International Council for the
Exploration of the Sea

C.M.1989/H:2
Ref.: G

REPORT OF THE WORKING GROUP ON INTERNATIONAL YOUNG FISH SURVEYS

Copenhagen, 10 - 12 January 1989

T A B L E   O F   C O N T E N T S

1 TERMS OF REFERENCE, PARTICIPATION

At the 1988 ICES Statutory Meeting, the Council decided that the ICES Working Group on International Young Fish Surveys would meet at ICES Headquarters from 10-12 January 1989, with the following tasks:

a) discuss the problems encountered in the provision of final survey results,

b) evaluate the sampling areas for herring and sprat,

c) discuss improvements in the collection of environmental data,

d) discuss further standardization of the fishing methodology,

e) discuss the appropriate gear for sampling herring larvae,

f) evaluate the standard retrieval procedure from the data base.

The meeting was attended by the following persons:

T. Boon	UK (England and Wales)
A. Corten	Netherlands
H. Dornheim	Federal Republic of Germany
O. Hagström	Sweden
H. Heessen (Chairman)	Netherlands
J. Lahn-Johannessen	Norway
P. Munk	Denmark
A. Newton	UK (Scotland)
A. Souplet	France
H. Sparholt	Denmark

Dr H. Dooley and Mr W. Panhorst attended from the ICES Secretariat.

2 DATA EXCHANGE AND PROCESSING

2.1 Data Base

2.1.1 Current status

An overview of the present status of the data base is given in Table 2.1. All data are at present loaded in a single data base domain. As shown in Table 2.1, data for the years 1983-1988 are complete, but for the years 1970-1982 many data are still missing. A serious problem is the insufficient exchange of gear parameters.

The coordinators in the national laboratories are urgently requested to review which data are available, and submit the gear parameters that are not yet exchanged previously to the Secretariat as soon as possible.

The data base (DB) administrator informed the meeting that the runing costs for the data base are rather high. Recently a project has been started, in which tests will be made whether it is feasible to move the data base from the University Computer

Centre to a Sun workstation. An important factor that possibly
will determine the outcome of these tests, is the size of the
data base and, thereby, the number of years to be stored on-line
in the data base. The DB-administrator pointed at the difference
in data reporting from and prior to 1983, and suggested whether
one had not to conclude that the historic data will never become
complete and whether one should not aim at a shorter - but com-
plete - historic data series, thereby reducing the immediate size
of the data base. Further, the DB-administrator asked whether it
was still desirable to have a data base consisting of a series of
years rather than of a single year. Earlier years could be down-
loaded on tape and rolled-in whenever needed. Although this will
delay queries for data covering more than one year, such queries
are relatively infrequent and one might possibly accept the de-
lay.

In the following discussions it was noted that in the 1970's the
conditions in the North Sea were markedly different from the
present situation, and that, therefore, the historic data set
might contain valuable information. However, it was also noted
that from 1976 the GOV trawl was introduced, and that not every
participating country started to utilize this trawl immediately
from 1976. It was therefore doubted whether the information
stored in the data base, that possibly might reflect the change,
could be of much value. In addition, sampling methods applied in
earlier years cannot always be compared with the methods applied
in more recent years.

In 1987 the IYFS Working Group had decided that the range of
years to be loaded on-line in the data base should be 14 years,
thus allowing a comparison between VPA estimates of younger age
groups and the data available in the data base. In view of what
was said earlier, the meeting emphasized this decision once more.
Applying the decision to the present status of the data base
means that the data base will contain data from 1976, and this
fits well with the time of introduction of the GOV trawl in the
survey. Most participants commented that, in principle, one will
be able to provide historic data from the time of introduction of
the GOV trawl.

The possibility of a different length of the time-series for main
species and for by-catch species was discussed. The DB-adminis-
trator commented that this would be difficult to implement with
the present data base structure.

The meeting then decided that the data base shall always contain
14 years of data: the 13 most recent years and allowing one year
of earlier year's data to be rolled-in when required.

2.1.2 Description of standard retrieval procedures

The DB-administrator presented a paper "Computation of Aggregated
IYFS Standard Tables and Charts" (Pedersen, mimeo 1988). The
table descriptions refer to the standard tables numbered 3.2 to
9.1. In previous meetings the Working Group had defined the
tables in a different layout than the one in which they are pro-
duced at present. However, the data coordinators, meeting in May
1988 in the Secretariat, had concluded that the Working Group's

format was in many aspects impractical, and a new set of tables was consequently designed.

