

NORTH EAST ATLANTIC DATA HELD IN THE BIOLOGICAL DATA BASE OF THE INSTITUTE OF OCEANOGRAPHIC SCIENCES DEACON LABORATORY, U.K.

P. M. HARGREAVES

ARQUIPÉLAGO



HARGREAVES, P. M. 1990. North East Atlantic data held in the biological data base of the Institute of Oceanographic Sciences Deacon Laboratory, U.K. - *Arquipélago*, Life and Earth Sciences 8:55-61. Angra do Heroísmo. ISSN 0870-6581.

The relational data base used for the storage and retrieval of biological data relating to the vertical and geographic distribution of open oceanic midwater species of macroplankton and micronekton, including fish and crustaceans, is described. The data have been derived from sampling carried out during the last two decades in the North-East Atlantic between the Equator and 60°N and from just off the European and African coasts mainly to 33°W and exceptionally to 62°W. Hauls sampled contiguously strata between the surface and maximum depth of 1500/2000 m and exceptionally to 5000 m. The data base and the parameters associated with species and sampling data are described, retrieval facilities are outlined and examples given of the types of data which may be available.

HARGREAVES, P. M. 1990. Dados do Atlântico Nordeste contidos na base de dados biológicos do Instituto de Ciências Oceanográficas Laboratório de Deacon, Reino Unido - *Arquipélago*. Ciências da Natureza 8:55-61. Angra do Heroísmo. ISSN 0870-6581.

Descreve-se a base de dados relacional, para armazenamento e consulta de dados biológicos, relacionados com a distribuição vertical e geográfica de espécies oceânicas, macroplânctônicas e micronectônicas, incluindo peixes e crustáceos. Os dados foram obtidos a partir de amostragens realizadas durante as duas últimas décadas no Atlântico Nordeste, entre o Equador e os 60°N e entre o litoral das costas Europeias e Africanas até aos 33°W de longitude, excepcionalmente até aos 62°W. Os arrastos estratificados foram amostrados continuamente desde a superfície até à profundidade máxima de 1500/2000 m e excepcionalmente até aos 5000 m. Além da descrição da base de dados e dos parâmetros relacionados com as espécies e dados de amostragem, demonstra-se a facilidade de consulta, recorrendo-se a exemplos com os tipos de dados que estão disponíveis.

P. M. HARGREAVES, *Institute of Oceanographic Sciences Deacon Laboratory (Natural Environment Research Council), Brook Rd., Wormley, Godalming, Surrey, GU8 5UB, England, U.K.*

INTRODUCTION

During the past two decades the biology group at the Institute of Oceanographic Sciences Deacon Laboratory (IOSDL) has undertaken a series of comprehensive midwater sampling programmes. During late 1987 data relating to these programmes held on BIOS, the Institute of Oceanographic Sciences database for marine biological data (DOMANSKI 1981) was

transferred to an ORACLE relational database system (ORACLE CORPORATION 1987). Since then additional data have been entered.

The aim of this paper is to describe the types and amount of biological data held on the data base and to give examples of output.

MATERIAL AND METHODS

IOSDL biological data are based on midwater sampling conducted in the North Atlantic

mainly between the Equator and latitude 60°N and from offshore Europe and Africa mainly to 33°W and exceptionally to 62°W. Between 1969-74 the sampler used was the opening/closing Rectangular Midwater Trawl (1+8) (BAKER & al. 1973) but in 1974 this sampler was superseded by the multiple version (RMT 1+8m), (ROE & SHALE 1979). Using both systems a macroplankton and a micronekton sample are collected simultaneously in an RMT1 and a RMT8 net respectively, fished in tandem. The RMT1 sampling net, has a mouth area of 1 m² and a mesh size of 0.32 mm and samples macroplankton; the RMT8, sampling mouth area 8 m², mesh size 4.5 mm, samples micronekton. At many stations a series of horizontal hauls were taken systematically in discrete depth strata 50-200 m in thickness so that the whole water column was sampled. In the upper 900-1000 m usually both day and night samples were collected; below these depths samples were taken irrespective of the light regime. One well documented set of station for which data are available are positioned roughly at 10° intervals of latitude between 11°N and 60°N and close to the 20-25°W meridians. In addition, at several transects including one between 32°N 16°W and Bermuda, a series of oblique hauls were taken usually between the surface and 1000 m. Many animals present in the hauls have been identified to species and enumerated to give data which can be standardised with the aid of data derived from a net-mounted flow meter.

