

national programmes.

5) We recognize the significant contributions already made by commercial companies and governmental agencies to furthering the knowledge of the Atlantic margin of Africa through the partial release of their geological or geophysical data. In the interest of science, we urge those organizations which have further relevant information to make this available as far as possible for publication.

6) We note with interest the Geotraverse across the North Atlantic from Cape Hatteras to North West African planned by ESSA.

Working Group 31 believes it has fulfilled its existing terms of references, but it is willing to accept new terms if so desired.

ANNEX VII

REPORT OF SCOR WORKING GROUP 32, BIOLOGICAL DATA INVENTORIES

Report of Meeting in Washington, 7-10 April 1970

The Working Group met at the National Oceanographic Data Center in Washington, D.C., on April 7th to 10th, 1970. The following participated:

Nominated by ACMRR: Dr. Saul B. Solla, Dr. B. Zeitzschel; nominated by SCOR: Dr. J. M. Colebrook, Dr. G. Hempel (Chairman); ex-officio members: Mr. E.F. Akyuz, Dr. A.R. Picciolo, Dr. Raoul Serene.

The following observers were present: Dr. Elaine Collins (NODC, USA-Rapporteur); Mr. Reginald Creighton (Smithsonian, USA); Dr. Sidney J. Holt (Secretary, IOC); Miss Betty J. Landrum (Smithsonian, USA); Dr. James Mello (Smithsonian, USA); Mr. Ronald Moffat (WDC-A, Oceanography); Mr. William Molo (WDC-A, Oceanography).

The following terms of reference had been given for the Working Group:

1) To review the present status of biological data inventories and information retrieval in national, regional and world data centers (WDC's).

2) To propose standard forms and procedures for inventory of marine biological and related biochemical data (exclusive of commercial fishery statistics).

3) To review present procedures in cataloging reference collections of marine organisms and to consider means for speedy retrieval and exchange of information contained in such catalogs.

The Agenda as adopted by the Working Group is given in Attachment I. After the opening of the meeting by the Chairman, Dr. Austin spoke both as the host and as Chairman of the IOC Working Group on Oceanographic Data Exchange. He brought the participants up to date on the change in the policy of the U.S. National Oceanographic Data Center (USNODC) from storage of biological data to information retrieval, particularly inventories. He quoted from the Report of the 4th Meeting of the IOC Working Group on International Oceanographic Data Exchange, which had emphasized that many of the recommendations of Working Group 18 on Biological Data had never been implemented and which had stated that steps should be taken for the "setting up of a revised ACMRR/SCOR Working Group to update the recommendations of Working Group 18 and to arrange for the implementation of its proposals". He urged that the recommendations of Working Group 32 be made available to the IOC Data Exchange Working Group for its forthcoming meeting in Geneva in September, 1970.

The Chairman gave a brief history of the activities of SCOR and ACMRR in the field of biological data exchange since the establishment of WG 18 in 1964. At its meeting in 1965, WG 18 recognized the following reasons for biological data exchange: pooling of data of different origin; juxtaposition of biological and environmental data; ensuring the conservation of data by keeping centralized records; and recognition of gaps in the seasonal and/or geographical coverage in international sampling programs. During the meeting of WG 18, the discussion centered on the development of systems for international storage of biological data and on the suitability of different biological parameters for submission to data centers. Some alterations were made to the IOC Manual on Oceanographic Data Exchange. WG 18 recommended submission of biological data or of inventories thereof to national and world data centers. Major emphasis was laid on large-scale and international sampling projects.

There is an increasing need for better handling and accessibility of biological data. The number of large international projects in oceanography and of FAO field projects involving exploratory fishing and investigations in biological oceanography is growing. The amount of data being collected by continuous measuring and sampling devices is also increasing. Reference is made to the work of the ACMRR Working Party on Fish Egg and Larvae Surveys and the SCOR/IBP WG 29 on Continuous Monitoring of Biological Parameters. However, despite efforts to standardize methods, most biological data need to be accompanied by detailed information on the methods of collection and analysis. Interpretation of results is often influenced by methods and the environmental conditions during sampling. Therefore, submission of raw data to data centers cannot be satisfactory in many fields of biology. Inventories of the data holdings of operating agencies and bibliographic services would be at present the most useful means of information exchange, as they permit the retrieval of data with accompanying auxiliary information held by the collecting scientist or institution.

