RESTRICTED

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

Serial No.1706
(A.a.1)

ICNAF Comm.Doc.66/21

ANNUAL MEETING - JUNE 1966

Report on Eighth General Meeting of Scientific Committee on Oceanic Research (SCOR) of the International Council of Scientific Unions (ICSU)

by A.J.Lee

I attended the above meeting, which was held in Rome during the period 23-27 May, as a member of the U.K. delegation and a representative of ICNAF. Of the matters discussed the following will be of interest to the Research and Statistics Committee:

1. SCOR has a number of working groups: the future activities of these were examined. It was decided to abolish the three dealing with (a) Abstracts and Bibliography, (b) a General Scientific Framework (GSF) for study of the World Oceans, (c) Photosynthetic Pigments, but to keep an editorial board for the GSF and a rapporteur on Photosynthetic Pigments. The terms of reference and composition of some of the other groups were changed slightly. The Working Group on Zooplankton Sampling Methods, which is a joint SCOR/ICES/UNESCO group, is to be reduced in size as much of its work is finished and all that has to be done is to write the report and to complete the work on sampling micro zooplankton and fast-moving macroplankton. This group has built and tested a new net for sampling the zooplankton which is usually caught with a No.3 mesh (about 60 meshes per inch). The tests were carried out in wind tunnels in the Department of Aeronautical and Mechanical Engineering in the University of Sydney and at sea in Sydney Harbour in February this year. The group has also drawn up specifications for an unencased net and an encased sampler for sampling the larger zooplankton and it is hoped that sampler and nets to these specifications will be built and tested. The group is to prepare a monograph on plankton sampling methods for publication by UNESCO.

2. SCOR is an advisory body to the Intergovernmental Oceanographic Commission (IOC) and it considered various IOC resolutions. It decided to set up jointly with the ACMRR of FAO a Working Group on Marine Pollution in order to assist IOC. The SCOR nominees will cover physics, chemistry and biology. SCOR did not consider the IOC resolution on the possibility of carrying out cooperative investigations in the North Atlantic (See Comm.Doc.66/11) as it did not have before it any detailed proposals by the USSR, the original sponsors of the resolution in question.

3. SCOR held a three day symposium on variability in the ocean. Papers on biological variability were given on the first day and papers on physical variability on the second and the morning of the third. The final afternoon was spent in general discussion. Sampling theory, space and time variability, the analysis of time series, recording instrumentation, and the practice of working standard sections were topics all dealt with at length. The papers are to be published by the Consiglio Nazionale delle Richerche in Rome. As a result of this symposium it was decided to recommend to IOC that the time is not yet ripe for the working of a standard section in the North Atlantic on an international basis for a year as had been proposed (See Comm.Doc.66/11). Instead countries should be encouraged to carry out their own studies of variability in different areas, laboratories joining forces on a bilateral or multilateral basis as the need arises but not in a way such as to call for the establishment of a formal IOC program of work. SCOR intends to set up a Working Group on the Instrumentation for Time Series Measurements.

APPENDIX I

International Council of Scientific Unions

Scientific Committee on Oceanic Research

Eighth General Meeting, Rome, 23 - 27 May 1966

Report of the Chairman, Working Group 13 on Zooplankton Sampling Methods

Introduction

WG 13 can be said to have originated in January 1964 following discussions by various international and national bodies which have expressed keen desire to consider the possibilities of standardization of zooplankton methods where it was reasonably practical to do so.

A joint working group of SCOR, UNESCO and ICES was therefore set up to deal with this problem and at their first meeting in Paris 1964 a general plan was prepared.

