International Commission for the Northwest Atlantic Fisheries

Serial No. 3495
(B.g. 40)

ICNAF Summ.Doc. 75/17
Addendum 1 (Revised)

ANNUAL MEETING - JUNE 1975

Addendum to the Report of the Biological Surveys Subcommittee, April 1975

Chairman: J. Messtorff

Rapporteur: J.G. Pope

The Report of the April Meeting of the Biological Surveys Subcommittee was adopted by STACRES except those items of the report which required revision and/or further consideration.

Accordingly, the Subcommittee met on two occassions during the 1975 Annual Meeting of STACRES at Aberdeen, Scotland.

Revision of items 2 and 3

Member Countries asked for the following additional entries to be made to Tables 1 and 2:

Table 1.

	Subarea 4	Subarea 5
1974 March-April		BTJ Z (FRG)
1975 March-April	L 100 X (CAN)	BTJ Z (FRG)

Table 2.

Canada	Larval herring	4X	Sep-Nov
Norway	Capelin	3LNO	Jun-Jul

The provisional schedule for the joint larval herring surveys to be conducted in autumn of 1975 was revised as follows, subject to confirmation by correspondence with Dr Grosslein (USA):

R/V Belogorsk (USSR)	15 Sept-5 Oct
R/V Wieczno (Poland)	15 Oct-5 Nov
R/V Anton Dohrn (Fed.Rep. Germany)	26 Oct-12 Nov
R/V Albatross IV (USA)	December

Publ. in ICNAF Redbook 1975: 65-73

In addition to the above schedule further experiments and survey activities to be conducted in 1975 in conjunction with the larval herring surveys in Subarea 5 have been definitely and/or tentatively planned, e.g. the "Helgoland experiment"; UOR-trials and possibly activities according to relevant recommendations given in the Report of the Environmental Subcommittee. As those would require additional vessel time, the Subcommittee agreed that further details could best be coordinated directly by a "task force leader" to be appointed by the Environmental Subcommittee.

The continuation of the juvenile herring surveys in spring 1976 was also agreed. The participating countries, except the German Democratic Republic (not present), confirmed that they would be able to conduct the surveys at about the same times as in 1975, but it was not yet possible to give firm dates as the vessels schedules had not yet been fixed:

Poland - R/V Wieczno

Fed.Rep. Germany - R/V Anton Dohrn

German Dem.Rep. - R/V Ernst Haeckel

USA - R/V Albatross IV

At the request of the Chairman of STACRES, there was a further discussion on the question of the future assignment of priorities to the various survey programs in the ICNAF Area. Mr Hennemuth (USA) suggested that the Subcommittee should consider what survey work is required throughout the ICNAF Area and how much research vessel time these various requirements would take. He also suggested that it is difficult for some countries to initiate field work except as part of an agreed international program with priorities set by ICNAF. Dr Sahrhage (FRG) pointed out that the execution of surveys recommended by ICNAF was primarily a national problem and that countries would have to consider them within their own overall priorities.

Dr Messtorff (FRG) suggested that the existance of time series tends, of itself, to set priorities since there clearly are strong reasons for continuing successful surveys for which a considerable time series have been accumulated. Dr Grosslein (USA) pointed out that there were two types of surveys, those concerned with routine monitoring and those concerned with the evaluation of the underlying mechanisms of

fish stocks. The interest shown by various countries in the "Helgoland experiment" for example suggested that there was considerable interest in this latter type of work. The Subcommittee felt that the assignment of priorities was desirable but it would require both an input from the Assessments Subcommittee and a considerable volume of work in considering the precision of the various programs. Some of the estimates of precision would only become available after a reasonable time series had accumulated. Whether or not the Biological Surveys Subcommittee set these priorities was, of course, a question for STACRES to decide.

Further consideration of item 6

The proposed manual on the methodology of ICNAF groundfish surveys was discussed. The suggested outline of contents (Appendix I) of the Report was agreed with the one amendment suggested by Dr Sahrhage. This was that a section on comparative fishing should be included.

