

Impact of environmental variation on female polar bears (*Ursus maritimus*) reproductive tactics and life histories.

Life-history theory predicts that an optimal level of parental investment should maximize current reproductive success balanced against maintenance, survival, and future reproduction.

Using long-term (30 years) individual data on 665 female polar bears (*Ursus maritimus*) from Svalbard, we assessed the impact of environmental factors (sea-ice dynamics and arctic oscillation phase) and maternal traits on litter size and survival. We also investigated the impact of environmental factors and maternal traits on body mass differences among twin litters which we hypothesized would reflect the cost of reproduction.

To do so, we used logistic and gamma regression models, and a multi-state capture-recapture model accounting for the dependency existing among individual life histories within each polar bear family unit until offspring independence (at 2 years-old). Analyses were performed in a Bayesian framework using nimble.

As previously shown, litter size varied with maternal age, with younger female having higher chances of losing a cub during their first months of life. The effects of environmental factors also varied with maternal age, although they were generally weak. Unexpectedly, sea-ice dynamics had little effect on litter size. Because population growth mostly depends on female's reproductive success, itself influenced by maternal traits, our findings highlight the importance of accounting for individual heterogeneity and extended parental care to understand the species response to environmental perturbations.