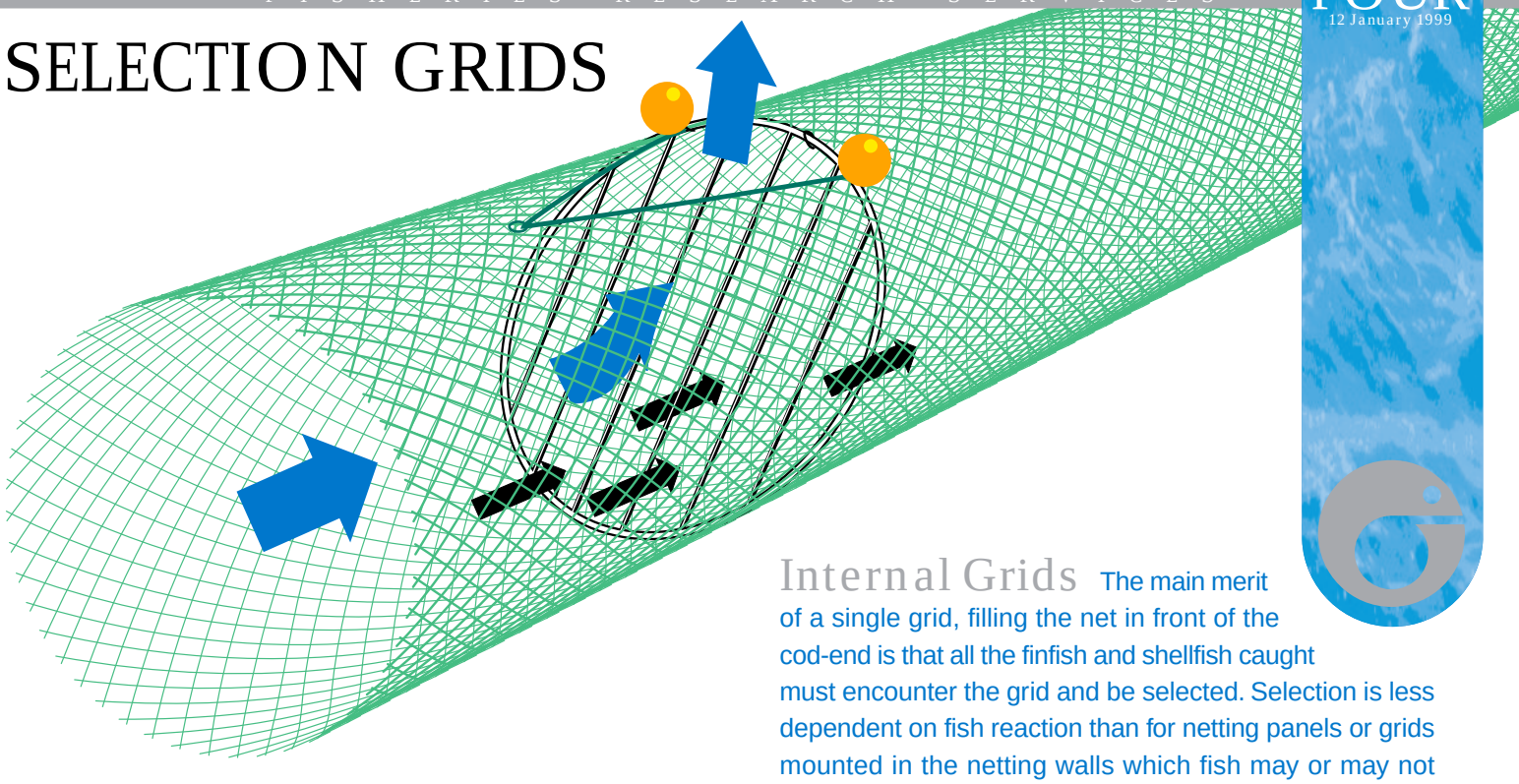
SELECTION GRIDS



Introduction

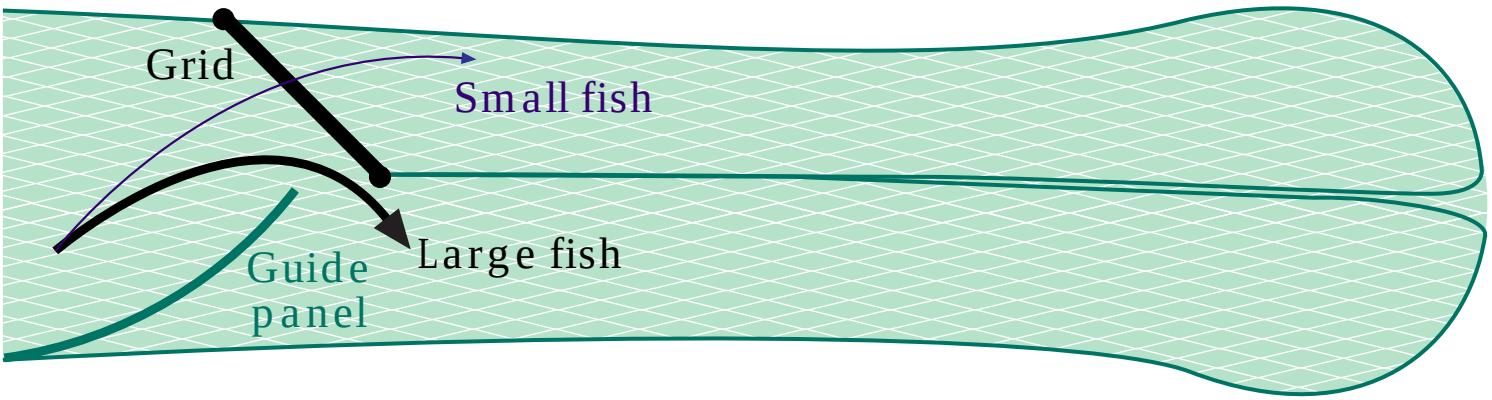
Selection grids were originally developed to reduce the by-catch of fish in the shrimp fisheries for both Penaeid and Pandalid species. Small mesh cod-ends are needed to retain shrimps but prevent fish from escaping. As by-catches can be very high a method of releasing fish was needed to enable these fisheries to continue. Inclined netting panels at the cod-end mouth were tried first to divert fish to escape holes, but rigid grids, notably the Norwegian Nordmøre grid, were found to be more effective and robust. The smaller bodied shrimps pass through the bars whilst the fish are directed upwards to a gap in the top panel of the cod-end and escape.

Although the initial aim was to separate species of widely differing sizes, it was found that grids could also separate a single species by size. A second generation of grids has now been evolved for size selection of finfish. There is plenty of scope to develop grids for specific fisheries. Multi-section grids and multiple grids have been devised to provide both species and size selection in the same cod-end but complexity inevitably reduces practicality and the simple forms are the best.

Internal Grids

The main merit of a single grid, filling the net in front of the cod-end is that all the finfish and shellfish caught must encounter the grid and be selected. Selection is less dependent on fish reaction than for netting panels or grids mounted in the netting walls which fish may or may not choose to approach. These grids are set with the bars running fore and aft rather than across the net. This makes it easier for small fish and shellfish to pass through and helps unwanted fish to slide to the escape hole. The efficiency of selection depends on the angle of the grid to the water flow and the through water speed. For each net and grid, the angle must be tuned to optimise selection. Too steep an angle traps fish against the bars and hinders passage to the escape area. Too shallow an angle makes it difficult to pass through the bars, reduces selection and increases losses of the target species. Efficiency is improved if the catch is directed towards the leading edge of the grid by a netting panel.

The disadvantage of internal grids is that they can become clogged with weed or obstructed by fish, especially large flatfish. If the target species cannot pass through the grid, losses through the escape hole mount rapidly. In these circumstances the grid needs frequent cleaning or the vessel must move grounds. Despite this problem the use of these grids is now mandatory in the shrimp fisheries of several countries where the by-catch is seen as a serious problem.