The Subcommittee agreed that the correct way to proceed with producing the manual was to ask people with the appropriate expertise to draft the various sections. The revised outline contents list with the names of the authors or institutions who took responsibility for drafting the various sections are set out at Annex II. The Subcommittee requested that these drafts should be made available to the Chairman in advance of the Annual Meeting of ICNAF in 1976 at which time an editorial group will be set up to prepare the final document.

Dr Boerema (FAO) expressed the particular interest of FAO in this document.

ANNEX II

Outline Contents of Manual on ICNAF Groundfish Surveys

	Authors or institutions who took responsibility for drafting the various sections
I. Introduction	
A. Need for survey information[1]	Dr Messtorff (FRG)
B. Historical development of surveys in ICNAF Areas	
C. Major objectives of a coordinated survey program	
D. Existing survey manuals	
1. FAO	
2. National programs - USA, Canada, Fed.Rep. Germany	
E. Need for ICNAF manual	
F. Planning of joint international surveys	
II. Survey design and statistical considerations	
A. Definition of groundfish surveys	Dr Doubleday (Canada)
1. Random	
2. Stratified	
3. No searching	
B. Factors influencing design procedures	
1. Diurnal behaviour patterns	
2. Seasonal migrations - calendar/environment	
3. Habitat preferences - ability to sample	
4. Demersal/semi-pelagic/pelagic species differences	
5. Age/size variability between species	
6. Multi-species/single species	
7. Cruise track to be consistent	
C. Statistical considerations	
1. Statistical reliability of estimates-accuracy/precision	
2. Measurement of bias	
3. Sources of error	
D. Stratification	Dr Messtorff (FRG) - SA 0, 1, 2, Div. 3K St. John's - SA 3 except Div. 3K St. Andrews - SA 4 NMFS, Woods Hole, USA - SA 5, 6
1. Pre-stratification: fathoms/meters	
2. Bottom type/depth/species distribution/temperature	
3. Ice conditions	
4. Area overlap of existing stratification schemes	
E. Physical description of strata	
1. Strata charts	
2. Areas	
3. Strata numbering	
F. Station selection procedure	Dr Doubleday (Canada)
1. Randomization technique	
III. General requirements for vessels and trawl gear	
A. Vessels	NMFS, Woods Hole, USA

[1] Throughout this outline, "survey" should be taken to mean only groundfish survey.

1. Type: side *vs* stern
2. Precise speed and location control
3. Ability to monitor trawl performance during surveys
4. 24-hour operations/12-hour operations
5. Provision for concurrent sampling programs

    a) Environmental-hydrography, meteorology
    b) Plankton
    c) Biological (maturity, food habits)

6. Long-term availability
7. Ability to carry sufficient staff

B. Trawl gear

1. Selection criteria

    a) Species caught
    b) Bottom type
    c) Desired sampling potential
    d) Vessel size and long-term availability

2. Standardization of construction and rigging
3. Consistency of gear

NMFS, Woods Hole, USA

IV. Standardization

A. Definition of gear operations for each particular vessel

1. Documentation of performance
2. Speed of tow
3. Trawl scope *vs* depth
4. Time of tow
5. Direction of tow
6. Convention for dealing with untowable bottoms
7. Gear damage decisions and repeat criteria
8. Selection of shooting position

B. Comparative fishing — Dr Sahrhage (FRG)

V. Data collection

A. Trawl station methodology

1. Collection of trawl catch data: multi- *vs* key-species

    a) Minimum data requirements: weights and numbers and length/sex distribution
    b) Additional data requirements: biological samples for ageing
    c) Sample size/sub-sampling samples
    d) Need for standardized log forms/assigned area
    e) Sampling conventions: length, weight, scales, otoliths

2. Collection of trawl station data

    a) Position/depth
    b) Weather conditions
    c) Time: ships/local/GMT
    d) Tow direction/duration
    e) Trawl performance criteria
    f) Bottom type and condition of gear

3. Concurrent sampling programs

    a) Environmental-hydrography, meteorology
    b) Plankton
    c) Biological (maturity, food habits)
    d) Need for standardized log forms (op-scan)

