International Commission for the Northwest Atlantic Fisheries

Serial No. 3730
(B.e.75)

ICNAF Summ.Doc. 76/VI/3

ANNUAL MEETING - JUNE 1976

Report of Special Meeting of Panel A (Seals)
Bergen, Norway, 12 December 1975

1. Opening. The meeting was called to order by the Chairman of the Panel, Mr K. Vartdal (Norway), who welcomed the participants and referred briefly to meetings of the Canada-Norway Sealing Commission on 11-12 December 1975, and of the Scientific Advisers to Panel A in Ottawa, 17-19 November 1975 and in Bergen, 9-10 December 1975. Representatives of all Member Countries of the Panel were present (Appendix I).

2. The Executive Secretary was appointed Rapporteur.

3. Agenda. The Agenda as circulated was adopted (Appendix II).

4. Reports of Meetings of Scientific Advisers. Dr A.W. Mansfield (Canada), Chairman of the Scientific Advisers, was asked to review the Reports of the Ottawa (Appendix III) and Bergen (Appendix IV) meetings of the Scientific Advisers. Dr Mansfield pointed out that the report of the Bergen meeting was more pertinent and presented the scientists' findings with regard to the hooded and harp seal stocks. He noted that the scientists had agreed that it would be prudent to leave the total allowable catch for hooded seals at the present level of 15,100. But, however, there was no unanimous agreement on a total allowable catch for the harp seal, owing to uncertainties in the data available. The Chairman thanked Dr Mansfield on behalf of the Panel for the work of the Scientific Advisers at Ottawa and Bergen and requested any comments on the reports. The delegates of Canada and Norway also expressed their sincere thanks for the work carried out by the scientists and agreed on the need for an increase in scientific effort. The delegate of Denmark also agreed to do as much research as possible within the limits of funds made available.

5. Conservation Measures for Harp and Hooded Seals. The Chairman requested comments from the Panel Members. The delegate of Canada stated that, although thorough consideration had been given to the results of the scientific meeting by the Canadian and Norwegian delegations in another forum, the two delegations had as yet been unable to form a common view regarding TACs and national allocations. It was Canada's view that the best chance for reaching agreement would be provided by allowing more time for consultations between the two countries. It was hoped that Denmark would understand the reasons for the delay and would accept postponement of discussion in the interests of reaching an agreement satisfactory to all sides. It was suggested that any decision be postponed to another meeting of Panel A to be held during the period of the Eighth Special Commission Meeting beginning 21 January 1976 at FAO in Rome. The delegate of Norway agreed to the Canadian suggestion. The delegate of Denmark pointed out that Denmark would have liked to have seen an agreement reached from the Canada-Norway Sealing Commission meeting, but that she was prepared to accept a postponement in the interests of achieving a satisfactory solution of the problem. A request was made to know something more about the differences of the positions of Canada and Norway which had prevented a decision being taken at this time. The Chairman noted that it was wise not to take a vote now if Canada and Norway could not agree. He hoped that further discussions between Canada and Norway would effect a compromise and requested that Canada and Norway report more of the details of their positions. The delegate of Canada expressed appreciation of Denmark's understanding and willingness to postpone a decision. Canada noted that the Canadian scientific reports gave TACs below the present TAC of 150,000 for harp seals (a range of 90,000 to 127,000). It was pointed out that, although some Canadian scientists acknowledged uncertainties in the information and that maintenance of the TAC for harp seals at 150,000 might not unduly damage the stocks, all Canadian scientists felt that the TAC should be lowered and this was Canada's position. There had been a sorry history of management of fish stocks in the ICNAF Area where upper limits of ranges of TACs proposed by scientists had consistently been chosen and had been proven too high. It was, therefore, prudent to give further consideration to both the harp and hooded seal conservation requirements. The delegate of Norway expressed understanding of the Canadian position and feeling regarding the fish stocks in the ICNAF Area, but felt that the Commission was in a better position with regard to seals where more complete and precise data have been reported for a long period of time. Concerning a TAC, the Norwegian position was to go along with the advice from the majority of the scientists. It was pointed out that the economic position of the sealing industry made it difficult to reduce the possibilities for sealing. More time was needed to consider the industry's problem. The understanding and willingness of Denmark to postpone a decision was acknowledged. The delegate of Denmark reported that it was in the interest of the Greenland hunters to allow more seals to escape from the fisheries in the south. Therefore, a low TAC was preferred.

