

Formation of lipid reserves, fatty acid composition and reproduction of *Limnocalanus macrurus* (Copepoda, Calanoida) during summer in the Bothnian Sea, northern Baltic

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Abstract

We studied the lipid content and fatty acid (FA) composition of adult *Limnocalanus macrurus* in the Bothnian Sea between May and September during 2013–2014 and focused on the role that they play in reproduction. In the Baltic Sea, only a little research has been done on the reproductive biology and lipid chemistry of the species despite it is one of the most abundant copepods in the Gulf of Bothnia and Gulf of Riga, and an important food item for the commercially important planktivore, the Baltic herring (*Clupea harengus membras*). The climate change scenarios predict that *L. macrurus* will distribute from the gulfs to the Central Baltic with the freshening of the water, becoming there an important link of the pelagic food chains. The forecasts are based on the salinity and temperature requirements of the species; but, ultimately, the distribution pattern of the species depends on the growth of the population and the success of reproduction. Our work focuses on this part of the species life-cycle.

The total FA content was found to decrease towards September while the amount of essential fatty acids (EPA, DHA) showed an opposite trend. Dietary FA markers indicated that in May, *L. macrurus* exploited the phytoplankton bloom, consisting mainly of diatoms, but later during summer also signs of a dinoflagellate diet were observed. The presence of spermatophores in females and an abundance of nauplii indicated that some reproduction took place also during the summer, but the reproduction rate was low in spite of rich lipid reserves acquired during spring. As the amount of essential fatty acids was low in spring, the results suggest that the quality of lipids is more important than their quantity for the reproduction of the species. In the face of climate change,

we conclude that this may form a bottleneck limiting the population growth and dispersal of *L. macrurus* due to potential temperature increases in the Baltic Sea.

Keywords: fatty acids, *Limnocalanus macrurus*, Baltic Sea, Marine food webs, climate change