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Guidelines for the Establishment of Logbook and Related Systems

by

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NOTE

At the 10th Session of the CWP (Coordinating Working Party on Atlantic Fishery Statistics), the Task Force on Logbooks reviewed the contents of 73 different fisheries logbooks on a world-wide basis and proposed that guidelines should be prepared which would promote the standardization of data collected in the logbooks and assist countries with the introduction of logbooks for the first time. Consequently, the CWP recommended *that the Secretary of the CWP explore the possibility of FAO producing a technical report or a manual, arraying the requirements for planning, designing and implementing logbook systems.* FAO Fisheries Circular No. 793 (appended) represents the results of that recommendation.

For bibliographic purposes, citation of this paper should be the same as that of the original circular, as follows:

POPE, J. A. 1986. Guidelines for the establishment of log-book and related systems. FAO Fish. Circ., No. 793, 26 p.

FAO Fisheries Circular No.793 FIDI/C793

GUIDELINES FOR THE ESTABLISHMENT OF LOGBOOK AND RELATED SYSTEMS

by

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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PREPARATION OF THIS DOCUMENT

The question of logbooks has assumed greater significance with the extension of national jurisdictions and the growing need for data. The CWP (Coordinating Working Party on Atlantic Fishery Statistics), at its 10th Session (Madrid, July 1980), recommended that guidelines be prepared in an effort to promote as far as possible the standardization of the data collected. It was also aimed to give help in the design of these documents to those countries who were introducing logbooks for the first time. The author at the time of preparation of this paper was Principal Scientific Officer at the Marine Laboratory, Aberdeen, Scotland. He has long experience of statistical systems for fisheries and played an important part in the design and implementation of the systems for recording and analysing fishery statistical data in Scotland.

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FAO Fisheries Circular (FAO Fish.Circ.)

A vehicle for distribution of short or ephemeral notes, lists, etc., including provisional versions of documents to be issued later in other series.

ABSTRACT

The document provides a justification of the need for logbooks in terms of management and draws attention to the different and somewhat conflicting objectives of data collection, if undertaken for statistical purposes or for enforcement. The data which needs to be collected in either case is identified and practical details concerned with the design and format of logbooks are discussed. The paper finally considered problems to be resolved in connection with the submission and processing of the data collected.

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I. FISHERIES MANAGEMENT

Commercially exploited fishery resources require effective management. Without proper management, benefits which might be realised will, sooner or later, be reduced or completely lost. These benefits encompass the social and economic gains by society at large and the fishing communities in particular as well as the food supply which the resource itself is capable of providing.

Fisheries management has, for several decades now, been actively practised by many countries in many differents parts of the world. The specific aims of management may vary from situation to situation, while the tools of management are many and diverse. However, the main aim of most management programmes is that of conserving the resource itself. Secondary aims are generally of a socio-economic nature.

At its simplest, conservation means ensuring the continuing ability of the resource to provide a harvest. Early scientifically based studies of conservation theory introduced the concept of maximising the sustainable yield from a resource. Implicit in this approach was the assumption that "steady-states" are possible. Nowadays this is recognized as a very much over-simplified view. A fishery system is not closed, but is subject to the effects of perturbations external to itself, whose magnitudes and interactions are frequently unpredictable and often incapable of control. Nevertheless, regulatory measures can be used to control certain factors of major importance and optimize the outputs from a fishery system even in the presence of effects which are not within the control of any management programme. A sound management programme should, when necessary, be able to respond speedily to changing events in the fishery. For this to be at all possible an essential ingredient of the management organisation must be the provision of up-to-date information on the state of the system in all its aspects. Data must, therefore, be collected not only in a timely fashion but they must also be speedily processed and provide meaningful information to the fishery administrators.

Of the various objectives of management, the assessment, monitoring and regulation of the fish resource is of central importance. Assessment requires a knowledge of the entire natural histories of all the fish species which make up the resource and of the effect of fishing on population structures, spatial distributions and behaviour patterns. Assessment is a highly quantitative exercise for which it is essential to have detailed statistical information on the inputs to and outputs from the resource, over periods long enough to determine with sufficient certainty seasonal variations and longer term trends and relationships. The aim of assessment is to provide an informed basis for interpreting the changing behaviour of a fishery system and for evaluating the likely effects of alternative management strategies.

The statistical information on inputs which is required relates to the type and amount of fishing effort generated on the stocks. This has to be collected by sufficiently fine time periods and fishing areas to reveal variations which are of significance from an assessment point of view. The outputs from fishing activity consist of records of the quantities of all fish species of interest removed by human exploitation. Like the inputs these need to be collected by appropriate time and area breakdowns which should preferably be the same as those used for the collection of the input statistics.

Whilst valuable assessments of some stocks may be made using information on only these inputs and outputs, in the majority of situations information on biological characteristics of the stocks, in particular their age and size compositions, are essential for a proper understanding of the effects of exploitation. Such biological information is generally considered to be of specifically scientific importance and the criteria for its effective collection are best defined by those fishery scientists engaged in making the assessments. Statistics on fishing effort and catches on the other hand, while of prime importance to the scientists, have also uses in wider areas of management and the criteria for their collection need to be defined by administrators as well as scientists.

Given that the objective of management is the conservation of the resource, the initial need is to appraise the harvest potential of the resource and to determine where the current level of exploitation is in relation to the optimum harvest. Resource management usually assumes importance only when it has been established that the resource is being overexploited. The management objective is then the reduction of exploitation either to bring about an improvement in the cost effectiveness of exploitation investment or to avoid the risk of collapse of the resource.

Exploitation may be controlled in a variety of specific ways but generally these all involve either the regulation of the amount of fishing or the size of catch permitted or both, or restrictions on the size of fish which may be taken. At the present time the main regulatory measure in use in the management of fisheries in the North East Atlantic is that embodied in the setting of a Total Allowable Catch (TAC). TAC's are scientifically determined on a total stock basis to achieve one or more specific objectives. Sharing of the advocated TAC among nations fishing the stock is the concern of the fisheries adminstrators. Monitoring of each nation's uptake of its share of the TAC demands reliable collection and reporting of statistics. Additional and alternative measures aimed at controlling the rate of exploitation of a stock include the use of closed areas and seasons. Each of these measures requires the creation of statistical databases containing all relevant information for their definition and subsequent monitoring.