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The Danish position could be associated with the Canadian position, but it was thought best to have a reasonable compromise reached at a further meeting to be held within the time allocated for the Eighth Special Commission Meeting in Rome. The Chairman noted the agreement of the Panel Members to delay a decision on conservation requirements for both the harp and hooded seal stocks.

6. Research Requirements. The Chairman noted that research requirements had been reported in meetings of Scientific Advisers and that Canada, Denmark, and Norway would press for more funds for additional research. The delegate of Denmark pointed out that the last two meetings of the scientists had been very fruitful, as there had been time to study the presentations, and that it was very important that working papers and research results should be presented well in advance of the next meeting for thorough study. The delegate of Canada agreed that good progress had been made in the scientific studies and that reports should be presented early for detailed study.

7. Approval of Report. The Panel agreed upon a draft of the Report which was prepared for consideration by the Panel before adjournment.

8. Time and Place of Next Meeting. The Panel agreed that the Executive Secretary be requested to arrange for a special meeting of the Panel on Thursday, 22 January 1976, during the time of the Eighth Special Commission Meeting in Rome.

The delegate of Denmark extended a welcome to the Scientific Advisers to meet in Copenhagen after the ICES meeting which was being held from 4 to 13 October 1976, to be followed by a meeting of the Panel if it was considered necessary. This invitation was gratefully accepted by the Panel.

9. Other Business. There being no other business, the Chairman and the delegates of Canada and Norway joined in expressing their gratitude to the delegate of Denmark for attending the meeting and for his understanding of the difficulties which made it necessary to postpone a decision on the conservation measures for the hooded and harp seal stocks at this time.

10. Adjournment. The Special Meeting of the Panel adjourned at 1400 hrs, 12 December 1975.

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Appendix I

Special Meeting of Panel A (Seals)
Bergen, Norway, 12 December 1975

List of Participants

(Head of Delegation underlined)

Chairman: Mr K. Vartdal, Directorate of Fisheries, P.O. Box 185-186, 5001 Bergen, Norway

CANADA

Commissioner:

Mr K. Henriksen, H.B. Nickerson & Sons Ltd., P.O. Box 130, North Sydney, N.S.

Advisers:

Mr L.J. Cowley, Fisheries Management (Nfld) Branch, Fisheries and Marine Service, Environment Canada, P.O. Box 5667, St. John's, Nfld. A1C 5X1
Mr T. Curran, Fisheries and Marine Service, Environment Canada, Goose Bay, Labrador
Capt M. Johnson, Johnson Combined Enterprises Ltd., Catalina, Nfld.
Mr P.F. Lett, Fisheries and Marine Service, Environment Canada, Biological Station, St. Andrews, N.B. E0G 2X0
Dr A.W. Mansfield, Fisheries and Marine Service, Environment Canada, Arctic Biological Station, P.O. Box 400, Ste. Anne de Bellevue, P.Q. H9X 3L6
Dr B.S. Muir, Resource Branch, Fisheries Management Maritimes, Fisheries and Marine Service, Environment Canada, P.O. Box 550, Halifax, N.S. B3J 2S7
Dr D.E. Sergeant, Fisheries and Marine Service, Environment Canada, Arctic Biological Station, P.O. Box 400, Ste. Anne de Bellevue, P.Q. H9X 3L6
Capt A.M. Shaw, Mayhaven Shipping Ltd., 6676 Second Street, Halifax, N.S.
Dr M.P. Shepard, International Fisheries Policy, Fisheries and Marine Service, Environment Canada, 580 Booth Street, Ottawa, Ont. K1A 0H3
Mr G.C. Slade, Department of Fisheries, 4th Floor, Viking Bldg., St. John's, Nfld.

