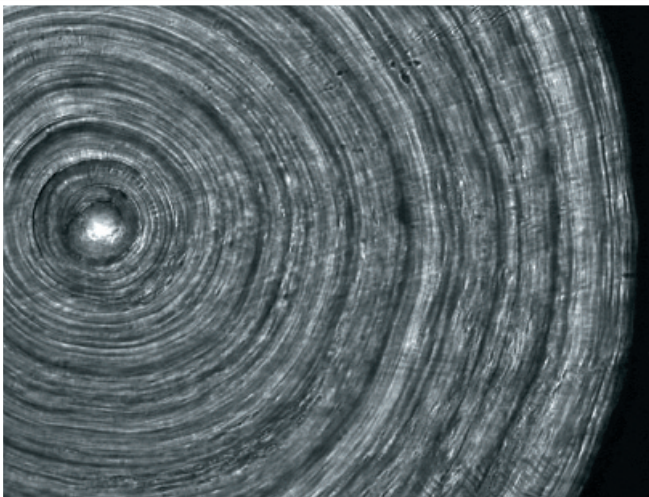


Monkfish, also known as Anglerfish, are also aged using a different method. Because the otolith can be difficult to read, a section is instead taken from the illicium or 'lure' that the fish uses to attract its prey.

When otoliths are viewed under the microscope a series of opaque and translucent bands are visible. The opaque bands are wide and represent summer growth, when food is plentiful and the temperatures are warm. The translucent bands are narrower and represent winter growth, when food is less plentiful and temperatures are colder.



Monkfish illicium (x100)

### Deep Water Fish

FSS also conduct an ageing programme on deep water species. These species live at depths from 500 - 1,500m, compared to 1 - 400m for the traditional fish species such as cod and haddock. Deep water fish have otoliths and can be aged just like common demersal and pelagic fish species. They tend to have many bands on the otolith indicating that they are very long lived. For example, grenadiers have been aged up to 60 years, with fish reaching maturity at 12 years of age. This indicates that grenadier may be vulnerable to overfishing. What do you think?

### The Fisheries Science 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 Science Service 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
- Discard Sampling at Sea
- 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 DCMNR
- 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

Marine Institute, Fisheries Science Services (FSS), Rinville, Oranmore, Co. Galway, Ireland. Phone: + 353(0) 91 387200

### Or your local Port Based Technician in

- Clogherhead (041) 9889788
- Dunmore East (051) 385011
- Castletownbere (027) 71937
- Ros a Mhíl (091) 572584
- Killybegs (074) 9741871

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A DEEPER UNDERSTANDING...

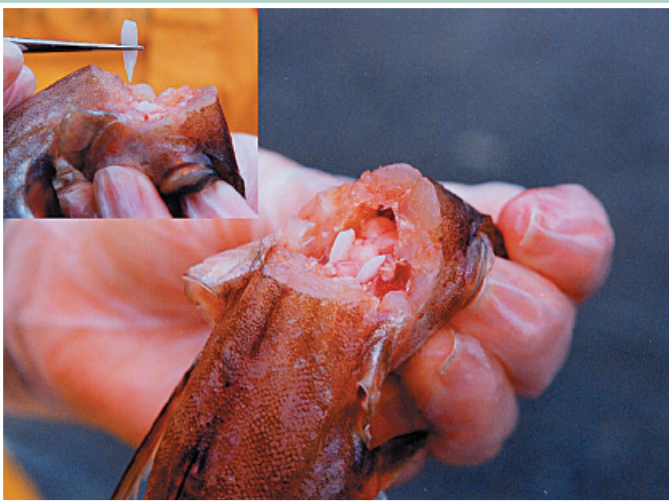
# AGEING OF FISH



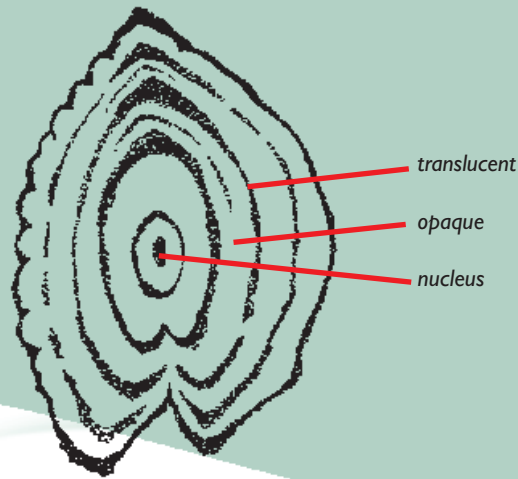
## FISHERIES SCIENCE SERVICES

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





The otolith from a plaice. It is composed of opaque (summer growth) and translucent (winter growth) bands. Count the bands and estimate the age of the fish. It is 5 years old.



## Why do we age fish?

In order to assess the state of any fish stock it is vital that the age structure of that stock is known. The age profile of a stock gives an indication on how healthy the stock is. If there is a broad range of ages present, then the stock would appear to be in good shape. If there are no young fish, then recruitment (spawning) may have failed and there will be problems in the future. If there are no old fish in the stock, then there may be overfishing of the stock. Age data give a good insight into the state of the fish stock and are very important components of the information required to carry out a stock assessment.

The most common method used to age marine fish is to examine the ear stones or 'otoliths' found in the head of the fish. These are made of calcium and help the fish to maintain its balance, similar to the way that the semi-circular canals work in human ears.

Otoliths are the first bony structures that develop in a fish and they provide an accurate representation of the life history of the individual fish. The otolith consists of layers of calcium carbonate that are built up on an annual basis, much like tree bands. Each year of growth is composed of an opaque and a translucent zone (corresponding to summer and winter growth respectively). Thus the age of an individual fish can be determined by reading the pattern of bands on the otolith. By determining the age of a large number of individual fish it is possible to build up a picture of the age structure of the whole population. Knowledge of the age structure provides an indication of how the stock is measuring up to exploitation.

## How do we age fish?

The otoliths are located beside the brain in the head of the fish. A cut is made just behind the eye and the otoliths are removed with forceps. They are then brought back to the Marine Institute laboratories in Galway or Dublin and examined under a microscope. Each species of fish has different shaped otoliths. Otoliths in plaice, sole, mackerel and herring are thin and the bands are clear and easy to count. However, the otoliths of cod, haddock, whiting and hake are thick and the otolith must be sectioned before the ring pattern can be seen.

Fisheries Science Services (FSS) have special sectioning machines which cut the otoliths and produce thin sections. The otoliths are first embedded in resin blocks and then sectioned using special diamond blades.

The resulting sections show a ring pattern that is very clear and the fish can be aged easily. FSS use a special high-speed saw that sections up to 25,000 otoliths per year.

A special method is needed to read black sole otoliths. The otoliths are broken and burnt. The burning causes the winter bands to appear very black, and it is very easy to age the fish.

## How Big are 1 year old Fish?

The following gives a rough guide to the size of 1 year old fish.

Cod	25 to 40 cm
Haddock	14 to 30 cm
Whiting	12 to 22 cm
Plaice	10 to 15 cm
Sole	15 to 25 cm

The size of fish at age 1 varies with the time of year and with area. It will even vary from year to year.

The FSS can provide you with more detailed information on the age of fish in your area. We can also give you information on the size of older fish.

## Quality Control

In order to maintain the quality of our data it is important that there is a consistency amongst age readers both within the Marine Institute laboratory and with our international colleagues. In order to do this regular international workshops and exchanges are conducted where scientists agree on age reading protocols and criteria. Within the Marine Institute regular quality checks and training programmes take place on our age readers across all our species.