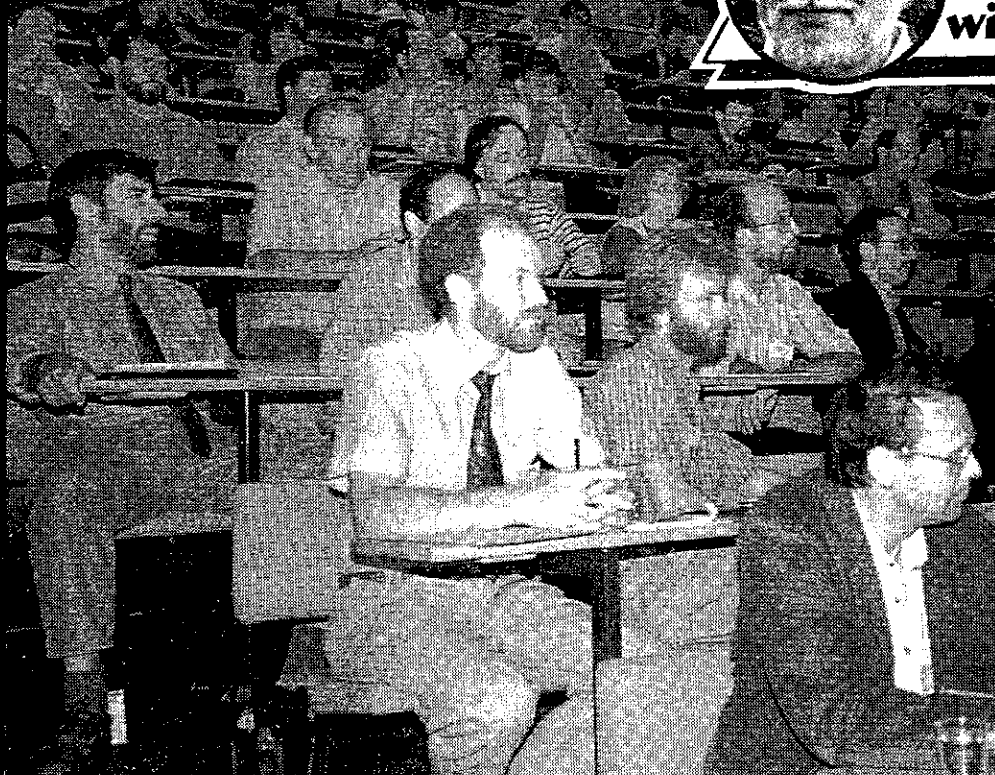


Paper from Japan describes herding with air bubble curtain



Some of the nearly 150 participants at last month's Symposium on Fish Behaviour in Relation to Fishing Operations in Bergen, Norway.



GEAR TALK
with Tom Wray



Norway fish behaviour seminar told:

I JOINED nearly 150 fisheries scientists and fishing industry professionals from Europe, North America, Australia and Asia at last month's three-day Symposium on Fish Behaviour in Relation to Fishing Operations held in Bergen, Norway.

Countries represented included Australia, Belgium, Canada, Denmark, Faroe Islands, Finland, France, Iceland, Ireland, Japan, the Netherlands, Norway, Portugal, Russia, Spain, Sweden, United Kingdom and the USA.

The symposium, organised by the International Council for the Exploration of the Sea (ICES) and held at the University of Bergen, covered three main themes: fish behaviour relevant to fish capture processes, techniques of observation and application of fish behaviour knowledge.

Convenor of the event — the first of its kind since the FAO/ICES-sponsored conference on fish behaviour held in Bergen in 1967 — was Professor Steinar Olsen of Norway's Institute of

Marine Research.

