis aeruginosa* alone. Furthermore, we found a significant increase in the expression of oxidative stress response genes, specifically Superoxide dismutase, Glutathione-S-transferase, and Cytochrome-P in the gills of mussels exposed to these toxins. These findings strongly indicate elevated oxidative stress, a potential disruption in detoxification processes, and possible interference with the mussels' cytoskeletal functions. These results show that microplastics with toxic cyanobacteria present can intensify stress on some aquatic organisms.

Environmental risk assessment of chromium in waters near nickel laterite deposits in South-east Asia and Melanesia

Dr Jenny Stauber[1], Dr Ross Smith[2], Dr Graeme Batley[3], Ms Woan Feei Liew[2], Dr Lisa Golding[4]
[1]La Trobe University, Albury-Wodonga, Australia, [2]Hydrobiology, Singapore Water Exchange, Singapore, [3]Macquarie University, Sydney, Australia, [4]CSIRO Environment, Brisbane, Australia

Session 1A: Risk Assessment & Regulation of Metals in the Asia-Pacific Region 1, Chancellor 1, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Ross has over 40 years of experience as an aquatic biologist/ecotoxicologist, focusing principally on the environmental management of tropical aquatic ecosystems. Ross was a major contributing author to the national Water Quality Guidelines for the governments of Australia and New Zealand for the current (2018) revision. Ross has collaborated with teams led by the Nickel Institute's Environmental Research Agency (NiPERA) to assess the applicability of bioavailability-based criteria for nickel in Australia, Southeast Asia and Melanesia, and, currently, Indonesia. He is a director of the Hydrobiology group of companies in Australia, Singapore and Latin America

The majority of the world's laterite nickel resources are mined and processed in tropical areas, particularly in South-east Asia and Melanesia (SEAM). Nickel laterite mining can increase concentrations of chromium and other metals in the aquatic environment, with chromium (VI) of particular concern due to its high toxicity to aquatic biota.

Existing environmental data on total chromium, Cr(III) and Cr(VI) concentrations in fresh and marine waters in the SEAM region were compiled. Due to the limited high-quality data available, data from reference and impacted sites were combined in the risk assessment. For the freshwater effects assessment, there were no high quality ecotoxicity data for locally important or endemic species in the SEAM region. We therefore used internationally available effects data in a species sensitivity distribution (SSD) for dissolved Cr(VI) in freshwater, together with a draft freshwater SSD for total (unfiltered) Cr(III). Even though freshwater species are thought to be more sensitive to Cr(VI) than Cr(III), the 95% species protection values were similar (4.4 vs 6.7 µg/L respectively for freshwaters).

For the risk characterisation, both deterministic and probabilistic approaches were used. At the median Cr(VI) concentration of 8.4 µg/L in freshwaters, 9% of species would be predicted to be at risk 50% of the time. In marine waters, Cr(VI) was a slightly lower risk than in freshwaters, with 6% of species at risk 50% of the time at the median Cr(VI) concentration of 14 µg/L.

At the median Cr(III) concentration of 31 µg/L in freshwaters, 21% of species would be predicted to be at risk 50% of the time. Cr(III) presents a greater risk in these freshwaters mostly due to the higher concentrations of Cr(III). However, these risk predictions are not based on local species that may be adapted to higher background metal concentrations and potentially at lower risk.

Are PFAS yet another threat to bees?

Dr Carolyn Sonter[1], Dr Romina Rader[1], Dr Matthew Tighe[1], Dr Susan Wilson[1]
[1]University of New England, Armidale, Australia
Session 4A: Contaminants of emerging concern 2, Chancellor 1, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Carolyn Sonter is a Post Doctoral Research Fellow at the University of New England where she recently completed her Doctorate on the impact of PFAS and protected cropping on honey bees. At UNE, Carolyn is involved with the Pollution Science Research Group and Rader Lab. She is developing a crop protection product guide for beekeepers to bridge the knowledge gap between manufacturers and beekeepers. Carolyn owns a small commercial beekeeping operation that produces honey and provides pollination in glasshouses.

Bees provide essential pollination services, thereby contributing to the preservation of biodiversity, ecosystem stability and food security. Bees, however, face numerous threats including loss of habitat and resources, climate change, natural disasters, predation, pests, diseases and exposure to crop protection products. Per- and polyfluoroalkyl substances (PFAS), a class of persistent organofluorine compounds, are now ubiquitous throughout the environment. Exposure to PFAS may present a particular threat to bees, but viable exposure routes and the resultant impacts of PFAS on this key pollinator species are poorly understood. In particular, plants readily take up PFAS but translocation to pollen and nectar, key components of the bee diet, is not yet confirmed. Active ingredients of numerous and commonly used pesticides such as Bifenthrin, Fipronil, and Fluvalinate include PFAS or are PFAS synergists. Bee exposure to these pesticides may occur through direct application or residue consumption. Some studies demonstrated that PFAS, in particular perfluorooctane sulfonate (PFOS), is toxic to bees and increases mortality at concentrations detected in contaminated environmental surface water. Sublethal PFOS exposure in insects (*Drosophila hydei*, *Enallagma cyathigerum*, *Bombus terrestris* L. and *Apis mellifera*) impairs developmental and reproductive function with the greatest effects observed on the larval life stage. This current work describes the first review of available literature on the risk that PFAS poses to bees, including potential exposure routes, behavioural responses, biological impacts and transfer to honey. Knowledge gaps include exposure routes in the field, the relative importance each exposure route, chronic sublethal exposure effects on bee health, and the risks to consumers of bee products. These knowledge gaps must be filled to allow development of protective reference thresholds that protect bee populations, food security and consumer safety.

Saving Species - One Island at a Time

Mr Keith Springer[2], Mr John Quigley[1]
[1]Orillion, Whanganui, New Zealand, [2]BirdLife South Africa, Glenorchy, New Zealand
Session 1C: Predator free islands and conservation - human health risk aspects, Chancellor 4, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
John is an accomplished manager with vast international experience in private sector manufacturing, export and senior government trade roles. His experience covers agriculture, food, manufacturing and technology. Coming up to eight years' of working at Orillion, he has extensive knowledge of bait formulation and bait integrity. This includes the continuous quest to enhance palatability of products for a range of invasive vertebrate pests. When he is not supporting customers and their exacting needs, he is actively involved with his local LandSAR group and planning his next tramp in the hills.

The use of second-generation rodenticides has enabled significant biodiversity improvements in ecologically-vulnerable island ecosystems globally, by eradicating invasive species. In particular, rodents and lagomorphs have had significant negative impacts on islands, with the extirpation or significant reductions of plant, invertebrate, and bird species being a frequent outcome of colonisation of islands by these invasive species.
Advances in toxic bait formulation, methods of aerial bait distribution and the accuracy of bait coverage gained by GPS use have enabled these species to be targeted for eradication from islands, with rodents eradicated from over a thousand islands worldwide. Potential population-level impacts to non-target species are evaluated in the planning stages and feasible mitigation measures considered for at-risk native species, although some non-target mortality often occurs. Recovery response of those and other native species - including plants and invertebrates - is frequently dramatic after invasive species eradication, leading to enhanced ecological condition and at least partial restoration of island ecosystems.
In this presentation, impacts of invasive species on islands are outlined (what's the problem?) along with current eradication methodology (what's the solution?), using Australasian case studies to illustrate ecosystem recovery (what's the result?). Additionally, the joint presentation covers the importance of bait palatability, attractiveness and quality assurance while delving into getting the manufacturing and logistics settings right. All wild animals exhibit a degree of caution towards any novel food and it takes some species longer to become sufficiently familiar with novel food/bait that they will then "handle" and consume. In an elimination setting, palatable bait and bait uptake is critical to success.

From Lipstick to Lunch Plates: Unmasking PFAS in Everyday Essentials

Mr David Springer[1]
[1]Envirolab, Chatswood, Australia
Session 3C (i): Contaminants in consumer products and cosmetics, Chancellor 4, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
David Springer is Envirolab's advocate and a key figure in the science industry. He represents Envirolab at conferences, forums, with government and universities, fostering strong industry relationships. And with a PFOS in blood level at 6ppb, exactly the same for the past 8 years, he believes he is now in a state of PFAS equilibrium with the universe.

Introduction
Per- and polyfluoroalkyl substances (PFAS) are a group of synthetic chemicals widely used for their water-resistant, grease-proof, and durable properties. Dubbed "forever chemicals," PFAS persist in the environment and bioaccumulate, raising concerns about their potential health impacts, including links to cancer, immune system suppression, and developmental issues. While awareness of PFAS contamination is often tied to industrial sources such as firefighting foams, many consumers are unaware of their presence in everyday products. This talk explores the hidden pathways by which PFAS infiltrate our daily lives, from cosmetics to cookware, and their alarming potential to cycle through the environment and food chain.
Background
Awareness of PFAS contamination has historically focused on industrial applications and environmental hotspots, with firefighting foam being the most widely recognized source. However, PFAS are also deliberately used in a range of consumer goods, where their unique properties make them desirable. These include cosmetics (to improve product longevity and spreadability), grease-resistant food packaging, and non-stick coatings for cookware. Despite regulatory scrutiny and growing awareness, many consumers remain unaware that PFAS are present in products they use daily, potentially exposing them to harmful levels over time.
Our research highlights the widespread prevalence of PFAS in everyday items, underscoring the need to shift the narrative beyond firefighting foam. While the use of PFAS in consumer goods is less visible, it has far-reaching implications, not only for human exposure but also for environmental contamination. For example, food packaging treated with PFAS can leach these chemicals into food and subsequently into soil, water, and living organisms.

Results
Our analysis revealed the presence of PFAS in a wide array of consumer products, including:

- Cosmetics such as lipstick and eyeliner, where PFAS improve texture and water resistance.
- Sugarcane plates, marketed as sustainable alternatives, yet leaching significant levels of PFAS.
- Frypans and plumber’s tape, which utilize PFAS for their non-stick and sealing properties.
- Dishwasher tablets, which contain PFAS to enhance their water-repellent qualities.

Alarmingly, sugarcane plates generated PFAS levels that were subsequently taken up by earthworms, mushrooms, and other foods. This finding highlights the potential for PFAS to cycle through the environment and re-enter the food chain, posing unforeseen risks to human and ecological health. These results call for increased awareness, more stringent regulation, and a collective effort to phase out the use of PFAS in consumer goods. By uncovering the hidden pathways of PFAS exposure, this presentation aims to empower consumers and policymakers to make informed decisions to reduce their risks and protect the environment.

A new framework for the implementation of bioavailability-based metal guideline values in Australia and New Zealand

Dr Jenny Stauber[1], Dr Jenni Gadd[2], Dr Aleicia Holland[1], Dr Rick Van Dam[3], Dr Erin Smith[4], Dr Adam Ryan[5], Dr Ellie Middleton[6], Dr Angela Slade[7]
[1]La Trobe University, Sydney, Australia, [2]Hydrotoxy, Auckland, New Zealand, [3]WQAdvice, Adelaide, Australia, [4]Copper Development Association, USA, [5]International Zinc Association, USA, [6]NiPERA, USA, [7]Slade Technical Services, Adelaide, Australia

Session 1A: Risk Assessment & Regulation of Metals in the Asia-Pacific Region 1, Chancellor 1, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
Dr Jenny Stauber is an Adjunct Professor at La Trobe University, Australia. She has recently retired from CSIRO Environment, Sydney, Australia where she was a Chief Research Scientist and formerly Deputy Chief and Acting Chief of CSIRO Land and Water. Jenny is an aquatic ecotoxicologist with expertise in the bioavailability and toxicity of contaminants in marine and freshwater systems, environmental risk assessment, downstream impacts of mining, and the derivation of toxicant water and sediment quality guidelines. She is a SETAC Fellow and a Fellow of both the Australian Academy of Science and the Australian Academy of Technology and Engineering.

The bioavailability and toxicity of metals in freshwaters is influenced by the water chemistry of the specific water body, including such Toxicity Modifying Factors (TMFs) as pH, hardness ions (calcium and magnesium), and dissolved organic matter. Following recommendations from a workshop of scientists and regulators in Sydney in April 2023, we have developed a new framework for deriving and implementing bioavailability-based default guideline values (DGVs) for copper, nickel and zinc in New Zealand and Australia.
The tiered assessment framework, which builds on similar approaches in Europe, introduces a screening level at Tier 1, where measured dissolved concentrations of copper, nickel and zinc are compared to a high-bioavailability DGV. The high-bioavailability DGV was developed from a probability distribution identifying highly sensitive waters in Australia and New Zealand. If the DGV is exceeded at Tier 1, a metal bioavailability tool is used at Tier 2 to either normalize the metal concentration to represent the bioavailable fraction or adjust the guideline value for the sample water chemistry, yielding a bioavailability-adjusted guideline value (BAGV). The metal bioavailability tool is an on-line, publicly-available and user-friendly tool that automatically undertakes these computations and also calculates a Hazard Quotient for use in risk assessment. If the sample still fails at Tier 2 (i.e., the bioavailable metal fraction exceeds the DGV or the dissolved metal fraction exceeds the BAGV), then, at Tier 3, multiple lines of evidence can be used to determine the likely risks of an exceedance. This framework has similarities with the ANZECC/ARMCANZ (2000) hierarchical decision tree for assessing metal toxicity.
The outputs from the project include technical reports describing the process of deriving the high bioavailability DGVs; a guidance document on how to use the tiered approach and tool, including case studies; and training materials and other relevant updates to the ANZG (2018) website.

PFAS and Other Additives in 'Eco-Friendly'/Compostable Products: Analytical Insights from Aotearoa New Zealand

Miss Nargiss Taleb[1], Prof. Lokesh Padhye[1,2], A/Prof. Melanie Kah[1], Dr. Gabriela Baron[1]
[1]University Of Auckland, Auckland, New Zealand, [2]New York State Center for Clean Water Technology, Stony Brook, United States of America

Session 3C (i): Contaminants in consumer products and cosmetics, Chancellor 4, August 26, 2025, 4:10 PM - 5:40 PM

Biography:

Nargiss Taleb is a doctoral candidate researching emerging contaminants in complex matrices, with a focus on microplastics and PFAS. She is also passionate about science communication, contributing to projects like UoA Scientific magazine to make research more accessible and engaging for the public.

In July 2023, the NZ Ministry for the Environment implemented a ban on a range of single-use plastic items, prompting the need to identify alternatives. Compostable products as a result have seen a rise in popularity, businesses opting for products like paper cups or sugar cane trays as an alternative to previously used single-use plastic. Although there are many scientific studies that report how these compostable materials break down in the environment, very little is known about the hidden additives that have the potential to impact not only compost quality but also the health of our soils. This study investigated concentrations of per- and polyfluoroalkyl substances (PFAS), heavy metals, bisphenol, phthalates and polymers of concern in 10 compostable products found in Aotearoa New Zealand. Pyrolysis-gas chromatography-mass spectrometry (Pyr-GC-MS) was employed to identify potential polymers of concern, while PFAS were assessed through total fluorine and non-target screening, followed by confirmation using total oxidisable precursor assay (TOPA) and targeted analysis. The results revealed a wide variation in additive content across the 10 products tested. Notably, a fibre tray returned relatively high levels of a PFAS that is phased out, and a pizza box contained nearly all tested additives. This work helps to inform future policy related to compostable products whilst generating new knowledge that can support the decisions of practitioners, manufacturers, users, and composters. Additionally, this work forms part of an international collaboration with an ongoing study in the Netherlands, allowing for a cross-regional comparison of compostable product composition between Europe and Aotearoa New Zealand.

Drowning in Toxins: Exploring the Ecotoxicological Effects of *C. grandiflora* on Freshwater Species

Ms Martine Tande[1], Dr. Shelley Templeman[1], Dr. Sarah McDonald[1], Dr. Cassandra James[1]
[1]TropWATER, Townsville, Australia

Session 7C(i): Contaminants of emerging concern 4, Chancellor 4, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Martine Tande is a final-year Master of Marine Biology student at James Cook University, affiliated with TropWATER. Her research focuses on the ecotoxicological impacts of the invasive rubber vine (Cryptostegia grandiflora) on aquatic ecosystems. She previously completed her Bachelor's degree in the United Kingdom and is passionate about advancing freshwater and marine conservation through applied environmental science.

Cryptostegia grandiflora (rubber vine) is an invasive vine, introduced to Australia from Madagascar around the 1870s. In many regions across the world, *C. grandiflora* has posed a threat to humans due to its highly toxic sap. It is known as the "widow's little helper" as it has been historically used as a poison by wronged wives, earning it the names "viuvinha" (small widow) and "viúva-alegre" (happy widow) in northeast Brazil. While the full range of toxic compounds in the sap has not been fully characterised, it is known to contain cardiac glycosides, which relax the heart muscle and can lead to "dropping dead syndrome" in livestock that ingest it.

Current rubber vine infestations are widespread across northern Australia, particularly in riparian communities and flood-prone pastures across North Queensland. Its climbing habit (up to 20m) causes it to restrict growth in trees and cause dieback, leading to severely degraded and dead riparian communities. It is also responsible for livestock deaths in pastoral areas and is considered a Weed of National Significance.

Current research has focused on the impacts of rubber vine on terrestrial vegetation, as well as toxicity to livestock and terrestrial animals. However, there have been no studies into the toxicity of the sap on aquatic organisms.

This project assesses the potential ecotoxicological effects of *C. grandiflora* sap on freshwater autotrophs. Experimentally we will be determining the effect of aqueous and alcohol extracted compounds on the growth and photosynthetic efficiency of *Lemna aequinoctialis* and *Chlorella* sp. Our findings will be discussed within the context of understanding the potential risk rubber vine toxins pose to aquatic communities.

Developing a more focused picture of NZ's chemical landscape

Mr Oliver ter Ellen[1]
[1]EPA New Zealand, Wellington, New Zealand
Session 9C: Regulatory science, policies, and evidence-based decisions, Chancellor 4, August 28, 2025, 1:35 PM - 3:05 PM

Biography:
Oliver ter Ellen is a Senior Advisor - Hazardous Substances at New Zealand Environmental Protection Authority. Oliver completed a Bachelor of Science majoring in chemistry from Victoria University of Wellington in 2012. He has worked in a commercial analytical chemistry laboratory. Since joining EPA, he has worked in data and environmental monitoring, including working on their Chemical Map tool, and the reassessment of hazardous substances.

The EPA is the key regulator for the approval for import and manufacture of hazardous substances in New Zealand. However, information about chemical usage after approval is divided between various agencies and bodies. Due to this, it has been argued that this fragmentation leads to difficulty in joined up decision making.
Therefore, the EPA has begun developing an IT tool called Chemical Map to collect and hold this information, making an easily accessible and holistic overview of chemical usage available to decision makers. Chemical Map collects Aotearoa-specific data on chemical use, chemical monitoring, adverse incident reports, approaches from other common interest NZ regulators and comparison with overseas regulation, which help provide valuable context for hazardous substances. Recently the second prototype of the Chemical Map was completed. Furthermore, as a part of the funding provided to set up this prototype, the EPA was provided with funds to set up environmental monitoring projects where need was seen.
This presentation will explain some of the features of the tool and present some of the more recent results from monitoring projects, including testing for PFAS in the Waikato River and for environmental contaminants in mussels in the South Island.