Review of the Present State of Biological Data Inventories

Since 1965 little progress has been made in biological data exchange in most of the national and international data centers. Although most centers do not decline to accept biological data, they do not encourage the submittance of these data by providing an adequate machinery for their processing and retrieval. The only exceptions are regional data centers such as ICES (when dealing with data on fish stocks and fishery statistics) and the USNODC.

Dr. Picciolo gave a brief history of the evolution of the USNODC with respect to biological data storage. The five biological forms produced in 1964/65 and discussed by WG 18 were never filled in by operating institutions. Emphasis, therefore, was turned to data already recorded on magnetic tape and punch card in the format most suitable to the data originator. At present, USNODC is not converting biological data to fit onto a standard format, but rather can reproduce it in the originator's format. As a result of the need for preparing an annual list of Declared National Programs for the United States, a recording and inventory form was devised called the National Marine Data Inventory (NAMDI). The form, which has now been in use for three years, was well accepted by the scientific institutions and agencies. The NAMDI forms are normally filled out soon after each cruise. The establishment of inventories of biological data appears more acceptable to marine biologists than the submittance of the data themselves to a data center. Flexibility of the NAMDI form, its on-line capability, and its use in summarizing long-range cruises on a single sheet were queried. The Working Group suggested to USNODC that, from the biological point of view, geographical information based on Marsden squares is not satisfactory and that a stronger emphasis on information on pollution might be desirable.

Mr. Akyuz reviewed the present state of FAO Fishery Data Center. Expected to be operational by 1971, it will be the repository for special fishery data, mainly assessment oriented from FAO-executed projects, regional commissions, international cooperative investigations and such other specialized data of national and international origin. The Center will essentially be responsible for compiling, processing and analyzing data for use at national or international level. Periodically, inventories of data holdings of the Center will be prepared and be widely distributed.

The data stored in the Center are supplemented by machine retrievable bibliographic infor-

mation services. These services will be available to the user at the national and international level.

Dr. Holt, while deplored the delay in the establishment of the FAO Fishery Data Center, informed the group of the intention of IBP to use the FAO Center as a depository for data collected in IBP marine projects, including comparative biological studies in grey mullets, mussels, pollution, primary production in coastal lagoons, and productivity studies in coral reefs.

The interrelations between the FAO Fishery Data Center and WDC-A were discussed. It was felt necessary that the exact scope of all specialized centers be spelled out more clearly. It was agreed that WDC's should be informed of data holdings at FAO, that non-fishery data or their inventories should be routinely forwarded to WDC-A and the experts working in UNDP, FAO and UNESCO projects should be reminded of the need for speedily submitting environmental and non-fishery marine biological data or their inventories to WDC-A. It was strongly suggested by the Working Group that IOC, when inviting a national data center to act as a regional center for an international cooperative investigation, should ensure that this center is actively seeking the biological data and related information collected during those investigations.

For its future work, the Working Group requires detailed information on the policy and current status with respect to biological data in national data centers (Recommendation 1).

Standard Forms for International Inventories of Marine Biological Data

The Working Group divided the discussion into considerations of information on an entire operation and on biological investigations in particular during the operation.

With regard to the operation itself, the need was stressed for covering in one format both discrete cruises and expeditions as well as work on fixed stations and continuous recordings over long distances of drift or steaming.

Biological and fishery studies take place predominantly in relatively small areas on the shelf. In this case, the use of Marsden squares as a reference basis is not practical. To a lesser extent the same holds for ocean wide lines of continuous recordings. The Working Group therefore considered the geographical code reported on by Mr. Creighton of the Smithsonian Institution as a very useful approach, and proposed that corner positions (in latitude or longitude) of a polygon enclosing the sampling area be used to report position. If the system is not workable, Marsden squares can be deduced from the position polygon. The Group recommended (Recommendation 2) that WDC-A run trials on the Smithsonian retrieval system for geographical areas. In addition, the Group proposed that the IHB Chart of Limits of Oceans and Seas be refined by subdividing open ocean areas into four quarters. The World IHB chart should be printed on the cover of the pads of inventory forms, possibly along with a blown-up chart of the area of major interest of the respective NODC.