Present were the convener, J.H.Fraser (ICES), Dr G. Humphrey (SCOR), Dr T. Parsons (UNESCO) and Prof. J. Krey (Chairman of the Plankton Committee ICES). As plankton covers such a great range of organisms, in size, shape, consistency, behaviour and taxonomic grouping no single standardized method is possible and arbitrary divisions become necessary, each with its disadvantages as well as advantages. Of these size was chosen as the most practicable and innocuous and the following terms of reference were agreed:

Terms of reference

To set up small working parties from experts in their particular fields of work, who will examine and consider the methods used at sea and in the laboratory in sampling zooplankton of various categories, and to make recommendations concerning the methods they consider the most satisfactory for general adoption. Where they consider present methods inadequate new methods should be recommended, based if necessary on new hydrodynamic or other research. Where it is possible to do so the working parties should compile a series of intercalibration factors between the methods most frequently in current use, and should consider the inclusion of factors for past methods especially where much data have been published.

There should be four such working parties in zooplankton (including fish eggs and larvae) to deal with:

(1) The microzooplankton, at present sampled by water bottle, very fine meshed nets and pump filters.

(2) The zooplankton now sampled by a great range of techniques, but largely dependent on filtration through a No.3 mesh (about 60 meshes per inch).

(3) The larger zooplankton, often sampled by stramin or other coarse meshed nets.

(4) The faster moving macroplankton, such as the larger euphausids and small fish.

We agreed that the working parties should be of a practical size and there should be five members to parties 1, 3 and 4 but seven for W.P.2 which has more complex problems, chosen from suitably experienced experts and representing as far as reasonably practical a world wide coverage of interests.

It is important to emphasize that while standardization of plankton methods would assist greatly in the comparisons of one area with another, and would help in the selection of gear by those needing such help, standardization

should in no way be interpreted as a bar to progress toward further improvements of methods, nor as a discouragement in the use of other more specialized gear for purposes where this is considered desirable.

It was agreed that an effort should be made to complete the work of WG 13 in two years time.

Personnel of the working parties

It was regarded as essential that the members of each working party should not only be experienced in the appropriate field but should be selected on as wide a geographic basis as possible. With a view to this all the countries represented in SCOR were asked to nominate suitable personnel for consideration by the convening committee and these lists were very helpful in selecting the W.P. members. Not all those first selected were able to give their services and those finally selected were:

Working Party 1

R. Currie	(UK) Convener
J. Krey	(Germany)
K. Banse	(USA)
V. Hansen	(Denmark)
I. McLaren	(Canada)

Working Party 2

A.W.H.Be	(USA) Convener
N. Della Croce	(Italy)
A. Boudillon	(France)
A. de Decker	(South Africa)
B. Kimor	(Israel)
E. Hagmeier	(Germany)
B. Bogorov	(USSR)

Working Party 3

D. Tranter	(Australia) Convener
N. Vannucci	(Brazil)
J. Gehringer	(USA)
M. Vinogradov	(USSR)
L. Anraku	(Japan)

Working Party 4

P. Foxton	(UK) Convener
W. Aron	(USA)
M. Legand	(New Caledonia)
T. Nemoto	(Japan)

Although these members are given with their nationality, their representation on the working parties is to be entirely international. The Chairman of WG 13 would endeavour to attend any working party meeting if this was desired by the convener and would also act in an advisory capacity by correspondence with all four working parties.

Financial

To help keep expenses within reasonable bounds we expected the working parties to do much of their work by correspondence, but some meetings would certainly be necessary. The costs of the working parties would be borne on an equal basis between SCOR, UNESCO and ICES. Although an assessment of costs beforehand could not be expected to be accurate, a figure of 12,000 U.S. dollars was estimated, i.e. 4,000 dollars for each of these three organizations over a two year period. Each organization agreed to meet costs up to this estimated figure.