Clearly then, every management programme requires the collection and processing of statistical information on (a) the amount and type of fishing effort expended; (b) where and when fishing was carried out and (c) the amount of fish removed from the stock. The setting up and maintenance of a statistical system requires not only a clear statement of management objectives and the active involvement of administrators, statisticians and scientists, but also the willing collaboration of the fishermen themselves. Their understanding and co-operation are essential to any effective management policy.

II. DEFINITIONS OF STATISTICAL ELEMENTS

A variety of information is required for fisheries management. This may be conveniently subdivided into information on inputs and information on outputs.

i) Inputs: The inputs embrace the total manpower engaged in the system, the amount and type of equipment available and the extent to which it is used. Considering the exploitation (catching) sector only, the manpower refers to the total number of persons actively engaged in fishing operations. The amount and type of equipment refers to the number of fishing units and their components. The extent of usage refers to the amount of time engaged in fishing operations.

a) Manpower: In highly organized fishing industries the number of persons employed full-time in fishing should be relatively easy to ascertain. Such information can be gathered, for example, at the times of population censuses or by carrying out special investigations of fishing enterprises. It should also be easy to ascertain the identity of the person or the name of the company in overall charge of a fishing unit. Such an individual, or company representative, is the most suitable person from whom to obtain statistical information on certain aspects of fishing operations.

However, small-scale, artisanal, part-time fisheries, even in countries supporting large-scale, highly organized catching industries, may account for a sizeable proportion of the total amount of fish taken from a stock and these cannot be completely ignored. When landings by such fishermen are marketed, an opportunity exists for identifying at least those in charge of individual fishing units and from whom information relating to fishing activities may be obtained. Where even this opportunity does not exist it will be necessary to initiate a special investigation either to gather precise information or to estimate the significance of this component of the system. If it is significant some method of gathering statistical information on fishing inputs, perhaps on a sample basis, will have to be operated.

Although manpower is not a quantity used explicitly in stock assessment, it is necessary in the management of a fishery to have as precise an estimate as possible of the number of people whose livelihood may be affected by management procedures. Manpower information will also assist in gauging the scale of proposed data gathering exercises.

b) Number and Type of Vessels: The number of fishing vessels in existence, classified as actively fishing or laid up, their characteristics and equipment need to be known especially in situations where management of fishing effort is to be exercised.

The fishing power of a vessel is a function of, among other things, its size and engine power. Size may be defined in terms of the tonnage or length of the vessel. Several tonnage measurements may be used, but that most often employed is the gross registered tonnage (GRT). In the same way different length measurements may be employed, the overall length probably being the most frequently used in this context. Again the power of the vessel's engine may be measured in a variety of ways, the nominal horse power often being quoted since it is often the easiest to ascertain.

The importance of fishing power lies in its relationship to the fishing mortality generated by the fishing unit (vessel plus gear). As such, fishing power is used as an index rather than an absolute measure and vessels of broadly similar fishing power may usually be conveniently grouped together. Thus it will often be sufficient to classify vessels by tonnage, length and horse power groups. Suitable groupings are those recommended by the Co-ordinating Working Party on Atlantic Fishery Statistics (CWP). These are given in Appendix I.

Apart from the size of the vessel and its engine power, which influences the size of fishing gear it may use, certain equipment intended to improve fishing efficiency may be employed. Among those, specific mention may be of Sonar devices used for locating concentrations of fish.

A central register of fishing vessels, listing details of the above type, should be maintained. Such a register not only provides information of importance for management purposes but it can be linked to other statistical information, such as details of outputs. Because much of the information on vessel characteristics remains constant, these data need not be collected repeatedly but only often enough to monitor changes.

c) Fishing Gear: Besides the vessel itself there is the fishing gear which it uses. The two together comprise the fishing unit. As different gears often exploit different components of a stock, it is necessary to maintain statistics of inputs and outputs classified by type of fishing gear. For this purpose it is necessary to identify and classify the gear types used by the fishermen. A recommended system for classifying fishing gear is the International Standard Statistical Classification of Fishing Gear (ISSCFG). (See Appendix II). In specific situations it may be necessary to employ a finer breakdown of gear types, but this should be done within the framework of the ISSCFG.

d) Fishing Effort: The main input component from an assessment viewpoint is fishing effort. The fishing effort exerted by a gear type is a function of the fishing power of the gear and the length of time the gear is actively fishing. The fishing power of the gear is determined by, among other things, the size and rig of the gear and the size and power of the vessel. The collection of information on vessels and gear has been mentioned above.

Suitable ways of recording the amount of time spent in fishing operations have been considered by the CWP which has drawn up a list of time units for different types of fishing gear. (See Appendix III).

e) Fishing Position: For both regulatory and scientific purposes the areas where fishing has taken place need to be known. For instance, management of a fishery may involve the closure of certain areas at certain times and it is necessary to know where fishing has taken place in relation to these areas. The position where catches have been made needs to be known so that a picture of the areal distribution of the stocks and how this changes with time can be built up and used in assessment studies.

Position may be recorded in a variety of ways. For instance, popular, regularly visited fishing grounds very often are known to all fishermen by a specific name. Alternatively, a position may be given as a compass bearing and distance from some fixed point on land. However, the universally accepted method of position fixing is by giving the co-ordinates of latitude and longitude in degrees, minutes and seconds. These may be determined by standard principles of navigation but more usually nowadays, in many parts of the world, by means of some navigational system using signals transmitted from shore-based stations or from man-made earth satellites. These latter methods provide encoded bearings which may be translated into latitude and longitude equivalents.