Research to regulation: A quantitative framework for establishing microbial sensitivity thresholds to protect marine ecosystems

Dr Marie Thomas[1,2], Dr Rebecca Fisher[3], Gretel Waugh[1,2], Dr Inka Vanwonterghem[4], Prof Nicole Webster[1,2,5], Dr Heidi Luter[1], Dr Andrew Negri[1]
[1]Australian Institute of Marine Science, Townsville, Australia, [2]Australian Centre for Ecogenomics, University of Queensland, Brisbane, Australia, [3]Australian Institute of Marine Science, Crawley, Australia, [4]Commonwealth Scientific and Industrial Research Organisation, Brisbane, Australia, [5]Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Australia

Session 8B: Identifying 'ecologically relevant endpoints' for microbial processes to inform Environmental Quality Guidelines and One Health approaches 1, Chancellor 6, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Dr. Marie Thomas is a Postdoctoral Fellow at AIMS, specialising in marine microbial ecotoxicology. She focuses on assessing microbial community responses to environmental stressors by developing quantitative methodologies that integrate DNA metabarcoding, cell viability assays, and statistical stress-response modelling to establish microbial sensitivity thresholds under pollution and climate stress. Her research has pioneered approaches that provide a pathway for formally incorporating microbial endpoints into environmental risk assessments, including the Australian and New Zealand Water Quality Guidelines. Her research supports more holistic regulation and timely ecosystem interventions to protect ocean microbiomes and broader ecosystem health.

Marine ecosystem resilience is closely linked to microbiome health, yet microbial communities are typically overlooked in conservation management due to challenges in quantitatively defining microbial sensitivity thresholds. This study introduces a quantitative framework that combines 16S rRNA gene amplicon sequencing with ecotoxicology concentration-response modelling to assess marine microbial responses to contamination stress at both community and taxon levels. By applying propidium monoazide to differentiate intact from membrane-compromised cells, combined with normalisation of relative to absolute abundances via flow cytometry, no-significant-effect concentration values can be derived from individual taxon-specific stress-response curves. These thresholds inform Prokaryotic Sensitivity Distributions, enabling the derivation of microbiome Hazard Concentrations, which estimate the contaminant concentrations affecting x% of the microbial community. This approach aligns with the Australian and New Zealand water quality guideline methodology and offers a pathway to formally incorporate microbial endpoints into risk assessments. We applied this approach to planktonic microbial communities with varying disturbance histories, exposing them to increasing copper concentrations in controlled microcosm experiments. Microbiomes from ecologically valuable, low impact sites (e.g. pristine coral reefs) were more sensitive to copper stress than those from disturbed areas. The microbiome Hazard Concentrations for copper affecting 5% of the community ranged from 0.10 to 0.94 µg L-1, underscoring the need for stricter environmental protection of high-value ecosystems. Using this case study, we also demonstrate how microbial sensitivity data could be integrated alongside eukaryotic data in future environmental risk assessments. Ultimately, establishing more robust protection thresholds that span both prokaryotic and eukaryotic taxa represents a critical step toward evaluating whole-ecosystem responses to environmental disturbances.

Metal Mitigation: Nature based solutions for freshwater management

Ms Karen Thompson[1], Ms Amelia Shepherd[1]
[1]Earth Sciences NZ, Hamilton, New Zealand

Session 2A (i): Risk Assessment & Regulation of Metals 2, Chancellor 1, August 26, 2025, 1:30 PM - 3:00 PM

Biography:
Karen has worked at NIWA for 21 years and is both the Manager of the Chemistry and Ecotoxicology Group and the Ecotoxicology Laboratory.

Copper and zinc are vital for life but can harm aquatic organisms at high concentrations. In New Zealand's urban streams, levels of these metals often exceed ANZG species protection guidelines, especially during storm events, contributing to poor ecological health.
Research (MBIE funded) being undertaken by Earth Sciences NZ in collaboration with iwi, an engineering advisor group and ecotoxicology experts, is investigating the use of nature-based solutions to reduce metal bioavailability and consequently the toxicity from dissolved metals in our freshwater waterways by optimally applying dissolved organic matter (DOM) derived from NZ native plants.
This presentation focuses on a study component which has determined the acute toxicity of copper, zinc, and a 1:6 mixture of the two metals at three DOM concentrations (nominally 0, 5, and 10 mg/L C) of which was derived from leaves of NZ native plants; Mānuka (*Leptospermum scoparium*), Karamu (*Coprosma robusta*), Koromiko (*Hebe stricta*), Kōwhai (*Sophora molloyi*), and Pōhutukawa (*Metrosideros excelsa*) to the freshwater alga (*Raphidocelis subcapitata*). Results showed a significant reduction in metal toxicity with increasing DOM concentration, with the source of DOM also influencing toxicity reduction.
This research, along with DOM characterisation (See Holland et al. presentation), metal binding and other species toxicity studies (see Shepherd et al. poster presentation), is aiding the development of a DOM-metal-mixture-bioavailability model. This model will predict metal toxicity accurately, allowing for targeted mitigation through riparian and roadside planting, green roofs, tree pits, raingardens, infiltration basins, or constructed wetlands. By utilising specific plant materials and types (e.g. leaves or bark) these nature-based solutions can enhance waterway health and support effective freshwater management.

Does benchmarking increase the accuracy of predicting biodegradation across aquatic ecosystems?

Dr Run Tian[1,2], Lily Weir[1], Dr Malte Posselt[2], Prof. Dr. Kathrin Fenner[3,4], Prof. Dr. Michael S. McLachlan[2]

[1]Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Brisbane, Australia, [2]Department of Environmental Science (ACES), Stockholm University, Stockholm, Sweden, [3]Eawag, Swiss Federal Institute of Aquatic Science and Technology, Zürich, Switzerland, [4]Department of Chemistry, University of Zürich, Zürich, Switzerland

Session 5A: Contaminants of emerging concern 3, Chancellor 1, August 27, 2025, 1:30 PM - 3:00 PM

Biography:

My research focuses on the environmental fate of organic contaminants. I am passionate about understanding how chemicals degrade/transform in the environment. The ultimate goal of my work is to understand the environmental degradation/transformation processes of organic chemicals and to develop more robust and accurate methods/tools for predicting the environmental fate of chemicals and assessing chemical persistence.

Biodegradation is often the largest source of uncertainty in assessing chemical exposure. Previous studies have reported significant spatial and temporal variability in biodegradation rates, yet no environmental factors have been identified to mechanistically explain this variability. This study compiled a comprehensive dataset of 2265 biodegradation rate constants for 97 diverse chemicals from modified OECD 309 tests in 38 European and Australian aquatic ecosystems. We evaluated three approaches for reducing/describing spatiotemporal variability in rate constants: total microbial biomass normalization (TBN); universal benchmarking (UBM), i.e., normalizing all chemicals to a single benchmark chemical; and group-specific benchmarking (GBM), i.e., normalizing chemicals within each chemical group to a single benchmark chemical selected from that group. Neither TBN nor UBM reduced the variability, while GBM reduced the variability for 87% of compounds when grouping was based on clustering of spatiotemporal patterns of rate constants. However, GBMs based on chemical features (MACCS molecular fingerprints or predicted initial biotransformation rules) had negligible effects in reducing the variability. Three chemical groups that have high structural similarity showed considerable reductions in variability using both data-driven and chemical feature-based GBMs. We conclude that chemical grouping has the potential to predict biodegradation rates across ecosystems. However, for group-specific benchmarking to become a viable predictive tool, a deeper understanding of the key chemical features associated with biodegradability is essential.

Evaluating herbicides as ALP enzyme inhibitors – towards rapid herbicide monitoring

Mr Abner Tonu Lema[1,2,3], Mr Moni Philip Jacob Kizhakedathil[1], Prof Gil Garnier[1,2], A/Prof. Simon R. Corrie[1,2]

[1]Department of Chemical and Biological Engineering, Monash University, Clayton, Australia,
[2]Bioresource Processing Institute of Australia (BioPRIA), Monash University, Clayton, Australia,
[3]Kupang State Agricultural Polytechnic, Kupang, Indonesia

Session 7C(i): Contaminants of emerging concern 4, Chancellor 4, August 28, 2025, 9:25 AM - 10:55 AM

Biography:

Abner Tonu Lema is an academic staff at the Kupang State Agricultural Polytechnic, Indonesia, with a background in analytical chemistry, and environmental science. He earned his MSc in Analytical Chemistry from Brawijaya University, where his research focused on the development of a spectrophotometric method for determining iodide concentrations. In November 2022, Abner commenced his doctoral studies at Monash University, Australia. His current Ph.D. research involves development of in situ paper-based biosensors capable of detecting herbicides in agricultural fields. This innovative approach aims to improve the rapid detection of chemical contaminants, contributing to safer food production and effective environmental surveillance.

Herbicides are used worldwide to improve agricultural crop yields; however, there are no widely accessible methods for monitoring herbicide presence without laboratory facilities and specialized equipment. One of the main concerns is the off-target accumulation of herbicides, which can damage non-target areas, contaminate water sources, and pose risks to human health. Some herbicides are known to inhibit the function of plant enzymes, and this enzymatic inhibition can be leveraged to develop simple, sensitive, and rapid paper-based biosensors. We found, in agreement with previous studies, that the ALP catalysed hydrolysis of p-nitrophenyl phosphate (p-NPP) is inhibited by 2,4-D. We extended the study to investigate a range of common herbicides, revealing previously unknown ALP inhibitors. By utilizing Michaelis-Menten kinetics, we determined the mechanisms of inhibition for a range of commercial herbicides, and we conducted an in-silico study of ALP/inhibitor docking, with AI-guided predictions, to confirm these interactions. Finally, this data is being used to develop a paper-based sensing platform for phenoxy herbicides at the point-of-need, with applications in agricultural monitoring and herbicide production.

Transforming chemical and waste management using multiple worldviews

Dr Louis Tremblay[1], Dr James Ataria[1], Prof Karen Fisher[2], Dr Ani Kainamu[1], Ms Nikki McRobie[3], Ms Stevie-Rae Blair[3], Mr Dean Whaanga[3]
[1]Manaaki Whenua - Landcare Research, Lincoln, New Zealand, [2]School of Environment, University of Auckland, Auckland, New Zealand, [3]Te Ao Marama Inc, Invercargill, New Zealand

Session 2B (i): Bridging the gap: Collaborative pathways to transformative outcomes in pollution monitoring, mitigation and management 2, Chancellor 6, August 26, 2025, 1:30 PM - 3:00 PM

Biography:
Louis an environmental toxicologist specialised in toxicology, mechanisms of toxicity, physiology and biomarkers. Louis has interests in environmental protection, human health and food safety, and the education of the community to raise awareness about the impacts our activities pose to the environment. His research uses a combination of traditional ecotoxicology methodologies and novel omics approaches to characterise the mechanisms of toxicity of pollutants in New Zealand native species. His contaminants research is recognised through providing advice to Regional Councils, industry and Māori on pollution issues. He uses a One Health research approach to develop acceptable environmental management options.

Anthropogenic chemicals are fundamental for maintaining our standard of living in modern society. Unfortunately, some chemicals are persistent and can enter waste streams and, ultimately, the environment. Planetary Boundary has been exceeded for chemicals including plastics (novel entities). It is obvious that current chemical management frameworks are inappropriate and that there is an urgent need for novel approaches including bringing Indigenous research methods to this challenge. The Towards Sustainable Futures project is a transdisciplinary collaboration between Canadian and New Zealand colleagues. The aim is to boldly transform chemical risk management in four arenas: 1) Indigenous community-based practice, 2) research labs and classes, 3) regulatory practices, and 4) policy development. The structure of the programme includes 6 subprojects including one in New Zealand. The research explores the appropriate use of taonga (culturally significant species) for toxicity testing by exploring how new approach methodologies (NAMs) can be incorporated within Māori designed and operated environmental monitoring programs within Murihiku, in Southland. The collaborative investigation with the Environmental Protection Authority, the local chemical regulatory authority, academic institutes and science organisations will target opportunities to further strengthen embedding Indigenous knowledge systems and learnings into these education, research, policy and regulatory contexts towards achieving mutually respectful understanding of Indigenous methods and evidence. The overall objective is to inform best practice around chemical risk reduction, risk assessment and appropriate management through proper tikanga (right processes) for chemical risk assessment aligning with key values and aspirations that reflect the local setting.

Optimisation of the USEPA (1991) pH 2 extraction method for measuring potentially bioavailable iron (iron III)

Dr Melanie Trenfield[1], Dr Andrew Harford[1], Dr Rick van Dam[2]
[1]Department Of Climate Change, Energy, The Environment and Water, Darwin, Australia, [2]WQ Advice, Adelaide, Australia

Session 1A: Risk Assessment & Regulation of Metals in the Asia-Pacific Region 1, Chancellor 1, August 26, 2025, 11:00 AM - 12:30 PM

Biography:
I have been working in the field of freshwater and marine environmental protection for 20 years, with the Office of the Supervising Scientist in Darwin, northern Australia, protecting aquatic biota from the adverse effects of contaminants. My research focusses on metal contaminants from mine sites and includes collaborations with Australian Institute of Marine Science, CSIRO, University of Wollongong, Charles Darwin University, and RMIT University. I also assist with the technical review of national default water quality guideline values.

Some metals, including iron (Fe3+ or Fe (III)), have low solubility in freshwater and seawater but have been found to be toxic at concentrations above their solubility limit. Research has shown that certain particulate and colloidal (precipitated) forms of Fe3+ can contribute to toxicity (ECCC 2019, Balsamo Crespo et al. 2023). The draft Australian and New Zealand default guideline values for aquatic ecosystem protection for Fe3+ in fresh and marine water recognised that particulate forms of Fe3+ could contribute to toxicity and, to account for this, recommended a pH 2 extraction method (USEPA 1991, Method 200.1) for the analysis of potentially bioavailable Fe3+ in environmental water samples. However, advice provided to the ANZG Project Coordination Group (PCG) recommended refinement of the USEPA (1991) method and validation of its application for the measurement of potentially bioavailable Fe3+ in environmental water samples to ensure consistent interpretation and adoption by commercial laboratories.
The current study aimed to validate the USEPA (1991) method for Fe3+ using extractions at pH 2 from both freshwater and seawater. Experimental validation included investigation of the optimal acidification period, optimal pH adjustment process and maximum holding time prior to extraction for a range of water types; synthetic freshwater, unmodified lake water, mine-impacted water elevated in Fe and unmodified seawater. Water types were spiked with 1) freshly precipitated iron oxyhydroxide (prepared immediately prior to spiking), 2) well-mineralised suspended particulate Fe, or 3) a combination of both.
The recommended method results in reasonable recovery of potentially bioavailable Fe from all diluent types, particularly if samples are processed within three days and a 16-h extraction period at pH 2 is used. This work was funded by the Department of Climate Change, Energy, the Environment and Water, and the method has been incorporated in the revised ANZG default guideline values for Fe3+.

Particulates, plastics, and real-time risks

Dr Len Turczynowicz[1], Ms Felicia Maragkos[1], Ms Lilliana Drapaniotis[1], Mr Isaac Vann[1]
[1]University Of Adelaide, Adelaide, Australia

Session 8A(ii): Particulates, plastics and real-time risks, Chancellor 1, August 28, 2025, 11:20 AM - 12:50 PM

Biography:
Dr Len Turczynowicz has over 38 years' experience in public health toxicology, exposure science and human health risk assessment and holds a BAppSc (Chemistry and Microbiology), Master of Public Health and PhD. He has worked in government, industry, and academia, developed national guidelines, regulatory frameworks, and been an expert witness in court. He has undertaken numerous risk assessments for hazardous substances in air, soil, water, food and consumer goods. He currently holds a part-time Senior Research Fellow position at the University of Adelaide with the balance of his time as Founder and Director of HealthRisk Services Pty Ltd.

Indoor and ambient air particulate matter is characterised by particle size and composition. Respirable particles (≤10 microns in aerodynamic diameter (PM10)); fine particles (≤2.5 microns (PM2.5)) and ultrafine particles (≤0.1 microns (100 nm)) are key exposure determinants. The former are assessed via mass per unit volume measures while the latter are based on particle number concentrations (PNC). Cardiopulmonary population impacts, e.g. increased hospital admissions, are associated with elevated respirable particulate exposures with finer particles exhibiting greater potency. Exposure methods use time-averaged assessment, but real-time monitoring suggests acute cardiac deficiency with no lag phase implying the importance of real-time assessments. Recent ultrafine monitoring at bus shelters in Adelaide, South Australia suggests short-term peak exposures at concentrations of concern. The chemical composition of these particles further reflects an additional level of complexity in assessments.

Plastics released into the environment will degrade into polymeric micro- and nano-particulates and particle size and composition concerns prevail. A recent umbrella review evaluated the impact of plastic-associated chemical exposure on human health and reported that exposure occurs from pre-conception leading to a diverse range of linked effects from pre-birth to adulthood. Micro-plastics and nano-plastics are found in water, food and air and community exposures are unavoidable.

Particles smaller than 2.5 microns cross the pulmonary epithelium and can be distributed throughout the body. Recent findings have suggested that bioaccumulation can result in adverse health effects such as respiratory disorders including lung cancer, asthma and hypersensitivity pneumonitis, and neurological symptoms such as fatigue and dizziness, inflammatory bowel disease and disturbances in gut microbiota.

The advent of real-time monitoring devices identifies peak inhalation exposures enabling remedial actions on source contributors to be identified and managed. While these represent a qualitative approach, the lack of suitable inhalation dosimetry information restricts quantitative real-time risk assessment methods to be confidently undertaken.

Toxicological Considerations of Low Doses of Bromoform as an Environmental Inhibitor

Pravesh Tyagi[1], Dr Jefferson Fowles[1], Mr Peter Cressey[2], Mr Abhishek Gautam[2], Dr Andrew Pearson[3], Professor Charles T. Eason[4]
[1]Ministry For Primary Industries, Wellington, New Zealand, [2]Institute of Environmental Science and Research, Christchurch, New Zealand, [3]Tonkin and Taylor, Wellington, New Zealand, [4]Lincoln University, Canterbury, New Zealand

Session 7A: Food Chemical Risk Assessment 1, Chancellor 1, August 28, 2025, 9:25 AM - 10:55 AM

Biography:
Pravesh Tyagi is a senior adviser (toxicology) at the Ministry of Primary Industries (MPI), New Zealand. With a strong background in risk assessment, hazard identification, and chemical safety evaluation, Pravesh provides critical support for safety evaluation of chemical residues and contaminants. His experience spans various industries and government agencies, including pharmaceuticals, chemicals, and consumer goods. His goal is to protect public health while facilitating business growth through informed toxicology and regulatory strategies.

The red seaweed, *Asparagopsis taxiformis* and *Asparagopsis armata* are effective at inhibiting methane production in ruminants, mediated by the bioactive, bromoform. Bromoform is a trihalomethane in the same family as chloroform, dibromochloromethane, and bromodichloromethane, all common drinking water disinfection by-products. Discrepancies exist in hazard classification of bromoform. International Agency for Research on Cancer (IARC) concludes bromoform is not classifiable as to its carcinogenicity to humans; the United States Environmental Protection Agency (US EPA) classifies it as a probable human carcinogen based on a low incidence of intestinal tumours in female rats given high gavage doses over two years. Under the same conditions mice exhibited no carcinogenicity, in contrast with other trihalomethanes, indicating that the non-linear tumour incidence in female rats is likely to be secondary to localised cytotoxicity. While there is some *in vitro* evidence of mutagenic potential for bromoform acting via a metabolic pathway involving GSTT-1, this pathway is unlikely to be linear in the generation of mutations *in vivo*. The available human evidence, based largely on drinking water disinfection by-product studies, is also inconclusive. The collective implications for these findings are that cancer risks from low doses of bromoform are not well informed using the National Toxicology Program (NTP) rat study, and likely to be negligible and secondary to non-cancer effects. A precautionary approach to methane inhibition in livestock is to ensure that bromoform doses do not exceed the capacity for capture and metabolism in the rumen, in order to minimise the risk of uptake into the circulation, regardless of these toxicological considerations.

