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Role of zooplankton in feeding of the White Sea threespine stickleback in a period of warming Arctic

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Abstract

Threespine stickleback *Gasterosteus aculeatus* population in the Arctic White Sea significantly grew during the last two decades and turned out from the rare to the most abundant species due to increased temperatures. Now it comprises about 95% of all fish in inshore area during summer period. Their massive inshore migration in early summer drastically change trophic chains of coastal communities. Thus, studies of feeding are needed to better understand the structure and functioning of ecosystem. Juvenile stickleback during the first weeks of their life feed on both benthos and zooplankton. Among the latter are copepods *Temora longicornis*, *Microsetella norvegica* and ciliophora *Helicostomella subulata*. Spawning adults feed in inshore zone mostly on benthos and stickleback eggs and on some zooplankton. Very limited data on offshore feeding shows that before spawning, adults feed on such zooplankton taxa as copepod *Calanus glacialis* and *Euphausiidae varia*, whereas youngs of the year feed on zooplankton taxa with dominance of cladoceran *Podon leuckarti*. In inshore zone, the stickleback diet well correlates with composition of zooplankton in the sea, but offshore the correlation is weaker and food organisms dominating in stomachs may be rather rare in the sea. We noted this for *P. leuckarti*, *C. glacialis* and euphausiids. This shows that the stickleback may quickly change their position depending on presence of preferable prey. Therefore, stickleback exhibits very plastic feeding behavior quickly establishing multiple trophic links with high variety of organisms and hence interlink inshore and offshore communities. High phenotypic plasticity allows this species to adapt to different environments and facilitates its quick population growth. The study was supported by RSF grant 19-14-00092.

Keywords

threespine stickleback, White Sea, zooplankton, climate change