For most management and scientific purposes the precise position of fishing is not an item which needs to be known. 1/

Larger sea areas are usually sufficient and for this the total area occupied by the stocks may be divided into sub-areas. These sub-areas may be defined to reflect biological knowledge of stock distribution when they would correspond to some meaningful stratification of the total area, or to coincide with the way regulatory measures have been formed. On the other hand a purely arbitrary division using a regular, rectangular grid will often be the most feasible way of defining sub-areas. If this method is adopted the sub-areas should be sufficiently small to allow appropriate groupings of them to be made for different purposes. Such a grid system is employed in the North-eastern Atlantic in what is known as the ICES area. 2/

1/ In the enforcement of closed sea areas which may give rise to prosecutions for illegal fishing, the precise position can, of course, be critical on individual occasions.

2/ International Council for the Exploration of the Sea

ii) Outputs: The only output from a fishery system with which we shall be concerned is the amount of fish removed from the different stocks which form part of the total resource. These removals represent the gross catch. This is the weight of all animals caught and brought on board the fishing vessel. All or part of this gross catch will be retained, any part not retained being discarded. The retained catch may or may not be processed at sea. Processing may involve such things as gutting, filleting, curing and reduction to meal and oil. The retained catch, in processed or unprocessed form, will be landed for sale, although in certain instances the retained catch may be sold and trans-shipped at sea.

For assessment purposes it is the quantity of fish, in their natural condition, removed from the stock which is all important. If this quantity is expressed in terms of weight, the equivalent live weight (nominal weight) is therefore the appropriate quantity.

In summary, the fishery system, from the assessment viewpoint may be looked at schematically as in Figure 1 (See page 25).

III. STATISTICS COLLECTION PROCEDURES

The statistical items which need to be collected for stock assessment and management purposes have been broadly itemised in Section II and further details on some of these items given in Appendices I, II and III. Collection of data relating to the actual vessels of the fishing fleets has also been discussed. Statistical information on the other items needs to be collected more frequently.

The fishing gear used may well be fixed and constant for a given vessel. In such circumstances this information could be recorded at the time of compiling the list of vessel details. However, some types of vessel may employ different gears on different voyages or even change from one gear to another during the same trip. For this reason it is recommended that the type of gear used and the number of operations on which each was employed be recorded for every trip.

The amount of time spent fishing and, where relevant, the amount of time spent searching for fish prior to the using the gear, will very often not be the same on every trip and may also change from operation to operation. Such information needs to be noted after every operation.

The gear used and the amount of fishing effort expended can only be observed at sea during the actual fishing trip. Records kept at the time can be used as the basis for the noting of this information. The information can be gathered for statistical compilation either by interviews conducted by shore-based statistics collectors with the person in charge of fishing (the vessel owner, the skipper or his deputy) or through a system whereby the basic records are submitted by the person in charge himself.

Interview systems are widely used but they have several potential drawbacks. In the first place the person in charge may rely on his memory of what happened during the trip rather than on records made at the time. If a trip extends over several days or weeks, accurate recollection of what actually took place is unlikely. Again it may not be possible for the statistics collector to interview the person in charge at the end of every trip. Delays in interviewing will again inevitably result in the collection of inaccurate information if details have not been recorded during the voyage.

Many fishermen do keep records of their fishing activities for their own personal purposes and, where such recording procedures have been formalized to meet statistical needs, it is likely that these have come to be regarded as convenient aids rather than unnecessary encumbrances. Many countries already employ such a formalised recording procedure by the fishermen themselves for the collection of statistical information. Such records are generally referred to as logbooks 1/, logsheets or fishing sheets.

The gross catch likewise can only be observed at sea but, unlike fishing effort, accurate measurement of weights of all species taken is rarely possible at the time. Exceptions may be on vessels which process all the catch taken and for which the total throughput is required for book-keeping purposes. Normally the catch can only be estimated when it is brought on board and then only the retained catch. The quantity of discarded fish is not of direct interest to fishermen and, almost certainly, attempts by the crew to estimate the amount thrown away would interfere with the normal handling of the retained catch. The need to discard exceptional quantities of fish, for example because of their lack of commercial value, may at times be noted but the irregular discarding of small, though not cumulatively insignificant amounts, is not likely to be recorded. On the other hand the landed catch or catches transferred to other vessels, is recorded to a much greater degree of accuracy. This is done by specially appointed shore-based staff or by fish buyers. The landed weights are, however, recorded in terms of the form in which the fish are presented (gutted, filleted, etc.) and not in terms of the nominal live weight. The latter, as already noted, is the unit used for assessment purposes. Furthermore, only the total (aggregate) quantity of fish landed at the completion of a voyage will be available, information about quantities taken at different times, or in different areas being lost.

IV. LOGBOOKS

Logbooks as a methods of collecting statistical information on commercial fishing activities are widely used. As noted in the preceding section these provide a means of recording data at the source and not, as in the case of interviews conducted at the end of voyages, some time after the events to which they refer have taken place.

1/ Logbook: a book kept on all ships for recording courses towed, speed, position, meteorological information and employment of crew. Derived from ship's log which was originally a slab or wood towed through the water to determine the ship's speed.

However, both methods reply on the integrity of the skipper and on his willingness to provide accurate information. Masters and owners cannot all be expected to devote time to activities which they regard as onerous and for which they see no useful return.

With the ever-growing amount of control being exercised in many fisheries, the provision of statistical information is becoming increasingly used or contemplated as a mandatory requirement for the granting of licences or permits to fish. Even in situations where no licencing system is in operation but where monitoring of fishing activities forms an essential aspect of control, the need to maintain precise records of fishing operations in the form of logbooks is recognized. Such records may be inspected both at sea during a voyage and at the end of a trip in order to ensure that management and regulatory measures are being complied with. The opportunity exists when licences are being issued to provide explanations of the reasons for requesting the type of information sought as well as giving instructions on how the statistical information should be recorded.

i) Items for inclusion: A distinction may be made at this stage between two principal types of logbook objectives:

- data-orientated objectives. For such objectives the logbook is considered as a principal source of information on fishing inputs and outputs.