Revisions to the ANZG method for deriving water quality guideline values for toxicants

Dr Rick Van Dam[1], Dr Graeme Batley[2], Dr Jenny Stauber[3], Professor David Fox[4,5], Dr Rebecca Fisher[6], Dr Chris Hickey[7], Associate Professor Michael Warne[8]
[1]WQadvice, Adelaide, Australia, [2]Environmental Contaminants Research, Sydney, Australia, [3]La Trobe University, Melbourne, Australia, [4]Environmetrics Australia, Melbourne, Australia, [5]University of Melbourne, Melbourne, Australia, [6]Australian Institute of Marine Science, Perth, Australia, [7]RMA Science, Hamilton, New Zealand, [8]University of Queensland, Brisbane, Australia

Session 9C: Regulatory science, policies, and evidence-based decisions, Chancellor 4, August 28, 2025, 1:35 PM - 3:05 PM

Biography:
Rick Van Dam is an independent aquatic ecosystem and water quality specialist with over 30 years of experience, and for much of this time he has worked at the interface of science and regulation. Prior to working as an independent consultant, Rick was the Director of the Environmental Research Institute of the Supervising Scientist (ERISS). Rick has an extensive background in applied research on the impacts and risks of contaminants to aquatic environments. He also has extensive knowledge and experience on international guidance for the management and assessment of water quality (including the Aust/NZ Water Quality Guidelines).

The approved method for deriving water quality guideline values (GVs) for toxicants in Australia and New Zealand, colloquially referred to as "Warne et al.", was first published in 2015, with minor updates in 2018. Based on (i) further experience using the method to derive default GVs (DGVs), and (ii) a collaboration between Australia and Canada on the statistical approach for deriving toxicant GVs, the method was in need of another update. The updated Warne et al. (2025) GV derivation method has recently been published and includes the following key updates compared to the 2018 method:

- Overall improvement in structure for greater flow and clarity
- Improved reference to supporting documentation for deriving site-specific GVs
- Improved guidance on checking for significant limitations of toxicity data
- More explicit reference to ecological relevance of toxicity data
- Improved guidance on the hierarchy for preferred measures of toxicity
- Ability to derive combined freshwater and marine water GVs (with minor associated change to the GV reliability classification)
- Improved data quality assessment process, weighted more towards test quality/performance than provision of basic test information
- Improved guidance on conversion of toxicity data for different purposes
- Improved guidance on deriving bioavailability-based GVs
- Replacement of Burrlioz 2.0 with ssdtools (and its online interface, shinyssdtools – https://bcgov-env.shinyapps.io/ssdtools/) as the approved statistical software for deriving GVs, with the following associated changes:
    - Updated minimum data requirements
    - Use of model-averaged SSDs rather than SSDs based on single models
    - Updated assessment for data modality
    - Updated guidance on accounting for bioaccumulation to align with that on the ANZG (2018) website
    - Updated guidance on accounting for formulations

The presentation will provide details of the updates as well as some areas where further development may be needed.

Development and characterisation of marine wildlife cell cultures for ethical toxicity testing

Dr Jason van de Merwe[1], Dr Kimberly Finlayson[1], Dr Frederic Leusch[1]
[1]Griffith University, Gold Coast, Australia

Session 5C(ii): Alternative approaches to animal testing, Chancellor 4, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
Dr Jason van de Merwe is a marine ecologist and ecotoxicologist, with expertise in marine turtle ecology, the fate and effects of chemical contaminants in the aquatic environment and human impacts in the coastal zone. Jason's research is currently focused on ethical alternatives to assessing the accumulation and effects of chemical contaminants in the environment, particularly in marine wildlife species such as marine turtles, dugong, whales and dolphins. In addition, he is currently involved in the development of a suite of cell-based bioassays for more ethical and high throughput assessment of the toxicity of wastewater release.

Chemical contaminants are accumulating in marine wildlife, globally. However, we know very little about the effects of contaminants in these animals, mainly due to the ethical and logistical constraints of conducting whole animal toxicity testing on these large, long-lived animals of high conservation significance. Cell cultures are an increasingly valuable and ethical tool for research into the toxicology and health of humans and animals. However, their application to understanding the toxicology and health of marine wildlife has been limited, largely driven by the lack of available cell cultures for these species. Using the tissue explant method, we have established cell cultures from a range of marine wildlife species (whales, dolphins, dugong and turtles) and tissue types (skin, liver kidney, brain). Further, we have confirmed the species of origin of each cell culture via DNA sequencing and karyotyping, and used transcriptomics to distinguish between tissue types. Long term cryopreservation of these fully characterised cell cultures in the Marine Wildlife Cell Bank allows for the distribution of these cell cultures to researchers all over the world. Cell cultures from the Marine Wildlife Cell Bank are now facilitating species-specific understanding of wildlife toxicology, contributing to the management and conservation of marine wildlife species globally.

Assessing Contaminant Risks in Antarctic Soils: Development of Native Fungal Toxicity Tests

Ms Jordan Vink[1,2], Dr Xabier Vázquez-Campos[1,2], Dr Catherine K. King[3], Dr Daniel Wilkins[3], Dr Belinda Ferrari[1,2]

[1]School of Biotechnology and Biomolecular Sciences, The University of New South Wales, Sydney, Australia, [2]Evolution and Ecology Research Centre, The University of New South Wales, Sydney, Australia, [3]Environmental Stewardship Program, Australian Antarctic Division, Department of Climate Change, Energy, the Environment and Water, Kingston, Australia

Session 3A: Contaminants in soil: Filling knowledge gaps & enhancing decision making 2, Chancellor 1, August 26, 2025, 4:10 PM - 5:40 PM

Biography:

Jordan Vink is a third-year PhD candidate at the University of New South Wales, Australia, supervised by Professor Belinda Ferrari. Her industry-linked PhD, in collaboration with the Australian Antarctic Division, focuses on developing a fungal toxicity test using a native Antarctic fungus to enhance risk assessment and regulatory frameworks in Antarctica. Jordan completed her bachelor's degree in biotechnology in 2020 and joined the Ferrari lab as an Honours student in 2021, researching a novel form of motility in Streptomyces. Her work in ecotoxicology encompasses ecology, bioremediation, biotechnology, and toxicology in an effort to improve environmental protection practices.

Antarctica supports a surprisingly rich terrestrial biodiversity, including an abundance of microbial life, particularly in the soils of its ice-free areas. Human activities on the continent, however, have resulted in contamination from hydrocarbons and metals which can pose a risk to unique microbial assemblages and valuable soil ecosystems. The dominant source of hydrocarbon pollution is from light diesel blends, while metal contamination primarily stems from past waste management practices at research stations. With no Antarctic-specific environmental guidelines for contaminants, predicting the risk of such contaminants to soil biota is challenging.

Traditional single-species toxicity assays using a range of Antarctic native biota including plants, invertebrates, and algae, have been used for risk assessments. However, fungal communities have not yet been represented. Fungi are vital for a healthy ecosystem, even in extreme environments like Antarctica. Therefore, this study aims to develop the first native Antarctic fungal toxicity test. From 110 Antarctic fungi screened for sensitivity to diesel and copper, we identified seven strains suitable for single-species toxicity test development. Multiple endpoints were investigated to assess fungal stress responses to toxicants, including adenosine triphosphate (ATP) levels, enzymatic activity, growth rates, and morphological changes. The reliable measurement of these stress responses was challenging due to variable and complex stress pathways, which can differ even at the species level.

Additionally, to shed light on the role that fungi play in the bioremediation process, fungal community shifts in hydrocarbon-contaminated soil over 29 months of bioremediation, and 22 months post-return to the environment were monitored via internal transcribed spacer (ITS) amplicon sequencing.

This study underscores the importance of fungi in maintaining soil health and is an important step towards the development of an environmentally relevant fungal toxicity test for use in risk assessments in Antarctica.

Do microplastics change the microbial risk profile of wastewater?

Dr Olga Pantos[1], Dr Joanne Kingsbury[1], Dr Louise Weaver[1], Hayden Masterton[1], Stefan Maday[2], Prof. Gavin Lear[2], Jessica Wallbank[2]
[1]New Zealand Institute of Public Health and Forensic Science, Christchurch, New Zealand, [2]University of Auckland, Auckland, New Zealand

Session 5C(i): Micro- and nanoplastics: Environmental emission and sources, human exposure, & potential health implications 2, Chancellor 4, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
Olga holds a degree in Marine and Environmental Biology from the University of St Andrews and a PhD in microbial ecology of coral disease from the University of Newcastle, UK. She is passionate about understanding how human-induced stressors affect ecosystems and organisms. As Science Leader at ESR, Olga's research focuses on the ecological and health impacts of plastics and microplastics, including plastic-microbe interactions. Her work explores how these interactions influence ecosystem health and function, with particular interest in the microbial plastisphere—both its potential to facilitate pathogen rafting and its capacity to support the biodegradation and remediation of plastic pollution.

Plastic pollution poses significant and varied environmental harms, influenced by factors such as polymer type, size, morphology, aging, and interactions with organisms and ecosystems. Although much research has focused on the physical and toxic effects of plastics, less is known about how plastics affect microbial functions and how they interact with microbial pathogens, which both pose risks to human health.
Wastewater treatment facilities serve as critical points of interaction for microbial pathogens and plastics. Depending on treatment levels, plastic particles can either be removed before environmental discharge or found in treated effluent and biosolids. As these plastics age, they may leach pollutants, adsorb harmful substances, provide substrates for biofilm formation, and create optimal conditions for conjugation, possibly impacting antimicrobial resistance (AMR).
To investigate the interactions between plastics and microbes, we introduced five types of pristine and artificially weathered plastics and a glass control into the final maturation pond of a municipal wastewater treatment plant in Ōtautahi-Christchurch, Aotearoa New Zealand. We sampled the resulting plastic-associated biofilms (plastisphere) at 2, 6, 26, and 52 weeks, across three depths (20, 40, and 60 cm). Metagenomic sequence analysis was used to assess microbial diversity and functional potential.
Bacterial 16S ribosomal RNA genes composition did not vary among plastic types and glass controls but varied among sampling times. Overall, there was no polymer-substrate specificity evident in the total composition of genes, but sampling time and depth were significant factors. The plastisphere housed diverse AMR gene families, potentially influenced by biofilm-mediated conjugation. The health risk of plastic-associated microbes in the effluent may therefore pose an increasing environmental, and human health risk and warrants further study.
This study highlights that the removal of microplastics from wastewater (ideally by prevention) is critical for the protection of the environment and humans from both chemical and microbial threats.

Optimising pyrolysis GCMS techniques for halogenated plastics detection

Miss Ruvini Weerasinghe[1,2], Prof. Kevin V. Thomas[1,2], Dr Jake W. O'Brien[1,2], Dr Elvis D. Okoffo[1,2], Mr Carl Lehnert[3], Dr Cassandra Rauert[1,2]

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Session 4C(ii): Micro- and nanoplastics: Environmental emission and sources, human exposure, & potential health implications 1, Chancellor 4, August 27, 2025, 11:00 AM - 12:30 PM

Biography:

Ruvini got her Bachelor's degree in Biological Sciences from the University of Sri Jayewardenepura in Sri Lanka. She then went on to pursue an MPhil degree in the same university. Her research there focused on the identification of chemical toxicity and antifouling potential of some marine fouling organisms. She is now a PhD candidate at Queensland Alliance for Environmental Health Science (QAEHS). Her research aims to develop hyphenated methodologies for quantifying halogenated plastic materials.

Halogenated polymers such as polytetrafluoroethylene (PTFE), polychlorotrifluoroethylene (PCTFE), and brominated polystyrene (BrPS) are used in many commercial products due to their chemical, thermal resistance and durability. However, these polymers can degrade physically, chemically, and photochemically, releasing halogenated micro- and nanoplastics (MNPs). Currently, there is limited information on the occurrence and fate of these polymers in the environment, stemming from a lack of reliable quantification methods.

This study aimed at developing Pyrolysis Gas Chromatography Mass Spectrometry (Py-GC-MS) methods to characterise halogenated plastics in various environmental matrices. The double-shot mode of a multi-shot micro-furnace pyrolyser-PY-3030D (Frontier Lab Ltd., Fukushima, Japan), coupled with a GC-MS - GC2030 (Shimadzu Corporation, Japan), was used to develop methods to identify and quantify key pyrolytic markers of BrPS and PCTFE. Halogenated polymer standards were introduced into the pyrolysis unit, then analysed at various pyrolysis temperatures to optimise the formation of pyrolysis products. The resulting pyrograms were compared with the NIST mass spectral library and available published literature (Tsuge et al. 2011).

For PCTFE, isomers of 1,2-dichlorotetrafluoro propane and three homologous series of unidentified structures (A, B, and C series), ranging from dimers to hexamers, were identified. When a mixture of PVC and PCTFE was analysed, the abundance of the B series decreased. In contrast, the C series increased, suggesting that the presence of PVC affects the formation of the PCTFE pyrolysis products, and it needs to be investigated further. BrPS produced 17 identified pyrolysis products, with o- and p-bromostyrene, p-bromotoluene, and β-bromostyrene the most prominent. Additionally, bromostyrene dimers and trimers with varying levels of bromination were detected. Polystyrene products were also identified, indicating that the presence of BrPS might lead to the false identification of polystyrene. Optimal pyrolysis temperatures for both polymers were determined to be between 600 and 650°C.

Assessment of Seasonal Variability, Treatment Performance, and Ecological Risks of Target Contaminants of Emerging Concerns (CECs) in four Victorian WWTPs

Mrs Madara Weerasooriyagedara[1], A/Prof Bradley O. Clarke, A/ Prof. Stefano Freguia, Mr Jordan Partington, Mr Mulugeta Akele
[1]School of Chemistry, University of Melbourne, Parkville, Australia

Session 5A: Contaminants of emerging concern 3, Chancellor 1, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
Madara Weerasooriyagedara is a PhD candidate in Environmental Chemistry at the University of Melbourne. Her research focuses on the occurrence, transformation, removal, and ecological risks of emerging contaminants (CECs) in wastewater systems. She applies both targeted (LC-MS/MS) and non-targeted (LC-QTOF-MS) approaches, with expertise in solid-phase extraction method development and matrix effect evaluation across diverse water types. Prior to her PhD, she coordinated research projects at the National Science Foundation of Sri Lanka, gaining experience in environmental monitoring and stakeholder engagement. Her work bridges academic research with industry needs in water quality, contaminant surveillance, and sustainable environmental management.

This study presents a comprehensive evaluation of the occurrence, seasonal dynamics, mass fluxes, and ecological risks of 19 contaminants of emerging concern (CECs) in influent and effluent streams from four wastewater treatment plants (WWTPs) across Victoria, Australia. Triplicate 24-hour composite samples (n = 352) were collected over seven days in autumn (May 2023) and spring (November 2023) and analysed with solid-phase extraction (SPE) and LC-MS/MS. All CECs were detected in influent samples with frequencies exceeding 73%, while effluent samples exhibited lower detection rates, reflecting partial removal through treatment processes. Acetaminophen (1,600–26,000 ng/L) and caffeine (716–9,700 ng/L) were the most abundant CECs, regardless of WWTP or season. Spatiotemporal variation was observed, with elevated levels of codeine, ofloxacin, sulfamethoxazole, and trimethoprim in autumn, and citalopram, desvenlafaxine, and DEET in spring. Weekly variations in influent concentrations were statistically significant ($p < 0.05$) for 10 compounds. Caffeine showed midweek peaks, while fluoxetine, venlafaxine, sulfamethoxazole, atrazine, piperonyl butoxide, BBP, and TCEP peaked on Sundays. Removal efficiencies varied widely across compounds and WWTPs, ranging from negative values to complete elimination. One WWTP consistently achieved >85% removed most CECs, outperforming reported treatment performance. Environmental risk assessments were assessed using the Risk Quotient (RQ) method to evaluate the effluent. Acute toxicity risks were low for algae and invertebrates. However, chronic exposure indicated moderate to high risks for fish, particularly at the 90th percentile concentrations of venlafaxine, fluoxetine, citalopram, and carbamazepine. Median concentration-based RQs revealed lower risks overall, except for carbamazepine at one WWTP. Invertebrates faced moderate chronic risks from acetaminophen and sulfamethoxazole, though no compounds exceeded RQ>1. The assessment was based on measured effluent concentrations, where the 90th percentile values were used to represent peak exposure scenarios, and median concentrations were used to approximate typical long-term exposure, without accounting for dilution effects in receiving environments.

From Lab to Field: A Comparison of the Biodegradation Rates of Organic Chemicals in a Subtropical River

Lily Weir[1], Dr. Run Tian[1], Assistant Prof. Malte Posselt[2], Prof. Hubert Chanson[3], Prof. Jochen Mueller[1], Prof. Michael McLachlan[2]
[1]Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Brisbane, Australia, [2]Department of Environmental Science (ACES), Stockholm University, Stockholm, Sweden, [3]School of Civil Engineering, The University of Queensland, Brisbane, Australia

3C(ii): Contaminants of emerging concern 1, Chancellor 4, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
Lily is a PhD candidate at the Queensland Alliance for Environmental Health Sciences (QAEHS), where her research focuses on improving our understanding of the persistence of organic micropollutants in aquatic environments. She holds a Bachelor of Science (2019) and First-Class Honours from Griffith University, with her Honours research investigating the desorption of PFAS from contaminated soils. Lily also works with the Department of Environment and Science, contributing to ambient water quality monitoring programs across Queensland's coastal catchments. She is passionate about applying research to real-world environmental challenges and addressing critical knowledge gaps.

Understanding the persistence of organic chemicals in aquatic environments is essential for assessing their long-term ecological risks and informing effective chemical management. Biodegradation is a key removal pathway for many chemicals, however, measuring biodegradation *in situ* is inherently complex, resource-intensive, and subject to high environmental variability. As a result, both regulatory frameworks and research efforts often rely on laboratory-based biodegradation tests, which are intended to offer controlled and reproducible conditions. Despite their widespread application, few studies have evaluated how well these laboratory-based biodegradation results represent biodegradation occurring in real aquatic environments. In this study, we compared biodegradation rate constants (k) obtained from a modified OECD 309 laboratory test - designed to be more environmentally relevant - with those derived from a field experiment for a subtropical river in Queensland, Australia. 23 chemicals covering a range of structures and functions had measurable biodegradation in both experiments. These chemicals demonstrated a moderate positive linear relationship between laboratory- and field-derived k (Pearson $r = 0.6$, $p < 0.01$), where both datasets had similar magnitudes of k (i.e., median difference of 10 %). However, only 36 % of the variation in the field-derived k was predicted by the lab-derived k. The rank-orders of k were more strongly aligned (Spearman $\rho = 0.8$, $p < 0.001$). These findings suggest that while uncertainty between laboratory- and field-derived k of some chemicals remains, the modified OECD 309 test can effectively represent both the magnitude and rank-order of biodegradation for a diverse range of chemicals *in situ*, and without the need for scaling factors. From a regulatory standpoint, this suggests that the modified OECD 309 test shows potential for both chemical prioritisation and informing environmental persistence assessments.

