

Canadian Ecotoxicity Workshop 2018

Vancouver

Sessions

Title: Advances in omics for ecotox: Methods and Applications

Co-chairs: Dr. Bharat Chandramouli (SGS AXYS) and Dr. Denina Simmons (University of Ontario Institute of Technology)

Description:

Omics techniques including genomics, transcriptomics, proteomics and metabolomics have emerged as powerful tools in studying the effects of chemicals, habitat, diet and other impactors on both aquatic and terrestrial organisms. Omics studies range the gamut from controlled, lab-based investigation of molecular initiating events leading to observed apical endpoints to their application in “the wild” in studies that aim to prioritize chemicals in complex mixtures by observed effect. Omics tools, due to their greater sensitivity, show the promise to provide early indications of potential harm to organisms from chemical exposure. The application of systems biology approaches such as pathway analysis and enrichment analyses connect these molecular measurements to biological systems, then eventually to measurable physiological or behavioural endpoints. Integrated studies that incorporate more than one omics endpoint, and a good understanding of the chemicals and other variables that impact the organism have the potential to be especially valuable. This session will bring together studies on methods and ecotoxicological applications of genomics, transcriptomics, proteomics, and metabolomics in laboratory and field conditions.

Title: Developments in Bioaccumulation Science

Co-chairs: Leslie Saunders (Simon Fraser University) and Dr. Frank Gobas (Simon Fraser University)

Description:

The objective of this session is to highlight research that seeks to improve our understanding of chemical bioaccumulation in aquatic and terrestrial environments. Research may include analyses of laboratory and field data, and the use of in vitro, in vivo, and in silico methods.

Case studies are welcome, as are regulatory perspectives on apparent discrepancies and/or uncertainties in data compiled during bioaccumulation assessments. Research that can be incorporated into weight of evidence (WOE) frameworks to assess bioaccumulation potential is also invited.

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Title: Multi-Generation Ecotoxicology and Epigenetics

Co-chairs: Dr. Jessica Head (McGill University) and Steve Wiseman Department (University of Lethbridge)

Description: A growing body of literature from the human and biomedical sciences suggests that early life exposures to environmental chemicals can affect health outcomes later in life, and even into subsequent generations. The epigenetic basis for these findings is a fascinating area of research that is just beginning to be explored in the ecological sciences. This session will bring together scientists who are interested in epigenetic mechanisms of environmental contaminants (e.g. DNA methylation, histone modification, non-coding RNA) with those studying persistent and multi-generational effects in animal models. We invite submission of abstracts directly related to epigenetic mechanisms as well as abstracts concerned with phenomena that may have an epigenetic basis (e.g. multi-generational studies, acquired resistance to chemicals, effects of parental behaviour on offspring).

Title: Advances in Environmental Quality Guidelines, Objectives and Benchmarks

Co-chairs: Ali Azizishirazi (Environment and Climate Change Strategy), Andrew Burton (Manitoba Sustainable Development), Tamzin El-fityani (Environment and Climate Change Canada), Joanne Little (Alberta Environment and Parks) and Robert Santore (Windward Environmental)

Description:

Environmental quality guidelines, objectives or other chronic effects benchmarks form a cornerstone of risk assessment, environmental management and reporting on state of the environment. Recent developments have focused on improving the relevance and applicability of guidelines through advancements such as approaches for incorporation of multiple toxicity modifying factors, accounting for bioavailability, using field data to validate guidelines, inclusion of behavioural and genomic endpoints and improving the statistical basis for species sensitivity distribution. The goal of this session is to investigate such advances in the development of guidelines and bring awareness to the progress of development of individual guidelines. The target audience consists of those interested and/or responsible for developing and applying guidelines including public administrators, consultants, industry representatives and academics.

