Despite Atlantic cod and haddock extending further into Arctic waters, a new study reveals there is little competition for food between the invaders and native polar cod. However, it is uncertain whether climate change will increase competition between the species as range expansion of the Atlantic species progresses.

Changes in sea temperature, circulation patterns and ice-cover caused by climate change are expected to have profound effects on ecology and biodiversity in the Arctic Ocean. Under an increasingly warming climate, the distribution of Atlantic cod and haddock are known to be expanding their geographical range into the Arctic Circle, where polar cod have been the dominant species until now.

Recent studies have found that young polar cod can coexist with others of closely related species. However, few studies have so far sought to understand how polar cod populations respond to competitors. In this study, researchers under the EU-funded Arctic Tipping Points (ATP) project set out to investigate the extent to which the diets of polar cod overlap with those of Atlantic cod and haddock. Polar cod are an important food source for seabirds, marine mammals and other fish, so disturbances to their diet and habitat would have a wide impact on Arctic Ocean ecosystems.

The researchers analysed the stomach contents of young cod and haddock collected in fjords near Svalbard, Norway, in 2006, 2008 and 2009. They found that native cod fed mainly on krill and crustaceans, such as *Pseudocalanus*, *Calanus* and *Thermisto* species. Atlantic cod and haddock fed on some of the same species, including *Thermisto* species and krill, but where all three species inhabited the same waters, overlap in their diet was found to be less than 40%. Researchers identified only one of the regions – near a glacier in Billefjorden – where the diets of Atlantic cod and haddock were similar to each other, but overlap with polar cod was still low at just 37%.

Because stomach contents only reveal what fish have eaten very recently, the researchers also carried out stable isotope analysis, a method that can be used to investigate diet through chemical analysis of muscle tissue. Again, their results suggested distinct diets for all three species.

However, the scientists highlight that most studies to date have focused on fish collected during the summer and autumn months. Thus, variations in feeding behaviour during other seasons when less prey is available could be key to understanding the potential effects of climate change on diet.

They also suggest that competition and predation is likely to increase for polar cod if Atlantic cod and haddock become more abundant in the Arctic. The potential shifts in populations could present a challenge to managers, particularly since it would involve commercially valuable species.

1. Arctic Tipping Points (ATP) is supported by the European Commission 7th Framework Programme. See: http://eu-atp.org/


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Theme(s): Climate change and energy, Marine ecosystems