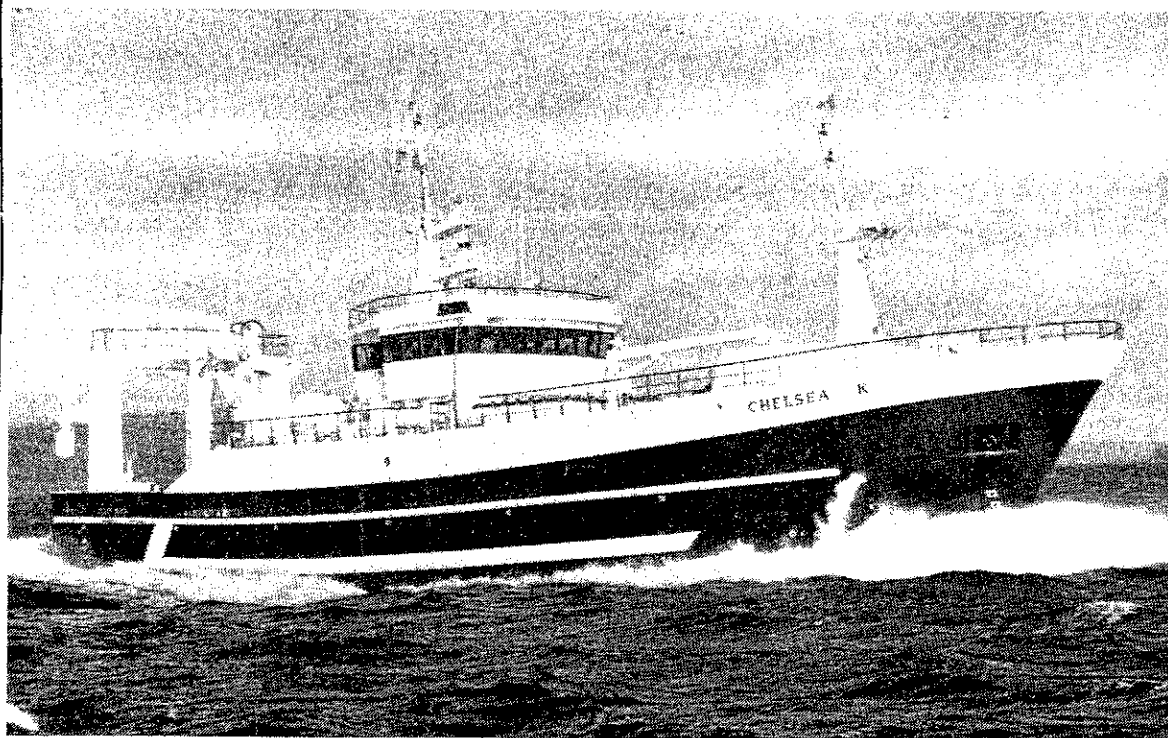
The steering committee included Dr. D. L. Alverson (USA), Dr. Pierre Freon (France), Bob van Marlen (Netherlands), Peter Stewart (Scotland) and Professor Kjell Olsen (Norway).

Study

While the symposium was organised by scientists for scientists, it also attracted other people including representatives from several equipment suppliers. These included firms such as Scanmar and Simrad, whose equipment is playing a significant role in the study of fish behaviour and/or in the monitoring of fishing gear performance.

Two leading US trawl makers — Gourcock Trawls and Net Systems — also

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'50 major stocks

THE final session of the Bergen symposium looked at the application of fish behaviour knowledge for improved assessment and fisheries management. Some nine papers were presented on this topic.

One of these was given by Dr. Lee Alverson of US firm Natural Resources Consultants. He said that, at the time of the FAO/ICES fish behaviour conference in 1967, about five of the world's fish stocks were being overfished.

Now we are overfishing 50 major fish stocks and over half of those in the Atlantic region are identified in a United Nations assessment as being overfished, said Lee Alverson, whose co-author was T. Laevastu of the National Marine Fisheries Service Alaska Fisheries Science Center.

