

Understanding behavioural trends to help reduce discards

In the second of a series of articles, **Mike Montgomerie**, gear technologist at Seafish, gives his perspective on the issue of discards and the work that Seafish and the industry have been doing to help develop new selective technologies and net-based fishing activities to reduce them

How can the behavioural trends of fish be exploited when designing and positioning discard reduction devices, or redesigning nets to reduce the number of fish discarded?

Much can be done by modifying the existing gear and a lot of work has already been done in this area. However, there is no one magical device to cure all discard problems. Usually it is a case of linking the correct device to the particular problem in a particular fishery, and in many situations combining the benefits of several discard reduction options.

In many fisheries the skippers have already refined their gear to minimise unwanted bycatch and discards, as they appreciate the detrimental effect discards have on their profits and the public perception of their industry. Taking into account that many discard devices will result in a slight decrease in the quantity of target species caught, there needs to be some incentive, other than just legislation, to encourage skippers to adopt these modified gears.

This could take the form of a financial benefit, an increased quota, an increased days-at-sea allowance, or an acceptance that

that particular vessel is fishing more responsibly with consideration for the environment.

There can often be an increase in the value of the catch at market when discards are reduced in the trawl, due to the improved quality of the catch coming out of the codend.

There could be a number of reasons for this. It could be due to less benthic debris in the net, resulting in less abrasion damage to the softer fleshed fish. It could be due to just less bulk of fish, resulting in less crushing and damage to retained catch; or it could be because as there is less bulk to sort through on deck, the catch is getting put down into the chilled fish room much more quickly.

More than likely it will be as a result of a combination of several of these factors. On several occasions it has been found that by cutting back on discards in the trawl, the amount of target species retained increases slightly.

UNDERSTANDING FISH BEHAVIOUR

Before deciding what discard reduction device to use, we have to understand how fish behave in the vicinity of the fishing gear, how the various parts of the gear affect the behaviour of fish, and how this in turn affects the catching mechanism of the gear.

All fishing gear has been developed and evolved with an understanding of how fish behave and where they are in

the water column at different times of the day, and at different times of the year, dependent on various climatic and tidal variations. Different species and different size classes within these species can behave in completely different ways in the path of a trawl.

■ **The warps:** In a single boat trawl the warps will have very little effect on demersal fish but could have a slight herding effect on pelagic species. In a pair trawl, pair seines or seine net, the part of the warps or ropes off the bottom will have a certain amount of herding effect for pelagic fish or demersal fish close to the seabed. The sections of the ropes or warps on the seabed are the main catching mechanism for these methods of fishing.

■ **Trawl doors and clump weights** are the devices that initiate the herding of fish such as haddock, whiting, cod, lemon sole and plaice by creating a sand cloud on the seabed.

■ **Sweeps and bridles** will continue this herding effect all the way to the net for these species, but many fish will still escape over the sweeps and bridles before they reach the net.

■ **The net:** depending on the size and type of ground gear, and how efficient it is at maintaining bottom contact, many fish may escape underneath it. Depending on the mesh size in the fore parts of the trawl many of the smaller fish may be filtered out before arriving at the codend. The codend mesh size, its orientation, its construction and the speed it is towed at will dictate how well

fish are retained in the codend.

Generally all fish will be herded to some extent by the doors and sweeps of a trawl system, or the ropes and wires of pair trawler/seiner or fly dragger.

The degree to which any fish is influenced by the sweeps depends on how close it lives to the seabed, how powerful a swimmer it is, and the speed that the gear is towed at. Sweeps have very little effect on nephrops and Dover sole.

Once the fish are herded into the mouth of the trawl they behave differently. As the fish tire they will fall back into the trawl.

Haddock and whiting rise up in the water column as they pass over the ground gear.

Cod tend to swim ahead of the ground gear close to the seabed, before falling back into the trawl, just above the ground gear and belly sheet of the trawl.

Flatfish tend to react in a similar fashion to cod. Megrim and Dover sole tend to pass over the ground gear quite low, then dive for the seabed through the sand cloud, and are often seen meshed in the netting just behind the fishing line when the gear is hauled.

Small haddocks, whiting and cod etc (below 150mm) tend not to rise up in the trawl but stay low just clear of the sand cloud entering the trawl. The fish will stay in this form of vertical separation in the fore part of the trawl, becoming more mixed up as they fall back towards the codend.

Haddock and whiting will physically try to find a way out of the trawl, cod tend to just sit there and let themselves fall back into the codend. The larger fish will turn and swim along with the net at the end of the tapered section, before entering the codend extension, whereas the smaller fish of these species tend to tire quickly and just get carried all the way down to the codend.

These behavioural trends can be exploited when designing and positioning discard reduction devices, or redesigning nets to reduce the number of fish discarded.

■ In the next article Mike Montgomerie will look at work Seafish, along with the industry, has been doing to help develop new selective technologies and net-based fishing activities to reduce discards. These articles will cover some of the commonly used discard devices, how they work, how effective they can be for different species and highlight any problems that are likely to crop up when using and fitting them.

