North Atlantic Marine Mammal Commission

ANNUAL REPORT
1995

Layout & editing: NAMMCO Secretariat
Printing: Peder Norbye Grafisk, Tromsø, Norway

ISSN 1025-2045
ISBN 82-91578-00-1

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Preface

The North Atlantic Marine Mammal Commission was established in 1992 by an Agreement signed in Nuuk, Greenland on the 9th of April between the Faroe Islands, Greenland, Iceland and Norway. The objective of the Commission, as stated in the Agreement, is to "... contribute through regional consultation and cooperation, to the conservation, rational management and study of marine mammals in the North Atlantic."

The Council, which is the decision-making body of the Commission, held its inaugural meeting in Tórshavn, Faroe Islands, 10-11 September 1992 (NAMMCO/1), and has convened four times since: in Tromsø, Norway 19-20 January 1993 (NAMMCO/2); Reykjavik, Iceland, 1-2 July 1993 (NAMMCO/3); Tromsø, Norway 24-25 February 1994 (NAMMCO/4); and most recently in Nuuk, Greenland, 21-23 February 1995 (NAMMCO/5).

The present volume contains proceedings from NAMMCO/5 - the fifth meeting of the Council, which was held at the Hotel Hans Egede in Nuuk, Greenland 21-23 February 1995 (Section 1), as well as the reports of the 1995 meetings of the Management Committee (Section 2) and the Scientific Committee (Section 3), which presented their conclusions to the Council at its fifth meeting. Included as an annex to the Management Committee report is the report of the second meeting of the Working Group on Inspection and Observation. Section 3 (Scientific Committee) also contains Scientific Committee Working Group reports which were presented to the 3rd meeting of the Scientific Committee in Copenhagen, Denmark 31 January - 3 February 1995 (Section 3.1), as well as National Progress Reports submitted at the same meeting (Section 3.2).

In addition to meetings under the Commission, NAMMCO arranged and hosted the International Conference on Marine Mammals and the Marine Environment, which was held in Lerwick, Shetland, 20-21 April 1995. The Secretariat's summary of Conference proceedings is contained in Section 4 of this volume. Section 5 contains a list of addresses of Council delegates, observers and members of the Scientific Committee.

This is the first fully published Annual Report of proceedings from meetings under the North Atlantic Marine Mammal Commission, the contents of which are confined primarily to activities in the 1995 calendar year. The Secretariat plans to produce such a publication on an annual basis, with a compilation of all relevant proceedings from meetings under the Commission.

The reports contained in this volume are presented here in their final edited form and thereby replace any preliminary versions which have been circulated prior to this publication.

Contents

Meetings & Office Bearers 1994-1995

Members of the Commission		**Heads of delegations**
Faroe Islands	(F)	Kjartan Hoydal
Greenland	(G)	Einar Lemche
Iceland	(I)	Þórður Ásgeirsson
Norway	(N)	Halvard P. Johansen

Council

4th Meeting	24 - 25 Feb.1994	Saga Hotel, Tromsø
5th Meeting	21 - 23 Feb.1995	Hotel Hans Egede, Nuuk
Chairmen	1993-95	Kjartan Hoydal (F)
	1995 -	Halvard P. Johansen (N)

Management Committee (MC)

3rd Meeting	24 - 25 Feb. 1994	Saga Hotel, Tromsø
4th Meeting	22 Feb.	Hotel Hans Egede, Nuuk
Chairmen	1993-1994	Kjartan Hoydal (F)
	1995 -	Einar Lemche (G)

MC Working Group on Inspection and Observation

2nd Meeting	8 Nov. 1994	Greenland Home Rule Government, Copenhagen
Chairman	1994 -	Halvard P. Johansen (N)

Working Group on Hunting Methods

2nd Meeting	7 Nov. 1994	Greenland Home Rule Government, Copenhagen
Chairman	1993 -	Amalie Jessen (G)

Scientific Committee (SC)

3rd Meeting	31 Jan. - 3 Feb. 1995	Grld.Fish. Research Institute, Copenhagen
Chairmen	1993-1995	Jóhann Sigurjónsson (I)
	1995 -	Tore Haug (N)
Vice Chairmen	1993-95	Tore Haug (N)
	1995 -	M. P. Heide-Jørgensen (G)

SC Working Group on Management Procedures (WGMP)
SC Working Group on Northern Bottlenose and Killer Whales (WGNBK)

Joint meeting	2 Feb. 1995	Grld. Fish.Research Institute, Copenhagen
Chairmen	WGMP	Nils Øien (N)
	WGNBK	Tore Haug (N)

SC *ad hoc* Working Group on Atlantic Walrus

Meeting	31 Jan.-3 Feb. 1995	Grld. Fish.Research Institute, Copenhagen
Convener		Erik Born (G)

SC Committee Working Group to Plan NASS-95 (WGNASS-95)

1st Meeting	25 Feb. 1994	Saga Hotel, Tromsø
2nd Meeting	2 Dec. 1994	SAS Hotel, Tromsø
3rd Meeting	2 Feb. 1995	Grld. Fish.Research Institute, Copenhagen
Chairman		Finn Larsen (G)

The NAMMCO Fund

Meetings of the Board:		
By telephone, 1994:	11 March; 2 April; 23 June; 9 Sept.; 27 Oct.; 15 Dec.	
In person:	20 Feb. 1995	Hotel Hans Egede, Nuuk
Chairman of the Board		Einar Lemche (G)

International Conference on Marine Mammals and the Marine Environment

Conference Planning Group members	Dorete Bloch (F)
	Amalie Jessen (G)
	Gísli Víkingsson (I)
	Inger Winsnes (N)

Secretariat

Kate Sanderson	Secretary
Jens Paulsen	Assistant Secretary
Margot Bertelsen	Office assistant (from Oct. 1995)
Elisabeth Vileid	Temporary office assistant (March - Oct. 1995)

SECTION 1

Fifth Meeting of the Council
Nuuk, 21-23 February 1995

Fifth Meeting of the Council

Nuuk, Greenland, 21-23 February 1995

Summary of major decisions

Finance and Administration

- The Council agreed to establish an *ad hoc* group on finance and administration;

- The proposed budget for 1995 and forecast budget for 1996 were adopted, with an increase in member contributions for 1996.

- The Council agreed to the Scientific Committee's proposal to establish a NASS-95 Fund of NOK 800,000 using surplus Scientific Committee funds from 1993/94 .

Management Committee

The Council endorsed the following conclusions and recommendations proposed by the Management Committee:

Northern bottlenose whale

- It was concluded that the traditional coastal drive hunt of northern bottlenose whales in the Faroe Islands did not have any noticeable effect on the stock and that removals of fewer than 300 whales a year were not likely to lead to a decline in the stock.

Atlantic walrus

- While recognising the over all priority of further research on the delineation and abundance of walrus stocks in the North Atlantic, it was recommended that Greenland take appropriate steps to arrest the decline of walrus along its west coast.

Inspection and observation

- It was agreed to request the Working Group on Inspection and Observation to continue its work on the formulation of a standard checklist for inspectors.

- The Working Group on Inspection and Observation was requested to consider the details of a reciprocal observer scheme between NAMMCO member countries and to further develop these.

Requests to Scientific Committee

The Council agreed to request the Scientific Committee to:

- advise on stock identity of *ringed seals (Phoca hispida)* for management purposes

and to assess abundance in each stock area, long-term effects on stocks by present removals in each stock area, effects of recent environmental changes (ie. disturbance, pollution) and changes in the food supply, and interactions with other marine living resources;

- review and assess abundance and stock levels of *grey seals(Halichoerus grypus)* in the North Atlantic, with an emphasis on their role in the marine ecosystem in general, and their significance as a source of nematodal infestations in fish in particular;

- review results of the North Atlantic Sightings Survey 1995 *(NASS-95)* in the light of recent assessments of North Atlantic whale stocks;

- *monitor stock levels and trends in stocks* of all marine mammals in the North Atlantic in relation to the importance of the further development of multi-species approaches to the management of marine resources.

External relations

- It was agreed to establish working relations with the Canada-Greenland Joint Commission for the Conservation and Management of Narwhal and Beluga;

The NAMMCO Fund

- The Council agreed that the provisional forecast budget for 1996 should include an additional NOK 200,000 for the NAMMCO Fund;

Election of Chairman

- Halvard P. Johansen, Norway was elected new Chairman of the Council for 1995 - 1997.

Next meeting

- The Council agreed to hold its next meeting in Tromsø, 27-29 March 1996 (dates to be confirmed by the Secretariat), to be immediately preceded by a meeting of the *ad hoc* finance and administration group.

Report of the Fifth Meeting of the Council

Nuuk, Greenland, 21-23 February 1995

The Fifth Meeting of the Council of NAMMCO was hosted by the Greenland Home Rule Government and held in the Hotel Hans Egede, Nuuk, Greenland from 21 to 23 February 1995. The meeting was attended by delegations from the member countries - the Faroes, Greenland, Iceland and Norway - as well as observers from the Governments of Canada, Denmark and Japan. The International Whaling Commission (IWC), the Northwest Atlantic Fisheries Organization (NAFO) and the Agreement on the Conservation of Small Cetaceans in the Baltic and North Seas (ASCOBANS) were also represented by observers at the meeting, as were a number of non-governmental organisations. Participants are listed in Appendix 1.

1. Opening procedures

1.1 Address of welcome

The Council was convened by the Chairman, Kjartan Hoydal. The Chairman introduced the Minister of Fisheries, Hunting and Agriculture of the Greenland Home Rule Government, Mr Hans Iversen, who gave an address of welcome. Mr Iversen's address is attached as Appendix 3.

1.2 Opening statements

Opening statements were made by the Heads of Delegations from the Faroes, Iceland and Norway and were also distributed to participants in written form (see Appendices 4 - 6).

1.3 Adoption of agenda

The Agenda, as included in Appendix 2, was adopted.

1.4 Admission of observers

The Secretary informed the Council of the governments and organisations who were represented by observers to the meeting. These included representatives from the Governments of Canada, Japan and Denmark, as well as the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), the International Whaling Commission and the Northwest Atlantic Fisheries Organization, and a number of non-governmental organisations. Participants are listed in Appendix 1. On behalf of the Council, the Chairman welcomed the attendance of all the observers present.

Under this Agenda item, the representatives from the Governments of Japan and Denmark made brief statements (Appendices 7 and 8).

1.5 Meeting arrangements

The Secretary reported on the practical and social arrangements for the meeting, which included a reception on Tuesday 21 February and a dinner on Wednesday 22 February, both of which were hosted by the Ministry of Fisheries, Hunting and Agriculture in the Greenland Home Rule Government and held in the Hotel Hans Egede. The Minister of Health and Environment, Mr Ole Rosing Olsen, hosted the dinner on behalf of the Government on the

Wednesday evening.

2. Administration and finance

Under this Agenda item, **the Council agreed** to establish an *ad hoc* group to review the financial and administrative aspects of the Secretary's report, and to consider these together with the draft budget. The *ad hoc* finance and administration group met on the afternoon of Tuesday 21 February, and agreed that a formal written report to the Council was not necessary at this stage. It was decided that the finance group should convene again immediately prior to the next meeting of the Council.

The Secretary reported back to the Council on the meeting of the *ad hoc* finance and administration group, which had reviewed the 1994 audited accounts and reviewed and revised the draft 1995 and forecast 1996 budgets (See Appendix 9; see also under 2.2 and 2.3 below).

2.1 Secretary's report

The Secretary presented a report to the Council on developments in the Secretariat since the last meeting of the Council.

2.1.1 Staff

It was reported that the Secretariat planned to hire a permanent office assistant. This had not as yet been possible due to delays in finding permanent accommodation. There were also plans to hire a consultant to assist with the establishment of the database in the Secretariat. Such assistance would be on a temporary, contract basis, although it was noted in the report that the Council may choose to review the need for a permanent scientific member of the Secretariat staff at a later stage. The expected costs of such temporary contract help were taken into account in the 1995 budget (see Appendix 9).

2.1.2 Accommodation

The Secretary also reported on the new accommodation recently acquired by the Secretariat, which occupies the entire third floor (180 square metres) of Søndre Tollbugate 9 in the centre of Tromsø, just across from the Polar Museum. Delays in finding permanent offices were due to the fact that the originally planned accommodation for the Secretariat proved to be economically unfeasible for the University. Alternatives were subsequently considered both on campus and in downtown Tromsø. After consultations with the Ministry of Fisheries and the Chairman of the Council, the present location was agreed, and the Secretariat moved offices on 8 February 1995.

Although the final lease was still under preparation, the terms were such that the Secretariat would be sub-letting the premises from Tromsø University, which leases from a private company. The total annual rental costs of the premises are NOK 185,000. The lease would, however, include a clause allowing the University access to the fourth office, after consultation with the Secretariat, in exchange for which the University would cover 25 % of the total rental costs. The total annual rental cost to the Secretariat would therefore be NOK 140,000, including utilities and cleaning services. The Secretariat would continue to have the advantage of being connected to data and communication services through the

University.

2.1.3. Committee and Working Group meetings

The Secretary further reported that since the last meeting of the Council, the following meetings had been held:

- meetings of the Working Group on Inspection and Observation and the Working Group on Hunting Methods were held at the Denmark Office of the Greenland Home Rule Government in Copenhagen, 7-8 November, 1994;
- the Scientific Committee Working Group to plan NASS-95 held a meeting in Tromsø, 2 December, which was also attended by a number of external experts;
- the Scientific Committee (and associated Working Groups) met at the Greenland Fisheries Research Institute, in Copenhagen, 31 January - 2 February 1995.

2.1.4. Host Agreement

The Secretary reported that steps had now been taken to initiate the formulation of a Host Agreement between NAMMCO and Norway. The Norwegian Ministry of Foreign Affairs had informed the Secretariat that a draft proposal was currently under review in the Department of Finance, and that the first written response from the Norwegian authorities to the Chairman's letter of November 1994 was expected very soon.

2.1.5 Information

It was reported that the Secretariat continued to distribute information on NAMMCO as widely as possible; to date mostly in the form of a brief fact sheet (*NAMMCO - In Brief*). A more substantial information brochure on NAMMCO was currently under production and was expected to be available in April.

The Secretariat was offered the opportunity to hold a "NAMMCO Day" in Tromsø (12 September 1994) in connection with Tromsø's bicentenary celebrations. For the occasion the Secretariat screened videos on pilot whaling in the Faroe Islands and sealing in Greenland, and offered samples of marine mammal cuisine from the Faroes and Greenland in the Polar Museum. NAMMCO had a poster display at the International Symposium on the Biology of Marine Mammals, held at the University of Tromsø, 29 November-1 December 1994.

It was reported that the Secretariat staff had also attended a number of other meetings of general relevance to NAMMCO, which had been held in Norway over the past year. These included a meeting of the Association of Norwegian Agricultural Journalists, (9 August, 1994 - J. Paulsen); a one-day seminar on Norwegian fisheries and the EU, with an emphasis on resource management, organised by the Norwegian College of Fisheries Science, Tromsø (5 September, 1994 - K. Sanderson and J. Paulsen); the Autumn Session of the Nordic Council, Tromsø (15-16 November -J. Paulsen); and the annual meeting of *Norges Småhvalfangerlag* (Norwegian Small-Type Whalers' Union) in Svolvær (2-3 December, 1994 - J. Paulsen).

2.2 Audited accounts 1994

The Council adopted the audited accounts after review by the *ad hoc* finance and administration group.

2.3 Draft 1995 and forecast 1996 budgets

The Council adopted the proposed budget for 1995, as reviewed and revised by the *ad hoc* finance and administration group (see Appendix 9). The 1996 forecast budget was adopted provisionally, with an increase in members' contributions, including an additional 200,000 for the NAMMCO Fund. It was noted, however, that it would be necessary to review this forecast before its formal adoption in 1996, either at the next meeting of the Council, or prior to that if necessary.

3. Scientific Committee

3.1 Report of the Scientific Committee

The outgoing Chairman of the Scientific Committee, Jóhann Sigurjónsson (Iceland) presented the Report of the Scientific Committee to the Council. The full Scientific Committee Report, with Annexes, is contained in Section 3.1 of this volume.

The Scientific Committee Chairman reported on the Committee's *cooperation with other international organisations*, including ICES (see also under points 3.2, 8.1 & 8.2 below), the International Whaling Commission (IWC) and the Northwest Atlantic Fisheries Organization (NAFO). The Scientific Committee recommended to the Council that working relations be established between NAMMCO and the Canada-Greenland Joint Commission for the Conservation and Management of Narwhal and Beluga (see under 8.2).

An invitation had been extended by the NAMMCO Scientific Committee to members of the IWC Scientific Committee to take part in the planning and implementation of the 1995 North Atlantic Sightings Survey (NASS-95). It was noted that although the Scientific Committee has no agreement to exchange observers with the IWC Scientific Committee, it was now standard procedure to distribute NAMMCO reports, including the report of the Scientific Committee, to other international organisations, including the IWC.

The Council was informed that a *revision and update of the List of Priority Species* would be undertaken before the next meeting of the Scientific Committee in 1996. The Scientific Committee had also agreed to address questions related to the *role of marine mammals in the marine ecosystem* more fully at its next meeting, with a basis in recent research which would be available as the proceedings from the International Symposium on the Biology of Marine Mammals in the Northeast Atlantic (Tromsø, November 1994), as well as papers to the forthcoming ICES/NAFO Symposium on the Role of Marine Mammals in the Ecosystem (Dartmouth, September 1995).

3.1.1 Further development of management procedures

With regard to the Council's request for further development of management procedures, the Council was informed that a joint session of the Scientific Committee Working Groups on Management Procedures and Northern Bottlenose and Killer Whales had been held in Copenhagen, 2 February, to address these and other questions (see also below under 3.1.2 - northern bottlenose whale). The full report of the joint session is contained in Section 3.1, Annex 1.

The Working Group on Management Procedures had considered the responses to the

Scientific Committee's request for more guidance from member countries on their management objectives. The Scientific Committee had concluded that the contributions received did not fully address the need for further clarification of objectives, and suggested that a general discussion at Council level may provide further input for the work of the Scientific Committee. Generally, however, it was felt that a more pragmatic approach on an area and species/case specific basis would be desirable for the development of specific management procedures. The Scientific Committee had also noted that defining objectives implies clarifying the relative importance of economic and biological factors.

Greenland stressed the difficulty for administrators of identifying the relative importance of biological and economic factors, as these were largely political questions. The general aim was for the Scientific Committee to be in a position to deal effectively with the tasks it receives from administrators. If the Scientific Committee is in need of further input, then more discussion is obviously necessary. The Chairman of the Council agreed that the Scientific Committee must be given concrete tasks to deal with.

Iceland noted that these questions would be considered in greater depth by the Management Committee, as had been suggested by the Scientific Committee (see under 4.1 below and Report of the Management Committee, Section 2).

The Chairman of the Scientific Committee informed the Council that no further work could be carried out in the Working Group on Management Procedures until specific tasks were identified by the Council.

3.1.2 Marine mammal stocks - status and advice

The Council was informed of progress made by the Scientific Committee in addressing the Council' s requests for advice on a number of specific stocks and species, as outlined below.

Long-finned pilot whale

No meeting of the ICES Study Group on Pilot Whales had been held in 1994, although a meeting was scheduled for November 1995 in Cambridge, UK, which would review progress on addressing the outstanding questions that had been identified by the Study Group at its last meeting in Copenhagen in 1993.

Northern bottlenose whale

It was reported that the joint meeting of the Working Groups on Management Procedures and Northern Bottlenose and Killer Whales in Copenhagen (2 February 1994) had addressed the Council's request for modelling of the northern bottlenose whale population. The modelling was based on available catch series, abundance estimates and biological parameters, assuming, in the absence of other indications, a single stock in the area from Cape Farewell in the west to the British Isles in the east. The full report of the joint meeting is contained in Section 3.1, Annex 1 of this volume.

Alternative Maximum Sustainable Yield (MSY) rates of 0-5% were considered, and an uncorrected surface estimate of 8,827 whales, as well as a tentatively corrected estimate of 40,000 whales, were used as alternative target stock sizes. Prior to 1877 and since 1974, the annual average catch of bottlenose whales in the Faroes had been 1.2 animals, during which

periods the Faroese fishery was the only harvesting of these whales. Even at an MSY rate as low as 1%, it was concluded that these catches have not had any detrimental effect on the stock.

Harp and hooded seals
It was reported that for both these species, no new information in response to the Council's requests would be available until after the next meeting of the ICES/NAFO Joint Working Group on Harp and Hooded Seals, to be held in Dartmouth, Canada in June.

It was also reported that relatively large numbers of young harp seals had recently been occurring in interactions with fisheries along most of the northern Norwegian coast, which seemed to indicate a larger number of young seals in the system, and could probably also be related to the known success of recruitment of the stocks in the early 1990s. Recapture of tagged animals indicated that the young animals came from the East Ice/Barents Sea stock.

Greenland noted that there should be no uncertainty with regard to the fact that NAMMCO's request for advice to the Joint ICES/NAFO Working Group on Harp and Hooded Seals related to stocks in both the Northeast and Northwest Atlantic.

Atlantic walrus
The Chairman of the Scientific Committee outlined the work of the Committee in dealing with the Council's request for advice on the Atlantic walrus. Prior to the third meeting of the Scientific Committee in January/February 1995, Erik Born of the Greenland Fisheries Research Institute was requested to coordinate the compilation of a status report on the Atlantic walrus. This led to the collaboration of an international group of walrus experts from Greenland, Norway and Canada who met in Copenhagen prior to the Scientific Committee to finalise the draft report: Born, Gjertz & Reeves, *Population assessment of Atlantic walrus (Odobenus rosmarus rosmarus L.).*[1] This report subsequently provided the basis for deliberations in the Scientific Committee's *ad hoc* Working Group on Atlantic Walrus.

The Scientific Committee Chairman pointed out that this was the first time an intergovernmental organisation had dealt properly with this species. He then summarised the Committee's findings and conclusions, with reference to the Report of the *ad hoc* Working

[1] A further revised and limited draft edition of this report was also circulated to the Council during its meeting in Nuuk. The final edited report will be published, with support from NAMMCO, as: E.W. Born, I. Gjertz and R.R. Reeves (in press) Population Assessment of Atlantic Walrus (*Odobenus rosmarus rosmarus L.*), *Norsk Polarinstittut Meddelelse 138*.

Group on the Atlantic Walrus, a preliminary draft of which was circulated to the Council. The final Report of the *ad hoc* Working Group on the Atlantic Walrus is contained in Section 3.1, Annex 2 of this volume.

With regard to *stock identity*, eight groups of Atlantic walruses had been tentatively identified as population units (see Section 3.1 Annex 2, Figure 1). These were considered as functional (ie for the purposes of monitoring of catches and abundance) rather than genetic units. It was stressed that due to the limited nature of the information on which these stocks had been distinguished, their number and configuration could very well change as new data becomes available. *Abundance estimates* were available for only three of the eight stocks of Atlantic walruses. Even for these stocks, the available estimates are uncorrected and/or incomplete and the Scientific Committee expressed concern about the lack of rigorous abundance estimates for all stocks.

With respect to the *long-term effects of present removals on stocks*, the Scientific Committee compared the stock sizes required for sustainability with the abundance estimates (see Section 3.1, Annex 2, Tables 1 & 2). The Council's attention was drawn in particular to the Scientific Committee's conclusions relating to the southern subunit of the Central West Greenland stock, which is probably shared with Canada via southeastern Baffin Island, and which was being over-exploited, as well as the North Water (Baffin Bay) stock, which was understood to likely include the northern subunit of the Central West Greenland stock, and which was probably also being over-exploited.

With respect to the *effects of environmental changes*, the Scientific Committee concluded that there was no documented evidence that environmental factors such as pollution and disturbance had contributed to recent changes in walrus populations, although further research is required to determine the long-term effects of factors such as contaminants on many marine mammals, including walruses.

In relation to *the effects of changes in food supply*, the Scientific Committee concluded that although the precise effects were unknown, fisheries activities, such as the disturbance of sea floor from trawling and noise, were likely to have some effects on walruses and their habitat, and may have contributed to the continued depletion of the stock of walruses off Central West Greenland.

Concluding his presentation of the Scientific Committee's assessment of the Atlantic walrus, the Chairman of the Scientific Committee noted that all information presently available had been taken into account, and that no further advice on Atlantic walrus would be possible until further research had addressed some key questions. It was, however, recommended that the highest priority should be given to studies of stock identity, trends in abundance and catch levels of walruses in the Central West Greenland and North Water (Baffin Bay) stocks. Similar studies were also recommended on other walrus stocks subject to heavy exploitation, including the South and East Hudson Bay stock and the North Hudson Bay-Hudson Strait-Southeast Baffin-Labrador stock, one or both of which may be connected with the Central West Greenland stock.

Greenland noted that according to the Scientific Committee's assessment, there were two

stocks of particular importance to Greenland, namely the Central West Greenland stock and the North Water (Baffin Bay) stock, which were being over-exploited. It was stressed that a way must be found to deal with the fact that these stocks are probably shared with countries not members of NAMMCO. The participation of Canadian scientists in the work of the Scientific Committee was greatly appreciated. It would now be necessary for Greenland to determine how to deal with management questions on this species in relation to Canada.

3.1.3 NASS-95

The Chairman of the Scientific Committee reported on the good progress that had so far been made in the planning of the North Atlantic Sightings Survey (NASS-95) (see Section 3.1, Annex 3). It was reported that various institutes in non-member countries, as well as governments of North Atlantic range states had been approached with invitations to participate in NASS-95 in attempts to ensure a wider coverage. Although there had been little response, there was a possibility of some Canadian participation. It was further reported that Greenland was no longer able to be involved.

Greenland pointed out that the probable withdrawal of Greenland's participation in NASS-95 was related not just to financial, but also logistical and practical questions, as well as priorities with regard to survey activities for species other than those currently being dealt with through NAMMCO.

The Council agreed to the Scientific Committee's proposal to establish a NASS-95 Fund of NOK 800,000 using surplus Scientific Committee funds from 1993/94. This Fund would be administered by a steering group consisting of one scientist from each member country, who would be responsible for allocating funds in an equitable manner to national research groups.

3.1.4 Scientific Committee budget, data and administration

In relation to the allocation of Scientific Committee funds, the Scientific Committee sought guidance from the Council on the question of funding the participation of scientists working within member countries in the work of the Scientific Committee.

The Council agreed that the general principle should be that scientists appointed by member countries as members of Scientific Committee Working Groups should be funded by member governments, and that funds earmarked for external expertise should be reserved for such use only.

It was further reported that the Scientific Committee endorsed the idea for extra staff on a contract basis to assist with the establishment of a database in the Secretariat, which would concentrate initially on the priority species currently relevant to the work of the Committee. The Chairman of the Council stressed the importance and advantage of establishing such a database in the Secretariat.

It was the view of the Scientific Committee that National Progress Reports should be made widely available as appendices to the Scientific Committee report, which was distributed internationally to other relevant organisations and bodies. However, the Scientific

Committee also sought guidance from the Council on the preferred form in which any catch statistics to be compiled by the Secretariat should be submitted, and whether official catch statistics should be included in National Progress Reports.

Greenland noted that the policies of Greenland and the Faroes with respect to the availability of catch data on small cetaceans were well known, and suggested that the Scientific Committee report could contain a more general compilation, or that National Progress Reports should only contain summarised information. More detailed statistics should be submitted directly to the Secretariat for inclusion in the database.

Norway stated that it would welcome the opportunity of making data on small cetacean catches available to other bodies through NAMMCO, and had no objections to providing this data in the form of National Progress Reports to the Scientific Committee.

Greenland suggested that it might be useful in the future to set up a drafting group to formulate questions to the Scientific Committee.

3.2 Cooperation with ICES

The Chairman of the Scientific Committee reported to the Council on the participation of the Environment Secretary of ICES, Dr Janet Pawlak, at the last Scientific Committee meeting. Dr Pawlak had provided updates on work being carried out within ICES on requests forwarded from NAMMCO, as well as on new ICES requirements for the reporting of all by-catches of marine mammals, and the establishment of a thematic data centre for the Arctic Monitoring and Assessment Programme (AMAP) on contaminants in marine mammals.

It was also noted that ICES had appointed Dr Arne Bjørge as its official representative to speak at the forthcoming International Conference on Marine Mammals and the Marine Environment in Shetland in April (see also under 5.1 below).

(Observer relations between ICES and NAMMCO are dealt with under item 8 below)

3.3 Any other business

The Chairman of the Council thanked the Scientific Committee Chairman for his presentation of the Scientific Committee report, and in particular for his valuable input in coordinating the initial work of Scientific Committee during the first two years since NAMMCO's establishment. The Chairman noted with appreciation that due to the capable chairmanship of Jóhann Sigurjónsson, a great deal of progress had been made and many important gaps in scientific collaboration had been filled.

As outgoing Chairman of the Scientific Committee, Jóhann Sigurjónsson highlighted in particular the importance for the continued work of the Scientific Committee of having access to funds for external expertise and contract studies, pointing out that the most recent work carried out on the Atlantic walrus would not have been possible without the participation of invited experts.

The Council was informed that the Scientific Committee had elected Tore Haug (Norway)

as its new Chairman for the next two years, and Mads Peter Heide-Jørgensen (Greenland) as Vice-Chairman.

4. Management Committee

4.1 Report of the Management Committee

The Council reviewed and endorsed the Report of the Management Committee, which had met on 22 February under the Chairmanship of Einar Lemche. The full report is contained in Section 2 of this volume.

In general discussions of management approaches and procedures, the conclusions of the Scientific Committee were noted with respect to the fact that it was not considered appropriate to develop a generic approach to assessments and development of advice on stocks/species. Rather, a case-by-case approach would be more suitable, and stock/species specific management committees, for which the NAMMCO agreement provides, would then identify the most appropriate approaches for the particular stock and/or species with which they were concerned.

Difficulties in providing detailed requests for advice to the Scientific Committee due to lack of information on stock/species could be dealt with in a step-by-step way, whereby the Scientific Committee would first be requested to generate general advice on which more specific requests from the Council could then be based.

In was also noted that NAMMCO could take a lead in formulating a broader definition of management which could be applied to other forms of human impacts on marine mammals besides directed catches for human consumption.

4.2 Recommendations & requests for advice

The Council endorsed the following conclusions, recommendations and requests proposed by the Management Committee:

Northern bottlenose whale:

It was concluded that the traditional coastal drive hunt of northern bottlenose whales in the Faroe Islands did not have any noticeable effect on the stock and that removals of fewer than 300 whales a year were not likely to lead to a decline in the stock;

Atlantic walrus:

While recognizing the over all priority of further research on the delineation and abundance of walrus stocks in the North Atlantic area, it was recommended that Greenland take appropriate steps to arrest the decline of walrus along its west coast. Taking into account the views of the Scientific Committee that the Baffin Bay walrus stock is jointly shared with Canada and that the West Greenland stock might be shared, the Council encouraged Canada to consider working cooperatively with Greenland to assist in the achievement of these objectives.

