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North Atlantic Marine Mammal Commission

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CONTENTS

MEETINGS & OFFICE BEARERS 1999

Members of the Commission		**Councillors**
Faroe Islands	(F)	Mr Kaj P. Mortensen
Greenland	(G)	Mr Einar Lemche
Iceland	(I)	Ms Kristín Haraldsdóttir
Norway	(N)	Mr Halvard P. Johansen

Council

Chairmen – 1995-97	Mr Halvard P. Johansen (N)
1997-99	Mr Arnór Halldórsson (I)
1999…	Ms Amalie Jessen (G)

NAMMCO/9 – Ninth Meeting of the Council, 5 – 8 October 1999, Akureyri

Management Committee

Chairmen – 1995-98	Mr Einar Lemche (G)
1998…	Mr Kaj P. Mortensen (F)

Eighth Meeting of the Management Committee, 6 October 1999, Akureyri

Management Committee Working Group on Inspection and Observation

Chairman	Dr Egil Ole Øen (N)

Committee on Hunting Methods

Chairmen - 1994-98	Ms Amalie Jessen (G)
1998…	Mr Jústines Olsen (F)

Management Committee Working Group on By-catch

Chairmen – 1998-99	Mr Gislí A. Víkingsson (I)
1999…	Dr Arne Bjørge (N)

Scientific Committee

Chairmen – 1995-97	Prof. Tore Haug (N)
1997…	Dr Mads Peter Heide-Jørgensen (G)

Seventh Meeting of the Scientific Committee, 13 - 15 April 1999, Nuuk

Scientific Committee Working Group on Management Procedures

Chairman	Dr Nils Øien (N)

Scientific Committee Working Group on Abundance Estimates

Chairman	Dr Nils Øien (N)

Scientific Committee Working Group on the Economic Aspects of Marine Mammal – Fisheries Interactions

Chairmen – 1998-99	Dr Gunnar Stefánsson (I)
1999…	Mr Aqqalu Rosing-Asvid (G)

Scientific Committee Working Group on the Population Status of Narwhal and Beluga
Chairman Prof. Øystein Wiig (N)

Scientific Committee Working Group on the North Atlantic Fin Whales
Chairman Mr Gislí A. Víkingsson (I)

Finance and Administration Committee
Chairman Mr Øyvind Rasmussen (N)

The NAMMCO Fund
Chairman of the Board Ms Ulla S. Wang (F)

Secretariat

General Secretary	Dr Grete Hovelsrud-Broda
Scientific Secretary	Mr Daniel Gordon Pike
Administrative Assistant	Ms Tine Richardsen

SECTION 1 - COUNCIL

1.1
REPORT OF THE NINTH MEETING OF THE COUNCIL

Akureyri, Iceland, 5 – 8 October 1999

The Council of NAMMCO held its 9th Meeting at the Foss Hotel Kea Hotel in Akureyri, Iceland, 5 - 8 October 1999. The meeting was attended by delegations from all Contracting Parties, the Faroe Islands, Greenland, Iceland and Norway, as well as observers from the Governments of Canada, Denmark, Japan, the Russian Federation and Saint Lucia. A number of intergovernmental and non-governmental organisations were also represented at the meeting. The List of Participants is contained in Appendix 1.

The Chairman of the Council, Arnór Halldórsson, convened the meeting.

1. OPENING PROCEDURES

1.1 Welcome address

The Chairman introduced the representative from the Icelandic Ministry of Fisheries, who gave a welcome address on behalf of the Minister of Fisheries, Árni M. Mathiesen. The Minister sent his regrets that he was prevented from attending the opening but was able to join in the meeting later. The full text of the address is contained in Appendix 4.

1.2 Opening statements

The heads of the delegations of the Faroe Islands, Greenland and Norway made opening statements to the meeting. In addition, an opening statement was made by the observer from the Government of Japan. These statements are contained in Appendix 4.

1.3 Admission of observers

On behalf of the Council, the Chairman welcomed the attendance of observers from governments, intergovernmental and non-governmental organisations. In particular he welcomed to the Council for the first time the observer from the Nunavut Tunngavik Incorporated.

The General Secretary informed the Council that the following had sent their regrets in not being able to attend the meeting: the Secretariat of the Agreement on the Conservation of Small Cetaceans of the Baltic & North Seas (ASCOBANS); the Convention on the Conservation of Migratory Species of Wild Animals (CMS/Bonn Convention); the UN Food and Agriculture Organisation (FAO); the International Council for the Exploration of the Sea (ICES); the Nunavut Wildlife Management Board (NWMB); the European Bureau for Conservation and Development (EBCD), and the Inuit Circumpolar Conference (ICC).