St. John's, Canada

VI. Data analysis

A. Need for automatic data processing facilities

1. Central ICNAF data bank
2. International data exchange
3. Requirements of Assessments Subcommittee for timely summaries

} ICNAF Secretariat

B. Data processing procedures

1. Standard form, if possible
2. Need for standard codes
3. Need for standard data format
4. Data recording through optical scanning
5. Verification and checking procedures

C. Data summaries

1. Standardization procedures and program parameter requirements

a) Area/volume swept by trawl
b) Stratum area
c) Weighting coefficients
d) Data transformations, i.e. logarithms
e) Catchability coefficients (q)
f) Tests of significance - estimates of variability

2. Biological statistics

a) Numbers-weights per tow/strata/area

i) Pre/post-recruitment definitions
ii) Individual species - total community
iii) Length frequencies
iv) Biological samples - food habits, maturity

b) Standard program requirements

i) Population abundance trends
ii) Species/community biomass
iii) Age frequencies
iv) Year-class strength
v) Growth/mortality rates
vi) Seasonal changes in distribution
vii) Other

} NMFS, Woods Hole, USA

c) Standard procedures for reporting to ICNAF

i) Assessments Subcommittee requests
ii) Timely data submission and distribution

} ICNAF Secretariat

VII. Validation of survey results

A. Correlation with independent estimates

B. Comparison with commercial CPUE

} NMFS, Woods Hole, USA

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ICNAF Summ.Doc. 75/17

ANNUAL MEETING - JUNE 1975

REPORT OF BIOLOGICAL SURVEYS SUBCOMMITTEE, APRIL 1975

Chairman: J. Messtorff

Rapporteurs: J.A. Posgay
J.G. Pope

The Subcommittee met on three occasions during 8-18 April 1975 at Woods Hole, USA, in conjunction with the spring meeting of the Assessments Subcommittee, to consider a number of items on the STACRES Agenda. The main considerations involved a review of survey activity in the ICNAF Area in 1974 and survey plans for 1975, reporting and processing procedures for survey data, plans for a manual on coordinated groundfish surveys, and a review of hydroacoustic survey techniques.

1. Review of Survey Results Relevant to Assessments

The results of recent surveys relevant to stock assessment were reviewed as follows:

- Groundfish (Res.Doc. 75/15, 18, 26, 45, 48, 62, 63, 65)
- Larval and juvenile herring (Res.Doc. 75/47, 49, 50, 66, 67, 71)
- Capelin (Res.Doc. 75/3, 53)
- Hydroacoustic (Res.Doc. 75/16, 34, 41)

It was noted that survey results relevant to assessments would be considered in detail within the various stock assessment working groups. The general observation was made that survey results could only be considered as firm evidence when a time series of survey catches of a species could be satisfactorily correlated with independent estimates of the biomass. Nevertheless, preliminary results, such as the sharp declines in catches observed for cod in Div. 2J from groundfish surveys conducted by Fed. Rep. Germany and for several species in Subarea 3 from Canadian groundfish surveys, were too important to ignore and should be considered as background information in assessment of these stocks. With regard to the correlation of time series of catches, Mr Cohen (USA) reported that the use of logarithmic transformation of catch data helped to smooth the variability often inherent in such data.

Mr Parsons (Canada) reported that an analysis of day and night catches of redfish from Canadian surveys indicated that a strong diurnal variation in availability occurred. This could cause bias in the results of surveys not designed with this source of variation in mind. It was considered that this point, and others concerning the validity and variance of groundfish surveys, should be incorporated in the manual on survey techniques that is being prepared.

2. Review of Survey Activities in the ICNAF Area in 1974

An inventory of surveys conducted by Member Countries in the various subareas [including Statistical Areas 0 (Baffin Island) and 6] during 1974 and to April 1975 are listed in Table 1. The type of survey is indicated by abbreviations (explained at the bottom of Table 1), followed by the number of hauls, ICNAF divisions and country.

