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FOURTH ANNUAL MEETING - SEPTEMBER 1982

Provisional Report of Scientific Council

Dartmouth and Halifax, Canada, 8-16 September 1982

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PROVISIONAL REPORT OF SCIENTIFIC COUNCIL

Annual Meeting, September 1982

Chairman: R. Wells Rapporteur: V. M. Hodder

The Scientific Council and its Standing Committee on Fishery Science (STACFIS) and on Publications (STACPUB) met at the Bedford Institute of Oceanography, Dartmouth, during 8-13 September and at the Lord Nelson Hotel, Halifax, Nova Scotia, Canada, during 15-16 September 1982 to consider and report on the various matters listed in the Agenda (see Appendix III). Representatives attended from Canada, Cuba, European Economic Community (Denmark, Federal Republic of Germany, and France), Japan, Portugal, and Union of Soviet Socialist Republics (USSR), and observers were present from Spain and United States of America (USA) (see Appendix IV). The participants included several scientists who were invited to present papers at the Special Session on Stock Discrimination in Marine Fishes and Invertebrates of the Northwest Atlantic on 8-10 September 1982.

The reports of the Standing Committees, as adopted by the Council at this meeting, are given in Appendix I (STACFIS) and in Appendix II (STACPUB). Brief summaries of these reports and other matters considered by the Council are given below.

I. FISHERY SCIENCE (see App. I)

1. Special Session on Stock Discrimination in Marine Fishes and Invertebrates

The Council noted that the Special Session took place on 8-10 September 1982, with T. D. Iles (Canada) as Convener. The purpose of the session was to focus on identification of exploited fish stocks and its application to fishery management. Discussion centered mainly on the biological nature of stocks, the degress of variation in stock-unit separation, the need for a multidisplinary approach towards stock discrimination studies, and the importance of a proper balance between biological insight and the application of standard statistical procedures in analysis of data.

2. Assessment of the Cod Stock in Divisions 2J, 3K and 3L

The Council reviewed the state of this cod stock, on which the provision of scientific advice was deferred from the June 1982 Meeting (SCS Doc. 82/VI/18) to allow for analysis of additional information from research vessel surveys and the commercial fishery. The new material was considered and the assessment was carried out on the basis of the Canadian request for scientific advice. The results of this assessment are presented in the Report of STACFIS (Appendix I). The Council endorsed the conclusions of STACFIS which involves three options of catch for 1983 at different levels of spawning stock biomass aimed at for 1984.

3. Flemish Cap Project

The Council noted that STACFIS had reviewed the 1983 research plans that were proposed at the June 1982 Meeting, involving sampling by Canadian and USSR research vessels during February-May 1983, coordination of methodology and sampling strategy, and the possible exchange of scientists during the surveys. The Council endorsed the 1983 survey plans outlined by STACFIS (see Appendix I). The Council also noted the concern of STACFIS that substantial data collected in recent years have not yet been made available for consideration, and endorsed the recommendation that a special effort be made by all participants in the Flemish Cap Project to analyze all previously-collected data and to present the results at the June 1983 Meeting.

4. Report of *ad hoc* Working Group on Herring Tagging

The Council noted that, although the Working Group had met on 12-14 January 1982, the report of its meeting was not available at the June 1982 and September 1982 Meetings of the Council. The Council therefore endorsed the recommendation of STACFIS that this report should be completed and distributed to Working Group participants by mid-October 1982 and presented to STACFIS at the June 1983 Meeting.

5. Evaluation of the Impact of Changes in Mesh Size on the Interacting Fisheries for Cod and Redfish in Division 3M

Since no new data were presented on this matter, the Council agreed with STACFIS that this item will not be placed on future agenda until such time as the appropriate data become available.

6. Review of Scientific Papers

The Council noted that 36 scientific contributions were presented at this meeting, most of which were considered during the Special Session on Stock Discrimination, with four of them being deferred to the June 1983 Meeting.

II. PUBLICATIONS (see App. II)

1. Editorial Policy Regarding Scientific Council Publications

The Council was very pleased to adopt the recommendation of STACPUB that Mr. Basil Parrish (UK) be invited to serve on the Editorial Board for the *Journal of Northwest Atlantic Fishery Science* as Associate Editor for Vertebrate Fisheries Biology.

The Council noted that efforts to increase the number of subscribers to the Journal have met with some success, especially in North America, and endorsed the recommendation of STACPUB concerning the further steps necessary to promote the Journal. The Council also noted that STACPUB had a preliminary discussion on promotion and distribution of *NAFO Scientific Council Studies* and had agreed to defer the matter for further consideration to the June 1983 Meeting.

2. Ichthyoplankton Identification Manuals

The Council noted the intended publication of "A Guide to the Early Stages of Marine Fishes Occurring in the Western North Atlantic Ocean (Cape Hatteras to the Nova Scotian Shelf)" by M. P. Fahey, and adopted the recommendation of STACPUB regarding the printing and distribution of this special volume. The Council further noted that two other manuscripts on ichthyoplankton identification have been submitted for publication in the Journal, one of which was recommended for publication. The Council accepted the recommendations of STACPUB on the future work of the *ad hoc* Working Group on Ichthyoplankton Manuals and on the need for research on ichthyoplankton taxonomy.

3. Papers for Possible Publication

The Council noted that STACPUB had reviewed the scientific papers presented to this meeting and had recommended 18 papers relevant to the Special Session on Stock Discrimination and 3 others for possible publication in one of the Council's publication series, subject to revision by the authors and acceptance by the Editor. The Council agreed with these actions, noting that a final decision on the production of a special issue of Studies for the Stock Discrimination papers was deferred to the June 1983 Meeting when the number of papers available for inclusion in such an issue would be known.

4. Utilization of Microfiche

The Council concurred with the conclusions and proposals of STACPUB regarding the possible utilization of microfiche for storage, retrieval and distribution of scientific council documents and publications.

III. RULES OF PROCEDURE

1. Amendment to Rule 3.1 Regarding Election of Officers

In the absence of the quorum required for voting at the June 1982 Meeting of the Scientific Council, The Executive Secretary was requested to conduct a vote on the proposed amendment (SCS 82/VI/18, page 8) and to report the results of the vote at the September 1982 Annual Meeting. In a letter dated 23 June 1982, the Scientific Council representatives of all Contracting Parties were requested to vote on the proposed amendment. "Yes" votes were received from the following: Canada, Cuba, EEC, Iceland, Japan, Norway, Poland, Portugal, Romania and USSR. There were no negative votes.

The Council, noting that more than two-thirds of the Contracting Parties had expressed approval of the proposed amendment, agreed that Rule 3.1 of the Rules of Procedure for the Scientific Council, as revised on 13 June 1980 (*NAFO Sci. Coun. Rep.* 1979-80, page 109), shall be replaced by the following:

> "The Chairman and Vice-Chairman shall take office at the conclusion of an annual meeting. Election of these officers shall take place at such annual meeting or at the special meeting held immediately preceding such annual meeting."