It was agreed to forward the following requests to the Scientific Committee:

Ringed seal:

The Scientific Committee was requested to advise on stock identity of ringed seals for management purposes and to assess abundance in each stock area, long-term effects on stocks by present removals in each stock area, effects of recent environmental changes (ie. disturbance, pollution) and changes in the food supply, and interactions with other marine living resources.

Grey seal:

The Scientific Committee was requested to review and assess abundance and stock levels of grey seals in the North Atlantic, with an emphasis on their role in the marine ecosystem in general, and their significance as a source of nematodal infestations in fish in particular.

NASS-95:

The 1995 North Atlantic Sightings Survey (NASS-95) would provide updated abundance estimates for a number of whale species in the North Atlantic, and the Scientific Committee was requested to review results in the light of recent assessments of North Atlantic whale stocks.

Multi-species management

In relation to the importance of the further development of multi-species approaches to the management of marine resources, the Scientific Committee was requested to monitor stock levels and trends in stocks of all marine mammals in the North Atlantic.

It was agreed to endorse the Management Committee's recommendations for the following further tasks of the Working Group on Inspection and Observation:

Standard checklist for inspectors:

It was agreed that the list of common elements of inspection, as identified by the Management Committee Working Group on Inspection and Observations in its discussions on developing a common inspection scheme for coastal minke whaling, could be applied in all national inspection schemes, where resources allow, and that such elements could also apply to coastal whaling for other species besides minke whales. The Working Group on Inspection and Observation was requested to continue its work on the formulation of a standard checklist for inspectors.

Reciprocal observer scheme:

The Working Group on Inspection and Observation was requested to consider the details of a reciprocal observer scheme between NAMMCO member countries and to further develop these.

5. Environmental questions

5.1 Conference on Marine Mammals and the Marine Environment

The Secretary reported on progress in the planning of the International Conference on Marine Mammals and the Marine Environment, to be held in Lerwick, Shetland 20 - 21 April 1995. Printed preliminary programmes for the Conference were distributed to participants at the meeting. Arrangements had also been made to publish the proceedings of the Conference in a scientific journal, which would be useful for reference and review of environmental factors in the future work of the Scientific Committee. A Summary of the Conference Proceedings is included in Section 4 of this volume.

6. Hunting methods

6.1 Report of the Working Group on Hunting Methods

The Report of the Working Group on Hunting Methods was presented to the Council by the Chairman of the Working Group, Amalie Jessen (Greenland). The Working Group had met in Copenhagen 7 November 1994.

It was reported that Working Group members had compared experiences with the levels of wastage resulting from the use of the penthrite grenade harpoon, as a result of concerns expressed by hunters in Greenland. No systematic study had, however, been conducted of wastage levels using the penthrite grenade in Greenland fin and minke whaling operations. Norwegian studies indicated significant reductions in wastage levels since the introduction of the penthrite grenade in 1984. This had also been the experience in Icelandic whaling operations.

The Working Group had discussed plans in Greenland to produce an instruction manual for the maintenance and use of harpoon cannons as a part of a wider project to check and overhaul all harpoon canons used in Greenland whaling operations. This was considered important both for reasons of safety and efficiency, as well as to reduce long-term maintenance costs to hunters. There was some indication that such practical information on the use and maintenance of equipment might be of interest in Iceland. In Norway, whaling regulations ensured control of the proper use and functioning of harpoon canons as a part of the annual shooter's test.

The Working Group also compared parameters for collecting data related to hunting methods, in particular times-to-death in different forms of whaling. In Greenland, data on times-to-death in fin and minke whaling had been collected annually since 1992 although hunters needed better guidelines to ensure accuracy and compatibility of the collected data. Norwegian guidelines for veterinarians collecting data on times-to-death in minke whaling were listed as a possible reference for Greenlanders. Times-to-death in the Faroese pilot whale hunt were also being collected under a newly implemented project, the overall

objective of which was to reduce the incidence of prolonged killing times and continue to refine whale drive procedures in general.

The Working Group had noted that applying final loss of movement in an animal as the criterion for time of death in data collection did not take into account the fact that movements caused by spinal reflexes could probably occur some time after the brain had stopped functioning. When applying these criteria, therefore, some animals that are already unconscious and therefore insensible would be recorded as being still alive. The importance of considering both median and mean times-to-death when assessing the data was also noted.

The Chairman of the Council thanked the Chairman of the Working Group on Hunting Methods for her presentation of the report.

7. The NAMMCO Fund

7.1 Annual Report of the NAMMCO Fund

The Chairman of the Board of the NAMMCO Fund, Einar Lemche (Greenland) presented the annual report of the NAMMCO Fund to the Council. The report included an overview of the Board 's activities in 1994 and an outline of the projects which it had decided to support, as well as a summary of general policy discussions and a review of the budget for the coming year.

The Board of the Fund had decided to support a total of eight proposals for different information projects, six of which were publications related to the biology, management and conservation of marine mammals, as well as the publication of the proceedings of a conference on wildlife resource management, and a travel grant for a postgraduate research project on marine mammal management. It was also noted that the seminar on information held in conjunction with the previous Council meeting in Tromsø (26 February 1994) had been financed by the NAMMCO Fund. It was considered regrettable that no report from the seminar was yet available. The Secretary assured the Council that efforts would be made to complete a report on the seminar as soon as possible.

The Board had also defined some general policies relating to the funding of projects. Board members had agreed on the principle of supporting projects with general relevance to NAMMCO, rather than projects focused on issues specific to individual countries. It was also agreed that based on this policy, support could also be given to projects from beyond the boundaries of the member countries which met the requirements of the Fund statutes. Widespread advertisement of the Fund had not so far been considered necessary, but the Board noted that it might be desirable to review publicity and develop guidelines for applications to the Fund.

The Board agreed that projects receiving support from the Fund should be required to acknowledge this support publically in a form appropriate to the project. A further policy to which Board members had agreed was that support from the NAMMCO Fund should not as a rule exceed 50% of the total costs of any one project. Discussions in the Board of the Fund had also stressed the importance of distribution of information material supported by the Fund.

7.2 Other matters

The Council agreed that the Fund should continue to operate as it had done so far, noting the useful and varied source of information provided by the projects so far supported. It was also noted, however, that given the limited amount presently remaining in the Fund, it would not be possible to continue to provide this form of project support in 1996 without additional financial contributions from member countries. The provisional forecast budget for 1996 therefore included an additional NOK 200,000 for the Fund (see also above 2.3).

8. External relations

8.1 Observers' reports

The Secretary informed the Council that NAMMCO had been represented by observers to a number of international fora over the past year.

Jóhann Sigurjónsson (Iceland) reported on his participation as observer for NAMMCO to the 82nd Statutory Meeting of ICES, and drew particular attention to the adoption by ICES of a specific policy on marine mammals, which emphasised ecological approaches to the study of marine mammals and the importance of assessing interactions with fisheries.

The Secretary reported on her attendance as observer for NAMMCO at the meetings of the IWC, ASCOBANS and CITES in 1994.

The 46th Annual Meeting of the IWC was held in Puerto Vallarta, Mexico in May 1994. An opening statement from NAMMCO was distributed to participants at the IWC meeting, together with a two-page fact sheet on NAMMCO. NAMMCO also hosted an evening reception during the week of the Commission meeting, to which IWC Commissioners from a number of countries, including North Atlantic range states, as well as the Chairman and Vice Chairman of the Commission, Chairman of the Scientific Committee and senior staff of the IWC were invited.

Major decisions of the 46th annual meeting of the IWC included the establishment of a "whale sanctuary" in the Southern Ocean, which was adopted as a schedule amendment by the required 3/4 majority of votes. The decision would be reviewed again after 10 years. The Revised Management Procedure (RMP) as developed by the Scientific Committee of the IWC, was accepted as the scientific basis for calculating catch quotas, but would not be applied until the Commission had agreed on other elements of a Revised Management Scheme, in particular an agreed international inspection and control system. NAMMCO had also been represented by the Secretary at the IWC intersessional meeting on inspection and control which was held in Reine in Lofoten (Norway), in January 1995.

The First Meeting of the Parties to the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) was held in Stockholm, 26-28 September 1994. The First Meeting of the Parties established a permanent Advisory Committee and adopted a resolution on the implementation of a conservation and management plan. It also agreed to establish its permanent Secretariat in Cambridge, UK, appointing Dr Christina Lockyer as Secretary. Information on NAMMCO was provided to the meeting, including in

particular an invitation to the Parties to participate in NASS-95 and the International Conference on Marine Mammals and the Marine Environment in Shetland in April. The Parties to ASCOBANS agreed to a standing invitation to NAMMCO to attend future meetings of the organisation.

The 9th Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was held in Fort Lauderdale, USA, 7-18 November 1994. Information on NAMMCO's activities, including the first announcement of the Conference on Marine Mammals and the Marine Environment, was distributed to delegates at the meeting. The Conference of the Parties adopted new, detailed and more scientifically-based criteria for the listing of species on Appendices I and II, replacing the former "Berne" criteria. A proposal from Norway to downlist the Northeast Atlantic and North Atlantic Central stocks of minke whales from Appendix I to Appendix II was rejected. It was decided to hold the 10th Conference of the Parties to CITES in Zimbabwe in 1997.

8.2 Cooperation with other organisations

The Chairman of the Council noted that steps should be taken towards developing a Memorandum of Understanding between NAMMCO and ICES, and that this would have future financial implications for the Commission.

The Council agreed to establish working relations with the Canada-Greenland Joint Commission for the Conservation and Management of Narwhal and Beluga. It was envisaged that these relations could begin with an exchange of information and reports, including the annual reports of the Council and the Scientific Committee.

8.2.1 Appointment of observers

The Council agreed to delegate its observer status at forthcoming meetings of other international organisation as follows:

ICES - At the 83rd Statutory Meeting of ICES, NAMMCO would be represented by Iceland;

IWC - At the 47th Annual meeting of the IWC, NAMMCO would be represented by the Secretary;

NAFO - At the 17th Annual Meeting of NAFO, NAMMCO would be represented by Iceland;

NEAFC -The Council noted that renewal of contact with the Northeast Atlantic Fisheries Commission (NEAFC) should be a priority and agreed that any future observer participation at meetings of NEAFC should be delegated to Norway.

The appointment of observers to meetings of other organisations would be decided after consultation between the Secretariat and the Chairman.

8.3 Other matters

The observer from Japan requested the Council to express its concern with regard to recent

developments in the International Whaling Commission, in particular the establishment of the southern ocean whale sanctuary, the continuation of the zero-catch limit for commercial whaling, despite the development of the RMP and scientific advice that certain stocks could be harvested on a sustainable basis, and the failure of the Commission to agree to an interim relief quota of minke whales for Japanese community-based whaling.

The Council agreed to express its support for Japan's position in the context of an opening statement to the forthcoming annual meeting of the IWC, noting the importance of basing resource management on sound science and the principles of sustainable use.

The observer from Japan also extended an invitation to NAMMCO to participate in the forthcoming Conference on the Sustainable Contribution of Fisheries to Food Security to be hosted by the Government of Japan in collaboration with the UN Food and Agriculture Organization (FAO) in Kyoto in December 1995. Preliminary information about the Conference was distributed to participants.

9. Closing arrangements

9.1 Election of Chairman

The Council elected Halvard P. Johansen from Norway as its Chairman for the next two years.

In accepting the Chairmanship, Halvard Johansen thanked the Council for the confidence placed in himself and in Norway, noting the honour and challenge represented by the office of Chairman, not least after the leadership of the retiring Chairman. He stressed the importance of the principle of sustainable use of living marine resources as the basis for both Norwegian resource policy and for cooperation between NAMMCO member countries. He also remarked on the immediate importance for NAMMCO of enhancing its position as a legitimate international organisation, and that this could best be achieved by maintaining an open and informative approach to the work of the Commission.

9.2 Election of Vice-Chairman

The Council agreed to return to this agenda item at its next meeting.

9.3 Annual Report

The Council agreed to the inclusion of National Progress Reports in a summarised form as appendices to the Scientific Committee report, which would be included in the Annual Report. The finalisation and adoption of the Report of the Council would be done, as previously, by correspondence and in collaboration with the Chairman of the meeting, while the production of a full Annual Report would be the responsibility of the Secretariat.

9.4 Adoption of Press Release

The Council adopted a Press Release which is contained in Appendix 10.

9.5 Next meeting

The Council agreed to hold its next meeting in Tromsø, 27-29 March 1996 (dates to be confirmed by the Secretariat), to be immediately preceded by a meeting of the *ad hoc*

finance and administration group.

Iceland noted that it should not necessarily be considered a rule that annual meetings of the Council be held every consecutive year in Tromsø.

9.6 Any other business

The retiring Chairman of the Council, Kjartan Hoydal, concluded the meeting with some final remarks on the progress of the organisation to date and the outstanding work to be done, now that his term of office as Chairman was over. He applauded the good progress that had been made over the past two years, in particular in the work of the Scientific Committee and the setting up of the Secretariat. He regretted not having seen some other matters decided during his term as Chairman, in particular the addition of Canada and the Russian Federation as full members, and the conclusion of a host agreement with Norway, but hoped that these would be realised during the term of the new Chairman. He also expressed his hope for the establishment of a sister organisation to NAMMCO in the North Pacific, and stressed the importance of continued good international relations and cooperation in scientific and other areas. He concluded by wishing his successor every luck in taking the work of NAMMCO forward.

Appendix 1

List of Participants

NAMMCO member delegations:

Faroe Islands	Kjartan Hoydal (Chairman)
	Anna Maria Fossá
	Dorete Bloch
	Hans Jacob Hermansen
Greenland	Einar Lemche
	Henrik Leth
	Amalie Jessen
	Bjørn Rosing
	Henrik Nielsen
	Finn Larsen
	Charlotte Holten Møller
	Hans Peter Christensen
	Anthon Siegstad
	Hansi Kreutzmann
Iceland	Þórður Ásgeirsson
	Arnór Halldórsson
	Magnús Hannesson
	Jóhann Sigurjónsson
	Kristján Loftsson
Norway	Halvard P. Johansen
	Jan Frederik Danielsen
	Thoralf Stenvold
	Hallstein Rasmussen
	Egil Ole Øen
	Paul Stark

Government observers:

Canada	Gordon Koshinsky
Denmark	Henrik Fischer
Japan	Minoru Morimoto

Hideo Inomata
Yoshinori Shoji

Intergovernmental observers:

IWC	Henrik Fischer
ASCOBANS	Henrik Fischer
NAFO	Hallstein Rasmussen

Non-governmental observers:

European Bureau for Conservation and Development	Despina Symons
High North Alliance	Elisabeth Hallenstvedt
Inuit Circumpolar Conference	Ingmar Egede Jørgen Wæver Johansen
Inuvialuit Game Council	Richard Binder Norman Snow Larry Carpenter
Regional Authority of Northern Norway	Jostein Angell
Secretariat	Kate Sanderson Jens Paulsen
Support Staff - Greenland	Alice Møller Mary Brandt

Appendix 2

Agenda

1. Opening procedures

1.1 Address of welcome: Mr Hans Iversen, Minister of Fisheries, Greenland Home Rule Government *
1.2 Opening statements *
1.3 Adoption of agenda
1.4 Admission of observers
1.5 Meeting arrangements

2. Administration and finance

2.1 Secretary's Report
2.2 Audited accounts 1994
2.3 Proposed budget 1995

3. Scientific Committee

3.1 Report of the Scientific Committee
3.2 Cooperation with ICES
3.3 Other business

4. Management Committee

4.1 Report of the Management Committee
4.2 Requests for advice
4.3 Other business

5. Environmental questions

5.1 Conference on Marine Mammals and the Marine Environment
5.2 Other business

6. Hunting Methods

6.1 Report of the Working Group on Hunting Methods
6.2 Other business

7. The NAMMCO Fund

7.1 Report from the NAMMCO Fund
7.2 Other business

* Open to the public and press

8. External relations

8.1 Observers' reports
8.2 Cooperation with other international organisations
8.3 Other matters

9. Closing arrangements

9.1 Election of Chairman
9.2 Election of Vice-Chairman
9.3 Annual Report
9.4 Adoption of press release
9.4 Next meeting
9.5 Any other business

Appendix 3

Address of Welcome

by
Mr Hans Iversen,
Minister of Fisheries, Hunting and Agriculture
Home Rule Government of Greenland

Mr Chairman, Delegates, Representatives, Observers, Dear Friends,

I would like to welcome you all sincerely. The Greenland Home Rule Government and the Greenlandic people appreciate very much that international conferences can also take place here in Greenland. It is especially nice to see the delegates to NAMMCO, an organsiation we ourselves have taken part in establishing, and which was established here in Nuuk three years ago, in these very rooms.

All member countries - the Faroe Islands, Iceland, Norway and Greenland - have societies which rely on fish and animals, much more than other countries. But here in Greenland it should be emphasised that marine mmmals have special importance for our society.

The importance of hunting in Greenland is the reason why, a couple of weeks ago, we held a major seminar about hunting today and in the future in Greenland. Hunters from towns and settlements from all over Greenland participated. All participants agreed on the principle of sustainable utilization of natural resoruces - birds, fish and mammals - whether from the land or the sea.

To follow up on the principle of sustainable utlization there needs to be information from both hunters and biologists. In this respect, mutual understanding is necessary from all parties. We have to realize that both hunters and biologists can be right, even though this might sound contradictory. Let me give an example: the biologists say the stock of a particular species is diminished. The hunters say several hundred animals have been seen in the same place. Both parties can be right. Former experiences show that some animals gather for "seminars" sometimes too.

Also in NAMMCO it is important that both hunters and biologists can be heard. We have, through NAMMCO, asked the biologist to assess the stocks we consider to be of special interest at the moment. These species are walruses, harp seals, hooded seals, pilot whales, killer whales and bottlenose whales. We have heard that in some cases the biologists have not come so far that they are yet able to provide the advice we have asked for. What is lacking is not so much more information from the hunters, as more calculations from the biologists. In my opinion it is a good thing that our biologists in NAMMCO's Scientific Committee conduct serious work, even though the time they spend can be felt to be long.

NAMMCO was established because there was a need for an organisation for the conservation and rational management of marine mammals in the North Atlantic. But there is also a need to establish unity towards the outside world, which has forgotten what it has so solemnly signed.
Let me name a few examples of solemn principles which some in the outside world have forgotten:

- The International Covenant on Economic, Social and Cultural Rights of 1966. This states that all peoples may freely dispose of their natural wealth and resources, and that in no case may a people be deprived of its own means of subsistence;

- The Declaration from the Earth Summit of 1992, which states that unilateral trade policy measures to deal with environmental challenges outside the jurisdiction of the importing country should be avoided;

- Thirdly, I would like to mention GATT. Some countries' ban on sealskin and other products from marine mammals which are not endangered is clearly a contravention of GATT.

To be able to read these internationally agreed principles, you do not need to speak Greenlandic. English will do. I hope that our meeting in Nuuk will generate new inspriation in our unity towards the outside world which has forgotten something very important. I wish you all a good meeting and a nice stay here in Nuuk.

Appendix 4

Opening Statement by the Faroe Islands

The Faroese delegation is very pleased to be able to participate in the fifth NAMMCO Council Meeting and wants to thank the Greenland authorities for inviting NAMMCO to Nuuk. We see this meeting as one more step forward in the process of establishing NAMMCO as the focus of regional cooperation in the North Atlantic in science and management of marine mammals.

We look forward to using considerable time this year in the Management Committee on discussions of management objectives.

The Faroese delegation notes with appreciation that the Scientific Committee has finished its work on the bottlenose whale. Their results provide the Faroe Islands with the possibility of reevaluating the traditional bottlenose whale hunt.

There is no exemption from the general ban on commercial whaling in the Faroese Fisheries Zone at present, but the question has been raised recently in the Faroese parliament. A decision on small-type whaling inside the Faroese Fisheries Zone will depend on biological advice. The Faroe Islands, therefore, have an interest in the undertaking of a full-scale North Atlantic Sighting Survey in 1995.

Appendix 5

Opening Statement by Iceland

The Icelandic delegation has brought with it to this meeting some clear expectations as to what we would like to see achieved in our deliberations here in Nuuk. What we hope to be able to report from this meeting is a confirmation that NAMMCO has come through its first difficult years of infantry and childhood and succeeded in establishing itself as an international organisation fully equipped to serve its purpose. Recognising the biological unity of individual stocks of various species of marine mammals in the North Atlantic, as well as their interrelationship, Iceland is aware of how important it is to cooperate with other nations regarding rational utilisation and conservation of these stocks. In the view of Iceland, NAMMCO seems to be an excellent umbrella organisation where such cooperation can be accommodated without infringing the sovereign rights of its members, as stipulated in the United Nations Convention on the Law of the Sea which entered into force 16 November last year.

Taking into account not only the duty to cooperate, but also the obvious need to do so, it is important that other States, other intergovernmental organisations, non-governmental organisations and even individual persons are invited to participate in the work of NAMMCO. Canadian participation in the working group on Atlantic walrus at the last session of the Scientific Committee is an encouraging example of the contribution of other states to cooperation on the conservation, rational management and study of marine mammals in the North Atlantic under the auspices of NAMMCO. We can only hope that this forum, which we have participated in creating, is becoming attractive and respected enough for more states to seriously consider joining as full members.

The papers already distributed for discussion at this meeting reflect the serious efforts of the members of this organisation and we do appreciate all the work and expertise put into these papers. To mention only two of these papers, the Icelandic delegation attaches much importance to the report of the Working Group on Inspection and Observation. We hope to see this work taken considerably further and we support the recommendation of the Working Group that some kind of reciprocal observation scheme between NAMMCO countries be established. The report of the Scientific Committee and its Working Groups bear witness to quality work by our experts. In fact, the Scientific Committee offers a challenge to the rest of us to guide it to some more constructive work directly related to management of marine mammals.

Unfortunately, Iceland has not been involved in managing any whaling activities in the past few years, as you all know. The whaling issue, however, has remained the subject of discussions between politicians, fishermen and the general public throughout this non-whaling period, and these discussions have now resulted in a government decision to put before the parliament this week a resolution proposal for the resumption of whaling. In this resolution proposal, there is an emphasis on the inspection side of future whaling activities,

as well as - of course - scientific advice. It is left open to the government to decide the timing of a resumption of whaling in Iceland, but this resolution proposal makes the basic policy clear. Iceland intends to take up whaling again and of course this makes it essential to strengthen our ties and cooperation with other whaling countries as well as appropriate international organisations in this field of work.

Appendix 6

Opening Statement by Norway

The Norwegian delegation is very pleased to participate in the 5th meeting of NAMMCO here in Nuuk where the Agreement on Co-operation in Research, Conservation and Management of Marine Mammals in the North Atlantic was signed by our political masters three years ago. In our view, it gives a realistic framework for our deliberations that a meeting like this is held in an area where the outcome is important to the people who live here.

The Norwegian delegation looks forward to fruitful discussions and further strengthening of NAMMCO and its commitment to promote the needs of the coastal communities of the North Atlantic. All of us here are aware of the fact that the people of these communities rely for their livelihood and well-being on the continued viability and diversity of marine mammals as resources for human consumption.

The approach to management of marine resources that we have agreed upon for our work in NAMMCO is based on internationally recognised principles of sustainable utilisation and rational management. We note with great satisfaction that these principles have gained greater adherence today, than when we met a year ago.

In my opening statement in Tromsø last year I said that the mass media gave much attention to the hunting methods in whaling and sealing, and that their comments were often accompanied by vivid descriptions of whales and seals in agony. The picture is not that bleak today. There are still reports of our whaling and sealing in the media, but the information given by the media is now more balanced, and our views and reasons are also presented to the public in a decent way. We cannot always expect other people to like what we are doing, but we urge them not to impose their values upon us. Scientific advice is the only viable basis for international cooperation and mutual understanding in this field.

The changes that we have seen in the media are in our view the result of the efforts made by NAMMCO, the member countries and organisations that promote the idea of conservation and rational use of renewable resources - efforts to disseminate information on these issues and not leave the arena open to those who only speak of protection. I see a great challenge, when disposing of the NAMMCO Fund, to keep in mind the enhancement of the idea of sustainable utilisation and rational management of renewable resources.

In this context I would like to congratulate the Secretariat on preparations so far for the forthcoming Conference on Marine Mammals and the Marine Environment. We think it appropriate for NAMMCO to promote the study of all matters that affect marine mammals and look forward to participating in the Conference.

We have a full agenda ahead of us in the Council and we have an important meeting in the Management Committee. I am confident that we will make further progress in the building of NAMMCO.

Appendix 7

Opening Statement by Denmark

We would like to take the opportunity to thank NAMMCO for the invitation to attend the meeting - and thank the Greenland Home Rule Government for hosting the meeting.

We are looking forward to listening with interest to the points of view being presented at the meeting; viewpoints which may give inspiration to international negotiations aimed at establishing international - and reasonable - solutions for sustainable small-type whaling.

Appendix 8

Opening Statement by Japan

Taking the opportunity of the fifth meeting of the Council of NAMMCO, on behalf of the Japanese Government, I would like to express its sincere gratitude to the Contracting Parties of NAMMCO for their efforts in getting the organization on the right track.

First of all, I would like to express my opinion with respect to what happened on whaling around the world since the fourth meeting of the Council, last year. It was regrettable that an unscientific Southern Ocean Whale Sanctuary was adopted by the vote of a more than three quarters majority at the 46th Annual Meeting of the International Whaling Commission (IWC). However, the Government of Japan filed a formal objection to the inclusion of Antarctic minke whales among whale species for the Southern Ocean Whale Sanctuary, because minke whales in the Antarctic represent robust stocks which number at least 760,000 animals. This decision was based on our position as regards the concept of sustainable utilization, which was established at the UNCED, and subject to spirit of the International Convention for the Regulation of Whaling.

Secondly, I would like to draw your attention to increasing efforts within the IWC to place small cetaceans under its jurisdiction. It is clear that the management of small cetaceans is not within the competence of the IWC. Management of local marine living resources such as small cetaceans should be conducted on a regional basis, taking account of human rights and needs. The Government of Japan therefore strongly supports the activities of NAMMCO and looks forward to its further development. We are actually planning the establishment of a regional organization, like NAMMCO, to manage marine mammals,

including small cetaceans, in the North Pacific. The exchange of information with NAMMCO is the very basis for cooperation, serving to enhance the development of a similar regional organization in the North Pacific.

Lastly, I wish the Council of NAMMCO a fruitful meeting and progress towards rational utilization of marine mammal resources in the North Atlantic as intended by the Convention. I would like to convey from Mr Kazuo Shima, the Japanese Commissioner to the IWC, his expectations for the furtherance of NAMMCO's activities and his friendship to you all.

Appendix 9

1995 adopted and 1996 forecast budget

Section	Description	Draft 1995	Forecast 1996
Expenditure (1,000 NOK)			
1	Staff related costs	1,250	1,250
2	Rent, office	140	140
3	Meeting	20	20
4	Travel and subsistence	150	130
5	Communication	70	70
6	Office removal and furniture	90	0
7	Data and office supplies	100	100
8	Information	300	300
9	Subscriptions and reference material	50	50
10	Other expenses	250	250
11	Subtotal	2,420	2,310
12	The Scientific Committee	435	435
13	NASS-95	800	0
14	Conference	500	0
15	Fund	0	200
16	**Total expenditure**	**4,155**	**2,945**
Revenue (1,000 NOK)			
17	Contributions	2,480	2,830
18	Surplus from previous year	1,703	88
19	Interest	60	30
20	**Total revenue**	**4,243**	**2,948**
21	**Surplus**	**88**	**3**

Standing assets: Reserve: 200

Fund, 1995: 317

Notes on Budget

Item no.

1. Salaries
   - Kate Sanderson & Jens Paulsen
   - Office assistant
   Leave transportation
   Employers tax (5.1% of the salaries)

2. New accommodation from 8 February 1995. The costs include heat, electricity, cleaning etc.

5. Telephone, telefax, E-mail and mail

6. Costs of relocation of the Secretariat and office funiture

7. Copy machine, computers etc., service and other office supplies

8. Information on NAMMCO, e.g. a NAMMCO brochure (printing costs etc.), c. NOK 150,000

10. Contract work, auditors, insurance, fees etc.

12. DKK 390,000; Exchange rate 7 February 1995 DKK/NOK: 111.42

13. Recommendation from the Scientific Committee, Copenhagen 31 January - 3 February 1995

14. International Conference on Marine Mammals and the Marine Environment, Shetland 20 & 21 April 1995 - Venue, Invited Speakers etc.

17. Scale of Contributions, 1996:

Faroes:	NOK 322,500 (c. DKK 290,000)
Greenland:	NOK 322,500 (c. DKK 290,000)
Iceland:	NOK 645,000 (c. DKK 580,000)
Norway:	NOK 1,540,000 (c. DKK 1,158,000 + NOK 250,000)

Appendix 10

Press Release

The Council of the North Atlantic Marine Mammal Commission - NAMMCO - held its fifth meeting in Nuuk, Greenland, 21 - 23 February 1995. The Commission has as its objective to contribute through regional consultation and cooperation to the conservation, rational management and study of marine mammals in the North Atlantic. The members of the Council are the Faroe Islands, Greenland, Iceland and Norway.

The fifth meeting of the Council was attended by delegations from member countries and observers from the Governments of Canada, Denmark and Japan. Observers from ASCOBANS (the Agreement on the Conservation of Small Cetaceans in the Baltic and North Seas), the International Whaling Commission (IWC) and the Northwest Atlantic Fisheries Organization (NAFO) also participated at the meeting, as well as representatives from a number of non-governmental organisations.

Based on the comprehensive work carried out by the Scientific Committee in response to requests for advice from the Council, a number of specific conservation, management and research recommendations were made by the Council at this meeting:

- It was established that the population of northern bottlenose whales in the North Atlantic could sustain the traditional coastal drive hunt in the Faroe Islands and that removals of fewer than 300 bottlenose whales a year would not be likely to lead to a decline in the stock;

- Based on the Scientific Committee's recent extensive international review of the Atlantic walrus, and recognising that priority should be given to further research on this species, it was recommended that Greenland take appropriate steps to arrest the decline of walrus along its west coast;

- Further research was recommended on the ringed seal and the grey seal, with regard to general abundance, ecological factors and impacts of these species on the marine ecosystem;

- In relation to the importance of the further development of multi-species approaches to the management of marine resources, the Scientific Committee was requested to monitor stock levels and trends in stocks of all marine mammals in the North Atlantic;

- The 1995 North Atlantic Sightings Survey (NASS-95) would provide updated abundance estimates for a number of whale species in the North Atlantic, and the Scientific Committee was requested to review results in the light of recent assessments of North Atlantic whale stocks.