Most of the surveys listed were groundfish surveys. Those conducted by Denmark in Subarea 1 also include shrimp. The survey activity in 1974 remained at about the same level as in 1973. It was noted, however, that an increase of routine groundfish surveys using the existing stratified random schemes would be desirable, especially in the northern part of Subarea 3, in Subarea 2 and in the Baffin Island area.

3. Survey Plans and Coordination for 1975

Surveys already completed in early 1975 are listed at the bottom of Table 1. Planned survey activities of Member Countries are summarized in Table 2.

Publ. in ICNAF Redbook 1975: 65-73

For the joint larval herring surveys to be conducted again in the autumn of 1975, a preliminary schedule for the participating countries was set up as follows:

R/V *Wieczno* (Poland)	- 15 September to about 5 October
? (USSR)	- 15 October to about 5 November
R/V *Anton Dohrn* (Fed.Rep. Germany)	- about 26 October to 12 November
R/V *Albatross IV* (USA)	- December

The Polish R/V *Wieczno* will be available in the area for a total of 50-60 days, and it was agreed that this vessel would take part in the "Helgoland experiment" (see Section 6) and possibly in trials with the "Undulating Oceanographic Recorder" (UOR) which is a towed continuous plankton and oceanographic data recorder. An independent coverage of the survey area is planned at a time when results can be compared with those of a vessel conducting the normal larval herring survey. The US R/V *Delaware* will be available for about 15 days in October to conduct an inshore larval survey in Subarea 5 and chartered vessels may conduct inshore surveys in September and November. Canada plans to conduct larval herring surveys in the Bay of Fundy (Div. 4X) in September and November.

The USSR R/V *Belogorsk* may conduct trawl comparison studies with the US R/V *Albatross IV* in Subarea 5 and Statistical Area 6 in September 1975.

A tentative plan was made for juvenile herring surveys in March 1976 (the fourth in the series), subject to confirmation and coordination of vessel time at the 1975 Annual Meeting. At present, it seems that the following countries will participate:

Poland (R/V *Wieczno*)
Red.Rep. Germany (R/V *Anton Dohrn*)
German Dem.Rep. (R/V *Ernst Haeckel*)

Concurrent larval herring sampling will form a part of the program as in previous years.

Dr Edwards (USA) stressed the need for some group within ICNAF to assign priorities to the various survey programs in the ICNAF Area, and indicated that the Biological Surveys Subcommittee is probably the most appropriate body to do this. Mr Pope (UK) suggested that the Assessments Subcommittee and its Working Groups should be asked to put forward their survey requirements and the rationale behind them. It was agreed that this matter be considered by STACRES at its Annual Meeting in June 1975.

4. Reporting and Processing of Survey Data

The Subcommittee discussed the desirability of using a standardized format for the recording and processing of survey data. Canada provided examples of forms and punch cards used to record the results of their surveys. It was suggested that those countries that have not yet adopted standard forms should confer with those countries that have, and where possible adopt the same form. Examples of forms will be shown in the survey manual. Some laboratories do not yet have computer facilities to process their survey data and the possibility of using the facilities of the Secretariat was raised. The Assistant Executive Secretary explained that this is not possible at present but, if the funding is approved at the Annual Meeting, the Secretariat expects to install a terminal with access to large computer facility by January 1976. Under these circumstances, some time might be allocated to the processing of survey data. It was noted that the USA now processes all of the data from all countries participating in the juvenile herring surveys. The USA also hopes to compile a complete record of all of the larval herring surveys. It was noted that the USA already has available on magnetic tape the complete results of all joint bottom trawl surveys in Subarea 5 and Statistical Area 6. Dr Edwards stressed that these data may be readily obtained from the USA upon request.

5. Review of Stratification Schemes

A stratification scheme for the Baffin Island area (Statistical Area 0) was presented by Dr Messtorff (FRG). This was approved by the Subcommittee, but it was felt that the scheme might need to be modified in the light of future experience in the area. It was recommended that the stratification should be extended into the adjacent waters of Subarea 1 (Div. 1C and 1D) and Dr Messtorff agreed to do this.

Canadian scientists indicated that some of the strata boundaries in Subarea 3 may be modified.

