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Fish Capture Committee

**REPORT OF THE JOINT SESSION OF THE WORKING GROUP
ON FISHING TECHNOLOGY AND FISH BEHAVIOUR AND
THE WORKING GROUP ON FISHERIES ACOUSTICS
SCIENCE AND TECHNOLOGY**

Bergen, Norway, 16 June 1992

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INTRODUCTION

A joint meeting of the Working Groups on Fisheries Acoustics Science and Technology and Fishing Technology and Fish Behaviour was held on 16 June 1992 in Bergen, according to ICES Resolution 1991/2:9.

In a circular of 26 February 1992 to all participants the chairman identified the radiated noise of survey vessels as a special topic for the meeting.

PRESENTATION AND DISCUSSION OF PAPERS

Nine papers were presented at the meeting, of which seven were on the special topic.

1. **Mitson, R.B.**
Research vessel noise signatures

The main sources of noise and vibration aboard ships were identified and the characteristics of the resultant underwater radiated noise were described. Some emphasis was given to the very low frequencies being radiated and the sources from which they arise. A number of graphs were presented of acoustic signatures from current research vessels and the changes that occur at different speeds. Examples were given of the noise characteristics of controllable pitch propellers which differ from those of fixed-blade propellers.

2. **Nicholson, M.D., Rackham, B.D. and Mitson, R.B.**
Measuring the effect of underwater radiated noise on trawl catches

Catch comparison experiments, with FRV *Corystes*, have been performed to assess the influence of an intense tone at 300 Hz. Switches in the smoothing chokes of each propulsion motor enable this tone to be turned on and off. Only the haddock catches in deep water showed a significant choke effect but overall, there was no evidence that catches decrease when the choke is out of circuit. It should be noted however, that the analysis was of the total catch for each species and that any effect that may depend on fish size has been ignored.

3. **Furusawa, M. and Takao, Y.**
Acoustic specifications of fisheries research vessel "Kaiyo-maru"
(Presented by J. Traynor)

A new Japanese fisheries research vessel, Kaiyo-maru, was completed in July 1991. Since the most important work of this vessel is acoustic surveys, the noise signature was the main concern in drawing up the specifications. Machinery noise, bubble generation and roll and pitch were to be as small as possible. Special attention was paid to low frequency noise because of its effect on fish behaviour and to high frequency noise because of its interference with echo signals. Measurements show that the vessel performs well compared to existing research vessels but no information was available on frequencies below 100 Hz.

4. **De Haan, D.**
The underwater sound emission of research vessels and a commercial beam trawler

Acoustic investigations were carried out for the old and new RV *Tridens*, the RV *Isis* and a commercial beam trawler to assess the factors determining the underwater sound generated. For the beam trawler the firing rate of the engines causes a lot of noise and for the research vessels the rotation frequency of the propeller blades and propeller cavitation are the most important factors. The acoustic emissions of these vessels, while towing a GOV sampling trawl, were compared with the emissions of several other research vessels.

5. **Ovredal, J.T.**
Noise measurements of a fishing vessel

Acoustic measurements were carried out on a fishing vessel on which the commercial catches were abnormally low. A lot of noise was generated by the propeller blades at low frequencies with a peak at 8 Hz. To reduce this noise the propeller was replaced and commercial catches then reached normal levels.

6. **Garnier, B., Beltri, E., Marchand, P. and Diner, N.**
Noise signature management of fisheries research vessels: a European survey

At IFREMER in France RV *Thalassa* and RV *Cryos* will be replaced by a new, larger and well equipped research vessel. To update the information on the relation between vessel design and radiated noise a review of data on several European research vessels was carried out. Information was gathered on the radiated noise signatures, the internal noise generated, correlation with the shipbuilding technologies and hydrodynamic optimisation.

7. **Arnold, G.P.**
Fish and ship: compass orientation of midwater plaice

Experiments were carried out as to the effect of vessel movement on the behaviour of plaice swimming in midwater. The fish were acoustically tagged and followed with a sector scanning sonar while the vessel encircled the fish. Though many tones in the frequency spectrum of the vessel were above the hearing threshold of plaice, the fish were not herded by the vessel but continued to migrate in their chosen direction.

8. **Hafsteinsson, M. and Misund, O.A.**
The possible influence of migration speed on acoustic assessment of capelin (*Mallotus villosus* (Müller 1776)) at Iceland

To study the effect of migration on acoustic fish abundance estimates, surveys were conducted on migrating capelin in a defined area south of Iceland. The area was traversed twice; first in and then, immediately afterwards, against the direction of migration. Total biomass was 212,000 tonnes for the first and 126,400 tonnes for the second estimate. Corrections for swimming speed gave estimates of 150,000-160,000 tonnes for both surveys.

9. **Aglen, A. and Misund, O.A.**
Outline of a sonar system for measuring schools

A new 95 kHz sonar system was tried out for school recording, with a narrow beam (less than two degrees) for good resolution. The range is not long but small schools can be detected up to 500 m, which is satisfactory. Equipment will be built for processing the sonar data and it is the intention to develop an algorithm for school area measurement, school biomass calculation and school position recording relative to the vessel.

RECOMMENDATIONS

The joint FTFB/FAST Working Groups recognise that special attention should be paid to the underwater noise radiated from existing and new fisheries research vessels, since this may affect accuracy in fish stock surveys, both demersal and pelagic. The radiated noise should neither impair the efficiency of instruments used for acoustic surveys nor should it disturb the natural distribution of fish in the vicinity of the vessels. The Working Group therefore recommends the formation of a study group, which could include technical specialists from industry, to specify the essential requirements for the noise signatures of research vessels and to recommend how these should be measured.

The working groups recommend that future joint sessions should consider the problems of near-bottom sampling in acoustic surveys and combined trawling/acoustic surveys, the errors which may arise and how stock densities close to the sea bed may be estimated.