

Climate responses of *Calanus finmarchicus* in a high latitude system

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Calanus finmarchicus is an important food source for a range of animals in the Northeast Atlantic, and potential climate impacts on the dynamics of this species is therefore of high relevance. Here, we synthesise our most recent studies on *C. finmarchicus*' life history and potential responses to climate variation. We combine long-term spatiotemporal survey data (1959-1993) from the north-eastern Norwegian Sea and south-western Barents Sea with state-of-the-art statistical methods and oceanographic particle tracking to (i) quantify the spatial distribution of *C. finmarchicus* egg production, (ii) disentangle how climate variation influences *C. finmarchicus* abundance, distribution and seasonality, and (iii) describe copepodite mortality levels in this high latitude region. We show that abundances of *C. finmarchicus* in different developmental stages correlate differently to changes in ambient temperature, and that increased temperatures apparently trigger an earlier abundance peak of the younger copepodite stages in spring. Furthermore, we find indications of a positive effect of the combination of shallow mixed-layer-depth and increased wind on food availability (chlorophyll) in spring, and in turn on *C. finmarchicus* biomass in summer. Together with new findings on population connectivity and mortality rates in the Norwegian Sea-Barents Sea region, these results imply how climate change might influence future feeding conditions for predators on *C. finmarchicus*.

Keywords: Barents Sea, climate, drift modelling, *Calanus finmarchicus*, mortality, seasonality, spring bloom, statistical analyses, temperature

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