Recovery of industrial residues: Toxicology needs to support risk assessments for resource recovery

Adam Wightwick[1], Jacqui Connor[2], Lyon McLeod[3]
[1]Ramboll, Melbourne, Australia, [2]Ramboll, North Sydney, Australia, [3]Ramboll, Perth, Australia
Session 4C(i): Whole-of-life approach to risk assessment, Chancellor 6, August 27, 2025, 11:00 AM - 12:30 PM

Biography:
Dr Adam Wightwick is a risk assessor with over 20 years of environmental consulting, research and regulatory experience. He currently leads the human health and ecological risk assessment service area for Ramboll in Australia. Adam's risk assessment experience has predominantly been in relation to contaminated sites and waste management. In recent years he has been involved in risk assessments to support resource recovery and circular economy initiatives. Adam is a Registrant of ACTRA (RACTRA).

Industrial processes can produce large volumes of residues to be managed. Such residues can be a valuable resource to be recovered for beneficial uses, such road construction and industrial fill. Recovery of residues for beneficial uses is critical for industries to meet sustainability goals and targets, e.g. by diverting waste from landfills, as sustainable alternatives to construction materials.

The recovery of the residues involves regulatory obligations and/or approvals related to 'end of waste' frameworks. Risk assessments are needed to evaluate if recovered residues can be used in a manner which poses minimal risk of harm to human health and the environment. Recovered industrial residues are typically re-used for non-sensitive land uses and/or in a manner which reduces the potential for exposures to receptors (e.g. beneath road pavements, cement-stabilised solids). However, risk assessments also need to consider risks if the recovered residues are used in proximity to sensitive environments and end of life exposures (e.g. if stabilised solids become crushed).

Risk assessments use readily available toxicological data and environmental quality guidelines for contaminants of potential concern (COPC). For less commonly studied COPC there is limited toxicological data available and guideline values are of low reliability. Toxicological studies are also typically conducted using 'test chemicals' which are not representative of the nature of the COPC present in the residues. Due to uncertainties, risk assessments tend to be overly conservative, which can limit the beneficial uses of recovered residues. There is a need for further toxicological studies to support recovery for industrial residues. These studies need to be undertaken and published in a manner to enable use by practitioners and regulators. The presentation will discuss toxicology needs for key COPC related to the beneficial uses of industrial residues recovered from processing of minerals to support energy transition, metal recycling and waste to energy facilities.

Application of the Fish Embryo Toxicity (FET) Test to Assess Bifenthrin Toxicity in Early Life Stages of two native fishes: *Mogurnda adspersa* and *Melanotaenia fluviatilis*

Ms Tehmina Yaqoob[1], Dr Vincent Pettigrove[1], Dr Kathryn Hassell[1], Dr Rhys Coleman[2]
[1]RMIT, Melbourne, Australia, [2]Melbourne Water Corporation, Melbourne, Australia
Session 3B: Toxicants and environmental impacts on wildlife 2, Chancellor 6, August 26, 2025, 4:10 PM - 5:40 PM

Biography:
Tehmina Yaqoob is a PhD candidate in Applied Biology and Biotechnology at RMIT University, Melbourne. Her research focuses on developing Fish Embryo Toxicity (FET) testing methods for native Australian freshwater species to improve ecological risk assessment and reduce reliance on traditional animal testing. Supported by Melbourne Water, her work contributes to advancing alternative ecotoxicological methods and informing environmental management. She is also actively involved in student leadership and mentoring within the HDR community at RMIT.

Fish Embryo Toxicity (FET) testing offers a scientifically robust alternative to traditional animal testing, that aligns with the three Rs (Replacement, Reduction, and Refinement) principles in animal welfare legislation in Australia. The primary objective of this study was to apply modified FET protocols to assess the toxic effects of bifenthrin (a synthetic pyrethroid insecticide commonly detected in urban waterways within Greater Melbourne) on two native Australian freshwater species: *Melanotaenia fluviatilis* (Murray River Rainbowfish) and *Mogurnda adspersa* (Purple-Spotted Gudgeon). Laboratory-based assays investigated the impact of increasing bifenthrin concentrations (B 1 = 0. 15 µg/L, B 2 = 1.0 µg/L, B 3 = 10 µg/L, B 4 = 100 µg/L) on embryonic development. Key endpoints included hatching success, larval morphometric traits (standard body length, eye diameter, and yolk sac volume), and skeletal deformities (spinal curvature %). Gudgeon embryos demonstrated greater sensitivity than rainbowfish, with reduced hatching rates and 25% of larvae were deformed at higher concentrations. Rainbowfish embryos exhibited lower sensitivity to bifenthrin, with relatively consistent hatching and a lower incidence of morphological abnormalities across the same exposure concentrations. To evaluate the environmental relevance of these tests, both species were also exposed to surface water samples collected from six sites within the Westernport catchment in Greater Melbourne. Embryos exposed to water from two of these sites exhibited signs of developmental stress and hatched earlier than controls. The precocious hatching was associated with lower larval survival– especially in gudgeon embryos, paralleling the laboratory bifenthrin results. This study demonstrates the utility of FET protocols in identifying species- and site- specific ecological risk, and provides further opportunities for the inclusion of native fish species into ecotoxicological risk assessments for aquatic environments.

Triaging Chemical Analyses in Product Testing: The Role of Non-Destructive Analytical Methods

Dr. Ian Zammit[1,2], Ms. Danielle Que[1], Mr. Lachlan Jekimovs[1], Dr. Brett Hamilton[3], Dr. Fisher Wang[1,2], Dr. Rory Verhagen[1], a/Prof. Phong Thai[1], Dr. Christie Gallen[1], Dr. Andrew Banks[1], Prof. Jochen Mueller[1,2]

[1]Queensland Alliance for Environmental Health Sciences, (QAEHS), The University of Queensland, Woolloongabba, Australia, [2]Minderoo Centre − Plastics and Human Health, Woolloongabba, Australia, [3]Centre for Microscopy and Microanalysis, The University of Queensland, St. Lucia, Australia

Session 3C (i): Contaminants in consumer products and cosmetics, Chancellor 4, August 26, 2025, 4:10 PM - 5:40 PM

Biography:

Ian Zammit is a Research Fellow at QAEHS and part of the Minderoo Centre – Plastics and Human Health, focusing on plastic-associated chemicals in human samples. He also works on chemicals of concern in consumer products, especially clothing. Previously, he was a Postdoctoral Researcher at the Catalan Institute for Water Research, using wastewater-based epidemiology to monitor public health. He earned his Ph.D. from the University of Salerno in 2019, studying antibiotic resistance in wastewater used for irrigation. Ian holds an M.Sc. in Environmental Sciences from Stockholm University and a B.Sc. (Hons.) in Chemistry and Biology from the University of Malta.

Many consumer products available in high-income countries are manufactured overseas, often in jurisdictions with limited regulatory oversight for the important country. This globalised supply chain poses major challenges for ensuring product safety, particularly given the vast number and diversity of imported items. Comprehensive screening of imported goods is both logistically and financially unfeasible. As a result, there is a need to develop rapid, high-throughput screening procedures and fit-for-purpose sampling strategies for chemicals of concern.

A number of analytical techniques can be used to triage more labour-intensive chemical analyses and reduce sample numbers by exclusion. X-ray Fluorescence (XRF) is a non-destructive technique that provides elemental information about a sample. Handheld XRF devices are commercially available and can detect elements such as bromine, chlorine, and fluorine with high throughput. We have used XRF to prioritise targeted chemical analysis for brominated flame retardants and can be used for other halogenated flame retardants. Consumer products were tested both with XRF for bromine detection and Br positive samples were processed with destructive extraction methods for quantification.

Mass spectrometry has underpinned a great deal of analytical chemical testing, typically as targeted and some non-targeted LC/GC -MS. Other emerging mass spectrometry approaches in exposure science include Direct Analysis in Real Time (DART), Matrix-Assisted Laser Desorption Ionization (MALDI) and Desorption electrospray ionization (DESI). All approaches can be coupled to various mass analysers greatly increasing the breadth of experiments which can be achieved. DESI and MALDI are widely used for imaging analyses, providing information regarding the spatial distribution of analytes, which when coupled to the quantitative robustness of LC/GC -MS, can provide a powerful result. DART is very useful in that liquid, solid, and powdered samples can be analysed directly.

The work presented here explores using DART-MS to triage large numbers of samples very quickly for more in-depth and time-consuming GC/LC -MS.

Low salinity influences the dose-dependent transcriptomic responses of oysters to cadmium

Dr Junfei Zhan[1,2], Professor Chenglong Ji[2,3], Professor Huifeng Wu[3]
[1]Ludong University, Yantai, China, [2]The University of Newcastle Australia, Newcastle , Australia,
[3]Yantai Institute of Coastal Zone Research (YIC), Chinese Academy of Sciences, Yantai, China
Session 5B(ii): Environmental omics applied to ecotoxicology & eco-surveillance, Chancellor 6, August 27, 2025, 1:30 PM - 3:00 PM

Biography:
My research has focused on the toxicological effects of heavy metal pollutants (like cadmium and arsenic widely distributed in Chinese coastal environment) in marine bivalves by integrating multi-omics with traditional toxicology approaches. I also study arsenic accumulation and speciation in marine bivalves and explore the occurrence mechanism of arsenic biotransformation by the benchmark dose method. Moreover, I specialize in using meta-analysis (a statistical method and quantitative tool) to identify a general trend through combining the published consistent/inconsistent results with the same topic, like revealing the species-, dose- and duration-dependent effects of cadmium toxicities in marine bivalves.

Species in estuaries tend to undergo both cadmium (Cd) and low salinity stress. However, how low salinity affects the Cd toxicity has not been fully understood. Investigating the impacts of low salinity on the dose-response relationships between Cd and biological endpoints has potential to enhance our understanding of the combined effects of low salinity and Cd. In this work, changes in the transcriptomes of Pacific oysters were analyzed following exposure to Cd (5, 20, 80 μg/L Cd2+) under normal (31.4 psu) and low (15.7 psu) salinity conditions, and then the dose-response relationship between Cd and transcriptome was characterized in a high-throughput manner. The benchmark dose (BMD) of gene expression, as a point of departure (POD), was also calculated based on the fitted dose-response model. We found that low salinity treatment significantly influenced the dose-response relationships between Cd and transcripts in oysters indicated by altered dose-response curves. In detail, a total of 219 DEGs were commonly fitted to best models under both normal and low salinity conditions. Nearly three quarters of dose-response curves varied with salinity condition. Some monotonic dose-response curves in normal salinity condition even were replaced by nonmonotonic curves in low salinity condition. Low salinity treatment decreased the PODs of differentially expressed genes induced by Cd, suggesting that gene differential expression was more prone to being triggered by Cd in low salinity condition. The changed sensitivity to Cd in low salinity condition should be taken into consideration when using oysters as an indicator to assess the ecological risk of Cd pollution in estuaries.

Comparative study of PFAS treatment by UV, UV/ozone, and fractionations with air and ozonated air

Assoc. Prof. Jianhua Zhang[1]
[1]Victoria University, Melbourne, Australia

Session 7B: Future-Proofing Wastewater Treatment: Tackling Emerging Contaminants with a Holistic Approach – it's more than just PFAS, Chancellor 6, August 28, 2025, 9:25 AM - 10:55 AM

Biography:

Dr Jianhua Zhang has been working on membrane fabrication study and related treatment for more than 10 years. Since 2018, his study has been focusing on the PFAS decontamination from both water and soil by membrane technology and fractionation. He published 95 articles including 3 book chapters, with H-index of 40. Over 80% of his papers are published in Q1 and D1 journals and 40% as the first and corresponding author. This has all been achieved despite his considerable industry consultancy load, which takes 80% of his research time.

Per- and poly fluorinated alkyl substances (PFAS) and their derivatives are persistent organic chemicals, resulting in significant adverse human health and environmental effects. In this paper, UV, ozonated air fractionation, air fractionation and UV/ozone combined treatment for PFAS removal were studied and compared. The feed water was synthesised from the firefighting foam, which contained multiple per- and poly fluorinated alkyl substances. Combined UV and ozone equipment patented by EGL were used to compare the performance of different treatment methods, in which a two-unit rig was employed as a benchtop setup and a nine-unit rig using UV/ozone combined treatment was employed as a pilot rig. It was found from the benchtop tests that PFAS removal efficiency was improved with the increases of air and feed flowrates in the UV/ozone combined treatment. The highest PFAS removal efficiency achieved was 87% at an air flowrate of 30 L/min and feed flowrate of 1.4 L/min (10 min residence time). The different treatment techniques including UV only, ozonated air fractionation, and air fractionation were compared with the UV/ozone combined treatment at the residence time of 20 min. UV alone removed 16.8% PFAS, which showed the worst performance of all tests. 73% PFAS was destroyed by the UV/ozone combined treatment. Air fractionation was able to achieve 81% PFAS removal. Ozonated air fractionation showed the best PFAS removal efficiency, which was more than 95%, as a result of the enriched OH radicals in the gas bubble. For the nine-unit pilot rig, the UV/ozone combined treatment achieved about 79% PFAS removal. However, foam fractionation occurred during the treatment, which led to approximately 4% removal of PFAS based on the mass balance. Therefore, the PFAS removal contributed by UV and ozone combined treatment was 75%, which was similar to the result of benchtop rig. All treatment resulted in a concentration increase of at least one type of short-chain PFAS. When foam fractionation with gas bubbles occurred in the treatment, it was easier to remove perfluoroalkyl sulfonate (PFSA) than perfluoroalkyl carboxylate (PFCA), because PFSA is more hydrophobic than PFCA, which makes it more affinity to gas bubbles. In addition, in comparison with long-chain PFAS it is much more difficult to remove the short-chain PFAS by fractionation technologies, due to the partition factor declining exponentially with the reduced carbon number.

Abstracts – Poster Presentations

PFAS Characterization in Four Victorian Wastewater Treatment Plants: Temporal Trends, Mass Flows, and Catchment-Specific Insights

Mr Mulugeta Akele[1]
[1]University of Melbourne, Melbourne, Australia

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
I am currently undertaking my PhD within the Australian Laboratory for Emerging Contaminants research group at the University of Melbourne. My research focuses on identifying sources of legacy and emerging PFAS in Australian wastewater treatment plants. I employ a combination of targeted analysis using LC-TQ and non-targeted analysis with high-resolution mass spectrometry (LC-QTOF). My work aims to uncover chemical signatures linked to PFAS emitters, enabling early detection and mitigation of contamination sources.

Per- and polyfluoroalkyl substances (PFAS) are an emerging concern for wastewater treatment plants (WWTPs) due to their persistence, toxicity, and limited removal during conventional treatment. This study presents a comprehensive, temporally resolved assessment of legacy and emerging PFAS across four WWTPs (W1–W4) in Victoria, Australia, with daily composite influent and effluent samples collected over two seasons (autumn and spring 2023). Of the 47 PFAS targeted, 13 were consistently detected, primarily perfluoroalkyl carboxylic acids (PFCAs) and perfluoroalkanesulfonic acids (PFSAs). While W1–W3 exhibited low to moderate concentrations (13–71 ng/L), W4 showed markedly elevated levels (432–574 ng/L), attributed to infiltration of contaminated groundwater. Notably, PFOS concentrations in W4 effluents exceeded the NEMP 3.0 guideline value of 130 ng/L, raising ecological concerns. PFAS mass loads showed no significant change between influent and effluent across all sites, though short-chain PFCAs increased in effluents, suggesting precursor degradation. Annual discharge loads, calculated using flow data from WWTP operators, ranged from 0.01 kg/y (W3) to 13 kg/y (W1), with a combined total of 23 kg/y across all sites. Despite high concentrations at W4, its total discharge was only 2 kg/y due to lower flow. Per capita loads varied substantially: W3, serving mostly residential areas, had the lowest at 5 µg/d/person—providing a useful benchmark for domestic PFAS discharge. Higher per capita values at W1, W2, and W4 reflected trade waste and groundwater infiltration. Principal component analysis revealed shared sources for PFBS/PFHxS and PFHxA/PFHpA, whereas PFDA and PFPeA had distinct profiles. Minimal seasonal variation indicated stable PFAS profiles over the short term. These findings underscore the value of site-specific mitigation strategies and long-term monitoring and highlight the utility of per capita and mass load estimates in interpreting PFAS sources and informing regulation.

In vitro effects of environmentally relevant concentrations of para-nonylphenol and selected pyrethroid metabolites on a mouse Sertoli cell line

Ms Nthabiseng Matjomane[1,2], Dr Lisa Repsold[2], Prof Sean Patrick[1], Dr Magdalena Van Zijl[1], Dr Michelle Visagie[1], Dr Natalie Aneck-hahn[1]
[1]University of Pretoria, Pretoria, South Africa, [2]Tshwane University of Technology, Pretoria, South Africa

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Dr Natalie Aneck-Hahn is the director of the Environmental Chemical Pollution and Health Research Unit in the Faculty of Health Sciences at the University of Pretoria. She has more than 20 years' experience in research on the effects of endocrine disrupting chemicals, effects on human (including male infertility) and aquatic health and the use of in vitro bioassays to determine the activity of chemicals and mixtures in water samples. Natalie has been involved in a number of GWRC and WRC funded research projects, the latest being the Toolbox for effect-based methods and the application of EBMs for water quality assessment.

Introduction:
South Africa (SA) still battles with endemic malaria. Indoor residual spraying, using either DDT or pyrethroids for malaria vector control. Nonylphenol is used as a carrier compound. Also known as endocrine disrupting chemicals (EDCs), these compounds have been linked to adverse semen quality and reproductive toxicity. Mouse Sertoli cells (TM4), which are targets for various environmental contaminants and may serve as a model for male reproductive toxicological studies.

Aim:
To evaluate the *in vitro* effects of environmentally relevant concentrations of para-nonylphenol and selected pyrethroids and pyrethroid metabolites in mouse Sertoli cells (TM4).

Methods:
The TM4 cells were exposed to environmentally relevant concentrations of cypermethrin, deltamethrin, rac-trans permethrinic acid, 3- phenoxybenzoic acid and para-nonylphenol (p-NP) for 24 hours. Toxicity was assessed using the MTT assay, oxidative stress (reactive oxygen species) was measured using a kit. The haematoxylin & eosin (H&E) staining technique was used to assess aberrant morphological changes within the cell.

Results:
The MTT assay data showed a moderate decline (approximately 20% cell death) in the TM4 cells viability. Statistical analysis of reactive oxygen species (ROS) production revealed significant differences for the pesticide mixtures compared to the negative control. While the effect sizes were relatively small, practical significance was confirmed through Cohen's d-value analysis. Aberrant morphological alterations including membrane elongation, cytoplasmic vesicle formation and cell density reduction were observed, particularly in cells exposed to nonylphenol.

Conclusion:
This study provides evidence that exposure to pyrethroids and nonylphenol may potentially induce significant toxicity in mouse Sertoli cells. Future studies are needed to explore the effects of prolonged *in vitro* exposure with environmental concentrations found in SA. Implementation of regular monitoring of the concentration levels of these compounds and exploration of safer alternatives to mitigate the potential detrimental consequences associated with prolonged exposure is recommended.

Degradation of per- and polyfluoroalkyl substance (PFAS) in Aqueous Film Forming Foam (AFFF) and Foam Fractionate by ultrasound

Mr Olalekan Simon Awoyemi[1], Dr Cheng Fang[1], Professor Ravi Naidu[1], Professor Clovia Holdsworth[2]
[1] Global Centre for Environmental Remediation (GCER), School of Environmental and Life Sciences, University of Newcastle, Australia, Newcastle, Australia, [2]School of Environmental and Life Sciences (SELS), University of Newcastle, Australia, Newcastle, Australia

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Simon is an environmental researcher with a multidisciplinary background in air, soil, and water remediation. He earned his B.Tech in Chemical Engineering from Ladoke Akintola University of Technology (Lautech), Nigeria, and holds dual MSc degrees from Ghent University, Belgium—one in Environmental Technology and the other in Soil Science. With expertise in environmental chemistry, his current work focuses on the degradation of PFAS ("forever chemicals") using ultrasonic treatment, aiming to develop effective water remediation strategies. Driven by a strong commitment to addressing pressing environmental challenges, Simon seeks to create innovative and sustainable solutions.