Reports of the Working Parties

Working Party 2 was the first to complete its preliminary work by correspondence and arrangements were made for a meeting to be held at Villefrance, September 28-30 in 1965, as convenient a location and date as possible for the members and immediately prior to the Rome meeting of ICES, thus saving some travel time and expense. Acknowledgement is given, with appreciation, to Dr Bougis for his permission to use the facilities of the Station Zoologique for the meeting. All the working party members except Prof. Bogorov were present, with Dr Hempel (UNESCO) and Fraser (as Chairman of WG 13). Because of the necessarily close affinities between W.P.s 2 and 3, we had the benefit of the help and advice of D. Trenter, Convener of W.P.3, and Dr M. Vannucci who was to attend the I.B.P. meeting in Rome.

After very fruitful discussions, W.P.2 decided to recommend a net with the primary purpose of sampling the biomass, within the w.p. size range, from the upper 200 metres of water. Details of this net and its use are given in the interim report of this meeting. (In mimeograph issued by Dr Allan Be dated October 1965, 13 pages). The net was designed using the personal experiences of those present and their knowledge of the publications on the subject. Two of the recommended nets were made, one in USA (through the help of Dr Be) and one in Australia (through the help of David Tranter) with a view to testing them hydrodynamically and then making such modifications as the tests showed to be desirable. Testing was carried out at the University of Sydney during the Symposium on the Hydrodynamics of Plankton Nets (see below). The design proved to be very satisfactory indeed and required only minor modifications to take full advantage of tests to improve its efficiency. The modified design should make an excellent net for its purpose. It could be called the "International W.P.2 Net" which is distinctive and refers to its origin.

The interim report of W.P.2 is now being considered by various experts and a final report in the light of their comments and including the modifications to the net, should be ready for duplication shortly.

W.P.2 also made recommendations about the care of the net and the preservation of samples. They considered the possibility of intercalibration of the various nets in current and past use but decided that this was an impossible task during their tenure of two years and not likely to be a fruitful exercise during an extended tenure.

Their report concludes with the following recommendations for future work.

(1) Hydrodynamic and field testing of our standard samplers and acquire basic knowledge of net design and high-speed samplers in relation to water flow, plankton behaviour, concentration, and patchiness. Research on materials (e.g. net material).

(2) Development of a telemetering depth-flowmeter, electrically opening-closing samplers, a shipboard flowmeter calibration tank, and a flowmeter with digital dial operated magnetically.

(3) Research toward elimination of bridle and other obstructions in front of net - as related to plankton avoidance of nets.

(4) To study effect of ship's shock wave and noise on plankton sampling.

(5) Development of a standard method of processing plankton samples in the laboratory.

(6) To prepare a "Manual of Plankton Sampling Methods" to accompany our recommendations.

Symposium on the Hydrodynamics of Plankton Samplers

The suggestion to hold this symposium was first proposed by David Tranter as a valuable way to provide the background knowledge necessary to the proper functioning of W.P.3. It was logical to recommend that it be held at

Sydney, where the right facilities were readily and freely available at the University of Sydney through the courtesy and cooperation of the Department of Aeronautical and Mechanical Engineering, and where all the prior organization could be done on the spot without additional expenditure.

The idea was strongly supported by W.P.2 and by ICES, and thanks to help from SCOR and UNESCO, it was possible to hold the symposium at Sydney in February 1966. There were 27 participants plus 7 observers from Australia, and 38 contributions were given.

The Symposium started with two days practical testing at the University of Sydney. Here experimental work was carried out:

(1) Using model nets in wind tunnels with visible smoke trails. Models of various meshes and length of cone were tested without and with clear perspex cases to represent encased nets such as the Gulf III; nets were held at different angles and using various degrees of artificial clogging.

(2) Testing the W.P.2 net in a larger wind tunnel. A hot wire anemometer was used to give a full picture of the flow and turbulence over the whole diameter of the net at various distances in front of it, and including the effects of the bridles and to ascertain the best position for the flowmeter.

(3) Testing the Clarke-Bumpus net for flow and filtration coefficient using various meshes and lengths of cone and at various speeds in the water test tank.

The W.P.2 net was also tested from a boat in Sydney Harbour to ascertain wire-angles and behaviour at sea.