1.4 Adoption of Agenda

The Agenda as contained in Appendix 2, was adopted.

1.5 Meeting arrangements

The General Secretary outlined the practical and social arrangements for the meeting, which included a reception hosted by the Icelandic government on 5 October at the restaurant *Fiðlarinn* in Akureyri.

A list of documents presented to the meeting is contained in Appendix 3.

2. FINANCE AND ADMINISTRATION COMMITTEE

2.1 Report of the Finance and Administration Committee

The Chairman of the Finance and Administrative Committee, Øyvind Rasmussen, (Norway) presented the report of the Committee.

The Finance and Administration Committee held a telephone meeting on 26 August 1999, and met again in Akureyri on 4 October 1999. The task of the Committee was to review audited accounts for 1998, to develop a draft budget for 2000 and a forecast budget for 2001, (see also under 2.2 below), to develop Rules of Procedures for the Council (see under 2.3) and to consider other financial and administrative matters related to the activities of the Council. The report of the Committee telephone meeting was available to the meeting as document NAMMCO/9/4 while the report from the meeting in Akureyri, was presented orally.

2.1.1 Host Agreement between NAMMCO and Norway

The Council noted the Committee's review of the developments in the negotiations with the Norwegian government on the Host Agreement. It was reported that a Host Agreement draft presented by Norway had been thoroughly reviewed by the NAMMCO Council. A meeting between Norway and NAMMCO (represented by the Chair, Arnór Halldórsson and the General Secretary, Grete Hovelsrud-Broda) took place in Oslo, June 1999. Further negotiations had taken place via correspondence. NAMMCO is currently awaiting Norway's response to the proposed changes to the draft agreement.

It was further reported that many of the financial issues contained in future budgets are contingent upon the outcome of the Host Agreement.

2.1.2 Staffing

General Secretary

The Council Chairman welcomed Grete K. Hovelsrud-Broda, as the new General Secretary to NAMMCO.

Scientific Secretary

The Council Chairman welcomed Daniel G. Pike as the new Scientific Secretary to NAMMCO.

Staff Rules

The General Secretary reported that due to time constraints at the Secretariat in connection with staff changes, no progress could be reported on the development of

general Staff Rules for the Secretariat. It was reported that some aspects of the staff rules will also depend upon the outcome of the Host Agreement.

2.1.3 Other matters

The Chairman thanked the Finance and Administration Committee for their report.

2.2 Commission Budget 2000 and Forecast Budget 2001

2.2.1 Accounts 1998

The Council noted that the final audited accounts of the Commission for 1998 had been reviewed by the Finance and Administration Committee in August and were formally approved by the Council at the Annual Meeting in Akureyri (see Appendix 5).

2.2.2 Commission Budget 2000

The Council **adopted** the budget for 2000, as contained in NAMMCO/9/4 – Annex 1 rev.

2.2.3 Forecast Budget 2001

The Council **adopted** on a preliminary basis the forecast budget for the year 2001, as contained in NAMMCO/9/4 – Annex 1 rev., with amendments for several budget items. In the absence of a surplus transfer from 2000 to 2001, and with a smaller increase in membership contributions than forecast for 2000, the membership contributions for 2001 will increase to a total of NOK 3,535,000 to maintain the same level of funding activity. It was noted, however, that the anticipated finalisation of the Host Agreement would have significant consequences for future budgets.

2.3 Rules of Procedure

Iceland presented the Council with a revised version of the Draft Rules of Procedure as contained in NAMMCO/9/4 – Annex 2 rev., including Norway's suggestion from the previous year of adding general provisions for amending the Rules.

The Council **adopted** the revised draft of Rules of Procedure as presented by Iceland, with a note to the Finance and Administration Committee to finalise outstanding items.

2.4 Other business

As suggested by Greenland, the Council **requested** the Finance and Administration Committee to identify problems related to the release of documents by NAMMCO bodies such as the Scientific Committee, subcommittees, working groups and the Secretariat. In addition, the Committee is **requested** to develop appropriate procedures designed to regulate the distribution of documents: which documents could be distributed, to whom they should be available and at what time.

It was therefore agreed that until such procedures have been finalised, documents, reports and data should be released only to:

1. the relevant NAMMCO bodies;
2. contracting parties; and

3. other parties that have previously been given observer status to the body of NAMMCO producing the document, unless the relevant body/bodies have either dealt with that document or have accepted to have the document released.

Documents that are dealt with at the Council meetings will be released to the public after the meeting unless the Council makes a decision to the contrary. The Council instructed the Finance and Administration Committee to study this further.