Title: Behavioural Toxicology

Co-chairs: Greg Pyle (University of Lethbridge) and Parastoo Razmara (University of Lethbridge)

Description: An animal's behaviour integrates its external environment with its internal physiology. This integration can reflect the ecological fitness of the animal, particularly under changing or challenging environmental conditions. Researchers have begun to appreciate behavioural endpoints as sensitive bioindicators in contaminated environments. However, implementing behavioural endpoints in a regulatory context has remained elusive owing to a lack of standardized protocols that are suitable for compliance testing purposes. Moreover, technological advances for detecting contaminant-induced behavioural changes have led to increasing numbers of behaviours affected by contaminants in a wider range of species. Establishing criteria for choosing the most suitable species and developing standardized behavioural testing protocols for testing the most ecologically relevant endpoints remains a challenge in this field.

This session proposes to address some of the most important issues facing environmental managers today in terms of how to implement behavioural toxicological endpoints as regulatory tools. We aim to attract researchers from government, industry and academia to provide a wide range of perspectives on these challenging issues. By showcasing research that focuses on cutting-edge behavioural testing and

analysis, we can initiate an important dialogue about how these techniques can improve our ability to protect potentially threatened ecosystems.

Title: Latest advances in metal bioavailability and toxicity to aquatic organisms

Co-chairs: Dr. David Semeniuk (Minnow Environmental) and Dr. Anne Crémazy (University of British Columbia)

Description: Well established metal bioavailability models for aquatic organisms (e.g., the Free Ion Activity Model and Biotic Ligand Model) have proven useful for predicting the toxicity of metals in aqueous environments for a variety of organisms, from phytoplankton to fish. These models propose that metal bioavailability and toxicity to a given organism are directly related to bulk water chemistry, and notably the free ion concentration. This session seeks recent work that improves our understanding, and thus ability to predict, metal bioavailability and toxicity to aquatic organisms. This includes work exploring challenging environmental conditions (e.g., varying salinity and pH, complex metal mixtures), studies providing new insights into mechanisms of uptake and toxicity (e.g., uptake of metals in weak complexes), as well as work on emerging methods for assessing metal bioavailability and toxicity in laboratory and field environments.

Title: Mixtures: Dosing, Results and Risk Assessment

Co-chairs: Kobby F. Awuah (University of Saskatchewan) and Dr. Steven D. Siciliano (University of Saskatchewan)

Description: The ecotoxicological study of chemical exposure to organisms beyond binary mixtures has received increased attention in recent years. This is because organisms are naturally exposed to chemicals as mixtures. To date, legislation still focuses on the assessment of individual chemicals or assume concentration addition. Reason for our focus on complex mixtures is to be able to characterize the hazard associated, and to improve risk assessment. Nevertheless, in the absence of an appropriate dosing method and experimental design, estimates from mixture models beyond binary components could be misleading. The session is therefore designed to cover field and laboratory mixture studies of organic and inorganic toxicants. Studies under the following issues are encouraged to be submitted: mixture dosing, mixture modelling (concentration and response addition), risk assessment of chemical mixtures, bioavailability/bioaccessibility of mixtures, and mixture toxicokinetics. The end goal of the session is to improve our current knowledge on mixture dosing, and modeling results from mixture experiments to improve risk assessment.

We welcome researchers from academia, industry, government and other non-governmental agencies.

Title: The R's of Contaminated Soils: Remediation, Reclamation and Risk Assessment

Co-chairs: Amy Gainer (University of Saskatchewan), Dr. Katherine Stewart (University of Saskatchewan) and Dr. Theresa Phillips (Pinchin)

Description:

Contaminated soils impair healthy ecosystem function and adversely affect human health. Managing contaminated soil often requires evaluating and reducing risks associated with human or ecological exposure through remediation and/ or restoration of soil quality and resilience. Thus, a management program for contaminated soils might consist of the combined execution of the three “R’s”: Risk Assessment, Remediation, and Reclamation. This session will bring together Canadian leaders in soil remediation, reclamation and risk assessment to showcase innovative and applied research. We invite scientists and managers from government, industry, consulting and academia to highlight their achievements with industrial, agricultural, natural or urban contaminated soils. Soil studies performed in laboratory or field settings under the following topics are welcomed: remediation; land reclamation; ecological restoration; ecotoxicology; human health soil toxicology; human health and ecological risk assessment; fate and transport; risk communication as it relates to soil contamination and site management; and, emerging contaminants. Through this session, we aim to integrate knowledge and experience to advance contaminated soil assessment and management.

