

G e a r a n d B e h a v i o u r C o m m i t t e e

By A.R. MARGETTS

1969

Belgium
(P. Hovart)



Comparative experiments on the drag between beam-trawl nets with different taper ratios were carried out.

Some selectivity experiments on semi-pelagic nets were also undertaken.

Work on standardization of net materials and netting was continued in co-operation with ISO. The following aspects were studied: terms and definitions, cutting rates, drawing of nets, testing of netting yarns and netting.

A preliminary theoretical study was carried out in the field of the electro-fishing in view of substituting the tickler chains by a system of electrical impulses for shrimp and flatfish fisheries.

Experiments with the pair trawl fixed to the booms of a double beam trawler were started.

Canada
(J.M. Anderson)

Salmon drift nets of different mesh sizes and of different twine material were used in 1969 in Canadian waters, and in West Greenland, to compare their efficiency in catching salmon and in providing fish in suitable condition for tagging. Best catch rates in each area using twisted Ulstron (polypropylene) nets were obtained with stretched mesh sizes of 5 to 5 1/2 inches (127 to 140 mm). However, nets of monofilament nylon (polyamide) with 6 inch mesh (152 mm) equalled best catch rates of the Ulstron nets in Canada and gave catch rates of 2.3 times that of the next best Ulstron mesh sizes in Greenland. Viability of the salmon taken, and proportion of the catch that could be tagged, increased with mesh size used and were best for the monofilament nets. Overall return rates in the Canadian experiment were 36% of the tags supplied; though monofilament nets gave a return of 47%.

Experiments to determine whether fish attempt to avoid or escape from noises produced by fishing gear continued in 1969 using sonic stomach tags (in cod) and tracking receivers, and with the recording of ship and trawl noise. The recordings were made with the gear approaching the hydrophone on the bottom as it would approach a fish. The equipment used was a hydrophone, 500-ft. cable, and a portable FM instrumentation tape recorder. Real-time spectral analysis equipment to analyse the recordings and to measure the noise in terms of frequency, level, and temporal pattern, has been started.

A computer programme has been developed to reduce the field data to a more usable form on the performance of the east coast otter trawl. The research programme is now moving strongly into its theoretical phase. This includes the application of known principles of fluid mechanics, and of stress analysis, to reveal further specific information on the trawls from the field data already collected, and the evolution of generalised engineering principles for trawl design which are demonstrably valid for Canadian east coast trawls. In preparation for a detailed engineering study of trawl door performance, an instrument package is being developed for use on the doors to measure door spread, tensions in the towing warps and in the ground warps at the doors, and the three angles (attack, pitch, and heel) required to define the attitudes of the doors. This package includes echo-sounder and transponder units for measuring door spread,

hydrostatic load cells with pressure compensation to measure line tensions, and electromagnetically-damped recording inclinometers to measure pitch and heel angles. Also, instruments described in previous years continue to be improved as indicated by experience with them. A new type of underwater warp angle meter has been designed and acquired, a vehicle for the headline height transducer has been made more stable, the understatic load cells have been fitted with overload protection, and the calibration technique for the underwater strain-gauge load cells has been improved.

Work continued on the response of lobsters to pheromones produced by the female at the time of moulting. A more efficient lobster trap is one application of this research. Although salmon are "visual feeders", the gustatory senses seem to be employed in food selection. Food pellets treated with dilute solutions of mercuric ion are rejected, while inert carriers treated with normal aliphatic acids longer than five carbon atoms in chain length are ingested. This work involves, in addition to conventional behavioural observations, neurophysiological recordings from the appropriate nerves enervating taste buds in the roof of the mouth and the neuromasts in the head region.

The locomotory migratory behaviour of returning adult Atlantic salmon, in relation to a variety of environmental factors, including known sources of pollution, was studied in the estuary of the Miramichi River, using sonic tagging techniques.

Denmark

(K.P. Andersen)

Investigations of the quantities and size compositions of salmon caught in drift-nets in relation to their positions in the nets were continued in the Baltic as in previous years. In this connection the viability of netted and discarded salmon below legal size was examined.

Experiments with nets of special constructions were carried out in order to tackle the problem of especially small salmon being retained by the triangular head meshes of drift-nets.