The widespread use of per- and polyfluoroalkyl substances (PFAS) in products such as aqueous film-forming foam (AFFF) has led to significant environmental and health concerns due to their persistence and toxicity. While foam fractionation is an established technique for concentrating PFAS from contaminated water, it requires additional steps for complete PFAS destruction. Ultrasonication, an advanced oxidation process (AOP) that generates localized heating and hydroxyl radicals, offers a promising method for breaking down PFAS. In this study, real-world AFFF and foam fractionate (FF) samples were treated with ultrasound. Results showed a ~65% reduction in total PFAS levels for AFFF (from ~2,200 ppb to 766 ppb) and a ~97% reduction for FF (from 1,950 ppb to 60.8 ppb). Notably, defluorination percentages exceeded 100%, suggesting effective oxidation of PFAS precursors resistant to conventional assays. These findings highlight the potential of a foam fractionation–ultrasound hybrid system as a scalable and effective strategy for PFAS remediation. This work provides important insights into advancing practical solutions for managing persistent environmental contaminants.

How rad is your science: Reducing animal requirements in ecotoxicology studies

Miss Alexandra Boyd[1], Dr Elisabeth Tondl[1], Dr Francesca Gissi[1], Ms Marie Thomas[2,3], Dr Tom Cresswell[1]
[1]Australian Nuclear Science and Technology Organisation (ANSTO), Lucas Heights, Australia, [2]Australian Institute for Marine Sciences (AIMS), Townsville, Australia, [3]University of Queensland, Brisbane, Australia

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Biography:
Alexandra has been working with the ANSTO Ecotoxicology and Radioecology team for the last three years and has supported numerous experimental research studies, including ANSTO-led research, student research projects, and commercial projects. Her primary focus is on investigating the environmental impact of contaminants in decommissioned offshore oil and gas pipelines, specifically mercury. Alexandra has technical expertise in handling and analysing radioactive isotopes and NORMs and aims to ensure all laboratory work has the highest level of QA/QC to ensure the resulting data is robust and can be used for multiple applications.

The use of animal models and testing is near unavoidable in the fields of ecotoxicology and biomedical research. Whilst the use of animals in experimental studies is strictly regulated by ethics committees, most studies still require the sacrifice of specimens to determine a quantity of a compound or its localisation within the organism.

Radiotracing techniques offer significant benefits in animal studies by enabling researchers to non-invasively track the biodistribution and kinetics of substances within a living organism. Radiolabelled compounds, also called radiotracers, emit energy signals that can be detected in various ways. For example, gamma emitting compounds can be detected via a gamma counter, enabling analysis of a live animal in a non-invasive manner. This allows for the uptake and egestion of these compounds to be tracked in a single specimen over time, which substantially reduces the number of animals required for a study, compared to traditional techniques, and highlights how physiological differences between individual animals can affect these processes, for example, the effects of moulting in crabs.

Another advantage of radiolabelling is the ability to use imaging techniques, such as autoradiography, to visualise and quantify the location of these compounds within a specimen. This helps to elucidate the fate of these compounds within an animal and also serves as a powerful communication tool that can enhance the impact of a publication or presentation.

Overall, radiotracing techniques offer a highly sensitive and specific alternative to animal testing, reducing the need for large sample sizes and invasive procedures in animal experiments. Here, we highlight the use of various mercury radiotracers to investigate bioaccumulation in marine organisms, supporting risk assessments for the decommissioning of mercury contaminated offshore oil and gas infrastructure.

Assessing the ecological risk of complex contaminant mixtures to Antarctic terrestrial communities using Direct Toxicity Assessments

Dr Kathryn Brown[1], Dr Bianca Sfiligoj[1], Dr Gwilym Price[1], Dr Catherine King[1]
[1]Australian Antarctic Division, Kingston, Australia

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
I am a Research Scientist with the Australian Antarctic Division. My research focus has primarily been in the fields of ecotoxicology, environmental risk assessment and management. My work mainly involves toxicity testing with Antarctic marine and terrestrial invertebrates exposed to a range of contaminants and assessing impacts of contaminated sites in Antarctica. Outcomes from my research provide the evidence basis that contributes to development of Antarctic-specific risk-based guidelines and remediation targets, informs risk assessments and management and protection of the Antarctic environment.

Human activities in Antarctica have introduced chemical contaminants to the environment that pose risks to endemic biological communities. Contaminants are often present in complex mixtures, including at fuel spill sites, legacy waste sites, and in wastewater discharges with unknown contaminant profiles. Traditional ecological risk assessments rely on guideline values for single contaminants derived from toxicity datasets spanning diverse taxa. These are poorly suited to Antarctic ecosystems however, due to unique ecological communities, limited region-specific toxicity data, and the prevalence of mixed contaminant profiles. Direct toxicity assessments (DTA) are used in site specific risk assessments to assess the ecological impacts of field collected contaminated material. They provide a direct measure of the bioavailability and toxicity of complex mixtures in soils, sediments, waters and leachates. The Australian Antarctic Division (AAD) uses DTAs as a line of evidence in contaminated site ecological risk assessments, to direct remediation activities and to inform soil reuse. Over the past 20 years, the AAD has used bioremediation to treat diesel contaminated soil in biopiles, with the aim of reducing contaminants and associated impacts on terrestrial ecosystems, ultimately enabling reuse of soil on stations. Here we present an example of the use of DTAs with indigenous microinvertebrate fauna, to evaluate remediation efficacy for biopile soils containing hydrocarbons at different levels of degradation. This study quantified the biological responses of bdelloid rotifers and nematodes (including mortality and reproductive endpoints) to treated and untreated soils, providing empirical, site-relevant effect thresholds. These data underpin site-specific ecological risk assessments and inform management decisions for remediated soils. Moreover, this framework offers a replicable approach for risk assessment of other contaminated sites across the Australian Antarctic Territory, enhancing the protection of sensitive terrestrial ecosystems in the face of ongoing human presence.

Harvestsafe Aotearoa – Investigating Soil Contamination in Community Gardens and Māra Kai

Biying Cao, Melanie Kah[1], Emma Sharp[1]
[1]University of Auckland, Auckland, New Zealand

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Biying (Moss) Cao is a Master of Environmental Science student at the University of Auckland. Moss has a background in ecology and sustainable agriculture. His research project, Harvestsafe Aotearoa, examines trace element contamination in community gardens and māra kai.

Community gardens (CGs) are often located in urban areas, where risks of contamination by some trace elements are elevated. There is currently no data available in Aotearoa, New Zealand. Filling this gap is important for improving NZ policies regarding soil and human health in urban agriculture. The Harvestsafe project recruited over 40 CGs and māra kai from around the country. Between one and three composite soil samples were collected at each location depending on the size and characteristics of the garden. Samples are about to be tested for Pb, As, Cu, and Cd by ICP-MS after microwave extraction. Soil pH and total organic matter will be tested to estimate the bioavailability of the contaminants. The gardeners were asked to complete a questionnaire on the condition and management of their garden, including questions on soil additives, past land use, building age and material, etc. We will investigate the relationship between these factors and contaminant levels using principal component analysis and linear models.

Our project addresses these specific questions:
1. Is there a concerning level of trace element contamination in CGs and māra kai in NZ?
2. Are these concentrations correlated with factors like garden location, past land use, building age and material, or soil additives?
3. What are common practices in CGs and māra kai in terms of soil management?

The Harvestsafe project is community-oriented. We provide the often-underfunded CGs access to expensive soil tests, and one of our objectives is to report the test results to the gardeners in a practical and helpful manner. The results of this study will contribute to the understanding of soil health in urban agriculture and have the potential to help improve soil contaminant policies and guidelines.

The geochemistry of palladium (Pd) in two Australian soils

Mr Po-hao Chen[1], Prof Meenakshi Arora[2], A/Prof Suzie. M Reichman[1]
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Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Paul is currently undertaking a PhD at the University of Melbourne focused on the biogeochemistry of palladium (Pd) contamination in soil and earthworms. The aim is to understand the geochemistry of Pd in soil and the mechanism of Pd toxicity on earthworms that can be used for risk assessment in terrestrial environments. Paul's previous work involved assessing the impact of polyethylene terephthalate (PET) glitter and novel cellulose nanocrystal (CNC) glitter on springtail (Folsomia candida), an international model species in terrestrial environments. Results were published in Chemosphere and presented at the 2024 Bioscience research showcase in University of Melbourne, Australia.

Palladium (Pd) is a metal frequently used as an oxidation catalyst in vehicles. Over the last few decades, palladium concentrations have been steadily rising in soil globally due to emissions from catalytic converters. Generally, Pd in aquatic systems has been found to have higher toxicity than other metals used in catalytic converters such as platinum and rhodium. However, there has been no research on the effects of Pd on soil systems. Therefore, this study aims to explore the geochemistry of Pd in two Australian soils to gain a better understanding of factor affecting Pd bioavailability and mobility in soil. Our results found that Pd (II) exhibited strong adsorption to soil colloids, compared to common metals such as Cd (II) and Cu (II). Adsorption kinetic experiment revealed that Pd (II) was absorbed and reached equilibrium in 8 hours. Pd (II) in multiple metal ion systems had higher selectivity than Cd (II) but showed less competitiveness with Cu (II). Additionally, the sorption behavior was impacted by clay content, pH, and organic matter. Soil with high clay, Fe and Mn concentrations had higher adsorption capacity for Pd (II) than soil that was lower in these factors. In summary, strong and fast sorption of Pd (II) to soil implies relatively low bioavailability and mobility in soil, but absorption capacity was highly affected by soil properties.

Artificial Intelligence–Supported Risk Communication in Low-Trust Environmental Incidents

Craig Dalton[1]
[1]HNE Health District, University of Newcastle, HMRI, Newcastle, Australia
Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Dr Craig Dalton is a public health physician and conjoint Associate Professor at the University of Newcastle/HMRI. He has over 25 years of risk communication experience and is the author of an ebook "How NOT to piss off a community – How to Work in Low-Trust Environments with Integrity and Compassion"

Background
Toxic environmental incidents in low-trust settings present major communication challenges. Even skilled risk communication specialists can struggle to address the diverse concerns of affected communities—especially when organisational approval processes, legal oversight, and media management dilute or delay messages. Best practice recommends testing content with typical stakeholder groups, but this is rarely feasible in fast-moving events. Large language models (LLMs) within agentic frameworks can help close this gap.

Methods
An agentic framework using multiple commercial LLMs was developed to review and stress-test draft risk communication material. The framework's knowledge base combined evidence-based risk communication principles from the author's 'How NOT to Piss Off a Community' ebook and a set of community personas synthesised from public relations and environmental advocacy research. The agent analysed a real-world case: a gas turbine facility's delayed (10-day) web statement following a major diesel fume emission. It assessed alignment with best practice, identified strengths and weaknesses, and generated simulated stakeholder responses.

Findings
The AI review found the statement was technically informative but lacked emotional resonance, timely acknowledgement, transparency measures, and mechanisms for two-way engagement. Anticipated community reactions included frustration over delays, demands for real-time data, calls for independent oversight, and concerns about health impacts.
Key improvements include:
1. Timeliness – Initial acknowledgement within hours.
2. Transparency – Real-time monitoring data publication.
3. Empathy – Recognition of emotional as well as health impacts.
4. Engagement – Creation of empowered community advisory panels.
5. Proactive Alerts – Opt-in SMS/email notifications for future incidents.
6. Follow-up – Regular open forums with plain-language technical briefings.
7. Independent Review – Third-party oversight of testing and communications.

Conclusion
AI-driven, persona-based reviews strengthen message clarity, anticipate public concerns, and support organisational adoption of best-practice communication in environmental incidents. The system needs to be trialled by front-line risk communicators to assess its usefulness in a range of settings.

Pharmacokinetic basis for vertebrate pesticide developments to minimise negative impacts on wildlife when protecting native species

Professor Charles Eason[1], Dr Lee Shapiro[2], Mr Duncan MacMorran[3], Dr Elaine Murphy[4], Dr Shaun Ogilvie[5]

[1]Lincoln University, Lincoln, New Zealand, [2]Boffa Miskell Ltd, Auckland, New Zealand, [3]IPC Ltd, Auckland, New Zealand, [4]Department of Conservation, Christchurch, New Zealand, [5]University of Canterbury, Christchurch, New Zealand

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Biography:

Professor Charles Eason, Lincoln University, NZ has a background in toxicology and pharmacology and the development of medicines and pest control products. He has specialised in pharmacokinetics linked to the safety and efficacy of drugs, natural compounds and vertebrate pesticides and in the challenging area of vertebrate pesticide safety.

The risks to non-target animals that accompany the use of rodenticides are determined in part by their tendency to bioaccumulate linked to pharmacokinetics. This is illustrated by comparative retention half-lives and residue data collected from wildlife from New Zealand and overseas. The variation in the way that the different vertebrate pesticides are absorbed, distributed, metabolised and excreted by animals will be highlighted. Sub-lethal residues of short half-life compounds, such as cyanide, para aminopropiophenone (PAPP) and norbormide are substantially excreted within 24 hours. Others with slightly longer half-lives, such as diphacinone and cholecalciferol will be largely cleared from the body within two to eight weeks. More potent anticoagulant compounds like bromodiolone, brodifacoum and flocoumafen persist for months or years leading to bioaccumulation, following repeat exposure, leading to secondary poisoning. To reduce the challenges native and threatened local species face when there is an over-reliance on second generation anticoagulants for predator control, a variety of tools have been developed based on low residue compounds. The rationale and development history for cyanide, cholecalciferol, diphacinone, PAPP, diphacinone in combination with cholecalciferol and current focus on norbormide will be described. Research has continued in New Zealand over several decades and more effective and selective baits and killing systems have been developed. Whilst toxins like brodifacoum will remain important, this paper will illustrate how integration of humane, low residue and selective toxins will reduce over-use of second-generation anticoagulants for endangered species protection and reduce risk to individual non-target species and negative ecosystem-wide effects. A range of tools in the toolbox for the control of invasive species which do not bioaccumulate and cause secondary poisoning and have some degree of target specificity based on their mode of action or delivery mechanism is the result of a deliberate strategy.

Distribution, Exposure, and Health Risks of Per- and Polyfluorinated Substances (PFAS) in Seafood from High Fishing and Rural Communities: A Meta-analysis

Ms Maureen Egbuatu[1], Dr Anthony Umeh[2], Laureate Prof Ravi Naidu[1]
[1]Global Centre for Environmental Remediation GCER, University of Newcastle, Newcastle, Australia, [2]EPA, New South Wales, Newcastle, Australia

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Maureen Egbuatu is a PhD student at the Global Centre for Environmental Remediation (GCER), University of Newcastle, Australia. Her research explores the distribution and bioaccumulation of PFAS in aquatic environments and human exposure through seafood consumption, focusing on rural and indigenous communities in Nigeria and Australia. Her goal is to improve the understanding of PFAS contamination in vulnerable and high-exposure communities, ultimately supporting the development of evidence-based strategies to reduce PFAS exposure, inform environmental policy and protect public health.

Per- and polyfluorinated alkyl substances (PFAS) are widely utilized in various consumer and industrial products due to their unique chemical properties. However, improper disposal of PFAS-containing materials has led to the widespread contamination of seafood, one of the main sources of daily protein for populations worldwide. Exposure to PFAS through seafood consumption poses potential human health risks, especially in rural areas with high seafood consumption that often lack effective monitoring programs to detect PFAS in seafood. To address this issue, we conducted a meta-analysis of 22 studies, comprising 773 seafood samples, including fish, molluscs, and crustaceans, from diverse regions. Our objective was to evaluate PFAS contamination levels and assess associated human health risks. The analyses revealed significant heterogeneity in PFAS concentrations across different regions and species. Notably, Australian fish species exhibited a higher prevalence of perfluorooctane sulfonic acid PFOS, while African fish species predominantly contained perfluorooctanoic acid (PFOA). Crustaceans and molluscs showed variable PFAS levels, with species such as giant mud crabs displaying elevated concentrations of PFOS and perfluorohexane sulfonic acid PFHxS. Several fish species, including Jacopever, Carp, Snakehead, Red Drum, Leader catfish, Chub, Tilapia, and Trout, showed measurable PFAS bioaccumulation. Risk assessment using hazard quotients (HQ) indicated that most species had HQ values below 1, suggesting limited immediate risk. However, the Skygazer from China was the only species with HQ exceeding the threshold of 1, indicating a potential upon consumption. This meta-analysis highlights the pervasive contamination of aquatic environments by PFAS and its implications for food safety and public health. The findings highlight the urgent need for stringent environmental regulations and systematic monitoring of PFAS levels in seafood, especially in regions exhibiting high contamination. This study provides a valuable resource for policymakers, researchers, and communities, reinforcing the importance of mitigating PFAS pollution to safeguard human health and environmental integrity.

Current Situation of Highly Hazardous Pesticides in Chile: A One Health Approach

Professor Sebastian Elgueta[1]
[1]University San Sebastian, School of Nutrition, Providencia, Chile

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Dr. Sebastian Elgueta obtained a BSc in Agronomy (2007), MSc (2009), PhD (2013) Post-doctorate (2015) in the field of Environmental Sciences at the University La Frontera, Chile, and the University Federico II, Naples, Italy. His research interests focus on pesticide residues in food, water, and soil, as well as their environmental and health impacts. He has published over 50 scientific papers and contributed to several chapters in book-length works. In his professional career, he coordinated and collaborated on national and international projects addressing environmental chemical contamination and management within the agri-food value chain.

The One Health approach constitutes a holistic framework that acknowledges the interconnectedness of human, animal, and environmental health. Within the context of pesticide application in agricultural systems, the One Health paradigm emphasizes the potential risks and hazards linked to pesticide exposure for all stakeholders, including human, animal, and ecosystem health. In Chile, the use of pesticides in agriculture has increased significantly over the past two decades. Managing Highly Hazardous Pesticides (HHPs) requires an integrated and systemic approach. By adopting a One Health perspective, we can promote comprehensive pesticide management strategies that mitigate adverse effects on biodiversity, prevent contamination of water resources, and safeguard public health. This study examined the impact of highly hazardous pesticides on human health, the environment, and animal welfare in Chile. A thorough evaluation of the available scientific evidence and official governmental data was conducted. The findings indicate a lack of accepted methodologies for assessing the risks associated with cumulative exposure to multi-residue pesticides in Chile.
Additionally, the country lacks comprehensive chemical monitoring programs targeting aquatic environments, particularly streams and rivers. Several pesticides currently available in Chile are prohibited in most European nations. Chile lacks an official methodology or decision-making framework for regulating or banning pesticides in agricultural practices based on rigorous risk assessments. This regulatory deficiency underscores the urgent need for effective methods to assess and mitigate the risks associated with HHPs.

Preliminary assessment of the stability and extraction of tyre-derived compounds, N-(1,3-dimethylbutyl)-N’-phenyl-p-phenylenediamine (6PPD) and 6PPD-quinone, for environmental soil analysis

Ms Gloria Hui Yu Gao[1,2], Prof Myrna Simpson[2], Prof Therésa Jones[1], A/Prof Suzie Reichman[1]
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Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Gloria is currently pursuing a joint PhD between the University of Melbourne and the University of Toronto, focusing on chemical additives from microplastics in terrestrial ecosystems. The project aims to determine the current levels of compounds from tyre wear particles, namely 6PPD and 6PPD-quinone, in soil. The impacts of 6PPD on various soil invertebrates will also be investigated to fill in these knowledge gaps. Her previous work involved determining the fate and occurrence of microplastic pollution at the University of Toronto. She developed a method to distinguish between sources of polystyrene foam in the Great Lakes.