A map showing the stations at which horizontal or oblique hauls were made and for which taxonomic data are held on the data base is given in Fig.1. The data are stored within an ORACLE (version 2.0) relational data base system which uses SQL. Data are represented as tables each consisting of a series of rows (the equivalents of records) and columns (parameters). A summary of some of the most useful tables is given in Fig. 2. Most are self-explanatory for example the SAMPLE table contains information about the sampling of an area including station number, nets, depth ranges, calculated flow rates and the longitude and latitude. (The last two digits of a station number comprise the series number of each haul within the water

column, whilst the preceding digits refer to a given geographic sampling position).

Details of species caught are stored in 'CATCH' tables which also include information on totals, fractions identified, flow of water through the net, type of net, depth ranges, longitude and latitude. There is provision for standardising data to given flow rates or fractions of samples and for retrieving, inserting, updating and deleting data using SQL commands. These commands are either used directly or from FORTRAN programs. New tables can be easily added and confidentiality of data maintained. Although the data are held on several different tables it is often possible to gain all the information required by interrogating just a single table. However, two tables or more can be accessed simultaneously by concatenation.

TYPES OF INFORMATION AVAILABLE

Data on the horizontal and vertical distribution and maturity stages of the following taxonomic groups are included in the data base: - Decapoda, Ostracoda, Chaetognatha, Mysidacea, Fish, Siphonophora, Euphausiacea. The total number of 'catch' records held up to December 1989 for some of these taxa is given in Table 1. Often there are several records for a species at any one station because it may have been sampled by various types of nets.

A list of parameters associated with the storage of data within the ORACLE tables is given in Table 2. Records or parts of records may be accessed using any of these parameters, in any order. An example of output in response to an interrogation of the data base for information on the geographic and vertical

Table 1. Total number of records held for various taxa.

Taxa	No. of records
Decapoda	6888
Euphausiacea	10753
Mysidacea	2422
Ostracoda	10849
Fish	15500
Chaetognatha	1245