The paper is the first of its kind that in a mathematical form describes the computations of the various analyses and the path followed in the process of converting length distributions to age distributions on basis of aggregated age/length keys.

The Working Group expressed its appreciation of the paper, and concluded that it gives in almost every aspect a proper description of the various methods. It noted a minor discrepancy between the calculation of the age distribution as given in the paper (and hence as done by the programs) and the calculation as actually required:

If no length/age key is found in the data base matching a particular length, the program tries to find a length class above and below the given length for which length/age keys are available. The program always tries to find the closest length class above and below, and the length/age key for the given length is computed as an average of these two new length classes, weighted by their number of otoliths.

The Working Group noted that the approach of finding a length below or above is correct, but that the searching process should stop as soon as at least one length class, either below or above, is found (whichever is closest): it is not required that always two length classes are available. Two length classes are only selected in case they are distanced from the original length class by an equal size.

In case only one length class is found, its age/length key is copied to the length class for which one originally intended to access a key.

In case the searching process hits the lower or upper limit for the length of a species, the length/age key for the original length class will be set to unknown.

2.1.3 Annual Technical Report

The IYFS Technical Report for 1988 (Anon., 1988c) was presented, and as it was the first time such a paper was available, the Working Group was asked for comments.

The report contains various errors and warnings found while preparing the standard tables, mentions some special circumstances with regard to the data and gives some general administrative information. The Working Group discussed the report and suggested a few improvements that will be incorporated in future reports.

2.1.4 Annual Survey Report

The Annual Survey Report (Anon., 1988d) was discussed and it was decided to implement the following changes in its contents:

- The charts with the total number per hour per haul for a species are replaced by a chart that displays the number per hour per haul for age group 3^+.

- The Hydrographer's report on IYFS data is from now on included in the Annual Survey Report.

It was noted that the presentation in the charts of IKMT data in the report is different from the GOV data. The Working Group commented that the visual presentation of the IKMT data should continue, but that yearly a table with the actual IKMT data should be sent to the contact persons in the national laboratories.

Some members of the Working Group did not receive a copy of the Annual Survey Report, and it was noted by all participants that the small print in the report was unfortunate for the reproduction of the charts. It was therefore decided that the chairman will receive a copy of the original A4-sized report, who will then distribute the report in A4-size to the Working Group members.

Olle Hagström and Arnauld Souplet were appointed as coordinators for the Annual Survey Reports in 1989 and 1990, respectively for the sections on herring/sprat/mackerel and roundfish.

For the previous two Annual Survey Reports the two coordinators met in the Secretariat for two days in May to check the standard output from the data base with the DB-administration. As all procedures that are followed to produce the output are now fully described, and no problems were detected in the standard output for 1988, the Working Group decided that it will not be necessary for the coordinators to continue with these meetings. However, the Working Group does not rule out that in some special circumstances the Secretariat might need assistance from the coordinators.

Therefore, the Working Group recommends, that in future years, at the Council's expense, one or both coordinators will be able to meet in Copenhagen to draft the Survey Report, if the Chairman of the Working Group considers this necessary.

However, normally the report will be prepared by correspondence. The deadline for receiving survey data by the Secretariat is set to 15 April. Not later than 1 June the coordinators will receive the standard output from the ICES Secretariat. The coordinators will prepare drafts for their sections, to be sent to the chairman of the Working Group for final editing. The Annual Survey Report will be printed by the Secretariat.

2.2 Exchange of Provisional and Final Data

2.2.1 Deadlines

Consideration was given to some relaxation of the deadlines for submission of survey data. Although in 1989 the Roundfish Working Group will meet later than usual, the other working groups using the IYFS results (Industrial Fisheries and Herring South of 62°N)

meet shortly after the end of the survey. Also, the final analysis should be available to ACFM at their meeting in May.