3. SCIENTIFIC COMMITTEE

3.1 Report of the Scientific Committee

Mads Peter Heide-Jørgensen, Chairman of the Scientific Committee, who was elected for one more year as chairman, presented the Report of the Seventh Meeting, which was held in Nuuk from 13 to 15 April 1999. The full report was available to the Council Meeting as NAMMCO/9/5, and is included in Section 3 of this volume.

At its meeting the Scientific Committee addressed both new and outstanding requests for advice forwarded to it by the Management Committee. New working groups were established to deal with requests pertaining to North Atlantic fin whales and North Atlantic beluga and narwhal.

National Progress Reports for 1998 from the Faroe Islands, Norway and Iceland, and for 1997 from Greenland, were submitted to the Scientific Committee, and are included in Section 4 of this volume.

3.1.1 Incorporation of users' knowledge in the deliberations of the Scientific Committee

At its 8th meeting in 1998 in Oslo, the Council recommended that the Scientific Committee should develop a strategy on how to incorporate the knowledge of marine mammal users in the advice provided by the Scientific Committee. A proposal to further this process was prepared by the Secretariat and accepted by the Scientific Committee at its 7th meeting in Nuuk in 1999.

The proposal was to integrate both scientific knowledge and the knowledge of marine mammal users in the NAMMCO "Status of Marine Mammals in the North Atlantic" report. This report will consist of stock status reports for each species in the North Atlantic. The stock status reports will contain most of the information that is important to user groups, such as stock definition, distribution, population estimates, population trend, harvest levels and suggested sustainable harvest level. The information will be presented in a non-technical format and distributed widely through the NAMMCO website and other means.

For stocks for which there is considerable user knowledge, for example West Greenland Beluga, an assessment committee would be formed to bring together scientists, knowledgeable users and managers. The committee would consider a draft stock status report prepared by the NAMMCO Secretariat in consultation with

appropriate expertise. The objective of the committee would be to integrate all relevant knowledge in the report. Agreement and disagreement between user knowledge and scientific knowledge would be explicitly noted, and all statements would be clearly referenced. There would be no attempt to reach a "compromise" between scientific and user knowledge. Where there was disagreement between scientific and user knowledge, it would be left up to the NAMMCO Council to decide which knowledge base to use in their decision making process.

The final stock status report produced by the committee would go to the NAMMCO Council for approval. It would then be published widely through the Internet and otherwise as appropriate.

The Council noted the recommendations of the Scientific Committee on this matter and agreed to refer the matter to the Management Committee.

3.1.2 Update on "Status of Marine Mammals in the North Atlantic"

At its 5th meeting in 1997, the Scientific Committee agreed that the "List of Priority Species" should be replaced by a new document, entitled "Status of Marine Mammals in the North Atlantic". The new document would incorporate status information on all marine mammal species in the North Atlantic, and would integrate scientific and user knowledge (see 3.1.1). A draft Stock Status Report on Minke Whales was available to the meeting as NAMMCO/9/7. The Scientific Committee had reviewed this document through correspondence prior to the 1999 Council meeting, but user knowledge has not yet been integrated in this report. At its 7th meeting in Muuk in 1999 the Scientific Committee agreed that the Secretariat should proceed with the development of this report, with priority given to the eight species (minke whale, fin whale, walrus, pilot whale, bottlenose whale, beluga, narwhal, ringed seal) for which the Committee has generated advice. Reports for species/stocks could be published separately as they are completed.

The Council noted the progress made on this matter and urged the Scientific Committee to complete the reports as efficaciously as possible.

3.1.3 Role of marine mammals in the marine ecosystem

At its 8th meeting in Oslo in 1998, the Council recommended that the Scientific Committee should investigate the following economic aspects of marine mammal-fisheries interactions:

i) to identify the most important sources of uncertainty and gaps in knowledge with respect to the economic evaluation of harvesting marine mammals in different areas;
ii) to advise on research required to fill such gaps, both in terms of refinement of ecological and economic models, and collection of basic biological and economic data required as input for the models;
iii) to discuss specific cases where the present state of knowledge may allow quantification of the economic aspects of marine mammal-fisheries interactions;

a) what could be the economic consequences of a total stop in harp seal exploitation, versus different levels of continued sustainable harvest?
b) what could be the economic consequences of different levels of sustainable harvest vs. no exploitation of minke whales?

Heide-Jørgensen noted that this was a demanding request that could not be dealt with quickly. The Scientific Committee considered points i) and ii) to be a necessary first step in fulfilling the request, and it was therefore decided to separate the request into two sections. The Working Group on The Economic Aspects of Marine Mammal - Fisheries Interactions will be reactivated to meet this request, and will meet within a year to consider points i) and ii) of the request. The treatment of iii) will await the conclusions from the Working Group report on i) and ii).