France

(R. Letaconnoux)

Technologie du chalut

Les principales études de plans ont porté sur différents types de chaluts:

- de fond à grande ouverture verticale pour les bateaux de pêche artisanale des ports du nord de la France et de la côte Atlantique,
- semi-pélagique pour la pêche du maquereau,
- pélagique à un bateau pour plusieurs espèces de clupeidés (hareng, sardine, sprat et anchois).

Des captures importantes de hareng ont été faites en Manche orientale au mois de décembre par les bateaux artisans travaillant en bocufs avec des chaluts pélagiques comportant des grandes mailles à l'entêteure.

Des essais de pêche de la dorade et du merlu aux chaluts semi-pélagique et pélagique effectués par un chalutier de pêche industrielle ont été suivis en Atlantique et de nouvelles données ont été recueillies sur la technique du chalutage contrôlé du hareng en Mer du Nord.

Il est à noter que plusieurs chalutiers pêche arrière, parmi les plus modernes de la flotte de pêche industrielle, ont orienté la quasi totalité de leur activité vers la pêche pélagique (hareng, maquereau) et que le chalutage pélagique de la morue s'est amplifié parmi les bateaux de grande pêche.

Etudes sur maquettes

Des études en commun de modèles réduits de chaluts à crevettes et particulièrement de chaluts à perche ont été effectuées par les belges, les hollandais et les français dans le bassin d'essai de Boulogne.

Des mises au point de gréement et de nombreuses démonstrations de maquettes de chalut ont été faites devant les professionnels des différents ports de France.

Sélectivité

Aucune expérience nouvelle sur la sélectivité des chaluts n'a été effectuée au cours de cette année. Toutefois des essais d'allongement des fils pour filets ont été conduits en laboratoire en vue de la détermination ultérieure de l'influence de cette propriété sur le facteur de sélection.

Germany

(A. von Brandt)

Fishing gear investigation

For trawl investigations, especially for bottom trawls with high opening and mid-water trawls, new types of "multinetsonde" have been developed. These apparatuses can operate up to 12 transducers alternately and give new possibilities to observe the behaviour of the gear as well as the behaviour of fish opposite the trawl. Recently the "netsonde" has been combined with a thermosonde.

Selectivity experiments

In 1969 selectivity experiments with bottom trawls were carried out off Iceland and Newfoundland. The new polyamide standard netting twine was used for the first time. Comparative fishing was made with cod-ends of polyamide of other makes or thicker twines (R 18 000 tex) and polyethylene. It was found that there is no significant difference between the selectivity of extra strong and "normal" netting yarns. This could obviate the need for topside chafers.

New experiments with salmon drift-nets in the Baltic confirmed the 1968 results in that there were no significant catches of smaller salmon when seam meshes with longer bars were used in nets without strops. Also the total quantity of catch seemed to be no smaller than in the drift-nets used till now.

A new type of mesh gauge for salmon drift-nets was proposed.

Net materials

As in previous years net materials of polyamide fibres dominated for trawls in deep-sea fisheries. This is especially true for mid-water trawls.

Fish behaviour

As in the previous years, the investigations concerning fish behaviour opposite fishing gear have been continued, especially the reactions of herring to mid-water trawls. This will also be put on the programme for 1970.

The investigations of fish reactions in respect to noises caused by vessels have been continued. It has been found that the main energy content of these noises is in the region below 100 cps. Tests inside the vessels have demonstrated that not only the sound producer is of interest, but also the construction of the vessel's frames and the hull-material. Up to now all investigations were limited to small crafts only.

Iceland

(G. Thorsteinsson)

Measurements of the sinking speed and closure of the net gap during pursing operation were carried out on capelin purse-seines.

A few experiments in pelagic trawling were undertaken. Due to scattered occurrence of pelagic schools the catch results were poor.

Search for deep-sea prawn fishing grounds was carried out with bottom trawls off the north coast in deep waters. Promising catches (100-200 kg/hour) of Pandalus borealis were obtained in a double cod-end selective trawl of French type.

The material testing service was continued.

Ireland

(D. de G. Griffith)

Cod-ends of Danish seines, bottom trawls and mid-water trawls were examined for mean mesh size (using the ICES gauge) and for the material used in their manufacture. The survey was carried out in areas VIIa and VII g-k.

