

Preserving large females key to sustaining Atlantic cod

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Credit: AI-generated image ([disclaimer](#))

Cod was once a staple diet across many European countries, and so important in fact that in the past some countries have even gone to war over this important resource. Their popularity, however, meant that they have become overfished in some areas leading to a shortage of large and old cod, which in turn has led to the fish becoming more sexually mature

at a younger age. This, according to research conducted by the University of Gothenburg, Sweden has led to a serious change in cod stocks and could severely impact the fish's health, physiological ageing and reproductive capacity.

If you have ever eaten fish and chips in the United Kingdom, chances are you ate cod from the Atlantic. So popular has cod been to the country's diet that Pitt the elder referred to cod as 'British gold'. In Portugal it is said that there are over 1 000 recipes for dried and salted cod, which is known as bacalhau, and in some parts is eaten as part of a traditional Christmas meal - a meal for special occasions. In fact cod is eaten almost all over Europe and the countries on the Atlantic, and special stories surround its importance in each culture. It is this importance that has spurred a research group from the University of Gothenburg working with the Swedish University of Agricultural Sciences to investigate the health and ageing of male and female cod.

'We measured various aspects of oxidative stress, a condition in the cells that can lead to [irreparable damage](#), antioxidant capacity, which protects against oxidative stress, and telomere length,' says researcher and [marine biologist](#) Helen Nilsson Sköld.

[Telomeres](#) are repeated [DNA sequences](#) that protect the ends of [chromosomes](#). The length of these telomeres and the rate at which they get shorter are important as they are closely linked to health and ageing. The researchers compared the health of cod in the Öresund, Skagerrak and Kattegat. It is important to note that the cod in the Öresund have been protected from trawling since 1932 and as a result stocks include larger and older fish, whereas the cod in the Skagerrak and Kattegat have been seriously overfished.

'Our results show that older males generally have shorter telomeres and a reduced antioxidant capacity,' Helen Nilsson Sköld explains. 'However,

we didn't see the same pattern among females - there were no signs of physiological ageing in the age span we looked at for the females (two to eight years).

In fact the researchers were surprised to see such marked gender differences. Although older males were fatter and seemed less stressed than younger males, the females were generally in better shape than the males.

'Our theory for why the males age and are more stressed during spawning is that they have to compete for territory and mates. This stress seems to be more acute among the younger males.'

Over the course of their investigation the researchers were unable to find any signs of the overfished stocks of the Skagerrak and Kattegat being less healthy than the Öresund population. A key factor in this context is that larger fish produce a much higher number of eggs - this can vary from half a million to five million depending on the size of the [cod](#).

'Our study also shows that large older females are healthy and don't seem to have aged physiologically,' Helen Nilsson Sköld adds. 'The conclusion is that it's important to look after the large older females, as they produce many more eggs than younger ones. A conservation strategy of this kind would be ideal in the Skagerrak and the Kattegat.'

More information: Almroth, B.C., et al. 'Gender differences in health and aging of Atlantic cod subject to size selective fishery', *Biology Open*, 2012

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