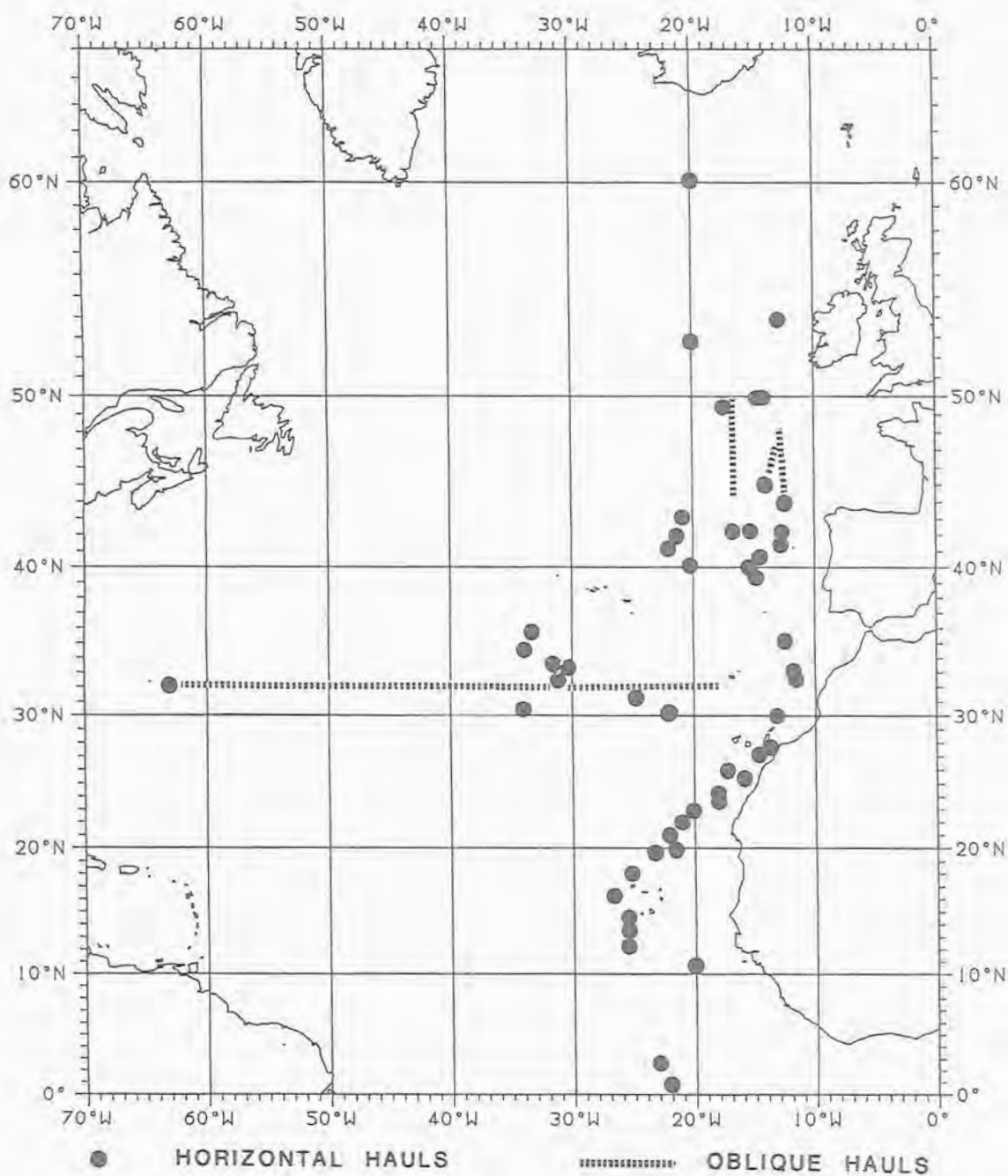


Fig. 1 - Some of the stations for which data are held on the IOSDL biological data base. At many stations a series of samples will have been obtained at various depths throughout the water column.