The Working Group appreciated the efforts of WDC-A in the recent development of an inventory form for international use, ROSCOP, which is very similar to the USNODC NAMDI form. Taking this as a working document, the Working Group proposed amendments to the heading of the form as given in Attachment II. A clear explanation together with examples of the categories in the heading should be given on the cover. Instead of listing the scientist-in-charge in the heading of the form, the scientists responsible for the operation should sign the form together with the person who filled in the form.

With regard to the biological section of the international inventory form, the Working Group recognized the necessity for a compromise between the needs for:

- a) easy handling by the "producer", who has to fill out the forms, who might also use copies of the form as records of his activities at sea,
- b) appropriate processing and retrieval in the data centers,

c) comprehensive information to the "user" searching for the holder of relevant biological data.

It was decided that the most common types of investigation should be listed in the form (see Attachment III) and that a block of ten to fifteen lines should be left blank for filling in other investigations in any field of oceanography. To facilitate computer retrieval, a glossary of terms should be provided and, as far as possible only these terms should be entered in the blank lines. Suggestions for some biological items for the glossary are given in Attachment IV.

In addition to the physical, chemical, geological and biological sections of the ROSCOP form, a section covering studies on pollution should be established. Some suggestions for items to be included in this section are listed in Attachment V.

The Working Group would like to see the addition of the following items to the physical and chemical sections: turbidity, ammonia, extinction coefficients, and subsurface light measurements.

These changes and additions will require some rearrangement of the ROSCOP format. Writing the "programs" vertically and eliminating the maps of Marsden squares will provide an additional 31 lines without the need to reduce the spacing between lines.

The back of the form should be left blank, to be used at the discretion of the "producer", except when the NODC issuing the forms requires further information.

It was understood that the forms will be submitted to the respective NODC, DNA or regional or specialized data center which will communicate the information contained in the form (or copy of the form) to WDC's. On request the "user" will receive printouts or copies of inventories. The need for updating the inventories by follow-up information was stressed, but procedures for this follow-up have to be discussed at a later meeting of the Working Group.

Reports on Bibliographic Documentation in Marine Biology

The problems of inventories of biological data and of bibliographic documentation of marine biological publications are closely related. In many cases publications contain detailed data lists which are not otherwise easily accessible and publications are the most important result of activities listed in the primary inventories.

Dr. Collins reported on USNODC's Biological Information Retrieval System, which involves detailed indexing literature on marine ecology and the distribution of organisms. Mr. Akyuz described the plans for the development of FAO's Current Bibliography in Aquatic Sciences into a fully automated information storage and retrieval system of the literature in the field of marine and fresh-water aquatic sciences as far as they are related to living organisms. While the USNODC system is entirely produced within the institution, the indexing for the FAO system will be done through FAO, several scientific institutes, and a commercial firm. The coverage in scope and number of journals searched will be wider in the FAO system than in USNODC.

Catalogs of Collections of Marine Organisms and Taxa

The Chairman and Dr. Holt described the particular problems related to inventories of the holdings of marine biological centers engaged in the sorting of material mainly collected in international expeditions. In order to familiarize the scientific community with the increasing number of marine biological sorting centers and their various activities, services, and collections, a directory should be produced containing information on topics including:

Complete address and affiliation
Staff

Reference to published description
Sources of material
Field of work
Research activities
Training activities
Contract sorting
Sorting activities
Sorting categories
Availability of reference collections
Format of data lists
Final location of samples and data
Relationship to data centers
Publications
Operation of information exchange
Capacity (manpower)

The Working Group invited the Smithsonian Oceanographic Sorting Center to take the lead in approaching the various marine biological centers to provide the necessary information so that the Working Group can prepare a directory to be published by IOC (Recommendation 4).