Italy

(F. Matta)

Rien à signaler pour l'année 1969.

Netherlands

(J.G. de Wit)

A study was undertaken to estimate the loss of valuable fish through an artificial hole in the belly of the trawl. This was done by attaching escaping bags on different places of experimental beam trawls, and comparing data on escaping fish, especially soles, as well as of fish caught in the cod-end. It was found that if the hole was made not too close to the end of the net, fishermen will lose hardly any valuable fish (soles).

Also this year work on the new type of shrimp sieve was continued. The sieve consists of two co-axial cylindrical sieves which, unlike the obsolete type (the shaking mechanical sieve) works with a rotating rather than a shaking motion. The inner sieve separates the fish from the shrimps; the outer one separates the small shrimps from those of marketable size. The undersized shrimps and small fishes are swept together with a large amount of water and finally swim overboard through a wide flexible tube, virtually without suffering any damage. From 1970 onward the new sieve, owing to Government regulations, will be used by most of our shrimp fishermen.

Research to improve the usefulness of shrimp trawls with a separating panel has been continued.

The work to replace the big number and heavy weights of tickler chains of beam trawls by the introduction of electrified tickler chains is in progress.

Experiments to replace the tickler chains by other devices to reduce the towing resistance of the beam trawl gear were unsuccessful from the point of view of the catching performance of the gear.

Experiments to reduce the drag of a beam trawl for flat fish showed that the upper part of such a net can be cut away over a considerable length without the slightest reduction of the catching performance of the net and with a decrease in pull in the warps of about 15%.

Measurements of the towing resistance of mid-water trawls are in progress.

Pair trawls and mid-water trawls with 60 cm meshes in the front part of the net are coming into use more and more.

Trials to use a pair trawl by a single double rig boom trawler were successful.

Work on standardization of fishing nets continued in co-operation with ISO. The testing of netting yarns and netting has been studied by an ISO Working Group. The work is still in progress. Yarns for net making were 100% polyamide.

Norway
(L. Midttun)

Gear

Performance trials and construction of the new research vessel has been continued. Since it is a tool and platform for future experiments and field work in fisheries research, including gear and behaviour studies, the design of this vessel has been regarded as a task of great importance. The ship will be arranged for all sorts of fishing operations, and equipped with the most modern instruments, including a computer system for data logging, processing and presentation.

Preliminary work on a new purse-seine design has been carried out.

Behaviour

Laboratory experiments on hearing in fish are being continued. Nervous activity in response to pure tone and noise stimulation is recorded from the brain. Some preliminary results were presented at the Statutory Meeting of ICES in Dublin in 1969. In later experiments particular emphasis has been put on studying the effect of masking the response to pure tone signals with background noise of different frequencies and intensities.

At a field station studies on hearing direction of fish and their reaction to noise was continued. Preliminary results were presented at the Statutory Meeting of ICES in Dublin 1969.

A working group completed an analysis on the importance of noise to the effectivity of fishing operations. A report has been delivered to the Norwegian Director of Fisheries:

Acoustics

Work on improvement of acoustic methods for absolute abundance estimation have been continued.

Two sonic methods for estimation of abundance of fish, the echo integrator and the digital counter methods were compared on single and schooling fish in Lofoten, Norway during March 1969. Results are published in the J.Fish.Res.Bd. Canada 26.

Further studies have been carried out on the possibility for acoustic identification.

Poland
(W. Strzyzewski)

Investigations on the behaviour of cod, flatfish and herring in relation to the trawl when towing the net were continued in the Baltic. Experiments were conducted using a trawl with cod-end divided in two parts by a horizontal piece of netting.

Studies were continued on the improvement of different types of bottom and pelagic trawls. The introduction of polypropylene for construction of nets continued.

Portugal

Spain

Sweden
(G. Otterlind)

As in previous years some experiments have been done with one-boat pelagic trawl.

No remarkable changes have occurred in the use of net materials, etc. in the Swedish fishery during 1969.

Underwater TV and/or frogman equipment have been used to study the behaviour of the lobster, the edible crab, the Norway lobster and the deep-water prawn.

