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Laurentian Chapter of the Society of
Environmental Toxicology and Chemistry

Ottawa Pub Night

Contaminants, Climate Change and Time: Observations on Hudson Bay Polar Bears, a Priority Species in a Changing Ecosystem

Dr. Adam Morris

Environmental Scientist

Crown-Indigenous Relations & Northern Affairs Canada

When: Wednesday January 29
5:00 – 7:00 p.m.

Where: Clock Tower Brew Pub
575 Bank Street

Cost: \$1 members
\$3 non-members

Join us for an engaging talk, good eats and fine brew!
For more information contact Rebecca Dalton:

becca.dalton@gmail.com



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Contaminants, Climate Change and Time: Observations on Hudson Bay Polar Bears, a Priority Species in a Changing Ecosystem

Adam Morris, Ph.D.

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Abstract:

The Hudson Bay is an expansive ecosystem that extends from near-temperate to Arctic latitudes with a broad range of resident and migratory wildlife. This includes top and apex predators of ecological significance, as well as animals of subsistence and cultural importance to Indigenous peoples throughout the North such as polar bears, ringed seals, seabirds and caribou. Over the past several years, we have investigated two major stressors on Hudson Bay polar bears: contaminant mixtures and climate change, and how climate and weather affect contaminants over time. The polar bears around the Hudson Bay have comparatively high concentrations of legacy organochlorine compounds and pesticides (OCs and OCPs) as well as halogenated flame retardants compared to other circumpolar subpopulations. When all contaminants of interest (> 200) were profiled in the liver for metabolomic effects assessments, the burdens in both Hudson Bay and the High Arctic Baffin Bay polar bears were dominated by concentrations of perfluoroalkyl substances (PFASs) and mercury along with some OCP metabolites (e.g., oxychlordan). Potential physiological effects of these contaminants were assessed using the Hudson Bay and Baffin Bay bears, with ~250 metabolites (amino acids, fatty acids, bile acids, biogenic compounds, TCA cycle intermediates) profiled in their livers using a targeted metabolomics platform. The results demonstrated shifts in fatty acid cycling and homeostasis as well as protein catabolism and synthesis that were most strongly related to variation in the concentrations of PFASs, as well as specific PCB and PBDE congeners; dietary variation between the subpopulations (measured by stable isotopes) was also an important factor affecting metabolite patterns/levels. In addition to high contaminant burdens, the polar bears of the Western Hudson Bay live at relatively low latitudes where climate change effects are exacerbated relative to High Arctic animals. The most consistent factors of influence on time trends of priority legacy POPs, BDE-47 and PFOS over time were the Arctic and/or North Atlantic Oscillation Indices, spring or fall sea ice concentrations, sea ice freeze up times, and the duration of the ice-free period in the Hudson Bay. These results add to the growing weights of evidence regarding effects of organic contaminants on wildlife metabolite profiles, particularly the relationships between PFASs and fatty acids, and also provide comparative data regarding the impact of changing climate and weather factors on contaminant trends in an apex predator.



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Biography:

Dr. Morris obtained his BSc in marine and freshwater biology with a focus on biochemistry and physiology, and his PhD in Environmental Biology and Toxicology, both from the University of Guelph. During his PhD, Adam worked extensively with Inuit colleagues and developed a strong love of the North and its people during his studies of contaminant dynamics in the polar bear-ringed seal food chains of the High Arctic. His love of the North also drives Adam to improve scientific education, capacity building and outreach for Indigenous peoples and to help to expand their roles in scientific research to become partners and leaders in projects of interest to them. Adam applies all of these interests and skills in his current role as the Environmental Monitoring and Research Coordinator with the Northern Contaminants Program (CIRNAC) and in his international work with the Arctic Monitoring and Assessment Programme (AMAP).