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REPORT OF THE WORKING GROUP ON THE EVENTUAL ESTABLISHMENT OF AN ICES ADP SYSTEM FOR FISHERY STATISTICS

Charlottenlund, 23-26 February 1976

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Report of the Working Group on the Eventual Establishment of an ICES ADP System for Fishery Statistics

1.1 Participants

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Mr R C A Bannister	U.K.
Mr D de G Griffith	Ireland
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Mr R Behrens	Norway
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Mr E Nielsen	Denmark
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1.2 Terms of Reference

C.Res.1975/2:30 stated as follows:

"It was decided, that:

(i) the ADP Working Group should meet from 23-26 February 1976 at ICES Headquarters to:

(a) draw up a specification for appropriate computer software (programs) to be implemented within the ICES FISHDAT System, for handling the data used and calculations carried out by the North Sea Flatfish Working Group, and prepare in a form suitable for punching, flatfish data for a trial run of the proposed system;

(b) develop further the specification (record format, etc.) of the various computer files to be handled by the ICES FISHDAT System and define the links between these files;

(c) produce an estimate of the total workload required to create files of herring and flatfish data;

(d) assess the suitability of the format and contents of Bulletin Statistique, Volume 59 (including Tables A-L) and advise on any changes required to be made in succeeding volumes;

(ii) in order to facilitate the work of the Group it is felt to be essential that:

(a) the Working Group meets during the time of, or immediately after, the next meeting of the North Sea Flatfish Working Group so that members of the latter Group can participate in discussions on Item (i)(a) above;

(b) the Convener of the ADP Working Group contact, before the next meeting of the ADP Working Group, members of the five Fish Committees of ICES, the Statistics Committee and the Baltic Fish Committee with a view to ascertaining their impressions of the new-style Bulletin Statistique.

1.3 Agenda

1. Bulletin Statistique.
1.1 Review of production of Part II by ADP methods (Vol 58, 1973).
1.2 Review of Part I, Tables A-K, and Part II, Table 10.

2. New version of ICES FISHDAT system.
2.1 Description of new version.
2.2 Review of new Trial Run on North Sea Herring.
2.3 Future work.

3. Data Input Forms.

4. Specification of Trial Run on North Sea Flatfish.

5. Any other business.

In addition to dealing with these items the members of the Working Group spent some time each day on familiarisation trials of the system from remote terminals. This provided an invaluable means of gaining first-hand experience of the present stage of development of the command language and the processing facilities so far available and in recognising those areas where further development is most urgently required. (See section 3.3 below).

2. Bulletin Statistique

At its meeting in 1975 the Working Group finalised plans for the production by computer of a limited number of tables in the next Bulletin Statistique. Subsequent to that meeting the next volume, volume 58 (1973 data), was published in which Tables 1-5 had been produced by ADP methods using part of the ICES FISHDAT system. The other tables had been produced directly from typescripts. The Working Group examined this volume and commended the development so far. It noted that all the earlier recommendations of the Working Group had been implemented in the layout of the tables. It was agreed that the computerisation of Table 7 (Quantity of Fish Landed by some Countries for which Data Concerning the Fishing Effort are Available) should be the next development.

2.1 Review of Introductory Tables

The Working Group examined the content and layout of the introductory tables of the Bulletin Statistique and made the following recommendations: Table A. (Percentage of total catch taken by each country, 1962 and last four years). The title should explain that the percentages refer only to catches of fish (ie to the totals in Table 1) and do not include invertebrates. It is felt that the data on invertebrate catches are not yet sufficiently accurate to warrant treating them in the same way as the vertebrate material and that the title of this table should be "Percentage of total fish catch (Table 1) taken by each country compared with 1962".

Table B. (Percentage ratio of the national catches in each of the last four years to the catch in 1962). The same comments apply as for Table A.

Table C. (Ratios to 1962 of the returns of some of the most important species), and Table D (Catch of the principal fish in percentage proportion to the grand total in 1962 and the last four years). Both these tables are thought to be useful and should be retained, but the species listed in both tables should be the same. Some of the species in Table C are no longer among "the most important" - notably brill, turbot, halibut, ling, rays and skates - and do not warrant retention. Capelin, horse mackerel and Norway pout, on the other hand, have shown a great increase in importance in recent years and should be included in Tables C and D. The titles of the tables should be, Table C "Catches of some fish species compared with 1962 (=100)". Table D "Catches of some species as percentages of the total fish catch (Table 1) compared with 1962".