Inventories of the number and kind of samples received from various cruises should be reported by marine biological centers to WDC's, preferably for publication through WDC's. Those inventories should be updated at half-yearly or yearly intervals to keep track of the sorting of the material. Smithsonian Oceanographic Sorting Center was again asked to prepare drafts of inventory forms and to suggest follow-up procedures covering the holdings of sorted and unsorted samples as well as reference collections (Recommendation 5). The importance of these reference collections for the sorting and research activities of the staff and scientific visitors of marine biological centers was stressed.

Dr. Serene and Mr. Creighton introduced the Working Group to the problem of computer-based storage and retrieval of collection items and information maintained in the principal museums of natural history. The catalogs of those large collections together with smaller reference collections throughout the world are an essential reservoir of information on reference material for marine biologists. The Smithsonian Institution's Museum of Natural History demonstrated to members of the Working Group its pilot program of a computer-based catalog of specimen-related data and informed the Working Group that similar programs exist or are being developed in other museums, and that a UNESCO Working Group has suggested the use of a program of this type for the Regional Reference Collection of South East Asia.

The implementation of a uniform automated system which permits retrieval by taxa, geographic distribution, and related information is a general problem which has to be solved soon in order to make sensible use of the growing collections and of the potentialities of cross references between the segments of information attached to the various specimens. It seemed advisable to call on IUBS/ICSU for a general solution of the problem (Recommendation 6).

Other Items

The Working Group reviewed in detail the "Manual on International Oceanographic Data Exchange, Second Edition (Revised)", in order to propose amendments which might reflect the policy regarding data inventories, sorting centers, and other results of the discussion of the Working Group. A number of proposals, as listed in Attachment VI, were accepted by the Working Group for transmittal to IOC. Furthermore, it seemed advisable to update the historical remarks in Appendix 1 of the Manual to incorporate the activities of WG 32.

Dr. Zeitzschel pointed to the need for training staff members of marine biological centers (and possibly also in some of the data centers) in automated data processing. IOC under its programs for training, education, and documentation should arrange for fellowships or preferably for

training courses on a regional basis (Recommendation 7).

Dr. Mello outlined items for shipboard logging of biological measurements and samples by the onboard use of flexowriter, which might eliminate duplication of effort in labeling samples and keeping of log books by making one operation a by-product of the other. The Group agreed that such a system might provide speedier transmittal to WDC's and should be investigated further. This is in line with the request by ACMRR's Working Party on Fish Eggs and Larvae Survey, to WG 32, to develop standard forms for recording and labeling plankton catches during surveys (see Recommendation 3).

The Working Group was convinced of the need of at least one of its members taking part in the forthcoming meeting of the IOC Working Group on Data Exchange. Dr. Picciolo agreed to participate if travel funds will be covered by ACMRR or SCOR. Furthermore, the participation of Mr. Akyuz would be welcomed (Recommendation 8).

The next meeting of the Working Group should be held in the winter of 1970. Washington, D.C. seems to be the most suitable place also for the next meeting in view of the work allocated to Smithsonian Institution, WDC-A, and USNODC in developing data inventory forms, shipboard logging systems, automated catalog inventories, as well as the directory and inventories of marine biological centers and other activities related to the terms of reference of the Working Group.

The meeting was closed with the Chairman's warm thanks to the host and to the participants of the meeting.

SCOR/ACMRR Working Group 32 Recommends:

1. That the IOC take steps to provide it, as a basis for further work of the Group, with up-to-date information on the status and current mode of operation of National Oceanographic Data Centers (NODC's) and Designated National Agencies (DNA's) with respect to biological data and information. It suggests that such information be obtained by the Chairman of the IOC Working Group on Data Exchange from these centers and agencies.
2. That WDC-A run trials on the Smithsonian Global Reference Code System for geographical areas for marine inventory retrieval and report the results to the IOC Working Group on Data Exchange for its meeting in September, 1970.
3. That the terms of reference of Working Group 32 be broadened to include, at a future meeting, improvements and standardization of shipboard data logging for marine biological samples.
4. That a directory of marine biological centers engaged in sorting of samples collected in international and national cruises be published by IOC. The Working Group invites the Smithsonian Oceanographic Sorting Center to collect the necessary information from the marine biological centers for evaluation and processing by SCOR/ACMRR Working Group 32. The Smithsonian Oceanographic Sorting Center is also invited to draft a format and procedures for inventories of sample holdings in marine biological centers and report back to the Working Group.
5. That the Smithsonian Oceanographic Sorting Center, in collaboration with WDC-A, develop standardized forms to serve as a retrieval system on the data derived from the sample holdings of marine biological centers and report back to this Working Group.
6. That SCOR urge IUBS/ICSU to effect an immediate selection and adoption of a uniform automated processing system for retrieval of taxa.
7. That IOC consider the possibility of training selected staff members of the national oceanographic data centers and marine biological centers engaged in sorting samples by awarding fellowships or holding training courses on information storage and retrieval as well as data recording and processing.

- 8. That SCOR and ACMRR arrange for the participation of Dr. A.R. Picciolo at the IOC Working Group on Data Exchange in Geneva in September, 1970. The Working Group further would welcome the participation of Mr. E.F. Akyuz at the same meeting.
 - 9. That the "Manual on International Oceanographic Data Exchange, Second Edition (Revised)" be amended according to the proposals given in Attachment VI.

ATTACHMENT I
to Annex VII

**FIRST MEETING OF SCOR/ACMRR WORKING GROUP 32
ON BIOLOGICAL DATA INVENTORIES**

National Oceanographic Data Center
Washington, D.C.
April 7-10, 1970

AGENDA

- (1) Opening by the Chairman
 - (2) Address by Dr. T.S. Austin, Director, NODC and Chairman, IOC Working Group on Oceanographic Data Exchange
 - (3) Introduction by the Chairman
 - (4) Review of the present state of biological data inventories
 - (5) Development of standard forms and procedures for international inventories of marine biological data (exclusive of commercial fishery statistics) and their publication
 - (6) Reports on bibliographic documentation (information) in marine biology
 - (7) Catalogs of collections of marine organisms and taxa
 - (8) Other Items
 - (9) Consideration of recommendations, including suggestions for revisions to the IOC Manual of International Oceanographic Data Exchange

ATTACHMENT II
to Annex VII

RURITANIAN NATIONAL OCEANOGRAPHIC DATA CENTER
INVENTORY OF MARINE OBSERVATIONS/SAMPLES (IMOS)

SYSTEM		SYSTEM IDENTIFICATION				DATA SET IDENTIFICATION				DAYS AT SEA			MILES STEAMED				
COLLECTING INSTITUTE					COUNTRY		FROM		DATE		RANGE OF OBSERVATIONS			TO			
							D	M	Y		D	M	Y				
IHB AREA		POSITIONS DELIMITING SAMPLING AREA															
		1)	2)	3)	4)									6)			
INVESTIGATIONS		A	B	C	D	E	QUERIES ABOUT DATA SHOULD BE ADDRESSED TO				A	B	C	D	E	REMARKS	
DESCRIPTIVE OCEANOGRAPHY							A										
							B										
					C												
					D												
					E												
					FINAL DISPOSITION OF DATA					BIOLOGY							
					A												
					B												
					C												
					D												
					E												

SYSTEM - Enter name of data acquisition system; e.g., research ship, fishing vessel, buoy, dive series, continuous plankton recorder, etc.

SYSTEM IDENTIFICATION - Enter name of ship, buoy, etc.

DATA SET IDENTIFICATION - Enter number of data sets; this number may be an Alpha numeric name and is allocated by collecting institute.

COLLECTING INSTITUTE - Enter full postal address of the collecting institute.

IHB AREA - Enter number of IHB area. Chart given on cover of pad, major oceanic areas divided into 4 quarters.

POSITIONS DELIMITING SAMPLING AREA - All in degrees and minutes of latitude and longitude.

Fixed station - one position
 Ship track - two positions
 Grid or other sampling pattern - three to six positions clockwise from any convenient position.