Title: Watershed-Based Monitoring & Assessment

Co-chairs: Lana Miller (BC Ministry of Environment and Climate Change Strategy) and Kelly Munkittrick (Wilfrid Laurier University)

Description: Watershed and large area monitoring assessment programs are becoming more common as we are trying to understand the impacts of multiple stressors on watersheds or other large areas. The goal of this session is to discuss the challenges, learnings, and opportunities in watershed-based or large scale monitoring and assessment studies. This information is valuable to regulators who manage the watersheds, industry who operates in the watersheds, and academics who are interested in creating tools to improve monitoring and assessment at this scale.

We would like to hear about how you are working with multiple stakeholders and First Nations to collect and analyze data, how you are using data to manage the watershed, what kind of data analyses techniques work well with large data sets, and how you are considering multiple lines of evidence to discuss the status of the watershed or areas with multiple stressor inputs.

Title: Directing the future of pesticide research

Co-chairs: Adrienne J Bartlett (Environment and Climate Change Canada, Water and Science Technology Directorate) and Stacey A Robinson (Environment and Climate Change Canada, Wildlife and Landscape Science Directorate)

Description: Pesticide use in agricultural and urban settings, and the potential for impacts on biodiversity, continues to be a controversial issue. Concerns about the environmental and human health effects of pesticides are becoming more prominent as societal awareness grows. As scientists from academia, government and industry, what are our recommendations for the direction of pesticide toxicity research in order to conserve and protect our environment? We are primarily interested in research that has a forward focus, where the science is establishing endpoints, designing exposure scenarios or investigating new compounds that will advance the relevance and sensitivity of pesticide toxicity research. Our ultimate purpose is to provide a session for those interested in pesticide research to share the innovative and novel directions that should be considered to better understand and protect

our environment and wildlife. As such, we also welcome research discussing pesticide mitigation strategies to protect or reduce exposure to wildlife in their natural environment.

Title: Molecular Methods In Environmental Monitoring and Impact Assessment

Co-chairs: Dr. Cindy Meays (BC Ministry of Environment and Climate Change Strategy) and Dr. Caren Helbing, (University of Victoria)

Description: As the numbers of species increase with genome and transcript information, the ability to harness powerful biomolecular methods for application in impact assessments to determine animal health and ecosystems effects is now within reach and becoming a reality. Transcriptomics including qPCR, proteomics, and metabolomics techniques evaluate impacts at the individual organismal level. Environmental DNA (eDNA) including qPCR and metagenomics approaches provide information regarding species presence and composition within an ecosystem. This session presents state-of-the-art applications and discusses the promise, challenges, and solutions in their incorporation into impact assessments for use by regulatory agencies, industry, First Nations, academic researchers and other interested parties.

Title: Eco Talks: A 3MT® Challenge for Professionals

Co-chairs: Rosalie Allen Jarvis (Environment and Climate Change Canada) and Derek Green (University of Saskatchewan)

Description: In recent years, CEW members have been increasingly interested in discussing enhanced communication skills as part of the CEW scientific program. Inspired by the Three-Minute Thesis (3MT®) challenge created for PhD students at the University of Queensland, the Eco Talks session will challenge professionals to present their work in a maximum of three minutes using a single static slide. The objectives of the session will be to focus messaging to key points, support development of “elevator pitch” skills, and link research to the “So what?” question often posed at CEW.

All non-student members of CEW are invited to participate in this platform session. Presenters in this session may choose to also submit their abstract for inclusion in the regular poster and platform sessions. For each 20-minute time slot of the CEW platform program, the Eco Talks session will see 4 presenters take on this challenge and answer audience questions.

