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Current patterns during pelagic stages determine interannual variability
in length-at-age of juvenile Arcto-Norwegian cod

by

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ABSTRACT²

The large Arcto-Norwegian stock of cod (*Gadus morhua* L.) in the Barents Sea exhibits a pattern of pronounced year-to-year variability in individual growth. Earlier authors have suggested both density-dependent and density-independent causes. Here three hypotheses for the observed close inverse relation between abundance and length-at-age of juveniles (1-4 year old fish) are suggested and evaluated: I) Population size, high abundance leading to reduced growth (density-dependent growth). II) Population size, through altering geographical distribution pattern and thus ambient temperature. III) Abiotic, density-independent mechanisms during the pelagic stages. Enhanced inflow of warm, prey-rich Atlantic water masses from the southwest leads to an abundant cohort as 0-group distributed farther east into colder water masses, which causes lower post-settlement growth rates. Based on comprehensive data, we conclude that year-to-year differences in juvenile length-at-age mainly are a consequence of distribution patterns determined during the pelagic first half year of the fishes' life (hypothesis III). We can not reject density-dependent growth effects directly related to variability in food rations (I), but our data do not suggest this to be the main mechanism. II) is rejected, mainly due to year-to-year differences in length being established already at age 2, which is too early for such movements.

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