It was also decided to request the Working Group on Inspection and Observation to further develop the details required for a reciprocal observer scheme for coastal whaling in the North Atlantic.

These recommendations, in particular with respect to the bottlenose whale and Atlantic walrus, have filled important gaps in international cooperation on the conservation and management of marine mammals in the North Atlantic.

The NAMMCO Secretariat would in the future function as a repository for data on small whales and seals in member countries. Plans are under way to develop a comprehensive database over these species in the Secretariat in Tromsø.

Other than maintaining and enhancing existing relations with a number of other international organisations, the Council also agreed to establish working relations with the Canada/Greenland Joint Commission on the Conservation and Management of Narwhal and Beluga.

After its first year of activities, the NAMMCO Fund has established itself as a useful source of funding for information projects which contribute to a better understanding and knowledge of the rational utilisation of marine mammals. It was agreed to recommend further contributions from member countries in 1996 so that the Fund can continue to provide such support.

The International Conference on Marine Mammals and the Marine Environment in Lerwick, Shetland 20-21 April 1995, which is being organised by the NAMMCO Secretariat, will provide an important forum for presentations on the latest research into the effects of chemical pollutants on marine mammals, and on the health implications for coastal people who have marine mammals as a part of their diet.

The Council elected Mr Halvard Johansen from Norway as its new Chairman for the following two-year term. At its recent meeting, the Scientific Committee had elected Tore Haug from Norway as its new Chairman.

In accepting the office as Chairman of the Council, Mr Johansen drew attention to the importance of the principle of sustainable use of living marine resources, which is the crux of resource policy in NAMMCO member countries.

SECTION 2

Fourth Meeting of the Management Committee
Nuuk, 22 February 1995

Report of the Fourth Meeting of the Management Committee

Nuuk, Greenland, 22 February 1995

1. Chairman's opening remarks

The Chairman of the Management Committee, Einar Lemche, welcomed members to the meeting. He also noted that it had been decided that all observers admitted to the Fifth Meeting of the Council had been invited to attend the present meeting of the Management Committee, and also welcomed their participation. Participants are listed in Appendix 1.

2. Adoption of Agenda

The Agenda, as contained in Appendix 2, was adopted.

3. Appointment of rapporteur

The Secretary was appointed as rapporteur.

4. Matters arising from the Scientific Committee / Proposals for conservation and management

Items 4 and 5 on the Agenda were dealt with together by the Management Committee

4.1 Impacts of marine mammals on the marine ecosystem

The Management Committee discussed the necessity of the multi-species aspect of management. It was noted that an answer to the request for advice on these issues was not immediately forthcoming from the Scientific Committee.

In the absence of detailed advice allowing assessment of the interspecific (multi-species) effects of changes in stock levels of different components of the ecosystem, the Management Committee agreed that it would be wise not to change the balance between these components significantly.

In order to monitor progress in this field, the Management Committee asked the Scientific Committee to produce annually a table with all available information on stock levels and trends in stock levels for marine mammals in the North Atlantic (see under Research Recommendations, 6.4 below).

4.2 Development of Management Procedures

The Management Committee referred to the Scientific Committee's suggestion in its most recent report for a general discussion of management objectives at Council level. This suggestion was a result of the Scientific Committee's own deliberations on the task it had been set by Council to further develop management procedures. Discussions in the Scientific Committee had addressed outlines of management objectives received from individual member countries. The Scientific Committee concluded that no further work could be carried out in this area until Council members identified clearly their management objectives

on a species/case specific basis.

The Management Committee noted that at its last meeting in Tromsø (February 1994), the Council had requested the Scientific Committee to further develop RMP-like procedures. It also noted the conclusions of the Scientific Committee that it was not considered appropriate to develop a generic approach to assessments and development of advice, but that this was more appropriately dealt with on a case-by-case basis. In the case of the 1.2 bottlenose whales stranded annually in the Faroes, for example, a management procedure for generating advice on such a catch would not be necessary. It was noted that the NAMMCO Agreement provides for the establishment of more than one Management Committee, and that these would presumably identify the most appropriate management approach for the particular stocks and/or species with which they were concerned.

The Management Committee also noted that it may in some cases be difficult to provide a detailed request to the Scientific Committee when there is little available information on the stock/species of interest. A step-by-step approach would in such a case be best, whereby the Scientific Committee would first be asked to generate general advice on the status of the relevant stock/species, which would then provide a basis for formulating more precise requests in relation to management objectives.

The observer from the Inuit Circumpolar Conference asked for clarification of the definition of management in the NAMMCO context, and whether this recognised that management of human behaviour in relation to marine mammals was the real focus. The Chairman noted that NAMMCO could indeed take a lead in formulating a broader definition of management that could also be applied to other forms of human impacts on marine mammals as well as directed catches for human consumption.

4.3 Long-finned pilot whales

The Management Committee noted that work was proceeding in the ICES Pilot Whale Study Group which was dealing with NAMMCO's request for advice. The next meeting of the Study Group would be in November 1995 in Cambridge, UK, the report of which would likely provide the Scientific Committee with the necessary basis to respond to the Council's request on this species.

4.4 Northern bottlenose whale

The Management Committee discussed the advice of the Scientific Committee on the status of the northern bottlenose whale and noted that this was the first conclusive analysis on which management of the northern bottlenose whale could be based.

The Management Committee accepted that the population trajectories indicated that the traditional coastal drive hunt in the Faroe Islands did not have any noticeable effect on the stock and that removals of fewer than 300 whales a year were not likely to lead to a decline in the stock.

A Faroese proposal to request the Scientific Committee to calculate total allowable catches of the northern bottlenose stock was supported by Greenland and Iceland. It was, however, decided not to forward this request for the time being, but that it could be reconsidered by

the Management Committee at the next meeting.

4.5 Killer whale

The Management Committee noted that further research was still under way on this species, and that no comprehensive advice from the Scientific Committee could be offered until the results of this research were available.

In response to a question from the Chairman, Iceland, Greenland and Norway reported that at the present time, despite receiving a number of requests, no licences were issued for the live-capture of killer whales for marine display purposes.

4.6 Harp and hooded seals

The Management Committee noted that the Joint ICES/NAFO Working Group on Harp and Hooded Seals would be meeting again in Dartmouth in June 1995, and that no further advice could be offered by the Scientific Committee until the report from the Working Group was available for discussion.

4.7 Atlantic walrus

The Management Committee examined the advice of the Scientific Committee on Atlantic Walrus and noted the apparent decline which the Scientific Committee identified in respect to "functional" stocks of walrus of Central West Greenland and Baffin Bay.

While recognizing the over all priority of further work to clarify and confirm the delineation and abundance of walrus stocks in the North Atlantic area, the Management Committee recommends that Greenland take appropriate steps to arrest the decline of walrus along its west coast.

Taking into account the views of the Scientific Committee that the Baffin Bay walrus stock is jointly shared with Canada and that the West Greenland stock might be shared, the Management Committee encourages Canada to consider working cooperatively with Greenland to assist in the achievement of these objectives.

6. Research recommendations

The Management Committee made the following recommendations for research:

6.1 Ringed seal

The Management Committee requests the Scientific Committee to advise on stock identity for management purposes and to assess abundance in each stock area, long-term effects on stocks by present removals in each stock area, effects of recent environmental changes (ie. disturbance, pollution) and changes in the food supply, and interactions with other marine living resources.

6.2 Grey seal

The Management Committee requests the Scientific Committee to review and assess abundance and stock levels of grey seals in the North Atlantic, with an emphasis on their role in the marine ecosystem in general, and their significance as a source of nematodal

infestations in fish in particular.

6.3 NASS-95

The Management Committee looks forward to the forthcoming abundance estimates which will be obtained from the North Atlantic 1995 NASS surveys, and calls upon the Scientific Committee to review results in the light of recent assessments of the North Atlantic whale stocks.

6.4 Multi-species aspects

The Management Committee requests the Scientific Committee to monitor stock levels of all marine mammals in the North Atlantic and present annually a table on stock levels and trends in stock levels to the Management Committee.

7. Report of the Working Group on Inspection and Observation

The Chairman of the Working Group on Inspection and Observation, Halvard Johansen, presented the report to the Management Committee. The report is included as Appendix 3.

The Management Committee noted the common elements identified by the Working Group in its discussions of developing a common inspection scheme for coastal minke whaling. It was agreed that the following elements could be applied in all national inspection schemes, where resources allow:

- regular control of equipment
- direct reporting of position/status of whaling operations
- landing at specially designated landing stations
- checking use of exploding grenades
- checking number of shots fired
- licensing of whaling vessels

It was noted that such elements of an inspection scheme could also apply to coastal whaling for other species besides minke whale.

The Management Committee agreed to ask the Working Group to continue its work on the formulation of a standard checklist for inspectors.

The Management Committee also agreed to ask the Working Group to consider the details of a reciprocal observer scheme between NAMMCO member countries and to further develop these.

8. Adoption of Report

The Report was adopted on 23 February 1995.

Appendix 1

List of Participants

NAMMCO member delegations:

Faroe Islands	Kjartan Hoydal
	Anna Maria Fossá
	Dorete Bloch
	Hans Jacob Hermansen
Greenland	Einar Lemche (Chairman)
	Henrik Leth
	Amalie Jessen
	Bjørn Rosing
	Henrik Nielsen
	Finn Larsen
	Charlotte Holten Møller
	Hans Peter Christensen
	Anthon Siegstad
	Hansi Kreutzmann
Iceland	Þórður Ásgeirsson
	Arnór Halldórsson
	Magnús Hannesson
	Jóhann Sigurjónsson
	Kristján Loftsson
Norway	Halvard P. Johansen
	Jan Frederik Danielsen
	Thoralf Stenvold
	Hallstein Rasmussen
	Egil Ole Øen
	Paul Stark

Government observers:

Canada	Gordon Koshinsky
Denmark	Henrik Fischer
Japan	Minoru Morimoto

Hideo Inomata
Yoshinori Shoji

Intergovernmental observers:

IWC	Henrik Fischer
ASCOBANS	Henrik Fischer
NAFO	Hallstein Rasmussen

Non-governmental observers:

European Bureau for Conservation and Development	Despina Symons
High North Alliance	Elisabeth Hallenstvedt
Inuit Circumpolar Conference	Ingmar Egede Jørgen Wæver Johansen
Inuvialuit Game Council	Richard Binder Norman Snow Larry Carpenter
Regional Authority of Northern Norway	Jostein Angell
Secretariat	Kate Sanderson Jens Paulsen
Support Staff - Greenland	Alice Møller Mary Brandt

Appendix 2

Agenda

1. Chairman's opening remarks

2. Adoption of agenda

3. Appointment of rapporteur

4. Matters arising from the Scientific Committee

   4.1 Development of Management Procedures
   4.2 Other matters

5. Proposals for conservation and management

6. Research recommendations

7. Report of the Working Group on Inspection and Observation

8. Any other business

Annex 1

Report of the Working Group on Inspection and Observation

Copenhagen, 8 November 1994

The Working Group met in the offices of the Greenland Home Rule Government, Copenhagen, 8 November 1994. The meeting was attended by Einar Lemche, Amalie Jessen and Henrik Nielsen (Greenland), Jústines Olsen (Faroe Islands), Arnór Halldórsson (Iceland), Egil Ole Øen (Norway) and Halvard P. Johansen (Chairman, Norway). The Secretary was rapporteur.

1. Adoption of Agenda

The Agenda is contained in Appendix 1.

2. Election of Chairman

Halvard P. Johansen, Norway, was elected Chairman of the Working Group.

3. Update on national regulations

Working group members presented brief updates on changes to national regulations for whaling and sealing. The Working Group also agreed that the Secretariat should be provided with copies of all relevant national legislation and the latest changes in specific regulations for whaling and sealing operations in member countries.

Norway provided copies of the most recent Norwegian regulations for minke whaling from 1994 (*Forskrift om utøvelse av fangst av vågehval i 1994*). These had been circulated to Working Group members for reference, as had the Norwegian inspection form for minke whaling (*Inspeksjonsskjema - vågehvalfangst* Appendix 2). Norway would also forward copies of the latest directives on sealing to the Secretariat.

Greenland reported that regulations for beluga and narwhal hunting, as well as for the hunting of large whales, were currently being revised. Copies of recent legislation on polar bear and walrus hunting were also provided by Greenland. The Faroes reported that revised regulations for pilot whaling were complete, but had not as yet come into effect. Iceland would undertake to provide the Secretariat with copies of relevant Icelandic legislation on whaling.

4. Development of a common inspection scheme for coastal minke whaling

The Working Group returned to the discussion from the first meeting concerning the possible development of a common inspection scheme for coastal minke whaling. Noting the terms of reference of the Working Group, as proposed by the Management Committee (*Report of the Third Meeting of the Council of NAMMCO*, 1-2 July 1993, p.6), the Working Group clarified the reasons for establishing a common inspection scheme. It was considered important to ensure that the basic data collected in the course of inspection schemes on a national basis were compatible for scientific purposes (see also under item 8). Furthermore, it was agreed that, while minke whaling operations differed from country to country, it was worthwhile to determine the necessary basic elements for effective control and inspection which were common to all forms of coastal minke whaling in the region, and which could be applied and built upon by national authorities as appropriate.

The Working Group reviewed the preliminary list of basic elements for a common inspection scheme which had been outlined at its last meeting (*Report of the Fourth Meeting of the Council*, Appendix 12, p. 116). These elements were discussed in more detail, and related to the specific inspection and control requirements currently implemented in individual countries in order to determine whether there was a basis for establishing them as common minimum requirements.

4.1 Check of hunting equipment (quality control)

Working Group members from Greenland and Norway outlined their respective current regulations and procedures for the quality control of hunting equipment. It was noted in general that quality control was an important requirement for ensuring the efficiency of equipment and the safety of those involved in its use.

Greenland explained that the authorities had implemented a general overhaul of all harpoon equipment used in minke and fin whaling in order to improve the safety and efficiency of the hunt. It was noted that, of the two methods of minke whaling used in Greenland, quality control was easier to undertake for penthrite grenade harpoons than for rifle hunting from dinghies. Although a special working group had been set up to look into a number of aspects of the rifle hunting of minke whales, it was also noted that systematic quality control of rifles in Greenland would be very difficult to implement.

Norway explained that, unlike in Greenland, where the initiative had come from the government authorities, it was the responsibility of individual minke whalers in Norway to maintain and check the quality of their equipment. Whalers risked legal action if their equipment was found to be faulty. It was further pointed out that Norwegian whalers would not pass the requisite shooters test with faulty equipment. As such, this test also provided a form of indirect quality control. All boats were required to take a shooters test every year and whalers decided themselves when to take the test. This was not only an important way to test the skill of the harpoon gun operator, but was also a means of controlling the proper functioning of the equipment in use, rather than just checking correct installation.

Greenland pointed out that there was no such shooting test in Greenland as it would be very difficult and expensive to arrange along the extensive Greenland coastline. There is, however, a requirement that equipment be checked on an annual basis.

It was noted that Greenland had more stringent requirements than Norway with respect to the technical checking of equipment. Norway referred to the idea of having the manufacturer of the equipment produce a system of certification for weapons, and it was hoped that the manufacturers Henriksen in Norway could prepare a proposal for such a certification system. It was noted that it was important for any overhauling work to be carried out on the local level by qualified people.

On the question of the use of rifles, and requirements for quality control of these, Norway pointed out that rifles were used as a secondary method of killing in minke whaling, and that shooting tests were also applied to rifles to ensure that whalers were familiar with the type of ammunition appropriate for use at sea and were also properly trained in where to shoot the whale accurately.

Greenland informed the Working Group that although there was no shooting test for rifle use or ownership in Greenland, there were requirements for a minimum calibre of 7.6 mm. This was compared with the Norwegian required minimum of 9mm. The Working Group noted the importance of addressing the question of minimum rifle calibers for diverse whaling activities, but agreed that this was a more appropriate matter for discussion under the terms of reference of the Working Group on Hunting Methods. The matter was therefore referred to the Working Group on Hunting Methods.

In summing up, the Working Group noted that the difference in quality control requirements currently implemented in Greenland and Norway was that in Greenland it was obligatory to have harpoon guns checked, while this was voluntary in Norway, although quality checks were an implicit part of the annual shooting required of Norwegian minke whalers. It had been proposed that a weapons certification system be implemented in Norway to facilitate a more systematic approach to the quality control of whaling equipment.

After comparing and noting the different requirements in respective countries, as outlined above, the Working Group agreed that a minimum common requirement for quality control would be the regular control of harpoon equipment, both in terms of safety and efficiency.

4.2 Reporting beginning of the hunt, catch from sea & intended landing destination

Working Group members discussed the various requirements for, and feasibility of, reporting the beginning of the hunt, the catch from sea and the intended landing destination of the catch in their respective whaling activities.

Greenland informed the Working Group that it would be relatively easy for hunters in Greenland to report the beginning of the hunt of minke whales, although such a requirement did not at present exist in Greenland. Norway pointed out that it was a requirement in Norway that once boats embarked on whaling they should not change back to fishing activities until their whaling was complete. They were also required to keep a logbook of their activities, which included information on the date, time and port of departure, time, position and other details of each catch, and date, time and port of landing (see Appendix 3).

The purpose of reporting the beginning of the hunt (ie departure of the vessel) and the catch

from sea was seen to be in order to alert land-based inspectors that whaling was taking place so that suitable arrangements could be made to inspect the catch at the point of landing.

The Working Group noted that this was relevant for Greenland and for previous Icelandic whaling operations, but at present in Norway this was not necessary as there was an inspector on board every whaling boat. It was noted that in Greenland whaling and in Icelandic minke whaling, boats were used for more than one activity, and that there may be a certain interest from the point of view of the hunters to have a record of the time of the commencement of whaling activities.

With regard to the reporting of the catch from sea, Greenland noted that this might be important in the high season when the total quota is close to being filled.

On the question of reporting the intended landing destination, the Working Group noted that in general, inspection could be carried out more efficiently and effectively if the number of landing sites was limited to only a few.

Greenland reported that there was an initiative in Greenland to designate a specific number of flensing sites, also for hygienic purposes. In present Norwegian operations, whales are flensed on board. Norway agreed, however, that it would be possible to designate certain harbours as landing sites for whale meat. At present, with inspectors on board every boat, this was not considered important.

Iceland added that if transhipment were likely to be a problem as a means of avoiding inspection, then regulations would also need to take this into account.

The reporting of the beginning of the hunt, the catch from sea and the intended landing destination were agreed by the Working Group as important elements for consideration in any land-based inspection scheme, other than those in which an inspector is present on board every boat. Greenland pointed out that there was a lack of manpower to cover all these elements in Greenland. The Working Group agreed that these should be up to the national authorities and would depend on the availability of the appropriate control schemes.

4.3 Check that exploding grenades have been used

The Working Group agreed on the need to check the use of exploding grenades. The purpose of this element of inspection is to check that the correct equipment has been used. It was noted that the most obvious way of checking whether grenades had been used was by counting the grenade heads. As well as on board inspection, as is presently the case in Norwegian minke whaling, this could also be an element of land-based inspection when whales are inspected at landing stations.

There would also be the possibility for inspectors to check for illegal equipment on board boats, both as a part of on-board and land-based inspection schemes.

Recommendation: ***While noting that the cold harpoon was no longer used in any whaling operations, the Working Group agreed to recommend that the use of such equipment and its presence on board all***

vessels be officially prohibited in relevant national regulations, where not already done so.

4.4 Register number of shots in logbook

Greenland pointed out that its hunt report forms required information on failed shots and the reasons for these. The Working Group discussed the idea of using serial numbers on grenades as a way of controlling their use and agreed that this was something which should be considered in the future.

4.5 Licences for catcher boats

The Working Group agreed that the requirement of a licence was common to all. In Greenland licences are issued per whale. A minimum size of boat is stipulated for fin whaling. In Norway licences are issued to boats, with a set catch quota per boat. Boats have to meet certain conditions, including conditions of ownership, before they are issued with licences.

4.6 Common elements

In summary, the Working Group refined the common elements which could be applied in all national inspection schemes, depending on available resources, as follows:

- regular control of equipment
- direct reporting of position/status of whaling operations
- landing at specially designated landing stations
- checking use of exploding grenades
- checking number of shots fired
- licences for whaling vessels

The Working Group noted that there may be other, more specific requirements from country to country, depending on the particular circumstances and national regulations.

5. Formulation of a standard inspection checklist

Working Group members agreed that, with reference to the recommendation from the last meeting of the Working Group on the formulation of a standard checklist for inspectors, it was not the task of the Working Group to produce an actual checklist form, but rather to identify those common elements which inspectors in all countries should be responsible for checking.

The Working Group referred to the Norwegian minke whaling inspection scheme (Appendix 2) and it was noted that this was used only in connection with breaches of the regulations. Inspectors on board Norwegian whaling vessels were also required to submit full written reports to the authorities after each trip. Working Group members also reviewed the hunt report form which hunters in Greenland are required to complete and deliver (Appendix 4).

Reference was made to the NAFO system in which standard inspection forms were filled out, whether or not there was a breach of the regulations. This provided a valuable overview of fishing activities in general.

In formulating the checklist, the Working Group agreed that the already existing forms used on a national basis (eg. the hunt report form required in Greenland and the catch logbook

required for Norwegian minke whaling) should form the basis for the inspection checklist, and that it should be the responsibility of the inspector to certify that the required national report forms have been filled out fully and accurately. It was therefore agreed that an inspection checklist could be comprised of the following elements:

1) Details of inspector/vessel/licence/owner; date of inspection / position

2) Certification that the national catch logbook/report form is correctly filled out with all the required information

3) Indication of any breaches of regulations - separate report on these

It was understood by Working Group members that the national catch forms should contain information covering the agreed basic elements of inspection. The Working Group noted that regular quality control and the control of use of correct equipment were not currently a part of the existing catch reporting procedures. It was also noted that the national forms would have to be adjusted to allow a section for the signature of the inspector.

6. Development of a common system for recording data on seals

The Working Group referred to the recommendation from the last meeting for using a common system for recording data on the number and species of seals taken in each NAMMCO member country.

Greenland informed the Working Group that data was collected in Greenland on the number, species and hunting method. Iceland reported that reports on seal catches in Iceland were good as these were based on a bounty system whereby Icelanders were subsidised to cull seals. The Faroes reported that there was no systematic recording of seal numbers killed, but that a rifle permit was necessary to shoot seals, and that such rifle permits were only issued to salmon farmers for the culling of seals which interfere with salmon farming. Norway reported that it had a full inspection scheme and full annual catch reports from its sealing operations.

It was noted that the question of data on seal catches was not a matter for the Working Group on Inspection and Observation, but that there was a need to report data on the level of catches to NAMMCO. The Working Group agreed that as a minimum, each individual country should report their seals catches to the NAMMCO Secretariat. How this should be done would be a matter for the Scientific Committee to determine in connection with the development of a database and the standardisation of national reports to the Secretariat.

7. Role and Function of International Observers

The Working Group referred to the discussion from the last meeting concerning the role and function of international observers and the points left open for further discussion.

Greenland pointed to IWC discussions on observers and the relations between sovereign states in fisheries management, where it was the clear position of Denmark, for example, that

jurisdictional authority of international observers in national waters could not be accepted. Working Group members were all in agreement with this. Iceland suggested that the word observer itself alludes to a passive role rather than any regulatory competence.

The Working Group discussed the possibility of a reciprocal observation scheme between NAMMCO countries. It was noted that in such a scheme, the credentials and training of observers would be very important. It was agreed that NAMMCO observers should, as a minimum, be qualified as national inspectors or trained as veterinarians (as were Norwegian inspectors). The task of the observer would be to oversee that the regulations were upheld, but would not have the jurisdiction of an inspector. National inspectors should have the authority to sign the observer's report. The practical questions of communication and accommodation on board small vessels should also be taken into consideration. For safety and efficiency, it was considered very important that observers be able to communicate effectively with the crew, and that they were well-trained in safety requirements at sea.

Recommendation: ***With these considerations in mind, the Working Group agreed to recommend to the Management Committee that the establishment of some kind of reciprocal observation scheme between NAMMCO countries be considered, with the basic principle that the observer country pays the expenses. Observers reports would be sent to the respective countries and the NAMMCO Secretariat.***

8. Standardisation of data collection

The Working Group noted the basic elements of data to be collected during whaling operations, as outlined in the Report of the Second Meeting of the Scientific Committee. These included position and date of catch and length and sex of animal. The Scientific Committee had recommended that "for the time being ... such information be included in the National Progress Reports submitted to the Scientific Committee."

The Working Group also noted that the Scientific Committee had not yet determined a standard format for the submission and content of National Progress reports. The Working Group therefore referred the matter of standardised data collection to the Scientific Committee, awaiting further guidelines on how such data should be submitted in the form of National Reports to the Scientific Committee

10. Adoption of report

The draft report was circulated to Working Group members by fax two weeks after the meeting, and the final report was adopted on 16 December.

Appendix 1

Agenda

1. Adoption of Agenda
2. Election of Chairman
3. Update on national regulations
4. Development of a common inspection sceme for coastal minke whaling
5. Formulation of standard inspection checklist
6. Development of a common system for recording data on seals
7. Role and function of international observers
8. Standardisation of data collection
9. Any other business
10. Adoption of report

Appendix 2

Inspection form for minke whaling in Norway

Appendix 3

Logbook for minke whaling in Norway

Appendix 4

Greenland whaling report form

SECTION 3

Scientific Committee

SECTION 3.1

Third Meeting of the Scientific Committee

Copenhagen, 31 January - 3 February 1995

Report of the
Third Meeting of the Scientific Committee

Copenhagen, 31 January - 3 February 1995

The Scientific Committee of NAMMCO met at the Greenland Fisheries Research Institute in Copenhagen, Denmark from 31 January to 3 February. The meeting was attended by members of the Scientific Committee and a number of invited experts. A list of participants is contained in Appendix 1.

1-3. Opening procedures

The Chairman, Jóhann Sigurjónsson, welcomed members and the invited participants to the meeting, in particular the new member for the Faroes, Eyðfinnur Magnussen, who replaced Jógvan M. Grástein. The Chairman extended a special welcome to Janet Pawlak, ICES Environment Secretary, who had offered to inform the Committee of relevant work being carried out within ICES, in particular in relation to the establishment of databanks. The Chairman commended the serious work already undertaken by the Committee, and noted that further important work was anticipated as a result of the present meeting.

The Agenda, as contained in Appendix 2, was adopted. The Secretary, Kate Sanderson, was appointed as rapporteur. Practical arrangements for the meeting were clarified, and these included a dinner invitation to all participants from the Greenland Fisheries Research Institute.

The Chairman outlined the order of business for the meeting. In relation to Agenda item 9.6 on the Atlantic walrus, the Committee agreed to establish an *ad hoc* Working Group on Atlantic Walrus, to be convened by Erik Born, which would report to the Committee on its deliberations at the present meeting (see under 9.6 below).

4. Review of available documents

Documents presented to the meeting, as listed in Appendix 3, were reviewed. These included National Progress Reports for 1993 and 1994 from the Faroes, Iceland and Norway, and for 1993 from Greenland (National Progress reports are contained in Section 3.2 of this volume).

5. Cooperation with other organisations

5.1 ICES

The Chairman referred to the various requests for advice which had been forwarded by the Council to ICES, and which were still being dealt with in the relevant ICES Study or Working Groups. He further noted that at its last statutory meeting, ICES had adopted a proposal for a specific policy on marine mammals, which emphasised ecological approaches to the study of marine mammals and the importance of assessing interactions with fisheries.

Janet Pawlak from ICES outlined briefly the ongoing work within ICES in response to questions forwarded from NAMMCO. She informed the Committee that the ICES Pilot Whale Study Group had agreed to meet in Cambridge (UK) from 15-17 November 1995 to address the outstanding matters in their work (see also 9.1.2 below).

The Joint ICES/NAFO Working Group on Harp and Hooded Seals was meeting again in Dartmouth, 5-9 June 1995, and would in particular be addressing questions related to stocks in the Northwest Atlantic (NAFO) area.

The ICES Study Group on Seals and Small Cetaceans in European Seas would be meeting again 5-8 December 1995 and would be reviewing the results of the 1994 SCANS survey.

Pawlak informed the Committee that a recent development within ICES is the requirement for the reporting of all by-catches of marine mammals on an annual basis. June 1 was set as the date for the submission of data to ICES from the previous year, although work was still under way, in collaboration with the Chairman of the ICES Marine Mammal Committee, to develop a formal system for reporting by-catches.

Pawlak also reported on the establishment by the ICES Secretariat of a thematic data centre for AMAP (the Arctic Monitoring and Assessment Programme) on contaminants in marine mammals. Pawlak noted that the potential existed for expanding this databank beyond the Arctic to also incorporate data on levels of contaminants in marine mammals in the ICES (Northeast Atlantic) area as well, and that this might be of interest to NAMMCO.

The Chairman thanked Dr Pawlak for providing the Committee with this information on ICES work and its relevance for NAMMCO, including updates on the progress of work on pilot whales, and harp and hooded seals. These would be discussed further under subsequent agenda items (see 9.1, 9.4 & 9.5 below). It was also noted that ICES had officially appointed Arne Bjørge to present a paper on the work of ICES on marine mammals at the forthcoming International Conference on Marine Mammals and the Marine Environment to be held in Shetland 20-21 April 1995.

5.2 IWC

In line with the Committee's decision at its last meeting to seek an exchange of information with the Scientific Committee of the International Whaling Commission, the Secretary pointed out that the IWC Secretariat had been informed of the present meeting of the Scientific Committee. It was noted that this was not an invitation to the IWC Scientific Committee to attend the present meeting in an observer capacity, as NAMMCO and the IWC had only agreed to an exchange of observers at Council/Commission level. The Secretary pointed out that it was now standard procedure to circulate the reports of the Council and Scientific Committee to other organisations, including the IWC.

The Committee also noted that the IWC Scientific Committee had been approached directly at its meeting in Mexico in May 1994 by the Chairman of the NAMMCO Scientific Committee and the Chairman of the NASS-95 Working Group with an invitation to IWC Scientific Committee members to take part in the planning and implementation of NASS-95. A further invitation was extended in November to IWC Scientific Committee members to

attend the meeting of the NASS-95 Working Group held in Tromsø, 2 December 1994.

5.3 NAFO

There was nothing further to report on relations between NAFO and the Scientific Committee, other than NAMMCO's standing request for advice on harp and hooded seals which had been passed on to the ICES/NAFO Joint Working Group on Harp and Hooded seals. The NAFO Secretariat had been informed of the present meeting of the Scientific Committee.

