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Investigating Hjort's second hypothesis - how to predict the part who's lost for recruitment?

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Time series (1977-1991) on distribution of pelagic juvenile Northeast Arctic cod show that up to 1/3 of the year class is off track, into deep ocean, from the expected successful transport routes from the spring-spawning areas along the Norwegian coast to the autumn-settlement areas in the Barents Sea shelf area. It has been a standing question for decades what is the fate of this between-years variable fraction of pelagic juveniles off track. The prevailing view has been according to Hjort's second recruitment hypothesis, also known as the aberrant drift hypothesis, that this fraction becomes lost for recruitment. Here, we examine the mechanisms behind the offspring cross-shelf transport into the deep Norwegian Sea, and what is the further transport and fate of these individuals. We analyse particularly the influence of year-to-year and within-season variability in specific weather events and the variability in spawning sites. Individual-based biophysical models are applied to estimate growth and dispersal of Northeast Arctic (NEA) cod (Gadus morhua) in their pelagic phase. Survival on its transportation route is determined by a combination of biological and physical processes. This work focus on the predictive skills of the physical processes linked to the transport and dispersion pattern. Physical parameters such as ocean temperature and salinity have been proven to have high predictive skills, in the order of months and longer, i.e. equal to the time interval focused on in this work. Also, interannual variability in the velocities of the two currents along the Norwegian coast is closely examined.

Keywords: biophysical model, pelagic juvenile transport, offspring loss, circulation pattern, weather events, recruitment mechanisms

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