

**Effect of juvenile distribution and environment on Northeast Arctic haddock**

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Climate change is affecting many fish populations globally. This is particularly true in high-latitude marine ecosystems where the warming effect is projected to be strongest. In the cold Barents Sea, increase of temperature is beneficial for the productivity of many commercially important fish species, such as haddock, cod and herring. The Atlantic haddock (*Melanogrammus aeglefinus*) is an arcto-boreal gadoid distributed on both sides of the North Atlantic, the Northeast Arctic (NEA) haddock in the Barents Sea and along the coast of northern Norway and NW Russia. NEA haddock has since around year 2000 and until lately had a strong increase in population size and a distributional expansion further north and east in the Barents Sea. Recent studies show that the year-to-year changes in distribution boundaries were more related to stock abundance than to temperature. Using distribution boundaries of juvenile (3-year old) haddock between 1981 and 2008, we investigate the effect of distribution on the population growth rate derived from matrix population models. The population growth rate was regressed (by Generalized Additive Models) against the distribution boundaries and environmental/anthropogenic variables. Our results demonstrate a positive effect of temperature on population growth. Further, there is a positive effect of a northerly distribution limit on population growth of juvenile haddock, but only up until around 73 °N (mid Barents Sea). This may be related to a shortage of food further north. A similar model using fishing mortality as a covariate indicates the same effect of distribution and the expected negative effect of fishing.

**Keywords:** Population growth –haddock – distribution – Demographic effects – Climate effects

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