Much of great value was learned at the Symposium and it is a pleasure to record appreciation of the very helpful cooperation of the staff of the University of Sydney, of the excellent organization by the convener David Tranter of CSIRO through the courtesy of Dr Humphrey.

It was suggested that UNESCO publish in their monograph series a review based on the papers contributed to the Symposium and prepared in seven chapters. (See W.P.3 report) Some of the papers presented at the symposium were being prepared for publication elsewhere, others were concerned with work not yet completed, and it was considered best to publish in this review form rather than publish the individual papers as suggested on p.50 of SCOR Proceedings Vol.1, No.2.

Working Party 3 met at the CSIRO laboratory, Cronulla, immediately following the symposium and thus had the great benefit from it in the consideration of their problems and recommendations. They considered that the W.P.2 net with a mesh of 200μ, designed primarily for biomass, would probably sample also the zooplankton within the size range arbitrarily chosen for W.P.3 sufficiently accurately for biomass assessment. This conclusion takes into account that the larger organisms are relatively scarce numerically compared with the smaller ones. The main purpose of W.P.3 would then be to recommend a sampler of a coarser mesh that would sample the larger organisms in as quantitative a manner as possible from a large quantity of water and not retain the smaller more numerous organisms. This would be a great help in sorting the catch for identification and assessment of populations, as collections made with a fine-meshed net are too overcrowded with the small organisms. Sieving in the laboratory does not overcome this problem as the small organisms stick to the larger ones in the preservative and so mask their characteristics - this is specially true of coelenterates.

W.P.3 considered that time at sea was important and to minimize loss of time, and to filter adequate quantities of water, high speed nets were desirable. Most high speed nets of current design had very reduced mouth apertures and they thus filtered relatively small quantities of water, though the small volume filtered had the advantage that the flow through the actual meshes of the net count be reduced with the consequent improvement of condition of the catch. A design of sampler was needed which would be hydrodynamically sound,

filter a large quantity of water at high speed yet keep the catch in good condition, and be as easy to handle as possible. They recommend a design of net for use during the interim period while a suitable high speed sampler was designed and tested.

W.P.3, like W.P.2, considered intercalibration factors for samplers in current use impracticable.

W.P.3 made the following recommendations:

"1. That an encased sampler with a net of mesh aperture 1 mm be designed to sample the larger zooplankton, its specifications to be dictated by the following considerations:

(i) That the sampler should filter at a rate of not less than 20 m^3/minute.

In addition it would be useful to measure also the speed of the sampler *in situ*.

(ii) That the flow through the sampler should be metered.

(iii) That the mesh velocity (exit velocity from the meshes)....?

(iv) That there should be no obstructions ahead of the sampler mouth.

(v) That the sampler should tow in a stable manner and the drag be as low as possible.

(vi) That the sampler be fitted with a depressor capable of taking it to a depth of at least 200 m at a speed of at least 6 kt.

(vii) That the sampler should be fitted with an acoustically operated opening closing action and a depth sensor telemetering to the surface, and that space should be left available for further modules if required.

(viii) That the sampler be robust and non-corrodable.

(ix) That the net and the catch be easy to remove and the flowmeter easy to read.

(x) That the sampler be as small as possible consistent with the above requirements.

2. That a simple unencased net with the following specifications would serve as the best interim sampler for the larger zooplankton:

(i) Mouth of 1 m^2 consisting of a 3/4" (approx. 2 cm), outside diameter, ring of galvanized tubing.

(ii) Net with a cylindrical forward part, 57 cm long, and a conical after part, 200 cm long, strengthened with 6 longitudinal tapes not more than 2 cm wide.

(iii) Gauze of monofilament nylon of mesh aperture 1 mm.

(iv) Throat of dacron sailcloth not more than 12 cm wide to be wrapped around the ring. Notches at 3 equidistant points to take the bridle lugs.