5.4 Other organisations

The Committee agreed to suggest to the Council that working relations be established between NAMMCO and the Canada-Greenland Joint Commission for the Conservation and Management of Narwhal and Beluga.

The Secretary drew the Committee's attention to the Report of the First Meeting of the Parties to ASCOBANS (the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas) which she had attended as observer in Stockholm in September 1994. Although this meeting would be reported on to the Council, the ASCOBANS report was made available to Committee members for their information.

The Secretary also explained that inquiries had been made concerning the possible establishment of some kind of working relationship between NAMMCO and the IUCN (the World Conservation Union). In a recent response from the Director General of IUCN, it was explained that, although the IUCN Council had not agreed to formal observer status for NAMMCO, the IUCN Council had decided that technical working links between IUCN and NAMMCO should be established through the Species Conservation Unit at IUCN and the Chairs of the Cetacean and Seal Specialist Groups of the Species Survival Commission. These contacts had yet to be made, but the Committee would be informed of any further developments when the nature of such links had been fully explored.

6. Update of List of Priority Species

The List of Priority Species had been circulated to members prior to the meeting as a separate document for easier reference (SC/3/4). Reference was made to the decision at the last meeting of the Committee that the List of Priority Species should be updated every second year in the context of Committee meetings. It was clarified that the text need not therefore be reviewed in detail until the next meeting.

Larsen noted, however, that there could already be a close review of available information on beluga and narwhal stocks for incorporation into the List, which would better reflect the most recent work of the Scientific Working Group of the Canada/Greenland Joint Commission on Conservation and Management of Beluga and Narwhal.

It was agreed that a process of revision and update of the List of Priority Species should be undertaken prior to the next meeting, and that this would be coordinated by the Secretariat in consultation with the Chairman. The Chairman noted that particular attention should be made to updating and screening catch figures for inclusion in a revised List.

Haug asked whether any progress had been made on the idea put forward at the last meeting of producing the List in several languages for wider use. The Secretary reported that there were still plans for this kind of production, although there had as yet been no opportunity on the part of the Secretariat to develop them further.

7. Impacts of marine mammals on the marine ecosystem

7.1 Update on progress

The Chairman referred to the Council's request for advice on the impacts of marine mammals on the marine ecosystem, noting that this was being dealt with in, among others, the ICES Multi-Species Working Group.

7.2 Future work

Haug suggested that these questions be more fully addressed at the next meeting of the Scientific Committee, with reference to the work which was being carried out in the area. A number of related papers had recently been presented at the International Marine Mammal Symposium in Tromsø, November/December 1994. This research, as well as the forthcoming ICES/NAFO Symposium on the role of marine mammals in the marine ecosystem (Dartmouth, Canada, September 1995) would provide a good basis for substantive discussion and review by the Committee. The Committee agreed to deal more fully with this agenda item at its next meeting.

8. Development of management procedures

8.1 Report of the Working Group on Management Procedures

In their joint session, the Working Group on Northern Bottlenose Whales and the Working Group on Management Procedures addressed the specific request formulated by the Management Committee and forwarded to the Scientific Committee by the Council at its fourth meeting:

"It was noted that the RMP could be an appropriate starting point in some future management cases. Therefore, taking into account the discussion in the Working Group (on Management Procedures) and the Scientific Committee, further development of RMP-like systems should be carried out" (NAMMCO/4 - *Report* (Appendix 12), 105).

The Chairman of the Working Group on Management Procedures, Nils Øien, presented the report of joint meeting of the Working Groups to the Committee (see also under 9.2 below). The report is contained in Annex 1.

At last year's meeting of the Scientific Committee it was agreed that there was a need for more guidance on management objectives before any concrete work could be started on developing appropriate management procedures. It was also concluded that these were likely to be case specific. Responses to this request (SC/3/12, SC/3/15 and SC/3/18 rev 1) were discussed at the joint meeting of the Working Groups.

The responses from Greenland and Iceland referred to the principles of MSY (maximum sustainable yield), while Norway and Iceland expressed a wish for a multi-species aimed

approach, also taking into account fisheries interactions. Iceland further referred to the MSY principle in relation both to biology and economy. Additionally, Greenland noted as a management objective that present distributions of harvested species should be maintained.

The Scientific Committee welcomed these contributions, but felt that they only partly addressed the need for further clarification of objectives. Defining objectives implies that weight is given to different goals for management, e.g., how much relative importance is given to biological and economical factors. Although the general views on management objectives received from Council members were of interest to the Committee, a more pragmatic approach on an area and species/case-specific basis would be desirable for the development of specific management procedures. It was therefore decided to suggest that requests for advice from the Council be accompanied by specific objectives defined for the case in question.

8.2 Future work

In light of the above comments, it was noted that a general discussion of management objectives at Council level may provide further input for the continued work of the Scientific Committee. As a possible aid to such a discussion, particular reference was made to the paper: "Management and conservation of marine mammals and their environment", in *Mammals in the Sea, Volume I.* Report of the FAO Advisory Committee on Marine Resources Research, Working Party on Marine Mammals, FAO Fisheries Series 1(5), 1978, 162-180.

In the future development of management procedures, the Committee saw no immediate reason to initiate further work until stocks and objectives had been identified for such work.

9. Marine mammal stocks - status and advice to the Council

9.1 Long-finned pilot whales

9.1.1 Update on progress

As mentioned by Pawlak (see under 5.1 above), the ICES Study Group on Pilot Whales would be meeting again in November in Cambridge, at which time it was expected that the main part of their work would be completed. The Committee noted that until that time, no new information was available to report to the Council on this species. Little progress had in fact been made since the last meeting of the Scientific Committee, as no formal meeting of the Study Group had been held in 1994.

9.1.2 Future work

The Committee noted the list of items for further work on the pilot whale which had been identified at its last meeting, based on the report of the ICES Study Group on Pilot Whales from Copenhagen, September 1993. These had also been reviewed by an informal meeting of the Pilot Whale Study Group in Tromsø in late November, and remained just as relevant now as they had been over a year before. They related to problems associated with estimates of population dynamics parameters, population size, population identity, multispecies interactions and modelling

9.2 Northern bottlenose whale

9.2.1. Report of the Joint Meeting of the Working Group on Northern Bottlenose Whales and the Working Group on Management Procedures

At last year's meeting of the Scientific Committee, information on several aspects of abundance and status of the northern bottlenose whale was examined. Some further time was needed for completion of work requested by the Council.

A joint session was held of the Working Group on Northern Bottlenose Whales and the Working Group on Management Procedures in order to consider the request from the Council to undertake the necessary modelling of the population using catch series and abundance estimates.

The Chairman of the Working Group on Management Procedures, Nils Øien, presented the report of the joint session to the Committee (Annex 1 and item 8.1 above).

Following on from last year's work, and in order to provide the requested advice on the status of the northern bottlenose whale (*Hyperoodon ampullatus*) in the North Atlantic, modelling was carried out. The basis for the modelling was available catch series, abundance estimates and biological parameters, where alternative target stock sizes and MSY rates were explored with respect to the available catch history.

The available abundance estimates obtained by the Icelandic and Faroese NASS-87 and NASS-89 surveys, covering the area from Cape Farewell in the west to the British isles in the east, were used. In the absence of indications to the contrary, the Committee chose to regard the North Atlantic bottlenose whales in this area as belonging to a single stock. Alternative MSY rates considered were 0-5%, and an uncorrected surface estimate of 8,827 whales, as well as a tentatively corrected estimate of 40,000 whales, were used as alternative target stock sizes.

9.2.2 Advice on status

The population trajectories generally show the same trends, independent of assumptions (Annex 1, Figure 1, a-c). The average catches of northern bottlenose whales in the Faroese removals was 1.2 whale per year prior to 1877 and from 1974 onwards. During these periods this fishery has been the only harvesting of these whales, and even at an MSY rate as low as 1%, these catches have not had any detrimental effect on the stock. During periods with heavy exploitation, the population trajectories show a decline in the stock.

9.3 Killer whales

9.3.1 Update on progress

The Chairman of the Working Group on Northern Bottlenose and Killer Whales, Tore Haug, reported that further research on killer whales in Norway is still in progress. It was not, therefore, possible to offer any further information on the status of this species until analysis of the most recent research data has been completed. Sigurjónsson reported that research continues on killer whales off Iceland, which involves photo-identification work, work on energetics and satellite tracking. It was noted that such research was a time-consuming task for those working in the field, but that some results were expected within the next 12 months, and some new information might therefore be available by the next meeting of the

Committee.

9.3.2 Future work

The items identified at the last meeting of Scientific Committee were reiterated as the priorities for ongoing research on killer whales (NAMMCO/4 - *Report (*Appendix 11- Scientific Committee report), 53).

9.4 Harp seals

9.4.1 Update on progress

The Committee noted that no new information in response to the Council's request was available at the present time. The Joint ICES/NAFO Working Group on Harp and Hooded Seals will be meeting again in Dartmouth (Canada) in June. It will be concentrating its attention on Northwest Atlantic stocks, but would also address issues related to ecosytem impacts, in preparation for the ICES/NAFO Symposium in September (see 7.1 above). The most recent stock estimate for the West Ice is based on aerial and visual surveys as well as mark-recapture data from 1991. As for the East Ice, the Russian data was not comprehensive and reliable stock estimates were not yet available.

Haug reported on recent developments along the coast of Norway, where relatively large numbers of juvenile harp seals have been reported in interactions with fisheries, as far south as the northern part of southern Norway. In contrast to the large numbers of harp seals which occurred along the Norwegian coast in the late 1980's, the present incidence largely involved young animals. The occurrence of animals further south was, however, also a feature of the seal invasions of the late 1980's.

Although coastal occurrence of harp seals is not uncommon, the relatively large numbers of juvenile harp seals recorded along the Norwegian coast this year would seem to indicate a larger number of young seals in the system, which would in turn be directly related to the known success of recruitment of the stocks in the early 1990's (compared with the poor recruitment years in the late 1980's). Some animals had been retrieved for analyses of stomach contents and general body condition. Haug also reported that recaptures of tagged animals indicated that the young animals belong to the East Ice/Barents Sea stock.

9.4.2 Future work

The Committee recommended that future work should be identified when the report of the next meeting of the Joint ICES/NAFO Working Group on Harp and Hooded Seals was available.

9.5 Hooded seals

9.5.1 Update on progress

Øien reported that attempts had been made in 1994 to conduct an aerial survey for hooded seals over the West Ice using two aeroplanes and one helicopter. However, bad weather and ice conditions prevented adequate coverage of hooded seal breeding patches, so no new estimate of the hooded seal population of the West Ice would be forthcoming this year.

9.5.2 Future work

No other progress was reported, and discussions on this species were also deferred until the

subsequent report of the Joint ICES/NAFO Working Group on Harp and Hooded seals was available.

9.6 Atlantic walruses

The Chairman referred to the Council's request for advice on Atlantic walruses which had been forwarded from the Management Committee at the second meeting of the Council in Tromsø, January 1993. For the Atlantic walrus, the Council requested the Scientific Committee to:

> "... advise on stock identity for management purposes; to assess abundance in each stock area; to assess long-term effects on stocks by present removals in each stock area; to assess effects of recent environmental changes (ie disturbance, pollution), and changes in the food supply" (NAMMCO/2 - *Report*, 64).

At its last meeting in Reykjavik in November 1993, the Scientific Committee had agreed that it was not in a position to offer advice on this species due to the lack of available information. The Committee had aimed to review the report of the Walrus International Technical and Scientific Committee (WITS) which had met in January 1993, but this was not available at the time of that Scientific Committee meeting. When finally obtained, the WITS report was circulated to Committee members as SC/3/6.

It was subsequently decided in late 1994 to request Erik Born of the Greenland Fisheries Research Institute in Copenhagen to coordinate the compilation of a status report on the Atlantic walrus in time for the present Scientific Committee meeting, drawing on the assistance of other relevant walrus experts from Canada, Norway and Russia. Other experts who contributed to the work were Randall Reeves and Robert Stewart from Canada and Ian Gjertz and Øystein Wiig from Norway. The Russian scientist, Stanislav Belikov, had also been approached, but was unable to take part in the work of the group.

The result of this collaboration was the draft report, E.W. Born, I. Gjertz and R.R. Reeves, "Population assessment of Atlantic walrus (*Odobenus rosmarus rosmarus*)", a final draft version of which was distributed to the Scientific Committee (SC/3/13). Born summarised the report of the three experts for the Committee.

9.6.1 Review of status

A meeting of the *ad hoc* Working Group, which had subsequently been established (see under 1-3 Opening Procedures above), was convened by Born, who then presented the Working Group report to the Committee. The report of the *ad hoc* Working Group is contained in Annex 2. Based on this report, the Scientific Committee considered the specific aspects of the Council's request for advice on the Atlantic walrus.

9.6.2 Advice on:

i) Stock identity

The Committee welcomed the conceptual model and related alternative hypotheses developed by the Working Group as a way of understanding stock separation in walruses. The eight groups of Atlantic walruses tentatively identified by the Working Group as population units of some kind are illustrated in 3.2.2, Figure 1. It is important to emphasize

that these units have been defined on the basis of very limited information. The number of units recognized and the configuration of the boundaries between units are likely to change substantially as new data become available. Of the identified units or stocks, all but the Foxe Basin stock and possibly the South and East Hudson Bay stock may cross international boundaries.

It is also important to note the distinction made by the Working Group between genetic stocks and "functional" stocks. Some of the tentative stocks proposed by the Working Group may prove to be genetic stocks, but all are viewed as functional stocks in the context of both the Working Group report and this report of the Scientific Committee. Within this report, reference to "stock" is understood to mean functional stock (population units that are regarded as convenient for management purposes, eg in relation to the monitoring of catches or abundance), and not necessarily genetic stock.

ii) Abundance by area

Abundance estimates were available for only three of the eight stocks of Atlantic walruses. Even for these stocks, the available estimates are uncorrected and/or incomplete. The Scientific Committee expressed concern about the lack of rigorous abundance estimates for all stocks.

iii) Long-term effects of present levels of removals on stocks

Although the Working Group did not have time to address the question of stock status, its report did provide the Scientific Committee with the information necessary for doing so (3.2.2, Table 1). The Working Group report provided estimates of annual current removals, by stock, and noted the inadequacy of catch data from all areas. These estimates were used to make projections of the stock sizes needed to sustain removals, assuming a range of net recruitment rates of 2-5%.

The Scientific Committee compared the stock sizes required for sustainability with the abundance estimates and made the following conclusions about the status of the stocks:

1. The southern subunit of the Central West Greenland stock (which is probably "shared" with Canada via southeastern Baffin Island) is being over-exploited.

2. The Baffin Bay (North Water) stock (understood to probably include the northern subunit of the Central West Greenland stock) is probably also being over-exploited. Although no direct estimate of abundance for this stock was available, the information provided in SC/3/13 made it appear unlikely that the 7,600-19,000 walruses that are needed to sustain current catch levels are available within the stock's range.

3. The Scientific Committee expressed concern about the situations of the South and East Hudson Bay stock and the North Hudson Bay-Hudson Strait-SE Baffin Island-Labrador stock. The lack of complete abundance estimates and reliable information on removals for these stocks precluded any assessment of their status.

4. It was agreed that the exploitation rate of the Foxe Basin stock may be close to a

sustainable level. The East Greenland and Svalbard-Franz Joseph Land stocks are either stable or increasing. The Kara Sea-South Barents Sea stock is at a low level, although signs of increase have been noted.

iv) Effects of environmental changes (ie disturbance, pollution)

The Scientific Committee noted that further research is required in relation to the long-term effects of environmental factors on walrus stocks. These factors included the possible negative effects of disturbance by maritime and other activities, such as petroleum exploration.

With respect to the effects of chemical pollution, little direct research has been carried out on the effects of oil pollution on walruses. They may be particularly vulnerable to this kind of pollution given their social behaviour, habitat preferences, and the fact that they are benthic feeders.

Like other marine mammals, walruses are also vulnerable to the potentially toxic effects of heavy metals and chlorinated hydrocarbons (CHCs), as well as radioactive contamination in the marine environment as a result of incidents such as weapons testing and accidents. Few specific studies have, however, been carried out on walruses.

The Committee concluded that there was no documented evidence that environmental factors had contributed to recent changes in walrus populations. In relation to the issue of contaminants in general, more work is required to document and characterise the effects of pollutants on many marine mammals. There are some indications that increased shipping and nuclear testing have been detrimental to walruses in Russia.

v) Effects of changes in food supply

Although the direct and indirect effects of fisheries on Atlantic walruses are unknown, some effects are likely. Bottom-draggers have destroyed potential walrus feeding habitat at Svalbard. The noise from fisheries in or near walrus habitat and the disturbance of the sea floor caused by trawling may have contributed to the continued depletion of the stock of walruses off Central West Greenland.

9.6.3 Future work

The Scientific Committee concluded that the assessment at this meeting had taken into account all relevant information presently available, and that no further advice on Atlantic walruses would be possible until research has addressed some key questions. In view of the situation described above for the walrus stocks in West Greenland and Canada, the Scientific Committee made the following recommendations:

i) West Greenland stocks

Highest priority should be given to studies of stock identity, trends in abundance and catch levels of walruses in the Central West Greenland and Baffin Bay (North Water) stocks.

ii) Other stocks

As a second priority, similar studies should be carried out on the other walrus stocks that have been heavily hunted, and for which available data are inadequate to evaluate current

status. These are the South and East Hudson Bay stock and the North Hudson Bay-Hudson Strait-Southeast Baffin-Labrador stock, one or both of which may have a connection with the Central West Greenland stock.

On behalf of the Committee, the Chairman expressed his gratitude to the *ad hoc* Working Group, and to the invited participants in particular, for their efforts in producing their report and presenting their findings to the Committee.

10. Planning of the North Atlantic Sightings Survey

10.1 Update on progress

The report of the Third Meeting of the Scientific Committee Working Group to plan the 1995 North Atlantic Sightings Survey was presented by the Chairman, Finn Larsen (Section 3.2.3). The Scientific Committee was pleased to note the good progress that had been made in planning this important joint research, in which the Faroes (1 vessel), Iceland (3 vessels and 1 aircraft) and Norway (11 vessels) had decided to participate. It was noted that Greenland had decided not to conduct surveys as part of these joint efforts. Nor had efforts to increase the coverage of NASS-95 been successful, despite various approaches to governments and laboratories in several countries. The possibility of Canadian participation is not, however, completely ruled out, and it seems also that a nearshore vessel survey of the US coast will be carried out.

10.2 Survey funding

In light of the importance the Council and the Scientific Committee have attached to the NASS-95, the Committee agreed to recommend that a special fund of NOK 800,000 be established from the NAMMCO budget for use in financing various aspects of NASS-95, where required. It was recommended that one scientist from each member country should be appointed to a steering group which would be responsible for allocating funds in an equitable manner to national research groups.

10.3 Future work

The Scientific Committee noted that there was no need for extra meeting activities of the NASS-95 Working group unless new parties became involved.

11. Budget

The Committee noted the level of funding allocated to it by the Council as a part of the overall NAMMCO budget. This remained at the originally agreed level of NOK c. 430,000 (for invited participants and projects). The Committee also noted the comments by the Council at its last meeting that any unused Scientific Committee funds from previous years should not necessarily be regarded separately from the main budget, while acknowledging the presumed extra budget requirements for NASS-95.

The Committee stressed the importance of having sufficient funds to allocate for contract work and invited expertise in order to further the work of the Committee. There was, however, some discussion of the extent to which funds earmarked for external expertise should also be used to support the participation and work of scientists working within

NAMMCO member countries. It was agreed to seek more guidance from the Council on these questions.

An informal proposal to fund certain research projects related to some of the outstanding work of the ICES Pilot Whale Study Group was discussed briefly in relation to the general principles of Scientific Committee fund allocation, as discussed above. It was agreed that more details of the nature of the work requiring support would have to be presented before the Committee could further consider such a proposal.

12. Data and administration

12.1 Establishment of database

In relation to discussions at the last meeting, and consultations between the Chairman and the Secretariat, the Committee agreed that work should proceed in the Secretariat in establishing a database, in particular for those species currently relevant to the work of the Committee, namely: pilot whales, killer whales, northern bottlenose whales, Atlantic walruses and harp and hooded seals.

The Secretary informed the Committee of plans to hire an extra member of staff on a temporary, 12-month basis to assist with the establishment of a database in the Secretariat. This would preferably be a person with some background in biological studies and data handling who could also assist in identifying possible future methods and needs in relation to data collation and storage. After a 12-month period, the requirement for further assistance of this kind in the Secretariat could then be reviewed, based on experiences gained in the interim. The Committee endorsed this suggestion.

12.2 Requirements for National Progress Reports

The Committee discussed the Annotated Draft Guidelines for the Content and Format of National Progress Reports, which had been distributed to members prior to the meeting (SC/3/5) as a result of discussions on the matter at its last meeting.

A question was raised concerning the inclusion of official catch statistics in the National Progress Reports. It was noted that in relation to the discussion on data requirements, the Committee had decided at its last meeting that catch data should, for the time being, be included in National Progress Reports. The Committee agreed to seek guidance from the Council as to the preferred form in which any catch statistics to be compiled by the Secretariat should be submitted.

The Committee also agreed in principle that the National Progress Report should be appended to the main Scientific Committee report. It was noted in this connection that it was the practice of the Secretariat to circulate the Scientific Committee report widely to other relevant organisations and bodies, and that the Council had also agreed that it was important to make the work of the Scientific Committee widely available.

13. Future work plans

13.1 Scientific Committee

The future tasks of the Scientific Committee were briefly discussed. Referring to the seven items for which the Management Committee, through the Council, had requested advice (NAMMCO/2 - Report, 63-64), most of these were being dealt with or had already been dealt with by ICES working/study groups, by the Joint ICES/NAFO Working Group on Harp and Hooded Seals or by the NAMMCO Scientific Committee itself.

The Committee felt that priorities need to be identified for future work, but felt that impacts of marine mammals on the marine ecosystem should be considered in some depth at its next meeting.

Mention was also made of environmental aspects as an area relevant for the Committee's future consideration. It was further noted that the forthcoming NAMMCO Conference on Marine Mammals and the Marine Environment in Shetland (20-21 April 1995) would provide an important source of information for future discussions in this area.

The Committee received with appreciation an invitation from the Faroes to hold its next meeting in Tórshavn in February 1996.

13.2 Working Groups

In light of the progress made with respect to killer whales and northern bottlenose whales, the Committee decided there was no further need for designated working groups for these species. The Committee therefore decided to dissolve that working group, and thanked its Chairman, Tore Haug, and its members for their valuable contribution.

14. Election of officers

14.1 Election of Chairman

Tore Haug, Norway, was elected as new Chairman of the Scientific Committee for the next two years.

14.2 Election of Vice Chairman

Mads Peter Heide-Jørgensen (Greenland) was elected as new Vice Chairman of the Scientific Committee for the next two years.

15. Any other business

The Chairman thanked the members of the Committee for their support during his term of office, since the first establishment of the Committee, and expressed his gratitude to the Secretariat for the professional handling of the work of the Committee. He also extended his thanks to the Greenland Fisheries Research Institute for their generous hosting of the meeting and for providing back-up support during the meeting. On behalf of the Committee, Larsen thanked the outgoing Chairman for his valuable efforts in getting the work of the Scientific Committee off the ground. He also extended a thanks to the Secretariat for the efficient running of proceedings.

16. References

Anon., 1978, "Management and conservation of marine mammals and their environment", in *Mammals in the Sea, Volume I*. Report of the FAO Advisory Committee on Marine Resources Research, Working Party on Marine Mammals, FAO Fisheries Series 1(5): 162-180.

NAMMCO/2 - Report - *Report of the Second Meeting of the Council of NAMMCO*, Tromsø 19-20 January 1993. NAMMCO/4 - Report - *Report of the Fourth Meeting ofthe Council of NAMMCO*, Tromsø, 24-25 February 1994.

Appendix 1

List of Participants

Scientific Committee members:

Faroes	Dorete Bloch Eyðfinnur Magnusen
Greenland	Mads Peter Heide-Jørgensen Finn Larsen
Iceland	Þorvaldur Gunnlaugsson Jóhann Sigurjónsson (Chairman) Gísli Víkingsson
Norway	Tore Haug (Vice Chairman) Nils Øien

Invited experts:

Erik Born
Ian Gjertz
Randall Reeves
Robert Stewart
Øystein Wiig
Janet Pawlak (ICES Secretariat)

Secretariat:

Kate Sanderson (Secretary)

Appendix 2

Agenda

1. Chairman's welcome and opening remarks

2. Adoption of Agenda

3. Appointment of Rapporteur

4. Review of available documents and reports
   - 4.1 National Progress Reports
   - 4.2 Working Group reports
   - 4.3 Other reports and documents

5. Cooperation with other organisations
   - 5.1 ICES
   - 5.2 IWC
   - 5.3 NAFO
   - 5.4 Other

6. Update of List of Priority Species

7. Impacts of marine mammals on the marine ecosystem
   - 7.1 Update on progress
   - 7.2 Future work

8. Development of Management Procedures
   - 8.1 Report of the Working Group on Management Procedures
   - 8.2 Future work

9. Marine mammal stocks - status and advice to the Council
   - 9.1 Long-finned pilot whales
     - 9.1.1 Update on progress
     - 9.1.2 Future work
   - 9.2 Northern bottlenose whales
     - 9.2.1 Report of the Joint Meeting of the Working Group on Northern Bottlenose Whales and the Working Group on Management Procedures
     - 9.2.2 Review and advice on status
     - 9.2.2 Future work
   - 9.3 Killer whales

9.3.1 Update on progress
9.3.2 Future work

9.4 Harp seals
9.4.1 Update on progress
9.4.2 Future work

9.5 Hooded seals
9.5.1 Update on progress
9.5.2 Future work

9.6 Atlantic walrus
9.6.1 Review of status
9.6.2 Advice on: (i) stock identity; (ii) abundance by area; (iii) long-term effects of present levels of removals on stocks; (iv) effects of environmental changes (ie disturbance, pollution); and (v) effects of changes in food supply.
9.6.3 Future work

10. Planning of the North Atlantic Sightings Survey
10.1 Update on progress
10.2 Survey funding
10.3 Future work

11. Budget
11.1 Funds allocated 1993/94
11.2 Allocation of budget 1995
11.3 Other

12. Data and administration
12.1 Establishment of database
12.2 Requirements for National Progress Reports
12.3 Other matters

13. Future work plans
13.1 Scientific Committee
13.2 Working Groups
13.3 Other matters

14. Election of officers
14.1 Election of Chairman
14.2 Election of Vice-Chairman

15. Any other business

Appendix 3

List of documents

SC/3/3 - Faroes	Progress Report on Marine Mammal Research 1994
SC/3/3 - Greenland 1993	Progress Report on Activities in 1993
SC/3/3 - Iceland 1993	Progress Report on Marine Mammal Research in 1993
SC/3/3 - Iceland	Progress Report on Marine Mammal Research in 1994
SC/3/3 - Norway	Progress Report 1993 and 1994
SC/3/4	List of Priority Species (updated SC/2 - 1993)
SC/3/5	Annotated Draft Guidelines for the Content and Format of National Progress Reports
SC/3/6	Report of the 2nd Walrus International Technical and Scientific (WITS) Workshop, 11-15 January 1993, Winnipeg, Manitoba, Canada (eds. R.E.A. Stewart, P.R. Richard & B.E. Stewart)
SC/3/7	NASS-95 Working Group Report, Tromsø, 2 Dec. 1994 (+ Appendix 3)
SC/3/8	T. Haug & K. T. Nilssen, "Observations of Walrus *Odobaenus Rosmarus* in the Southeastern Barents Sea in February 1993".
SC/3/9	NASS-95 Working Group Report, Tromsø, 25 February 1994
SC/3/11	Letter from Secretary to Council members requesting information on management objectives (24 November 1994)
SC/3/12	Response from Norway on management objectives (9 January 1995)
SC/3/13	E.W. Born, I. Gjertz and R.R. Reeves, Population assessement of Atlantic walrus (*Odobenus rosmarus rosmarus*).
SC/3/15	Response from Greenland on management objectives (30 January 1995)
SC/3/16	M.P. Heide-Jørgensen and E.W. Born, Monitoring walrus abundance off West Greenland.
SC/3/17	D. Bloch, G. Desportes, M. Zachariassen and I. Christensen, The Northern Bottlenose Whale in the Faroe Islands, 1584-1993.
SC/3/18 rev 1	Management objectives for marine mammals in Iceland, A. Halldórsson, Ministry of Fisheries, Reykjavik, 31 January 1995.

Annex 1

Report of the Joint Meeting of the Scientific Committee Working Groups on Northern Bottlenose and Killer Whales and Management Procedures

Copenhagen, 2 February 1995

1. Chairman's welcome and opening remarks

The Chairman, Nils Øien, welcomed participants (listed in Appendix 1) and gave a brief account of the rationale for the joint meeting of the two Working Groups:

The Working Groups had been given the task of modelling the northern bottlenose whale *(Hyperoodon ampullatus*) population, and results from preliminary work were to be presented and discussed.

At the last meeting of the Scientific Committee, it was agreed that there was a need for more guidance on management objectives before any concrete work could be started on developing appropriate management procedures. It was also concluded that these were likely to be case specific. Responses to this request were to be discussed at this joint meeting of the Scientific Committee Working Groups.

2. Adoption of agenda and appointment of rapporteur

The draft agenda was adopted and Tore Haug was appointed rapporteur.

3. Review of available documents and reports

The Chairman briefly reviewed the titles and reference numbers of the available documents. The list of documents is contained in Appendix 2.

4. Northern bottlenose whales; modelling and management implications

4.1 Catch history

The catch history of the northern bottlenose whale was comprehensively reviewed by the Working Group on Northern Bottlenose and Killer Whales during the last meeting of the Scientific Committee (NAMMCO/4 - Report, pp. 83-104).

There has been no local hunting of bottlenose whales in Greenland this century. A total of five animals were taken by whaling vessels in 1950 and 1958. This might reflect low abundance but also the low esteem in which bottlenose products are held in Greenland.

There has been no organised, commercial hunting of bottlenose whales by Iceland. Catch history data exist for Norway and the Faroes, although they are not of the same kind in both areas.

In the Faroes, both a limited-scale drive fishery and a limited-scale commercial offshore whaling have been conducted (SC/3/17). Reports exist of offshore catches between 1894 and 1935. Catches were maximum 11 animals per year, totalling 92 animals, and occurred mostly between May and July. Reports of drive fishery catches and strandings exist mainly from 1709 to the present. The annual catch increased from 1820 and peaked in 1890, whereafter it declined and reached its lowest concurrently with the decline of the Norwegian catches. Drive fishery catches peaked at the end of August and during the first half of September. A total of 646 bottlenose whales have been caught in the Faroes from 1584 up to and including 1994.