DENMARK

Commissioner:

Mr E. Lemche, Ministry for Greenland, Hausergade 3, DK-1128 Copenhagen K

Advisers:

Mr Sv.Aa. Horsted, Grønlands Fiskeriundersøgelser, Jaegersborg Allé 1B, DK-2920 Charlottenlund
Mr F.O. Kapel, Grønlands Fiskeriundersøgelser, Jaegersborg Allé 1B, DK-2920 Charlottenlund

NORWAY

Commissioner:

Mr H. Rasmussen, Directorate of Fisheries, P.O. Box 185-186, 5001 Bergen

Advisers:

Mr E. Aas, Ministry of Fisheries, Oslo
Mr S. Engesaeter, Economic Section, Directorate of Fisheries, P.O. Box 185-186, 5001 Bergen
Mr T. Gislesen, Ministry of Foreign Affairs, Oslo
Mr B. Hundven, Directorate of Fisheries, P.O. Box 185-186, 5001 Bergen
Capt G. Jakobsen, Norwegian Fishermen's Association, P.O. Box 567, 9001 Tromsø
Mr O.H. James-Olsen, Directorate of Fisheries, P.O. Box 185-186, 5001 Bergen
Dr Aa. Jonsgaard, Institute of Marine Zoology and Limnology, University of Oslo, Oslo
Mr P. Karlsen, Norwegian Fishermen's Association, 6062 Brandal
Mr P. Kibsgaard-Petersen, Association of Norwegian Fishing Vessel Owners, P.O. Box 122, N-6001 Aalesund
Mr P.L. Mietle, Directorate of Fisheries, P.O. Box 185-186, 5001 Bergen
Mr T. Øritsland, Institute of Marine Research, P.O. Box 2906, 5011 Bergen
Mr L. Sørensen, c/o G.C. Rieber & Co., Bergen

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Appendix II

Special Meeting of Panel A (Seals)
Bergen, Norway, 12 December 1975

Agenda

1. Opening by Chairman, Mr K. Vartdal (Norway)
2. Appointment of Rapporteur
3. Adoption of Agenda
4. Report of Meetings of Scientific Advisers, 17-19 November 1975 (Summ.Doc. 75/XII/47) and 9-10 December 1975 - Chairman of Scientific Advisers, Dr A.W. Mansfield (Canada)
5. Conservation measures for:
   a) harp seals
   b) hooded seals
6. Research required
7. Approval of Panel Report
8. Next Meeting
9. Other business
10. Adjournment

Serial No. 3722
(B.f.6)

Appendix III
(also ICNAF
Summ.Doc.
75/XII/47 -
Revised)

Report of Scientific Advisers to Panel A (Seals)

Ottawa, Canada, 17-19 November 1975

1. In the absence of Dr A.W. Mansfield (Canada), Dr M.A. Bigg (Canada) was requested to serve as Chairman.

2. Participants.

Canada -	Dr M.A. Bigg	Mr P.F. Lett	Dr K. Ronald
	Dr P. Brodie	Dr A.W. May	Dr D.E. Sergeant
	Dr C.K. Capstick	Dr B.S. Muir	Dr G.H. Winters
	Dr D.M. Lavigne	Dr W.E. Ricker	
Denmark -	Mr Sv.Aa. Horsted	Mr F.O. Kapel	
Norway -	Mr T. Benjaminsen	Mr T. Øritsland	Mr Ø. Ulltang

3. Rapporteur. Dr G.H. Winters (Canada) was appointed Rapporteur.

4. Agenda. The Agenda (Annex 1), as proposed by the Chairman, was adopted without revision. A list of pertinent documents and working papers is at Annex 2.

5. Harp Seals

(a) Results of research in 1975

Canada reported results of 1975 studies relating to photographic aerial surveys of whelping harp seals in the Gulf and Front areas, ultra-violet sensing results, marking of pups in the Gulf, and analysis of age frequencies from shore-based fisheries (Res.Docs. 75/XII/142, 75/XII/144). Aerial and ultra-violet photographic surveys indicated a level of production of 46,000 pups in the Gulf and about 141,000 on the Front for a combined production in 1975 of about 187,000 pups, a decrease since 1972 of 12.5% per annum. Catches of young seals in 1975 were 140,629, of which 7550 were taken in the Gulf. Analyses of tagging studies indicated a poor representation of year-classes 1969-1971 with catches in excess of 200,000 annually and strong representation of year-classes 1972-1973 following imposition of the 150,000-quota.

