



spawning stock biomass of mackerel and horse mackerel stocks for stock assessment purposes.

The Marine Institute ran a collaborative project with the North West Pelagic Management Committee to assess whether there was significant spawning of mackerel outside the area covered by the international mackerel egg surveys. The survey verified the sampling area of the international programme and revealed further spawning information on other fish species around offshore banks west and north of Ireland.

Combined oceanographic/egg surveys have been carried out since 2001 and focused on specific spawning grounds around Ireland. In the Celtic Sea, gadoid spawning grounds have been studied to reveal how fish eggs and larvae interact with their environment. For this purpose drifters were released to map ocean currents while MOCNESS sampled fish eggs and larvae at different water depths. In the western Celtic Sea the Multinet sampler was used to obtain more information on the vertical distribution of hake, megrim and mackerel eggs and larvae.

A number of fish egg and larval surveys have been carried out by the Marine Institute in the waters north, west and south of Ireland to obtain information on spawning areas of commercial fish species in Irish waters.

The Fisheries Ecosystems Advisory Services Team

In order to ensure the sustainable harvesting of the fisheries resources, it is essential that management is underpinned by sound marine science that is clear, transparent, timely, impartial and inclusive.

The Marine Institute's Fisheries Ecosystems Advisory Services Team works closely with the fishing industry to provide this marine science through.

- Research Vessel Surveys (Acoustic, Groundfish, Egg and Larval Fish, Underwater TV)
- Surveys on Commercial Vessels
- Market Sampling of Landings
- Analysis of Logbook Data
- Studies on the Biology of Fish
- Working with the Regional Advisory Councils (RAC's)
- Articles in the trade press
- Working with our international scientific colleagues
- Regular meetings with Industry Representatives and DAFM
- Regular Meetings with EU

This information is essential to our understanding of the current state of the fisheries resources and the ecosystem in which they live.

More detailed information, as well as similar leaflets on related issues are available from

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FISHERIES ECOSYSTEMS ADVISORY SERVICES

Assessing, researching and advising on the sustainable exploitation of living marine resources in a healthy ecosystem



Marine Institute
Foras na Mara

Why carry out fish egg surveys?

The waters around Ireland contain some of the most important spawning areas for north-east Atlantic fish stocks. Egg and Larval Surveys are a vital part of mapping these spawning areas and contribute to fisheries management decisions. Egg surveys can also give scientists an indication of the state of the spawning stock within a particular area by using what is called the Annual Egg Production (AEP) method. This method uses information on the number of eggs sampled in an area, and relates it to the number of eggs produced by female fish in the spawning season, to calculate the number of females spawned in the area.

Where are fish eggs found?

Most marine fish species in Irish waters have pelagic eggs, which means they float in the water column as plankton. Some exceptions to this include herring and sandeels, whose eggs attach to substrate on the seabed. In general, fish eggs are transparent and round in shape.

How are species identified?

Fish eggs are identified under a microscope according to their size and special features. Different species eggs fall into different size ranges, for example, a plaice egg is between 1.6 and 2.2mm in diameter while a dab egg is between 0.65 and 0.9mm. In addition fish eggs can be divided into three types; those without oil globules, those with one oil globule and those with more than one oil globule. When an egg contains one oil globule its size can further be used as an identifying feature e.g. mackerel eggs fall between 1 and 1.4mm, with an oil globule of 0.3mm diameter.

Can all fish eggs be identified visually?

No. The eggs of some of fish species overlap in size range, which makes them very difficult to be identified. For example the size range of cod eggs overlaps with that of haddock, whiting and plaice among others. In order to positively identify the eggs the analyst looks for special features on the fish embryo or the egg capsule. New methods such as genetic markers or the use of enzyme composition are being developed to overcome identification problems.

How are egg surveys carried out?

Egg surveys are carried out using a high-speed plankton



Gulf Stream VII Plankton Sampler

sampler called the Gulf Stream VII. The sampler is towed behind the vessel and slowly dropped to within 5 metres from the bottom and then returned to the surface again. A net of fine meshsize inside the sampler collects small animals and plants that float in the water column. Nosecones of different diameters regulate the amount of water entering the net while flow meters measure how much water is being filtered. Sensors attached to the sampling frame collect temperature, salinity and depth data in order to relate the distribution of eggs to environmental conditions. When the sampler is taken back onboard it is hosed down and the sample is retained in the codend.

The Gulf sampler collects plankton samples continuously from the surface to the bottom. In order to study the vertical distribution of fish eggs in the water column, different plankton samplers have been designed such as MOCNESS (Multiple Opening and Closing Net Environmental Sensor system) and the Multinet. These samplers hold up to 9 nets, which can be remotely opened and closed at different depths to collect samples at discrete depth intervals. The samplers also measure various environmental parameters such as temperature, salinity, fluorescence and turbidity, so that the position of eggs in the water column can be related to their physical surroundings.

What happens to the sample after collection?

Once collected, the plankton sample is preserved in fixative and stored. Initial analyses are often carried out on board the

vessel to obtain preliminary distribution maps and guide the research vessel in its sampling programme. Full analysis is completed in the laboratory and includes the identification and enumeration of eggs, their size measurements and their allocation to different developmental stages.

What recent egg studies have been carried out by the Marine Institute?

International mackerel and horse mackerel egg surveys take place every 3 years and cover the spawning grounds in the NE Atlantic from the Bay of Biscay to the north of Scotland. Each year Ireland joins research vessels from Norway, Scotland, Germany, England, Netherlands, Spain and Portugal to monitor the distribution and concentrations of mackerel and horse mackerel eggs between February and the end of July. The aim of this intensive programme is to estimate the