"Considering that roughly 28 per cent of the world's major marine fish stocks are now considered to be overfished and that considerable quantities of subsistence and recreational catches are not included in the documented statistics, we may have already reached a production level of conventional fish forms that

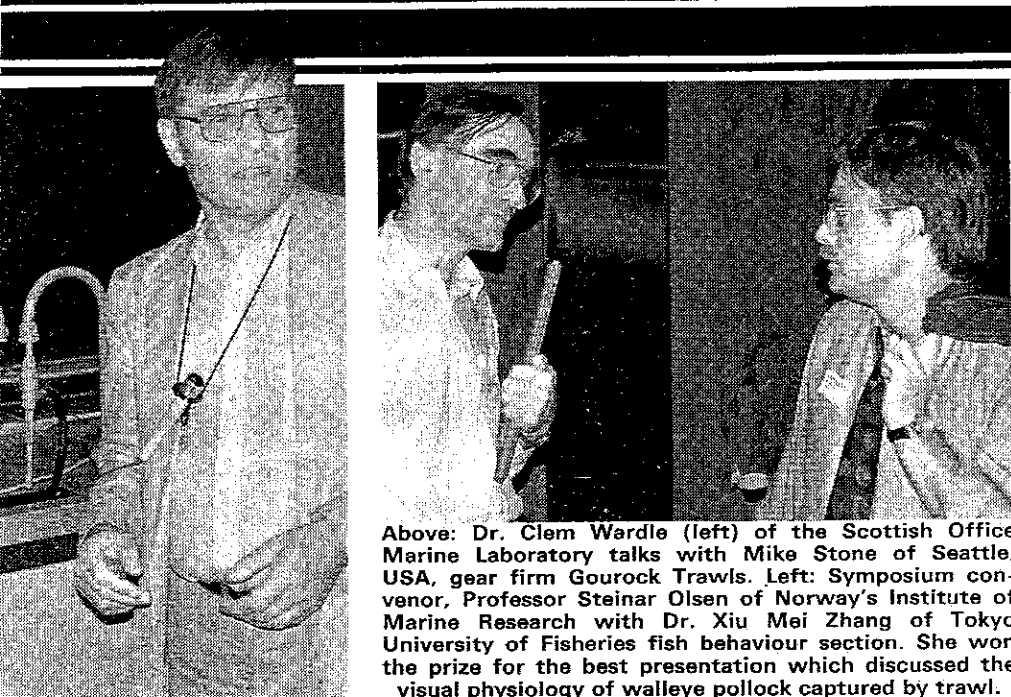
will be difficult to sustain in the future," he said.

He went on to tell delegates that, along with the trend of overfishing, has been an ever-increasing number of fish/marine mammal, bird, turtle interactions which have sent fisheries groups into confrontation with conservation groups.

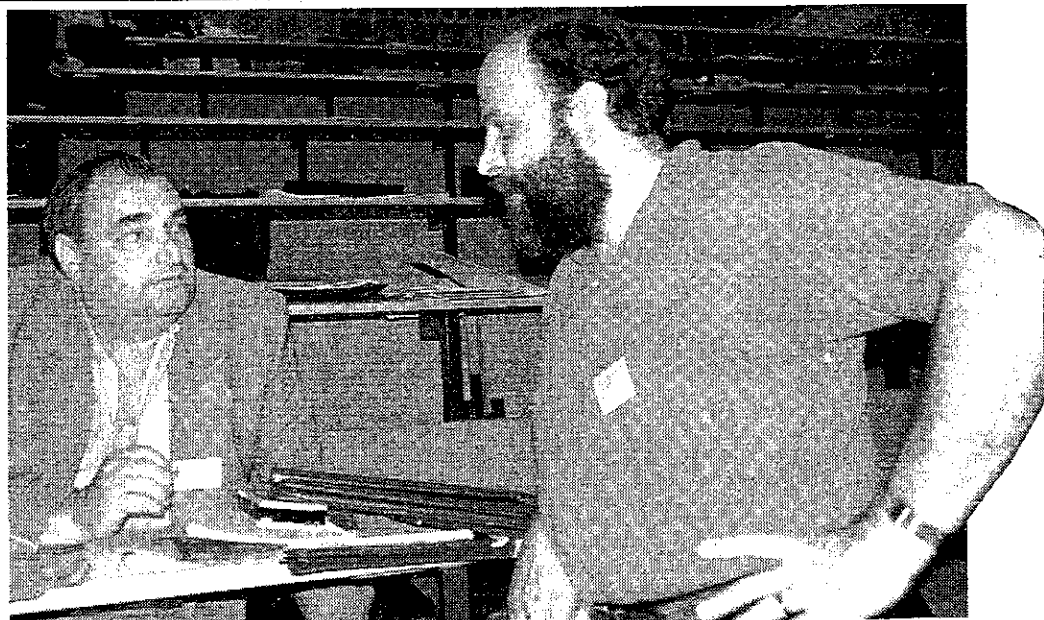
"For the first time in history we are facing a demand for the termination of a harvest by fishing gear based on global condemnation of the gear as being "dirty", "walls of death", indiscriminate killer" of the ocean's living resources and a threat to open oceans' ecosystems.