IV. FUTURE SCIENTIFIC MEETINGS

1. Mid-term Meeting for Assessment of the Seal Stocks

The Council noted that STACFIS, at the June 1982 Meeting (SCS Doc. 82/VI/18), did not adequately deal with the Canadian request for advice on the Northwest Atlantic harp and hooded seal stocks, and agreed to meet at NAFO Headquarters, Dartmouth, Nova Scotia, during 12-17 November 1982, to further consider this matter. It was pointed out that most of the biologists involved in research on the North Atlantic seal population would likely be attending the ICES *ad hoc* Meeting on seals during 4-7 October 1982.

2. Mid-term Meeting for Assessment of the Shrimp Stocks

Regarding the Canadian and EEC requests for scientific advice on management in 1983 of the shrimp stocks in Subareas 0 and 1 and the EEC request for advice on shrimp off East Greenland, the Council considered that it would be extremely difficult for analysis of the large volume of research data collected in 1982, particularly the photographic survey material, to be completed and ready for presentation before early 1983, and therefore proposes that a meeting of 5 days early in 1983 would be most appropriate for this purpose.

3. Possible Further Assessment of Capelin Stocks

The Council agreed that, if more precise scientific advice on management of the capelin stocks in 1983 than that provided at the June 1982 Meeting (SCS Doc. 82/VI/18) is required, a meeting early in 1983 would allow the analysis and presentation of data collected during 1982.

4. Regular Meeting in June 1983

As agreed at the June 1982 Meeting, the Regular Meeting of the Scientific Council, together with its Standing Committees, Subcommittes and Working Groups will be held at NAFO Headquarters, Dartmouth, Nova Scotia, Canada, during 8-23 June 1983.

5. Annual Meeting in September 1983

The Scientific Council, noting that the 1983 Annual Meeting will be held at Leningrad, USSR, with meetings of the General Council and the Fisheries Commission during 19-23 September 1983, agreed provisionally to meeting during 13-19 September 1983, the final dates to be confirmed at the June 1983 Meeting.

The Council endorsed the proposal of STACFIS regarding the theme for a special session at the 1983 Annual Meeting, as follows: "Trophic relationships in marine species relevant to fisheries management in the Northwest Atlantic". Dr. V. A. Rikhter (USSR) was nominated as Convener for the Special Session in September 1983, and he agreed to work in collaboration with a Canadian scientist (to be nominated) and the NAFO Secretariat regarding organizational arrangements for the Special Session.

6. Theme for Special Session at the 1984 Annual Meeting

The Council agreed that themes for special sessions at annual meetings should be made known at least two years in advance, and therefore endorsed the proposal of STACFIS regarding the theme for a special session in September 1984, as follows: "Biology and ecology of the squids, *Illex illecebrosus* and *Loligo pealei*, in the Northwest Atlantic".

The Secretariat was requested to circulate widely, in an appropriate form (posters), announcements of the themes for the special sessions as soon as they are known.

V. OTHER MATTERS

1. Provisional Report of the June 1982 Meeting

The Council noted that the continued absence of certain 1981 fisheries statistics had prevented the Secretariat from completing the "Fishery Trends" sections for inclusion in the Report of the June 1982 Meeting. Upon being informed that the statistics were en route to the Secretariat, the Council requested the Assistant Executive Secretary to compile and circulate the relevant sections to Scientific Council members for comments and approval prior to publication in *NAFO Scientific Council Reports* for 1982.

2. *Ad hoc* Working Group on Sampling Guidelines

The Council was informed that time was insufficient for the Secretariat to compile and circulate to

members of the Working Group, which was established at the June 1982 Meeting, all of the relevant material required for examination prior to this September 1982 Meeting. Noting that the material will be dispatched to the designated scientists soon after this meeting, the Council agreed that the Working Group should meet and report to STACREC at the June 1983 Meeting.

3. Concern About the Cod Stocks in Divisions 3M and 3NO

The Council reiterated the problem of obtaining sampling data for stocks where catches may be below the level specified in the minimum sampling guidelines (SCS Doc. 82/VI/18, page 7), and urgently requests any country participating in the fishery for cod in Div. 3M and 3NO to intensify sampling of its catches. This is particularly important for Div. 3M, where the Fisheries Commission has adopted a TAC for the cod stock in 1983, although the Scientific Council advised that there should be no directed fishery.

4. Communication Between the Scientific Council and the Other NAFO Bodies

The Executive Committee of the Scientific Council is requested to investigate the mechanism by which information is communicated between the Scientific Council, General Council, Fisheries Commission and coastal states, and to report its conclusions to the Scientific Council in June 1983.

5. Presence of Experts Required During Presentation of Reports

The Council emphasizes that participants in meetings of working groups, subcommittees and committees of the Council should make every effort to be present at the meeting of the parent body when the report of such working group, subcommittee or committee is being presented for approval. Participants are therefore requested to arrange their travel and accommodation in order to achieve this objective.

VI. ADJOURNMENT

The Chairman expressed his thanks to the chairpersons and rapporteurs of STACFIS and STACPUB and the various working groups, including the Special Session on Stock Discrimination, and to all participants for their cooperation and support during the course of this meeting. He also thanked the Secretariat staff for their usual assistance and efficiency. The meeting was adjourned at 1700 hours on 16 September 1982.

APPENDIX I. REPORT OF STANDING COMMITTEE ON FISHERY SCIENCE (STACFIS)

Chairman: J. P. Minet

Rapporteurs: Various

The Committee met at Dartmouth, Nova Scotia, Canada, during 8-13 September 1982 to consider and report on various matters referred to it by the Scientific Council (App. III), relating specifically to the Special Session on Stock Discrimination in Marine Fishes and Invertebrates of the Northwest Atlantic, the assessment of the Cod Stock in Div. 2J+3KL which was deferred from the June 1982 Meeting, and the *ad hoc* Working Group on the Flemish Cap Project, all of which met at various times during 8-10 September 1982. The Report of the *ad hoc* Working Group on Herring Tagging, which met in January 1982, was not available for consideration. The conveners of the various groups acted as rapporteurs in summarizing the results of the discussions at their respective sessions for consideration by STACFIS. Scientists attended from Canada, Cuba, EEC (Denmark, Federal Republic of Germany, and France), Japan, Portugal, Spain, USSR and USA.

I. SPECIAL SESSION ON STOCK DISCRIMINATION IN MARINE FISHES AND INVERTEBRATES IN THE NORTHWEST ATLANTIC

1. Introduction

The Special Session, convened by T. D. Iles (Canada), was held at the Bedford Institute of Oceanography on 8-10 September 1982 during which period 28 contributed papers and two oral reports on research were presented. Two of the papers were keynote presentations: Dr. W. Templeman (Canada) on the general issue of stock discrimination and identity, and Dr. C. J. Sindermann (USA) on parasitological methodology. The papers were presented in four sessions during 8-9 September and a summary-discussion session was held on the morning of 10 September. Attendance was at least 50 at each of the sessions and a high level of interest was maintained throughout. The species dealt with included several fishes (Atlantic cod, haddock, silver hake, Atlantic redfishes, American plaice, Greenland halibut, Atlantic herring and Atlantic saury) and invertebrates (short-finned squid, scallops, queen crab and blue mussel). Several of the papers dealt with methodology of data analysis with particular reference to the validity of statistical procedures in discrimination studies.