So the Working Group decided not to change the present deadlines:

Type of data	Address	Deadline
Preliminary data on numbers per specified length group and number of IKMT hauls	RV Tridens: Telex 36544 Radio 2431 kHz	During survey
(Only if data have not been exchanged by telex):		
Record forms with preliminary data on numbers per length class	H. Heessen, RIVO, P.O. Box 68 1970 AB IJmuiden	End of survey
Tape with preliminary length data and possibly ALKs on commercial species	W. Panhorst, ICES, Palægade 2-4, DK-1261 Copenhagen K	10 March
Tape with final results GOV-GOV-trawl catches	W. Panhorst, ICES	15 April
Record forms with final results IKMT sampling	P. Munk, Danish Institute for Fisheries and Marine Research, DK-2920 Charlottenlund	28 March
Hydrographic data	H. Dooley, ICES	1 May

2.2.2 GOV-data

In previous years, some countries had problems to provide their data in time. No future delay is expected in the submission of the final Danish data. With respect to the Federal Republic of Germany, problems are mainly due to a lack of manpower to read otoliths and to punch the data. Therefore, the same procedure will be followed as in 1988 and data will be punched by the IJmuiden Institute. Furthermore, it was suggested to reduce the number of otoliths and to collect no more otoliths as recommended in the manual.

With regard to Norway problems mainly arise from a lack of manpower to read the gadoid otoliths. In this respect the Marine Laboratory in Aberdeen offered to read the cod, haddock and whiting otoliths collected by Norway in 1989.

2.2.3 IKMT data

Reporting data

The catch of herring, sprat, eels, and krill should be reported on standard record forms. Reporting of other species is optional. The records (i.e., paper forms) are sent to P. Munk, Danish Institute of Fisheries and Marine Research, and entered to the database at this institute.

Database

All available information on catch of sprat and herring has been entered to the database for the period 1977-1988 (year classes 1976-1987). The file is indexed with keyed access to records. Exchange copies are available by tape or floppy disc.

2.2.4 Hydrographic data

Temperature and Salinity

According to current instructions, temperature and salinity measurements are made at each GOV-trawl station for at least the surface and bottom layer (survey manual). These data should be reported separately from the fish data to the ICES Hydrographer, either on tape or on paper (Anon., 1985). The ICES Hydrographer, after editing, includes the data in the ICES hydrographic data base. He also provides bottom temperature and salinity for each trawl station to the manager of the IYFS data base, for inclusion in the data base.

The question was raised whether it was sensible to load the same data into two separate data bases. If data in the hydrographic data base are for some reason amended, there may arise a discrepancy between the two sets of data. It was pointed out that scientists studying the relationship between trawl catches and hydrographic parameters would prefer in any case to go to the hydrographic data base, as the information contained in the IYFS data base would be insufficient. In some of the deeper parts of the North Sea and Division IIIa, the water is stratified in February, and data just for the bottom layer would not adequately describe hydrographic conditions in the whole water column. Moreover, it would be necessary to consider data over a longer time period than just the day when a particular trawl set had been made.

For these reasons, it was decided to remove the bottom temperature and salinity from the IYFS data base. Instead, each haul in the IYFS data base will be given a hydrographic station number which refers to the corresponding data in the ICES hydrographic data base. The change in the data base will already be implemented in 1989. The necessary change in the exchange format will be implemented in 1990.

The ICES Hydrographer pointed out that some participants usually are very late in reporting temperature and salinity data. He kindly asked all participants to adhere to the agreed deadline of 1 May for the submission of hydrographic data.

The Working Group proposed that summarized results of temperature and salinity sampling, until now presented as a separate report to the ICES Statutory Meeting, could better be included in the annual survey report. This means that the ICES Hydrographer will become co-author of the annual survey reports.

Nutrients

The situation concerning nutrient sampling seems to be in a dead-lock at the moment. After several requests for nutrient sampling had been made in the past by ACMP and the Working Group on Shelf Seas Oceanography, the participants in the IYFS were encouraged to add nutrient sampling to their existing programmes. Some countries complied with this request; others were not able to do so because they did not have the manpower or expertise available to analyse the samples.

In order to try and solve this problem, the ICES Hydrographer in 1988 contacted various national laboratories with the request whether some of them could analyse additional samples, collected by countries that had no opportunity for analysis. Unfortunately, the response to this request was negative.

The present situation is such that only England and Scotland col-lect nutrient data and provide them to ICES. Norway and the Fed-eral Republic of Germany are collecting nutrient data, but for some reason do not supply them to ICES. Denmark, France, and The Netherlands do not collect samples because of lack of manpower. Sweden has surveys immediately prior and after the IYFS survey, of which the data are reported to ICES, and therefore does not measure nutrient data during the IYFS survey.