Tyre wear particles are a pervasive form of microplastics in the environment, produced from the friction between vehicle tyres and road surfaces. These particles can introduce a suite of chemical additives into the environment via leaching. One compound that has been detected in the environment is N-(1,3-dimethylbutyl)-N’-phenyl-p-phenylenediamine (6PPD), an additive that is ubiquitously used in tyre production to increase product lifetime. 6PPD is highly reactive and can degrade into several products, including 6PPD-quinone. 6PPD-quinone has gained significant attention due to its high toxicity to certain fish species in aquatic environments. Consequently, research has largely focused on these tyre-derived compounds in water, while their presence and behavior in soils, an inherently more complex and heterogeneous matrix, remains poorly understood. To support future soil assessments, we conducted preliminary laboratory tests to investigate the stability of 6PPD and 6PPD-quinone under varying light and temperature conditions. Our findings indicated that both 6PPD and 6PPD-quinone degraded within 14 days in methanol, though to differing extents. 6PPD showed substantial degradation, with only 50 ± 8% (n = 3) of the initial concentration remaining under dark, low-temperature (4 °C) conditions. 6PPD-quinone was comparatively more stable, with 90 ± 6% (n = 3) of the original concentration remaining after 14 days. Additionally, we validated a soil extraction method for these compounds using spike-and-recovery tests. Ultrasonic extraction with acetonitrile and dichloromethane yielded a recovery of 106% (RSD = 6%; n = 3) for 6PPD and 81% (RSD = 4%; n = 3) for the surrogate standard benzophenone-d10. These findings validated the extraction method and lay the groundwork for the first quantification of 6PPD and 6PPD-quinone in Australian soils, which will be essential for future research on these emerging pollutants in soil environments.

Determination of Estrogenic Pollution in Otago Surface Waters

Iona Grigor[1]
[1]University of Otago, Dunedin, New Zealand
Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Iona Grigor completed a MSc in Toxicology at the University of Otago in 2024, working across the Zoology, Pharmacology and Toxicology, and Chemistry departments to investigate estrogenic pollution in surface waters. She now works at the Environmental Protection Authority as an Advisor to assess applications for new hazardous substances.

Estrogenic pollution can cause feminization and reduced embryonic survival of numerous species, causing whole-ecosystem disruption in freshwater environments. Agricultural and wastewater effluents in Aotearoa New Zealand have previously been found to contain high levels of estrogenic compounds, with estrogenic pollution also reported in aquatic environments. However, the state of estrogenic pollution within the Ōtākou Otago region has not yet been well characterized. Previous work by our laboratory suggested that 17β-estradiol is present in 20 Otago riverine sites. Therefore, the same sites were surveyed for a wider range of compounds (estrone, 17α-estradiol, 17β-estradiol, estriol, ethinylestradiol, bisphenol A [BPA], nonylphenol, and five conjugated estrogens). Biological estrogenic activity was also measured. Sites with agricultural (Taieri River) and urban (Cromwell oxidation ponds) influence were also investigated as potential sources of pollution. Developing sensitive chromatographic methods to detect trace levels of target compounds was a secondary aim. Grab samples were processed using solid-phase extraction. Extracts were analyzed using liquid chromatography-mass spectrometry (LCMS) and the yeast estrogen screen assay. Two sites had estrogenic activity above effect-based trigger values, indicating ecological risk: Catlins at Houipapa (0.57 ± 0.13 ng/L estradiol equivalence [EEq]) and Hāwea at Camphill Bridge (0.22 ± 0.09 ng/L EEq). Although matrix effects impacted LCMS analysis, 17α-estradiol (the most abundant form of estrogen in cattle) was found below detection limits at Catlins at Houipapa, indicating a potential agricultural source of the estrogenic activity. No significant estrogenic pollution was detected in the Taieri or Cromwell sites. These results suggest that harmful levels of estrogenic pollution may be present in the Otago region. Further studies which develop and apply robust analytical methods could fully determine the scale of this pollution and thus the ecological risk posed to freshwater environments.

Assessing metal mixture toxicity in Japanese rivers based on realistic exposure profiles

Dr Yuichi Iwasaki[1], Dr Hiroyuki Mano[1], Dr Masashi Kamo, Dr Wataru Naito[1]
[1]National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan
Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Yuichi Iwasaki is a senior researcher at the National Institute of Advanced Industrial Science and Technology (AIST), Japan. His research focuses on ecological risk assessments of chemical substances, particularly metals, through field biological surveys in rivers and statistical modelling approaches, such as species sensitivity distributions. He is especially interested in linking what aspects of ecosystems we aim to protect with how risk assessment and management are practically implemented.

Metals such as Ni, Cu, and Zn commonly co-occur in aquatic environments, such as rivers. To better understand ecological risks associated with these metals, it is essential to consider not only the effects of individual elements but also their mixture effects. In this study, we first compiled available monitoring data on six metals (Ni, Cu, Zn, Pb, Cd, and Al) from rivers across Japan. Using hierarchical cluster analysis, we categorized 194 metal-contaminated sites into three groups characterized by different metal concentration profiles. By designing the test concentrations of metal mixtures to reflect the concentration profiles of these three groups, we conducted short-term chronic toxicity tests using *Ceriodaphnia dubia*, focusing on five metals of particular concern (Ni, Cu, Zn, Cd, and Al). We then examined whether the observed mixture toxicity could be predicted based on the results of single-metal toxicity tests. These findings will be discussed in greater detail during the presentation.

Whole effluent toxicity testing using *in vitro* effect-based methods: comparison with conventional methods

Mr Matt Johnson[1], Dr Akrami Kambez, Dr Nicholas Crosbie, Dr Peter Goonan, Dr Merran Griffith, Dr Paul Leahy, Dr Reinier Mann, Prof Frederic Leusch[1], Dr Peta Neale[1], Dr Jason van de Merwe[1], Ms Taylor Wilde[1], Dr Kimberly Finlayson[1]
[1]Griffith University, Ashmore, Australia

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
A keen interest in the outdoors and specifically anything water related. Currently investigating ways to improve in vivo direct toxicity assessments of contaminated wastewater by the way of in vitro bioassays. Just completed my PhD and exploring future options

Treated effluent from wastewater treatment plants (WWTPs) contain a diverse array of anthropogenic and natural contaminants, many of which are classified as contaminants of emerging concern (CEC). These contaminants have the potential to pose significant environmental and/or human health risks, especially since conventional WWTP processes are not designed to remove them. While targeted chemical analysis is an indispensable tool for monitoring WWTP discharge, its limitations—such as the large number of chemicals and their transformation products, inability to detect mixture effects and the lack of regulatory standards —highlight the need for complementary methods. Direct toxicity assessment (DTA) using *in vivo* bioassays is a widely used approach to evaluate the ecological effects and safety of effluent discharge. However, these tests are constrained by ethical considerations, high costs, low throughput and a focus on limited endpoints, such as mortality and reproduction. Additionally, DTA offer limited species that can be cultured/ reared in a lab in sufficient numbers for a wide range of dilutions. To address these challenges, *in vitro* bioassays have emerged as a promising alternative, offering higher sensitivity, broader toxicological coverage, faster testing and improved ethical and operational efficiency. This study investigates the potential of *in vitro* bioassays as a complementary approach to traditional DTA for monitoring WWTP effluent of differing treatment levels. Primary treated effluent was typically most toxic to bacteria and contained elevated levels of endocrine disrupting compounds. WWTPs with tertiary treatment that have a combination of disinfection processes (chlorine, ozone and UV) were typically found to contain genotoxic compounds. Effluent from all WWTPs induced moderate to strong aryl hydrocarbon (AhR) activity along with potential nutrient induced algal growth. A strong correlation was observed between the *in vivo* DTA sea urchin fertilisation test and the *in vitro* ERα GeneBLAzer bioassay. Of the wide range of endpoints evaluated toxicity to bacteria, algal photosynthesis inhibition and growth, estrogenic activity along with evaluation of genotoxic compounds provided the most sensitive and relevant results. These assays have the potential to be incorporated into regulatory frameworks to supplement and screen for toxicological effects that require further investigation.

AQUA-GAPS/MONET-Derived Concentrations and Trends of PFAS across Global Waters

Professor Sarit Kaserzon[1], Ms Kristie Thompson[1], Professor Rainer Lohmann[2], Dr Derek Muir[3], Dr Kateřina Šebková[4], Dr Petra Přibylová[4], Professor Branislav Vrana[4]
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Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
A/Prof Kaserzon's research interests have focused on developing novel sampling and analytical methods and approaches to detect trends, behaviour and fate of persistent and emerging organic environmental pollutants, to better inform human and environmental health risks.

Per- and polyfluoroalkyl substances (PFAS) are a large group of compounds that have been used in countless industrial, commercial and manufacturing processes and products for decades. Due to their high stability, mobility and persistence, PFASs have been detected in all environmental compartments, as well as in humans. Despite some restrictions on use of certain PFAS, their ongoing use in consumer and industrial products are likely to contribute to ongoing PFAS contamination of surface waters for years to come, highlighting the need for ongoing environmental monitoring for human and environmental risk assessment. Under the Stockholm Convention Global Monitoring Program, water was identified as a core matrix for monitoring PFAS, based on the evidence that water is the main transport medium for these chemicals in the environment.
Passive sampling has emerged as an important tool for the monitoring of PFAS in waters, as they provide *in situ* concentration of chemicals, can increase sensitivity, are time-integrative and can provide a more representative understanding of PFAS contamination. In this study, we present results of PFAS in surface waters from across the world, monitored within the AQUA-GAPS/MONET network (2020-2024). A microporous polyethylene tube (MPT) passive sampler was used, along with centralized sample analysis, to allow for direct comparison of data and minimization of measurement uncertainty. The MPT sampler has been successfully validated in surface waters for a broad range of PFAS with long-term deployment capability.
The objectives were to (i) deploy passive samplers for PFAS at a wide range of lake, estuarine and marine sites across the world; (ii) determine background concentrations of PFAS across waters of the world; (iii) assess relation of dissolved PFAS concentrations with latitude, temperature, and population density; (iv) investigate PFAS using suspect screening and non-targeted analysis methods (v) use the information gained to optimize site distribution for long-term monitoring efforts.

PFAS in Cosmetics: Investigating Natural and Organic Products

Sara Ghorbani Gorji[1], Vivienne Noonan[1], Prof Kevin Thomas[1], A/Prof Sarit Kaserzon[1]
[1]Queensland Alliance of Environmental Health Sciences (QAEHS), Brisbane, Australia
Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Dr. Sara Ghorbani Gorji is a research fellow at the Queensland Alliance for Environmental Health Sciences (QAEHS), UQ. Her work specializes in environmental health and chemical exposure science, focusing on understanding the occurrence, behavior, and impact of persistent contaminants, particularly per- and polyfluoroalkyl substances (PFAS), in various environmental media and consumer products. Her research aims to improve risk assessment frameworks and develop strategies for minimizing human and environmental exposure to these emerging contaminants. Key areas of expertise include: PFAS contamination, Chemical exposure science, Advanced analytical methods.

Per- and polyfluoroalkyl substances (PFAS) are synthetic chemicals widely used for their unique resistance to water, oil, and heat, commonly found in industrial processes and consumer goods. However, their environmental persistence, potential for bioaccumulation, and emerging links to human health risks have raised global concerns. While PFAS exposure through ingestion and inhalation has been extensively studied, the presence of PFAS in personal care products (PCPs) and cosmetics—particularly those applied directly to the skin—represents a less understood but increasingly important pathway. Our recent investigations have shown that even products marketed as natural or organic may contain PFAS, either intentionally added for performance benefits or introduced through contamination. This study combined a global literature review with a suspect screening analysis of cosmetics sold in the Australian market, with a focus on products labelled as natural, organic, or chemical-free. Using high-resolution mass spectrometry, the analysis revealed the presence of PFAS in a wide range of product types, including those with no fluorinated ingredients listed on their labels. Polyfluoroalkyl phosphates (PAPs) were the most frequently observed PFAS class, aligning with findings from international studies in the products that had PFAS on the ingredient list. Foundation products consistently showed higher detection rates compared to other categories such as lip care, bronzers, and hair oils. The use of advanced suspect screening methods allowed for the identification of a broad array of known and emerging PFAS, many of which would be overlooked in conventional targeted testing. These findings highlight the need for improved transparency in product labelling, stricter regulatory oversight, and continued monitoring of PFAS in everyday products—especially those marketed as safe or environmentally friendly.

PFAS in Tap and Bottled Water in Australia: Overcoming Detection Limits and Background Contamination

Sara Ghorbani Gorji[1], Ayla Aykac Kocak[1], Dr Pritesh Prasad[1], Prof Kevin Thomas[1], Professor Sarit Kaserzon[1]

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Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:

Dr. Sara Ghorbani Gorji is a research fellow at the Queensland Alliance for Environmental Health Sciences (QAEHS), UQ. Her work specializes in environmental health and chemical exposure science, focusing on understanding the occurrence, behavior, and impact of persistent contaminants, particularly per- and polyfluoroalkyl substances (PFAS), in various environmental media and consumer products. Her research aims to improve risk assessment frameworks and develop strategies for minimizing human and environmental exposure to these emerging contaminants. Key areas of expertise include: PFAS contamination, Chemical exposure science, Advanced analytical methods.

Per- and polyfluoroalkyl substances (PFAS) are a group of persistent and potentially harmful synthetic chemicals increasingly detected in various environmental matrices, including drinking water. In Australia, monitoring PFAS in tap and bottled water has become a public health priority to better understand low-dose exposure. This study investigates the occurrence of PFAS in a selection of tap water sources and commercially available bottled waters across Australia, with a particular focus on the challenges of detecting ultra-trace levels using advanced analytical techniques. Accurate quantification of PFAS at low nanogram per litre (ng/L) or even picogram per litre (pg/L) concentrations requires highly sensitive instrumentation, meticulous sample preparation, and rigorous quality control procedures. One of the key challenges in this study was managing background contamination, which can arise from laboratory materials, solvents, or even the ambient environment, potentially compromising data integrity. Measures such as field and procedural blanks, PFAS-free sampling equipment, and the use of isotopically labelled internal standards were essential in minimising these risks. The study employed liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS), optimized for detecting a broad range of target PFAS compounds. Despite these precautions, variability in blank levels and matrix interferences highlighted the need for continual refinement of methodologies and enhanced laboratory practices. Notably, several PFAS— were detected in both tap and bottled water samples, albeit at concentrations significantly below current Australian regulatory thresholds. These findings emphasize the importance of ongoing surveillance and the refinement of ultra-trace analytical methods to support accurate exposure assessments.

Bushfire fighting chemicals disrupt amphibian tadpole growth, development and pigmentation

Dr Chantal Lanctot[1], Mr Jacob Devine[1], Ms Karyn Robichaud[1], Mr Simon Roach[1], Dr Clare Morrison[1], Dr Laura Grogan[2]
[1]Griffith University, Southport, Australia, [2]University of Queensland, Brisbane, Australia
Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Dr Chantal Lanctôt, ARC Industry Fellow and former DECRA Fellow at Griffith University, is an ecotoxicologist whose research focuses on assessing the fate and effects of environmental pollutants across multiple levels of biological organisation. Her research employs advanced analytical technologies and effect-based methodologies to understand the mechanisms and consequences of contaminant exposures and the dynamic nature of toxicity risks associated with multiple environmental stressors.

As the frequency and severity of bushfires increase due to the continual threat of climate change, the need for aggressive suppression and management strategies, which include the use of firefighting chemicals, is growing. Various types of firefighting chemicals are used globally to suppress or delay the spread of bushfires, including retardants, foams and gels. Studies have raised concerns about the potential for these chemicals to cause indirect or sub-lethal effects to aquatic organisms, though the toxicity information regarding the potential for such impacts is limited. We assessed the physiological, behavioural and developmental responses of striped marsh frog (*Limnodynastes peronii*) tadpoles exposed to the widely used ammonium polyphosphate-based fire-retardant Phos-Chek LC95W (PC) and class A foam Solberg Fire-Brake 3150A (FB) at a range of environmental concentrations. Results showed that the PC formulation significantly impaired growth and development and caused the darkening of tadpole colouration (i.e., increase in pigment cover), even at low concentrations (0.02 g/L). The highest concentration tested (1 g/L) resulted in death over a 16-day exposure. Acute exposure (96 h) to the PC retardant significantly altered the relative abundance of 14 metabolites in whole tadpoles. The overall metabolic response pattern was consistent with the effects reported for ammonia toxicity and was also suggestive of energy dysregulation and osmotic stress associated with alterations to physicochemical water quality parameters in the retardant treatments. No significant behavioural responses were reported for either formulation. Results suggest that run-off or accidental application of ammonium-based fire retardants into waterways can have significant sub-lethal consequences on developing frogs. These chemicals may pose a particular concern for frog species that breed and develop in small, often ephemeral, waterbodies. Our findings highlight the need for a more comprehensive assessment of the ecological impacts of the broad range of chemicals used to control and suppress bushfires.

Occurrence of pharmaceuticals of six therapeutic classes in Spanish Mediterranean marine biota

Mr Jorge Lejo-santiago[1], Dr Estefanía Concha-Graña[1], Dr Purificación López-Mahía[1], Dr Juan Bellas[2], Dr Juan A. Campillo[3], Dr Víctor M. León[3], Dr Soledad Muniategui-Lorenzo[1]
[1]University of A Coruña, A Coruña, Spain, [2]IEO-CSIC Vigo, Vigo, Spain, [3]IEO-CSIC Murcia, Murcia, Spain
Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
I am Jorge Lejo Santiago, a graduate in Chemistry and Biology. I have a Master's degree in Science, Technology and Environmental Management, with knowledge and skills in both Chemistry and Biology, thanks to the simultaneous completion of both degrees. Now I am doing a PhD in Fundamental and Environmental Chemistry developing new analytical strategies for the evaluation of the presence, behaviour and potential risk of the pharmaceutical compounds in the marine environment. Now I'm working at UQ learning the NTA from the Kevin Thomas' team.

Pharmaceuticals represent a group of contaminants of emerging concern (CECs) which are starting to be regulated and proposed to be monitored in the European Union. These compounds are designed to have a biological effect, so their presence in the environment represents a threat to both humans and the environment.
There are several studies which have investigated the presence of pharmaceuticals in water, detecting some of them in surface and seawater, but there are fewer that address these contaminants in biota. However, the occurrence of pharmaceuticals in wild biota confirms their bioaccumulation is taking place in the environment.

The aim of this work is to study the presence and distribution of 47 pharmaceuticals in marine biota using ultrasound extraction and SPE purification and liquid chromatography coupled to triple quadrupole mass spectrometry (LC-MS/MS (QqQ)) for their determination.
Two different organisms were selected as indicators of contamination in Spanish monitoring programmes: mussels and red mullets. Mussels are filter feeders used as indicator of the water column contamination and red mullets as an indicator of benthic contamination due to its close association with sediments. Samples were collected during spring (mussel) and autumn (red mullet) 2022 near different coastal Mediterranean populations.

Only three therapeutic classes (antibiotics, psychiatric drugs and cardiovascular drugs) were found in the samples, represented by nine pharmaceutical compounds at levels ranging from 0.5 to 50 ng/g. Sulfamerazine, sertraline, fluoxetine and propranolol were present in both species, especially in mussels, evidencing their bioavailability and potential adverse effects on them.