2. General Considerations

There was considerable discussion on the biological nature of fish stocks, and it was generally agreed that the important criteria were genetic isolation, geographical distribution and the self-sustaining capacity of the stocks. These criteria were considered important to management, in that individual stock units of commercial species could be vulnerable to the effects of exploitation quite independently of other stock units and that stocks should therefore be the units for resource protection and conservation. The corollary of this is that exploitation patterns for a particular species should take into account its stock structure and the degree of intermixture in fishing areas. This also led to a conclusion of major importance to future research programs that stock discrimination studies should be directed more towards spawning concentrations, that is, at the time of reproductive isolation when stock units are segregated from each other.

There was little doubt that most commercially-exploited marine species are subdivided into stock units, but the degree to which this occurs varies greatly from species to species. At one extreme, there is the Atlantic saury (and possibly others) which apparently constitutes a single unit throughout its range; at the other extreme, Atlantic herring is divided into a large number of stock units. There are a number of instances where the degree and even the kind of subdivision of a population (or species group) is in doubt. This is perhaps particularly true for invertebrate species, and it was generally agreed that the development of a general theory of marine "fish" stocks should account for invertebrates as well, since the common biological factor is the existence of the larval stage in both. It was generally agreed that the dynamics of larval dispersal, aggregation and retention must be more thoroughly understood if a general stock theory is to emerge.

The contributions to the meeting illustrated many different areas of expertize, and it was clear, in some instances, that conclusions derived from one methodology needed support from other independent sources to carry conviction. This emphasized the need for a multidisciplinary approach toward stock discrimination studies, particularly the involvement of population geneticists.

It became obvious early in the discussion that a proper balance between biological insight and the application of standard ("packaged") statistical procedures should be aimed at in the analysis of data, but that this was not always achieved up to now. Following a review of the question by Dr. R. Misra (Canada), it became apparent that a suitable paper on this subject should be prepared and included with the other contributions in any publication arising from the meeting.

It was generally agreed that the contributions, taken together, were such as to make up a valuable compendium of current information and opinion on stock discrimination in marine commercial species. STACFIS therefore

recommends

that STACPUB consider the matter of publication of the contributions to the Special Session on Stock Discrimination.

II. ASSESSMENT OF THE COD STOCK IN DIVISIONS 2J, 3K and 3L

1. Introduction

The *ad hoc* Working Group on Assessment of the Cod Stock in Div. 2J+3KL was convened by J. P. Minet (EEC) at the Bedford Institute of Oceanography during 8-10 September 1982 to complete the assessment which was initiated at the June 1982 Meeting (SCS Doc. 82/VI/18).

2. Fishery trends

Nominal catches were as high as 800,000 tons in 1968 but declined to a low level of 139,000 tons in 1978, corresponding closely to the TAC. The decline in catch over this period was coincident with a decline in catch rates; however, from 1979 onward the catch rate has increased. The 1981 catch was less than the TAC mainly due to a lower than expected catch by inshore gears. This decline in inshore catch, mainly in the cod trap fishery, was probably the results of unusual environmental conditions. Recent management strategy has been to limit catches to a level associated with fishing at or below the $F_{0.1}$ level. Recent TACs and nominal catches are as follows:

	1974	1975	1976	1977	1978	1979	1980	1981	1982
TAC (000 tons)	657	554	300	160	135	180	180	200	237
Catch (000 tons)	373	288	214	173	139	167	175	160[1]	

[1] Provisional data.

3. Assessment (SCR Doc. 82/IX/77, 99)

a) Age composition of 1982 catches

Age composition data available for the offshore fishery during the first half of 1982 from Canada (N), Faroe Islands, Federal Republic of Germany, Portugal, and Norway indicated that removals were mainly from the relatively strong 1973-75 year-classes. In the Canadian offshore otter-trawl fishery, the 1976 and 1977 year-classes were poorly represented. Data from the inshore fishery for July 1982 in Div. 3K and 3L indicated a similar pattern of year-classes in the catch but with the 1978 year-class being very abundant in the codtrap fishery.

b) Research vessel surveys

Surveys conducted in Div. 2J by the Federal Republic of Germany from 1972 to 1981 and by Canada (N) from 1978 to 1981 were adjusted on the basis of area surveyed and were averaged to produce an index of weight caught per tow (Table 1). The combined index showed a general increase in recent years. Surveys conducted in Div. 2J by France were not combined with those by Canada (N) and Federal Republic of Germany, because of the relatively small number of sets, but the age composition data from all surveys indicated that the 1978 year-class was relatively strong.

In Div. 3K, the Canada (N) surveys, which were conducted over a period of 4 years, showed no trend, but large fluctation in terms of mean weight per tow was evident. The surveys by USSR also showed a great deal of fluctation in mean weight per tow. The extent of coverage by French surveys in Div. 3K once again limited their reliability as an index of abundance. Age composition data from the Canada (N) and French survey catches indicated that the 1978 year-class was relatively strong.

An index of mean weight caught per tow in Div. 3L from the Canada (N) surveys was obtained by combining strata by depth zone (Table 1). The value for 1982 was lower than that for 1981 but similar to that for 1980. The 1978 year-class was found to be strong in the 1982 surveys of this area by Canada (N), France and USSR.

Table 1. Abundance indices for the cod stock in Div. 2J+3KL derived from commercial catch rates and research vessel survey data and biomass calculated from cohort analysis with F = 0.15 for 1981.

Year	Abundance indices: Commercial catch rate[1]	Abundance indices: From surveys Div. 2J	Abundance indices: From surveys Div. 3L	Mid-year biomass (000 tons): Age 4+	Mid-year biomass (000 tons): Exploitable
1962	1.000	-	-	2,180	1,380
1963	1.126	-	-	2,039	1,562
1964	0.997	-	-	1,864	1,310
1965	0.869	-	-	1,727	953
1966	0.988	-	-	1,756	1,134
1967	1.044	-	-	1,860	1,087
1968	0.997	-	-	1,731	1,295
1969	0.824	-	-	1,446	862
1970	0.712	-	-	1,291	918
1971	0.568	-	-	1,277	1,005
1972	0.496	178.37	29.07	1,183	953
1973	0.502	103.97	37.18	964	714
1974	0.612	46.48	23.64	673	478
1975	0.525	41.28	20.12	423	291
1976	0.437	36.19	43.79	336	206
1977	0.268	36.98	24.88	548	323
1978	0.311	78.25[2]	31.57	725	350
1979	0.531	133.38[2]	42.68	1,047	500
1980	0.638	120.54[2]	55.24	1,265	947
1981	0.753	170.47[2]	74.78	1,368	968
1982	0.780		50.92		

[1] Index standardized to 1962.
[2] Index derived from Canada (N) and Federal Republic of Germany surveys.

