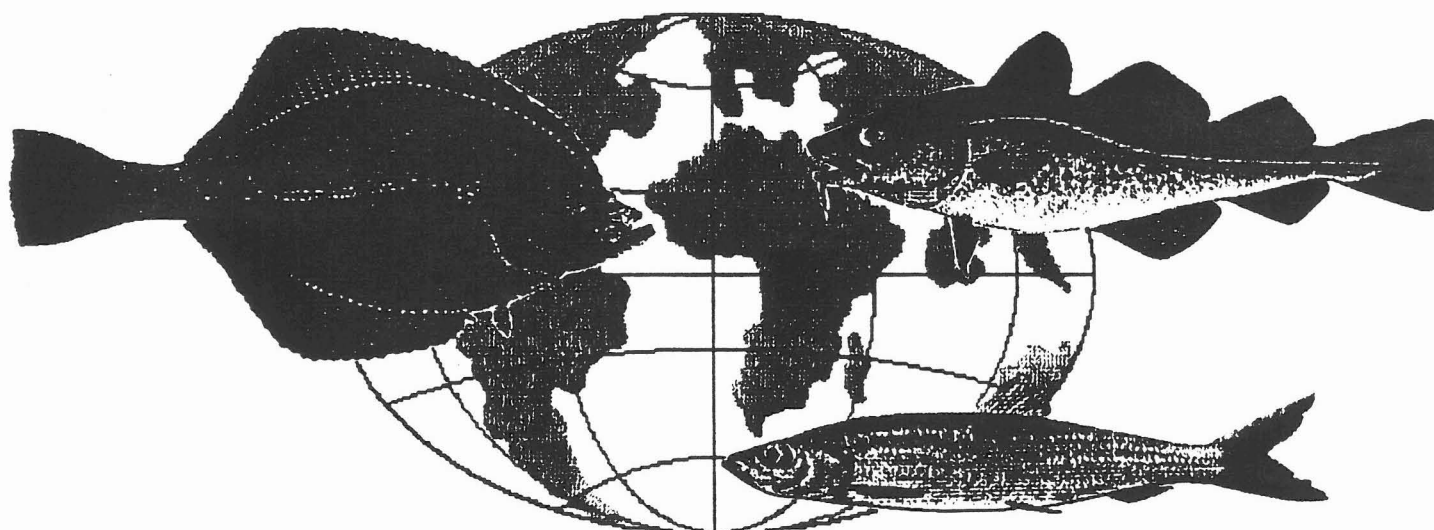


## 1993 REPORT OF THE STUDY GROUP ON

## FishBase.

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## ABSTRACT

This paper presents the current status of FishBase, a global database on fish developed by the International Center for Living Aquatic Resources Management (ICLARM) in collaboration with the Species Identification and Data Programme of the Food and Agriculture Organization of the United Nations (FAO) together with numerous national institutions and with the support of the Commission of the European Community (CEC). To date information on more than 8,000 species - including all fishes of North America and Europe - has been entered from more than 6,000 references. This information can be used for management and conservation purposes as well as for guiding future research efforts. The paper also presents the report and the recommendations of the Study Group on FishBase.

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## **Introduction**

The International Center for Living Aquatic Resources Management (ICLARM) in collaboration with the Species Identification and Data Programme of the Food and Agriculture Organization of the United Nations (FAO) together with numerous national institutions and with the support of the Commission of the European Community (CEC) is developing a global database (FishBase) to summarize key biological information on fish (Agustin et al. 1992; Capuli and Froese 1992; Froese 1990, 1993; Froese et al. 1992; Palomares and Pauly 1992a, 1992b; Palomares et al. 1991; Pauly and Froese 1991a, 1991b, 1992; Pauly et al. 1993). ICES has established the Study Group on FishBase with the following terms of reference: a) to identify more suitable data sets for inclusion in FishBase; b) to collaborate with relevant Working Groups to produce more species synopses for the ICES area; and c) to prepare a presentation of FishBase at the 1993 Theme Session on "Computers in Fisheries Research".

## **Status of FishBase**

The status of FishBase as of August 1993 is shown in Fig. 1. Information on more than 8,000 species - including all fishes of North America and Europe (about 2,000) - has been entered from more than 6,000 references. As a result of the efforts of the FishBase Project staff and its collaborators FishBase already contains the following outstanding collections:

- The largest collection of population dynamics data (growth parameters, natural mortality, length-weight relationships, maximum ages and sizes);
- The largest collection of ecological data (prey, predators, competitors, diet composition, food consumption);
- The largest available collection of electrophoretic data;
- The largest collection of common names (by country and language);
- The largest collection of genera of recent fishes (Eschmeyer 1990);
- The largest collection of data on fish metabolism (Thurston and Gehrke 1991);
- The largest collection of data on larval dynamics (Houde and Zastrow 1992);
- The largest collection of data on introduced fishes (Welcomme 1988).