It is obvious that this situation cannot be amended until some action is taken by hydrographers that are directly interested in this programme. If all countries that presently collect nutrient samples would supply their data to ICES, only a relatively small area of the North Sea would remain uncovered. The ICES Hydro-grapher could inform the IYFS Coordinator of the remaining gaps in sampling coverage, and specify some minimum requirements for sampling intensity in the remaining squares (1 or 2 samples per rectangle). Given some proper instructions for collecting the samples, ships working in these squares could collect the samples and preserve them for further analysis. The total number of ad-ditional samples collected in this way would be in the order of 50-100. If synoptic nutrient sampling over the entire North Sea has indeed a high priority for the hydrographic community within ICES, it should not be too difficult to find one or two labora-tories that would be prepared to analyse the additional samples.

For the time being, the IYFS Working Group will wait for initiat-ives from the ICES Working Group on Marine Chemistry and ACMP.

2.2.5 Changes in exchange tape specifications

The exchange tape format is in many aspects rather inefficient. However, making drastic changes in the format will mean that all established procedures for tape exchange in the national labora-tories and in the Secretariat will have to be adapted. This will

jeopardize the exchange program, and the Working Group referred to an earlier decision that major changes in the format should be as infrequent as possible, to be implemented only if there are very good reasons to do so.

Some minor adjustments were however decided upon, that are not expected to be difficult to implement:

Record type 1 (haul information)

DELETE the following items:

position   name

57 - 60   bottom temperature
61 - 64   bottom salinity

INSERT the following items:

position	name	type	m/o	range	comments
57 - 64	Hydro stat.no	8A	O		Station no. given to the hydrographic measurements Not given: space filled.
96 - 98	Door spread	3N	O	50-150, space	In meter.

It was decided that the change is to be implemented starting with the 1990 exchange. However, participating countries must for 1989 submit cross reference lists with the haul numbers and the hydrographic station numbers on paper to the DB-administrators.

2.3 **Use of the Data Base**

The IYFS data base system became fully functional during early 1987, providing relevant indices for various working groups in 1987 and 1988 and the necessary tables and charts for the final reports for 1986, 1987, and 1988. The data base will continue to provide these two main functions in the future.

It is recommended that a subset of aggregated data be provided for on-line retrievals by interested working groups.

In addition to the previously described existing and proposed uses of the data base, ad hoc retrievals have been made use of in, for example, the following ways.

Using 1- and 2-group cod, haddock and whiting from 1983-1985 surveys intership comparisons were made, the potential influence of a 50% reduction in effort investigated, and possible effect of depth, temperature, and salinity on catch rates was looked at (Buijse and Daan, 1986).

A poster has been produced describing the history of the IYFS and giving a number of examples of available standard retrievals (Heessen and Computer Section of ICES, 1988).

From the raw data for all species caught during 1983-1985 surveys mean catch per one hour haul was calculated. By comparing the catch rates of the species with known biomass (from VPA or MSVPA) with the catch rates of the other species a total biomass of all North Sea fish was calculated (Sparholt, 1987).

An analysis of abundance, behaviour, distribution, etc. by species of rays was made from raw survey data and a general linear model was applied to test the effects on the catch rates of rays of year, vessel, depth, time of day, area, and interactions of the class variables (Vinther and Sparholt, 1988).

Data on the distribution by area and year of Norway pout, haddock, whiting, and herring were used to analyze the change in the by-catch of human consumption species in the Norway pout fishery (Basson et al., 1988).

An examination has been made of the usefulness of geostatistical methods of calculating abundance indices using IYFS data for haddock and cod (Anderson, unpublished).

The IYFS data base was used to describe the geographical distribution of various MSVPA species in a preliminary investigation of the effect of geographical overlap in the MSVPA output (Anon., 1988[a])

IYFS data were used to describe the spawning grounds of North Sea cod in Macer and Parnell (1988).

A study of biology and distribution of dab over three years (Tassel, 1988) and an analysis of the distribution of flatfish species by length groups during the 1987 survey (Lefebvre, 1987) have been done using the raw data.

An analysis of long rough dab data has been made for a number of years for inclusion in a thesis on the species, biology and distribution (Harding, in prep.).

It is intended to include IYFS data in a proposed Atlas of North Sea Fish (Heessen, Hislop, Harding, and Daan, 1988).

