Title: Food chain accumulation of Persistent Organic Pollutants in the Arctic: warm-blooded species including humans

Supervisor: Jan Hendriks, Fiona Wang, Renske Hoondert (KWR)

Setting: Protecting Arctic ecosystems is of a global concern as threats originate from human activities from around the world. So far, global emissions of greenhouse gas macropollutants (esp. CO2, CH4, N2O) have received most attention, with impact of global warming being most pronounced in cold regions. Potential threats due to micropollutants such as Persistent Organic Pollutants (POPs) and mercury (Hg) have been investigated far less intensively. However, recent studies have shown that micropollutants can also affect animals and humans adversely. Even more, levels of some micropollutants in the Arctic are increasing and new substances are flooding the market, outpacing assessment of their environmental risks.

To address this scientific challenge and societal endeavour, we aim to link local and global micropollutant emissions to concentrations and effects in food chains of the Arctic, under current and future climate conditions, improving models used in regulatory frameworks. So far, we have addressed fate as well as accumulation in cold-blooded species. In the present study, you will derive magnification factors for warmblooded species, expressing accumulation in foodchains and determine whether the levels reached as safe for humans.

Objectives: We aim to determine accumulation of chemicals in warm-blooded species of Arctic food chains and assess risks for human consumers.

Methods:

1) Review papers related to the topic

2) Use and extend existing database [Hoondert et al. 2019/Derksen 2021] on concentrations in warm-blooded Arctic species, including humans

3) Calculate trophic magnification factors (TMFs), using an existing method applied to cold-blooded species [Hoondert et al. 2019]

2 & 3 have already been estimated but require checks and representative selection

4) Estimate concentrations of several POPs, sub-regions, social categories (children, mothers etc.), and perhaps future exposure scenarios

5) Collect concentrations critical to humans: e.g., quality standards, (no) effect levels, in vitro/in vivo response levels, esp. as observed in indigenous people

6) Compare 4) and 5)

7) Discuss probability of effects in humans" Tables and figures with TMF in warm-blooded species, concentrations at different trophic levels including humans, ratios of estimated and critical concentrations, preferably reported as a (short) paper.