MULTISAMPLER - A NEW TOOL FOR USE IN SAMPLING TRAWLS

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ABSTRACT

The MultiSampler is a system to be mounted in sampling trawls to give better estimates and knowledge about fish stocks.The system is remotely controlled via a hydroacoustic link from the vessel. It consists of a rigid steel frame with three separate codends replacing the standard codend in a sampling trawl. The MultiSampler takes three separate and unique samples from different depths in one trawl haul. The system is developed by the Institute of Marine Research and Scanmar. We are now at the end of the development period, and the system has already been used in regular abundance estimation cruises for spring spawning herring.

INTRODUCTION

Large pelagic trawls are used during Norwegian hydroacoustic surveys in the Barents Sea to obtain biological samples of the organism detected acoustically. Often the echosounder recordings show that organism in the survey area are stratified into discrete bands or layers within the water column. Without some means of discretely sampling in each specific layer, questions arise regarding the size- and species composition in the different layers. Ideally, several discrete samples from different layers should be sampled within a single haul, because the situation in the water column can easily change during the time required to take in and out the trawl several times.

With these concerns in mind, researchers from the Fish Capture Division, in co-operation with Scanmar, set out to develop a wireless remotely controlled system for opening and closing several codends in sequence during a single haul and with the trawl`s aft end open during the intervals between each sample.

SYSTEM AND OPERATION

The complete system, which we have named the "MultiSampler" (Fig. 1), replaces the extension section and codend of one of the Institute's large pelagic trawls (vertical opening 30 m). As presently configured, the principal component is a rigid stainless steel frame, installed to the specially tailored extension section to slope down and aft at approximately 45 degrees when fishing, carrying three full-sized codends and the release system components. The cross-section of the frame's opening is approximately 1 m^2. The release system consists of the motor drive and release mechanism from a Mocness plankton sampler, controlled and

monitored by a Scanmar HCL hydroacoustic communication link, with a separate rechargeable battery pack for power. The codends are attached at their top and bottom edges to stainless steel profiles spanning the width of the MultiSampler's frame, with the profiles free when released to slide down and aft along stainless steel bars under the force of water flow and gravity. A control unit on the vessel communicates hydroacoustically with the HCL to command release cycles and to receive and display operation verifications and other status reports.

Before shooting the trawl, the three codends of the MultiSampler are lifted to the top of the frame (Fig. 2), and toggle-ended wires from all six upper and lower profiles are sequentially loaded into the Mocness release unit. With all three codends in their uppermost position and the mouth of the frame open, the net is shot away and deployed to the depth from which the first sample is to be taken. On command from the shipboard unit, the bottom profile of the first net is released, allowing it to fall to the bottom of the frame where it is captured by a ratchet-like device. This ratchet is also fitted with a switch that sends a signal to the ship via the HCL that the first codend is now open, ready for sample collection. When sufficient time has elapsed, a command is sent to drop the first codend's upper profile, which also triggers a confirmation signal as it passes the ratchet. At this point the MultiSampler is open and fish can again pass freely through it, with two closed, empty codends in readiness at the top of the frame and the first codend at the bottom, now closed and containing its sample. The net's position can be adjusted in readiness to take the next sample, and once there it can be towed briefly in its open state to flush out any lingering fish from an earlier period of the tow. At this point the nest sample collection cycle can be initiated, and so on until all three codends have been deployed.

The system is dimensioned for 600 m depth and can normally be operated in a distance of 1500 m.

RESULTS

The MultiSampler system has been used routinely to take samples of acoustically detected fish during several hydroacoustic surveys assessing herring abundance in northern Norway.

During these cruises, it operated reliably for 24 hauls out of 28. A self-contained underwater video recording system was used to observe system operation *in situ*. It confirmed that the profiles fell correctly on command, opening and closing the codends. A grid-angle sensor confirmed that the frame maintained a stable 45-degree attitude throughout the operational cycle.

During four hauls, some problems communicating motor commands and confirmation signals occurred due to difficulties with correctly orientating the towed underwater hydrophone. In the future, this problem will be addressed and hopefully resolved by switching to a hull-mounted hydrophone.

The results obtained with the MultiSampler system during herring surveys have shown that there is a substantial degree of size stratification of fish within the water column even within one layer, with smaller fish nearer the surface and larger fish deeper (Røttingen, 1996).

Sometimes in very dense shoals of herring we got problems with the communication to and from the MultiSampler. It showed up to be herring that filled up surplus netting in the aft end of the extension section. We have no changed from diamond to square meshes in this section and hope we have solved the problem. Some other improvements have been done on the

mechanical parts, and Scanmar has put a lot of effort into making their part safe and easy to operate.