In addition to research results presented to Panel A Scientific Advisers at the 1975 Annual Meeting (Proc. 12, Appendix I), Norway presented additional data on age composition analyses and adjusted estimates of year-class survival, mortality and production which confirmed similar analyses presented in Res.Doc. 75/121.

Denmark presented a breakdown on catches of harp seals in West Greenland during 1954-1974 which indicated a relationship between survival of pups in the Gulf and Front areas and subsequent 0-group catches in West Greenland during the following summer (ICNAF Working Paper 75/XI/4).

(b) Mortality estimates

Information on levels of total and natural mortality since the early 1960's were provided, based on a variety of methods. Cohort analysis utilizing effort data (Res.Docs. 75/XII/145, 75/XII/148) indicated a level of $Z = 0.24$ and $M = 0.20$ for age-groups 1+; analysis of catch curves indicated a range of estimates of mortalities from $Z = 0.26$, $M = 0.21$ for adult seals (both sexes combined) (Res.Doc. 75/XII/143) to $Z = 0.09$ for breeding adult females (ICNAF Working Paper 75/XI/3). After considerable discussion, it was felt that variability and bias in catch and age composition, hunting effort and recruitment were the main confounding factors in the wide range of estimates and a small working group was established to compute revised estimates of mortality incorporating appropriate adjustments for the above factors. The results of catch analyses for adult males are presented below:

	Sampling year	Age-group	Z	Mean Z	Rate of change in recruitment	Total Z	Estimated hunting mortality	Natural mortality (M)
i)	1973	6-13	-.138	-.073	-.137	-.210	-.057	-.153
	1974	7-14	-.008					
ii)	1969-1974	8-21	-.073		-.02	-.093	-.04	-.05

The range of estimates of Z and M calculated in this manner were considered too large to be acceptable with confidence. Consequently, an alternative method of calculating mortality was considered involving levels of Z which would provide estimates of breeding stock within the limits considered probable in 1975, starting from an estimate of breeding stock in 1967. The following assumptions are made in the models presented below:

i) total mortality (Z) is constant over the various age-groups and years;
ii) whelping age = 6 years;
iii) breeding stock (age 6 years and older) in 1967 = 359,000 females, calculated by functional regression of survival on pup catches.

Calculated breeding stock

Year	A Z = .13	B Z = .14	C Z = .15	D Z = .16	E Z = .17	F Z = .18
1967	359	359	359	359	359	359
1968	371	365	359	353	347	342
1969	370	358	348	338	328	319
1970	353	338	325	312	299	287
1971	338	320	305	289	274	261
1972	339	318	300	281	264	249
1973	323	300	280	260	243	227
1974	303	278	257	237	220	204
1975	315	287	262	240	220	202

Models A, B, C, D, E, and F were variously considered acceptable under the assumptions made, depending on interpretations of information relating to estimates of pup production (and hence breeding stock) in 1975.

(c) Estimates of production in 1975

Agreement could not be reached as to the most accurate level of pup production in 1975.

Results of Canadian aerial surveys, both black-and-white and ultra-violet photography, in 1975 indicated pup production of 46,000 in the Gulf (ultra-violet) and 141,000 (black-and-white) on the Front, for a combined total of 187,000 pups. Estimates of Front pup production by Canadian Fisheries Officer, Mr T. Curran, indicated a level of 150,000 with a maximum of 165,000. Based on a Gulf production of 50,000, the ratio of adults from Gulf to Front in 1975 (1:3) also indicates a level of Front production of 150,000 or 200,000 altogether.

Total pup kill in 1975 was 140,000 of which 133,000 were taken on the Front. Observations by Norwegian sealers and one Norwegian observer suggest that Front escapement was good in 1975; this was indicated by that period in which the white coat kill preferences were fulfilled by the Norwegian fleet with a good escapement of white coats, and by the high daily kill rate of beaters experienced by the Norwegian fleet during the last three days of the hunt in an area of approximately 80 x 60 nautical miles east of Grey Islands (Res.Doc. 75/120)[1]. The degree of variability associated with aerial surveys was also pointed out particularly in relation to probable under-estimates of production by this method. Thus, estimates of Front production in 1975 may have been considerably higher than indicated by aerial surveys, and a range of 200,000-250,000 was suggested as alternative estimates.