Table E. (Proportion (%) of the total catch of sole, plaice, cod, haddock, hake and herring taken by different countries, 1962 and the last four years.) The species capelin, saithe, Norway pout, whiting, horse mackerel, sprat and mackerels should be included. The section for each species should commence with the total catch of that species by all countries in each of the years in question and should conclude with the percentage catch by "Others", or a single (named) country as appropriate, in order to bring the coverage up to 100%. The title should be "Percentage of the total catch of some species taken by different countries compared with 1962".

Table F. (Landings from the most important fishing grounds, 1962 and the last two years). Data for the Faroes Grounds (Vb_1 and Vb_2) should be included. The total catch for all areas in each of the years should be given at the top of the table, followed by the percentage catch in each named fishing area. The space thus saved by dropping the absolute catch figure in each of the fishing areas could be used to include the last four years rather than only the last two. The title should be "Landings from the most important fishing grounds compared with 1962".

Table G. (Catches of different species in principal fishing areas in the last year, and percentage of total fishing area catch.) (Only catches of more than 10 million kg.) The total catch of all species in that fishing area should be given at the beginning of each section of the table and space for the inclusion of data for more years should be created by omitting the figures of absolute catches as in Table F. The title should give the cut-off point as being 10 thousand tons rather than 10 million kg.

Table H. (Catches of the most important fish in the different countries in the last year.) The title should state that the cut-off point is 0.1%. Absolute catches for each species should be omitted but totals for each country should be placed at the opening of each section of the table.

Table J. (Member countries' catches, including invertebrates, in the ICES statistical area and their total catches - including catches in freshwater - in 1962 and the last three years.) The Working Group recommends that this table be maintained without change.

Table K. (Species composition of grouped categories in Table 5.) The following wording (taken from the introduction to Volume 57 of the Bulletin) should be included at the beginning of the table:

> "Catches of those species which, although reported as individual items on the Statlant forms submitted by member countries, are grouped together in the "Various" categories in Table 5".

The following information could also usefully be stated below the title:

> "Category total" signifies that the quantity refers to a group of species such as Gadoids and Macruroids. "n.e.i." means "not elsewhere included".
>
> " * indicates that the area distribution is the same as that given in Table 5 for the grouped category".

Table K. (cont.)

The Working Group suggested that the readability of the table would be enhanced if the group titles (Freshwater fishes, for example) were to be centred in the column rather than placed at the margin.

Table L. (Nominal catch by non-member countries in the ICES statistical area in the last year). The Working Group recommended that statistics relating to non-member countries continue to be published in this table.

2.2 Review of Table 10

Table 10. (Monthly quantities in thousand metric tons, landed from the North Sea). This table presents monthly catch data, rounded to one decimal place in units of thousand-tons, for twelve species. The antecedent of Table 10 first appeared in the Bulletin in 1932, giving the data as percentages of the North Sea total for the year for seven species (brill, cod, haddock, herring, plaice, sole, turbot). In 1961 the contents were extended to cover the twelve species asterisked on the Statlant 27B form as being of special interest, and the figures were altered to give the absolute catches instead of percentages. No changes in the table have been made since then. The Statistics Committee is invited to consider the desirability of publishing monthly catch data for the same twelve species in each of the ICES statistical divisions, in the same way as herring data currently appear in Table 11. This would mean the disappearance of Table 11 since it would be absorbed in the new Table 10.

2.3 Introductory Commentary

The Working Group was of the opinion that a commentary in the introductory section of the Bulletin, analysing the latest trends in the fisheries of the ICES Statistical Area, would be extremely useful. It suggests that the ICES Statistician be invited to present such an annual commentary to the Statistics Committee as a Council Meeting document prior to its publication in the Bulletin. The Working Group also felt that the Statistician should use his discretion as to the species to be included or deleted in the introductory tables in order to highlight recent developments and that this discretion might be exercised in consultation with the Chairman of the Statistics Committee where necessary. The value of continuity in the published material should, of course, always be borne in mind.

2.4 Future Requirements

Anticipating future calls on the ICES Statistical System arising from changes in fishing limits consideration should be given to the possible future needs of member countries and international agencies for data related to a 200 mile limit. The Working Group suggests that any proposals for altering the existing ICES fishing areas should not be countenanced since this could effectively bring about the collapse of the ICES Statistical System. Most of the problems could be met if countries were to comply with the annually repeated Council resolutions calling for catch (and fishing effort) data by statistical rectangles. In this regard the solution undoubtedly lies with the member countries themselves and their own statistical systems.

3. The ICES FISHDAT System

In its first report (ICES CM1972/D:7) the Working Group defined the essential features of a computer system for handling ICES Statistical requirements.

The ICES FISHDAT System (cont.)