6. Manual on Coordinated Surveys

The Subcommittee considered an outline of the major elements of trawl survey methods as presented by Dr Heyerdahl (USA), and set up a small working group to draw up a list of contents for the manual on the basis of Dr Heyerdahl's proposals.

The Subcommittee concurred with the group's suggestion that the manual should be concerned only with groundfish surveys. It was indicated that the manual should serve as a "recipe book" for any country wishing to conduct surveys in the ICNAF Area and not as a general review of survey methods and design. Consequently, the manual should contain discriptions of current practices and stress the need for consistency rather than innovation. The proposed outline for the manual is at Annex 1.

It was felt that members of the Subcommittee should have time to consider the proposed outline and a decision on its adoption was deferred until the Annual Meeting in June 1975, at which time an editorial group would be set up and representatives requested to draft the various sections.

7. Hydroacoustic Surveys

Mr Shotten (Canada) (Res.Doc. 75/16) described the equipment developed at the Bedford Institute of Oceanography (Canada) for computerized echo-counting and some statistical considerations relative to its use. Mr Sandeman (Canada) reported that the St. John's Laboratory (Canada) is developing an integrator system which should be functional by autumn 1975.

Mr Doubleday (Canada) (Res.Doc. 75/34) described the problems involved in the design of hydroacoustical surveys using zigzag tracks and of analyzing the results. A combined trawl and hydroacoustic survey using the methods he suggests is to be made in the autumn. Capelin surveys made by the USSR (Res.Doc. 75/7) and by Norway (Res.Doc. 75/3, 53) were noted.

Dr Smith (USA) reported that the Fed.Rep. Germany underwater laboratory "Heligoland" would be used by the USA in the autumn of 1975, in collaboration with Fed.Rep. Germany, Poland and USSR, to measure target strength. Further information on this project was given by Dr Cooper (USA) at a lecture arranged by the Woods Hole Laboratory.

Mr Suomala (USA) and Mr Gankov (USSR) reported on the recent joint hydroacoustic cruises of the research vessels *Poisk* (USSR), *Delaware II* (USA), *Ernst Haeckel* (GDR), and *Wieczno* (Poland). A complete body of raw hydroacoustic data is now available along with the appropriate logbooks, charts, catch data, etc., which forms a comprehensive and detailed history of a prototype hydroacoustic survey.

8. Review of Relevant Matters from the Environmental Working Group Report

Mr Sandeman (Canada) reviewed the Report of the Environmental Working Group (Summ.Doc. 75/7). The Environmental Working Group intends to concentrate its attention on the cod stock of Flemish Cap and the herring stock of Georges Bank, with the intention of considering those parameters likely to be of greatest importance in the production of good and poor year-classes of these two stocks. They recommend "that through the Chairmen of the Environmental Working Group and Biological Surveys Subcommittee, the scientists involved in the larval herring program be asked to put a high priority on the analyses of the data available and documentation of their results so that the knowledge gained from these surveys can form a base upon which the Working Group can build".

The attention of members of this Subcommittee was also directed to the recommended hydrographic standard sections proposed in this document. It is hoped that final agreement on standard sections for the ICNAF Area will be reached at the next meeting of the Working Group at Aberdeen in May 1975.

Table 1. Inventory of surveys conducted in the ICNAF Area during 1974 and to April 1975. (Names of the columns under each statistical area are: (1) = type of survey; (2) = number of hauls; (3) = ICNAF division; and (4) = country.)

