

“CODTRACE”

Tracing the whereabouts of Atlantic cod

*Cod (*Gadus morhua*) is one of the most economically important fish species of the European Union. Ineffective fish stock management and illegal and unreported fishing have however caused more cod to be removed from stocks than are replaced by reproduction, due to which a number of the cod stocks are now threatened with collapse (i.e. unable to replenish itself), while others are over-exploited with respect to the potential long-term yield (i.e. more fish could be taken from the stock in the future if fishing mortality would be reduced).*

Cod populations or stocks differ significantly both in appearance and biology; the cod stocks of the Baltic Sea, for instance, are adapted to low-salinity water. Enabling cod to be traced from its point of harvest to its origin would mean a big step forward for fisheries management, as this would result in a huge additional amount of **information on cod movement and stock mixing**, which currently is not available and thus adds to an increased uncertainty in cod stock assessment.

The ultimate aim of **CODTRACE** was to **establish legally indisputable evidence of the origin of cod**. To achieve this, the project aimed to optimise methodology to:

- differentiate individual fish **spawned** in different basins;
- identify the location of **harvest** of an individual fish.

Specifically, various existing tracing techniques, already used routinely in other areas of marine research, were optimised for fish traceability, i.e. for discriminating among cod stocks in the major marine basins of the EU (Baltic Sea, Celtic Sea, Irish Sea, North Sea, and Norwegian and Icelandic waters).

The CODTRACE techniques investigated included body morphometry, otolith morphometry, otolith core chemistry, otolith surface chemistry, genetic analysis of fish tissue (allozyme, mtDNA, *Syp* I and microsatellite), fish parasite and bacterial assemblages, and molecular markers for specific fish bacteria.

The majority of these were used for determining both the location of where a fish was spawned and where it was harvested, whereas others were applied exclusively for determining the harvest location of a fish, or for determining the spawning location.

Each technique was manipulated in such a way that it was able to discriminate among at least two spawning and/or harvest locations in the major EU basins. Its discrimination capacity, and the usefulness of the data it provided, was consequently analysed using multivariate statistics and validated with double-blind testing of samples, the latter to prevent conscious and unconscious bias in the research performed.



Project acronym:

CODTRACE

Full title of Project:

Establishing traceability for cod (*Gadus morhua*): determining location of spawning and harvest

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Web-site:

www.ucd.ie/codtrace

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This way, a set of techniques was selected, which, in concert, greatly increased the statistical probability of correctly classifying the basis where an individual fish was spawned and where it was harvested. In addition, a cost-benefit analysis was performed on each technique in isolation and in combination with every other technique.

CODTRACE has developed a protocol to determine the origin of cod, through the optimisation of techniques for identification of the spawning and harvest locations of individual cod. Such a traceability protocol offers several advantages, not only for fisheries management, but also for consumer safety, its confidence in seafood and for meeting the EU demands for food labelling. In addition it might be an efficient tool in the battle against illegal, unreported and unregulated fishing.

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