Scottish sealers and bowhead whalers took a total of approximately 1961 bottlenose whales from 1856 to 1970, including catches in both the Davis Strait and the Greenland Sea. Of these, 1,787 were taken in the period 1877-1892. At Scottish land stations a total number of 26 bottlenose whales were landed during the period 1909-1925 (Thompson 1928).

Northern bottlenose whales have been hunted by Norwegian whalers in the North Atlantic over two separate periods. During the first period, which lasted from 1882 to the late 1920's, a total of about 60,000 bottlenose whales were caught. The second period started with modern Norwegian whaling for smaller whales (mainly directed at minke whales) and commenced around 1930. Some bottlenose whales were included in the catches, and when the second period stopped in 1973, approximately 5,800 bottlenose whales had been caught in total.

4.2 Estimation of abundance

At the last meeting of the Scientific Committee, the Working Group on Northern Bottlenose and Killer Whales was unable to reach a conclusion on stock identity, i.e. to decide on the existence of one or more stocks of bottlenose whales in the North Atlantic. In the present modelling exercise, the population was treated as one single stock where reference was made only to data from the areas to the east of Cape Farewell (the southern tip of Greenland). The migratory nature of this species may support the one-stock hypothesis: the the peak in catches at Svalbard used to be in early spring, while the peak in the Faroese drive fishery is in September. Furthermore, sightings of whales west of Iceland are more frequent in early summer. If there is more than one stock, the degree of depletion in potential substocks may have been more adverse than that observed in the pooled stock.

A direct estimate of abundance comes from analysis of the Icelandic and Faroese data from the 1987 NASS survey (Gunnlaugsson & Sigurjónsson 1990). Most of the sightings recorded on board Icelandic vessels (59 of 86, i.e. 69%, representing 141 animals of 221 in total) were sighted between 4 and 20 July in the eastern part of the area, from Jan Mayen Ridge in the north, southward along the continental shelf edge east of Iceland towards the Iceland-Faroe Islands ridge to the Faroes in the South (i.e. in the area bounded by 70^{o}N-58^{o}N and 7-20^{o}W) (Sigurjónsson, unpubl.). A surface estimate (no correction for submerged animals) of abundance gave 4,925 (CV=0.16) whales for the Icelandic survey vessels. An estimate

for the Faroese survey vessel was 902 (CV=0.46) animals (Gunnlaugsson & Sigurjónsson 1990). From the 1989 NASS survey, an estimate for the southern blocks (south of 60°N) not covered in 1987 was obtained based on 8 sightings of 26 animals. This estimate is 3,006 (CV=0.4) south of 60°N. A total estimate of 8,827 (CV=0.32) was then obtained (WG-MP/2/4).
The Norwegian vessels made very few sightings of bottlenose whales during the NASS-1987 (Øien 1989), the Norwegian 1988 (Øien 1990) and the NASS-1989 (Øien 1991) surveys. This might reflect the fact that at the time of the survey, i.e. in July-August, the bottlenose whales have already left the area surveyed by Norwegian vessels. The Working Group noted that a southward migration out of the Norwegian Sea in mid summer could be inferred from historical catch data. No sightings were made from Spanish vessels.

The sightings estimate is undoubtedly biased downwards due to the long dive time of this species. Based on measurements from ten individuals given by Benjaminsen & Christensen (1979), an average of 33 minutes can be calculated.

The median perpendicular sighting distance on the Icelandic vessels in 1987 and 1989 was 0.32 nm and 0.34 nm, respectively. Considering only the sightings observed within the median perpendicular distance (i.e., half the sightings), the median forward distance is 0.5 nm. If the effective forward sighting distance is 1 nm (twice the median), which these vessels would traverse in about 8 minutes, a correction factor of 5 was derived, as explained in Gunnlaugsson & Sigurjonsson (1990). For an accurate correction factor to be obtained, the data needs to be recorded in more detail; e.g., if the deep diving is used as the cue, the distances should refer to that point (negative bias) and the animals not seen deep-diving before abeam should not be included (positive bias). Also, a larger number of dive time observations are needed, as well as other behavioural observations, which could resolve the question of whether group size is frequently underestimated or two groups believed to be one. Use of the correction factors derived above leads to an estimate of around 40,000 animals.

4.3 Population modelling

It was decided to try to model the development of the northern bottlenose whale population in the North Atlantic by using the catch series and the abundance estimates as presented above in the so-called "Hitter" model (Punt & Butterworth 1991). Thus, the runs with the uncorrected estimate of 8,827 and the corrected estimate of 40,000 as scenarios were considered. The group also decided to look at an intermediate value of 20,000 for the total stock size. Runs were made with natural mortality rates of 0.05 and 0.07. The results differed only slightly, and the group decided to represent only the results from the 0.07 runs. Other input parameters were female minimum age at maturity (7 years) and age at 50% and 95% maturity (9 years), male and female minimum age at recruitment (1 year) and age at 50% and 95% recruitment (3 years). Simulations were performed over the period 1856-1993 using MSY rates ranging from 0% to 10% (WG-MP/2/5).

During the NASS surveys there were no sightings of Northern bottlenose whales in the western part of the survey area (30°W - 42°W). Also due to the lack of an estimate west of the 42°W line the group decided to do runs for the area surveyed in the NASS surveys and catches there. The catch series used in the simulation is given in Appendix 3, Table 1.

All the runs show generally the same features (Appendix 3, Figures 1a-c). For instance, with an MSY rate of 3% the initial stock is in all cases close to 43,000 and declines to a minimum of around 5,000 animals in the 1920s. With an MSY rate of 1%, the stock would not have declined to such low levels, and the lowest level in the 1920's is about three times higher than that for an MSY rate of 3%, and the stock would not have increased significantly from that point. This appears be contrary to the observations made in paper SC/3/17 that drives were very few during the period of greatest depletion, and also the observations made on board Icelandic vessels west of Iceland, which show an apparent recent increase in sighting frequency (Sigurjonsson & Gunnlaugsson 1990). The group noted that the average annual catch of northern bottlenose whales in the Faroese drive fishery was 1.2 whales prior to 1877 and from 1974 onwards. During these periods the drive fishery has been the only harvesting of these whales, and even at an MSY rate as low as 1%, these catches have not had any detrimental effect on the stock. The modelling also shows the population as increasing in the period 1921-1960, when average annual catches were 66. This is in contrast to the stock trajectories for the periods 1877-1920 and 1961-1973, when average annual catches were 1,335 and 308 respectively.

5. Management objectives

At the last meeting of the Scientific Committee, it was agreed that there was a need for more guidance on management objectives before any concrete work could be initiated. On request from the Secretary on such guidance (SC/3/11), answers were received from Greenland (SC/3/15), Iceland (SC/3/18 rev 1) and Norway (SC/3/12).

The responses from Greenland and Iceland both mention the principle of maximum sustainable use (MSY), while Norway and Iceland expressed a wish for a multispecies approach, also taking into account interactions with fisheries. Iceland discussed the MSY principle in relation both to biology and economy. Additionally, Greenland noted as a management objective that present distributions of harvested species should be maintained.

Although the group appreciated these contributions, it felt that they did not answer the request for management objectives *per se*. Defining objectives implies that value is given to the different goals for management, e.g., how much relative importance is given to biological and economical factors. The group felt that although the general views on management objectives received from Council members were of interest, a more pragmatic approach on an area and species/case-specific basis would be desirable for the development of specific management procedures. It was therefore decided to suggest that requests for advice from the Council be accompanied by specific objectives defined for the case in question.

In light of the above comments, it was noted that a general discussion of management objectives at Council level may provide further input for the continued work of the group. The Working Groups identified examples and references which could aid such a discussion:

1) a list of management objectives given in Anon 1978;
2) possible questions about the goals of management such as those given in the

response from Greenland (SC/3/15); and

3) examples of management objectives such as minimizing risk or maximizing yield on an economic or biological basis.

A paper on the application of the Revised Management Procedure (RMP) by Friðrik M. Baldursson (WG-MP/2/3) was also submitted, but there was no time available to discuss it.

6. Future work and requirements

During the assessments of the northern bottlenose whale it was evident that several uncertainties exist around this species in the North Atlantic. This has hampered the Working Group's ability to give precise advice on the stock. It is therefore relevant to refer to the research needs identified during the meeting of the Working Group on Northern Bottlenose and Killer Whales at the last meeting of the Scientific Committee in Reykjavik, November 1993 (see NAMMCO/4 - Report, pp. 83 - 104).

With regard to future management requirements, reference is made to item 5 above.

7. Adoption of report

The report was adopted on 2 February 1995.

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Appendix 1

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Appendix 2

List of documents

WG-MP/2/3 F. Baldursson, Application of the RMP to East-Greenland/Iceland fin whale.

WG-MP/2/4 Þ. Gunnlaugsson, A note on the rationale fro abundance estimates of northern bottlenose whales used in Hitter/Fitter runs

SC/3/12 Response from Norway on management objectives (9 January 1995)

SC/3/15 Response from Greenland on management objectives (30 January 1995)

SC/3/18 rev 1 Management objectives for marine mammals in Iceland, A. Halldórsson, Ministry of Fisheries, Reykjavik, 31 January 1995.

Appendix 3

Table 1

Catch series (from 1856 to 1993) used in the Hitter runs of northern bottlenose whales. Males in the left column, females in the right; where sexual composition was unknown, the catches were split in two halves.

Appendix 3

Figure 1 (a)

Hitter runs for northern bottlenose whale target stock estimates in 1988 of 8,827.

Appendix 3

Figure 1 (b)

Hitter runs for northern bottlenose whale target stock estimates in 1988 of 20,000.

Appendix 3

Figure 1 (c)

Hitter runs for northern bottlenose whale target stock estimates in 1988 of 40,000.

Annex 2

Report of the *ad hoc* Working Group on Atlantic Walrus

Copenhagen, 31 January - 3 February 1995

The *ad hoc* Working Group on the Atlantic walrus met at the Greenland Fisheries Research Institute in Copenhagen from 31 January to 2 February 1995. The Working Group was convened by Erik Born. A list of participants is contained in Appendix 1.

The Working Group referred to the Council's request for advice on the Atlantic walrus (*Odobenus rosmarus rosmarus*), which was as follows:

> "[to]... advise on stock identity for management purposes; to assess abundance in each stock area; to assess long-term effects on stocks by present removals in each stock area; to assess effects of recent environmental changes (i.e. disturbance, pollution), and changes in the food supply" (NAMMCO/2 - *Report*, 64).

The Working Group addressed each of the elements of the request in turn, basing deliberations on all available data on the Atlantic walrus.

1. Stock identity

It was acknowledged from the outset that although Atlantic walruses are generally understood to exist in a number of separate stocks, few studies have been done explicitly addressing questions of genetic relatedness of different groups.

In a preliminary discussion, the Working Group attempted to develop a conceptual model of the distribution and movements of Atlantic walruses, with the following considerations:

a) Walruses breed in winter (February to April) when there is extensive ice coverage. Therefore, stock separation may be driven by discontinuity in the availability of reliable open-water areas in winter. The distribution of polynyas, persistent shore leads, and loose pack ice may dictate to a major extent the opportunities for genetic exchange among walrus groups.

b) Although Atlantic walruses have been characterized as more "sedentary" than the strongly migratory Pacific walruses (Mansfield 1973), they are also known to swim long distances in short periods (Wiig pers. comm.). Several authors (Freuchen 1935, Dunbar 1956, Currie 1968), citing as evidence primarily the observations by walrus hunters and the consistent timing of the arrival and departure of walruses in particular areas, have described migratory routes and schedules involving annual long-distance movements.

c) Aggregations of walruses at traditional haul-out sites on land have often been characterized as "herds", with the implicit assumption that they are social units of some kind. Although the evidence is not as strong for Atlantic walruses as for Pacific walruses, segregation, e.g. all-male groups at some haul-out sites, has been observed in Atlantic walruses during the summer and autumn. Since no mating

occurs in summer and autumn, when the terrestrial haul-out sites are occupied, it is possible that animals from different breeding areas share the same haul-out sites.

d) The abandonment of some terrestrial haul-out sites has been observed in Canada, Greenland and Svalbard. Such abandonment may be taken as evidence that the group of animals using the site was either extirpated or driven away by disturbance. It has sometimes not been possible to decide which of these causes was involved.

The Working Group attempted to use the above model in assessing the likely discreteness of groups of walruses in different areas. Two alternative hypotheses were considered, namely:

1. Wintering concentrations represent genetically separate stocks that migrate in summer to areas where walruses from different stocks mingle.
2. Summering concentrations, often involving a complex of traditionally occupied haul-out sites and often separated by large areas where walruses are absent or present only in very low density, represent stocks that are relatively sedentary, with animals moving away from the area only as far as necessary for access to food and open water in winter.

Very little evidence was available to support or refute either of these hypotheses, and it was agreed that both alternatives should be considered in our discussions of stock relations.

The Working Group agreed that it was useful to make a distinction between biological stocks which are genetically isolated, vs. management units, or functional stocks. The latter may include animals from more than one genetic stock, or alternatively be only a subunit of a genetic stock. The basis for defining management stocks may be practical (e.g. for purposes of catch monitoring or allocation, feasibility of designing and executing regular surveys to monitor abundance) or biological/behavioral (e.g. aimed at maintaining the traditional use by walruses of particular feeding, haul-out, or breeding sites).

The stocks proposed in SC/3/13 were reviewed and evaluated by the Working group, as follows (Figure 1, p.15):

1.1 Foxe Basin

Walruses are distributed mainly in the northern half of Foxe Basin where they are present in relatively high density all the year-round. Evidence from morphometric studies in the 1950s indicated that Foxe Basin walruses are larger than those in northern Hudson Bay (Mansfield 1958). No new data are available for northern Hudson Bay, but analyses of new material from Foxe Basin essentially agree with those of Mansfield in the 1950s (Garlich-Miller 1994).

Evidence on walrus distribution and movements, provided both by hunters and by scientists, is consistent with the view that the Foxe Basin group of walruses is largely isolated from other groups to the north (via Fury and Hecla Strait) and south (western Hudson Strait and Southampton Island area).

The Working Group concluded that there was sufficient evidence to regard the Foxe Basin

walruses as a separate management unit, and that there is a high probability that it is also a genetic stock.

1.2 Southern and Eastern Hudson Bay

The large gap in walrus distribution, year-round, along the west coast of Hudson Bay (approximately from Dawson Inlet south to Cape Henrietta Maria) provides a basis for separating the walruses in southern and eastern Hudson Bay from those in northwestern Hudson Bay. However on the east side of the bay the distribution of walruses appears to have been continuous historically from the Belcher Islands northward to the mouth of Hudson Strait. The apparent decline in numbers and reduced range of walruses in eastern Hudson Bay, with no obvious corresponding changes in northwestern Hudson Bay and western Hudson Strait, suggests that there is limited exchange between eastern Hudson Bay and these areas.

There is no basis for evaluating the relationships among the groups of walruses that haul out in summer on shoals and islands in southern and eastern Hudson Bay. It was noted that there is some open water in parts of James Bay and eastern Hudson Bay during winter, so some overwintering by walruses is possible. No direct evidence was available, however, of overwintering by walruses in this region.

The Working Group concluded that there may be reason to regard the southern and eastern Hudson Bay walruses as a separate management unit, but that there is no basis for viewing them as a separate genetic stock.

1. 3 Northern Hudson Bay - Hudson Strait - Northern Labrador - Southeast Baffin Island

Walruses are present all the year round in portions of this area, and they also migrate through Hudson Strait. Their distribution is essentially continuous from the Keewatin coast of northwestern Hudson Bay, throughout the Southampton Island, Coats Island, Foxe Peninsula, and Hudson Strait regions, and from the eastern entrance of Hudson Strait southward along the northern Labrador coast and northward along the southeastern Baffin Island coast. On the other hand, it was noted that densities are particularly high at specific localities, both in winter/spring (e.g. south of Akpatok Island, at the western end of Hudson Strait and in the leads along the north and south shores of Hudson Strait (McLaren and Davis 1982) and summer/autumn (e.g. terrestrial haul-out sites at Southampton and Coats Islands, Lady Franklin Island group, western and northern shores of Foxe Peninsula - MacLaren-Marex 1980, Richard and Campbell 1988, Mansfield and St. Aubin 1991).

In the absence of any direct evidence for stock differentiation (e.g. genetic analyses, tagging, morphometry), the Working Group inferred from the evidence on distribution and movements that the walruses in this area may belong to one genetic stock. It wished to emphasize, however, that considerable risk could be associated with treating them as a single management unit. There is a strong possibility that walrus groups have a high degree of fidelity to geographically separate breeding and haul-out sites. If they do, overhunting or disturbance could prevent the continued use by walruses of some parts of this large area. It was noted that the people living at settlements along the north and south shores of Hudson Strait must make long boat trips to offshore islands for walruses, whereas in the past they

were able to catch walruses regularly along shore and at near-shore islands.

1.4 Central West Greenland

Walruses overwinter in two discrete areas over shallow banks off central West Greenland (Born *et al.* 1994). These walruses leave the waters off West Greenland in spring and do not return until autumn. It has been suggested that some of them, particularly those in the southern group, move west to the east coast of Baffin Island. Others may move north to Upernavik and Avanersuaq municipalities. The deep water between the two banks has a very low density of walruses (Born *et al.* 1994; Heide-Jørgensen and Born 1995).

Mitochondrial genetic analyses have shown that the walruses wintering in the southern area off central West Greenland have different haplotypes that could indicate mixing (Cronin *et al.* 1994). However, due to the small sample size, the genetic evidence was judged to be inconclusive for purposes of identifying genetic discreteness.

On the basis of the hiatus in distribution between the two groups of wintering walruses, their differing responses to recent exploitation, and the fact that their status with regard to catches and population trends has been monitored separately (Born *et al* 1994; Heide-Jørgensen and Born 1995), the Working group concluded that these should be treated as separate management units, the southern group designated as the "Sisimiut group" and the northern one as the "Disko group". It was noted that a connection between the Sisimiut group and the southeast Baffin Island etc. group (*1.3* above), is likely.

1.5 North Water (Baffin Bay)

Walruses overwinter off Northwest Greenland and in the eastern Canadian Arctic in what appear to be several discontinuous aggregations (e.g. in the North Water polynya and polynyas in Wellington Channel and Cardigan Strait (Kiliaan and Stirling 1978, Finley and Renaud 1980, Born *et al.* 1995)). Summering grounds for these walruses are primarily in the eastern Canadian Arctic at terrestrial haul-out sites along the coasts of Ellesmere, Devon and Bathurst Islands (Koski and Davis 1979, Riewe 1992). Migrations through Lancaster and Jones Sounds, westward in spring and eastward in autumn, are well documented (e.g. Davis *et al.* 1978). One of ten walruses tagged in August 1993 at Bathurst Island was killed by Inuit off the north coast of Bylot Island in June 1994 (Stewart, unpubl.). Published reports referred to Greenlandic bullets being found in the bodies of walruses taken in the eastern Canadian Arctic (Freuchen 1921, Vibe 1950). Substantial northward migration into the North Water area in spring, along either Greenland or the Baffin Island coast, has not been documented in recent years (Koski 1980, Born *et al.*1994).

MtDNA analyses showed that walruses in the North Water area, hunted during the spring by Inuit in Avanersuaq municipality, are monomorphic (Cronin *et al.* 1994). There is a hiatus in walrus distribution off the northeast coast of Baffin Island (cf. Mansfield 1958, Koski and Davis 1979) that may be a secondary effect of overhunting.

The Working group concluded that the walruses centred in northern Baffin Bay, ranging from Avanersuaq municipality (N.W. Greenland) westward to Peel Sound in the eastern Canadian Arctic, probably comprise a separate genetic stock. Whether they are a genetic stock or not, this group should be considered a separate management unit. As was indicated for the Central West Greenland group, it may prove appropriate to subdivide this group further, for example on the basis of particular haul-out (summering) or overwintering

(breeding) sites.

1.6 East Greenland

The walruses present all the year-round in Northeast Greenland are geographically and genetically isolated from those in Northwest Greenland (Cronin *et al.* 1994). Some coastwise movement southward to South Greenland (mainly emigration) is possible. Movement across Fram Strait from East Greenland to Svalbard has been documented (Born and Gjertz 1993), but such movement is considered infrequent.

The Working Group agreed that the East Greenland walruses may be a separategenetic stock and that they should be considered a separate management unit.

1.7 Svalbard - Franz Joseph Land

Recent studies have demonstrated that the walruses in Svalbard and Franz Joseph Land belong to a common population that uses shore haul-out sites in summer and polynyas near both archipelagoes in winter (Gjertz and Wiig 1993). The possibility of a connection between these walruses and those that traditionally hauled out in summer on northern Novaya Zemlya deserves further investigation.

No genetic data are available for these walruses. It was agreed, however, that they should be treated as a separate management unit.

1.8 Kara Sea - Southern Barents Sea - Novaya Zemlya

Walruses definitely overwinter in the Pechora and White seas (e.g. Haug and Nilssen 1995), and there is reason to believe that some movement occurs through the Kara Entrance. The situation of walruses in the Kara Sea is entirely unknown, and any conclusion about their stock affinities would be speculation. For convenience, the Working group agreed to tentatively regard the walruses in the Kara Sea and southern Barents Sea and using Novaya Zemlya as a management stock, pending better information on them.

2. Estimates of walrus abundance

No dedicated walrus surveys that fully address questions of bias have been conducted in any of the areas in the North Atlantic where walruses occur. In some areas, densities obtained from aerial surveys can be used for extrapolation, but no information is available on submergence factors and haul-out patterns that are likely to affect the survey results. In other areas, counts at terrestrial haul-out sites provide information on a segment of the population, but do not correct for animals that were at sea during the survey and, for most areas, do not give complete simultaneous coverage of all haul-out sites that are likely to be used by the walrus stock. Finally, in some areas, figures on abundance are so old or poorly documented that they are no longer considered valid.

2.1 Foxe Basin

The best available information on present abundance of walruses in Foxe Basin are visual systematic strip-transect aerial surveys conducted in August 1988 (Mean 5200 95% CI 900-30500) and in August 1989 (Mean 5500 95% CI 2700-11200) (Cosens et al. 1993). The results of these surveys, which are considered as reference or index points for future surveys,

are not corrected for animals that were submerged during the survey. Also, some potential walrus habitats were not surveyed in either year.

2.2 Southern and Eastern Hudson Bay

Virtually nothing is known about historical or current sizes of walrus populations in this area. A group of walruses was counted in October 1978 at the terrestrial haul-out site at Cape Henrietta Maria. The Working Group was not able to assess the number of walruses in southern and eastern Hudson Bay.

2.3 Northern Hudson Bay - Hudson Strait - Northern Labrador - Southeast Baffin Island

Surveys were conducted using different methods in different years in parts of the range of this proposed stock. Aerial surveys in northern Hudson Bay revealed a count of about 2400 walruses in the summers of 1976-77 (Mansfield & St Aubin 1991). Richard (1990) reported sightings of about 1800 walruses from aerial surveys in parts of northern Hudson Bay and western Hudson Strait in 1988. Aerial survey counts of 600-700 were reported for an island off southeast Baffin Island in August 1978 (MacLaren Marex 1980), and Richard and Campbell (1988) estimated a summer population in southeast Baffin Island of about 1000 in the late 1970's, based in part on the count of 600-700 reported by MacLaren Marex (1980). Aerial surveys conducted during March 1981 gave uncorrected estimates of 223 walruses in southwestern Davis Strait and 850 in Hudson Strait (McLaren and Davis 1982).

The various counts and estimates reported above cannot simply be added. The Working Group was unable to produce an estimate for this stock from the data available.

2.4 Central West Greenland

The main wintering grounds have been surveyed from aircraft six times since 1981. The uncorrected abundance estimates indicate that 200-300 walruses are found in these areas during winter. There are recent indications of a decline in walrus abundance in the southern stratum. i.e. in the Sisimiut group (Heide-Jørgensen and Born 1995).

2.5 North Water (Baffin Island)

No complete population estimates are available, but surveys of the North Water in the late winter of 1979 indicated that around 700 walruses were present along the ice edge between Jones Sound and Talbot Inlet (Finley and Renaud 1980). Summer surveys indicate that 500-800 walruses move west into the eastern Canadian Arctic in spring (Davis *et al* 1978).

2.6 East Greenland

The only count covering a large area in East Greenland is from 1984, when two sport kayakers counted some 329 walruses from Nordostrundingen (c. 81°N) to Scoresby Sound (c.70°30'N).

2.7 Svalbard-Franz Joseph Land

An estimate has been made from a count of about 750 male walruses at haul-out sites in Svalbard. To account for an equal number of non-calf females, 750 was multiplied by two and 500 added arbitrarily to derive a rough minimum estimate of total population size of about 2000 for the Svalbard-Franz Joseph Land region (Gjertz and Wiig submitted). The

estimation procedure was questioned, as no experiments were conducted to simultaneously estimate sex ratio in the population, and because other male aggregations may have been overlooked.

2.8 Kara Sea - Southern Barents Sea - Novaya Zemlya

No population estimate is available. A total of 138 walruses, including females and calves, were counted in 1994 in the Pechora Sea (Haug and Nilssen 1995). Russian literature suggests that the population numbers a few hundred.

3. Catch statistics and recruitment rates

3.1 Current catches

The most recent catch statistics for each stock were reviewed and summarized (Table 1, p 16). Under-reporting continues to be a problem in all areas and most estimates are subject to reporting errors. Department of Fisheries and Oceans (DFO; Canada) records indicate "data quality" by identifying the percentage by which the reported catch may under or over estimate the true catch (e.g. 50 $\pm$ 50% indicates the estimated harvest was 50 but may have been 25 to 75). For the present status review, data with quality ratings greater than 100% were not used. All catch estimates have been rounded to help reflect their imprecision. There are no recent data for some stocks.

Walruses are killed but not retrieved in all stocks but loss rates have been estimated for only a few hunting situations. They range from 0 to 50% (Freeman 1970; Smith and Taylor 1977) but cannot be broadly applied because they vary with location, season, hunting methods, and hunter skill. Orr *et al.* (1986) concluded that 32% of shot walruses were killed but not retrieved during summer hunts in Foxe Basin. This figure has been used to correct the Foxe Basin reported catch although the proportion of the catch made and the loss rates during the winter hunt are unknown.

Born and Kristensen (1981) recorded the outcome of 34 walrus hunts in the Thule District in the 1980s. They found that 15% of shot walruses were not retrieved. Orphaned calves and severely wounded animals were presumed to have died, making the killed but not retrieved estimate 25%. This figure has been applied to the reported catch for Thule but not to catches in other areas where this stock is hunted.

The loss rate in east Greenland has been estimated at 23% (Born *et al*. 1995). This figure has been applied to the reported and estimated catches there.

3.2 Net recruitment rate

In the absence of data specific to the Atlantic walrus, the Working Group accepted a range of net recruitment rates of 2-5%, indicated from a simulation of a hypothetical population of Pacific walruses (DeMaster 1984).

3.3 Estimates of sustainable removals

Catch statistics and net recruitment rates were used to estimate the probable range of population sizes required to sustain current removals. Two sets of estimates were used - the estimated hunting mortality from Table 1 (p.16) which is adjusted for loss rates where these

are available; and a conditional estimate of hunting mortality which assumes a 30% loss rate for stocks lacking specific loss rate estimates. Population sizes are calculated using 2 and 5% net recruitment rates (Table 2, p.17).

4. Anthropogenic effects other than hunting

In Working Paper SC/3/13 information on the anthropogenic effects on walruses other than hunting was summarised and evaluated. The Working Group addressed the questions raised by the Council on potential effects on walruses of recent environmental changes (e.g. disturbance, pollution), and changes in food supply. The Working Group considered the potential effects on walrus populations of the following:

- Disturbance from various types of noise (e.g, that caused by aircraft and shipping, offshore exploration and operational activities, military activity);
- Pollution (e.g. spilled oil, heavy metals, organochlorine compounds, radioactivity, nuclear activity);
- Changes in food availability and interactions with fisheries;

4.1 Disturbance from various types of noise

The Working Group discussed the potential effects on walruses of noise from aircraft, ships and offshore exploration and operational activities.

4.1.1 Aircraft and shipping

Walruses react to the noise of aircraft. Although their reactions are variable, they usually escape into the water when the aircraft gets close. In some cases this can lead to stampeding with the result that calves are crushed to death. The long-term effects of repeated and continued disturbance from aircraft noise, however, cannot be evaluated easily. The Working Group could not rule out the possibility that walruses, like many other species, habituate to noise and other forms of disturbance that are not associated with other types of impact. Cases in which walruses have permanently abandoned uglit (e.g. western and eastern Greenland) have involved factors in addition to noise disturbance, such as hunting and smell of humans, dogs, offal etc., that could have been as, or more, significant.

Walruses also react to noise from boats and ships and they usually exhibit an escape response if the vessel gets too close. However, the degree of responsiveness is highly influenced by the type of noise and its source level, the social and behavioral situation of the walruses, and their previous experience with ship noise, especially whether it was associated with more drastic effects such as hunting. The Working Group did not feel that it was in a position to evaluate whether walruses, like many other species, habituate to noise from ships and boats, nor was the available information sufficient for evaluating the long-term effects of ship and boat traffic on walrus populations.

Because most walrus populations have been subjected to hunting pressure, in many cases intensive and over many years, and because various other human activities have modified walrus habitat through time, it will be very difficult to demonstrate long-term effects, at the population level, caused specifically by exposure to noise.

4.1.2 Offshore exploration and operational activities

Activities associated with oil and gas exploration are now occurring in many areas inhabited by Atlantic walruses. In some areas these activities are large-scale. For example, in the Svalbard area there has been extensive offshore explorations for oil since the early 1980s, and exploratory drilling is presently under way a little south of Bear Island. The feasibility of exploitation on Spitsbergen Bank between Bear Island and the island of Hopen is being evaluated, and exploitation is expected to be initiated before the end of this century. The world's largest field of liquified natural gas, the Stockmann field, is found in the Barents Sea.

In the western Russian Arctic, large oil and gas fields exist in the southern Barents Sea from the White Sea northeast to southern Novaya Zemlya, and along the west coast of Novaya Zemlya. Furthermore, large fields in the Kara Sea stretch eastward to the Yamal Peninsula. Seismic surveys started in 1971, and exploratory drilling in 1981. Several drilling platforms are present along western Novaya Zemlya and in the Kara and Pechora Seas, and oil is now produced on Kolgujev Island. These oil fields overlap with the summer distribution of walruses and therefore large-scale petroleum activities pose a potential threat to walruses in these areas.