During 1973 and 1974 development of the two main components of such a system, one for handling the filing and publication of fishery statistics, and the other for satisfying the requirements of Assessment Working Groups, was begun. The latter component was based on a file management software package, OSIRIS, implemented on an IBM370 computer at NEUCC*. Initial trials, using a limited amount of material relating to North Sea herring, were reviewed by the Working Group (ICES CM1975/D:2) which recommended that greater operational flexibility and improvements in the format of output tables would be required before the system could be offered as a tool of significant value to the Assessment Groups. Work to achieve such improvements was undertaken during 1975/6 by members of the Danish Institute and resulted in the development of an on-line interactive facility based on a data management system (DMS1100) implemented on a UNIVAC 1110.

3.1 Brief Description of the New System

The new system provides on-line access to data files previously created by the user. These files may be interrogated and information extracted from them. Extracted data may be processed in specific ways and the results stored in a temporary file. The contents of this file may, on request, be printed in a pre-assigned format which is not alterable by the user.

Before these procedures can be initiated it is necessary for the appropriate data files to be mounted on the computer. This is done by the systems manager sending a request (via his terminal) to the operations staff at the computer centre. Once this has been done the user may log-in at his terminal (it may be the same one as used by the systems manager) and, at that point, control passes to him. He is then in a position to instruct the computer to carry out certain commands. Those permissible commands which are currently available are described in the User's Manual (Annex I).

Responses to commands are transmitted back to the user's terminal which is either a Visual Display Unit (VDU) or a printer (hard-copy terminal) (teletype). Response times to a command depend on the amount of computer activity generated by a command and on the total loading of the computer at the time (ie the number and type of other activities being generated by other users of the computer).

Although a considerable amount of work still remains to be done, the Working Group agreed that extension of the facilities should be made based on the principle that this system is the one intended to cater for any species of fish and for the whole ICES area. The participants found the present system easy to operate and understand and were of the opinion that the design philosophy used in this approach should be adopted for the full implementation of the ICES FISHDAT system. Changes in design philosophy at this stage would almost certainly lead to a considerable delay in implementing the full system.

3.2 Results of New Trial Run

Prior to the meeting of the Working Group the new system was tested using North Sea herring data for 1973. These were similar to the data for 1972 used in the previous trial run described in earlier reports. A specification

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of the processing required was given in the Third Report (ICES CM1974/D:5). Briefly the requirement is to provide for all countries and for each division/sub-division monthly catches by different gears, in terms of numbers of fish at each age. Inadequacies in the reported commercial and biological statistics consist of incomplete area and gear breakdown of catches and incomplete records of numbers per kilogram and age composition. Missing information has to be estimated from available statistics and the system provides the means of obtaining estimates according to procedures decided by the user at run-time. This is achieved through the use of three separate programs, ESTABDAT, COMPLETE, TABUD. The first program loads the data-base and the third controls the printing of output tables. The second program, COMPLETE, performs the data manipulations requested by the user, Figure 1 illustrates the relationship between those programs within the system. They are described more fully in th User's Manual (Annex I) and only a brief description of COMPLETE, by way of examples, is given here.

Example 1 Allocation of catches to sub-divisions. Suppose that the total catch of herring in March by Faroese purse seiners has been reported for division IVa as 2300 mt but that this has not been split into IVaE and IVaW as required. Automatically this information will be transmitted to the user and he may then search for information in the data-base giving a split for any other specified month and country. A possible dialogue with the computer would be as follows.

Note: The system issues " > " as a sign to start answering. The remainder of lines starting with " > " is written by the user. The two macro commands used in this example are FIND and ACCEPT. They are defined in Appendix 1 and in Annex I.

```
NO SPLIT ON SUBDIVISION

GEAR PS  DIVISION 4A  MONTH  03  COUNTRY FAR   CATCH     2300

> FIND
MONTH
> 03
COUNTRY
> NOR
4A E:     0    0%      4A  W:      614  100%
> FIND
MONTH
> 03
COUNTRY
> ICE
4A E:     0    0%      4A  W:        0  100%
> ACCEPT
4A E = (%)
> 0
4A W = (%)
> 100
```

Example 2 Combination of no. per kg information with catches. The answers supplied by the user are the lines starting by "> " which is issued by the system. As catches have been aggregated over all countries, the country name is consequently not required as input when requesting information.

```
MISSING NO-KG  GEAR = PS          DIVISION = 4A
SUBDIVISION  = E
MONTH = 09
CATCH =          369
> FIND
SUBDIVISION
 >W
MONTH
 >06
ID NO  001
 NUMBER =          872
 WEIGHT =       141075
 SPRING SPAWNERS =         83
 > FIND
 SUBDIVISION
 >W
 MONTH
 > 07
ID NO 002
 NUMBER=         1579
 WEIGHT=       319934
 SPRING SPAWNERS=         448
 > ACCEPT
 HOW MANY
> 2
```

