

Dynamics of co-occurring *Calanus finmarchicus* and *C. helgolandicus* in Skagerrak

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The con-generic copepods *C. finmarchicus* and *C. helgolandicus* co-occur in the northern North Sea, and play important trophic roles as grazers of phytoplankton and as prey for higher trophic levels. Changes in total abundance as well as seasonality of *Calanus* spp. may have important impacts on juvenile fish in this region. The objective of this study was to describe seasonal and long-term inter-annual variations of the two species, and to reveal possible causes for the observed variations. Zooplankton and associated environmental variables were sampled at a fixed monitoring station in Skagerrak off southern Norway twice a month during 1994-2012. We found a clear seasonal pattern, with *C. finmarchicus* dominating in the spring peak and *C. helgolandicus* in the autumn peak. The seasonal abundance of *C. finmarchicus* was associated with low temperatures and high nutrient concentrations, while *C. helgolandicus* was related to higher temperatures. Differences in the inter-annual trends were observed for *C. finmarchicus* and *C. helgolandicus*. The abundance of *C. helgolandicus* showed an increasing trend throughout the study period 1994 – 2012, which was correlated with local sea temperature during June-August. In contrast, *C. finmarchicus* showed a cyclic pattern with a declining trend 1994 – 2000, increasing during 2000- 2010, and declining after 2010. The long term trend in *C. finmarchicus* was correlated with the inflow of Atlantic Water to the North Sea and the NAO winter index, while the year-to-year variation (de-trended time-series) was correlated with the strength of the Coastal Current. Our results suggest that a combination of both local and large scale climatic factors may explain the variations in abundance of *Calanus* spp at this site.