For a discussion on the food consumption of several marine mammal species see Scientific Committee Report, Section 3.1, item 8.2, page 129 of this volume.

3.1.4 Marine mammal stocks: Status and advice to Council

i) Harp and hooded seals

Based on a request from NAMMCO in May 1995, the Joint ICES/NAFO Working Group on Harp and Hooded Seals met in Tromsø, Norway from 29 September to 2 October 1998 to provide assessment advice on harp seals in the White Sea and Barents Sea, and harp and hooded seals in the Greenland Sea. The terms of reference formulated by ICES Advisory Committee on Fisheries Management were:

i) to complete the assessment of stock size, distribution and pup production of harp seals in the White Sea/Barents Sea and hooded seals in the Greenland Sea;
ii) to assess the sustainable yield at present stock sizes and provide catch options for these two stocks.

Harp seals

Stock identity, distribution and migrations

Results of studies of the stock identity of harp seals using DNA analysis support the view that there is a separation between western and eastern Atlantic groups. Results from satellite tracking experiments indicate that harp seals from the White Sea/Barents Sea stock migrate north-west into the Barents Sea after moult. In late autumn and early winter the seals moved south gradually with the expanding ice cover.

The Greenland Sea stock

Only Norway has taken catches of harp seals in the Greenland Sea pack ice since 1995. The catch in 1998 was 1,884 seals, of which 1,707 were weaned pups and 177 were older animals. This fell far short of the quota of 13,100 age 1+ seals, or twice the number of weaned pups. Between 1990-1998, less than 60% of the quota has been taken.

No current estimate of pup production for this stock is available. The most recent estimated pup production in 1991 was 67,300 (95% C.I. 56,400–78,113). The total population of harp seals in the Greenland Sea in 1998 was estimated using a model

incorporating the 1991 estimate of pup production along with reasonable assumptions on rates of natural mortality and reproduction. The estimated pup production in 1998 was 79,000-97,000, and the estimated total number of seals was 458,000-549,000, the range depending on the natural mortality values used.

Catch options for all stocks were developed using a model that calculates a constant exploitation rate that will stabilise the total population at or slightly below its current level. Once the population has stabilised, this exploitation rate then becomes equivalent to the replacement yield rate for the population. Catch options range from about 30,000 to 44,000 pups or 14,000 to 21,000 1+ animals in 1999. Estimates of pup abundance stabilise fairly quickly (approximately 15 years) while adult numbers continue to decline slowly for some time. Given this trend in abundance, lack of current data on reproductive rates and the lack of current pup production estimates for this stock, the Scientific Committee recommended that caution should be used when considering these catch options.

The White Sea and Barents Sea stock

The combined Russian and Norwegian catches in 1998 were 14,202 animals, of which 13,368 were pups. This is considerably lower than the 1989-1997 level, which ranged between 36,399 and 42,877. The total quotas during 1998 remained the same as during 1989-1997 (40,000 animals).

Aerial surveys of White Sea harp seals were conducted in March 1998 as a co-operative effort between Russian and Canadian scientists. The Scientific Committee accepted an estimate of 301,000 (95% C.I. 243,000 to 359,000) pups. This estimate is likely to be conservative as no correction for reader error was applied. The total number of harp seals in the stock was estimated as between 2,174,000-2,228,000, depending on the level of pup mortality used in the model.

Catch options range from about 96,000 to 142,000 pups or 50,000 to 72,000 1+ animals in 1999. Because of concerns that pup mortality may be greater than three times that of adults in some years, catch options were also derived under the assumption that pup mortality was five times that of adults. The option derived under this assumption is lower than the others, with catches of 76,000 pups or 32,000 1+ animals in 1999.

Given that historical estimates of abundance of this population are poorly documented, that the 1998 pup production estimate is based on new methods for which no comparable data exists, and that no information on population trends is available, the Scientific Committee recommended that a conservative approach be adopted in establishing harvest quotas.

Hooded seals

Stock identity, distribution and migrations

Results from satellite tracking experiments have shown that the seals remained within the Greenland and Norwegian Sea for most of the year. Several seals spent extended periods at sea west of the British Isles, or in the Norwegian Sea, between the breeding

and moulting periods.

The Greenland Sea Stock

Only Norway took catches of hooded seals in the Greenland pack ice in 1998. The total quota (5,000 1+ animals) was allowed to be taken as weaned pups with one adult equal to two pups. The catches totalled 6,351 animals, of which 5,597 were pups and 754 were 1+ animals.