At present, there is no exploitation of non-renewable resources in Greenland. Since 1991, however, marine seismic activity related to oil exploration has occurred along the coasts north to 79°N in eastern Greenland and 77°N in western Greenland.

The Working Group was not aware of any offshore petroleum development activity presently occurring in the eastern Canadian Arctic in areas currently occupied by walruses.

In a study of the effects on Pacific walruses of offshore drilling, the animals were found to exhibit only weak short-term behavioral responses to the drilling activities *per se*. They reacted, however, to the ice-breaking activities associated with these operations by moving away for a short time.

The Working Group was not aware of any studies which allowed it to make any conclusions about long-term effects of various exploration and operational activities on walruses.

4.1.3 Military activity

The Working Group was not able to evaluate the extent to which military activity (e.g. rocket launching, explosions) in different areas (e.g. southern Barents Sea) may adversely affect walruses.

4.2 Pollution

4.2.1 Oil spills

The Working Group was not aware of any studies that specifically addressed the direct or indirect effects of oil on walruses.

Studies of seals have shown that surface contact with oil causes stress, and temporarily irritates the eyes and skin. Some studies have indicated that ingestion of oil leads to physiological and chemical changes, possibly including effects on reproduction. Most evidence of internal organ and tissue damage from oil ingestion by seals is inconclusive for

walruses. Inhalation of aromatic hydrocarbons from an oil spill caused mental debilitation in spotted seals. Walruses exposed to an oil spill are likely to show some of these reactions. However, walruses depend almost entirely on blubber to minimize heat loss. Their sparse pelage presumably is of little value as insulation, and their skin is thick and very tough. It is therefore unlikely that exposure of the skin to oil would have any appreciable thermal effect except in newborn walruses. Perhaps the oiling of newborns that have not yet accumulated a thick insulating blubber layer would affect their ability to keep warm. Consequently, oil spills during the walrus calving season (late May-early June) in areas where females and young are present could, theoretically, have a greater adverse impact than spills at other times and in other areas.

It was the opinion of the Working Group that some features in the ecology of walruses make them more vulnerable to the harmful effects of spilled oil than are many other marine mammals:

i) Due to the high level of gregariousness in walruses, an oil spill that affects one would be likely to affect at least several individuals. Furthermore, an oil spill in one area may be transferred by individuals to other walruses on clean sites (for example oil-fouled walruses will rub oil onto the skin or into the eyes of other individuals during haul out).

ii) Walruses tend to inhabit coastal areas and areas of relatively loose pack ice. Spilled oil is likely to accumulate in such areas. Walruses therefore have a high risk of being fouled not only in the water but also when they haul out on rocks or land.

iii) Because they are benthic feeders, walruses may be more likely to ingest petroleum hydrocarbons than are most other pinnipeds. Benthic invertebrates are known to accumulate petroleum hydrocarbons from food, sediments and the surrounding water. The implications for walruses may be serious since contaminants in their food are certain to build up in their own tissue. In addition, oil contamination may reduce the biomass or productivity of the invertebrate communities that sustain walruses. Walruses would then be forced to seek alternative food or feeding areas. In such a situation, it cannot be assumed that alternative types of food or feeding areas are actually available, however, so such a scenario could prove detrimental to the walruses.

The Working Group was not able to evaluate the effects of a recent major oil spill on land in northwestern Russia. It noted, however, that the massive contamination could eventually reach marine waters and affect walruses in some way, especially the small population in the Pechora Sea region.

4.2.2 Heavy metals and chlorinated hydrocarbons (CHCs)

The Working Group considered the potential effects on walruses of two classes of pollutants that have given particular cause for concern in marine mammals: heavy metals and chlorinated hydrocarbons (CHCs). Few studies, however, have been made of these pollutants in walruses.

The three metals which give greatest cause for concern are mercury (Hg), cadmium (Cd) and

lead (Pb). The levels of heavy metals in Pacific walruses have been found to be very high. In certain organs these levels exceeded those considered safe for human consumption. Levels in Atlantic walruses, however, have been found to be less than in Pacific walruses. Certain metals have been found in relatively high concentrations in walruses from Foxe Basin (Cd), southern Hudson Bay (Pb and Hg) and northwest Greenland (Hg).

CHCs are anthropogenic chemicals which accumulate mainly in blubber and are of concern because of their potentially harmful effects on walrus reproduction, the walrus immune and hormone systems, and human health through consumption of contaminated walrus tissue. Walruses have generally low concentrations of CHCs. Especially high concentrations have, however, been found in Eastern Hudson Bay compared to other areas where this has been studied (i.e. other parts of Canada, West Greenland and Alaska). It is speculated that the high concentrations might be related to the significant consumption of ringed seals by these individuals.

The Working Group was concerned about the findings of comparatively high levels of CHCs in some walruses. It was, however, unable to reach a conclusion about what these findings mean to the walruses or to the people who consume them.

4.2.3 Radioactivity and nuclear activity

The Working Group noted that only few studies have been made on radioactive elements in walruses.

In connection with an airplane crash in the Avanersuaq area (Thule area, northwestern Greenland) plutonium was released from nuclear bombs to the surroundings. Analyses of plutonium in sediment, bivalves (including walrus food items) and other benthic organisms collected at the crash site showed values to be elevated from background levels. A study concluded, however, that in this area the plutonium levels in the animals at higher trophic levels such as birds, seals, and walruses were hardly significantly different from the fall-out background. Recent analyses gave the same results.

In general, nuclear weapon tests in different parts of the world caused a widespread fall-out of plutonium. However, the levels of this element, and other radionuclides such as Cs^{137}, reported so far from analyses of marine mammals are not considered high enough to pose a health risk to the animals.

No information is available about the effects on walruses of the nuclear activities in the Novaya Zemlya region and the Working Group could not evaluate the potential effects. Second-hand information, however, from Russian sources indicates that certain walrus haul-out sites in Novaya Zemlya were deserted in the 1960s due to nuclear testing on this island.

4.3 Changes in food availability and interactions with fisheries

The Working Group considered the potential effects on walruses of changes in food supply and direct and indirect effects of interactions with fisheries.

Changes in the density and availability of food will obviously influence the size of walrus

stocks. Fluctuations in stocks of walrus prey might be caused by changes in both abiotic and biotic conditions driven, for example, by predator-prey relationships or anthropogenic factors. However, there is no information available to determine whether or to what extent such changes have influenced the stocks of Atlantic walruses. The Working Group noted, however, that mere abundance of walrus prey does not necessarily trigger or sustain population growth. Despite the fact that walrus food must have been abundant in the Svalbard region for a long time, and that walruses have been completely protected there since 1952, walruses have only recently moved back into the area. This could mean that in the case of a walrus population which has been seriously reduced by hunting, factors other than prey density and availability govern the animal's ability or willingness to exploit a food resource. Walruses are highly conservative in choice of food and selection of habitat. So factors such as need to learn or a lack of experience may have played a role in the evident failure of the walruses at Svalbard to take full advantage of the rich feeding areas potentially available to them.

The Working Group concluded that although the direct and indirect effects of fisheries on Atlantic walruses are basically unknown, some effects very likely do occur. Fisheries using bottom-draggers have destroyed potential walrus feeding habitat at Svalbard. The noise from fisheries in or near walrus habitat and the disturbance of the sea floor caused by trawling have probably contributed, perhaps synergistically, to the continued depletion of the stock of walruses wintering off central West Greenland.

Intensive fisheries along the coasts of Svalbard and in the Barents Sea also may have prevented walruses from repopulating areas that, from a purely trophic perspective, still appear to be suitable walrus habitat.

5. Recommendations

The Working Group identified many information gaps. They are listed here with possible research approaches. This listing does not preclude the investigation and application of other methods. Items are not listed in any order of priority because priorities will vary according to stock and management objectives.

1. Determine stock identity, especially for international, hunted stocks (e.g. using mtDNA, nuclear DNA, morphometrics, tagging, contaminants, etc.).
2. Determine stock size and/or trend, especially of hunted stocks (e.g. using aerial surveys, haul-out monitoring, biological sampling), as suits management objectives.
3. Evaluate effects of industrial activities including disruption of behaviour and contaminant pathways and effects (e.g. experimentation, feeding habits, physiology).
4. Improve catch statistics and expand to include information on (at least) sex, age, location and loss rates (e.g. biological sampling).
5. Evaluate behaviour related to within-population segregation (e.g. haul-out monitoring, attachment of satellite-linked radio transmitters (PTTs));
6. Assess critical habitat with respect to fisheries interactions and industrial activity (e.g. using PTTs).

6. List of documents

SC/3/6	Report of the 2nd Walrus International Technical and Scientific (WITS) Workshop, 11-15 January 1993, Winnipeg, Manitoba, Canada (eds. R.E.A. Stewart, P.R. Richard & B.E. Stewart)
SC/3/8	T. Haug & K. T. Nilssen, "Observations of Walrus *Odobaenus Rosmarus* in the Southeastern Barents Sea in February 1993".
SC/3/13	E.W. Born, I. Gjertz and R.R. Reeves, Population assessement of Atlantic walrus (*Odobenus rosmarus rosmarus*).
SC/3/16	M.P. Heide-Jørgensen and E.W. Born, Monitoring walrus abundance off West Greenland.

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- (DFO) 1993, *Annual Summary of Fish and Marine Mammal Harvest Data for the Northwest Territories*, Vol. 4, 1991-1992, Freshwater Institute, Department of Fisheries and Oceans, Winnipeg:xiv + 69pp.
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Figure 1. Delineation of possible sub-groups used in review of the status of Atlantic walrus

1. Foxe Basin
2. Southern and Eastern Hudson Bay
3. North Hudson Bay - Hudson Strait - North Labrador - Southeast Baffin Island
4. Central West Greenland
5. North Water (Baffin Bay)
6. East Greenland
7. Svalbard - Franz Joseph Land
8. Kara Sea - South Barents Sea - Novaya Zemlya

Table 1 Estimated removals of Atlantic walrus by stock area

Stock	Year	Reported average annual catch (ref)	Year	Estim. loss rate (ref)	Estim. total removal	References & comments
Foxe Basin	1988/89 to 1992/93	200 (1)	1980s	32% (2)	300	(1) DFO, 1991...94 (2) Orr *et al.* 1986
S. & E. Hudson Bay		35 (3)		nd	35+	(3) Richard & Campbell 1988 (estimates out-dated and of poor reliability)
N. Hudson Bay - Hudson Strait - N. Labrador - S.E. Baffin Island	1988-89 to 1992-93 1972-85	160 (1) 70 (3)		nd	230+	(1) DFO, 1991...94 (3) Richard & Campbell 1988 (estimates out-dated and of poor reliability)
Central West Greenland *- Disko Group* *- Sisimiut Group*	 '80-'87 '80-'87	 10(5) 40(5)		 nd nd	 10+ 40+	(5) 10 from Upernavik, Born *et al* 1994
North Water (Baffin Bay)	1988-89 to 1992-93 1970-80 1980-87	20 (1) 250 (4) 10 (5)	1980s	nd 25% (6)	360+	(1) DFO, 1991...94 (4) Born (1987) estimated for Thule only. (5) 10 from Upernavik, Born *et al* 1994 (6) Born & Kristensen 1981
East Greenland	'80 to '87	16 (7) or 20 (8)	1980s	23% (8)	20 to 25	(7) SC/3/13 - reported catch is an underestimate (8) Born - estimated from interviews (SC/3/13)
Svalbard - Franz Joseph Land		protected			+ (9)	(9) Small unreported kill at Franz Joseph Land (SC/3/13). From 1989-93 there were 4 killed during scientific studies
Kara Sea - S. Barents Sea - Novaya Zemlya		protected			+ (9)	(9) Small unreported kill (SC/3/13)

Table 2 Calculations of size of various Atlantic walrus stocks necessary to sustain estimated current removals

Stock		**Required Population assumng NRR* of 0.05**	**Required Population assumng NRR of 0.02**	**Estimated total annual removal (from Table 1)**	**Required population assuming NRR of 0.05**	**Required population assuming NRR of 0.02**	**Abundance Estimate**	**Probable trend [1]**
Foxe Basin		4000	10000	300	6000	15000	5500 (95% CI 2700-11200)	stable?
S. & E. Hudson Bay		700	1750	50¤	1000	2500	no data	unknown
N.Hudson Bay - Hudson Strait - N. Labrador - S.E. Baffin Isl.		4600	11500	330¤	6600	16500	no data	unknown
North Water (Baffin Bay)		5600	14000	380¤¤	7600	19000	no data	declining?
Central West Greenland *- Disko group* *- Sisimiut grp.*		 200 800	 500 2000	 15¤ 60¤	 300 1200	 750 3000	no data	declining
E. Greenland		400	1000	25	500	1250	no data	stable/ increasing?
Svalbard-Franz Joseph Land				+			2000	increasing
Kara Sea - S. Barents Sea - Novaya Zemlya				+			no data	increasing?

* NRR = Net Recruitment Rate
[1] Derived from full Scientific Committee discussions
¤ where no stock-specific data were available, 30% was used
¤¤ 25% for Thule, 30% for Canada and Upernavik

Appendix 1

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Annex 3

Report of the Scientific Committee Working Group to plan NASS-95

Copenhagen, 2 February 1995

1 - 3 Opening procedures

The Chairman, Finn Larsen, welcomed the participants (Appendix 1) to the third meeting of the Working Group. The agenda as adopted is given in Appendix 2. The Chairman acted as rapporteur.

4. Review of available documents

Papers of relevance to the Working Group were SC/3/7, SC/3/9 and SC/NASS-95 WG/WP1.

5. Identification of priority species

After some discussion on whether the earlier pilot whale abundance estimates could be improved without carrying out a new survey, it was decided to keep pilot whales on the list of priority species.

6. Area coverage

6.1 Areas planned to be covered by national research programmes

Faroe Islands - As given in SC/3/7.
Greenland - Due to other commitments, there will be no Greenlandic participation in NASS-95.
Iceland - As given in SC/3/7.
Norway - As given in SC/3/7
(Planned Icelandic and Norwegian coverage is shown in Appendix 3)

6.2. Other areas of interest

The Working Group noted that for fin and pilot whales, present survey plans do not cover important areas in the southeastern part of the area covered by earlier NASS surveys, *i.e.* along the British Isles and the Iberian Peninsula. It was also noted that for these species there will be an important lack of coverage in the Northwestern Atlantic, *i.e.* along West Greenland and Northern North America. The Working Group further noted that for minke whales, present plans do not cover important areas, such as around the British Isles and around Greenland.

6.3 Coordination of survey effort

The Working Group agreed that the practical coordination of survey effort would be done by correspondence.

7. Methodology

7.1 Platform
As given in SC/3/7

7.2 Data collection and analysis
The Working Group recommends continuous I/O effort in passing or delayed closing mode. If the track line is left for species identification or mapping of sightings, the original line should be reentered in such a way that the likelihood of animals on the searchline being overlooked is small, and the analysis of these sightings should be relative to the original searchline. For this purpose, good positioning equipment is needed. The Working Group recognises the importance of closing on sightings which are suspected to be of unexpected species.

The Working Group recommends that sufficient time and effort should be given to mapping out sightings of pilot whales into subgroups, at least those close to the searchline (<0.5 nm), using high precision positioning systems such as GPS. The use of high-power binoculars for species identification and group size counts is also recommended.

Cues for all observations should be recorded; in particular surfacings for baleen whales and deep dives should be identified when possible. For sperm whales and northern bottlenose whales, the most important cue is the deep dive, and this point or the point where the animal is last seen at the surface should be recorded, at least up to the point where the animal is abeam of the vessel or for a time period at least as long as it would have taken the vessel to come abeam of the sighting in case the vessel slows down or diverts from the searchline.

The Working Group furthermore urges the Faroes to consider how to improve the sampling procedure for pilot whale sightings.

7.3. Problems with defining group size in pilot whale surveys
See item 7.2 above.

7.4. The use of US Navy Integrated Undersea Surveillance System data
There was nothing new to report under this item.

7.5. Improvements in present methods and new techniques for data collection
Larsen will distribute a description of the GPS-based data recording system used by Greenland Fisheries Research Institute.

Larsen will also obtain and distribute information on the high-power binoculars on poles used during the SCANS surveys.

7.6 Survey mode considerations

See 7.2. above

7.7. Collection of behavioural and ancillary data
There was nothing new to report under this item.

8. External expertise

No need for external expertise was noted.

9. Increasing the coverage of NASS-95: update on progress

The Working Group was informed that Canada has been approached by Iceland about participating in NASS-95. Canada expressed a serious interest in the surveys, but no commitment has so far been forthcoming.

It was noted by the Working Group that Canada is considering establishing an incidental sightings program for marine mammals on board vessels of opportunity.

10. Co-operation with other projects

10.1. Whale abundance in relation to environmental factors
There was nothing new to report under this item.

11. Funding

The Working Group noted that it may be possible to use part of the Scientific Committee budget to fund selected parts of NASS-95. It was also noted that the budget may be used for buying equipment that could be used during the surveys.

12. Other business

The Working Group agreed that there was no need for further meetings unless new parties become involved in the surveys

13. Adoption of report

The report was adopted on Friday, 3 February 1995.

Appendix 1

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Appendix 2

Agenda

1. Chairman's welcome and opening remarks

2. Adoption of agenda

3. Appointment of rapporteur

4. Review of available documents

5. Identification of priority species

6. Area coverage
   - 6.1. Areas planned to be covered by national research programmes
   - 6.2. Other areas of interest
   - 6.3. Coordination of survey effort

7. Methodology
   - 7.1. Platforms
   - 7.2. Data collection and analysis
   - 7.3. Problems with defining group size in pilot whale surveys
   - 7.4. The use of US Navy Integrated Undersea Surveillance System data
   - 7.5. Improvements in present methods and new techniques for data collection
   - 7.6. Survey mode considerations
   - 7.7. Collection of behavioural and ancillary data

8. External expertise

9. Increasing the coverage of NASS-95: update on progress

10. Co-operation with other projects
    - 10.1. Whale abundance in relation to environmental factors

11. Funding

12. Other business

13. Adoption of the report

Appendix 3

SECTION 3.2

National Progress Reports

Faroe Islands

Progress Report on marine mammal research 1994

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This paper reports on the activities of the Faroese Museum of Natural History, the Department of Natural Science of the University of the Faroe Islands, the Faroese Fisheries Laboratory, and the Department of Fisheries, Faroese Government.

1.1 Cetaceans

1.1.1 Sightings data

The sources of sightings are: the Faroese Fisheries Inspection Services (*Tjaldur (T), ÓlavurHalgi (OH),* the Faroese fisheries research vessel, *Magnus Heinesen* (*MH*), the vessel *Hvítiklettur* (*H*), most of the local ferries, *Ritan, Sam, Ternan, Ternan I, Tróndur, Teistin*, the weekly ferry between the Faroes and Aberdeen, Scotland (S*myril*), as well as local individuals (Local) and fishing baoats (*Polar Princess*, *Oyrnafjall*, *Sea Star*, *Skrápur*).

It is worth pointing out that more humback whales were sighted this year than in the previous years.

Table 1

Offshore whale sightings around the Faroe Islands, 1994
(Species given in Latin - English - Faroese)

Date	Position	Number	Comments	Source
M. novaeangliae - Humback whale - Kúlabøkur				
2 July	62°00'N 06°08'W	1	13.30 GMT	*OH*
17 September	60°42'N 07°20'W	1	16.00 GMT, No wind	*Polar Princess*
15 October	61°00'N 06°40'W	1	15.00 GMT	*OH*
B. physalus/borealis - fin/sei whale - Nebbafiskur/seihvalur				
20 February	65°19'N 02°35'W	1	Bad weather	*H*
16 March	65°30'N 05°20'W	1	Bad weather	*H*
17 July	56°45'N 20°30'W	4		*MH*
B. physalus - Fin whale - Nebbafiskur				
22 February	63°32'N 03°13'W	3-4	2 small, 2 large	*H*
11 March	64°32'N 06°39'W	1	Swimming W	*H*
16 March	65°36'N 05°15'W	1	Bad weather	*H*
8 October	60°54'N 05°39'N	1	14.00 GMT, SW 10 m/sec	*Polar Princess*
10 November	57°22'N 17°28'W	1	Fine weather	*Oyrnafjall*
11 November	64°36'N 06°07'W	2	Swimming S	*H*
12 December	300 nautical Miles N off Azores	7	Swimming E	*Oyrnafjall*
B. acutorostrata - Minke whale - Sildreki				
13 March	64°47'N 07°24'W	1	Breaching	*H*

21 March	64°01'N 05°51'W	1	Breaching	*H*
15 June	61°00'N 04°28'W	1	18.30 GMT, NW 8 m/sec	*Sea Star*
17 July	62°19'N 03°03'W	2	05.10 GMT, SW 7 m/sec	*Sea Star*
23 September	61°09'N 06°34'W	1	08.00 GMT, SW 16 m/sec	*Polar Princess*
1 October	61°41'N 06°18'W	1	17.45 GMT, no wind	*Polar Princess*
9 October	60°45'N 06°16'W	1	09.00 GMT, SW 10 m/sec	*Polar Princess*
15 October	61°30'N 07°20'W	2	11.00 GMT	*OH*
17 October	62°11'N 07°17'W	1	16.00 GMT	*OH*
3 November	62°56'N 07°37'W	1		*H*

P. macrocephalus - Sperm whale - Avgustur

04 September	60°48'N 09°50'W	2		*MH*
15 April	61°00'N 09°21'W	1		*MH*
09 May	61°22'N 07°36'W	1		*MH*
17 August	64°06'N 00°17'W	2		*MH*
August-September	Many North of the Faroes		*OH*	
1 October	62°44'N 07°27'W	5	15.25 GMT	*OH*
10 October	60°56'N 05°30'W	1		*MH*
16 October	60°49'N 05°52'W	2		*MH*

H. ampullatus - Bottlenose whale - Døglingur

22 February	63°27'N 03°02'W	3	Swimming E	*H*
11 March	64°42'N 06°01'W	1	Bad weather	*H*
13 March	64°47'N 07°23'W	2+3	Bad weather	*H*
14 March	65°07'N 05°28'W	2	Bad weather	*H*
15 March	65°37'N 05°31'W	2-3	Bad weather	*H*
15 March	65°34'N 05°07'W	3-more ?	Bad weather	*H*
30 April	60°54'N 07°43'W	5-6		*MH*
14 November	64°18'N 05°57'W	2		*H*
17 November	64°36'N 06°07'W	6	2 ad __ white front	*H*
17 November	64°36'N 06°07'W	4	Not the same	*H*
18 November	64°39'N 06°19'W	9	2 pods, not the same	*H*

O. orca - Killer whale - Bóghvítihvalur

23 April	62°26'N 07°45'W	5	Swimming E	*Skrápur*
27 May	60°58'N 05°26'W	15		*MH*
08 August	64°54'N 10°30'W	1		*MH*
09 August	64°13'N 09°00'W	10-15		*MH*

G. melas - Long-finned pilot whale - Grindahvalur

01 February	64°50'N 05°35'W	1	Freed from salmon line	*H*
08 February	59°27'N 14°33'W	200	Swimming NE	*MH*
11 February	55°32'N 19°56'W	30		*MH*
12 February	55°28'N 20°15'W	200	Swimming W	*MH*
20 February	59°19'N 15°28'W	30	Swimming N	*MH*
20 February	59°22'N 15°17'W	30	Feeding	*MH*
17 July	56°45'N 20°30'W	50		*MH*
17 July	57°26'N 19°39'W	200	Mixed with *L.sp.*	*MH*
18 July	57°10'N 17°29'W	30		*MH*
19 July	60°00'N 13°05'W	50+200	2 schools	*MH*
11 August	63°10'N 06°05'W	50		*MH*
18 August	63°33'N 02°42'W	15		*MH*
7 November	63°38'N 07°51'W	50-100		*H*
14 November	64°50'N 05°34'W	50		*H*
5 December	45°35'N 27°17'W	c.10	Swimming N	*Oyrnafjall*
15 December	49°31'N 21°23'W	150	Fine weather	*Oyrnafjall*

L. acutus - Atlantic white-sided dolphin - Hvítskjórutur springari				
20 August	60°39'N 08°27'W	3		*MH*
20 August	60°39'N 08°27'W	20		*MH*
20 August	60°42'N 08°13'W	50		*MH*
L. acutus/albirostris - White-sided/white-beaked dolphin - Hvítskjórutur/kjafthvítur springari				
12 July	59°28'N 15°02'W	20		*MH*
17 July	57°26'N 19°39'W	50	Mixed with *G.m.*	*MH*
19 July	60°09'N 12°35'W	30		*MH*
20 August	60°30'N 09°17'W	20		*MH*
20 August	60°42'N 08°13'W	50		*MH*
15 October	61°10'N 07°15'W	several 100		*MH*
P. phocoena - Harbour porpoise - Nísa				
20 August	60°37'N 08°33'W	6		*MH*

Table 2
Sightings of whales from coastal vessels in the Faroe Islands 1994 (Species given in Latin - English - Faroese)

Date	Locality	Number	Time	Comments	Source
M. novaeangliae - Humback whale - Kúlabøkur					
4 July	Hestfjørður	1	06.45	Tail and flipper	*Sam*
B. acutorostrata - Minke whale - Sildreki					
13 March	Vestmannasund	2	11.30	Swimming North	*Sam*
10-14 June	Vestmannasund	some	sev. times		*Ternan*
19 June	Hestfjørður	1	17.20		*Sam*
21 June	Hestfjørður	1	08.30	Close to coast	*Sam*
25 June	Vestmannasund	1	15.20	Swimming East	*Ternan*
28 June	Vestmannasund	1	17.12	Rapidly swimming North	*Ternan*
29 June	Vestmannasund	6	11.40	Lying still	*Ternan*
30 June	Skopunarfjørður	2	17.25	Swimming South	*Sam*
30 June	Skopunarfjørður	some	17.50	Mixed with *H. amp.*	Local
6 July	Hestfjørður	1	18.30	Breaching	Local
7 July	Hestfjørður	1	20-21	Feeding	Local
10 July	Vestmannasund	4	08.45	Swimming South	*Ternan*
23 July	Vestmannasund	1	19.30	Swimming North	*Ternan*
29 July	Vestmannasund	5ad+1juv	all day	1 juv. hunted by *O.orca*	*Ternan*
Seen several in all July and August in Hestfjørður					Sam
17 August	Vestmannasund	2	10.00	Swimming North	*Ternan*
21 August	Skopunarfjørður	1	18.25	Swimming South	*Sam*
22 August	Skúvoy	1	08.00	Swimming North	*Sam*
22 August	Hestfjørður	1	08.30	Swimming South	*Sam*
22 August	Hestfjørður	1	17.15	Swimming South	*Sam*
25 August	Vestmannasund	1	18.50	Feeding	*Ternan*
29 August	Vestmannasund	1	17.20	Swimming South	*Ternan*
3 November	Vestmannasund	1	09.48	Small, swimming North	*Sam*
B. physalus - Fin whale - Nebbafiskur					
14 June	Vestmannasund	1			*Ternan*
29 June	Vestmannasund	1	08.35	Swimming South	*Ternan*
30 June	Hestfjørður	5-7	10.00	Swimming North	*Sam*
8 July	Hestfjørður	2	19.40	ad. + calf	*Sam*
H. ampullatus - Bottlenose whale - Døglingur					

30 June	Vestmannasund	2-3	10.30	Mixed with *B. acu.*	Local
30 June	Skopunarfjørður	2-3	17.50	Mixed with *B. acu.*	Local
30 June	Skopunarfjørður	5-6	18.10	Close to coast	*Sam*
21 September	Sandvík	4		Close to coast, very big	Local
O. orca - Killer whale - Mastrarhvalur					
30 June	Vestmannasund	1	11.55	Swimming South	*Ternan*
29 July	Vestmannasund	1 _	all day	hunting juv. *B.acu.*	*Ternan*
G. melas - Long-finned pilot whale - Grindahvalur					
11 April	Æðuvík	1 pod		Swimming away	Local
22 April	Lopra	1 single		Swimming round	Local
19 August	Skúvoy	a pod	13.30	Swimming	*Sam*
15 September	Vestmannasund	1 pod	11.40	Small pod, swimming N	*Sam*
5 November	East of Froðbasev	pods		Impossible to catch	Local
L. acutus(/albirostris)					
11 September	Vestmannasund	2		Swimming North	*Sam*
L. acutus - Hvítskjórutur springari					
29 October	Hestfjørður	30-35	10.00	Swimming East	Local
P. phocoena - Harbour porpoise - Nísa					
10 June	Nólsoyarfjørður	1	7.15		*Ritan*
24 June	Nólsoyarfjørður	1	7.30		*Ritan*
29 June	Nólsoyarfjørður	6	9.30		*Ritan*
12 July	Nólsoyarfjørður	2	15.10		*Ritan*
22 August	Vestmannasund	3	16.20	Swimming North	*Ternan*
1 October	Nólsoyarfjørður	3	9.10		*Ritan*
27 October	Kaldbaksfjørður	5	8.15	Close to shore	Local

1.1.2 Strandings

Physeter macrocephalus - Sperm whale - Avgustur

One very rotten male sperm whale stranded close to the harbour at Nólsoy, 14 June. The whale was at least 9 m in length. Teeth were collected for age determination.

1.1.3 Statistics and data for small cetaceans

More pods of white-sided dolphins occurred in 1994 than in 1993, but none has been mixed with any schools of pilot whales driven ashore.

Table 3

Grinds (pilot whale drives) in the Faroe Islands in 1994

Date	Location	Number
24 February	Tórshavn	26
3 May	Hvalba272	
29 June	Miðvágur*	666
30 June	Hvannasund	119
10 August	Hvalba	33
18 August	Hvalba	85
Total	6 *grinds*	1,201

* This *grind* was composed of 3 schools.

Table 4
Drives of whale species other than *G. melas* in the Faroe Islands in 1994

Date	Locality	Number	Species	Comments
31 August	Hvalba	140	*Lagenorhynchus acutus*	
2 September	Streymnesi	8	*Tursiops truncatus*	
4 September	Kollafjørður	15	*Lagenorhynchus acutus*	Stranded and killed
4 September	Hvalvík	58	*Lagenorhynchus acutus*	2 schools
17 September	Tórshavn	10	*Lagenorhynchus acutus*	
14 September	Vágur	20	*Lagenorhynchus acutus*	
18 September	Hvalba	10	*Lagenorhynchus acutus*	
4 October	Streymnesi	5	*Lagenorhynchus acutus*	

1.2 Seals

A pilot project begun in 1993 on the feeding ecology of grey seals (*Halichoerus grypus*) was followed up by sampling material from 34 grey seals, and full samples were taken for further examination.

1.3 Publications and References

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Greenland

Progress Report on marine mammal research in 1993

Finn Larsen

I Introduction

Research on marine mammals was carried out by Greenland Fisheries Research Institute (GF), Tagensvej 135[1], DK 2200 Copenhagen N.