- surveillance-orientated objectives. Here the logbook is considered as an essential method for monitoring fishing activities to ensure compliance with resource management controls.

Although the logbook specifications for these two types of objectives are likely to overlap to a very large extent, some essential differences in detail are likely. However, proper planning can, where required, provide logbooks which can serve both purposes at least to a large degree. It is important to note, however, that where an interview system has already been established, the introduction of a logbook system as an additional method of data collection requires careful consideration. Fishermen may well resent having to give the same or similar information more than once and where logbooks are introduced for the mandatory collection of certain items, the hitherto freely given information on other non-mandatory items may cease or become increasingly inaccurate.

ii) Primary Considerations: Among the first questions which must be answered before designing and introducing a logbook system are the following:

a) Purpose of Logbooks: Is the logbook designed to meet surveillance or data-orientated objectives? For surveillance there will exist a defined minimum set of requirements. The list of items required in a data gathering context will be much wider and will normally include surveillance objective items as a sub-set.

b) Who keeps a Logbook?: It has to be recognized at the outset that the keeping of records at sea is likely to be much more difficult on small vessels than large vessels. Apart from considerations of physical space for writing on, larger vessels, because of their larger crews, should find it easier to arrange for logbooks to be entered more regularly. Again small vessels generally make voyages of short duration. If a vessel leaves port and returns within 24 hours it may be sufficient (e.g. if daily recording is required) to fill in a logbook on return to harbour, but only provided it does not demand more effort to complete the necessary entries than can be expected of the skipper after a full day's work.

If any section of the fleet or any type of operation is excluded from the need to carry and maintain logbooks it is essential that that section or operation can be clearly and unambiguously defined and distinguished from the rest of the fleet. The criterion "duration of time away from port" can certainly be clearly defined (e.g. "not more than 24 hours") whereas an exclusion principle based on size of vessel (length, tonnage) could be more open to confusion.

If any section of the fleet, for whatever reason, is excluded from the need to maintain a logbook, then some alternative means of collecting and recording information (e.g. by port interviews) will have to be used.

c) Frequency of Recording: An early decision has to be reached on how frequently entries have to be made in the logbook. The most frequent would be after every fishing operation (e.g. after every haul or set). The least frequent would be once per voyage but this would clearly be too infrequent unless voyages are always less than 24 hours.

If entries are required too frequently this will involve too much work at sea and can easily result in the recording of more data than can be handled by enforcement officers, port inspectors and data processing systems. It is attractive to think that haul-by-haul recording will result in a collection of data from which scientists, economists, administrators and statisticians will derive an endless amount of valuable information. Much costly effort will be needed to summarise and present such detailed information in a meaningful and understandable way.

However, a good deal will depend on the number of items which are to be recorded. If only details of fishing effort are required these are likely to be noted by the skipper anyway on a haul-by-haul basis and this frequency of entry will pose little or no extra burden.

It will certainly be essential to record separately, information pertaining to fishing on different grounds or with different gears.

If logbook systems are already operated by other countries in common sea areas, these should be studied to ensure that the introduction of a new system harmonizes with existing ones.

iii) Items to be considered: Having decided these preliminaries the next step is to define all the items (or components) which need to be recorded. The particular items to be entered will depend on the use for which the logbook has been created. If this is for monitoring purposes the items will be determined by whatever is being monitored by the management regime. However, items related to the vessel itself should be the same whatever purpose the logbook is intended to serve. Each page of the logbook should contain such items, the following list being essential requirements:

a) Vessel Details

- Name of vessel
- Nationality of vessel
- Vessel registration number
- Name of skipper
- Name of partner vessel (if appropriate)
- Nationality of partner vessel (if appropriate)
- Registration number of partner vessel (if appropriate)

Other essential and common items are ones relating to each individual trip. These are the following:

b) Trip Details

- Date of sailing
- Date of landing
- Port of landing
- Names of vessels to which catch was transferred (if appropriate)
- Nationality of vessels to which catch was transferred (if appropriate)
- Registrations of vessels to which catch was transferred (if appropriate)

The following items, which will occupy the main body of each page, refer to the operations conducted during the voyage and constitute the minimum essential list of items for data gathering purposes.

c) Fishing details

- Date to which entry refers (dates on which no fishing took place should be entered in chronological order)
- Fishing gear
- Position of fishing
- Fishing effort
- Retained catch (estimated weight in specified units)

The last item above (retained catch) should refer separately to each major species caught. More uncommon species may be suitably grouped.

There are many items additional to those given in the above lists which may be considered for inclusion. Some which may be deemed worthy of being added are given below. However, the introduction of further items should be made only after thorough consideration has been given to questions such as who will use the information, for what purpose will it be used and how will the extra data be handled?

d) Additional Vessel Details

- Place of registration
- Gross registered tonnage
- Overall length
- Engine power
- Fish finding equipment
- Vessel radio call sign

e) Additional Trip Details

- Depth of fishing
- Depth of sea bed
- Sea state

f) Additional Fishing Details

- Fishing gear specifications (e.g. mesh size)
- Discarded catch (estimated weights by species)

iv) Logbook and Page Formats: Design of a logbook capable of universal use, although perhaps possible in theory, is certainly not a sensible objective. However, general comments and suggestions applicable to all logbooks can be made.

If the information contained in logbooks is to be scrutinized by inspectors and subjected to processing ashore, and this will almost always be the case, the pages (or sheets) much be capable of being removed from the book. The pages much, therefore, be perforated so that they may be easily removed or the separate sheets must be lightly glued together at the top or bottom or along one side to form a pad of tear-off pages.

The size of the pages will be determined by the amount of information to be recorded but one of the ISO A-range sizes should be used. The most convenient and widely used of these is A4 (210mm x 297mm). Use of a standard size eases transmission, processing and filing.