More complex nets can be designed with grids which only partially occupy the extension and separate fish into two cod-ends. An inclined netting panel is again needed to ensure that all fish encounter the grid and are selected. The attractive feature of this device is that the cod-ends can have different mesh sizes, so that the net could be used for example, first to separate, then to size select cod and whiting.

Wall Mounted Grids

The best known version is the Norwegian SORT-X grid. The front and central sections are grids, and the aft section a canvas panel. The grids are set into the netting wall and there are side ropes to hold the cod-end in shape. Most of the catch encounters the grid as it moves aft and small finfish are released. By positioning a rising netting panel ahead of the grid, in the lower half of the cod-end, all the catch can be directed at the grid for selection. Any fish which fail to pass through the first grid collect in the cod-end behind or under the grid and have another opportunity to escape.

These grids are relatively large and were developed for use on stern ramp trawlers where they are never pulled on to a net drum or through a power block. They have been extensively tested in Norway and appear to work well with large catches. Mesh selection in standard cod-ends is poor with large catches as few fish can approach the netting. A simplified version of this grid has been tried on mackerel with some success.

Grids in the upper panels of the extension or cod-end of a net where the meshes are normally closed during towing can provide an escape route and are an alternative to square mesh panels in both pelagic and demersal trawls. The net and grid must provide a visual stimulus to the fish to encourage them to approach and pass through the bars and diverting water flow towards the grid helps.

Grids in the lower panels can allow small shellfish and debris to drop out of the net. Trials on *Nephrops* were encouraging. Cod-end mesh selection for *Nephrops* is very poor and the fixed bar spacing of a grid should give more consistent size selection.

Grid Construction

Given the constricted area of the mouth of a cod-end, grids for most nets are not large, ranging from 0.4 to 1.2 m^2 in area. The best fitting shape is elliptical but, as it is more difficult to construct, many grids are rectangular. For shrimp selection the bar spacing is from 15 to 20 mm. A bar spacing of 50 mm gives size selectivity for whitefish roughly equivalent to that of a 100 mm diamond mesh cod-end. A sorting grid has to be robust, flexible and resistant to corrosion. The bars have to be smooth to avoid damaging escaping fish and strong enough to resist distortion which would change the selectivity. Stainless steel has most of the required properties and is used in several countries but is expensive. Aluminium alloys are not strong enough and tend to corrode. Polymers should be more suitable for making grids and these materials are being investigated.