c) Commercial catch rates

Catch rates, based on catch and effort data, reported in the NAFO (ICNAF) Statistical Bulletins 1962-79 for Portuguese otter trawlers (tonnage classes 6 and 7) and for Canada (N) otter trawlers (tonnage class 5) were standardized with respect to country-gear type, month and division. Catch rates for the same country-gear types in 1979-82, obtained from the Canadian Observer Program and the Economics Branch of the Canadian Department of Fisheries and Oceans, were similarly standardized and subsequently combined with the first series by scaling the indices to a common factor for 1979. The Portuguese, Spanish and Canadian fleets have taken the major part of the directed offshore catch of cod in these years. The Spanish data were not included in the standardization because pair trawlers exhibited a different seasonal pattern than otter trawlers. Alternate methods of combining the Spanish series with the standardized series were not explored since catches by the Spanish fleet were not as large as catches by the Portuguese fleet in earlier years and data for the Spanish fleet were not available for recent years. The resultant catch rate index (Table 1) indicates a general decline through the 1960's and early 1970's, reaching the lowest value in 1977, after which it increased consistently. Recent values of the catch rate index are close to the level observed in 1969.

d) Cohort analysis: estimation of F for 1981

The catch-rate and research-survey indices (Table 1) were compared with mid-year exploitable biomass and age 4+ biomass respectively, which values were obtained from cohort analyses using a range of values of terminal fishing mortality (F_T = 0.10 to 0.20) for fully-recruited age groups (age 8+) in 1981. Regression analyses, using the catch rate index, indicated that F in 1981 was close to 0.15 (Tables 2 and 3). The analysis, using the research survey index for Div. 2J (Table 1), indicated that F in 1981 was between 0.15 and 0.20, whereas the analysis using the index for Div. 2J pointed to a 1981 value of F lower than 0.15 (Table 4). The Committee concluded that a 1981 value of F = 0.15 gave the best overall agreement between the abundance indices and population size from cohort analysis.

The partial recruitment and average weight-at-age values, together with the catch and population vectors for 1981 for F = 0.15, are listed in Table 5. Due to differences in the mean weight-at-age values for 1980 and 1981, the averages of the 1980 and 1981 values were used for projections, as there was no basis for distinguishing whether the differences represented real changes in these parameters or sampling variability.

Table 2. Regression analysis of mid-year exploitable biomass and catch rate index for cod in Div. 2J+3KL, 1962-81 (excluding 1974-76).

F-Values (1981)	0.10	0.15	0.20
Correlation (r^2)	0.63	0.80	0.78
Intercept	253	102	27
Slope	10,403	11,501	12,051
Residual - 1979	-142	-213	-249
- 1980	432	111	-49
- 1981	417	0	-208

Table 3. Regression analysis of mid-year exploitable biomass and catch rate index for cod in Div. 2J+3KL, 1962-78 (excluding 1974-76).

F-Values (1981)		0.10	0.15	0.20
Correlation (r^2)	0.81			
Intercept	135			
Slope	11,167			
Residual - 1979	(728)[1]	-65	-229	-310
- 1980	(848)[1]	500	99	-101
- 1981	(976)[1]	476	-8	-250

[1] Predicted exploitable biomass (000 tons).

Table 4. Regression analyses of age + mid-year biomass and survey catch rate (Table 1) for 1972-81 Div. 2J and for 1972-82 (excluding 1976 and 1981) in Div. 3L.

Parameter	Div. 2J (1972-81 surveys)				Div. 3L (1976-82 surveys)		
	0.10	0.15	0.17	0.20	0.10	0.12	0.15
Correlation (r^2)	0.71	0.87	0.88	0.85	0.80	0.80	0.71
Slope	8.74	6.16	5.55	4.88	47.80	37.03	27.07
Intercept	226.70	271.10	280.90	292.00	-533.90	-237.84	-30.30

Table 5. Parameters used in cohort analyses and catch projections for cod in Div. 2J+3KL.

Age (yr)	Partial recruitment	Av. weight (kg)		1981 numbers (10^5)	
		1981	1980-81	Catch	Population
4	0.18	0.76	0.77	65	2,691
5	0.48	1.15	1.16	118	1,872
6	0.70	1.63	1.68	218	2,409
7	0.85	2.21	2.30	191	1,757
8	1.00	2.87	3.23	105	830
9	1.00	3.82	4.43	29	229
10	1.00	5.31	5.45	7	55
11	1.00	6.34	6.54	3	24
12	1.00	7.12	7.51	2	16
13	1.00	7.48	8.11	1	8

e) Projections of catch and spawning stock biomass

Using the population numbers in 1981 and other parameters noted above, together with the assumption that the TAC for 1982 will be fully utilized, projections at three levels of fishing mortality (for fully recruited age-groups) in 1983 are presented to cover a range of fishing morality of $F_{0.1} = 0.20$ and lower (Table 6), consistent with the strategy to rebuild the spawning biomass faster than that associated with fishing at $F_{0.1}$, the target spawning biomass being in the range of 1.2-1.8 million tons (*ICNAF Redbook*, 1977, page 54). The specific values of fishing mortality used are those presented for this stock in previous years.

It was not possible to derive satisfactory regressions between survey and cohort analysis estimates of year-class size. Recruitment estimates at age 4, however, based on comparisons of the relative strengths of the 1978 and 1979 year-classes with those of the 1973-75 year-classes in Div. 2J and 3L from research vessel surveys, were about 500 million fish. This value, which corresponds approximately to the geometric mean of population numbers at age 4 from cohort analysis of data for 1962-81, was used as the strength of age 4 of the 1978 and 1979 year-classes in the projections. The large contribution of the 1978 year-class to several components of the 1982 fishery indicates that the size of this year-class may be underestimated.

It was noted that recruitment estimates for the 1978 and 1979 year-classes are subject to a high uncertainty, but these are responsible for only about 17% of the projected 1983 catches. Variance in mean weights has potentially greater impact on the projections, and the Committee recommended that this variance be investigated in detail prior to the June 1983 Meeting.

Table 6. Catch and spawning stock biomass projections (000 tons) for cod in Div. 2J+3KL, using the TAC for 1982 and three levels of fishing mortality in 1983. (Spawning biomass refers to age 7+ fish at the beginning of the indicated years.)

1981			1982			1983			1984
Spawning biomass	F	Catch	Spawning biomass	F	TAC	Spawning biomass	F	Projected catch	Spawning biomass
720	0.15	151	1,040	0.19	237	1,160	0.10	155	1,380
							0.16	242	1,300
							0.20	300	1,250

III. FLEMISH CAP PROJECT

1. Introduction

The *ad hoc* Working Group on the Flemish Cap Project was convened by J. T. Anderson (Canada) at the Bedford Institute of Oceanography on 10 September 1982, with scientists from Canada, EEC and USSR in attendance. The primary purpose of this meeting was to discuss the 1983 research plan that were proposed at the June 1982 Meeting of the Scientific Council and to review any new information available.

2. Research Plans for 1983

The general plan of research initially discussed at the June 1982 Meeting (SCS Doc. 82/VI/18) was reviewed along with the proposed sampling schedule. No changes in the plans were proposed. It was noted that sampling on the Flemish Cap in 1983 would be carried out by a Canadian research vessel during February and March and by the USSR research vessel *Suloy* during April and May.

