Occurrence, inter-annual variability and zooplankton-predation impact of the invasive ctenophore Mnemiopsis leidyi and the native jellyfish Aurelia aurita in Limfjorden (Denmark) in 2010 and 2011

In 2007, the invasive ctenophore Mnemiopsis leidyi was observed for the first time in Limfjorden (Denmark) where it exhibited mass occurrence in late summer while the indigenous and usually dominating common jellyfish, Aurelia aurita, was nearly absent. Both species were further studied in 2008 and 2009 and it was found that the additional predation pressure by M. leidyi caused the zooplankton stocks to be severely depressed. Here, we report on the population dynamics and predation impact of M. leidyi and A. aurita in Limfjorden in 2010 and 2011. In 2010, M. leidyi was observed in Limfjorden for the first time in August with the highest density and largest size in the central parts (Skive Fjord). The estimated half-life of zooplankton (copepods) was only important in Skive Fjord in mid-August 2010 when the joint predation impact of A. aurita and M. leidyi was 2.3 d. In 2011, no M. leidyi were observed on the first cruise (3 August), while during the second cruise (17 November) it was observed in large numbers. The western most location (Venø Bugt) was dominated by large sized (≤ 60 mm) M. leidyi, while the average size decreased towards the central parts of the fjord-system. The proportion of cydippid larvae increased from west to the central parts thus suggesting rapid reproduction and population-size expansion. The bio-volumes of ctenophores were highest in the central part with 85 ml m⁻³ in Løgstør Bredning, which may be compared to the greatest mean bio-volume of about 184 ml m⁻³ observed in the Black Sea in 1989 when the zooplankton and fish stocks collapsed. Analysis of available hydrographic data and model calculations indicates that re-invasion of M. leidyi from the North Sea seeded the autumn population in Limfjorden in mid-September.