(d) Advice on catch levels in 1976

The differences in scientific opinion on the level of pup production (and breeding stock) in 1975 precludes definitive advice on catch levels in 1976. However, the output of Models A through F above represent the range of scientific opinion relating to probable levels of pup production in 1975. It was considered appropriate to provide a series of calculations illustrating the effects on future pup production and breeding stock under alternative estimates of mortality and 1975 breeding stock contained in Models A through F. These are shown in Table 1.

(e) Required future research on harp seals

Additional studies from rec ent biological material to establish maturity ogives were considered an important need. The bias resulting from small samples, the problem of obtaining samples on the Front, and the time lag in response of females to population fluctuations were discussed. A sample of 200 females was considered as a minimum sample for such a study.

[1] However, a kill of 23,000 beaters was taken by landsmen on the Front through April and the greater part of May (ICNAF Working Paper 75/XI/1).

On-ice control of any aerial survey either by black-and-white or ultra-violet photography was considered necessary and in particular on the Front ice.

Norway expressed a willingness to participate in any *ad hoc* study on the Front, but on a routine basis, and for economic reasons, studies off Newfoundland would be conducted on alternate years. It was agreed that a cooperative research effort be made towards the construction of a systems simulation of the western Atlantic harp seal population on the available data to assist in future harp seal assessments as well as to provide some insight into their community dynamics.

6. Hooded Seals

(a) Population status

A Canadian re-assessment (Res.Doc. 75/XII/147) of hooded seal production from regression analyses of survival index on pup catch indicated a somewhat lower (26,200) pup production than initial Norwegian estimates (32,000, Res.Doc. 75/122) using older age-groups.

(b) Recommendations for TAC

The Scientific Advisers agreed to defer advice on the 1976 TAC level until the next meeting of Panel A in Bergen, Norway, December 1975.

(c) Future research

The Scientific Advisers agreed that future research efforts be intensified towards providing better information on stratified sampling of kill and aerial reconnaissance northward to include Davis Strait.

7. Time and Place of Next Meeting. The Scientific Advisers noted that their next meeting would be held 9-10 December 1975 at the Institute of Marine Research, Bergen, Norway, just prior to the meeting of Panel A in the Fisheries Directorate, Bergen, on 12 December 1975.

8. There being no other business, the meeting adjourned at 1245 hrs, Wednesday, 19 November 1975.

Table 1. Characteristics of stock models A through F considered (see table on calculated breeding stock, page 2).

Column	1	2	3	4	5	6	7	8	9
Stock model	Z	A	R	1967 pups	1975 pups	Catch from 1976	Long-term trend	Minimum pups	Year of minimum
-	0.21	0.189	0.142	359	-	0	-	0	
-	0.19	0.173	0.160	359	184	0	-	0	
F	0.18	0.165	0.170	359	202	0	±	125	1982
						50	-	0	
E	0.17	0.156	0.180	359	220	0	+	153	1982
						50	-	0	
D	0.16	0.148	0.191	359	240	0	+	185	1982
						50	+	185	1982
						100	-	0	
C	0.15	0.139	0.203	359	262	0	+	222	1978
						50	+	222	1978
						100	a	a	a
B	0.14	0.131	0.216	359	287	0	+	255	1978
						50	+	255	1978
						100	+	255	1978
						150	-	0	
A	0.13	0.122	0.229	359	315	0	+	293	1978
						50	+	293	1978
						100	+	293	1978
						150	+	293	1978
						200	±	0	

a = to be computed for the Eighth Special Commission Meeting, January 1976

Column 1. Instantaneous total mortality rate of seals from age 1 onward; Z. This is mainly natural mortality, but it includes hunting mortality on seals older than age 0.

Column 2. Annual actual mortality rate; $A = 1 - e^{-Z}$.

Column 3. Computed fraction of all pups surviving the age 0 kill that become pup-producing females at age 6; $R = e^{-6Z}/2$.

Column 4. Assumed number of pups produced in 1967.

Column 5. Computed number of pups produced in 1975.

Column 6. Annual level of catch (all ages) in 1976 and later years, used in the computation. Of these, 84% are considered to be pups, and the rest older ages.

Column 7. Final trend of the computed population.
+ = continually increasing;
- = continually decreasing;
± = very slow increase or decrease.