A test of the system is carried out in these days to verify that the results of the improvements are satisfactorily.

CONCLUDING REMARKS

The MultiSampler system makes it possible to take several uncontaminated samples during discrete, user-selected periods within a single trawl haul, using conventional large-scale trawl gear. It can be quickly installed on many different types of trawl, or shifted from one trawl to another, and requires little extra care when shooting and hauling. Whereas this first system was designed to carry three codends and has so far only been used during pelagic trawl hauls, other configurations or applications can certainly be accommodated within the concept.

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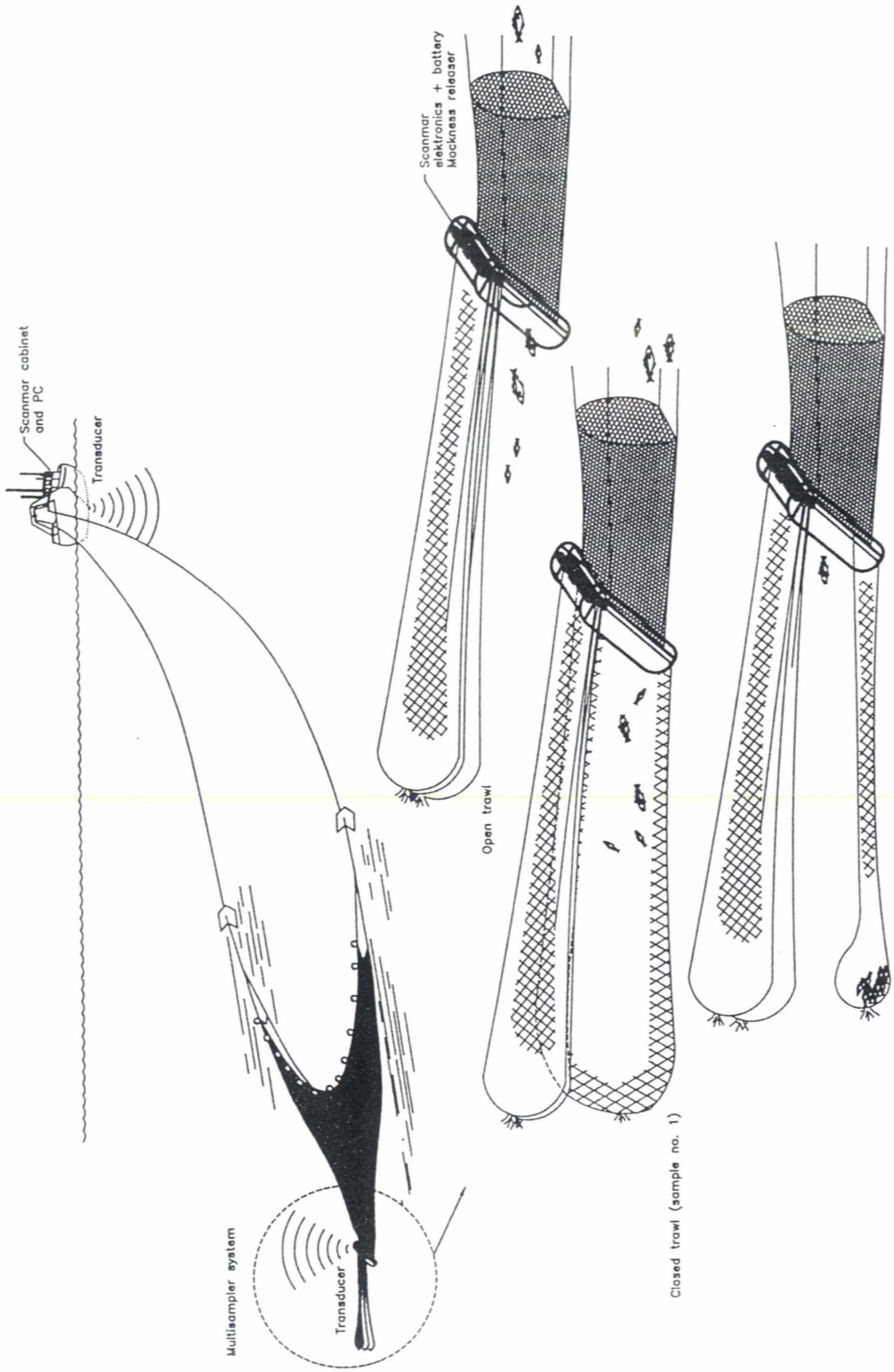

Fig. 1. MultiSampler: a remote controlled multi-sampling trawl system.