Several other collections will probably reach this status in the course of the next year, e.g. collections of data on morphology, reproduction, occurrence, swimming speed, and proximate analysis.

## **FishBase Products**

A demo disk and the FishBase Manual are available from the FishBase Project. A number of other FishBase products are also available on request:

- Data Collection Forms for contributing information;
- Summary of available information and references used for a given species (short synopsis);
- List of references used in FishBase from a given author;
- Synopsis of all information in FishBase on a given species (full synopsis);
- All species of a given family with basic information and references used;
- List of species with a given common name;
- List of all fishes used for aquaculture in phylogenetic order with reference;
- List of all dangerous fishes;
- All fishes in FishBase in phylogenetic order;
- List of fishes for a given FAO statistical area;

- List of all fish diseases contained in FishBase;
- Digitized fish pictures as .PCX or .CUT files;

For a given country:

- Checklist of fishes with basic information and common name;
- Checklist of freshwater fishes;
- Checklist of marine fishes;
- Checklist of introduced fishes;
- Checklist of threatened fishes;
- Checklist of aquarium fishes;
- Checklist of fishes used in aquaculture;
- Checklist of dangerous fishes;
- Checklist of game fishes.

These products are sent free of cost to requesting parties. Recipients have to be aware that most of the available information has not yet been checked for correctness. Rather they themselves are expected to share any corrections, comments and criticism with the FishBase staff.

The full FishBase software package with pictures requires about 100 megabytes of space on the harddisk of an IBM compatible computer and has at this stage only been given to close collaborators of the project. As of August 1993 a preliminary version of FishBase has been installed in the following institutions:

- ICLARM Headquarters, Manila, Philippines;
- CEC Headquarters, Brussels, Belgium;
- FAO Headquarters, Rome, Italy;
- Zoologisches Institut und Museum, Universität Hamburg, Hamburg, Germany;
- Alfred-Wegener Institut für Polar- und Meeresforschung, Bremerhaven, Germany;
- Marine Science Institute, University of the Philippines, Quezon City, Philippines;
- Institute of Marine Biology and Oceanography, Freetown, Sierra Leone;
- Instituto de Investigação Pesqueira, Maputo, Moçambique;
- Department of Fisheries, Domasi, Malawi;
- Department of Land and Natural Resources, Hawaii;
- Programa de Ecología, Pesquerías y Oceanografía del Golfo de México, Campeche, Mexico;
- CARICOM Fisheries Resources and Management Program, Belize;
- Ministry of Agriculture, Land and Marine Resources, Fisheries Division, Trinidad and Tobago;
- Universidad Nacional Mayor La Molina, Lima, Peru;
- Ecole Nationale Supérieure Agronomique de Toulouse, Toulouse, France;
- Muséum National de l'Histoire Naturelle, Paris, France;
- Musée Royal de l'Afrique Centrale, Tervuren, Belgium;
- Institute of Aquatic Biology, Accra, Ghana.

### **ICES Stocks in FishBase**

So far, four of the 160 stocks monitored by ICES have been included in FishBase: the Baltic flounder (Froese and Friess 1992), the spring-spawning herring of the western Baltic (Froese and Rechlin 1992), and the cod stocks of the western and the middle Baltic, respectively (Weber and Froese 1993). In all cases key information was extracted from scientific publications and filled into Data Collection Forms provided by the FishBase project. The forms were sent to ICLARM where the data were keyed into the computer. The resulting printouts were then

checked for correctness. This process is requested by the FishBase Project in order to secure the integrity of the database and contributing authors found it reasonably comfortable and reliable.

An analysis of the references used in the three synopses shows a high percentage of non-English and non peer-reviewed literature, both of which are usually difficult to access. The authors concluded that the Data Collection Forms provided by the FishBase Project were an appropriate tool to capture such information and that the printed synopses were an acceptable framework to make the information available with a standardized English interface. Since the printout from the database is an automatic procedure, it is particularly easy to correct and add information.

Once the accumulated information reflects the current knowledge on a stock it can be used to identify research gaps and to avoid unnecessary duplication of research. For example, 5 references with length-weight relationships and 8 references with growth parameters for the cod of the western Baltic indicate that there is little need to redo these studies. On the other hand there are only two records on predators (cannibalism on juveniles; herring feeding on cod eggs). It can be assumed that, e.g., turbot, mackerel, and whiting also feed on juvenile cods. Such information is relevant for ecological models such as ECOPATH (Christensen and Pauly 1992), which help to understand the interactions of a stock with the other major groups in a given ecosystem. It might therefore be worthwhile to research the contribution of juvenile cods to the diet of these and other species.