The catches of 1-group herring from the IYFS for 1978-1986 will be used with herring larvae data to analyse larval growth and drift and subsequent recruitment of herring (Munk, in prep. for the Fish Population Biology Symposium, Aberdeen, 17-21 July 1989).

The data base contains four levels of data. In addition to the exchange data, aggregation levels are built into the data base that may be of interest to potential users. An overview of the various levels follows:

Level 1 is the level with the raw exchange data. The format of the exchange file is not compatible to the format of the data in level 1. By a conversion process the exchange file is broken down

into various record types, one each for haul information, species data, length frequencies, and smalks. From these record types the exchange file can be re-constructed by a special retrieval.

Level 2 is the first level of aggregation. Length frequencies are aggregated by species and statistical rectangle, excluding invalid hauls for all species and night hauls for herring. Smalks are aggregated by species and sampling area.

Various parameters are available to define the set of data to be aggregated and the actions to perform on the aggregation. For example, one can subtract data from an aggregation if a replacement set of exchange data is received. To administrate this process automatically by the retrievals, a special record type is defined in level 1, where time and day data are used to administrate whether or not level 1 data have been aggregated or not.

As a rule, length frequency aggregates are always updated for all main species and the by-catch species, while aggregated smalks are standardly updated for the main species only.

Level 3 is a further aggregation of the smalks. This level is built in the construction of the standard tables, and contains the relative length/age distribution for the aggregated smalks from level 2. Occurrences of record types in this level are not updated regularly.

Level 4 contains information not depending on the year of exchange, such as species names, ship names, etc.

Users interested in receiving a copy of the data base description can receive one from the DB-administrator.

3 SURVEY METHODS

3.1 GOV Sampling Areas for ALKS or SMALKS

The survey manual presently specifies two different sets of sampling areas for age and maturity: one set is for herring and sprat, and the other for roundfish and mackerel. The herring/ sprat sampling areas are sub-divisions of the larger roundfish sampling areas.

The use of two different sets of sampling areas complicates the work at sea. Also, the use of a relatively high number of herring sampling areas results in a large number of standard tables being produced during the analysis of the data.

The Working Group wondered whether geographical differences in age/length for herring and sprat were so pronounced that they really justified a special treatment for these species. If not, herring and sprat could be sampled in the same way as all the other species, and the special herring sampling areas could be abandoned.

Such a decision could only be taken after a closer inspection of existing data; a task for which there was no time during the present meeting. The Working Group therefore asked the IYFS data

base manager to produce the following output from the data base
for the years 1986-1988 for herring and sprat:

- A set of ALKs based on the present herring sampling areas.

- A set of ALKs based on the roundfish sampling areas.

- The mean number per statistical rectangle for age groups 1 and
  2 per roundfish sampling area.

The output will be sent to the Chairmen of the Herring Assessment
and the Industrial Fisheries Working Groups. These Chairmen could
then, in consultation with their Working Groups, decide whether
the differences between various herring areas within one round-
fish area were large enough to justify a continued use of the
finer herring sampling areas.

If the herring sampling areas are combined into the larger round-
fish areas, the sampling intensity for herring and sprat will
drastically decline, because ships will collect only one age/
length sample per roundfish area instead of 2-7 as they used to
do. In that situation, one should consider an increase in the
number of otoliths taken per length class, in order to prevent a
too drastic drop in sampling intensity for age (Appendix I).

The Working Group in that case decides on a sampling intensity of
8 otoliths per length class for herring and sprat.

Concerning the Skagerrak/Kattegat area, it was noted that age/
length data for herring areas 81 and 82 were too different to al-
low a combination of these data into one ALK for roundfish area
8. However, this does not only apply to the herring data, but
also to roundfish. The ICES Working Group on Division IIIa stocks
has asked for a split in IYFS roundfish data between Skagerrak
and Kattegat (Anon., 1986). The present Working Group, therefore,
decided that the existing roundfish area 8 should be split into
two new areas 8 and 9, with the dividing line at $57^0 30'N$ from the
1989 survey onwards.

A question related to the grouping of age/length data into large
sampling areas, is whether the possibility remains to re-group
the data into different areas at some future time. Although it is
not the intention of the Working Group to re-arrange existing
age/length data very frequently, it would be advisable to keep
this option open for special occasions. For this purpose, it is
necessary that participants report their age/length data on a
haul basis, and that they are stored this way in the data base.
At the moment this is done for the majority of countries. Only a
few countries report their age/length data solely by sampling
area, and these data cannot be re-arranged at some future oc-
casion. The Working Group therefore recommended that these
countries should also try and report their age-data on a haul
basis.