(v) Bridle of 3 legs equal in length to the mouth diameter.

(vi) Flowmeter to be placed 25 cm inside the ring. It would be useful also to have a second flowmeter outside the net to measure the speed of the net through the water.

(vii) Bucket to be light in weight.

(viii) Towing speed to be 2-3 kt.

(ix) Sinker to be either a dead weight of approximately 40 kg or an equally efficient depressor.

(x) It is considered that there is no satisfactory way of closing this net.

3. That a list be made of the facilities available throughout the world, suitable for testing plankton nets, e.g. test tanks, circulating water channels, wind tunnels, etc.

4. That further research be undertaken to find the best practical means of telemetering information from the sampler to the surface and telemetering control signals from the surface to the sampler."

W.P.s 1 and 4 have at the time of writing this report made some progress by correspondence but have not yet come to final conclusions. It is hoped that they can finish their deliberations by correspondence, though this would be slower than by meeting. If reports are ready in time for the meeting in May they will be presented in the form of addenda.

Implementation of Recommendations

WG 13 has made very real and very satisfactory progress toward the introduction of sampling methods at sea for the middle-size groups of plankton organisms - i.e. those size groups that have to date been sampled by the greatest diversity of methods.

We have made recommendations for the adoption of a standardized net for biomass sampling, which we hope will be internationally adopted and for the design of a net for sampling the larger zooplankton until a more satisfactory encased high speed sampler has been designed. This, too, we hope will be internationally adopted. ICES Plankton Committee at their 1965 meeting in Rome recommended "that as soon as the recommendations from the working parties on the Standardization of Zooplankton Methods organized by ICES/UNESCO/SCOR are available, the member countries of ICES should cooperate in comparative tests with the recommended gear". It is hoped that other countries and institutions throughout the world will also adopt these recommended gear, where necessary as an addition to their own specialized equipment.

We have also made recommendations for future work, some of which we consider can be left in their present form to stimulate relevant research by interested laboratories, but SCOR should help by publicizing them. Other recommendations should be given special impetus. The most important of these is the recommendation to ask appropriate institutions, which have the necessary facilities, to design the best possible encased high speed sampler in accordance with the points laid down by W.P.3. Such an impetus could come either from the SCOR executive or from the convener of WG 13 with the backing of SCOR, UNESCO, and ICES.

SCOR could also, we believe, help by organizing the preparation of the list of facilities available for testing plankton nets (W.P.3 recommendation 3). The recommendation of W.P.3 (Rec.4) concerning telemetry is closely linked with W.P.2 (Rec.2) and in this connection it is useful to state that at the October 1966 meeting of ICES a joint session of the Plankton and Hydrographic Committees will have as its main theme "The present use of recording and telemetering apparatus in plankton research and hydrography".

The W.P.2 recommendation 6 is largely covered by W.P.3 in their paragraph "B" (Annex) concerning the review of plankton sampling methods to be published by UNESCO.

The future of WG 13

WG 13 was given, in the first place, two years to do its work. They have made very considerable advance in that two of their four W.P.s have completed their task, apart from editing final reports; the other two - if their work is not completed by the time this report is presented - should follow with

their recommendations before long.

No progress has been made towards the production of intercalibration factors between various methods as this is considered impracticable or would involve an undue amount of effort that could be better spent on more fruitful pursuits.

On the original remit, therefore, WG 13 needs to continue only to finish off those items well on the way towards completion, and to take such action as is necessary toward the implementation of its recommendations. If WG 13 is now disbanded, having been in existence for its two years, the chairman would have no official backing from SCOR to attend to this. It should therefore be retained as a working group for another year.

Working party 2 has recommended that "a small permanent international committee be set up to keep standardization of plankton sampling under review and to make such recommendations as may be advisable". I envisage this not as an unlimited prolongation of WG 13 but that SCOR should periodically set up a work-group to look into this question. The choice of period for review would be decided by SCOR executive, but I would expect something in the order of five years or more would be adequate, and the personnel would be chosen afresh each time. I believe this to be a sound recommendation as further research will undoubtedly lead to improvements in methods that will gradually make the present recommendations of WG 13 out of date.