"Whether or not these claims are factually supportable is of little consequence because the perception of the gear and the political movement for its elimination will soon settle the fate of the high seas drift-net fishery.

"Those who may join with others to applaud this upcoming elimination of



Above: Dr. Clem Wardle (left) of the Scottish Office Marine Laboratory talks with Mike Stone of Seattle, USA, gear firm Gourcock Trawls. Left: Symposium convener, Professor Steinar Olsen of Norway's Institute of Marine Research with Dr. Xiu Mei Zhang of Tokyo University of Fisheries fish behaviour section. She won the prize for the best presentation which discussed the visual physiology of walleye pollock captured by trawl.



Dr. Bill West (right), research and development manager of US gear firm Net Systems, chats with David Tait of the Canadian gear and electronics firm Nordsea.

By-catch issues must be tackled

sent along representatives to the symposium in the hope of acquiring knowledge to help solve some of the pressing by-catch problems in US fisheries.

The Canadian fishing gear and electronics supplier Nordsea was represented at the fish behaviour symposium by David Tait.

I went along to report on the event for *FNI* readers and will be spotlighting some of the research in more detail in future issues. Potential solutions being researched today could be in industry use tomorrow, so I believe it is important to be aware of what is going on.

Viggo Jan Olsen, the Norwegian Director General of Fisheries, opened the symposium, saying: "Research on development of gear avoiding by-catches or protected species and gear better adapted to selecting the spe-

cies we aim at utilising should have the highest priority.

"Research related to stock assessment is, of course, of utmost importance, but it is not enough. Meaningful, sensible, stock management has to take into consideration how the fish reacts to various types of gear and how the fishing gear itself can help to avoid these stocks being wrongly utilised both with respect to the catch and juvenile fish."

Advice

Viggo Jan Olsen said that this is an area where the authorities need — and should be prepared to pay for — advice from scientists.

He went on to mention the sorting grid developed in Norway for shrimp trawls. "The use of this device has

become an alternative to closing fishing grounds" and fishermen voluntarily installed it before we ordered them to do it, he said.

Norway's Fisheries Directorate also has "great expectations" for the use of grids in other types of trawls, he revealed.

"I strongly feel that research in this field can't be left to industry alone," he said.

"The authorities — those responsible for the sustainable development of the fishing industry — must accept that responsibility of granting funds for this type of research."

Steinar Olsen, who through many years has influenced the strong feelings of Viggo Jan Olsen and others in this respect, went on to point out that fishery science is now confronted with finding solutions to management problems related to the requirements encompassed in the new term 'responsible fishing.'

He said these problems can be solved only by comprehensive fish behaviour research as a basis for what one might call creative conservation engineering.

The symposium proper began with summaries of ten papers on observations of fish reactions to mobile and static gears.