3.2 GOV Standard Areas

Mackerel

The Mackerel Egg and Recruitment Workshop (Anon., 1988b) has re-defined the standard area that should be used for calculating in-dices for mackerel abundance. This new standard area, shown in figure 3.1, comprises nearly the entire North Sea sampling area.

Herring

The existing standard area for herring comprises a set of 57 rectangles in the central and southern North Sea. These rec-tangles were originally selected on the basis of complete cover-age during the years 1967-1973, or on catches of more than 1,000 herring in any of the years during that period. Now that sampling in recent years has covered nearly all rectangles in the central and southern North Sea, there is a case for adopting a more regu-lar and coherent standard area, instead of retaining the old and irregular one, which sometimes causes errors and confusion.

The obvious choice would be to make the new standard area coin-cide with roundfish sampling areas 2, 4, 5, 6 and 7, which covers approximately the same part of the North Sea as the old standard area. Preliminary calculations have shown that survey indices based on this combination of roundfish area are very strongly correlated with the existing series of survey indices, and there-fore probably would be equally adequate to predict recruitment.

There might be an argument, however, to decide on a much larger standard area, which includes also the northern North Sea. In recent years, significant catches of 2-group and older herring have been made in the northern part of the North Sea, and indices for the abundance of these age groups might also be of interest to the Herring Assessment Working Group.

The Working Group decided to refer the question of a re-defi-nation of the herring standard area to the Herring Assessment working Group. This Working Group could also consider the possi-bility of including Skagerrak/Kattegat into the standard area.

For the present herring standard area, daylight fishing is com-pulsory. If the standard area is changed, a decision has to be taken whether or not the instructions for daylight fishing should apply on the whole of the new standard area. This decision will partly depend on the outcome of the studies on day/night effects described in the following section.

3.3 GOV Day/Night Hauls

The present procedure used as regards the rules for day and night hauls was questioned in relation to a possible change of the her-ring standard area. The present instruction for fishing exclus-ively during daylight in the herring sampling area is based on a wide-spread belief that catches of herring are higher at daytime than during the night. However, the effect of the time of the day on the catch rates of the various species has never been quanti-tatively investigated. The Working Group was of the opinion that

the computerized IYFS data base now offers opportunities to examine this in detail. This can, however, not be done during a short meeting like this, and the Working Group would, therefore, strongly encourage individual scientists to make these analyses as soon as possible after this meeting. Ways of doing such analyses were shortly discussed, and it seemed that GLIM models, like those used by Hunton (1986), Shepherd and Forrester (1987) and Vinther and Sparholt (1988) can be helpful in this respect. Such models can isolate the day/night effect from other factors influencing the catch rate such as the depth, vessel, year and area. The ICES Secretariat is willing to supply IYFS data on relevant aggregations on request for this purpose.

To investigate the day/night problem further, comparative day/night hauls will be made by the Netherlands during the IYFS in 1990. Denmark will do the same, if possible, and other countries are encouraged to do likewise.

3.4 Fixed Stations

The problem of using fixed stations instead of the semi-random procedure used at present has been raised several times in the past. The computerized IYFS data base now offers opportunities to investigate this problem in detail. Also, this job is probably best dealt with as an intersession job, and scientists are encouraged to do so. According to Hunton (1986), a large increase in accuracy of a survey index can (under certain circumstances) be obtained by using a fixed station procedure.

The procedure used at present is here called a semi-random procedure, because most vessels choose between a limited number of trawl tracks within each square. A real random procedure cannot be used because of the risk of gear damage when fishing in "unknown" areas. With respect to the variabilities of the final indices, the semi-random procedure is expected to be similar to a real random procedure.

3.5 GOV Fishing Methods

The Group evaluated the present standard method and agreed on the following amendments and clarifications.

The recommended fishing speed should be 4 knots and measured as the speed over the ground. The speed should be measured with an accurate navigation system or preferably directly on the gear during trawling.

The minimum warp length at any depth should be 150 m. Measurements of door spread have demonstrated the close relationship between swept area or swept volume and the warp length and it is strongly recommended that the given warp length/depth ratio should be followed.