Discussion of sampling strategies confirmed that research bottom-trawl surveys and standard ichthyoplankton surveys would be carried out following past procedures used for the Flemish Cap Project. In addition, USSR scientists indicated that they will conduct a comparative research trawl study on Flemish Cap during April-May 1983. This will involve two survey techniques, one based on the fixed-station method used by the USSR and a second based on the random-stratified method used by Canada. Each survey will be carried out over the entire Flemish Cap region.

Ichthyoplankton sampling will be carried out using 61-cm Bongo samplers fitted with 0.333 mm mesh nets. This equipment will be supplied by Canada to the *Suloy* during a port call in St. John's prior to April-May sampling. In addition, oceanographic observations will be made at plankton stations on the Flemish Cap grid.

The biological data to be collected during routine trawl surveys were discussed. It was agreed that information routinely collected would adequately sample most features of cod spawning, as previously discussed at the June 1983 Meeting. However, it was agreed that material for fecundity estimation should also be collected during the February-March period, immediately prior to spawning. The collection of fecundity samples will therefore be made during the Canadian research surveys.

An exchange of USSR and Canadian scientists during respective research cruises by the two countries was discussed as being most beneficial to this cooperative sampling program planned for 1983. While representatives at the meeting agreed to this exchange in principal, it was pointed out that details would have to be finalized by participants at a later date.

3. Available Research Information

No additional research information was presented at this meeting. It was pointed out, however, that considerable information collected during recent years has not yet been made available to the Committee. Specifically, this includes USSR ichthyoplankton data collected since 1979 on Flemish Cap and other data collected by both Canada and the USSR, including oceanographic data, zooplankton data, and detailed data on cod biology. STACFIS therefore

recommends

that a consciencious effort be made by all participants in the Flemish Cap Project to analyze outstanding data previously collected and to present the results of such analyses at the June 1983 Meeting of the Committee.

Finally, STACFIS would welcome the active participation of other countries in the Flemish Cap Project.

IV. HERRING TAGGING

1. Report of *ad hoc* Working Group on Herring Tagging

Following the recommendation of STACFIS at its September 1981 Meeting (*NAFO Sci. Coun. Rep.* 1981, page 89) the Working Group was convened in Quebec city during 12-14 January 1982 by W. T. Stobo (Canada), (a) to summarize all Canadian and USA tag releases and recoveries relevant to the herring stocks in Subareas 4, 5 and 6 and (b) to review analyses related to movements of adults and juveniles, stock identification and mortality rates. The topic was placed on the agenda for the June 1982 Meeting of the Scientific Council, but the report of the Working Group was not available for consideration at that time, and the item was deferred to the September Meeting (SCS Doc. 82/VI/18, page 9). At this meeting, the Committee was informed that the report was still not ready for presentation but that it would be circulated for comments to the participants of *ad hoc* Working Group by mid-October 1982. Considering that the results of the study undertaken by the Working Group will greatly enhance knowledge of herring stock movements and identification in the NAFO Area, STACFIS

recommends

that the report of the ad hoc Working Group on Herring Tagging should be completed and distributed by mid-October to Working Group participants, and presented at the June 1983 Meeting of the Scientific Council.

V. OTHER MATTERS

1. Evaluation of the Impact of Changes in Mesh Size on the Interacting Fisheries for Cod and Redfish in Division 3M.

The Committee noted that this item was considered in some detail at the June 1981 Meeting (*NAFO Sci. Coun. Rep.* 1981, pages 49-50) and that a more comprehensive evaluation would require the acquisition and presentation of additional data. The recommendation relevant to the presentation of such data was reiterated at the June 1982 Meeting (SCS Doc. 82/VI/18, page 46). Since no new data were presented on this matter, STACFIS, consistent with the Scientific Council's decision at the June 1982 Meeting,

recommends

that the Council inform the Fisheries Commission that data are not available to provide further advice on "Impact of changes in mesh size on the interacting fisheries for cod and redfish in Division 3M", and that this item be dropped from the Council agenda until such time as the appropriate data become available.

2. Review of Scientific Papers

a) Herring Spawning and Bottom Temperature in Subarea 5 (SCR Doc. 82/VI/103)

The distribution of newly hatched larval herring was examined for 30 ICNAF larval herring surveys covering the September-December periods of 1971-77. Sampling was conducted on standard grids of Bongo-net stations at intervals of 3-4 weeks throughout the autumn. Concentrated abundances of small larvae (<8 mm SL) were used to delineate spawning areas and correlated with bottom temperatures at the stations to describe thermal spawning and hatching conditions. Delay of spawning on Georges Bank after 1973 was found to be associated with the warming trend. Large volumes of very warm (14-15°C) water on the top of Georges Bank during autumn surveys since 1971 could have affected herring spawning and/or egg and larval survival. The decline in abundance of the Georges Bank herring stock and the virtual disappearance of signs of spawning on the traditional fishing grounds after 1975 are discussed in conjunction with both the catch history and the continued spawning in the Nantucket Shoals area, where the mean bottom temperatures were much lower than those on Georges Bank.

b) Other papers

Of the 36 scientific papers available to STACFIS at the present meeting, 31 were considered in connection with the Special Session on Stock Discrimination and the assessment of the cod stock in Div. 2J+3KL, and one is considered above. The remaining 4 contributions, in view of their connection with matters to be discussed at the June 1983 Meeting, were deferred for review at that time. These are SCR 82/VI/100, 109 and 110.

3. Proposed Themes for Special Sessions at the Annual Meetings in 1983 and 1984

The Committee agreed that more advance notice should be provided in proposing themes for future annual meetings. Consequently, STACFIS proposes the following themes for the September 1983 and the September 1984 Meetings of the Scientific Council:

a) September 1983. Trophic relationships in marine species relevant to fisheries management in the Northwest Atlantic.

b) September 1984. Biology and ecology of squids, *Illex* and *Loligo*, in the Northwest Atlantic.

4. Acknowledgements

The Chairman of STACFIS expressed his appreciation to T. D. Iles who convened the Special Session on Stock Discrimination in Marine Fishes and Invertebrates, to J. T. Anderson who convened the Flemish Cap Working Group, to the rapporteurs and participants for their keen interest and coorperation during the various sessions. The Chairman also acknowledged the Secretariat for their usual efficient work both in preparing for and during this meeting.

APPENDIX II. REPORT OF STANDING COMMITTEE ON PUBLICATIONS (STACPUB)

Chairman: V. A. Rikhter Rapporteur: A. T. Pinhorn

The Committee met at NAFO Headquarters, Dartmouth, on 11 September and at the Lord Nelson Hotel, Halifax, Nova Scotia, Canada, on 16 September 1982. In attendance were V. A. Rikhter (Chairman), J. Messtorff and J. P. Minet (EEC), H. Hatanaka (Japan), R. G. Halliday and A. T. Pinhorn (Canada). The Chairman of the Scientific Council (R. Wells), the Executive Secretary (Capt. J. C. E. Cardoso) and the Assistant Executive Secretary (V. M. Hodder) also attended the sessions.