II Research

a) Species /Stocks studied

Walrus *(Odobenus rosmarus)* / Canada
Beluga *(Delphinapterus leucas)* / West Greenland
Narwhal *(Monodon monoceros)* / West Greenland
Pilot whale *(Globicephala melas)* / West Greenland
Minke whale *(Balaenoptera acutorostrata)* / West Greenland
Fin whale *(Balaenoptera physalus)* / West Greenland
Humpback whale *(Megaptera novaeangliae)* / West Greenland

b) Field Work

In order to investigate the relationship between Canadian and Greenland walruses, satellite-linked radio transmitters were deployed on seven adult male walruses on Bathurst Island in August 1993 (E.W. Born, GF, in cooperation with Department of Fisheries and Oceans, Winnepeg, Canada).

An aerial survey of wintering belugas and narwhals was conducted off West Greenland in March 1993 (M.P. Heide-Jørgensen, GF).

Seven narwhals were fitted with satellite-linked radio transmitters in Melville Bay in August-September 1993 (M.-P. Heide-Jørgensen, GF).

Samples were collected from the Inuit hunt of narwhals in the municipalities of Avanersuaq and Uummannaq in August and November, respectively. The samples include reproductive organs, material for age determination, stomach contents as well as measurements and weights of the whales (M.-P. Heide-Jørgensen, GF).

Lower jaws were collected throughout Greenland from the harvest of narwhals and belugas.

In January-February 1993, GF participated in an international project to collect ID-photos and skin biopsies from humpback whales in the Caribbean Sea. This project was a part of the Years Of the North Atlantic Humpback (YONAH) whale programme. In July 1993 a humpback photo-ID/biopsy-sampling cruise was carried out in West Greenland waters as part of the YONAH project (F. Larsen, GF).

An aerial survey for minke and fin whales in West Greenland waters was carried out in July-August 1993. Details and results are being reported in the Danish progress report to the IWC (F. Larsen, GF).

Tissue samples for genetic analyses were collected from c. 20 pilot whales caught in West Greenland in September 1993.

III Catch data

a) Pinnipeds

No catch data on seals are available for Greenland for 1993.

b) Cetaceans

	Beluga	Narwhal	Minke whale	Fin whale
W. Greenland	475*	741*	101	13
E. Greenland	-	-	9	-

* = estimated catch

Catch data for other cetaceans are not available.

IV Publications and documents

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Clapham, P. J., Palsbøll, P. J., Mattila, D. K. and Vasquez, O. 1993c. Composition and dynamics of humpback whale competitive groups determined by molecular analysis. *Behaviour* 122:182-194

Heide-Jørgensen, M.P. and R.R. Reeves. 1993. Description of an anomalous mondontid skull from west Greenland: A possible hybrid? *Marine Mammal Science* 9 (3): 258-268.

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Iceland

Progress report on marine mammal research in 1993

I Introduction

The following reports on studies conducted by or in cooperation with the Marine Research Institute (MRI) and the Icelandic Fisheries Laboratories (IFL), Reykjavík, Iceland.

II Research

a) Species/Stocks studies

Pinnipeds

As in recent years the main emphasis in seal research in 1993 was placed on grey seals (*Halichoerus grypus*) and common seals *(Phoca vitulina*). Other species (harp (*Pagophilus groenlandicus*), hooded *(Cystophora cristata*) and bearded seals *(Erignathus barbatus*)) were also investigated opportunistically.

Cetaceans

Research on cetaceans conducted by the MRI and cooperating institutions in 1993 concentrated on the recently exploited minke (*Balaenoptera acutorostrata*), fin *(B. physalus*) and sei *(B. borealis*) whales. Research was also conducted on species that have not been harvested in recent years, such as humpback *(Megaptera novaeangliae*), blue (*B. musculus*), sperm *(Physeter macrocephalus*) and killer whales *(Orcinus orca*), white-beaked dolphins *(Lagenorhynchus albirostris*) and harbour porpoises *(Phocoena phocoena*).

b) Field Work

Pinnipeds

Sampling of biological material, carried out as a part of the MRI's multi-species research project, continued, with an emphasis on feeding studies of grey and common seals.

Cetaceans

In recent years efforts have been made to monitor whale abundance and distribution in the MRI's regular fish surveys in spring and late summer. Since 1991 dedicated whale observers have also been on board the research vessels during mid-winter capelin surveys. Although these cruises are not designed for estimation of whale abundance, they give valuable information on distribution and relative abundance at different times of the year. In 1993 special whale observations were made in five of MRI's fish surveys.

From 1-28 June 1993 a special cruise was undertaken on board one of MRI's research vessels to collect ventral fluke photographs and skin biopsies of humpback whales in Icelandic waters. This was the latter of a two year sampling programme which was Iceland's contribution to the multi-national YONAH (Years of the North Atlantic Humpback whale) project, in which photographs and biopsies were sampled throughout the North Atlantic feeding and breeding grounds. Among the objectives of this project are stock identification, abundance estimates and determination of stock structure. In the 1993 cruise off Iceland photographs were obtained of roughly 150 individual animals and 37 skin biopsies were

sampled. During MRI's capelin *(Mallotus villosus*) cruise in October-November 1993 special observers were on board to study humpback whales on the capelin fishing grounds.

Long-term studies on killer whales on the herring (*Clupea harengus*) fishing grounds off East and Southeast Iceland were continued. These studies (initiated in 1984) aim at determining population size and structure, social behaviour and predation of killer whales on the local herring stock off Iceland. Field activities in the autumn of 1993 yielded limited results due to unfavorable weather conditions.

Sampling from incidentally caught harbour popoises and white-beaked dolphins continued in 1993. This project is a part of MRI's intensified research on species interactions (multi-species research) and was initiated in the winter of 1991/1992.

The MRI staff investigated or received information on whales that beached or stranded on the Icelandic coast in 1993. These include:

- 1 Unidentifiable large (ca 17.5m) baleen whale *(Balaenoptera spp*.), March, SW Iceland.
- 2 Sperm whales (one 15m, the other not measured), March, S Iceland.
- 1 Northern bottlenose whale (6.3m), March, W Iceland.
- 1 Long-finned pilot whale (2.3m), March, S Iceland.
- 1 Long-finned pilot whale (4.4m), April, E Iceland.
- 1 Northern bottlenose whale (6.7m) and 3 white-beaked dolphins (2.1,2.7 and 2.8m), May, SE Iceland.
- 1 Humpback whale, July, NW Iceland.
- 1 Northern bottlenose whale (8m), October, W Iceland.

c) Laboratory work

Pinnipeds

In 1993 the laboratory work of IFL concentrated on food and nematode infection in grey seals. Analysis of stomach contents of grey seals and common seals was continued as a part of the MRI's multi-species research project.

Cetaceans

Identification of photographs and laboratory work on biopsies, obtained as a part of the YONAH project, was continued in cooperation with other participating countries.

Analysis of the killer whale photographs collected in previous years was continued. The catalogue now contains around 280 individuals.

Laboratory work on stomach contents, age and reproduction of harbour porpoises and white-beaked dolphins, collected in 1991-1992, was initiated in 1993.

Studies on genetic markers in cetaceans, in relation to stock structure and stock identity were continued. Earlier studies on fin whales caught off Iceland and Spain have shown genetical differences between these two areas but the lack of samples from other areas prevented further comparisons within the North Atlantic. Recently, however, skin samples were obtained from Canada and Norway. In 1993, considerable effort was therefore directed

towards locating a variable genetic marker in skin samples from fin whales, suitable for comparison between these areas. Genetic variation vas investigated both within and between areas.

Research on genetic variation in minke whales off Norway continued. Samples were collected from four different areas off North Norway in 1992-1993. The main aim of this research (funded in part by the Norwegian Marine Mammal Programme) is to study population structure in minke whales in this area, and to compare this with previous investigations on minke whales off Iceland and Greenland.

d) Other studies

In cooperation with the National Economic Institute of Iceland, work was continued on the development of management models for whaling. Testing and evaluation of models, with special reference to the Revised Management Procedure (RMP) as developed by the IWC (International Whaling Commission) was undertaken for North Atlantic minke whales. The results were presented to the Scientific Committee of NAMMCO in November 1993. Further development and testing of these models is underway with respect to fin and sei whales in the North Atlantic.

e) Research results

In 1993 an overview of research on marine mammals in Iceland was published in the book *Villt Íslensk Spendýr* (Wild Mammals of Iceland). Among the topics included in the volume are distribution and abundance of seals and whales, general biology, feeding ecology, marking, parasites, energetics, genetics and sighting survey methodology.

In the period 1977-1988 457 grey seal pups were tagged in W Iceland; 55 were recovered in the period. Of 85 grey seal pups tagged in 1992, 3 were recovered in 1993.

Results from studies on seasonal pattern of hauling-out of common seals in NW Iceland in 1990-1991 were published in 1993.

Table 1 summarizes the cetacean sightings made onboard MRI's research vessels during regular fish survey cruises in 1993.

All available data on killer whales and northern bottlenose *(Hyperoodon ampullatus*) whales in Icelandic waters were compiled due to a special consideration of these two species by the Scientific Committee of NAMMCO in November 1993. A compilation of all data on long-finned pilot whales *(Globicephala melas*) in Icelandic and adjacent waters was undertaken in connection with the meeting of the ICES Study Group on Long-Finned Pilot Whales in the North Atlantic in August 1993. This included information on abundance, distribution, strandings and genetics.

Estimates of abundance of sei whales and long-finned pilot whales in the North Atlantic, based on large scale sighting surveys in 1987 and 1989 were published in 1993.

Preliminary results from the genetical analysis have shown that minke whales off Norway represent a separate breeding population from both those off West Greenland and Iceland.

III Catch Data

a) Pinnipeds

In 1993 around 1,200 common seals and 1,760 grey seals were caught. In addition 112 animals of other species (mostly harp and hooded seals) were caught.

b) Cetaceans

No directed catch of cetaceans took place in Icelandic waters in 1993.

IV Advice Given and Management Measures Taken

No whaling permits were issued in 1993 and no special management measures were taken regarding seals.

V Publications and Documents (MRI, IFL and cooperating institutions)

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Árnason, A. 1993. Hvalastofnar og erfðamörk. Pp. 146-159 In P. Hersteinsson and G. Sigurbjarnarson (eds.) *Villt íslensk spendýr*, Reykjavík, 1993, 351pp. (In Icelandic).

Baldursson, F.M. 1993. Alternative applications of the RMP to Central North Atlantic minke whale. NAMMCO Scientific Committee, Reykjavík, November 1993, SC-WG/MP1/2, 7pp.

Buckland, S.T., K.L. Cattanach, Th. Gunnlaugsson, J. Sigurjónsson, D. Bloch and S. Lens. 1993. Abundance and distribution of long-finned pilot whales in the North Atlantic, estimated from NASS-87 and NASS-89 data. *Rep.int.Whal.Commn*, 43, 533 (abst.).

Buckland, S.T., D. Bloch, K.L. Cattanach, Th. Gunnlaugsson, K. Hoydal, D. Bloch, S. Lens and J. Sigurjónsson. 1993. Distribution and abundance of long-finned pilot whales in the North Atlantic, estimated from NASS-87 and NASS-89 data. *Rep.int.Whal.Commn*, (Special issue 14), 33-49.

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Daníelsdóttir, A.K., S.D. Halldórsson and A. Árnason. 1993. Genetic variation at enzyme loci in northeastern Atlantic minke whales (*Balaenoptera acutorostrata*). *Rep.int.Whal.Commn*, 43, 526-527 (abst.).

Gunnlaugsson, Th. 1993. Hvalatalningar. Pp. 160-174 *In* P. Hersteinsson and G.

Sigurbjarnarson (eds.) *Villt íslensk spendýr*, Reykjavík, 1993, 351pp. (In Icelandic).
Hauksson, E. 1993. Seasonal pattern of hauling-out of common seal (*Phoca vitulina L.*) on Vatnsnes, NW-Iceland. Náttúrufrðingurinn 62 (1.-2.), 37-41 (In Icelandic with a summary in English).
Hauksson, E. 1993. Um fæðu útsela. Pp. 223-226 *In* P. Hersteinsson and G. Sigurbjarnarson (eds.) *Villt íslensk spendýr*, Reykjavík, 1993, 351pp. (In Icelandic).
Hauksson, E. 1993. Íslendskir selir. Pp. 188-201 *In* P. Hersteinsson and G. Sigurbjarnarson (eds.) *Villt íslensk spendýr*, Reykjavík, 1993, 351 pp. (In Icelandic).
Hauksson, E. 1993. Farselir við Ísland. Pp. 202-213 *In* P. Hersteinsson and G. Sigurbjarnarson (eds.) *Villt íslensk spendýr*, Reykjavík, 1993, 351pp. (In Icelandic).
Magnússon, K.G. and Th. Gunnlaugsson. 1993. Some sensitivity tests of "catch cascading" in management of North Atlantic minke whales. *Rep.int.Whal.Commn*, 43, 526 (abst.).
Ólafsdóttir, D. 1993. Hringormar í meltingarvegi landsela og útsela við strendur Íslands. Pp. 227-239 *In* P. Hersteinsson andG. Sigurbjarnarson (eds.) *Villt íslensk spendýr*, Reykjavík, 1993, 351pp. (In Icelandic).
Sigurjónsson, J. 1993. Recent developments in whale research in Iceland. International Seminar Series on Whaling, Institute of Cetacean Research, Tokyo 1993, 33-34 (abst.).
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Sigurjónsson, J. 1993. Notes on the occurrence and strandings/drive-fisheries of long-finned pilot whales (*Globicephala melas)* around Iceland. ICES Study Group on long-finned pilot whales, Copenhagen, September 1993, WG-16, 12pp.
Sigurjónsson, J. (ed.). 1993. Hearing on marine mammals - summary of findings. Pp. 7-18 In "*Public Hearing on Marine Mammals*", Council of Europe, Committee on Agriculture, Strasbourg, 1993.
Sigurjónsson, J. and G.A. Víkingsson. 1993. Availibility of data and status of research on killer whales (*Orcinus orca*) in Icelandic waters. NAMMCO Scientific Committee, Reykjavík, November 1993, SC-WG/NBK1/8, 9pp.
Sigurjónsson, J., G.A. Víkingsson and C. Lockyer. 1993. Two mass strandings of pilot whales (Globicephala melas) on the coast of Iceland. *Rep.int. Whal. Commn* (Special issue 14), 407-423.
Víkingsson, GA. 1993. Orkubúskapur langreyðar við Ísland og tengsl hans við far og æxlun. Pp. 175-187 *In* P. Hersteinsson and G. Sigurbjarnarson (eds.) *Villt íslensk spendýr*, Reykjavík, 1993, 351 pp. (In Icelandic).
Víkingsson, G.A. and J. Sigurjónsson. 1993. Northern bottlenose whale (*Hyperoodon ampullatus)*. Availability of data and status of research in Iceland. NAMMCO Scientific Committee, Reykjavík, November 1993, SC-WG/NBK 1/7, 4pp.

Table 1. Summary of sightings made on board MRI's research vessels in 1993

Vessel	*Árni Friðriksson*				*Bjarni Sæmundsson*					
Period	4-31 August		18 October-8 November		4 January-1 February		17 May-4June		7-27 August	
Species	NS	NA	NS	NA	NS	NA	NS	NA	NS	NA
Blue whales	2	3					4	5		
Fin whales	9	15	1	1			1	1	17	34
Sei whales									37	60
Minke whales	32	32	6	6		2	2	4	4	
Humpback whales	33	48	40	92	7	13	11	23		
Sperm whales	2	2	1	5		3	3	5	6	
Unidentified large whales	1	2	3	3					10	10
Pilot whales	1	25			1	4	2	12		
N-Bottlenosed whales			2	5	1	1	3	12		
Killer whales	1	1	2	7					2	3
White-beaked dolphins	12	120							19	298
Unidentified dolphins	6	41	2	17	1	4	3	63	1	7
Harbour porpoises	2	3	1	1			1	3		
Unidentified small cetaceans									1	4

NS: Number of sightings; NA: Number of animals

Iceland

Progress report on marine mammal research in 1994

I Introduction

The following reports on studies conducted by or in cooperation with the Marine Research Institute (MRI) and the Icelandic Fisheries Laboratories (IFL), Reykjavík, Iceland.

II Research

a) Species/Stocks studies

Pinnipeds

Main emphasis was on studying the local Icelandic seal stocks, common seals (Phoca vitulina) and grey seal (Halichoerus grypus), but vagrant species (i.e. harp seals, Pagophilus groenlandicus, hooded seals Cystophora cristata, and bearded seals Erignathus barbatus) were also studied on an opportunistic basis.

Cetaceans

Research on cetaceans conducted by the MRI and cooperating institutions in 1994 concentrated on the recently exploited minke *(Balaenoptera acutorostrata*), fin *(B. physalus*) and sei *(B. borealis*) whales. Research was also conducted on species that have not been harvested in recent years, such as humpback *(Megaptera novaeangliae*), blue (*B. musculus*), sperm *(Physeter macrocephalus*) and killer whales *(Orcinus orca*), white-beaked dolphins *(Lagenorhynchus albirostris*) and harbour porpoises (*Phocoena phocoena*).

b) Field Work

Pinnipeds

Sampling of biological material, carried out as a part of the MRI's multi-species research project, continued with an emphasis on feeding studies of grey and common seals.

Some new grey seal haul-out sites were visited in 1994, to study the dispersal of grey seals in the coastal waters of Iceland.

Cetaceans.

Since 1983 efforts have been made to monitor whale abundance and distribution in MRI's regular fish surveys in spring and late summer. Since 1991 dedicated whale observers have also been on board the research vessels during mid-winter capelin (*Mallotus villosus*) surveys. Although these cruises are not designed for estimation of whale abundance they give valuable information on distribution and relative abundance at different times of the year. In 1994 special whale observers were on board four of MRI's fish surveys.

Long-term photo-id studies on killer whales on the herring (*Clupea harengus*) fishing grounds off East and Southeast Iceland were continued. These studies (initiated in 1984) aim at determining population size and structure, social behaviour and predation of killer whales on the local herring stock off Iceland. In 1994 field activity on the herring grounds was increased in accordance with a renewed cooperation contract between the MRI and Sea

World Inc. A special cruise for collection of killer whale photographs was conducted on the herring grounds from 28 October - 25 November 1994.

Sampling from incidentally caught harbour porpoises and white-beaked dolphins continued in 1994. This project is a part of MRI's intensified research on species interactions (multi-species research) and was initiated in the winter of 1991/1992. In 1994 post-mortem examinations were conducted on 59 harbour porpoises and17 white-beaked dolphins.

The MRI staff investigated or received information on whales that beached or stranded on the Icelandic coast in 1994. These include:

- 1 sperm whale (12.9m), January, E Iceland.
- 1 minke whale, April, W Iceland.
- 1 harbour porpoise (1.6m), April, W Iceland.
- 6 sperm whales (10-13m), June NW Iceland.
- 1 fin whale calf (9.64m), August, SW Iceland.

In August 1994 scientists from the MRI and Woods Hole Oceanographic Institution conducted experiments involving satellite tracking of fin whales off W and SW Iceland.

c) Laboratory work

Pinnipeds

Work on age determination from teeth, and the estimation of sexual maturation from reproductive organs collected in recent years was continued.

Examination of the available material on stomach contents of grey seals was nearly completed in 1994, but some work on common seal stomachs remains. Analyses were made of the energy density of the dominant prey species of Icelandic seals. Preliminary investigations on the otolith-size/fish-length relationship of the major prey species were conducted, and more work in this field is planned.

Cetaceans

Identification of photographs and laboratory work on skin biopsies, obtained as a part of the YONAH project (Years of the North Atlantic Humpback Whale, 1992-1993), was continued in cooperation with other participating countries.

Analysis of the killer whale photographs collected in previous years was continued and work on the 1994 photos was initiated. The catalogue now containing around 280 individuals (excluding the material collected in 1994).

Laboratory work on stomach contents, age and reproduction of harbour porpoises and white-beaked dolphins, collected in 1991-1994 was continued. The laboratory part of this project is expected to be completed in 1995.

Studies were continued on genetic markers in cetaceans, in relation to stock structure and stock identity. Earlier studies on fin whales caught off Iceland and Spain have shown genetical differences between these two areas but the lack of samples from other areas

prevented further comparisons within the North Atlantic. Recently, however, skin samples were obtained from Canada and Norway. In 1993 and 1994, considerable effort was therefore directed towards locating a variable genetic marker in skin samples from fin whales, suitable for comparison between these areas. In 1994 further study on the genetic variation was investigated both within and between the above mentioned areas.
Research on genetic variation in minke whales off Norway continued. Samples were collected from four different areas off North Norway in 1992-1993. The main aim of this research (funded in part by the Norwegian Marine Mammal Programme) was to study population structure in minke whales in this area, and to compare with previous investigations on minke whales off Iceland and Greenland.

d) Other studies

In cooperation with the National Economic Institute of Iceland, work was continued on the development of management models for whaling. In 1994 the performance of models, with special reference to the Revised Management Procedure (RMP) as developed by the IWC (International Whaling Commission) was further tested and evaluated for North Atlantic minke and fin whales. Further development and testing of these models is underway with respect to fin and sei whales in the North Atlantic.

e) Research Results

Pinnipeds

The main results of recent investigations on the sealworm problem in Iceland can be summarized as follows: Grey seals are the main final hosts for sealworms in Icelandic waters. While the first intermediate invertebrate hosts for sealworm larvae are unknown, sculpin (*Myoxocephalus scorpius*) appears to be the most important second intermediate host. Feeding habits and diet of grey seals show annual, regional and seasonal differences. The intensity of infections is greatest in seals from the west coast of Iceland, reaching a peak during the breeding season in autumn when grey seals feed most intensively on sculpins. According to aerial surveys on the breeding grounds during 1982-1992, the population of grey seals appears to be stable at around 10,000 animals.

Cetaceans

An overview of the sightings made on board MRI's research vessels during regular fish surveys in 1994 is given in Table 1.

During the satellite tracking experiments one fin whale was successfully tagged and tracked for 45 days. During this period the animal travelled widely off W and SW Iceland with an average speed of 55 n.miles per day.

Analysis of the weight and energetic content of different tissues of fin whales in Icelandic waters has shown significant accumulation of energy reserves throughout the summer feeding season. In pregnant females the weight increase amounts to 26% and the increase in total energy content of the body to around 80%.

Results from the genetical studies have shown that minke whales off Norway represent a separate breeding population from the whales off West Greenland, and preliminary results indicate that the minke whales off Norway and Iceland represent separate populations.

Similarly, fin whales from Norway, Iceland, Canada and Spain seem to represent different stocks.

III Catch Data

a) Pinnipeds

Preliminary catch figures for 1994 are: 1,800 grey seals, 1,000 common seals and 200 of other species.

b) Cetaceans

No directed catch of cetaceans took place in Icelandic waters in 1994.

IV Advice Given and Management Measures Taken

No whaling permits were issued in 1994 and no special management measures were taken regarding seals.

V Publications and Documents (MRI, IFL and cooperating institutions)

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Daníelsdóttir, A.K. 1994. Genetic variation among different species and populations of baleen whales from the North Atlantic Ocean. Ph.D. Thesis, University College Dublin, Ireland. 308pp.

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Hauksson, E. and Fagerholm, H.P. (eds). 1994. Proceedings of the symposium on Parasites of Biological and Economic Significance in the Aquatic Environment. - Thirty years of research and future trends. *Bulletin of the Scandinavian Society for Parasitology*, 4(2): 1-116.

Hauksson, E. 1994. Larval anisakid nematodes in various fish species from the coast of Iceland. *Bulletin of the Scandinavian Society for Parasitology*, 4(2): 8 (abstract).

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(*Halichoerus grypus* (Fabr.)) in Icelandic waters. *Bulletin of the Scandinavian Society for Parasitology*, 4(2): 10.

Hauksson, E. and Ólafsdóttir, D. 1994. Grey seal (*Halichoerus grypus* Fabr.), population biology, food and feeding habits, and importance as a final host for the life-cycle of sealworm (*Pseudoterranova decipiens* Krabbe) in Icelandic waters. International Symposium on the Biology of Marine Mammals in the Northeast Atlantic, 29 November - 1 December 1994. The Research Council of Norway: 48 (abstract).

Sigurjónsson, J. 1994. On the life history and autecology of North Atlantic rorquals. International Symposium on the Biology of Marine Mammals in the Northeast Atlantic. The Research Council of Norway: 51 (summary).

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Table 1. Summary of sightings made on board MRI's research vessels in 1994								
Vessel	*Árni Friðriksson*		*Bjarni Sæmundsson*					
Period	3-31 August		5-31 January		19 May-9 June		3-19 August	
Species	NS	NA	NS	NA	NS	NA	NS	NA
Blue whales	4	7			4	5	3	6
Fin whales	5	10			3	11	59	116
Sei whales							15	23
Minke whales	39	40			22	23	10	11
Humpack whales	69	138	5	5	23	42		
Sperm whales	6	6	1	2	1	1	14	18
Unidentified large whales	5	8			3	3	11	14
Long-finned pilot whales	1	18					6	690
N-Bottlenosed whales					2	5		
Killer whales	2	25	6	28	4	30	1	1
White-beaked dolphins	24	219			18	65	10	115
White-sided dolphins							1	40
Unidentified dolphins	3	20	5	71	7	35	11	153
Harbour porpoises	10	28			2	2	1	1
Unidentified small cetaceans	8	48			1	3	2	3

NS: Number of sightings; NA: Number of animals

Norway

Progress report on marine mammal research in 1993 and 1994

(Tore Haug & Nils Øien)

I Introduction

This report summarises Norwegian research on pinnipeds and cetaceans conducted in 1993 and 1994. Since 1989, the major part of research on marine mammals in Norway has been organised through the National Marine Mammal Research Programme funded by governmental grants through the Research Council of Norway. The main results of the programme, which was terminated in 1994, were summarised at the International Symposium on the Biology of Marine Mammals in the Northeast Atlantic, held in Tromsø, 29 November-1 December 1994. Proceedings from the Symposium will be published in the first half of 1995.

Marine mammal research in Norway in 1993 and 1994 was conducted at the Universities of Tromsø (UiTø), Trondheim (UNIT), Bergen (UiB) and Oslo (UiO). Further research has also been carried out at the Norwegian College of Veterinary Medicine/ National Veterinary Institute in Oslo (NVH), the Institute of Marine Research in Bergen (IMR), the Norwegian Institute for Fisheries and Aquaculture in Tromsø (NIFA), the Norwegian Computing Center in Oslo (NCC), the Norwegian Institute for Nature Research in Oslo and Trondheim (NINA), the Norwegian Polar Institute (NP) in Oslo/Tromsø and the Centre of Veterinary Medicine in Tromsø (CVMT).

II Research

a) Species and stocks studied

Pinnipeds

* Walrus (*Odobaenus rosmarus*) - Svalbard
* Bearded seals (*Erignatus barabatus*) - Svalbard
* Ringed seals (*Phoca hispida*) - Svalbard
* Harp seals (*Phoca groenlandica*) - NW Atlantic, Greenland and Barents Seas
* Hooded seals (*Cystophora cristata*)- NW Atlantic and Greenland Sea
* Common seals (*Phoca vitulina*)- Svalbard and Norwegian coastal waters
* Grey seals (*Halichoerus grypus*) - NW Atlantic, coastal waters of Norway and Russia

Cetaceans

* Minke whales (*Balaenoptera acutorostrata*) - northeastern and central Atlantic waters.
* Harbour porpoises (*Phocoena phocoena*) - Norwegian coastal waters
* Killer whales (*Orcinus orca*) - off mid and northern Norway
* Humpback whales (*Megaptera novaeangliae*) - in the north-eastern Atlantic (the Norwegian part of the YONAH collaborative project to estimate abundance and stock structure)

b) Field work

Pinnipeds

Migrations and diving and behavioural patterns of **walruses**, **bearded** and **common seals** were studied using satellite telemetrical methods in Svalbard waters both in 1993 and 1994 (NP).

Energetic problems linked with lactation were studied for **ringed** and **bearded seals** at Svalbard and for **harp**, **hooded** and **grey seals** in the Northwest Atlantic (in collaboration with Canadian scientists) in 1993 and 1994 (UiO).

The effort to estimate pup production of **harp seals** from tagging and recapture during commercial sealing operations continued at the breeding grounds both in the Greenland Sea and the White Sea (cooperation with scientists from SevPINRO, Arkhangelsk, Russia) in 1993 and 1994. Attempts were also made to estimate **hooded seal** pup production using aerial and visual surveys in the Greenland Sea in 1994. (IMR).

Migrations and diving behaviour of **hooded** and **harp seals** were studied using taggings with satellite transmitters in the Greenland, Norwegian and Barents Seas in 1993 and 1994 (UiTø).

Studies of Barents Sea **harp seal** feeding ecology were continued in February 1993 with capture of seals for condition and stomach analyses and concurrent estimates of prey abundance using trawling and accoustic methods. In collaboration with Russian scientists (from SevPINRO, Arkhangelsk) data on **harp seal** feeding and condition were collected also in the White Sea in 1993 (March) and in 1994 (May) (NIFA).

During the **harp seal** expedition in February 1993, and also during commercial sealing in 1993 and 1994, material for studies of pollutants and their effects on harp seals were collected (NVH).

Monitoring of **grey seal** populations on the coast of Norway by both ship-bound and aerial surveys was carried out in both 1993 and 1994 (NINA-IMR).

Pup tagging and studies of stock identities, breeding biology, foraging behaviour, food habits, parasites and pollution of **common seals** in Norwegian waters and **grey seals** in Faroese, Norwegian and Russian waters were performed both in 1993 and 1994 (NIFA-UiTø-IMR-UNIT-UiO-NINA).

During scientific seal and whale expeditions conducted in 1993 and 1994, all observations of pinnipeds were systematically recorded by species and position (NIFA-IMR).

Cetaceans

During three periods in 1993 and 1994 (April-May, June-July and August-September), special permit catches of 69 (1993) and 73 (1994) **minke whales** were carried out as part of a comprehensive study on the ecological importance of minke whales in the northeast Atlantic. Stomach samples and condition data were the main items collected, although samples for many other purposes were taken (including studies of energetics, demography,

reproduction, stock identity and pollution). Samples for scientific purposes were also collected from minke whales taken in whaling operations in Norwegian waters from June to September in 1993 and 1994. The collections were carried out by the official inspectors who were all veterinary surgeons trained for the job (NIFA).

Times-to-death and several other data relevant to studies of the effectiveness of the killing process were recorded both during research and commercial catches for **minke whales** (NVH).