A proper quality of paper must be used. Whilst it is uneconomic to use paper of a better quality than is justified, it is false economy to use too cheap a paper. Logbooks are intended for use at sea where conditions may well be wet and the pages may be handled frequently and perhaps transmitted by post. Cheap paper is unlikely to stand up to these demands.

Again it will usually be necessary to allow for the copying of the entries so that the master of the vessel can retain a complete or part version of the information which has been recorded. Copies may be generated by using interleaved carbon paper or by using carbonless paper.

Paper of many different qualities exist and the advice of a technical expert should always be sought.

The general appearance of a logbook is extremely important. If it looks cluttered and complicated it will be unfavourably regarded by those who have to fill it in and this will have an adverse effect on the whole data gathering system. Any wording used should be simple, easily understood and unambiguous. Familiar words may be abbreviated where necessary.

Instructions on how to make all entries will be required. These should be a simple as possible and he kept to a minimum. A long list of instructions will be self-defeating. Unless the number of items on a page is small there is unlikely to be room for instructions to be printed on every page. If the log sheets are bound into books, instructions can be printed on the inside of the covers. If the logbook is produced in the form of a pad the list of instructions may be given on a backing board. Otherwise they may be provided as a separate item but this is not an ideal solution as an instruction leaflet or booklet may be easily mislaid or lost.

A great deal of care and thought needs to go into producing a suitable form. The layout of a form is determined by the number of items it carries, the space needed for the item names and the space needed for entries. Usually the latter is the determining factor. Adequate space must be allowed for entering information otherwise the form will be difficult to complete and will certainly cause problems to those handling completed records. Spacing should be tested by inserting a range of possible entries by hand and by typewriter. The width of a column should be determined by the length of the entry to be made, not by the size of the heading. If the size of the heading is large it may be abbreviated, provided the abbreviation is unambiguous, or spread over two lines. When entries are required to be totalled at the foot of a column, the space required for the total may exceed that required for individual entries. The column width should be chosen taking this into account. Alternatively totals of consecutive columns may be given on alternate lines.

The use of colour can help to distinguish different parts of a form and might be used, for example, to identify those items whose completion is mandatory from those which are optional. However, there are disadvantages and problems with the use of coloured sheets. In the first place, production is likely to be more expensive than printing black on white paper, particularly if more than one colour is used. Again some colours are irritating and may cause annoyance and eye strain to those handling large batches of sheets, e.g. punch operators at computer installations.

If information recorded on the log sheet is to be processed by computer, and this is very likely to be the case, it will be necessary to take this into account when designing the logbook. At the present time the most widely used methods of entering data into a computer are by means of punched cards or, increasingly, by direct keying of the data to disk. 1/

1/ Other methods, such as optical character recognition (OCR), exist but are as yet not widely employed.

Form design considerations for both methods are the same. Some things which need to be borne in mind in this context are:

- the data to be punched must be easily read. It can be an aid if the space for entering information is boxed off or marked by small vertical lines:

4	3	2	1

or

4	3	2	1

- sheets must be of a convenient size for handling by data input staff.

- data to be keyed should not appear on both sides of a sheet.

- data should appear on the sheet in the order in which they are to be punched or keyed.

Finally, each page should have a title and/or code number and margins should be sufficiently wide to allow for suitable filing.

v) Instructions for Completion: Instructions should be stated as briefly but explicitly as possible.

a) Vessel Details: The names of vessels are not likely to be required for computer processing. Sufficient space must be allowed for vessels with long names.

Coded entries may be used for the nationality of the vessel and any partner. If vessel length and engine power are required, the units used should be clearly stated on every sheet. This might be done by ticking an appropriate box, e.g.

ENGINE POWER		HP		kW	

Allowing a choice of unit may be more sensible than requesting the information in a unit with which the skipper is unfamiliar. In such a situation the entry may not be completed.

If fish finding equipment is requested this may be confined to the general type of equipment used, e.g.

Fish Finding Equipment Installed:

	YES	NO
Echo-Sounder		

	YES	NO
Sonar		

b) Trip Details: Dates must be given in a specific order and this should be made clear either in the instructions or on the page itself, e.g.

	D	D	M	M	Y	Y
DATE	0	2	1	2	8	4

meaning the second day of December, 1984.

Port of landing may have to be entered in full so sufficient space needs to be provided. It may be possible to use a pre-coded list, but such a list cannot be exhaustive and provision for an "other" entry needs to be made. Alternatively, all that may be required is a note of whether the port of landing is in the vessel's own country or a foreign country. In this case a box may be ticked as appropriate.

c) Fishing Details: The manner in which fishing position is to be given must be clearly stated in the instructions. If latitude and longitude are used, they should be given in that order, i.e. latitude preceeding longitude. Consideration must be given in which position is to be entered on the log sheet. If entries are to be made in relation to each fishing operation then, for towed gears, both the position at the start and end of the tow can be given. However, it may be that only one of these positions will satisfy requirements and, if this is the case, only the more important should be called for. Remember, it costs time and money to process information. On the other hand, if only daily records are to be kept, the position entered should, in some sense, reflect the area covered by fishing operations that day. This instruction needs to be made as unambiguous as possible. This may be done, for example, by requiring that the positions where fishing started and finished that day be entered. Alternatively the ship's position at a fixed time each day might suffice. For many purposes the position of fishing may be referred to a wider area. Where such area divisions are used it will be essential to provide with each logbook a clear map or chart showing the demarcations of these sub-areas.

Such a chart should be on a large enough scale to cause the skipper no problems in allocating his position to a unique sub-area. On the other hand, charts should not be of an unmanageable size. To prevent this it may be necessary to supply different charts for different sea areas. Special consideration in the use of sub-areas needs to be given to situations where the actual position coincides with the boundary between two or more sub-areas.

It has already been observed that whilst some ad hoc system of sub-areas may be attractive in certain local situations, the use of a regular grid system of rectangular sub-areas has many advantages and would conform with a widely established system of area breakdown.