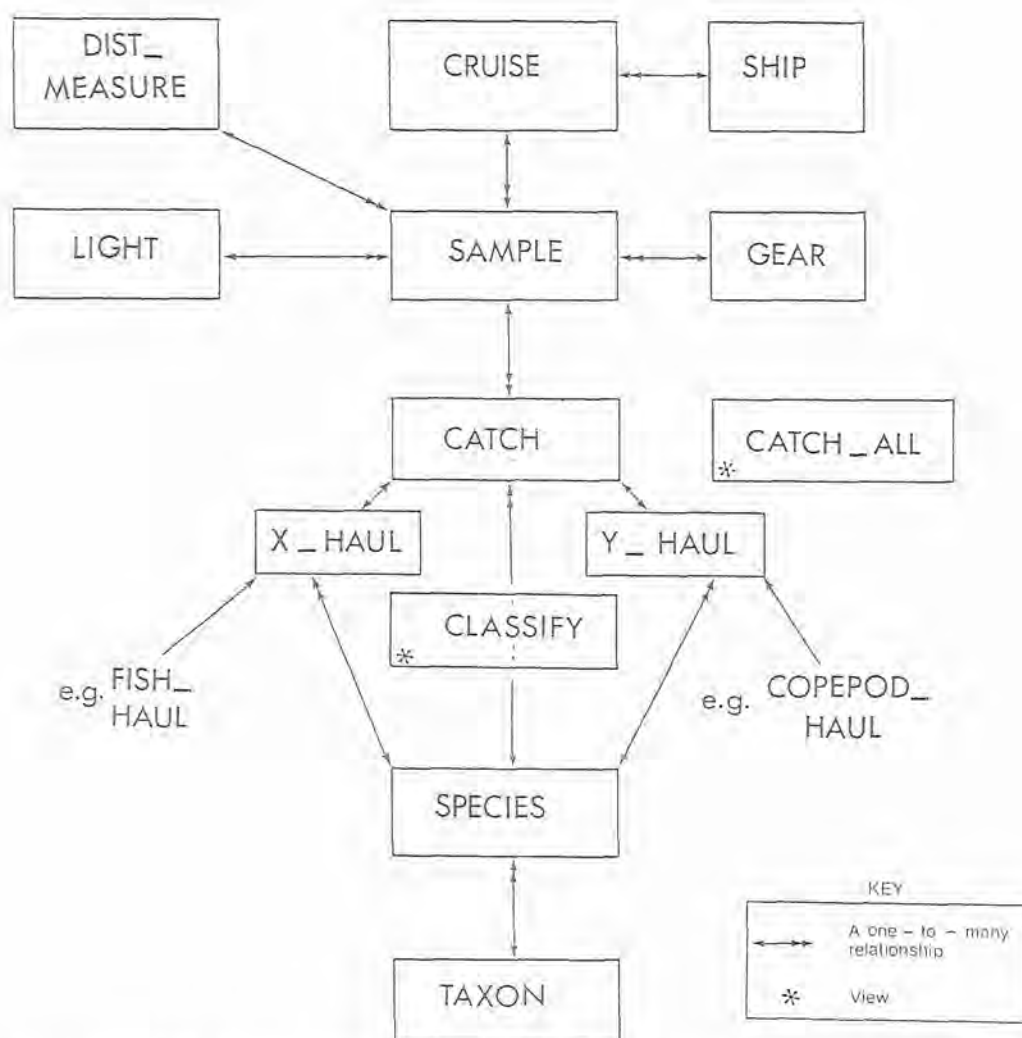


Fig. 2 - A summary of the types of table in which data are held. Arrows represent the relationship between tables, e. g. there are many GEAR records in the SAMPLE table. Views are virtual tables which contain information derived from several tables, e. g. CLASSIFY consists of a combination of records from the TAXON and SPECIES tables. CATCH_ALL contains information from several tables.

distribution and unstandardised totals of the decapod species *Acantheephyra pelagica* is given in Table 3. The following parameters were requested from the 'CATCH_ALL' Table, SPECIES, RAW_TOTAL (unstandardised to fraction or to amount of water filtered), GEAR_TOP, GEAR_BOTTOM (Depth horizons), LIGHT (Day or Night), GERA (Net), STATION, BEG_ALAT, BEG_ALON (beginning latitude and longitude).

DISCUSSION

This paper presents an overview of data held on the IOSDL Biological Data Base which can either be used as a basis for further research or for hypothesis testing. These data may also be made available to bona fide members of the scientific community at negotiable cost. Further enquiries should be addressed to the Biology Department at IOSDL, Wormley, Surrey, U.K.

Table 2. List of parameters associated with data storage. Most are self-explanatory but where they are not, descriptions are given.

Parameter	Description
CRUISE_NO	
CRUISE_NAME	
COUNTRY_CODE	
SHIP_CODE	
SHIP	
BEG_CRUISE	Date
END_CRUISE	Date
CRUISE_DESCRIPTION	
STATION	
GEAR_CODE	
GEAR	
GEAR_DESCRIPTION	
BEG_SAMPLE	Date
BEG_SAMPLE_TIME	
END_SAMPLE	Date
END_SAMPLE_TIME	
SAMPLE_DURATION	
SAMPLE_TIMES	
BEG_ALAT	Latitude
BEG_ALON	Longitude
END_ALAT	Latitude
END_ALON	Longitude
GEAR_TOP) Depth of Haul
GEAR_BOTTOM	
STATION_MEAN_DEPTH	
LIGHTING	Day/night
SAMPLE_VOLUME) Amt. of water filtered by net
SAMPLE_COMMENT	
FISH_BIOMASS	
SAMPLE_BIOMASS	
TAXON_CODE	
TAXON	
SPECIES_CODE	
GENUS_NO	
SPECIES	
MULTIPLY_FACTOR	
CATCH_COMMENT	
BIOMASS	
RAW_TOTAL	
TOTAL_JUV) Maturity Stages
TOTAL_LARVAE	

Table 3. An example of output in response to a query on the occurrence of the decapod species *AcanthePHYRA pelagica*. Information given includes species name, unstandardised numbers, upper and lower depths (day/night), nets, station number, latitude and longitude (given in decimals).