Satellite transmitters were deployed on **minke whales** off the coast of northern Norway both in 1993 and 1994. The most successful deployment was made in September 1994, after which uplinks were received from one of the tagged whales for more than a month. Improvements of attachment techniques are necessary (UiTø).

As part of YONAH, an international programme to estimate abundance and stock structure of **humpback whales** in the North Atlantic, field work to collect fluke photos for individual identification and biopsies was conducted in 1993 in the Bear Island-Hopen area of the Barents Sea in August - September, in the Central Barents Sea in September and in the Norwegian Sea in July. The work was carried out using vessels from the Norwegian Coastguard and research vessels from the Institute of Marine Research. Approximately 50 individuals were identified from fluke photos and 22 biopsies were collected (IMR).

During scientific seal and whale expeditions in 1993 and 1994, all observations of cetaceans were systematically recorded by species and position (NIFA-IMR). **Killer whale** surveys and photo-identification were performed during several cruises in the Lofoten - Vesterålen area in both 1993 and 1994 (IMR-UiTø-UNIT).

Information on **stranded cetaceans** has been compiled at the Institute of Marine Research Bergen and at the Norwegian College of Veterinary Medicine (IMR-NVH).

c) Laboratory work

Pinnipeds

Age readings from teeth and analyses of sexual organs have been conducted from **harp seals** (IMR-NIFA).

Harp seal stomach content samples have been analysed using traditional methods where the original biomass of prey items is reconstructed based on remaining hard parts in the contents. Stomach contents data are compared with data from concurrent estimates of prey abundances (NIFA).

Analyses of seal tissues and blood for various pollutants were continued in 1993 and 1994 for **harp**, **hooded** and **grey seals** (NVH-UNIT).

Studies of fibrinolytic activity in **grey seal** blood and of the capacity for contraction and release of stored red blood cells in **hooded seal** spleens have been conducted as part of the ongoing investigations of adaptations to diving in pinnipeds (UiTø).

Cetaceans

Age readings of **minke whales** caught under scientific permit and in whaling operations are now being carried out using *bullae tympanica*. Analyses of sexual organs are also underway (IMR).

Reproductive endocrinology of **minke whales** is being studied in a project at the Norwegian College of Veterinary Medicine (NVH).

Stomach content samples from **minke whales** caught under scientific permit have been analysed using traditional methods where the original biomass of prey items is reconstructed based on remaining hard parts in the contents. Stomach contents data are compared with data from resource surveys (NIFA).

The baleens from **minke whales** caught under scientific permit in 1993 and 1994 will be analysed for isotopic concentrations of $^{12}C/^{13}C$ and $^{14}N/^{15}N$ for the possible evaluation of diet and trophic position of minke whales (UiTø).

The digestibility of different prey types in **minke whales** has been studied. The method is based on the naturally occurring marker manganese (Mn) and an *in vitro* technique for simulating the different compartments of the digestive system. Samples of colon contents and fresh prey specimens have been analysed for energy density and Mn concentration. The results have been submitted for publication (UiTø).

Seasonal changes in energy density of prey of minke whales have been studied by sampling common prey types for minke whales throughout the year and determining their energy density (kJ g^{-1} wet mass) by use of bomb-calorimetry. The results have been submitted for publication (UiTø).

Material collected from **minke whales** for studies of temporal and regional variations in condition include girth and blubber measurements, meat and blubber masses and meat samples to be used in total lipid and protein content analyses. The analyses of this material are still in progress (NIFA-UiTø).

The energy cost of fat deposition is being studied by estimating the energy equivalent of the amount of fat that is deposited seasonally in blubber, muscle, skeleton and around the intestinal organs of **minke whales**. The energy content and the relative and absolute amounts of the different tissue types have been determined for animals caught in early spring and late autumn. The amount of energy deposited from spring to autumn can then be calculated by subtraction (UiTø).

The energy cost of growth and reproduction in **minke whales** is being studied. Samples of foetuses, placenta, muscle, blubber and visceral fat collected under scientific permit, have been analysed for energy density (UiTø).

The insulative value of **minke whale** blubber has been assessed by recording the thermal conductivity of the tissue. Blubber samples from different sites of the whale body have been collected from research catches in order to determine whether seasonal and /or body regional

variations exist. The lipid content of the blubber samples is being determined in order to investigate the relationship between the composition of the blubber and its thermal conductivity. The results of this study are important for the interpretation of heat loss model data, and in evaluating whether minke whales may have extra thermoregulatory expenses at some time of the year. The combined results from the feeding ecology studies and the energetic studies will ultimately be used to determine the daily energy and food requirements of northeast Atlantic minke whales (UiTø).

The chemical composition of **minke whale** blubber has been studied. Furthermore, clinical trials have been performed to study the effects of moderate intake of minke whale oil and seal oil on humans. One clinical trial period with 140 healthy persons is completed, and a new study with 240 persons is under way. Changes in coagulation, fibrinolysis, and cellular activation are being measured (NIFA-UITØ-UiB).

Fatty acid composition in blubber and heart tissue from **minke whales** caught under scientific permit are being chemometrically determined. The samples are analysed with respect to seasonal and geographical variation. The variation in fatty acid composition in different layers of blubber is also being investigated (UiB).

Levels of chlorinated organic pollutants (PCBs, DDTs, Chlordanes, HCH, HCB) have been measured in blubber samples from 35 female and 37 male **minke whales** caught during the scientific catch in 1992. Material collected in 1993 and 1994 are now being analysed.

The nematode (Anisakis) infection in **minke whales** caught during scientific catches in 1992-1994 is being studied in relation to geographical area, sex, age and diet of the whales (UiO).

Serum samples from **minke whales** caught under scientific permit in 1992-1994 have been tested for antibodies against PDV (phocine distemper virus). No antibodies against PDV have been found (VMCT).

Analyses of material concerning feeding habits and pollutants in **porpoises** have been carried out (NVH-NINA).

d) Other work

Historical data on distribution and reproduction of Barents Sea **harp seals** have been made available and have now been analysed in conjunction with more recent data. Cooperation with Russian scientists (from SevPINRO, Arkhangelsk) has been essential to this work (NIFA-IMR).

e) Research results

Pinnipeds

Walrus haul-out sites in Svalbard were mapped during the period 1989-1993. Ground surveys have been undertaken to determine the sex and age groups of the hauled-out animals. Aerial surveys were conducted in 1992 and 1993. Walruses in Svalbard were predominantly males, but some females and calves were encountered in the northernmost part of the

archipelago. The results of the survey indicate that a minimum of 750 males are found in Svalbard in the summer. The corresponding females and calves are believed to be in Franz Josef Land. The Svalbard-Franz Josef Land stock of walruses must therefore number a minimum of 2000 walruses. This is a conservative estimate, and the actual number is believed to be considerably higher.

Observed age compositions suggest a very poor recruitment to the Barents Sea stock of **harp seals** in the late 1980s. Historical and recent data also indicate a reduced growth rate and increased age at maturity for the stock during the past 30 years. An earlier increase in population size and depletion of potential prey organisms may have contributed to these possible density-dependent reactions (IMR-NIFA).

After their summer occurence and intensive feeding in northern waters, the Barents Sea **harp seals** return to the southeastern areas of the Barents Sea and the White Sea where they remain during winter and spring. Their winter feeding habits were studied in February 1993. Between Cape Kanin and Kolguyev Island herring dominated the diet of the seals, and herring was also abundant in trawl and echo surveys. In the Pechora Sea (further to the east) herring and polar cod were the most important species in the diet. Polar cod was also the dominant species in echo-integration estimates and trawl hauls. Studies of seasonal variations in condition clearly reveal that the intensity in harp seal feeding ceases after February, and remains low until July (NIFA).

Studies of population structure of **harp** and **hooded seals** using polymorphic characters in tissue proteins (enzymes) have been completed. For hooded seals, no significant differences were found in samples from the breeding lairs at Jan Mayen and off Newfoundland. These investigations, therefore, do not indicate that hooded seals in the North Atlantic are divided into more than one genetic population. While no statistically significant differences were found in harp seal samples from the West Ice and the East Ice, such differences were revealed between these two eastern populations combined compared with the population breeding off Newfoundland. On the basis of these findings, North Atlantic harp seals should probably be considered as constituting two genetic populations; one western population consisting of the Newfoundland herds, and one eastern population comprising the harp seals breeding at Jan Mayen and those breeding in the White Sea. (UiB).

Satellite tracking studies of 19 **hooded seals** from the West Ice stock show that these seals disperse over vast areas of the North Atlantic after pupping (in March/April) and moulting (in July) in the ice off the east coast of Greenland. Typical areas of operation were the waters off the Faroe Islands, along the shelf break between Bear Island and the Norwegian mainland, and in areas in the Irminger Sea (southwest of Iceland). Tagged hooded seals also visited waters off Svalbard, off Ireland (Rockall), and in the Norwegian Sea, and otherwise ranged along the drift ice edge off the east coast of Greenland, from the Denmark Strait (65^{o}N) in the south to 77^{o}N in the north. Dive data were collected from seals in all areas. These show that hooded seals are capable of diving deeper than 1,000m and stay submerged for more than 52 minutes, but that they usually dive to 100-600m depth, for 5-25 minutes. However, dive behaviour shows large regional and seasonal variation and can be correlated to local seasonal changes in the availability of different prey species (UiTø).

Satellite tracking data were collected from 9 **harp seals** from the West Ice stock. Location data were only obtained from hauled-out seals, i.e., from seals that stayed near the ice edge. However, long periods (up to 3 months) could pass without contact with the seals, suggesting that these had left the ice edge during these periods. This assumption is supported by one seal which left the West Ice and later reappeared off Hopen in the Barents Sea. Dive data were only obtained from harp seals as long as they stayed near the ice edge off Greenland. Data show that harp seals may dive down to more than 500m depth, and stay submerged for more than 15 minutes, but that they usually dive to between 100 and 300m, and dive for less than 15 minutes (UiTø).

Aerial and ground surveys reveal an increase in numbers of **grey seals** in North Norway and on the Murman coast in Russia over the past 25-30 years. Particularly large breeding colonies occur on the Murman coast, where approximately 3400 animals are distributed in two main areas (Aynov and Seven Islands).

Studies of the fibrinolytic activity of **grey seal** blood were conducted in order to investigate whether enhanced fibrinolytic activity during diving may be a factor in preventing thrombosis in diving seals. This was found not to be the case, and the question as to why blood does not clot during prolonged dives (which it should, considering its high blood cell count and low flow rate) is still not resolved (UiTø).

Studies of the function of the spleen in seals show that this organ is large in **hooded seals** and has the capacity of storing about 20% of the total blood volume when dilated. Furthermore, the spleen can be made to contract and expel its contents by sympathetic (adrenergic) stimulation. Further studies will be conducted to reveal how spleno-contraction operates and is physiologically controlled, and the importance of the mechanism for the diving capacity of seals (UiTø).

Low levels of PCB and organochlorine pesticides were found in **ringed** and **harp seals** (c. 3 ppm PCB and c. 3 ppm DDTs in blubber) while somewhat higher levels of PCBs were found in **grey seals**, particularly in eastern Finnmark (Varangerford) close to the Norwegian/Russian border (6 ppm PCB and 2.2 ppm DDTs in blubber) and in **hooded seals** from the West Ice (5 ppm PCB and 3 ppm DDTs in blubber). However, intraspecies variations were large. Geographical differences in OC-levels were registered with decreasing contamination from south to north in **harbor** and **grey seals**. An increasing PCB concentration gradient was indicated from west to east in the Arctic region when comparing levels in female **harp seals** from the West Ice and the Barents Sea region. Differences in OC patterns were found between species and between different populations of species.

Cetaceans

The results from **minke whale** stomach analyses indicate that the diet was dominated by fish; the species composition, however, varied with geographical area and sampling period. Gadoid fish species dominated in spring, and in summer and autumn krill was the most important food item in the northernmost areas, with the addition of smaller amounts of capelin (*Mallotus villosus*). In the coastal areas of northern Norway, minke whales had been feeding mostly on herring (*Clupea harengus*), and to a lesser extent on gadoid fish. 0-group fish did not seem to be important as food for minke whales in the area surveyed (NIFA).

Apparent digestible efficiency in **minke whales** feeding on herring or krill was found to be 92% and 93%, respectively. The efficiency of minke whales to digest fish is similar to that of seals, but better when it comes to krill, suggesting that the minke whale multi-stomach system with microbial fermentation is better suited than the single-stomach system of seals to digest complex structures such as the exosceleton of krill (UiTø).

Studies of the energy contents of prey of **minke whales** show that the energy density (kJ g^{-1} wet mass) of capelin varied between 8.8 (January) and 4.8 kJ g^{-1} (June). Herring showed large variations in energy density between different age groups, with a high energy density for mature herring in August (12.7 kJ g^{-1}) and low energy density for subadult herring in April (4.3 kJ g^{-1}). Krill varied between 2.4 kJ g^{-1} (May-June) and 6.1 kJ g^{-1} (September). These results show that important prey species of minke whales undergo large seasonal variations in energy density, which has to be taken into consideration when assessment of annual food consumption of minke whales are made based on energetic models. (UiTø).

Studies of the thermal conductivity of **minke whale** blubber revealed that there is no seasonal variation in conductivity, but that it varies in samples taken from different body regions. A negative correlation was found between blubber and lipid content and thermal conductivity. The measured conductivity values were generally higher than previously reported values, and calculations of heat loss rates based on the new data suggest that at least young (small) minke whales may have extra thermoregulatory expenses while in Arctic waters (UiTø).

Completed analyses of previously collected data on respiratory rates and swimming speeds of free-swimming **minke whales** show that the daily energy expenditure of minke whales in Northeast Atlantic waters is rather low (80 kJ kg^{-1} day^{-1}), which is probably due to a remarkably low cost of swimming (UiTø).

The total energy cost of fat deposition, growth and pregnancy of the Northeast Atlantic stock of minke whales has been estimated to be about $1.7990 \bullet 10^{12}$kJ. When the daily energy expenditure and adjustment for energy loss in faeces and urine are included, the calculations indicate that the total gross energy intake of the entire stock is in the order of $8.6 \bullet 10^{12}$kJ during an assumed 180 days stay in the Northeast Atlantic. This gross energy intake corresponds to a total food intake of about 1.4 million tonnes of various prey (UiTø).

The blubber of **minke whales** has been shown to contain 41-67% fat, 6-15% protein and 24-25% water. The lowest amount of fat and highest amount of protein and water were found in blubber from the anterior ventral part (ventral grooves) of the body. The composition also varied with the depth of the blubber. The outer half has almost twice the content of fat found in the inner half adjacent to the muscle. The fatty acid composition of oil produced from minke whale blubber is distinct from that of fish oil, e.g. cod liver oil. The whale oil consists of approximately 60% monounsaturated fatty acids, compared to about 50% in cod liver oil. The oxidative stability of minke whale oil was also found to be very high as compared to other marine oils, and work is ongoing to identify possible antioxidant components in minke whale blubber and oil.

Fatty acids in blubber from 63 **minke whales** caught in 1993 have been chemometrically

determined. Clearcut differences were detected in the composition of fatty acids between the different layers of the blubber. The fatty acid composition also appeared to vary with season, but not with location of the catch. Fatty acids in heart tissue from the same animals are currently being analysed for seasonal and geographic variations (UiB).

Results from the studies of pollutants (PCBs, DDTs, chlordanes, HCH, HCB) in **minke whales** indicate that the PCBs had the highest concentrations. In all the samples ΣPCBs > ΣDDTs > ΣChlordanes > HCB > ΣHCHs with the levels of ΣPCBs ranging from 0.5 - 8.0 ppm (average 4.5 ppm) in males and 1.1 - 9.5 ppm (average 2.5 ppm) in females. Animals taken in the Lofoten area seemed to have higher levels of organochlorines than animals taken in the Finnmark, Kola, Bear Island and Svalbard areas. Males taken outside Bear Island differed from the other groups in the composition of DDT-components and metabolites by having much lower relative amounts of the main metabolite p,p′-DDE (NVH).

The levels of PCBs in blubber of **minke whales** from Greenland and Jan Mayen are being compared with samples from minke whales taken in the northeastern Atlantic during scientific catch. The results so far have shown no significant differences between the western and the eastern areas (UNIT).

Selected heavy metals (*Pb, Cd, Cu, Hg*) and radionuclides(^{137}Cs, ^{90}Sr, *Pu*) have been determined in organs of **minke whale** from scientific catches in the Barents Sea, off the coast of Kola peninsula in 1992. ^{137}Cs concentrations were slightly lower than in animals caught off the coast of northern Norway in 1988. Results for ^{90}Sr and *Pu* are not yet available. Heavy metal concentrations were similar to those found in 1988. Compared to minke whales from the Antarctic Ocean, the Barents Sea minke whales showed substantially lower *Cd* levels and slightly higher *Hg* levels. Levels of other heavy metals did not differ between whales from the two areas. Studies on the *Hg/Se* ratio are planned to see if *Se* plays a role in *Hg* detoxification as previously shown for other marine mammals (UNIT).

Studies of foraging ecology and habitat use of **porpoises** in Norwegian coastal waters indicate that porpoises have a preference for foraging in shallow waters where benthic fish species dominate their diet. When porpoises are foraging in deeper waters the diet consists of pelagic and mesopelagic species (NINA and IMR).

Contaminants in **porpoises** incidentally caught in 1988-1990 have been analysed. The concentration of PCB and other organochlorines in blubber of male porpoises were determined and concentrations of mercury *(Hg)* and selenium *(Se)* in liver and kidney of males and females were analysed. Both total PCB, *Hg* and *Se* showed a decreasing trend from south to north along the Norwegian coast (NVH-NINA).

Photo-identification of **killer whales** in waters around the Lofoten and Vesterålen islands in northern Norway was continued both during the summer and in October-November. All the groups encountered were resightings from previous years and 25 individuals were added to the catalogue which now consists of 405 whales. As in previous years, most of the encounters were made in October-November in the wintering area of herring *(Clupea harengus)*. Studies on the feeding behaviour were continued in November with a high-frequency sonar. In addition to observations of killer whales feeding close to the surface,

groups of killer whales were observed chasing or feeding on herring schools at 60-90m depth (IMR-UITØ-UNIT).

III Catch Data

a) Sealing

Norwegian sealing included four vessels in each of the years 1993 and 1994, two of which operated in the West Ice (the Greenland Sea) and two in the East Ice (the southeastern Barents Sea). Since there is a Norwegian ban on catching pups, the targets for the Norwegian sealing have been moulting seals. The following table gives the Norwegian catches of harp and hooded seals in 1993 and 1994.

Table 1. Norwegian catches of harp and hooded seals in 1993 and 1994. All catches are of one year old or older seals.

	West Ice		East Ice	
	1993	1994	1993	1994
Harp seals	3,520	8,121	8,868	9,500
Hooded seals	384	492		

b) Whaling

A temporary hault in minke whaling in Norway was introduced after the 1987 season, and with the exception of catches under scientific permit, no whale catches were allowed during the period 1988-1992. In 1993, commercial minke whaling was resumed and quotas were established based on the Revised Management Procedure (RMP) developed by the Scientific Committee of the International Whaling Commission (IWC). A part of this quota was allocated as catches for scientific research which was conducted during the period 1992-1994 to study the feeding ecology of minke whales.

The RMP allocates catch quotas to specific management areas. There are five such management areas within the region of interest to Norwegian whalers. These are (1) the Svalbard-Bear Island area (abbreviated ES); (2) the eastern Norwegian Sea and central and northeastern Barents Sea (EB); (3) the Lofoten area (EC); (4) the North Sea (EN) and (5) the western Norwegian Sea/ Jan Mayen area (CM). During the years 1993-1994, the EC area has been open for scientific catches only.

Table 2 shows the number of minke whales taken both in whaling operations and for research purposes. Scientific catches were conducted according to a strict sampling scheme, both to achieve random sampling and to obtain a representative coverage with respect to areas and seasons. Neither in 1993 nor 1994 was the scientific program able to catch the allotted number of whales, and in 1994 some of the surplus research quota was re-allocated

to commercial whaling.

Table 2. Catches of minke whales in 1993 and 1994 by type of catch and management area as defined in RMP (1994 figures preliminary).

	Management area						
	EB	EN	ES	EC	CM	Total	%females
1993							
Commercial catches	111	9	24	0	13	157	55.8
Scientific catches	15	0	33	21	0	69	57.1
Total catch 1993:						226	56.2
1994							
Commercial catches	150	14	0	0	41	205	48.8
Scientific catches	25	0	29	9	0	73	64.3
Total catch 1994:	278	52.8					

IV Advice Given and Management Measures Taken

a) Sealing

Advice on management of harp and hooded seals is based on the deliberations in the ICES/NAFO Working Group on Harp and Hooded Seals. For harp seals in the West Ice, pup production in 1991 has been estimated both from mark-recapture experiments and visual and photographic surveys and found to be 57,800 (95% confidence interval 46,000-69,000) and 55,300 (95% confidence interval 44,500-68,500), respectively. These findings have been used to model the population to evaluate the impact of several catch scenarios. Russia has studied the East Ice harp seal population by conducting photographic surveys in the breeding lairs in the White Sea, and their most recent analyses indicate that the pup production in 1991 was approximately 140,000, but the status of this stock is uncertain due to apparent recruitment failure since the late 1980s. A survey to estimate hooded seal pup production in the West Ice in 1994 failed to meet its goal due to bad weather and ice conditions, and the status of this stock is still poorly known.

Russia and Norway both take part in sealing operations in the West Ice and the East Ice and therefore allocate quotas on a bilateral basis. The Norwegian quotas in 1993 were 8,400 harp seals and 1,700 hooded seals in the West Ice and 9,500 harp seals in the East Ice, and in 1994 10,600 harp seals and 1,700 hooded seals in the West Ice and 9,500 harp seals in the

East Ice. There is a general ban on catching females in the breeding lairs in the West Ice. The Norwegian ban on catching pups of the year, introduced in 1989, was maintained also for the 1993 and 1994 seasons.

b) Whaling

At the IWC Annual Meeting in 1992, Norway stated that it intended to resume minke whaling in 1993. So far, the IWC has accepted the RMP developed by its Scientific Committee as a basis for future management decisions, but has not implemented it. The Norwegian Government therefore decided to set quotas for the 1993 season based on the RMP, with parameters tuned to the cautious approach level as expressed by the Commission and using the best current abundance estimates as judged by the IWC Scientific Committee. The total quota in 1993 was 296 minke whales, of which 136 were allocated for scientific research, and 160 for commercial whaling. Similarly, in 1994 a total quota of 319 minke whales was allocated, with 192 whales for the commercial fleet and 127 for scientific research. The catch quotas have been set for each of the five management areas, of which the Lofoten area (EC) has been closed to commercial whaling.

Catch quotas for minke whaling have been allocated on a per-vessel basis, with usually 5-7 whales per vessel. 27 and 28 vessels participated in 1993 and 1994, respectively. The whaling season was from 9 June to 31 August in 1993 and 12 June to 14 August in 1994. All participating vessels had inspectors on board to monitor whaling activities.

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SECTION 4

International Conference
on Marine Mammals and the Marine Environment

Shetland Hotel, Lerwick, Shetland 20-21 April 1995

International Conference
on Marine Mammals and the Marine Environment

Shetland Hotel, Lerwick, Shetland, 20 & 21 April 1995

Summary

NAMMCO Secretariat - May 1995

The International Conference on Marine Mammals and the Marine Environment was held at the Shetland Hotel, Lerwick, Shetland (UK), 20 and 21 April 1995. The Conference, which was arranged and hosted by the North Atlantic Marine Mammal Commission (NAMMCO), with support from the Norwegian Ministry of the Environment, focused on the sources, levels and effects of chemical pollution in the marine environment and marine mammals, as well as the consequences of marine pollution for coastal communities.

More than 60 people from 15 different countries and a wide range of backgrounds and disciplines attended the two-day event, which featured a total of 20 presentations by scientists and other experts under the four main theme sessions of the Conference programme. Proceedings concluded with an open discussion on issues raised during the meeting, led by a panel of invited experts.

The arrangement of the International Conference on Marine Mammals and the Marine Environment was prompted by contemporary concerns about the state of the marine environment and the desire to understand better the nature and extent of impacts on, and risks to, marine ecosystems and their various components from human activities, both on land and at sea.

For many people in coastal communities throughout the North Atlantic and elsewhere, the sources, levels and effects of chemical pollutants in marine mammals are of particular concern. These concerns relate both to the possible long-term effects of contaminants on the continued viability of marine mammal populations, as well as the health risks faced by people who have marine mammals as a significant part of the diet. The International Conference on Marine Mammals and the Marine Environment provided a forum for presentations in both these areas.

The following is an overview of proceedings and a brief summary of some of the main points raised during general discussions. Scientific papers presented at the Conference are currently being edited for publication.

Conference Proceedings

The Conference programme was divided into four main sessions, as outlined below. Proceedings were distinguished by the variety of disciplines and backgrounds of speakers and other participants, with representatives from the chemical, biological, medical, social and political sciences, as well as from public administration and non-governmental organisations. This provided a useful interaction and exchange of information and ideas and led to constructive discussions of the issues on a number of levels.

Papers presented:

1 Marine mammals and the marine environment - impacts and management approaches

Assessing and managing man-made impacts on the marine environment - the North Sea example: R.Ferm, Chairman of the ICES/OSPARCOM North Sea Task Force

The work of ICES on marine mammals and their environment: A. Bjørge, International Council for the Exploration of the Sea (ICES)

2 Contaminants in marine mammals - sources, levels and effects

Sources and pathways of persistent organic pollutants to the North Atlantic and levels in the marine food chain: M. Oehme, Institute for Organic Chemistry, Basel / Norwegian Institute for Air Research, Oslo *Persistent organochlorines in marine mammals - a global perspective*: S. Tanabe, Department of Environment Conservation, Ehime University, Japan

Organochlorine contaminants in marine mammals in the Norwegian Arctic: J. Utne Skåre, Norwegian College of Veterinary Medicine

Organochlorine residues in seals from the northern hemisphere: W. Vetter & B. Luckas, Institute for Nutrition and Environment, Friedrich Schiller University, Jena

Organochlorines in western Canadian and Arctic seals: trends and toxicological significance: R.F. Addison, Institute of Ocean Sciences, Department of Fisheries and Oceans, British Columbia

Status and Trends of Metal Contaminants in Marine Mammals of the Canadian Arctic: R. Wagemann, Freshwater Institute, Winnipeg

Metals bioaccumulation in North Atlantic pilot whales: F. Caurant, Institute of Applied Ecology, Angers

The impact of the Braer oil spill on seals in Shetland: A. Hall, Sea Mammal Research Unit, Cambridge UK

Organochlorine/oil pollution of grey seals: B. Munro Jensen, Department of Zoology, University of Trondheim

Histological evaluation and cytochrome P4501A expression in tissues of pilot whales stranded on Cape Cod, MA, USA: M. Moore, Woods Hole Oceanographic Institution, Massachusetts

How toxic are toxic residues in cetaceans? An ecotoxicological view: C. Joiris, Laboratory for Ecotoxicology and Polar Ecology, Free University of Brussels

3. Coastal communities & marine pollution - social, economic and health considerations

Human health and diet in the Arctic: J. C. Hansen, Arctic Monitoring and Assessment Program (AMAP), Human Health Group/Centre for Arctic Environmental Medicine, Uni. of Århus

Inuit exposure to organochlorines and heavy metals through the aquatic food chain in Greenland: G. Mulvad, Centre for Primary Health Care, Nuuk

Health implications for Faroe Islanders of heavy metals and PCBs from pilot whales: P. Weihe, Department of Occupational and Human Health, Tórshavn

Effects of the Braer oil spill on the Shetland seafood industry: J. Goodlad, Shetland Fishermen's Association, Lerwick

4. Addressing the questions - problems and future needs

International efforts to combat marine pollution: experiences gained and future prospects: S. Andresen, Fridtjof Nansen Institute, Oslo

Conservation of small cetaceans - the role of a new regional Agreement, ASCOBANS: C. Lockyer, Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas

"Commons" concerns in search of uncommon solutions: Arctic marine issues and the relevance of North Atlantic experiences: N. Doubleday, Carleton University, Ottawa

5. Discussion

Conference proceedings concluded with a general, open discussion, initiated by brief statements from each of the four panelists - Steinar Andresen and Michael Oehme (see under 4 & 2 above), Jody Walker of the Contaminants Unit of the Department of Health, Government of the Northwest Territories, Canada, and Frank Anderson of the Ottawa office of the Inuit Circumpolar Conference (ICC). The panel and discusion session was chaired by Professor Guðmundur Eiriksson, legal adviser to the Ministry of Foreign Affairs, Iceland. Some of the main points raised during presentations and discussions are summarised below.

- Research on global atmospheric transport of persistent organic pollutants indicates that source areas are not necessarily affected by their own emissions. Organic pollutants in Arctic regions, as witnessed by high levels recorded in various species of marine mammals, derive from sources far from the receptor areas, in subtropical and tropical regions,where the use of toxic substances such as polyclorinated bornanes (toxaphenes) in agriculture is widespread in developing countries.
- Marine mammals are particularly vulnerable to the long-term toxicity of man-made chemicals in the marine environment, due to their place at the top of the marine food web and due to the accumulation of some pollutants in fat deposits of marine mammals.
- Although there is as yet no conclusive scientific evidence of a direct linkage between contaminant loads and mortality in marine mammals, experimental and other studies have shown that the possible long-term effects of chemical contaminants include hormone disruption and reduction of general resilience to other factors such as disease. Continued monitoring of temporal and spatial contaminant trends, and studies of the physiological effects of pollutants are required before detrimental effects on marine mammal populations can be determined.
- Recent medical research has shown high levels of heavy metals and organochlorine compounds in humans, deriving from marine food diets in which whales and seals are significant components, (e.g. the Faroes, Greenland and Canada). These levels are in many cases close to, or in excess of, internationally recognised intake limits. In the Faroes, studies to monitor possible neurobehavioural dysfunctions associated with prenatal exposure to mercury and PCBs are currently being conducted. Preliminary results suggest that some revision of present recommendations on intake levels may be necessary.
- The social, economic and health benefits of marine mammal foods in traditional

diets should be carefully weighed against the health risks associated with high levels of chemical contaminants. Radical changes in customary local diet in reaction to risk factors, the precise effects of which have yet to be substantiated, are not necessarily an appropriate response in communities dependent on marine foods.

- The reduction of chemical pollutants at their source should be the main focus of international cooperation related to the possible effects of marine pollution on marine mammals and the people who consume them. Present knowledge of the distribution of POPs (persistent organic pollutants), their apparent accumulation in colder regions, and indications of their potential long-term effects on both animals and humans, should provide sufficient motivation for global political commitments to the reduction and eventual elimination of these and other toxic substances.

SECTION 5

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