Example 3 Combination of age distributions with catches. The ages are 0-wr, I-wr,..... VIII-wr, VIII+-wr.
The catches have been aggregated as in example 2.

```
MISSING AGE-LENGTH     GEAR = PS          DIVISION = 4A
SUBDIVISION  = E
MONTH = 09
CATCH =          369
 > FIND
SUBDIVISION
 >W
MONTH
 >09
ID NO 001
AGE DISTRIBUTION
    554      0      1      285      198      36      26      6      0      2      0
>ACCEPT
HOW MANY
 >1
```

Example 4 Output from the programme TABUD. The table (Page 8) shows catch in numbers ('000) by month and by age. The combination of catches with biological information is here completely arbitary, being used merely for illustrative purposes.

Example 4

YEAR: 1973 GEAR: PURSEINE AREA: IV & V COUNTRY: ALL

	0	1	II	III	IV	V	VI	VII	VIII	VIII+	TOTAL
JANUARY	0	0	2012	17506	4225	5634	2414	0	201	0	31995
FEBRUARY	0	0	2695	23454	5661	7548	3235	0	269	0	42865
MARCH	0	0	5682	3642	437	582	145	0	0	0	10491
APRIL	0	0	21	13	1	2	0	0	0	0	39
MAY	0	0	1215	1364	175	129	30	3	0	0	2923
JUNE	0	160	51104	57351	7369	5446	1281	160	0	0	122873
JULY	0	148	40969	80449	17132	19069	8193	2532	148	446	169093
AUGUST	0	132	15770	31805	13650	4903	1329	265	0	265	68117
SEPTEMBER	0	102	29323	20371	3703	2675	617	0	205	0	56999
OCTOBER	0	0	28744	41678	5461	4311	574	287	0	287	81345
NOVEMBER	0	0	10813	6920	2378	2378	432	0	0	0	22924
DECEMBER	0	0	635	406	139	139	25	0	0	0	1347
TOTAL	0	545	188983	284959	60331	52816	18271	3247	823	998	611011

3.3 Further Development of the System

Work during 1976/77 should be directed to making improvements in a number of areas. These include (a) Extension of the Command Language (i) At present each command (MACRO) refers to a single piece of information, eg "the catch by Norway in June from IVaE taken by purse seine". A command for referring to and operating on a number of pieces of information taken together should be provided, eg "all catches by Denmark in IVa taken by trawl for consumption purposes should be allocated to IVaE". (ii) After issuing the command ACCEPT (see Appendix 1) the user should have the option of displaying the information stored in the data-base. (iii) The user should be allowed to use the command REJECT during catch allocation procedures. (iv) It should be made possible for the user to recall at any stage the original request made to the system. (b) Adding to or Amending the Data-Base (i) Currently there is no way of adding information to the data-base in the on-line mode. Such a facility should be provided since up-to-date information is often only reported at the commencement of a Working Group meeting. (ii) A means of amending and deleting information in the on-line mode should also be made available. However, this facility should probably only be made available to privileged users (eg the systems manager). (c) Additional Display Facilities (i) When loading the data-base the system should provide summary tables showing the extent and coverage of the data. (ii) The user should be able to call for a print out of the entire data-base and to have any specified part of it transmitted to his terminal.

3.4 Data Input

Looking ahead to the full implementation of the ICES FISHDAT system for all species there would be a considerable advantage, and in systems terms even a necessity, to impose uniformity on the reporting of the basic catch and biological data. However, at present, the system is only committed to trial runs of herring data and to the proposed trial run for plaice. Although the design of interim forms for the provision of input to these trial runs was discussed at length it was decided that full discussion of the important problem of providing unified input records, either on printed forms or on computer readable media, would have to be deferred till the next meeting of the Working Group.

In the meantime any country which would prefer to supply material for the trial runs in a computer readable form should consult with the ICES Secretariat on acceptable media and formats.

4. North Sea Plaice Trial Run

The main objective of the proposed plaice trial run is to gain experience with the FISHDAT system and its application to species other than herring. The Working Group discussed at some length the requirements which the Flatfish biologists had in mind for their use of an ADP system. The first stage would be to use the system as a research tool aimed at abstracting or combining data on a species-area basis, in order to take account of the seasonal and distributional characteristics of the plaice stock. The aim is to investigate whether more refined assessment methods based on this type of approach are feasible and will give a worthwhile improvement to the end result.