These included talks by Dr. Clem Wardle (UK) on fish behaviour and the capture process; Marc Soria (France) on the learning capabilities of tropical clupeidae using an artificial stimulus; Pingguo He (Canada) on the behaviour of cod around a fish trap; and Ole Arve Misund (Norway) on the packing density structure of herring schools.

Identification of factors determining capture efficiency and selectivity was covered by a further 12 papers. These were followed by ten papers on mathematical models, physiological factors and survival of fish after contact with gears.

They included a presentation by Dr. Xiu Mei Zhang of Tokyo University of Fisheries on the visual phy-

siology of walleye pollock in the capture process by trawl.

Techniques of observation were next discussed in 11 papers. They ranged from a review of techniques for observing fish behaviour in the sea, to an account of research on assessing the effect of bait competition on longline catch per unit of

effort using hook timers and direct video observations.

Applications of fish behaviour knowledge for developing fishing gear and methods with improved selectivity and reduced by-catch was covered by seven papers, including a Japanese account of research on the fish herding effect of an air bubble curtain.



Viggo Jan Olsen, Norway's Director General of Fisheries: "Research on selective fishing should have the highest priority."

overfished..

high seas gill-nets must also recognise that by-catch problems are not unique to high seas gill-net fisheries.

"The levels of by-catch in most fisheries within the EEZ of the coastal states is considerably higher than that observed for Korean, Taiwanese and Japanese high seas gill-net fisheries."

He says that many of these fisheries have not come under the detailed screening of the conservation community. The table, however, has been set, and the by-catch issue will increasingly become the most important confronting fish and wildlife management as we approach the next century.

"The future challenge of the fishing gear technologist will be the evolution of fishing systems and operational patterns that do not threaten or endanger non-target species and which minimise economic and biological waste of targeted and non-targeted species of fish and shellfish," he said.

While it was mentioned during the symposium that fishermen need to be made



Dr. Lee Alverson of US firm Natural Resources Consultants: "By-catch will become the most important issue for fish and wildlife management."

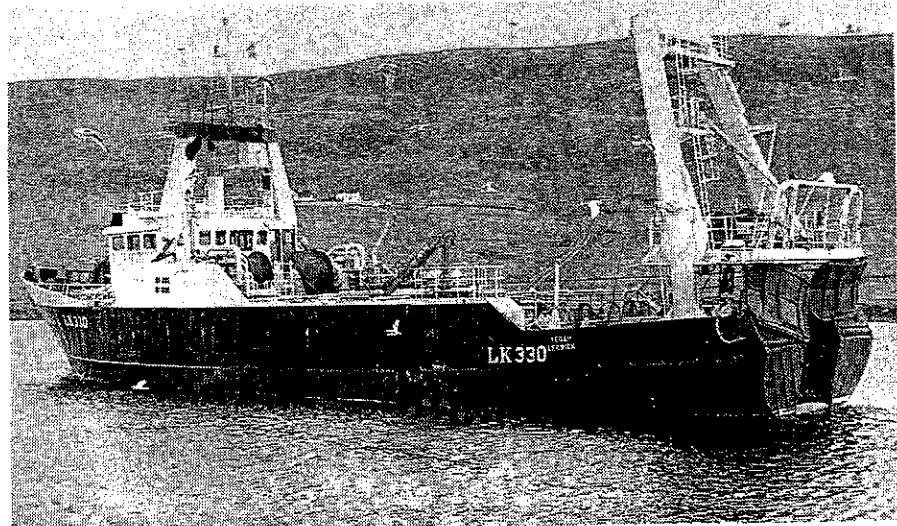
aware of the possibilities to fish more selectively, Dr. Bill West, Net System's research and development manager, maintained that fisheries managers need be made more aware that there are possibilities to fish selectively.

"At least in our country, I sense that they are rather pessimistic about it, and it becomes a self-fulfilling prophecy," he said.

"They don't fund selectivity research because they don't think it will work. I think we have the information at our disposal to convince them that it can work."

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