For example, if the grid is composed of small rectangles of 30' latitude by 1' longitude, it gives scope for aggregation into larger areas which would, in many situations, be equal or be closely similar to meaningful local ad hoc areas. Again the use of such a rectangular grid system permits easy coding, an advantage both from the skipper's viewpoint and that of computer programmers. It also makes for conformity with other systems constructed in the same manner. This can be particularly advantageous when reporting national statistics to international agencies.

If details of individual operations are to be recorded, the amount of fishing effort expended for each should be given in terms of the most preferred unit for the type of gear used. These are given in Appendix III. Where daily records are to be entered, the quantity recorded should be the total effort for all operations by the same gear that day. Separate entries should be kept for each gear used.

An almost unlimited variety of fishing gears is to be found throughout the world. For statistical and logbook purposes it will normally be sufficient to record the gear used in a broad, general way. An international classification of fishing gears has been drawn up by FAO in consultation with world authorities on fishing gear. This classification is given in Appendix II together with standard two and three letter abbreviations. These would serve the vast majority of situations and are to be recommended for use in logbooks.

When recording the catch taken, priority is to be accorded to entering the quantity of the retained catch. This should, so far as possible, be done for each species taken but it has to be accepted that (a) if a very large number of species is regularly caught then it may only be feasible, in terms of time and space, to separately record the species of major importance and (b) where only small quantities of lesser important species are taken these may have to be recorded under a grouped category heading. Although the quantity of discarded catch is of importance both from a management and scientific point of view, it is somewhat unlikely that details of fish caught but not retained can be recorded without unduly interfering with routine fishing activities. Desirable though such information would be, it may be that discarding practice will have to be recorded in a logbook and where this is considered to be so the opportunity should not be lost. Information on discarding practice can only be observed at sea.

The species caught may be identified in three different ways, viz by their scientific name, by their common name and by any local "popular" or "trade" name. The scientific name is the most precise and is universally applicable but is not likely to be familiar to most fishermen. The use of common names, which have their unique scientific equivalents, is to be recommended and such a list needs to be compiled for specific situations.

A world-wide species list has been compiled by FAO. This list, which is not claimed to be complete, is known as the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP) and is a taxonomically based species list.

Regional and local fisheries are likely to find restricted species lists more suitable for their needs and such a list, including all equivalent names, needs to be compiled and issued with the logbook instructions.

The use of three-letter code names for the common species is recommended for use when filling in logbook entries. No single universal three-letter list exists but international statistical agencies, including both ICES and ICNAF 1/ have agreed three-letter code names for all items included in ISSCAAP.

This list is used in FAO's Yearbook of Fishery Statistics and should be consulted and preferably used to avoid unnecessary proliferation of such codes.

The unit for recording weight of catch should preferably be the kilogramme. However, if it is believed that the use of this unit of weight might pose difficulties, some other unit may be employed provided it is of a standard value to within acceptably precise limits. For example, number of boxes could only be employed if the contents of a box correspond to a known and recognized standard amount. A separate sampling study might be required to establish this fact. Provision should be made on each sheet for specifying the actual unit of weight used.

The weight eventually required for scientific and management purposes is the nominal live weight of the catch. This is not necessarily a weight which the skipper is likely to be able to estimate. It is more probable that he will be able to give a good estimate in terms of landed weight. Whichever weight he thinks he is estimating is to a large extent immaterial since it will be necessary to adjust all the estimates to a live weight equivalent basis. What is essential is that each fisherman should aim to give estimates in a consistent way, at least for every entry made on the same voyage. Thus, if one part of the catch is gutted and another filleted before landing, the weight estimated should be the weight before any processing or the supposed landed weight as if all fish had been processed in the same way. The manner in which estimates should be adjusted is described in the following chapter.

Certain species may be identified as being of such importance and of such common occurrence that they will almost invariably be caught. For each such species separate columns may be reserved on the sheet with the species names or code-names pre-printed at the head of each column.

1/ International Commission for the Northwest Atlantic Fisheries, now replaced by NAFO, the North Atlantic Fisheries Organization.

This will facilitate the calculation of totals, especially if these are to be calculated by the skipper himself or by a shore-based statistics collector. It can also facilitate the preparation of data for computer processing. However, as a general rule it is wiser to instruct the skipper not to calculate any sheet totals as this takes up his time and often leads to mistakes. Where the data are to be processed by computer there is no need to enter column totals and, in fact, the use of reserved columns for specific species is also unnecessary provided the appropriate species code is always recorded and punched along with the corresponding estimated quantity.

There will be a need to provide space for entering the certified weight of all species landed at the end of the voyage. This quantity can only be obtained once the catch has been sold.

If the logbooks are required to be inspected at sea by enforcement officers belonging to a foreign country, either at sea or in port, it will be helpful to provide at least limited translation facilities. This could be done by providing suitable overlays with important key items given in different languages.

Finally space must also be left on each page for the skipper's signature. This is required to ensure that he has provided all the information requested to the best of his ability.

vi) Submission of Logbooks: Where fisheries control requires the frequent monitoring of fishing activity, inspection of logbooks at sea by enforcement officers will be called for. Apart from inspecting the gear of the vessels and checking the contents of fish holds against logbook entries, enforcement officers can be expected to maintain certain records themselves. However, such monitoring, because of the amount of inspection possible with the rather limited resources likely to be available, will be insufficient for control and statistical purposes. Logbook information will need to be collected from all sources for summarisation and analysis. This needs to be done efficiently and in a timely manner.

A system will, therefore, have to be set up whereby log sheets can be deposited at the end of each voyage once all information has been entered. How this is done will depend on whether or not a fisheries statistics collection system involving the use of statistics collectors based at ports of landing is already in existence. If it is, it should be an easy matter to arrange for log sheets to be collected from vessels at the completion of each voyage. Such statistics collectors, apart from ensuring that all log sheets are collected, can carry out simple vetting procedures and can calculate totals where required. Furthermore, when queries arise, as they are almost certainly bound to from time to time, the statistics collectors will be well placed to resolve them quickly.