1. Editorial Policy Regarding NAFO Scientific Council Publications

a) Editorial Board for the Journal

It was reported at the June 1982 Meeting that Dr. W. Templeman found himself unable to continue to serve as Associate Editor for Vertebrate Fisheries Biology and that both the regrets and thanks of the Scientific Council have been conveyed to him by the Editor. Mr. Basil Parrish (UK) was approached by the Editor on behalf of STACPUB and has indicated his willingness to serve as Associate Editor for Vertebrate Fisheries Biology. STACPUB is very pleased to

recommend

that Mr. Basil Parrish (UK) be invited to serve on the Editorial Board for the Journal of Northwest Atlantic Fishery Science as Associate Editor for Vertebrate Fisheries Biology.

b) Abstracting Documents and Periodicals

As far as can be determined from letters written and a preliminary check of recent issues, the NAFO scientific publications are being abstracted in FAO ASFA1 but not in Biological Abstracts. It was decided not to consider this matter further.

c) Promotion and Distribution of the Journal

Subscriptions have been solicited through various means and some increase in number of subscribers has taken place in North America but little progress has been made elsewhere. Special efforts should continue to promote the Journal as widely as possible, especially in countries outside of North America. To further the promotion of the Journal, STACPUB

recommends

i) that advertisements be placed by the Executive Secretary in the main fisheries journals;

ii) that Scientific Council representatives provide to the Executive Secretary, at the time of their annual review of their country's free distribution list, a list for their country of institutions which are potential subscribers to the Journal so that the Executive Secretary can canvass these for subscriptions; and

iii) that Scientific Council representatives themselves undertake and encourage scientists in their countries to distribute advertisements of the Council's publications at all appropriate scientific meetings and conferences attended during the next 12 months. (Such advertisements are available from the NAFO Secretariat.)

d) Promotion and Distribution of NAFO Scientific Council Studies

The Editor reported that the present policy and procedure for promotion and distribution of Studies are similar to those for the Journal. STACPUB held a preliminary discussion on the subject and decided to defer further discussion to the June 1983 Meeting.

2. Review of Progress on Ichthyoplankton Identification Guides

The *ad hoc* Working Group on Ichthyoplankton Guides met on 10 September 1982 and the report of the Working Group was reviewed and accepted by STACPUB. The relevant points of the report and STACPUB's subsequent recommendation are presented below.

a) Guide to the Early Stages of Marine Fishes, by M. P. Fahey

This has received peer review and has been recommended for publication in the *Journal of Northwest Atlantic Fishery Science.* The intended date of publication is April 1983 as Volume 4 (Number 1). STACPUB considered the potential demand for this issue, and

recommends

i) that 2,000 copies of the Guide to the Early Stages of Marine Fishes be produced, with the author's copies being additional;

ii) that a limited number of copies should be produced with hard covers to prolong the useful life of the manual for those recipients anticipating its frequent use, the actual number issued with hard covers being left to the discretion of the Executive Secretary, but the maximum not to exceed 500;

iii) that the Editor send free copies to several journals for book review so as to further advertise the Journal as a means of expanding its readership and distribution; and

iv) that a complimentary copy be sent to each person who reviewed the guide for publication.

b) Other Papers on Ichthyoplankton Identification

i) The manuscript by S. A. Evseenko, entitled "Ichthyoplankton of Slope and Gulf Stream Waters off Nova Scotia, Late Autumn 1974", was reviewed by the *ad hoc* Working Group and has been approved by the Editor, with revision, for publication in Volume 3 (No. 2) of the Journal.

ii) SCR Doc. 82/VI/31 was reviewed by the members of the *ad hoc* Working Group but was not recommended for publication, as various aspects of the manuscript made it unsuitable for a regional identification manual. STACPUB proposed that the Editor inform the author of this conclusion and the reasons for it, pointing out that, should the author wish to submit a revised manuscript, this would again be considered on its merits as to its suitability for publication as a regional manual.

c) Future Work of *ad hoc* Working Group

The future activities of the Working Group will be determined by developments in ichthyoplankton taxonomy and in the preparation of ichthyoplankton guides for the Northwest Atlantic. STACPUB, however,

recommends

i) that the Scientific Council should continue to encourage its members to pursue the study of the taxonomy of fish eggs and larvae in the Northwest Atlantic; and

ii) that the ad hoc Working Group, although not necessarily required to meet each year, should continue to function as an advisory group for STACPUB regarding the publication of future ichthyoplankton papers.

3. Papers for Possible Publication

STACPUB reviewed the list of research (SCR) documents presented at this Annual Meeting and recommended 18 documents from the Stock Discrimination Symposium for possible inclusion in a special issue of *NAFO Scientific Council Studies* (SCR Doc. 82/75, 78, 79, 80, 81, 82, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 107 and 108). Three other papers were also nominated for publication in one of the NAFO series (SCR Doc. 82/103, 109 and 110). The Editor was requested to contact the authors of the Stock Discrimination papers nominated for publication, and, depending on the number of positive responses, a decision on a special issue of Studies will be taken at the June 1983 Meeting.

4. Other Matters

a) Utilization of Microfiche for Storage, Retrieval and Distribution of Scientific Documents and Publications

The relative costs of in-house production versus contracting-out of microfiche conversion were presented by the Executive Secretary. The following conclusions evolved from the ensuing discussion:

i) Even with a microfiche system, members of the NAFO Scientific Council would still require printed copies of each year's current documents.

ii) Any requests that arose from other sources could be met either by a microfiche copy or, in isolated cases of requests for single documents, by a printed copy from a microfiche reader/printer.

iii) The possibility of a cost-sharing arrangement in the production of this microfiche file with Canadian Department of Fisheries and Oceans libraries should be investigated by the Executive Secretary.

iv) The Executive Secretary should investigate, with representatives of the Scientific Council, the interest in their respective countries regarding the purchase of microfiche copies of NAFO documents.

A recommendation on this matter will be made to the Scientific Council at the June 1983 Meeting, based on the responses received with regard to items (iii) and (iv) above.

5. Acknowledgement

There being no further business, the Chairman expressed his thanks to the rapporteur, the participants and the NAFO Secretariat.

APPENDIX III. SCIENTIFIC COUNCIL AGENDA - SEPTEMBER 1982

I. Opening (Chairman: R. Wells)

1. Appointment of rapporteur
2. Adoption of agenda
3. Plan of work

II. Fishery Science (STACFIS Chairman: J. P. Minet)

1. Special Session on Stock Discrimination in Marine Fishes and Squid of the Northwest Atlantic (Convener: T. D. Iles)
   a) Overview of stock discrimination in marine fishes
   b) Stock structure of some important marine fishes - case studies
   c) Review of parasitological studies in relation to stock discrimination
   e) Squid and other marine invertebrates
   f) Ecological and evolutionary implications
   g) Other considerations

2. Assessment of Fish Stocks (deferred from June 1982 Meeting)
   a) Cod in Div. 2J+3KL

3. *Ad hoc* Working Group on Flemish Cap Project (Convener: J. T. Anderson)
   a) Review of available research information
   b) Research plans for 1983

4. Herring Tagging (deferred from June 1982 Meeting)
   a) Report of *ad hoc* Working Group Meeting in January 1982 (W. T. Stobo, Convener)
   b) Other considerations

5. Other Matters
   a) Evaluation of the impact of changes in mesh size on the interacting fisheries for cod and redfish in Div. 3M (maximization of yield per recruit at $F_{0.1}$ for cod and redfish). (See Report of the June 1982 Meeting.)
   b) Adoption of outstanding section in STACFIS Report of the June 1982 Meeting.