The measurements of door spread also shows that the present method with two different sweep lengths used in depths less or greater than 70 meters gives relatively large variation in swept areas. The Group considered the merits of changing the standard

method but agreed not to do so until the effects on the trawl and the indices are analysed.

To facilitate an analysis it was agreed that the door spread should be measured during trawling. The mean value in meters should be recorded on the exchange tape (ref. section 2.2.5).

It was agreed when setting up the IYFS data base that gear parameters should be reported together with biological data on the exchange tape. From an inspection of the status in the data base it is clear that several countries have not followed this recommendation. It is therefore reiterated that gear parameters should be submitted to ICES as soon as possible to make it possible to analyse relations between catch rates and gear performance.

3.6 IKMT Design

Further investigations on the performance of the IKMT were made during a cruise in 1987 (Munk, 1988). The efficiency of the gear was shown to be low and dependent on gear speed.

Due to the resulting problems in standardization of sampling the use of the present design was reconsidered. It was decided to investigate the possibilities of using either an IKMT with a fine-meshed net or using a small frame trawl (MIK) (Munk, 1988). Trials with both gears will be made early in 1989. Dependent on the outcome of the investigations the Working Group members will, by correspondence, consider a change of standard gear from 1990. In case of shift to another design, thorough calibration between the two versions should take place to ensure continuation of the time series of indices.

3.7 IKMT Coverage and Fishing Methods

The Working Group considered the problems of a poor coverage in the central areas of the North Sea. Especially rectangles in sampling areas 23 and 61 are often left unsampled. A comparison between annual distribution patterns of larvae shows that differences in larval abundance in central areas are of importance to the overall abundance estimate. Thus the Working Group recommends that, in case of limited time available, priority should be given to coverage of central areas.

In order to improve the standardisation of IKMT-sampling it is important that the participants adhere strictly to the rigging- and sampling descriptions in the manual.

New investigations on the vertical distribution of larvae (Munk, 1988) show that larval distribution could extend below 50 m water depth, and it is recommended that the maximum fishing depth for Skagerrak is changed from 50 m to 100 m.

4 RECOMMENDATIONS

The IYFS Working Group recommends:

- That in future years, at the Council's expense, one or both coordinators for the Annual Survey Report will be able to meet in Copenhagen with the administrators of the IYFS data base to draft the Report, if the Chairman of the Working Group considers this necessary.

- That a subset of aggregated data from the IYFS data base be provided for on-line retrievals by interested Working Groups.

- That as soon as possible individual scientists make analyses on the IYFS data base to investigate

  i) the effects of the time of the day on the catch rates of various species,

  ii) the problem of using fixed stations instead of the semi-random procedure used at present.

5 REFERENCES

Anon. 1985. Report of Working Group on International Young Fish Surveys in the North Sea, Skagerrak and Kattegat. ICES, Doc. C.M.1985/H:2.

Anon. 1986. Report of Division IIIa Demersal Stocks Working Group. ICES, Doc. C.M.1986/Assess:18.

Anon. 1988a. Report of the Multispecies Assessment Working Group. ICES, Doc. C.M.1988/Assess:23.

Anon. 1988b. Report of the Mackerel Egg and Recruitment Workshop, 25-29 January 1988, Aberdeen. ICES, Doc. C.M.1988/H:3.

Anon. 1988c. IYFS technical report 1988. ICES, mimeo, 1988.

Anon. 1988d. Report on the International Young Fish Survey in the North Sea, Skagerrak and Kattegat in 1988. ICES, Doc. C.M.1988/H:8.

Basson, M., Bay, J., Baddington, J., Gloerfeld-Tarp, B., Nielsen, N.A., Rosenberg, A., and Sparholt, H. 1988. The consequences of increased North Sea herring, haddock and whiting abundance for the fishery for norway pout in the North Sea. An EEC report. Contract number 1946, 12 June 1987.

Buijse, T., and Daan, N. 1986. Sources of variation in IYFS indices of abundance - a preliminary analysis. ICES, Doc. C.M.1986/G:55.

Heessen, H.J.L, and the ICES Secretariat computer managament section, 1988. The International Young Fish Survey. ICES, Doc. C.M.1988/G:8 (Poster).

Heessen, H.J.L., Hislop, J.R.G., Harding, D., Daan, N. 1988. A proposed Atlas of North Sea fishes - a discussion document. ICES, Doc. C.M.1988/A:4.