Acknowledgment:
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Characterising environmental nanoplastics using Asymmetrical Flow Field-Flow Fractionation coupled to Pyrolysis-Gas Chromatography-Tandem Mass Spectrometry

Mr Haitao Lin[1,2], Dr Elvis D. Okoffo[1,2], Dr Jake O'Brien[1,2], Prof Kevin V. Thomas[1,2], Mr Carl Lehnert[3], Dr Cassandra Rauert[1,2]

[1]Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Woolloongabba, Australia, [2]ARC Training Centre for Hyphenated Analytical Separation Technologies (HyTECH), The University of Queensland, Brisbane, Australia, [3]Shimadzu Scientific Instruments, Eagle Farm, Australia

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:

Haitao Lin got his Bachelor's degree in Environmental Engineering from East China University of Technology. He then went on to pursue a Master's in Marine Chemistry at Third Institute of Oceanography, Ministry of Natural Resources. His thesis was about research on per- and polyfluoroalkyl substances in the waters of Xiamen Bay and their distribution and behaviour on microplastics. He is now a PhD candidate at Queensland Alliance for Environmental Health Sciences. His doctoral research centres on characterisation and quantification of nanoplastics in the environment using pyrolysis gas chromatography tandem mass spectrometry.

Nanoplastics (NPs), defined as plastic particles smaller than 1 micrometre (µm), originate either from the environmental degradation of larger plastic materials or are produced directly as byproducts of industrial processes. Due to their extremely small size and high surface-area-to-volume ratio, nanoplastics are potentially bioavailable to organisms and can accumulate in tissues through trophic transfer. Emerging evidence suggests they can enter the human bloodstream and potentially reach critical organs such as the heart and brain, raising significant concerns for ecological and human health.

This project aims to develop, validate, and apply advanced analytical techniques for the comprehensive detection, identification, and quantification of nanoplastics in complex environmental matrices, including aquatic systems and urban air. Two complementary methods are employed: Asymmetrical Flow Field-Flow Fractionation (AF4) for size-based separation, and Pyrolysis-Gas Chromatography-Tandem Mass Spectrometry (Py-GC-MS/MS) for polymer identification and quantification. The project has three core objectives: (1) to develop sensitive, matrix-specific methods for detecting nanoplastics in water and air; (2) to establish more effective extraction and pre-treatment procedures for diverse nanoplastic types; and (3) to adapt AF4 and pyrolysis-based techniques to measure nanoplastics with varying characteristics such as size, shape, surface charge, eco-corona, and colour.

Initial results from AF4-based separation of virgin and surface-functionalized polystyrene (carboxylated and amine-modified) indicate that surface modification leads to delayed elution and an overestimation of the calculated particle size. This highlights an unexplored limitation in current AF4 protocols and variable behaviour with particle characteristics which will be a key focus of our future work. These advancements aim to enhance environmental monitoring and inform future risk assessments of nanoplastic pollution.

A Machine Learning approach for predicting and interpreting key factors affecting nanopesticide wash-off from leaves

Miss Run Luo[1], Professor Melanie Kah[1]
[1]The University of Auckland, Auckland, New Zealand

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
I am currently a PhD student majoring in Environmental Science in Dr. Kah's research group at the University of Auckland. My research focuses on the occurrence, fate, and effects of environmental contaminants, with a particular interest in using machine learning and data science to address complex and emerging environmental challenges. Current studies include applying machine learning-assisted methods to monitor mixed pollutants in river and drinking water systems, investigate the removal mechanisms of emerging contaminants such as PFAS, and understand the fate and transport of nanopesticides in plants.

Pesticide wash-off from crop leaves reduces pesticide efficiency and results in environmental contamination. Wash-off is known to be influenced by many factors including rain, leaf and pesticide properties and it is challenging to predict. Previous work suggested that smaller pesticide particles, and nanoparticles in particular, exhibit improved rainfastness (i.e. reduced wash-off). It is currently unknown how this particle size effect plays out in the context of other influencing factors.
Here, we take advantage of artificial intelligence and introduce a model in which pesticide formulation properties and environmental factors are considered simultaneously in the evaluation of wash-off. The rainfastness of nanoformulations (zein nanoparticles loaded with methoxyfenozide) was systematically measured across a range of conditions (leaf type, concentration, rainwater type and pH) and compared to a commercial formulation of methozyfenozide as well as unformulated methoxyfenozide. Multi-way ANOVA indicated that formulation type, leaf type, and concentration were the dominant driving factors influencing rainfastness, while rainwater type and pH acted as conditional variables. The Random Forest model showed good predictive performance (R^2 >0.9), effectively capturing non-linear relationships. Model interpretation suggested that particle size and leaf type played more important roles on rainfastness than pesticide concentration. Smaller particle sizes and hydrophilic leaf surfaces enhanced nanoparticle retention much likely by promoting mechanical anchoring and interfacial interactions. The model was successfully applied to wash-off data previously generated for copper nano and non-nanoformulations, improving R^2 by 0.02 and validating the preliminary generalization capability across different formulation systems. Our study demonstrates that machine learning models can help identify and prioritize key factors driving the fate of pesticides. Formulation plays a central role in determining pesticide fate and nanoformulations are promising to improve pesticide performance. The proposed method provides a framework for evaluating wash-off potential under experimental conditions for early-stage screening in nanopesticide development.

Home range size and foraging niche moderate lead exposure variability in terrestrial birds

Mr Max M Gillings[1], Dr Riccardo Ton[1], Prof Simon C Griffith[1]
[1]Macquarie University, Sydney, Australia

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Max M Gillings is a PhD candidate in the School of Natural Sciences at Macquarie University, Sydney. His research focuses on the impacts of environmental toxicants on urban birds and their wider implications for human, animal, and ecosystem health.

A common assumption of wildlife biomonitoring studies and ecological risk assessments is that chemical exposures reflect average levels of contamination within the home range of an animal. However, this assumption often overlooks how the uneven and irregular use of space influences variability in chemical uptake and how this variability scales with home range size. To investigate this relationship, we conducted a meta-analysis of studies reporting site-specific lead concentrations from the feathers of birds against the documented home ranges of those species. Focus was given to terrestrial species inhabiting environments with potentially high spatial heterogeneity in lead contamination. We constructed a series of linear models to test the effect of ecological and environmental factors on variability in lead exposure, which we quantified using the coefficient of variation for site-specific feather lead concentrations. Traits including home range size and the primary locomotory niche used while foraging were important predictors of variability in feather lead concentrations, as was the type of feather sampled. Controlling for variance across study, site, and for phylogenetic relatedness, we found that birds with larger home ranges exhibited more variable levels of lead exposure than those with more restricted movement patterns. Species with the largest home ranges more frequently contained individuals with feather lead concentrations twice that of their site average. Variability was highest in non-ground foraging birds, followed by generalist and then ground foragers, which may relate to differences in dietary lead sources and niche complexity. Our findings show how the use of space at varying scales drives divergent patterns of chemical uptake in terrestrial birds. We re-emphasise the importance of integrating movement ecology into the assessment of wildlife health.

Sixty years since Silent Spring: a map of meta-analyses on organochlorine pesticides reveals urgent needs for improving methodological quality

Mr Kyle Morrison[1]
[1]University of New South Wales, Sydney, Australia

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Hi, I'm Kyle, a PhD student at the University of New South Wales. My primary research interests include research synthesis methods—particularly meta-analysis and systematic mapping—and ecotoxicology, where I explore the impacts of pesticides on fish and aquatic ecosystems.

Rachel Carson's Silent Spring inspired a wave of research on the impacts of organochlorine pesticides, followed by a subsequent wave of meta-analyses. These meta-analyses are now routinely cited in policy documents. However, the methodological quality of meta-analyses on organochlorine pesticides remains largely unknown. Here, our study systematically maps and evaluates the methodological quality of 105 meta-analyses synthesising 3,911 primary studies. Concerningly, we found that 83.4% of the quantified meta-analysis methodological items are low quality. We then revealed that 227 policy documents cited the included meta-analysis, and there is no difference in methodological quality between those that were cited in policy and those that were not. We also found a paucity of meta-analyses on wildlife despite ample primary evidence. Furthermore, our bibliometric analysis shows a limited number of meta-analyses originating from developing countries, where organochlorines are still used to combat vectors of fatal diseases. Finally, we quantified the positive impact of using reporting guidelines and we provide recommendations for readily implementable methodological improvements.

Assessing the permeation of surface-modified nanoplastics (NPs) across *in vitro* human gut-blood and blood-brain barrier models

Miss Yufei (Lily) Pan[1,2,3], Dr Taskeen Janjua Khan[4], Prof Kevin V. Thomas[1,2,3], Dr Claire Shepherd[5,6], Dr Cassandra Rauert[1,2,3]

[1]Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Woolloongabba, Australia, [2]Minderoo Centre – Plastics and Human Health, The University of Queensland, Woolloongabba, Australia, [3]ARC Training Centre for Hyphenated Analytical Separation Technologies (HyTECH), The University of Queensland, Woolloongabba, Australia, [4]School of Pharmacy, The University of Queensland, Woolloongabba, Australia, [5]Neuroscience Research Australia, Randwick, Australia, [6]School of Biomedical Science, University of New South Wales, Kensington, Australia

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:

Yufei (Lily) graduated with a Bachelor of Environmental Science major in environmental toxicology with Honours Class I at The University of Queensland in 2022. Her honours thesis focused on the effects of tyre wear particles on freshwater aquatic plants. She is now undertaking a PhD at Queensland Alliance for Environmental Health Sciences (UQ) with Dr Cassandra Rauert, Prof Kevin Thomas, Dr Taskeen Janjua Khan and Dr Claire Shepherd. Her project aims to explore the behaviour and fate of nanoplastics within the human system, focusing on key biological models such as the blood-brain barrier and gut-blood barrier.

Micro and nanoplastics (MNPs) are a growing concern to human health due to our constant exposure to plastic products and environmental plastics. While MNPs have been reported in various human organs, the mechanism of their permeation across critical biological barriers remains unclear. Understanding this translocation is essential to explain the presence of MNPs in organs. Permeation is complex and influenced by factors such as particle size, charge, surface chemistry and cell types. This study investigates the behaviour and fate of nanoplastics (NPs) using a human cell model that represents two key human biological barriers – the blood-brain barrier (BBB) and the gut-blood barrier (GBB) – to deepen understanding of the potential health risks associated with NPs. These barriers are represented by simple *in vitro* models using the human brain endothelial hCMEC/D3 cells and intestinal epithelial Caco-2 cells, seeded into the collagen-coated apical chambers of Transwell plates. Fluorescent, nano-sized (20-50 nm) polystyrene particles are first characterised using transmission electron microscope (TEM) and dynamic light scattering (DLS). Then, they are diluted in media and applied to the apical chambers. Samples of 100 µL are taken from the basolateral chambers every 2 hours to measure fluorescent intensity which indicates NP permeation through the cell barrier. Trans-endothelial electrical resistance (TEER) is regularly recorded to assess barrier integrity. Pyrolysis–gas chromatography–mass spectrometry is used to corroborate the results from fluorescence measurements. Preliminary results showed limited permeation of 30 nm polystyrene with carboxyl surface modification (~0.1% of particle dosage) through a successfully established Caco-2 monolayer after 4 hours. Follow-on experiments will focus on comparing the effects of carboxyl- and amine-modification of different sized NPs. In addition, we will investigate potential cellular uptake of NP using confocal fluorescent microscopy. These *in vitro* studies represent the first step towards understanding the potential health risks of environmentally relevant NPs.

Exposure to Lead (Pb) influences the outcomes of male-male competition during precopulatory intrasexual selection

Rosemary Patrick[1], Assoc. Professor Andrea S Griffin[1], Micheal Stat[1], Dr Wayne O'Connnor[2], Assoc. Professor Mohammed Mahmudur Rahman[3], Professor Mallavarapu Megharajc[3], Assoc. Professor Geoff R MacFarlane[1]

[1]University of Newcastle (Australia), Callaghan, Australia, [2]Port Stephens Fisheries Centre, NSW Department of Primary Industries, Taylors Beach, Australia, [3]Global Centre for Environmental Remediation, The University of Newcastle, Callaghan, Australia

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:

I am a third-year PhD candidate at the University of Newcastle, Australia, with a research focus in Behavioural Ecotoxicology. My research investigates the impacts of metal contamination on the behaviour of the estuarine shore crab, Heleocius cordiformis, with focus on intrasexual competition and mate selection dynamics. By combining field-based ecological assessments with laboratory behavioural assays, my research explores how sublethal exposure to metallic contaminants disrupts key reproductive behaviours, potentially altering sexual selection pressures in polluted habitats. I will be presenting a segment of my research titled "Exposure to Lead (Pb) Influences the Outcomes of Male-Male Competition During Precopulatory Intrasexual Selection".

Male-male competition is a component of intrasexual selection in Darwin's theory of sexual selection. It occurs when males compete directly or indirectly for access to resources that are vital for reproductive success. This form of competition can be physical contests, visual or behavioral displays, or the possession of resources critical for attracting mates. Male competition is largely driven by a size advantage, playing a role in determining dominance, access to resources, and the outcome of physical contests. For the first time, we asked whether exposure to metallic contaminants influences the outcomes of male-male competition in shore crabs thereby altering outcomes of intrasexual selection. Crabs were exposed to an environmentally relevant, and a behaviourally relevant, concentration of lead (i.e. Pb, 10 µg/L and 100 µg/L respectively) under laboratory conditions for 96 hours and subsequently allowed to compete for burrow ownership in experimental arenas. Exposed crabs (100 µg/L) were less successful than control crabs in chela size-matched paired competitive interactions, spent less time in burrows and predominantly lost burrow ownership. Further, exposure to Pb contamination (both 10 µg/L and 100 µg/L) negated the size advantage in chela size-asymmetric competitive interactions. This contaminant-induced loss of size-related competitive advantage may result in relaxation in selection pressure on body size and smaller male carapace widths and especially male chela lengths in contaminated locations. Assessment of a range of locations in the wild found a consistent pattern of metal-associated size declines and size abolishment in male-male competition in more contaminated locations.

Exploring the Effects of Pristine and Aged Biodegradable PLA and Conventional LDPE Plastic on Soil Nutrient Processes Influenced by Earthworms

Ms Lisa Qian[1], Mr Jon Habito[1], Dr Kevin Simon[1], Dr Melanie Kah[1]
[1]The University of Auckland | Waipapa Taumata Rau, Auckland, New Zealand
Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Lisa is currently a second year PhD student at the University of Auckland School of Environment investigating the impacts of biodegradable and conventional plastics on nutrient processes in ecosystems mediated by bioturbator organisms. Her bachelor's and master's degrees in chemistry were completed at Carnegie Mellon University in the USA, where she studied catalysts developed to break down micropollutants in wastewater, which led to her interest in the interaction of emerging pollutants on ecosystems. Her interest in untangling the impacts of 'harmless' substitutes for existing chemicals led her to her current studies.

The persistence and potentially detrimental effects of plastic waste in the environment have led to the development and use of biodegradable polymers (BP), which are designed to be microbially decomposed and are presumably less harmful than traditional plastic. As a result, the BP market is expected to grow at a compound annual growth rate of 9.2% from 2024 to 2030. One of the most popular biodegradable polymers, polylactic acid (PLA), is synthesized from plant starches and intended to break down under industrial composting conditions, but there is evidence PLA and its intermediate byproducts can alter terrestrial biogeochemical processes by affecting microbial community composition, enzyme activity, primary production, and decomposition processes. Prior research has largely examined pristine materials, but as any plastic ages, their physical and chemical structure changes, altering how they interact with external contaminants and the environment. We evaluated the impacts of pristine and aged biodegradable polylactic acid (PLA) and conventional plastic low density polyethylene (LDPE) microplastics of a variable size range on soil nutrient processes under the influence of *Eisenia fetida* earthworms. Soil microcosms were treated with environmentally relevant concentrations (25 mg/kg, 250 mg/kg, 2500 mg/kg) of pristine or field-aged plastic for 33 days and evaluated by measuring change in earthworm mass, greenhouse gas emissions, extracellular enzyme activities, and nutrient concentrations. Pristine PLA increased the activity of a key C-cycling enzyme β-glucosidase by 7-23%, while aged PLA increased it by 20-33%, indicating PLA might be a source of labile carbon. On the other hand, there were no significant changes to N-cycling enzymes, ammonium, nitrate, and nitrite concentrations in the soil, indicating that at realistic concentrations, plastic may not cause significant disruptions to N-cycling processes. Our findings offer new insights into potential biogeochemical impacts the presence of PLA and LDPE polymers may have under more environmentally realistic conditions.

A meta-analysis reveals average trophic magnification of PFAS and drivers of variability

Mr Lorenzo Ricolfi[1], Dr Yefeng Yang[1], Dr Patrice Pottier[1,2], Mr Kyle Morrison[1], Coralie Williams[1,3], Dr Pietro Pollo[1], Daniel Hesselson[4], Gregory Neely[5], Matthew Taylor[1,6,7], Prof Shinichi Nakagawa[1,8,9], Malgorzata Lagisz[1,9]

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Biography:

Lorenzo is an environmental scientist about to complete his PhD at UNSW Sydney. He specialises in evidence synthesis methods to address chemical pollution and sustainability challenges. With experience in academia, international development, and policy-relevant research, he is passionate about translating scientific evidence into actionable, equitable, and sustainable solutions. Lorenzo is the winner of the 2024 SETAC AU Postgraduate Research Publication Award.

Per- and polyfluoroalkyl substances (PFAS) threaten ecosystems worldwide due to their persistence, bioaccumulation, and toxicity. Through a global-scale meta-analysis of 119 aquatic and terrestrial food webs from 64 studies, we analyse 1,009 trophic magnification factors (TMFs) for 72 PFAS and identify key variability drivers. On average, PFAS concentrations doubled with each trophic level increase (mean TMF=2.00, 95% CI:1.64-2.45), though magnification varied considerably by compound. Notably, the industrial alternative F-53B exhibited the highest magnification (TMF=3.07, 95% CI:2.41-3.92), a critical finding given its expanding use and minimal regulatory scrutiny. Methodological disparities across studies emerged as the dominant source of TMF variability. Our models explained 84% of the variation in TMFs, underscoring predictive capacity. This synthesis establishes PFAS as persistent trophic multipliers and provides a framework to prioritise high-risk compounds and harmonise biomagnification assessments. Our results call for consideration of stricter PFAS regulation to curb cascading ecological and health impacts.

Assessing the effects of Harmful Algal Blooms and associated toxins on the early life stages of green-lipped mussels in New Zealand

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Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Anne leads ecotoxicology research and services at Cawthron. A cellular biologist, she specialises in flow cytometry and histology to study the physiology and health of aquaculture species. Her current research focuses on the impacts of environmental stressors—such as harmful algal blooms, contaminants, climate change, and pathogens—on aquatic animal health, and on developing cellular assays for toxicological assessments. She also co-leads the MBIE Endeavour-funded Changing Microalgal Communities (CMC) Research programme, which aims to understand shifts in New Zealand's microalgal communities and improve detection, prediction, and management of harmful algal blooms.