Month	SA 0 (1)	SA 0 (2)	SA 0 (4)	SA 1 (1)	SA 1 (2)	SA 1 (3)	SA 1 (4)	SA 2 (1)	SA 2 (2)	SA 2 (3)	SA 2 (4)	SA 3 (1)	SA 3 (2)	SA 3 (3)	SA 3 (4)	SA 4 (1)	SA 4 (2)	SA 4 (3)	SA 4 (4)	SA 5 (1)	SA 5 (2)	SA 5 (3)	SA 5 (4)	SA 6 (1)	SA 6 (2)	SA 6 (4)
1974																										
Jan				BT	5	CD	(DEN)					HM	38	P	(CAN)											
Feb				BT	>100	C	(USSR)									L	74	X	(CAN)	P			(USSR)			
												BT	?	P	(FRA)	BT	130	RTV	(FRA)							
Mar				BT	1	D	(DEN)	BT	?	J	(CAN)	BT	19	KL	(CAN)	L	94	X	(CAN)	P			(USSR)			
																BT	21	WX	(CAN)	BT	15	Z	(USA)	BT	48	(USA)
Apr																BT	23	V	(FRA)							
				BT	2	C	(DEN)					BT	81	Ps	(CAN)	BT	47	X	(USA)	BT	103	Z	(USA)	BT	11	(USA)
May								BT	60	J	(USSR)	BT	107	LN	(CAN)	BT	5	X	(USA)	BT	22	Z	(USA)			
												BT	60	K-P	(USSR)	P	97	T	(CAN)							
Jun				BT	8	CDE	(DEN)	BT	60	J	(USSR)	BT	60	K-P	(USSR)	BT,A	24	WX	(CAN)							
				C	?		(NOR)					CP	71		(USSR)											
												BT	95	Ps	(CAN)											
Jul	BT→			BT	12	BC	(DEN)									BT	?	VWX	(CAN)	P			(USSR)			
				BT	6	CD	(DEN)																			
Aug	BT	1	(DEN)	BT	13	A	(DEN)									BT	165	VWX	(CAN)	P			(USSR)	BT	?	(USSR)
	BT	?	(USSR)													P			(USSR)	BT	?		(USSR)			
	BT→			BT	60		(GDR)									P	83	T	(CAN)							
Sep																BT	69	T	(CAN)	BT	11	Z	(USA)	BT	68	(USA)
																L→		X→		→146		YZ	(POL)			
Oct																				L	124	YZ	(FRA)	BT	50	(FRA)
												BT	58	RST	(CAN)	BT	56	X	(USA)	BT	141	Z	(USA)			
																L	?	X	(USSR)	L	?	Z	(USSR)			
																BTJ	41	X	(CAN)							
Nov								BT	44	J	(FRG)					BT	6	X	(USA)	L	100	YZ	(FRG)			
								BT	13	J	(CAN)					BT	35	R	(FRA)	BT	19	Z	(USA)			
Dec				BT	6	CD	(DEN)					D	88	Ps	(FRA)											
				BT	8	F	(FRG)																			
Total hauls				222+ (SA 0+1)				177+				677+				970+				681+				177+		
1975																										
Jan												BT		P	(FRA)	BT		RV	(FRA)							
Feb								BT		J	(GDR)	BT		K	(GDR)	BT		VWX	(CAN)							
Mar																BTJ		X	(FRG)	BTJ		Z	(FRG)	BTJ		(POL)
and																				BTJ		Z	(GDR)			
Apr																				A		Z	(USSR)	A		(USSR)
																				BTJ		Z	(USA)	BTJ		(USA)

Abbreviations for types of surveys:
BT - bottom trawl, groundfish
BTJ - bottom trawl, juvenile herring
HM - herring/mackerel
D - dredging (shellfish)
A - acoustic
C - capelin
L - larval herring
P - plankton (fish eggs and larvae)

Table 2. Biological surveys planned in the ICNAF Area in 1975.