United Kingdom

1. England & Wales
(A.R. Margetts)

Fishing gear and apparatus

The ARL sector-scanning sonar installed on board R.V. "Clione" became fully operational with the interference noise from stabilisation hydraulics eliminated. Operators were trained in its use and the first of a series of observations were made on trawls fishing. On both pelagic and bottom trawls the towing warps, otter boards, bridles, headline, groundrope, net and cod-end were clearly discernible. At an appropriate range the whole of a Granton trawl could be seen in one picture. Fish shoals and individual fish were also seen.

Measurement was made of the spreads of a bottom trawl with various rigs of tickler chains.

Systematic measurement was made of net gape, spread and depth, otter-board spread and warp loading of a single boat pelagic trawl over a range of speeds and using various lengths of warp.

For the 100 kHz echo-sounder, a seabed-locked gating system was designed and constructed, enabling fish echoes to be counted to within 20 cm of the seabed regardless of contour changes. For both 30 kHz and 100 kHz sounders, a fish echo gating and signal processing unit was designed.

The automatic fishing time electronic recorder underwent successful extensive sea trials on a commercial trawler.

R.V. "Clione" took part in the FAO/ICES Acoustic Training Course at Svolver.

Co-operation was maintained with British Standards Institute and International Standards Organisation to establish standards for fishing nets.

Behaviour

An acoustic fish tag was developed especially for use with the sector scanner.

Detailed regular fishing records of a commercial North Sea trawler were analysed for indications of associations between catch and wind strength and direction.

The experiments with cod and perch to investigate tolerances and responses to hydrostatic pressure affecting buoyancy were continued with higher pressures.

Experiments were made on olfaction and feeding behaviour of whiting with a view to examining effectiveness of line baits, including artificial ones.

2. Scotland

(J.A. Pope)

A considerable amount of experimental work was carried out by Scottish research vessels into engineering aspects of trawl and seine behaviour and also the relationship between engineering and fish behaviour. A cruise was undertaken by "Explorer" in which comparisons were made between an experimental demersal trawl with large net and board spreads and a standard Granton trawl. It was found that the fishing power of the experimental gear was no better than that of the standard gear. This may have been due to the apparent instability of the larger gear compared with the Granton trawl. During this cruise the computer-based data logging system was in use. This system has, apart from a few minor problems with peripheral equipment, become fully reliable.

A number of advances in telemetry and instrumentation techniques were made during the year including the development of a reliable cored warp system which allows information to be passed from the otter boards to the ship without the need for additional cables or acoustic links.

Tests were made of the performance of a wide range of otter board types. Encouraging results were obtained with boards made of fibre-glass.

Pelagic trawls of various rigs and construction were tested on vessels of various sizes and some results indicated the real possibility of single small boat pelagic trawling on a commercial scale. Further studies of this type are planned.

An investigation was made of the effect on the selectivity of a trawl cod-end of using a large mesh outer cover. It was found that such a procedure could result in the lowering of the selectivity although experiments in previous years had not always shown this.

Underwater observations of the behaviour of fish in the vicinity of the mouth of a seine net were made as part of an extensive programme of underwater studies. In the field of underwater visibility attention was given to small scale variation in the optical properties of sea water and instrumentation for the prediction of visual range. Studies were also made of the reactions of fish to sound stimuli and the conditioning technique involving variation in fish heart-beat was again used in studies of hearing ability of cod and haddock.

Work has also continued on the improvement and development of a counting echo-sounder. Attempts to improve transducer design have been made and work was begun on improved time-lapse cameras for use in the study of fish behaviour.

U.S.S.R.

(A. Treschev)

Experimental marine investigations were conducted with the help of aerophotography to refine theoretical conclusions concerning the more reasonable form of opening and cutting out of trawls. A system of a continuous hauling of bottom trawls on side trawling fishing vessels was designed. A hydrodynamic board for attachment to a headrope of bottom trawls while operating at great depths has been developed.

In summer (July-August) 1969 underwater observations on fish behaviour were carried out on board the R.V. "Tunets". Fifty submersions were made in the observation chamber "Sever-I" at depths of 220 m. Studies were made on cod, long rough dab, rays and capelin. During these observations it proved possible to count fish and determine their species and lengths. Control trawlings confirmed results obtained during the visual observations. While the observation chamber was drifting capelin were not observed although the tape of an echo-sounder contained many echo-traces. Capelin are very fearful and elusive and so they were seen only when the observation chamber quickly submerged into a fish concentration.