WG 18 has suggested (page 88 of SCOR Proceedings Vol.1, No.2) that the terms of reference of WG 13 "be extended to include a guide for the presentation of biomass data and qualifying information to World Data Centres (and specialized centres, where such exist, for international expeditions)". They also recommend (page 89) that WG 13 (with other WGs) consider whether data on presence and abundance of the various taxa "can be submitted to W.D.Cs. in a breakdown and with the supplementary information as far as possible compatible with the data forms given in the 'Manual' of NODC, Washington".

These suggestions of WG 18 need special consideration in the question of the future of WG 13 as they came too late to be included in the topics discussed by the WG 13 working parties. The members of the four W.P.s were selected for their abilities to discuss the original terms of reference and it may well be that they should complete only their original duties. Rather than prolong the existence of WG 13, SCOR should consider the advisability of selecting new personnel for the new topic and to set up a new WG.

Against the continuation of WG 13 for the purpose of considering the placing of zooplankton data in W.D.Cs. are:

(1) WG 13 is a joint group of SCOR, UNESCO and ICES and any extension of remit would need the approval of all three.

(2) This would also involve approval for expenses on an equal basis or the introduction of a new scheme for financing WG 13.

(3) The original convening committee of WG 13 (see page 1 of this report) no longer exists as such owing to changes in representation at SCOR and UNESCO. This small group would not be the most appropriate for discussing plankton and W.D.Cs. Alternatively the present WG 13 working parties have a total membership of over 20 which is too large and would involve unnecessary expenditure.

(4) It is not always good policy to continue the existence of working groups by changing their remit.

As Chairman of WG 13, I wish to express appreciation of the help given by SCOR and by UNESCO in the duplication and dispatch of letters and reports, and of the work and time given by the working party conveners and members with such generous enthusiasm.

James H. Fraser
Chairman WG 13

ANNEX

A. The International W.P.2 Net

W.P.2 recommended the net for biomass sampling to be a conical net 57 cms diameter mouth (0.25 m^2), a side length of 250 cm, made of monofilament nylon with a mesh aperture of 200 microns, and a filtration ratio of 5-1. The results obtained at Sydney suggest that the shape be modified so that the first part of the net is cylindrical which would then increase the self-cleaning properties of the net and reduce the effects of clogging.

Arrangements have been made for monofilament nylon material with this size of aperture by various manufacturers to be comparatively tested in Hamburg under the supervision of Dr von Brandt.

Organisms 200 to 10 mm are considered to be adequately sampled for biomass by this net. An estimate of total biomass could be obtained by using the sampling methods recommended by W.P.s 1, 2 and 4 and separating from each sample those organisms within the sampling range of the next sized larger sampler, and adding those left together after adjustment for volume of water filtered.

B. The Review of Methodology

W.P.3, following the symposium in Sydney, have recommended the publication by UNESCO of a volume on methodology which would include the following chapters:

1.	History of plankton sampling	- Fraser
2.	Gauzes	- Heron
3.	Flow patterns	- Tranter and Smith
4.	Loss through the meshes	- Hempel and Vannucci
5.	Avoidance	- Anraku and Clutter
6.	Field techniques	- Aron and Gehringer
7.	Design of sampling	- Cassie

This would take about 100 pages and be followed by a bibliography and an appendix on terminology.

C. The W.P.3 Sampler

The points made by W.P.3 for consideration in the design of a sampler are suggested as ideals. In practice these ideals cannot be achieved without making the sampler larger than can be conveniently handled, so that a sacrifice of ideals will be necessary. W.P.3 will discuss this by correspondence so that some indications of where and how far the sacrifices should be made can be given to the designer.