4.1 The Data

Catch: The annual international catch of plaice is normally computed from Bulletin Statistique figures, comprising data for nine main countries which account for over 90% of the total, and a residual group "Others". Of the main countries, five, viz. Belgium, Denmark, England, Netherlands and Scotland, collect monthly catch data on a statistical rectangle basis, whilst the Federal Republic of Germany collects monthly catch data by fishing grounds.

Biological data: At this stage it is intended to use only commercial samples and to exclude research vessel samples. Length distributions of sampled landings and length/age data for individually sampled fish, are available for the six countries given above. These data are usually sexed, and are collected monthly. The gear types respresented are otter trawl, beam trawl, Danish seine and gill net.

In the case of Denmark, England, the Netherlands and Scotland the individual length distribution of a landing and the individual age determinations can be assigned to statistical rectangle (or in some cases several rectangles) fished by the sampled ship. In the case of the Federal Republic of Germany only the fishing ground or area can be specified.

In certain cases individual national length distributions may exceed in range the length range of the age length key part of the system (The converse is much less likely). In this case, some appropriate instructions as to necessary re-grouping will need to be specified. It is not certain at this stage whether comparison of length data across gear categories will require use of correction factors based on the relative selectivities of the gears involved.

At a later date, but not necessarily for the trial run, the length data will need to be corrected for the discarding pattern when this is known.

Effort: Fishing effort can usefully be included in the analysis at a later stage, but this is not envisaged for this trial run.

4.2 The Objective

The flatfish user requires a system with which he can combine and group length and/or age data for use with the total international catch allocated to any nominated groupings of statistical rectangles, in any season, in order to produce the appropriate sub-area age composition for VPA and length/age data for growth rate calculation. There will be a need to vary the rectangle groupings seasonally. These groupings will tend to cut across ICES division boundaries, so that the summation checks used by the herring system will not be applicable in the same way. The user will want to specify the class interval of the length data, eg 1 cm group, 3 cm groups, 5 cm groups.

4.3 Details of the Records

For the individual ships landing the original measurements are in some cases stratified by market size category. This requires the facility for samples to be raised to the total category landing, if this is known, or combined first and then raised, depending on the circumstances and available information. All length measurements are available on at least a single centimetre basis. In the case of age data, these will have to be submitted as individual records rather than as an age length keys. The age length key for the specified month, gear and rectangle group will be constructed, (by computer), using the individual records.

As an example of what may be required the following column codes have been drawn up on an experimental basis for the pruposes of transcribing the required data for Belgium, Denmark, England and the Netherlands for the trial run which will be based on the 1st quarter of 1974. Some adjustments may of course be necessary later.

Form	Code	Item
A	1-3	Nationality
	4	Data identity
	5-8	Sample number
	9-12	Year, month
	13	Utilisation
	14-15	Gear
	16-18	Division
	19-22	Rectangle
	23-25	Species
	26	Market category
	27	Not used
	28-30	Species area
	31-33	Total weight (kg) in sample
	34-37	Number in sample
	38-39	Maximum age determination
B	1-3	Nationality
	4	Data identity
	5-8	Sample serial number
Repeating Units	9-10	Length
	11	Sex
	12	Condition (gutted or whole)
	13-14	Age
	15-17	Weight (to 10 grams)
	18	Blank
	19-20	Length
	21	Sex
	22	Condition
	23-24	Age
	25-27	Weight
	28	Blank

5. Conclusions

Whilst extensive progress has been achieved so far, a considerable amount of work still remains to be done before the proposed system can be fully implemented. Priority areas of work have been recommended in previous sections of this report. At its next meeting the Working Group should include on its agenda

(a) a review of work in the extension of the command language.
(b) a review of progress with the trial run on North Sea plaice.
(c) the design of input records.
(d) program documentation.
(e) user manuals.

Appendix 1 Program: COMPLETE. Command Language

The program COMPLETE is an on-line interactive program involving a dialogue between the user and the computer system. Only certain user commands are legal. Those currently available are defined below.

Command	Usage
FIND	Displays requested information to help user in making decisions.
ACCEPT	Input of the user's decision on the data to be used.
EXIT	Stop the run, dump the data-base.
OMIT	Stop the run, restore the data-base to its state just before the run was started.
INITIALIZE	Restore the data-base to its state just after loading with ESTABDAT.
CONTINUE	Execution is continued from the point when the last EXIT command was issued.
REJECT	Used in connection with FIND when information from other gear types or divisions is needed.