### **Future Development of FishBase**

FishBase's main target group are fisheries managers and researchers. In order to quickly cover all fishes important to this group, FishBase - during its start-up phase - used recent summary publications such as Nelson's Fishes of the World (Nelson 1984), Check-list of the Fishes of the North-eastern Atlantic and of the Mediterranean (CLOFNAM, Hureau and Monod, 1979), and Common and Scientific Names of Fishes from the United States and Canada (Robins et al. 1991) as a source of scientific names. This did not satisfy the fish taxonomists who want Fishbase to use and cite the original literature rather than secondary sources.

In view of this criticism, the FishBase Project plans to further develop FishBase along four lines. Firstly, recent revisions of families and genera will be the main source to gradually include all fishes with basic information (nomenclature, main characters, distributional range). This will ensure that the taxonomic information is up to date according to the world experts on the respective groups. This task will be greatly facilitated by a cooperation with W. N. Eschmeyer of the California Academy of Science who is working on a complete catalog of recent fishes (names and synonyms) and who will make his respective database available to FishBase.

Secondly, checklists for countries and areas (e.g., Daget et al. 1991, Wheeler 1992, Robins et al. 1991) are the main source used to assign species to countries. This task is largely completed for the ICES area and the resulting checklists need verification by the national experts. For other countries, priority is given to those who actively collaborate with the

FishBase Project such as Australia, Bangladesh, Ghana, Hawaii, Malawi, Malaysia, Mexico, Peru, the Philippines, and Vietnam.

Thirdly, FishBase continues to include - and thus make available - databases developed by others. An example is the database on World Record Game Fishes which the project recently received from the International Game Fish Association in Fort Lauderdale, USA. The database is very useful in that it contains occurrence records and maximum sizes for a wide variety of species.

Fourthly, FishBase staff continues to scan the scientific literature to continuously update the contents of the existing tables. Special efforts are underway to open up two bodies of literature which, to a large extent, have not been accessible outside their respective countries, namely Japan and the States of the former USSR.

It is planned to make FishBase available on CD-ROM for nominal costs (95 US\$) to fisheries' institutions worldwide with special emphasis on developing countries, who will be supported in purchasing the necessary hardware and will receive training on how to use FishBase and related analytical tools. Distribution is planned to start in late 1994.

### **Conservation of fish biodiversity**

The maintenance of species biodiversity has been put on the global agenda by the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. ICES must be prepared to give advice not only on the management of the 160 commercial stocks but also on how to maintain biodiversity of aquatic species in its area of responsibility which includes more than 800 species of marine fishes alone, 12 of which are regarded to be threatened (IUCN 1990). FishBase aims to facilitate the task of conserving fish biodiversity by a threefold approach: i) by compiling all available key information (see above) on these species, ii) by compiling occurrence and abundance data from a wide variety of sources (museum records, research vessel surveys, national angling records, tagging experiments, scientific literature, etc.), and iii) by reporting their status of threat. Once the occurrence and abundance records reach a representative level, FishBase itself can be used to determine the status of threat by combining trends in distribution and abundance with a set of biological characters such as environmental tolerance, fecundity, longevity, and age at first maturity.

### **Collaborators**

While the FishBase staff over the past three years has developed the foundations of a global information system on fishes, the task of checking, improving and updating the information for their respective areas depends on the national and regional experts. It has to be a collaborative exercise for the FishBase concept to succeed. To date, more than 63 colleagues from 18 countries have actively provided databases or compilations or have helped in checking information. Their name is attached to every record they contributed and their efforts are acknowledged in the respective species synopses. They are also entitled to a free copy of FishBase once it is available.



### **Report and recommendations of the Study Group**

Due to other commitments of its members, the Study Group - which was to work by correspondence - had little interactions during the reporting period. Nevertheless the Study Group followed up on its terms of reference as follows:

- a) Data sets with occurrence records were obtained from the California Academy of Science and from the International Game Fish Association. A data set on allele frequencies of fishes turned out to be not available.
- b) Two synopses on the cod of the western and the middle Baltic, respectively, were completed, thus bringing the total number of ICES stocks covered to four (see above).
- c) The present paper is also copied to the Theme Session on "Computers in Fisheries Research" where FishBase will be presented.

On the basis of the four synopses the Study Group is of the opinion that FishBase is an appropriate tool to compile key information on ICES stocks and to make this information available to the ICES community. The Study Group recommends to the ICES secretariat to

- 1) have a preliminary copy of FishBase installed at ICES headquarters to gain hands-on experience with the software;
- 2) explore linkages between FishBase and other ICES databases;
- 3) consider options to make key information contained in ICES papers available through FishBase;
- 4) consider options to complete and update biological information on the ICES stocks in FishBase.

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