When such a collection system does not exist, consideration should be given to the possibility of employing collectors specifically for the purpose of collecting log sheets and vetting them before they are sent to the central statistical office. It may be sufficient, for example when langings are made at restricted times of the day, to employ collectors on a part-time basis.

If there are no local collectors at the ports, completed log sheets will have to be sent by post to a central point. This will require skippers to be issued with a supply of envelopes. These need to be of a size suitable for taking the sheets with a minimum amount of folding. For instance, an envelope of dimensions 110 x 220 mm will accomodate an A4 sheet with only two folds. Fold marks may be indicated on each sheet to facilitate correct folding. Envelopes may be plain in which case they should have the address to which they are to be sent pre-printed, or they may have address windows. If the latter type are used, the address can be pre-printed in the correct position on the reverse side of each log sheet.

For vessels away from port for long periods, information about their fishing activities may need to be made available earlier than end-of-voyage collection allows. In such situations, vessels can be required to transmit their information by radio. This would require the setting up of appropriate calling procedures.

When a vessel lands at a foreign port, arrangements will have to exist for sending in log sheet information. This could be done by using the postal method mentioned above. However, where countries already have arrangements whereby information, gathered by foreign fishery statistics collectors, is transmitted to the home-country, completed log sheets could be sent by this route. If the countries involved are all party to the same management regime this should pose no difficulty and, indeed, such reciprocal arrangements will be an essential factor in their common management procedures.

When vessels are fishing in pairs, both should keep and return records of the vessel and trip details as itemised earlier. Fishing position and effort records should also be noted by both vessels but the retained catch should only be entered on the log sheet kept by the vessel which actually took the catch on board.

V. PROCESSING LOGBOOK INFORMATION

Whether logbooks are introduced purely for surveillance purposes or to provide a database for administrative and scientific purposes, some processing and analysis of the recorded information will be called for. This must be recognized at the outset and borne in mind throughout all stages of planning. It is all too easy to call for large amounts of detailed data to be collected only to find, when they begin to become available, that resources do not exist, or are quite insufficient, to handle the information collected.

The provision of, at the very minimum, accurate up-to-the-minute meaningful summaries will be called for in order to provide the information essential for effective control. Administrative and scientific statistical information also needs to be adequately on time. These requirements are demanding and will almost certainly call for the data to be processed by computer. A decision as to whether or not computer processing is to be employed must be made early in the planning cycle.

If all log sheet information is to be handled manually then the number of clerical and administrative staff required will need to be estimated and a person appointed to be in overall charge. This person will need to be kept closely in touch with the planning of form sizes and layouts and will need to provide financial estimates for the purchase of stationery and office equipment, such as typewriters and desk calculators.

If computer processing of all or part of the data is to be employed, the first step should be to contact any existing government computer organization to see whether it can, with existing facilities, provide the required service. If no such government agency exists, a commercial computer bureau should be approached. If a fishery statistics scheme is already in operation using computing facilities, how the logbook information is to be integrated with existing processing, if at all, will be the first major consideration. Either way, computer systems analysts must be drawn into discussions at the beginning. Their advice will be invaluable, not only in the anslysis of the data once collected, but at the earlier stage of designing the log sheets themselves. They should also be able to advise on whether or not commercially available database management software will provide the necessary processing capabilities. If not, special software will have to be written. This may easily take at least a year to commission from the time of final agreement of the specification of what is required.

A major problem area in the implementation of a computer processing system is very likely to occur at the data preparation stage. If log sheets are sent directly to a central data preparation pool by skippers, the punching staff will have the problem of deciphering the hand-written entries. Many queries will have to be resolved by returning forms to the appropriate skippers. This will take time and may not resolve all problems. A screening arrangement whereby log sheets are passed to central offices via local statistics collectors will cope with most problems. Such collectors also provide the most convenient means of referring back any queries which still remain at the punching stage.

If port collectors are employed in this manner a more sophisticated scheme is possible. Using micro-computers at the ports, the collectors can enter log sheet information under program control and store it on diskettes or tapes. Data editing facilities, now widely available for micro-computers, may be used to correct any errors in the data entered. Once vetted data have been created they can be passed to a central, host computer for processing along with similar data received from other ports. Computer copies of the data may be retained at ports for local processing, provided sufficiently powerful micros and appropriate software are available. Initial costs for such facilities may appear high, especially if a large number of ports are to be equipped with micros, but the tremendous advantages to be a very cost effective one.

Also, costs of micro-computers and their software are presently decreasing. A thorough study of a micro-based network is to be recommended.

Guidance on appropriate software for processing data must be sought from computer experts. No system should be purchased until the potential supplier has clearly demonstrated to the user's satisfaction its capability to do the required job in the manner specified.

The actual processing which needs to be done will to some extent depend on the specific situations holding. Such things as aggregated catch and effort statistics, classified by sea area and type of vessel and gear are usual requirements. Such aggregates should be made available for all data currently entered rather than for specified time periods such as weeks or months. This avoids difficulties which can arise with the late entering of data due, for instance, to time lost in having to settle queries. The catches entered in the log sheets by skippers will normally require to be corrected, as far as is possible, for errors of estimation. This can be done by using the ratio of the total landing as certified for the voyage to adjust individual entries. For scientific purposes the nominal, live weight equivalent, of the catches is required. Landed catches will themselves require adjustment to convert them from landed weight to nominal weight. For this purpose conversion factors for each species and each method of fish processing used will, if not already available, need to be established. This is a scientific exercise entailing the collection of representative samples and appropriate analysis.

Apart from providing routine and ad hoc tabulations of data to satisfy administrative and scientific needs; a serious attempt should be made to provide simple summaries, accompanied by unsophisticated commentaries, aimed at the members of the fishing community. Such information should be chosen to be of interest to fishermen and should demonstrate the usefulness of the data they have collected to the continuing viability of their industry and livelihood.