Country	Type of survey	Area	Dates
Canada	Groundfish	2J	26 Nov-16 Dec
	"	3LNO	7-22 May
	"	3Ps	28 May-11 Jun
	"	4RST	8-22 Dec
	"	4VWX	15-22 Feb
	"	"	29 Jun-3 Aug
	Capelin	3LNO	20 Jun-2 Jul
Canada (1976)	Groundfish	4RST	19 Jan-3 Feb
	"	3Ps	29 Mar-14 Apr
	Capelin	3L	9-23 May
Denmark	Groundfish	1B	Jul
	"	1CD	Jan-Dec
	Shrimp	1AB	May-Oct
	"	1CD	Jan-Dec
	"	1F	Jun
	Plankton	1BC	Jul
	"	1D	Quarterly
Fed.Rep. Germany	Groundfish	1+East G'land	23 Jul-20 Aug
	"	2J+3K	16 Nov-20 Dec
	Larval herring	5YZ	16 Oct-15 Nov
France	Groundfish (cod)	3P+4RV	17 Jan-24 Feb
	Herring	3Pn+4TV	19-30 Apr
	Squid	3OPs+4W+5Z+6	3-19 May
	Shellfish	3Ps	27 Oct-10 Nov
	Squid	5Z+6	20 Nov-20 Dec
German Dem.Rep.	Herring & mackerel	5YZ	Aug-Sep
Poland	Larval herring	4X+5YZ	27 Sep-10 Oct
USSR	Groundfish (standard stations)	3KP	May-Jul
	" + tagging	0+1+2+3	Jul-Aug
	Capelin	3	May-Jun
	Larval herring	4+5	Sep- ?
USA	Groundfish	5YZ	16 Apr-2 May
	" (juvenile fish)	5Z	14-23 May
	" (" ")	5Z	18-22 Aug
	" (US-USSR comp.)	6	2-12 Sep
	"	6	17-30 Sep
	"	5Z	7-23 Oct
	"	5Y	28 Oct-13 Nov
	Larval herring	5YZ	2-19 Dec

ANNEX 1

Outline Contents of Manual on ICNAF Groundfish Surveys

I. Introduction

A. Need for survey information[1]

B. Historical development of surveys in ICNAF Areas

C. Major objectives of a coordinated survey program

D. Existing survey manuals

1. FAO
2. National programs - USA, Canada, Fed.Rep. Germany

E. Need for ICNAF manual

F. Planning of joint international surveys

II. Survey design and statistical considerations

A. Definition of groundfish surveys

1. Random
2. Stratified
3. No searching

B. Factors influencing design procedures

1. Diurnal behaviour patterns
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4. Demersal/semi-pelagic/pelagic species differences
5. Age/size variability between species
6. Multi-species/single species
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C. Statistical considerations

1. Statistical reliability of estimates-accuracy/precision
2. Measurement of bias
3. Sources of error

D. Stratification

1. Pre-stratification: fathoms/meters
2. Bottom type/depth/species distribution/temperature
3. Ice conditions
4. Area overlap of existing stratification schemes

E. Physical description of strata

1. Strata charts
2. Areas
3. Strata numbering

F. Station selection procedure

1. Randomization technique

III. General requirements for vessels and trawl gear

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    b) Plankton
    c) Biological (maturity, food habits)

6. Long-term availability
7. Ability to carry sufficient staff

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3. Concurrent sampling programs

    a) Environmental-hydrography, meteorology
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    c) Biological (maturity, food habits)
    d) Need for standardized log forms (op-scan)

VI. Data analysis

A. Need for automatic data processing facilities

1. Central ICNAF data bank
2. International data exchange
3. Requirements of Assessments Subcommittee for timely summaries

B. Data processing procedures

1. Standard form, if possible
2. Need for standard codes
3. Need for standard data format
4. Data recording through optical scanning
5. Verification and checking procedures

C. Data summaries

1. Standardization procedures and program parameter requirements

a) Area/volume swept by trawl
b) Stratum area
c) Weighting coefficients
d) Data transformations, i.e. logarithms
e) Catchability coefficients (q)
f) Tests of significance - estimates of variability

2. Biological statistics

a) Numbers-weights per tow/strata/area

i) Pre/post-recruitment definitions
ii) Individual species - total community
iii) Length frequencies
iv) Biological samples - food habits, maturity

b) Standard program requirements

i) Population abundance trends
ii) Species/community biomass
iii) Age frequencies
iv) Year-class strength
v) Growth/mortality rates
vi) Seasonal changes in distribution
vii) Other

c) Standard procedures for reporting to ICNAF

i) Assessments Subcommittee requests
ii) Timely data submission and distribution

VII. Validation of survey results

A. Correlation with independent estimates

B. Comparison with commercial CPUE