III. Publications (STACPUB Chairman: V. A. Rikhter)

1. Review of matters arising from previous reports
2. Editorial policy re NAFO Scientific Council publications
3. Review of progress on ichthyoplankton identification manuals
4. Papers for possible publication
5. Other matters

IV. Rules of Procedure

1. Proposal to amend Rule 3.1 of the Scientific Council Rules of Procedure (see Report of the June 1982 Meeting).

V. Adoption of Reports

1. Standing Committee on Fishery Science (STACFIS)
2. Standing Committee on Publications (STACFIS)
3. Provisional Report of the June 1982 Meeting of Scientific Council (SCS Doc. 82/VI/18)

VI. Review of Future Meeting Arrangements

1. Assessment of shrimp stocks (deferred from June 1982 Meeting)
2. Further assessment of capelin stocks, if required
3. Further assessment of seal stocks (see NOTE below and Annex 1)
4. Regular meeting in June 1983
5. Special theme for September 1983 Annual Meeting

VII. Other Matters

VIII. Adjournment

NOTE: The Chairman of the Scientific Council, noting the short period of time until the September 1982 Meeting, the incompleteness of statistics and other information required for the assessment, and the difficulty of finding sufficient time for STACFIS during the scheduled period for the September Meeting to adequately deal with the assessment, considers that the matter should be deferred to a meeting in mid-November 1982.

ANNEX 1

Canadian Request for Further Advice on the Seal Stocks

The following communication relevant to assessment of the seal stocks was received by the Executive Secretary from the Assistant Deputy Minister of the Canadian Department of Fisheries and Oceans on 8 July 1982:

Dear Captain Cardoso:

On April 13th I wrote to you requesting that the Scientific Council provide scientific advice on various matters, including the management in 1983 of harp seals. In this request, I specified a number of areas on which Canada was seeking comment and these were circulated by you as SCS Document 82/VI/I. Specifically, I asked that the Scientific Council reexamine the population status and dynamics of Northwest Atlantic harp seals, reviewing the model presented at the November 1981 meeting and commenting on:

i) Current stock size and pup production and recent trends in these parameters.

ii) Current replacement yield and sustainable yield at present stock size and in the long term, under varying options of age compositions in the catch, including that recently occuring.

iii) Trends in population size based upon differing levels of total allowable catch which incorporate quota regulation of all removals except that by traditional hunting in the Canadian Arctic and at Greenland.

iv) Trends in catches of harp seals in Canada, north of 60°N latitude and in Greenland.

I understand that the advice provided by the Scientific Council does not provide answers to these questions nor any commentary that is of use in the consideration of the management of the harp seal stock.

I must, therefore, reiterate my request that the Scientific Council address the questions set out above. I note that the Council is scheduled to meet in September and would hope that this will offer a suitable opportunity for the Council to restructure its advice into the format requested. I realize, however, that the Council's meeting may conflict with consideration within ICES of the status of the harp and hooded seal populations, and I would, in this case, be prepared to wait until mid-November for a new report from the Scientific Council.

Yours sincerely,

for L. S. Parsons
Acting Assistant Deputy Minister

APPENDIX IV. LIST OF PARTICIPANTS IN SCIENTIFIC COUNCIL MEETING - SEPTEMBER 1982

CANADA

J. T. Anderson	Northwest Atlantic Fisheries Centre, P.O. Box 5667, St. John's, Nfld.
D. B. Atkinson	" " " " " " "
C. A. Bishop	" " " " " " "
W. R. Bowering	" " " " " " "
J. E. Carscadden	" " " " " " "
E. G. Dawe	" " " " " " "
S. Gavaris	" " " " " " "
D. Kulka	" " " " " " "
W. H. Lear	" " " " " " "
G. R. Lilly	" " " " " " "
I. Ni	" " " " " " "
A. T. Pinhorn	" " " " " " "
T. K. Pitt	" " " " " " "
W. Templeman	" " " " " " "
R. Wells	" " " " " " "
G. H. Winters	" " " " " " "
M. C. Annand	Fisheries Research Branch, BIO, P. O. Box 1006, Dartmouth, N.S.
J. A. Gagne	" " " " " "
T. D. Iles	" " " " " "
T. Kenchington	" " " " " "
J. McGlade	" " " " " "
K. I. Metuzals	" " " " " "
A. F. Sinclair	" " " " " "
W. T. Stobo	" " " " " "
D. F. Waldron	" " " " " "
R. G. Halliday	CAFSAC, BIO, P. O. Box 1006, Dartmouth, N.S.
L. M. Dickie	Marine Ecology Laboratory, BIO, P.O. Box 1006, Dartmouth, N.S.
T. Amaratunga	Fisheries Research Branch, P. O. Box 550, Halifax, N.S.
R. K. Misra	" " " " "
R. K. Mohn	" " " " "
C. M. Morrison	" " " " "
J. D. Pringle	" " " " "
T. W. Rowell	" " " " "
M. Sinclair	" " " " "
M. McInerney-Northcott	Oceanography Dept., Dalhousie University, Halifax, N.S.
A. Campbell	Fisheries Research Branch, Biological Station, St. Andrews, N.B.
R. W. Elner	" " " " " "
J. S. Scott	" " " " " "
D. F. Markle	Huntsman Marine Laboratory, St. Andrews, N.B.
L. Van Guelpen	" " " "
S. McGladdery	Dept. of Biology, University of New Brunswick, Fredericton, N.B.
H. Powles	Fisheries Research Branch, P.O. Box 15500, Quebec, Que.
J. S. Beckett	Resource Research Branch, Dept. of Fisheries and Oceans, 240 Sparks St., Ottawa, Ont.
D. Rivard	" " " " " " " "

CUBA

R. J. Dominguez	Flota Cubana de Pesca, Desamparados Esq. Mercado, Habana Vieta, Habana
E. Fabregas	Ministerio de la Industria Pesquera, Ensenada de Potes y Atares, Habana

EUROPEAN ECONOMIC COMMUNITY (EEC)

R. Noé	Commission of the European Communities, 120 Rue de la Loi, Brussels, Belgium
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A. Forest	Institut Scientifique et Technique des Peches Maritimes, B.P. 1240, St. Pierre et Miquelon, France
R. H. Letaconnoux	Institut Scientifique et Technique des Peches Maritimes, B.P. 1049, Nantes-Cedex, France
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PORTUGAL

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UNION OF SOVIET SOCIALIST REPUBLICS