Column 8. The level to which the number of pups produced will decline, based on recruitment in 1975.

Column 9. The year of minimum pup production.

The model is started from initial conditions as below (numbers are in thousands):

Year	Pup production	Pup kill	Pup survivors
1961	406	160	246
1962	399	207	192
1963	384	260	124
1964	387	266	121
1965	367	183	184
1966	360	251	109
1967	359	278	81
1968		156	
1969		233	
1970		217	
1971		211	
1972		117	
1973		98	
1974		115	
1975		127	

The pup survivors in each year are multiplied by R and added to the female breeding stock 6 years later. The number of producing females (= pup production) in each year is multiplied by A and the result subtracted from the number present to give the number surviving at the start of the following year. After 1975 trial pup kill strategies are used as follows, as far as appropriate: 0; 42,000; 84,000; 126,000; 168,000. Notice that no adjustments made for increases or decreases in survival rate of bedlamers or adults because of the different numbers caught under the different kill strategies.

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Appendix III
Annex 1

Special Meeting of Scientific Advisers to Panel A (Seals)
Ottawa, Canada, 17-19 November 1975

Agenda

1. Opening
2. Election of Chairman (*pro-tem*)
3. Appointment of Rapporteur.
4. Adoption of Agenda
5. Harp Seals
   (a) Population status
   (b) Recommendation for total allowable catch in 1976
   (c) Future research
6. Hooded Seals
   (a) Population status
   (b) Recommendation for total allowable catch in 1976
   (c) Future research
7. Time and Place of Next Meeting
8. Other Business
9. Approval of Report of Scientific Advisers
10. Adjournment

List of Research Documents and Working Papers
presented to
Special Meeting of Scientific Advisers to Panel A (Seals)
Ottawa, Canada, 17-19 November 1975

Res.Doc. 75/XII/141 + Addenda 1-2	Harp seal survival as predicted by a modification of Allen's model by K. Ronald and C.K. Capstick
Res.Doc. 75/XII/142	Results of research on harp seals in 1975 with an estimate of production by D.E. Sergeant
Res.Doc. 75/XII/143	Mortality and production of harp seals, with reference to a paper by Benjaminsen and Øritsland (ICNAF Res.Doc. 75/121) with Appendix - Comments on the West Atlantic harp seal herd and proposals for the 1972 harvest (presented to Special Meeting of Panel A Experts, Charlottenlund, Denmark, 23-24 September 1971) by W.E. Ricker
Res.Doc. 75/XII/144	An aerial census of western Atlantic harp seals (*Pagophilus groenlandicus*) using ultraviolet photography by D.M. Lavigne, S. Innes, K. Kalpakis, and K. Ronald
Res.Doc. 75/XII/145 (Revised)	The impact of current management policies on stocks of western Atlantic harp seals, *Pagophilus groenlandicus* by P.F. Lett and D.M. Lavigne
Res.Doc. 75/XII/146 (Revised)	Consideration of present management regime for harp seals in relation to recent scientific analysis by B.S. Muir
Res.Doc. 75/XII/147	Comments on new estimates of production and sustainable yield of harp and hooded seals by D.E. Sergeant
Res.Doc. 75/XII/148	The estimation of natural mortality for the harp seal (*Pagophilus groenlandicus*) by P.F. Lett and D.M. Lavigne

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ICNAF Working Paper 75/XI/1	Canadian seal statistics, 1975 - Atlantic summary
ICNAF Working Paper 75/XI/2	Documentation of comments on Canadian harp seal estimates by Ø. Ulltang, T. Benjaminsen, and T. Øritsland
ICNAF Working Paper 75/XI/3 + Addendum	Adjusted estimates of year-class survival and production with estimates of mortality for Northwest Atlantic harp seals by T. Benjaminsen and T. Øritsland
ICNAF Working Paper 75/XI/4	Catch of harp seals in West Greenland, 1954-1974 by Denmark
ICNAF Working Paper 75/XI/5	The management of harp seals in the West ice by T. Øritsland
ICNAF Working Paper 75/XI/6	Comments on methods used by Benjaminsen and Øritsland (ICNAF Res.Doc. 75/121) by Sv.Aa. Horsted

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Appendix IV

Report of Scientific Advisers to Panel A (Seals)