Where the introduction of a logbook system of the type described here represents an exercise without any parallel, so that no relevant experience of data collection and processing exists, it is well worth considering mounting a trial exercise, based on a sample, before proceeding to full implementation. Any such trial needs to be planned with great thought and care in order to derive the maximum amount of useful information from it. All aspects which are thought likely to present difficulties should be included in the trial. It is quite possible that unexpected problems will arise, not only during a preliminary trial, but also once the full system has been put into operation, even if a trial has been carried out. The system should, therefore, be reviewed in detail after it has been in operation for a suitable period of time.

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Appendix I

International Standard Statistical Classification of Fishing Vessels (ISSCFV)

by GRT, Power and Length Categories

Division Code	GRT Categories		HP Categories		Kw Categories		Length	
	Lower Limit	Upper Limit*	Lower Limit	Upper Limit*	Lower Limit	Upper Limit*	Lower Limit	Upper Limit*
	GRT	GRT	HP	HP	Kw	Kw	---Metres---	
01	0	0.9	1	29.9	1	24.9	0	5.9
02	1	24.9	30	99.9	25	74.9	6	11.9
03	25	49.9	100	199.9	75	149.9	12	17.9
04	50	99.9	200	499.9	150	299.9	18	23.9
05	100	149.9	500	749.9	300	499.9	24	29.9
06	150	249.9	750	999.9	500	749.9	30	35.9
07	250	499.9	1 000	1 499.9	750	999.9	36	44.9
08	500	999.9	1 500	1 999.9	1 000	1 499.9	45	59.9
09	1 000	1 999.9	2 000	2 999.9	1 500	1 999.9	60	74.9
10	2 000	3 999.9	3 000	4 999.9	2 000	2 999.9	75	99.9
11	4 000	9 999.9	5 000		3 000	3 999.9	100	and over
12	10 000	99 999.9	-	-	4 000	and over		
99							not known	

* ".9" is understood to be recurring

Appendix II

International Standard Statistical Classification of Fishing Gear (ISSCFG)

Gear Categories	Standard Abbreviation
SURROUNDING NETS	
With purse lines (purse seines)	PS
- one boat operated purse seines	PS1
- two boats operated purse seines	PS2
Without purse lines (Lampara)	LA
SEINE NETS	
Beach seines	SB
Boat or vessel seines	SV
- Danish seines	SDN
- Scottish seines	SSC
- Pair seines	SPR
Seine nets (not specified)	SX
TRAWLS	
Bottom trawls	
- beam trawls	TBB
- otter trawls 1/	OTB
- pair trawls	PTB
- nephrops trawls	TBN
- shrimp trawls	TBS
- bottom trawls (not specified)	TB
Midwater trawls	
- otter trawls 1/	OTM
- pair trawls	PTM
- shrimp trawls	TMS
- midwater trawls (not specified)	TM
Otter twin trawls	OTT
Otter trawls (not specified)	OT
Pair trawls (not specified)	PT
Other trawls (not specified)	TX
DREDGES	
Boat dredges	DRB
Hand dredges	DRH
LIFT NETS	
Portable lift nets	LNP
Boat-operated lift nets	LNB
Shore-operated stationary lift nets	LNS
Lift nets (not specified)	LN

Gear Categories	Standard Abbreviation
FALLING GEAR	
Cast nets	FCN
Falling gear (not specified)	FG
GILLNETS AND ENTANGLING NETS	
Set gillnets (anchored)	GNS
Drift nets	GND
Encircling gillnets	GNC
Fixed gillnets (on stakes)	GNF
Trammel nets	GTR
Combined gillnets-trammel nets	GTN
Gillnets and entangling nets (not specified)	GEN
Gillnets (not specified)	GN
TRAPS	
Stationary uncovered pount-nets	FPN
Pots	FPO
Fyke nets	TYK
Stow-nets	FSN
Barriers, fences, weirs, etc.	FWR
Aerial traps	FAR
Traps (not specified)	FIX
HOOKS AND LINES	
Hand-lines and pole-lines (hand operated) 2/	LHP
Hand-lines and pole-lines (mechanized) 2/	LHM
Set longlines	LLS
Drifting longlines	LLD
Longlines (not specified)	LL
Trolling lines	LTL
Hooks and lines (not specified) 3/	LX
GRAPPLING AND WOUNDING	
Harpoons	HAR
HARVESTING MACHINES	
Pumps	HMP
Mechanized dredges	HMD
Harvesting machines (not specified)	HMX

Gear Categories	Standard Abbreviation
MISCELLANEOUS GEAR 4/	MIS
RECREATIONAL FISHING GEAR	RG
GEAR NOT KNOWN OR SPECIFIED	NK

1/ Fisheries agencies may indicate side and stern bottom and side and stern midwater trawls, as OTB-1 and OTB-2, and OTM-1 and OTM-2, respectively.

2/ Including jigging lines.

3/ Code LDV for dory operated line gears will be maintained for historical data purposes.

4/ This item includes: hand and landing nets, drive-in-nets, gathering by hand and simple hand implements with or without diving equipment, poisons and explosives, trained animals, electrical fishing.

Appendix III

Fishing Effort Measures by Gear Categories

Level of Priority	Fishing Gear	Effort Measure Descriptors
A. FIRST	Surrounding nets (purse seines)	No. of sets or Searching time
	Beach seines	No. of sets
	Boat seines (Danish seine, etc.)	No. of hours fished
	Trawls	No. of hours fished
	Boat dredges	No. of hours fished
	Gillnets (set or drift)	No. of effort units
	Gillnets (fixed)	No. of effort units
	Traps (uncovered pound nets)	No. of effort units
	Covered pots and fyke nets	No. of effort units
	Longlines (set or drift)	Thousands of hooks
	Harpoons	-
B. SECOND	All gears	No. of days fished
C. THIRD	All gears	No. of days on ground
D. FOURTH	All gears	No. of days absent from port
E. FIFTH	All gears	No. of trips made

Figure 1

Schematic Representation of a Fishery System