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DISSERTATION TITLE: *Under the surface: Disentangling climate effects on* Calanus finmarchicus *dynamics in a high latitude system*

Zooplankton constitute an important food source for a range of marine species, from invertebrates and fish to the largest animals on the planet, the baleen whales. Climate variation influences zooplankton, and thereby the animals dependent on zooplankton as food. During her doctoral work, Kristina Ø. Kvile investigated how *Calanus finmarchicus* is influenced by climate. Her thesis demonstrates how climate variation influences the food availability for this zooplankton species in spring, and how conditions in spring in turn shape the food availability for predators on *C. finmarchicus* in summer. Kvile also shows that increased temperatures, as predicted under future climate scenarios, trigger an earlier appearance of the new generation *C. finmarchicus* spawned in spring, leading to increased abundances in spring, but not in summer.

Calanus finmarchicus is a highly abundant zooplankton species in the Northeast Atlantic. In the Norwegian Sea and Barents Sea, *C. finmarchicus* is an important food source for several commercially harvested fish species. In particular, *C. finmarchicus* is a key part of the diet of Barents Sea cod larvae during their first spring and summer. To improve our knowledge about potential climate impacts on *C. finmarchicus*, Kvile and colleagues analysed survey data from the north-eastern Norwegian Sea and south-western Barents Sea collected by Russian scientists from 1959 to 1993. By combining survey data with oceanographic models, they could map the environmental variation likely experienced by the zooplankton as they drifted with ocean currents prior to sampling. With the same approach, Kvile and colleagues back-calculated the areas where the sampled zooplankton were likely spawned as eggs. *Calanus finmarchicus* is commonly believed to be transported into the Barents Sea from the Norwegian Sea. The work by Kvile and colleagues indicates on the other hand that *C. finmarchicus* found in the Barents Sea in spring to a large degree is spawned locally.

Finally, Kvile and colleagues developed a new and promising method to estimate zooplankton mortality rates. Limited knowledge of mortality levels is a drawback when predicting potential responses of zooplankton to climate change, and the new method can therefore be a useful tool. Altogether, the work by Kvile and colleagues both shows how climate change might influence *C. finmarchicus* and the feeding conditions for its predators in the future, and demonstrates state-of-the art methods that can drive this field of research forward.