Harmful algal blooms (HABs) in New Zealand present not only significant economic challenges—through the closure of shellfish harvest beds—but are increasingly recognized for their ecological impacts, particularly on the early life stages of the native and economically important, Green-lipped mussel (*Perna canaliculus*). We developed spermiotoxicity and embryo-larval development assays for this bivalve species to assess the impacts of exposure to key HAB species and biotoxins commonly found in New Zealand waters.
Passive samplers, which adsorbed commonly occurring HAB toxins, were deployed eight times for 3 weeks over a two-year period, in the Marlborough Sounds, a major *P. canaliculus* aquaculture region experiencing massively reduced spat fall and unexplained summer mortalities of mussels. Samplers were extracted into methanol and the attained natural biotoxin 'cocktail' extracts were tested using the spermiotoxicity assay. Results indicated acute spermiotoxicity corresponded with peak biotoxin levels in 2022. Subsequent investigation of the involvement of pectenotoxins (PTXs) and okadaic acid (OA), identified to be abundant during screening of the biotoxin cocktails, did not induce similar levels of toxicity in subsequent spermiotoxicity assays, suggesting that toxicity was likely caused by a combination of toxins and/or by unknown or uncharacterised toxins.
Further environmentally relevant HAB exposures were carried out, exposing sperm and developing embryos of *P. canaliculus* to *Alexandrium* spp., a paralytic shellfish toxin producing dinoflagellate, which blooms annually in the Marlborough Sounds. Significant developmental disruptions and sperm mortalities were recorded at environmentally relevant concentrations, with variation observed between algal species.
These findings show that HABs and associated toxins can impact the green-lipped mussel and underscore the need to consider sublethal and early life-stage effects of HABs in environmental and commercial risk assessments.

Effects of marine heatwave stress and harmful algal blooms on juvenile mussel (*Perna canaliculus*) survival and physiology

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Biography:

Anne leads ecotoxicology research and services at Cawthron. A cellular biologist, she specialises in flow cytometry and histology to study the physiology and health of aquaculture species. Her current research focuses on the impacts of environmental stressors—such as harmful algal blooms, contaminants, climate change, and pathogens—on aquatic animal health, and on developing cellular assays for toxicological assessments. She also co-leads the MBIE Endeavour-funded Changing Microalgal Communities (CMC) programme, which aims to understand shifts in New Zealand's microalgal communities and improve detection, prediction, and management of harmful algal blooms.

Marine heatwaves (MHWs) and harmful algal blooms (HABs) are increasing in frequency and intensity around New Zealand, concurrently affecting regions where the green-lipped mussel (Perna canaliculus) is naturally abundant or commercially farmed. This study investigated the effects of MHW conditions and exposure to the toxic dinoflagellate *Alexandrium pacificum* on juvenile mussels (spat), both individually and in combination. Spat were exposed to control (17 °C) or MHW (22 °C) temperatures, along with two environmentally relevant concentrations of *A. pacificum* for four days, followed by a four-day recovery period.

MHW conditions alone did not affect survival; however, exposure to *A. pacificum* significantly reduced survival, particularly at higher cell concentrations. Survival in the MHW-only treatment was 99%, however, this dropped to 59% in the combined exposure to the MHW temperature and *A. pacificum*. Mussels exposed to *A. pacificum* only showed marked reductions in byssal plaque production (up to four-fold), reduced growth (over 7.5-fold slower), tissue-level damage, and significant changes in gene expression, particularly in pathways related to lipid metabolism and detoxification.

These findings highlight the compounding effects of multiple environmental stressors and emphasize the need to better understand their combined impact, particularly in the context of climate change and the increasing prevalence of HABs in coastal ecosystems.

A collaborative approach: Using NZ native plant DOM super producers to mitigate metal toxicity

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Biography:
Amelia Shepherd studied a BSc (Tech) at the University of Waikato and has been working in the NIWA Ecotoxicology group since 2023.

Dissolved copper and zinc pose a significant threat to aquatic ecosystems, yet existing engineered systems rarely deliver the treatment for environmentally damaging concentrations of these metals.

This Earth Sciences NZ led research aims to explore how dissolved organic matter (DOM) derived from native NZ plants can be optimally applied to significantly reduce the harmful effects of these metals in freshwater environments. The project integrates a collaborative approach to metal remediation, incorporating mātauranga Māori with, engineering, chemistry and ecotoxicology. Leading experts in metal-DOM interactions, stormwater engineering and ecotoxicology are working with iwi partners to develop solution systems informed by both indigenous knowledge and western science.

DOM leachates from three native plant species were used in toxicity testing to assess their potential in mitigating the toxicity of metals, specifically copper and zinc. These metals were tested both individually and in environmentally relevant mixtures. The study involved conducting toxicity tests using the native waterflea (*Daphnia thomsoni*) to evaluate the extent to which the presence of the plant derived organic carbon can reduce the toxicity of the metals. The experiments demonstrated a significant decrease in toxicity as the DOC concentration increased, highlighting DOC's role as a toxicity modifier.

Toxicity research combined with DOM characterisation (refer Thompson and Holland et al. presentations), metal binding and stability in a model is being used to assess implementation options. Collaboration with Ngāti Whātua Ōrākei is ensuring the integration of mātauranga Māori and maramataka, guiding the collection of plant materials and test protocols. The co-design of toxicity test methods to align with Māori values represents a globally novel approach, ensuring the research respects indigenous knowledge and centres Te Mana o Te Wai. Throughout the project, our Engineering Advisory Group play a crucial role in assessing various implementation options, ensuring that the nature-based engineering solutions developed are practical and ultimately effective at enhancing the mauri of our waterways.

Developing a microplastic extraction method for agricultural soil: A comparative study of recovery efficiency, cost and environmental footprint

Dr Carolyn Sonter[1], Ms Nivetha Sivarajah[1], Professor Matthew Tighe[1], Dr Fiona Tang[2], Dr Kara Tighe[1], Professor Susan Wilson[1]

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Biography:

Carolyn is a honey bee ecotoxicologist and commercial beekeeper. She is currently a post graduate research fellow in pollination research and pollution science with the University of New England, Armidale, Australia. She also runs a small business in which she supplies bee hives for pollination in glasshouses. Her research interests include the impact of crop protection products on pollinator health and how to minimise exposure risk to pollinators.

Understanding microplastic (MP) occurrence and concentrations in agricultural soils is crucial for addressing the rising concerns of environmental pollution. The lack of standardised protocols for extraction hinders comparative analyses and assurance of data reliability. This study evaluated MP recovery using eight different combinations of density reagents (sodium iodide, sodium bromide, zinc chloride) and digestion reagents (30% H_2O_2, Fenton's reagent) at two different temperatures (50°C and 60°C). Methods were tested on three different agricultural soils spiked with MPs generated from six plastic polymers (PET, HDPE, PVC, LDPE, PP, PS). Results were integrated with a cost-environmental benefit analysis. The eight methods showed between 85-100% overall MP recovery across the soil types. Individual polymer recovery was greater than 80%, except for LDPE, which ranged from 40-100%. Zinc chloride density separation with 30% H_2O_2 digestion at 50°C was determined as the optimum extraction based on recovery, cost and environmental benefit, across the tested agricultural soils. This method achieved overall recovery above 92%, with individual polymer recovery above 73% for all soils. Cost was $5.47 per sample (AU), while environmental assessment indicated a moderate benefit compared to other methods when considering ecological impact, human and aquatic toxicity, and transport hazard under the Australian Dangerous Goods Code. The optimised extraction method offers an effective, affordable, and environmentally considerate solution in the tested scenario and is a move towards a universally applicable MP extraction method for a range of agricultural soils.

Establishment and Safety Assessments of Micro/Nanoplastic Libraries 6: Focus on Surface Degradation

Professor Yasuo Tsutsumi[1,2,3,4,5], Dr. Yuya HAGA[1,2], Mr. Sota MANABE[2], Ms. Wakaba IDEHARA[2], Ms. Mii HOKAKU[1,2], Mr. Phyo Bo Bo Aung[1], Mr. Yuto MOTOYAMA[1], Ms. Ayaha MORI[2], Dr. Ryotaro TSUTSUMI[6], Prof. Kazuya NAGANO[6], Dr. Haruyasu ASAHARA[1,2,3], Dr. Hirofumi TSUJINO[1,2,7], Dr. Kazuma HIGASHISAKA[1,2,8]

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Biography:

Dr. Yasuo Tsutsumi is a professor at the Graduate School of Pharmaceutical Sciences, Osaka University, Japan. Prof. Tsutsumi specializes in toxicology and public health in the field of pharmaceutical sciences. Especially, he is interested in the toxicity and safety of micro- and nanoparticles. Prof. Tsutsumi received a B.S. and M.S., Ph.D. in pharmaceutical sciences from Osaka University, Japan. He began work at the Graduate School of Pharmaceutical Sciences, Osaka University in the Laboratory of Pharmaceutics in 1994. Dr. Tsutsumi was promoted to professor in 2008 at the Graduate School of Pharmaceutical Sciences, Osaka University in the Laboratory of Toxicology and Safety Science.

Background

As highlighted in the SDGs, plastic waste leakage is a critical issue, with concerns over microplastics (MPs, <5 mm) and nanoplastics (NPs, <1 μm) affecting human health. These MPs/NPs (MNPs) have been detected in human tissues such as brain, lung, blood, and placenta, indicating inevitable exposure. Environmental MNPs vary in polymer type, size, shape, and surface characteristics, yet most safety assessments rely on spherical particles with smooth surfaces, which do not reflect real conditions. To address this, we developed an MNPs library considering environmental physicochemical properties.

Aims

This study aimed to characterize our MNPs library and assess its similarity to environmental samples. Additionally, we tried to evaluate the cellular response, especially focusing on the surface degradation of MNPs.

Methods

PE, PS, PP, PVC, and PET were selected due to their widespread use. Spherical, fragmented, fiber, and MNPs were prepared, and surface-oxidized MNPs were prepared by vacuum ultraviolet exposure to mimic environmental conditions. ATR-IR analysis and SEM confirmed their properties (surface properties, size, and shape). Several cell lines, including the lung adenocarcinoma cell line (A549 cells) and murine macrophage-like cells (THP-1 cells) were used. Cell viability was assessed by MTT assay.

Results

Surface oxidation was induced via VUV exposure (172 nm), forming hydroxy and carbonyl groups. NPs were produced using a precipitation-based method referring to a previous study. Our MNPs exhibited morphology and surface characteristics similar to environmental samples. Additionally, surface-oxidized MNPs exhibited cytotoxicity compared to non-degraded MNPs.

Conclusions

We developed an MNPs library considering environmental conditions. In addition, surface-degraded MNPs exhibited cytotoxicity compared to non-degraded MNPs. This library facilitates comprehensive safety evaluations, including oral and inhalation exposure tests, and is available for collaboration.

Estrogenic contamination of Otago's surface waters: Incidence, associations, and implications for management

Ms Danielle Turner[1], Professor Mark Lokman[1]
[1]University Of Otago, Dunedin, New Zealand

Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
I grew up in Auckland, New Zealand, and moved to Dunedin to pursue tertiary study at the University of Otago. As an undergraduate I enjoyed both sciences and humanities, and earned a BSc in Zoology and a BA in Classics. Following an interest in translational research and environmental health, for my MSc I undertook a study of estrogenic contamination of surface waters in Otago, with a particular interest in how findings could be applied to water quality management. At present I'm looking forward to further study in this field and finding how I can best contribute to it in future.

Freshwater contamination with estrogenic endocrine-disrupting chemicals is a global issue with the potential to reduce ecosystem health and biodiversity. However, relatively little research has been conducted to date on the state or extent of estrogenic contamination of New Zealand's surface waters. Accordingly, a survey of estrogenic contamination in twenty freshwater sites included in the Otago Regional Council's State of Environment monitoring programme was carried out bimonthly over a twelve-month period, with samples analysed via solid-phase extraction coupled with a 17β-estradiol (E2) radioimmunoassay. This was supplemented by an exploration of the survey's findings against a number of categories describing site environment, and against water quality data obtained by the Otago Regional Council, in order to evaluate what factors may be significant in contributing to or impacting the extent of estrogenic contamination observed in the survey. The survey showed that estrogenic contamination was widespread at low levels across the Otago region, being detected in all sampling sites throughout the sampling period at levels consistent with other studies of estrogenic endocrine disruptors in New Zealand. Levels of E2 measured for survey sites ranged from 0.03 – 0.80 ng/L, with an overall average level of 0.14 ng/L. Furthermore, significantly elevated levels of estrogenic material were measured during the summer sampling months. Of the site categories, climate appeared the most influential, with drier sites having significantly higher levels of estrogenicity compared with wet sites, though this significance was not supported following Benjamini-Hochberg correction. Among the water quality variables, pH had a significant positive relationship with E2, though this was also not supported following Benjamini-Hochberg correction. Lastly, implications of these findings for New Zealand's water quality management are discussed.

The Australian Environmental Specimen Bank (AESB): A National Resource for Chemical Exposure Science and Human and Environmental Monitoring

Josh Tynan[1], Professor Kevin Thomas[1], Laureate Professor Jochen Mueller[1], Associate Professor Leisa-Maree Toms[1,2]
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Poster Session & Networking Reception, Chancellor 2 & 3 (Exhibition Hall), August 26, 2025, 5:50 PM - 7:20 PM

Biography:
Josh is the Australian Environmental Specimen Bank Manager at QAEHS, University of Queensland. He works across the intersection of environmental health, exposure science, and sample archiving. He has worked as the logistics manager for Queensland's COVID-19 wastewater monitoring program, as an Indigenous health researcher in North-East Arnhem Land, and currently leads the operational development of the Australian Environmental Specimen Bank (AESB), supporting national programs through long-term biological and environmental sample archiving. He's passionate about building practical, future-facing systems that turn stored samples into meaningful insights about people, places, and the chemical pressures they face over time.

The rapid proliferation of new chemicals, many with unknown risks, outpaces our capacity to identify, assess, and monitor them. As analytical methods improve, archived biospecimens and environmental samples become invaluable tools for retrospectively assessing human and ecosystem exposure. The AESB has been systematically archiving biological and environmental samples since 1999 to address this gap. These specimens offer a powerful opportunity to reconstruct historical exposures, assess cumulative chemical burdens, and identify emerging trends.

Spanning three Brisbane-based facilities, the bank houses more than 200 m² of -20°C walk-in freezer space, eight -80°C ULT freezers, a processing station, and a vapour-phase cryogenic system under procurement. It contains hundreds of thousands of specimens—including an extensive catalogue of animal tissues, human biomonitoring samples, wastewater, reef water, leachate, textiles, and food. Notably, our marine collection includes over 1,000 archived sea turtle samples, alongside samples from dolphins, whales, dugongs, fish, crocodiles, sea snakes, seagrass, and sediment as well as passive samplers deployed in the Great Barrier Reef and other marine and freshwater systems over more than 2 decades.

The AESB provides a foundation for researchers to investigate long-term trends in chemical exposure across human and environmental systems. With this presentation, we aim to showcase the AESB and provide a foundation for collaborations that build on samples in our archive to support solving questions in environmental toxicology, chemical regulation, and environmental health.

Estimating ketamine consumption and evaluating ketamine/norketamine ratio across Australia during Census week 2021 using wastewater-based epidemiology

Miss Zeyang Zhao[1], Zhao Z[1], Verhagen R[1], O'Brien J[1], Tscharke B[1], Li J[1], Wang Z[1], Zheng Q[1], Keller E[2], Mueller J[1], Thai P[1]

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Biography:

Zeyang Zhao is a PhD candidate at Queensland Alliance for Environmental Health Sciences (QAEHS), The University of Queensland, Australia, currently undertaking research in environmental science. Her work focuses on monitoring ketamine consumption in Australia using wastewater-based epidemiology. Her work contributes to a better understanding of the misuse of ketamine. Given the rising international concern over recreational ketamine use and its associated health risks, WBE allows for the early detection of emerging trends and regional hotspots. This is particularly important for informing evidence-based public health strategies, harm reduction programs, and drug policy development.

Ketamine is commonly used as an anesthesia, but in recent years, its recreational use has been increasing internationally. Ketamine use in Australia has been monitored through the National Wastewater Drug Monitoring Program, consistently showing increasing trends. However, differences in ketamine consumption across Australian Statistical Geography Standard (ASGS) areas, the occurrence of ketamine during wastewater treatment plants (WWTPs) and the ketamine/norketamine ratio remain poorly understood. Wastewater samples (24-h composite) were collected from 85 influent and 96 effluent WWTPs across Australia during the 2021 Census week, covering approximately 15.6 million inhabitants (61% of the Australian population). Ketamine and norketamine were detected in 88% of influent samples, 94% and 88% of effluent samples, respectively. Geographical patterns of ketamine consumption across Major Cities, Inner Regional, and Outer Regional to Very Remote areas indicate that ketamine consumption is widespread across Australia, with slightly higher estimated use in Major Cities (42 ± 82 mg/day/1000 people) compared to Inner Regional (32 ± 53 mg/day/1000 people) and Outer Regional to Very Remote (28 ± 44 mg/day/1000 people). The detection of ketamine across all regions confirms that its use is not confined to metropolitan areas but occurs nationwide. The average removal efficiencies of ketamine and norketamine after wastewater treatment were 22% and 18%, respectively. Notably, at 39% and 53% of the WWTP sites, respectively, no measurable reduction in concentrations was observed, suggesting no removal at these WWTPs. The ketamine/norketamine ratio remained stable from influent to effluent, suggesting both compounds undergo similar removal and experience minimal transformation during wastewater treatment. The low removal efficiencies of ketamine and norketamine suggest a potential for environmental persistence and associated ecological risks, underscoring the need for advanced treatment technologies to enhance the removal efficiencies in wastewater treatment processes.

Toxicity and uptake of environmentally relevant micro and nanoplastics in crop plants

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Biography:
Dr Shima Ziajahromi's research focuses on understanding the occurrence and fate of microplastics (particularly wastewater-based microplastics) in the environment and how they negatively impact aquatic and terrestrial ecosystems, with a particular emphasis on the development of novel approaches for the identification and quantification of microplastics and nanoplastics. She is currently serving on the OECD Steering Committee (as Australia's representative) for developing the guideline on the "Safety Testing of Nanoplastics."

The increasing micro- and nanoplastic (MNP) contamination of agro-ecosystems has become a significant concern due to their potential effects on crop plants, and food safety. While research on the impact of MNPs on soil ecosystem has grown in recent years, our understanding of their fate and toxicity to crop plants remains limited. In addition, the actual impact and uptake of environmentally realistic MNPs in crop plants remain poorly understood, as much of current research examined the MNPs with characteristics and concentrations that do not reflect real world conditions. In this study, we examined the toxicity and uptake of MP fibres and fragments under a realistic exposure condition on two crop plants, wheat and tomato. We investigated the behaviour of different MPs in soil by analysing the soil leachate in the presence and absence of plants. We also assessed, for the first time, the toxicity of both individual and mixed MNPs to crop plants. Our finding showed that the presence of plant significantly reduced the leaching of aged polyethylene terephthalate (PET) fibre and polyethylene (PE) fragments, with smaller MPs (average 124 µm) leaching more significantly than larger sizes (average 568µm), implying plant-mediated retention of larger MPs in soil. The effects of fibres, at concentration found in biosolids, on plant growth and chlorophyl content were more pronounced in both crop species with tomato being more significantly impacted than wheat. Individual exposure to PE and polystyrene (PS) did not significantly affect the growth of either plants. However, exposure to the mixture of MNPs significantly reduced root and shoot length in tomato plant. The uptake of PS MPs (0.4 µm) was observed in both root and stem of tomato plant with SEM showed a clump of PS MPs within the xylem tissue. Our findings suggest that higher environmental concentration of MPs can negatively impact crop plants with uptake of smaller environmental MPs may pose a serious threat to food safety and human health. Our results also highlight the importance of implementing the environmentally realistic scenario for effective risk assessment of soil MNP contamination.