A. Total number of stations

B. Total number of samples

C.Q. (for queries)

D. FD. (for finals disposition of data samples)

E. Type of format available

ATTACHMENT III
to Annex VII

SCOR/ACMRR WORKING GROUP 32
ON BIOLOGICAL DATA INVENTORIES

Investigations Undertaken - Biology

- | | |
|----------------------------------|------------------------------|
| B-1 Primary Production | B-14 Micronekton |
| B-2 Phytoplankton Pigments | B-15 Invertebrate Nekton |
| B-3 Particulate Organic Carbon | B-16 Pelagic Fish |
| B-4 Particulate Organic Nitrogen | B-17 Demersal Fish |
| B-5 Seston | B-18 Benthic Micro Organisms |
| B-6 Dissolved Organic Carbon | B-19 Meiobenthos |
| B-7 Bacteria | B-20 Macrobenthos |
| B-8 Other Micro Organisms | B-21 Seaweed |
| B-9 Nanoplankton | B-22 Intratidal Animals |
| B-10 Phytoplankton | B-23 Aves |
| B-11 Zooplankton | B-24 Mammals and Reptiles |
| B-12 Fish Eggs and Larvae | B-25 Deep Scattering Layer |
| B-13 Neuston | B-26 Biological Echo Surveys |

SCOR/ACMRR WORKING GROUP 32
ON BIOLOGICAL DATA INVENTORIES

Glossary of Other Investigations

(Indication of type of entry expected in a glossary)

- | | |
|----------------------------------|---------------------------------|
| 1 - Biological Sound | 10 - DNA & RNA |
| 2 - Bioluminescence | 11 - Pathological Observations |
| 3 - Behavior - (specify group) | 12 - Enrichment Studies |
| 9 - Boring and Fouling Organisms | 19 - Experimental Fishing |
| 5 - Particle Size Spectrum | 15 - Abyssal Organisms |
| 6 - Total Particle Volume | 16 - Methodology |
| 8 - Vitamin Assays | 17 - Exploratory Fishing - Type |
| 7 - Amino Acid Assays | |

SCOR/ACMRR WORKING GROUP 32
ON BIOLOGICAL DATA INVENTORIES

Pollution

- | | |
|----------------------|---------------------------------|
| P-1 Discolored Water | P-4 Floating Petroleum Residues |
| P-2 Bioassay | P-5 Chemical Pollution |
| P-3 Microbiology | P-6 Physical Pollution |

SCOR/ACMRR WORKING GROUP 32
ON BIOLOGICAL DATA INVENTORIES

Proposed Amendments to "IOC Manual on International Oceanographic Data Exchange, Second Edition (Revised), 1967"

Page 10, 1st column, last paragraph

"Requests furtherpossible," should read:

"Requests further that Member States take the necessary steps to submit their data and data inventories from such Declared National Programmes and other marine research activities, if so desired, to the appropriate World Data Centre as quickly as possible."

Page 12, Item 3.3, line 3

"for the exchange offrom these activities", should read:

"For the exchange of all relevant data and data inventories from these activities."

Add a second paragraph as follows:

"National or international marine biological sorting centers should be closely associated

with the WDC system and participate actively in the exchange of data and information on their holdings."

Page 13, Item 4.1.8

"Values of plant pigments.....biomass*", should read;

"Values of primary production, plant pigments, zooplankton biomass, and micro-nekton biomass.*"

Page 14, Item 5.3

"Metric unitsused", should read;

"Celsius scale, metric units and nautical miles should generally be used."

Page 15, Item 6.3

"Confirmation thatdata", should read;

"Confirmation that proposed programmes have been carried out, should be reported to the appropriate World Data Center at the close of each programme by the submission of data inventories. Further information regarding additional past cruises.....data."

Page 15, Item 6.8

Delete the entire item.

Page 17, Item 8.6, line 2

"catalogues or information sheets.....under", should read;

"Inventories of data or information sheets.....under"

Page 17, Item 8.6, line 3:

"These catalogues and information.....should", should read;

"These inventories and informationshould"

Insert a new item as 8.7:

"8.7 The national and international marine biological centers engaged in sorting samples from international and national cruises are encouraged to disseminate information regarding their holdings of samples (sorted or unsorted) and of reference collections by issuing inventories periodically."