SPECIES	RAW TOTAL	GEAR TOP	GEAR BOTTOM	LIGHT	GEAR	STATION	BEG_ALAT N	BEG_ALON W
<i>AcanthePHYRA pelagica</i>	8	10	1000	Day	RMT8	783101	13.3067	25.5533
<i>AcanthePHYRA pelagica</i>	4	30	1000	Night	RMT8	783201	13.8283	25.8683
<i>AcanthePHYRA pelagica</i>	5	10	1000	Night	RMT8	783301	14.7983	26.4217
<i>AcanthePHYRA pelagica</i>	1	20	1000	Day	RMT8	783401	15.6717	26.5117
<i>AcanthePHYRA pelagica</i>	3	0	1000	Night	RMT8	708001	16.8567	27.0450
<i>AcanthePHYRA pelagica</i>	16	505	600	Night	RMT8	708917	17.7150	25.1983
<i>AcanthePHYRA pelagica</i>	1	210	300	Night	RMT8	708903	17.7483	25.4817
<i>AcanthePHYRA pelagica</i>	5	410	500	Night	RMT8	708922	17.7717	25.3617
<i>AcanthePHYRA pelagica</i>	1	1500	2000	Day	RMT8	708307	17.7783	-25.1800
<i>AcanthePHYRA pelagica</i>	3	610	700	Night	RMT8	708919	17.8133	25.2833
<i>AcanthePHYRA pelagica</i>	38	700	790	Day	RMT8	708905	17.8167	25.4333
<i>AcanthePHYRA pelagica</i>	4	1000	1250	Night	RMT8	780306	17.8250	25.1850
<i>AcanthePHYRA pelagica</i>	2	300	400	Night	RMT8	708911	17.8300	25.4450
<i>AcanthePHYRA pelagica</i>	4	700	785	Night	RMT8	708915	17.9167	25.4050
<i>AcanthePHYRA pelagica</i>	1	1500	2000	Night	RMT8	780309	17.9493	25.1067
<i>AcanthePHYRA pelagica</i>	20	0	1000	Night	RMT8	780301	18.0300	25.0367
<i>AcanthePHYRA pelagica</i>	7	0	1000	Day	RMT8	706901	18.1100	25.1950
<i>AcanthePHYRA pelagica</i>	4	0	1000	Dusk	RMT8	780201	18.6317	24.2550
<i>AcanthePHYRA pelagica</i>	3	0	1000	Night	RMT8	707001	18.8883	25.2633
<i>AcanthePHYRA pelagica</i>	4	0	1000	Night	RMT8	706801	19.0100	25.0717
<i>AcanthePHYRA pelagica</i>	48	0	1000	Day	RMT8	780101	19.1833	23.3683
<i>AcanthePHYRA pelagica</i>	6	0	0	Day	RMT8	706601	19.2867	24.4833
<i>AcanthePHYRA pelagica</i>	66	0	0	Dawn	RMT8	706501	19.6833	23.9067
<i>AcanthePHYRA pelagica</i>	32	0	0	Night	RMT8	780001	19.7783	22.5450
<i>AcanthePHYRA pelagica</i>	29	0	0	Night	RMT8	706401	19.9717	23.5267

ACKNOWLEDGEMENTS

I wish to thank colleagues for their critical and helpful advice on the manuscript.

REFERENCES

- BAKER, A. DE C., M. R. CLARKE & M. J. HARRIS 1973. The NIO combination net (RMT 1+8) and further developments of rectangular midwater trawls. - *Journal of the Marine Biological Association of the United Kingdom* 53:167-184.
- DOMANSKI, P. 1981. BIOS data base for marine biological data. - *Journal of Plankton Research* 3:3.
- ORACLE CORPORATION 1987. *SQLPLUS Users Guide, version 2.0*. Oracle Corporation. California.
- ROE, H. S. J. & D. M. SHALE 1979. A new multiple rectangular midwater trawl (RMT 1+8 m) and some modifications to the Institute of Oceanographic Sciences' RMT 1+8. - *Marine Biology* 50:283-288.

Accepted 8 January 1990.