Title: Alternative approaches to adult fish survey in EEM programs

Co-chairs: Mary Murdoch (Stantec) and Renée Morais (JD Irving)

Description: We invite papers that describe alternative ways to assess effects to fish and fish habitat for environmental monitoring. Although wild fish surveys are a central component of monitoring programs, standard survey approaches may be challenging due to a variety of factors, such as other effluent sources nearby, safety concerns for sampling, uncertainty about exposure area to effluent in relation to fish, low abundance of target fish, and difficulty sampling fish and interpreting endpoints. This session will provide a forum to learn about approaches used to overcome these challenges and use alternative ways to address environmental monitoring questions to meet the regulations. Alternatives such as caged bivalves and mesocosms have been in place for the past 25+years and methods have advanced

considerably. New approaches provide new solutions and include use of caged amphipods and development of extended bioassay tests on fish in a laboratory setting.

Title: Science and Decision Making (how science is used to support decisions, policy and regulation development)

Co-chairs: Gabi Matscha (BC Ministry of Environment and Climate Change Strategy) and Greg Tambly (BC Ministry of Environment and Climate Change Strategy)

Description: Government legislation, policy and decisions, particularly in the natural resource sector, have the potential to affect the environment and associated receptors. In order to ensure, significant impacts are avoided/minimized, decisions need to be informed by assessments of potential impacts, uncertainties and risk. Science plays an important role in these assessments and in supporting decisions. The goal of this session is to discuss how science is used to support decisions, policy and regulation development in various jurisdictions and situations.

We would like to hear about what type of science you use in which cases and how you translate scientific information (e.g. monitoring results, water quality guidelines, scientific literature, information submitted by clients, toxicity testing results, etc.) into recommendations to decision makers. We also would like to hear about any regulation, policy or guidance you have in place to guide the use of science in decision making.

Title: General Aquatic Toxicology

Co-chairs: Chris Kennedy (Simon Fraser University) and David Janz (University of Saskatchewan)

Description:

Aquatic environments offer and sustain diverse habitats for a variety of organisms, but also attract an ever-increasing level of anthropogenic activity, often resulting in contaminant exposure and toxic effects. These effects can be examined at all levels of biological organization, from the molecular to the ecosystem level. Understanding the wide variety of effects that occur are vital for determining cause-effect relationships, understanding basic biological function, and for more applied purposes such as biomarker development and risk assessment.

This proposed symposium will provide a popular, yet recently under-represented, multidisciplinary platform for researchers to present and discuss their work on basic toxicological impairments in individual organisms and potential links to organism fitness and population-level responses.

Title: Athabasca Oil Sands: Effects on Contaminants on Local Wildlife

Co-chairs: Tim Arciszewski (Alberta Energy Regulator), Gérald R. Tétreault (Aquatic Contamination research Division/Water Science and Technology Directorate), and Diane Orhel (Queen's University)

Description: Surface mining, bitumen extraction, and upgrader facilities are just a few examples of the oil sands processes that have been shown to negatively impact local wildlife. These processes release large amounts of harmful chemicals into the environment, including naphthenic acids, polycyclic aromatic hydrocarbons, and heavy metals. All of these compounds have been shown to be toxic to biota, with ranging effects which include neurotoxicity, carcinogenicity, and endocrine disruption.

Consequently, attention on the monitoring of benthos, fish populations and water quality in Northern Alberta has intensified with the recent expansion in monitoring in the oil sands. Although there are significant studies underway, there are a number of challenges, including baselines for comparison, changes in methods over time and across studies, and a lack of data on mobility and residency for some species.

This session aims to highlight emerging work on the effects of oil sands contaminants in wildlife. These works can take on many different forms, including lab-based toxicology studies, field-based ecotoxicity studies, and environmental monitoring. It is hoped that this session will increase the awareness of ongoing and historical work and provide an opportunity for collaboration and improving the overall understanding of the effects that oil sands contaminants play on local wildlife

Title: Macro and micro plastics in the Pacific Northeast; the true extent of the problem

Co-chair: Dr. Leah Bendell (Simon Fraser University)

Description: This session will discuss any efforts aimed at determining the potential role of both macro (more than 5mm) and micro plastics (less than 5mm) in the marine environment from environmental fate to concentrations to effects in biota.