Bergen, Norway, 9-10 December 1975

1. The meeting was called to order by the Chairman, Dr A.W. Mansfield (Canada).

2. Participants.

Canada	-	Mr P.F. Lett	Prof K. Ronald
		Dr A.W. Mansfield	Dr D.E. Sergeant
		Dr B.S. Muir	Dr G.H. Winters
Denmark		Mr Sv.Aa. Horsted	Mr F.O. Kapel
Norway	-	Mr T. Benjaminsen	Mr T. Øritsland
		Mr B. Bergflødt	Mr Ø. Ulltang
		Mr I. Christensen	

3. Rapporteur. Professor K. Ronald (Canada) was appointed Rapporteur.

4. Agenda. The Agenda, as proposed by the Chairman, was adopted after slight modification (Annex 1). A list of pertinent research documents and working papers was presented by the Executive Secretary of ICNAF, Mr L.R. Day (Annex 2).

5. Review of Report of Special Meeting of Scientific Advisers, 17-19 November 1975, Ottawa, Canada (Summ. Doc. 75/XII/47 and this Report, Appendix III). Hooded seals were considered first on the agenda, since it was felt that they had received insufficient discussion at the Ottawa meeting.

(a) Hooded Seals

i) Population status. The Norwegian estimate of pup production in 1968 (32,000, Res.Doc. 75/122) and the Canadian re-assessment (26,200, Res.Doc. 75/XII/147), presented at the Ottawa meeting, were reconsidered together with a Working Paper (75/XII/9) containing data on long-term fluctuations in seal huntrng in Greenland. After much discussion of the availability of hooded seals and the possible contribution of the Davis Strait herds to the catch on the Front, the Scientific Advisers were able to agree on a figure of 30,000 pups as the likely production in 1968. This figure, obtained from the functional regression of year-class survival on pup catch, was taken as the basis for calculating the production in 1975, using the best estimates of mortality available. A mean total mortality (Z) of 0.22 for adults, obtained from 1971-1974 catch curves, was used to derive a natural mortality (M) of 0.11. When applied to the 30,000 pups produced in 1968, this gave an estimated adult feamle population of 37,935 in 1975. Correcting for infertile females (5%), this gave a sustainable yield of 13,500 pups if the mean age of sexual maturity were assumed to be 4 years, and 9,600 pups if it were assumed to be 5 years. Total allowable catches would then be 23,800, including 10,300 adults, or 16,500, including 6,900 adults.

ii) Recommendations for Total Allowable Catch (TAC). It was concluded that, although the estimates were higher than the present TAC, it would be prudent not to change the TAC until firmer data on mortality rates, especially of immatures, and degree of recruitment had been acquired.

The Scientific Advisers, therefore,

agreed to recommend

that the TAC on hooded seals remain unchanged in 1976 at 15,100.

iii) Future research. More jaw samples for age analysis will be collected on the Front by both Canada and Norway in order to improve estimates of natural mortality.

Canada will also continue marking of hooded seals in the Gulf of St. Lawrence and will make another attempt to survey the patch of hooded seals in Davis Strait. It is hoped that the Canadian Armed Forces will supply a long-range reconnaissance aircraft for this task, and should the patch be located, a second aircraft from the Canada Centre for Remote Sensing will be used to obtain an estimate of the population, using the ultra-violet technique recently developed by the University of Guelph (Res.Doc. 75/XII/144).

Denmark will continue age analysis of the catches in West Greenland, which make up 15-20% of the total number of hooded seals taken in the ICNAF Area.

Canada and Denmark agreed to exchange recent information on ice distribution and movements in Davis Strait in order to look for recurring patterns which might determine the distribution of hooded seals.

Norway intended devoting most of its research effort on hooded seals to studies on the moulting herds in Denmark Strait outside the ICNAF Area, but felt that the information gained would provide useful insights into factors affecting the herd on the Front.

(b) Harp Seals

i) Population status. Several minor changes were suggested to the report of the Ottawa meeting (Summ.Doc. 75/XII/47; also this Report, Appendix III) and these will be incorporated into a revised edition. The implications of the report were not discussed in view of new calculations and evidence presented in three Working Papers (75/XII/7, 8, and 9) and two new Research Documents (75/XII/150 and 151).