Hunton, J.W. 1986. Areal and temporal sources of variation in the English North Sea groundfish survey. ICES, Doc. C.M.1986/G:15.

Lefebvre, V. 1987. Analyse des distributions de taille de sept espèces de Pleuronectiforme en Mer du Nord - DEA (Océanographie) -Université de Bretagne Occidentale - 30 p.

Macer, C.T., and Parnell, W.G. 1988. North Sea cod: simulation of a closure of the spawning grounds. ICES, Doc. C.M.1988/G:13.

Munk, P. 1988. Catching large herring larvae: gear applicability and larval distribution. J. Cons. Int. Explor. Mer, 45:97-104,1988.

Pedersen, L. 1988 Computation of aggregated IYFS standard tables and charts. ICES mimeo, 1988.

Shepherd, G. and Forrester, J. 1987. Diurnal variation in catchability during bottom trawl surveys off the Northeastern United States. ICES, Doc. C.M.1987/B:44.

Sparholt, H. 1987. An estimate of the total biomass of fish in the North Sea with special emphasis on fish-eating species not included in the MSVPA model. ICES, Doc. C.M.1987/G:52.

Tassel, M. 1988 Biologie halientique de la limande (_Limanda limanda_, L., 1758) en Manche Orientale et Mer du Nord -Thèse doctorat (Biologie). Université des Sciences et Techniques de Lille I - 238 p.

Vinther, M., and Sparholt, H. 1988. The biomass of skates in the North Sea. ICES, Doc. C.M.1988/G:48.

APPENDIX 1

Herring Otolithing Strategy

At present each herring sampling area is visited by two different vessels. Given that the minimum level of herring otolith sampling is 3 per 1/2 cm, each sampling area generates the possibility of 6 otoliths per length group. If the total number of otoliths taken in each herring area are aggregated into the relevant larger gadoid areas, the following minimum number of otoliths are likely to be currently obtained:

Roundfish Area	1	2	3	4	5	6	7	8
No. of herring areas	5	5	5	5	5	7	2	2
No. of vessels	11*	6	6	4	4	14	4	1
Otoliths (at 3 per 1/2 cm)	33	18	18	12	12	42	12	6

*Area 12 is surveyed by 3 nations (Norway/Federal Republic of Germany/Netherlands).

If the herring areas are abolished and the roundfish sampling strategy is applied, given the present allocation of blocks, there would need to be a revision to the minimum number of oto- liths taken by each nation. Some options are listed below:

Roundfish Area	1	2	3	4	5	6	7	8
No. of herring areas	1	1	1	1	1	1	1	1
No. of vessels	6	4	3	3	3	5	4	1
Otoliths (at 3 per 1/2 cm)	18	12	9	9	9	15	12	3
Otoliths (at 6 per 1/2 cm)	36	25	18	18	18	30	24	6
Otoliths (at 8 per 1/2 cm)	48	32	24	24	24	40	32	8

Table 2.1 Status of the IYFS data base as per January 1989.

Country	1988	1987	1986	1985	1984	1983	1982	1981	1980	1979
Denmark	+	+	+	+	+	+	+	X	X	+
France	+*	+	+	+	+	+	+	X	−	−
Germany, Fed.Rep.	+	+	+	+	+	+	−	−	−	−
Netherlands	+	+	+	+	+	+	+	+	+	+
Norway	+	+	+	+	+	+	−	−	−	−
Sweden	+	+	+	+	+	+	−	−	−	−
UK (Eng. & Wales)	+	+	+	+	+	+	+	+	−	−
UK (Scotland)	+	+	+	+	+	+	+	+	+	+

* By-catch species received but not yet placed in the data base.

Country	1978	1977	1976	1975	1974	1973	1972	1971	1970
Denmark	+	+	+	+	+	+	+	+	X
France	−	−	X	X	X	X	X	X	X
Germany, Fed.Rep.	−	−	−	−	−	−	−	−	−
Netherlands	+	+	+	+	+	+	+	+	+
Norway	−	−	−	−	−	−	−	−	−
Sweden	−	−	−	−	−	−	−	−	−
UK (Eng. & Wales)	−	−	−	−	−	−	−	−	−
UK (Scotland)	+	+	+	+	+	X	X	X	X

+: received
−: not received
X: no survey

Figure 3.1 Standard area for calculation of mackerel abundance indices from the North Sea International Young Fish Surveys.