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Y. B. Riazantsev	All-Union Research Institute of Marine Fisheries, 17 V. Krasnoselskays, Moscow
E. N. Saburenkov	Ministry of Fisheries, 12 Rozhdestvensky Boul., Moscow
V. K. Zicanov	" " " " " "
L. Shepel	Office of USSR Representative, 2074 Robie St., Halifax, N.S., Canada

OBSERVERS

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G. Alberto	Instituto Espanol de Oceanografia, Apartado 130, La Coruna
M. G. Larraneta	Instituto de Investigaciones Pesqueras, Muelle de Bouzas, Vigo

UNITED STATES OF AMERICA

F. P. Almeida	National Marine Fisheries Service, Northwest Fisheries Center, Woods Hole, MA
E. D. Anderson	" " " " " " " "
V. Anthony	" " " " " " " "
M. J. Fogarty	" " " " " " " "
S. A. Murawski	" " " " " " " "
A. G. Johnson	Panama City Laboratory, 3500 Delwood Beach Road, Panama City, Florida
C. Sindermann	National Marine Fisheries Service, Sandy Hook Laboratory, Highlands, NJ
J. J. Graham	Maine Dept. of Marine Resources, West Boothbay Harbor, Maine

APPENDIX V. LISTS OF RESEARCH AND SUMMARY DOCUMENTS

A. RESEARCH DOCUMENTS

SCR No.	Ser No.	Title	Author(s)
82/IX/75	N581	Vertebral averages of juvenile cod (*Gadus morhua*) from eastern Newfoundland and Labrador as indicators of stock origin.	W. H. Lear R. Wells
82/IX/76	N582	Geographical distribution of haddock on the Scotian Shelf.	J. S. Scott
82/IX/77	N583	An approach to the stock-recruitment relationship of cod (*Gadus morhua*) in Divisions 2J, 3K and 3L.	M. G. Larrañeta
82/IX/78	N584	Stock identification studies of Greenland halibut (*Reinhardtius hippoglossoides*) in the Northwest Atlantic from tagging experiments.	W. R. Bowering
82/IX/79	N585	Stock discrimination in marine fishes.	W. Templeman
82/IX/80	N586	Discrimination of spawning groups of herring, *Clupea harengus*, along the coast of Maine.	J. J. Graham B. J. Joule C. L. Crosby D. W. Townsend
82/IX/81	N587	An analysis of the stock structure of silver hake, *Merluccius bilinearis*, in NAFO Subareas 5 and 6.	F. P. Almeida
82/IX/82	N590	Meristic variation in golden redfish, *Sebastes marinus*, in the Northwest Atlantic.	I-Hsun Ni
82/IX/83	N591	Meristic variation in beaked redfishes, *Sebastes mentella* and *S. fasciatus*, in the Northwest Atlantic.	I-Hsun Ni
82/IX/84	N593	Population structure and management units of redfishes (*Sebastes* sp.) on the Scotian Shelf.	T. J. Kenchington
82/IX/85	N594	The genetic structure of mussel populations in eastern Canadian waters.	L. M. Dickie
82/IX/86	N595	Discrimination of Atlantic snow crab, *Chionoecetes opilio*, populations: a problem of managment application.	K. Davidson R. W. Elner J. Roff
82/IX/87	N596	Reproductive cycles of redfishes in southern Newfoundland waters.	I-Hsun Ni W. Templeman
82/IX/88	N597	The logistic model for determining size at maturity in species differentiation and stock discrimination for Northwest Atlantic redfishes.	I-Hsun Ni E. J. Sandeman
82/IX/89	N598	Discrimination of the cod stock complex in Divisions 2J+3KL based on tagging.	W. H. Lear
82/IX/90	N599	Parasites as natural tags for marine fish: a review.	C. J. Sindermann
82/IX/91	N600	On the stock identity of short-finned squid (*Illex illecebrosus*) in the Northwest Atlantic.	E. G. Dawe M. C. Mercer W. Thelfall
82/IX/92	N601	Vertebral number as a method of separating intra-populational groups of haddock in the Newfoundland subarea.	V. P. Shestov
82/IX/93	N602	Variability of morphometric and meristic features of the North Labrador grenadier, *Coryphaenoides rupestris* Gunn, related to their linear growth.	P. I. Savvatimsky
82/IX/94	N603	On discrimation of the silver hake stocks of the Nova Scotia Shelf (Div. 4W) and southwestern slope of the Grand Bank (Div. 3O).	V. A. Rikhter A. S. Noskov Yu. S. Grinkov

82/IX/95	N604	Data on distribution of the Northwest Atlantic saury, *Scomberesox saurus* (Walb.), for evaluation of the unity of their population.	A. A. Nesterov
82/IX/96	N605	Distribution of Greenland halibut from the Greenland-Canadian population.	A. K. Chumakov V. P. Serebryakov
82/IX/97	N606	The parasites of northwestern Atlantic herring (*Clupea harengus* L.).	S. McGladdery
82/IX/98	N607	Discrimination of possible silver hake (*Merluccius bilinearis*) stocks on the Scotian Shelf.	D. E. Waldron G. Drescher C. Harris
82/IX/99	N608	Has the catchability coefficient (q) really changed in Div. 2J+3KL cod fishery?	A. T. Pinhorn
82/IX/100	N609	Minimum trawlable biomass estimates of Greenland halibut in NAFO Divisions 2G and 2H from post-stratified groundfish surveys.	W. R. Bowering
82/IX/101	N610	Distribution of available potential energy, geostrophic circulation and biological productivity indices in two areas of the North Atlantic.	V. F. Tsyganov I. K. Sigaev Yu. A. Loktionov
82/IX/102	N611	Pattern recognition: partitioning in morphological hyperspace.	J. M. McGlade
82/IX/103	N612	Changes of time and sites of herring (*Clupea harengus* L.) spawning vs. bottom temperature over the spawning beds in the Georges Bank-Nantucket Shoals areas, 1971-1977 seasons.	S. K. Grimm
82/IX/104	N613	Population structure of the squid *Illex illecebrosus*.	T. Amaratunga
82/IX/105	N614	The use of hydroacostics for the enumeration of redfish - preliminary investigations in NAFO Div. 4RS.	D. B. Atkinson
82/IX/106	N616	Evaluation of the stock question for four species of scallops.	G. Robert M. Sinclair M. Heller
82/IX/107	N615	The quest for lobster stock boundaries in the Canadian Maritime Provinces.	A. Campbell R. K. Mohn
82/IX/108	N617	Tagging studies on Scotian Shelf herring.	W. T. Stobo
82/IX/109	N618	The biochemical population genetics of redfishes *Sebastes* sp.) off southern Newfoundland.	R. H. Payne I-Hsun Ni
82/IX/110	N619	Morphology of the extrinsic gasbladder musculature in golden redfish, *Sebastes marinus*.	D. J. Power I-Hsun Ni

B. SUMMARY DOCUMENTS

82/IX/19	N578	Cuban research report, 1981.	O. Leiva E. Fraxedas
82/IX/20	N579	German Democratic Republic research report, 1981.	P. Ernst
82/IX/21	N580	Japanese research report for 1981.	H. Hatanaka