No discussion of Res.Doc. 75/XII/149 took place since it was essentially a critique of an earlier document (Res.Doc. 75/XII/148) that had now been superseded. As at the earlier meeting in Ottawa, the Scientific Advisers were still not able to agree unanimously on a figure for total allowable catch owing to inherent uncertainties in the data, especially the estimates of pup production in 1975, and the mortality rates of females, both immature and adult.

The 1976 TACs at present catch composition for various estimates of pup production are shown in the following table:

	Estimated Pup Production (in thousands)			
Reference	290	270	260	220
1	180			
2		167		
3			127	
4				104
5			110	90

1 = Best estimate (natural mortality of immatures, 0.13; natural mortality of adult females, 0.10) by T. Benjaminsen.
2 = Conservative estimate by T. Benjaminsen.
3 = Working Paper 75/XII/8 by G.H. Winters.
4 = Working Paper 75/XII/8, using assumed production of 220.
5 = Res.Doc. 75/XII/151, using natural mortality of 0.11, by K. Ronald.

ii) Recommendations for TAC. In view of the wide variation in estimates of TAC, the Scientific Advisers were not able to reach a unanimous decision on the level of catch to be taken in 1976. However, the majority felt that, since the evidence was insufficient, they would not be able to recommend a change from the 1975 total allowable catch of 150,000 (excluding Greenland and the Canadian Arctic).

iii) Future research. The greatest inadequacies in the data were agreed to be in order of importance:

a) Estimates of pup production in the Gulf and on the Front, especially the latter;
b) Estimates of natural mortality of immature and adult females.

Future research by Canada, Denmark, and Norway will be aimed at improving these estimates. A cooperative effort should also be made to develop a systems simulation of Northwest Atlantic harp seal populations to assist in future management.

6. Time and Place of Next Meeting. The Scientific Advisers stressed the difficulty of providing new

information, based on the current year's sealing season, by the time of the Annual Meeting, and

recommended

that their next meeting be held in the fall of 1976.

It was suggested that the week following the ICES meetings at Copenhagen would be a suitable time and locale.

7. After requesting a representative from each country to review the typed draft of the report at 0945 hrs, 11 December, at the Directorate of Fisheries, the Chairman adjourned the meeting.

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Appendix IV
Annex 1

Special Meeting of Scientific Advisers to Panel A (Seals)
Bergen, Norway, 9-10 December 1975

Agenda

1. Opening remarks by Chairman, Dr A.W. Mansfield (Canada)
2. Appointment of Rapporteur
3. Adoption of Agenda
4. Review of Report of Special Meeting of Scientific Advisers, Ottawa, Canada, 17-19 November 1975 (Summ.Doc. 75/XII/47)
   - (a) Hooded Seals
     - i) Population status
     - ii) Recommendation for total allowable catch in 1976
     - iii) Future research
   - (b) Harp Seals
     - i) Population status
     - ii) Recommendation for total allowable catch in 1976
     - iii) Future research
5. Time and Place of Next Meeting
6. Other Business
7. Approval of Report of Scientific Advisers
8. Adjournment

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(B.f.6)

Appendix IV
Annex 2

Special Meeting of Scientific Advisers to Panel A (Seals)
Bergen, Norway, 9-10 December 1975

List of New Documentation

Res.Doc. No.	Serial No.	Title	Author
75/XII/149	3727	Comments on an attempt by P.F. Lett and D.M. Lavigne to estimate mortality for northwestern Atlantic harp seals from catch and effort data	Ø. Ulltang
75/XII/150	3728	Harp seal, *Pagophilus groenlandicus*, production in the western Atlantic during March 1975	D.M. Lavigne
75/XII/151	3729	A further review of Allen, Ronald, Capstick, harp seal model, based on data from Scientific Advisers Meeting held November 1975, Ottawa	K. Ronald and C.K. Capstick

Working Paper No.	Title	Author
75/XII/7	Further documentation of comments of Canadian harp seal estimates	T. Øritsland and T. Benjaminsen
75/XII/8	Analyses of harp seal stock size and mortality	G.H. Winters
75/XII/9	Data on the catch of harp and hooded seals, 1954-1974, and long-term fluctuations in seal hunting in Greenland	F.O. Kapel