Estimated abundance from a survey carried out in the Greenland Sea in March 1997 was 23,762 pups (95% C.I. 14,819 - 32,705). This should be considered a minimum estimate as it was not corrected for the temporal distribution of births or pups born outside of the whelping patches surveyed. The 1998 population size of hooded seals in the Greenland Sea was estimated to be between 131,800 and 140,200, depending on the assumptions on natural mortality used. Catch options range from about 11,000 to 25,000 pups or 7,000 to 15,000 1+ animals in 1999.

Co-ordination of joint feeding studies

At its 8th meeting, in Oslo 1998 the Council recommended that the Scientific Committee should co-ordinate joint feeding studies of harp and hooded seals in the seas around Iceland, Greenland and Norway and off West Greenland. The Scientific Committee had concluded that such studies were being adequately co-ordinated outside the auspices of the NAMMCO Scientific Committee.

ii) Harbour porpoises

At its 7th meeting in Tórshavn in 1997, the NAMMCO Council noted that the harbour porpoise is common to all NAMMCO member countries, and that the extent of current research activities and expertise in member countries and elsewhere across the North Atlantic would provide an excellent basis for undertaking a comprehensive assessment of the species throughout its range. The Council therefore requested the Scientific Committee to perform such an assessment, which might include distribution and abundance, stock identity, biological parameters, ecological interaction, pollutants, removals and sustainability of removals.

In response, the Scientific Committee decided that the matter could best be dealt with by convening an international workshop/symposium on harbour porpoises, involving experts studying species throughout its North Atlantic range. The International Symposium on Harbour Porpoises in the North Atlantic was held on board the Norwegian Coastal Steamer MS Nordlys enroute from Bergen to Tromsø, 10 - 14 September 1999. It was attended by 31 delegates from 12 countries and included 22 presentations. The Symposium agenda was structured around four theme sessions, each led and chaired by an invited keynote speaker who also summarised the discussions around their respective themes. The synthesised conclusions and recommendations were presented and discussed on the final day of the Symposium.

The Scientific Committee will develop assessment advice and research recommendations for the Council, based on the final report prepared by the Secretariat. In addition, many of the Symposium delegates have been invited to

contribute their papers for a future volume of *NAMMCO Scientific Publications*, which should be ready for publication late in the year 2001.

iii) *Narwhal and beluga*

In 1997 the Council of NAMMCO requested the Scientific Committee to "examine the population status of narwhal and beluga (white whales) throughout the North Atlantic". Since the two species inhabit the same areas, and the development of status reports for both species would draw upon the same expertise, it was decided to deal with both species in one working group. Thus the Scientific Committee established a Working Group on the Population Status of Narwhal and Beluga in the North Atlantic. The Working Group, which included experts from Canada, Russia and Denmark, as well as from NAMMCO member countries, met at the Zoological Museum in Oslo during 1 - 3 March 1999 under the chairmanship of Professor Øystein Wiig.

Stock identity, distribution and migrations

A considerable amount of new information on the population structure of narwhal and especially beluga has appeared during the last 5 years. A number of methods, including tooth morphology, satellite tracking, genetic studies of mtDNA and microsatellites, and studies of trace elements of both anthropogenic and natural origin, have contributed to the elucidation of a much more complex population substructure of beluga stocks than hitherto believed. A general picture of a seasonally strong philopatry to certain areas has emerged, and previous assumptions about the probable connections between nearby beluga occurrences have been challenged. On the basis of this new information, it was considered necessary to redefine beluga stocks as smaller or larger herds that are seasonally present at restricted localities. The splitting of beluga stocks into smaller units has important management implications, in that a status of the North Atlantic beluga needs to be developed on the basis of beluga aggregations that are seasonally but regularly present at specific fjords, coast lines, promontories or estuaries.

Status of beluga aggregations in the North Atlantic

The Working Group used the approach suggested above to identify 42 aggregations, or putative management stocks, of beluga in the North Atlantic (See Section 3.1, Annex 1 of this volume). Of these, 2 (South Greenland and Ungava Bay) are thought to have been extirpated by over-harvesting. For the majority of the stocks, information on population size is not available.

Beluga are harvested in Canada, Greenland and to a very small extent in western Russia. For some of the harvested stocks, the number of whales landed is uncertain, and the number of whales struck and lost is unknown for all areas.

Of the 42 stocks listed, 25 were considered to be “not threatened”, while the status of 5 stocks could not be assessed based on the available information. The present harvest level of beluga in West Greenland is a concern because the estimate of stock size is small relative to the high and incomplete reports on catch levels, and because a decline in relative abundance has been detected. Some beluga stocks in Canada are small and therefore at risk of being overexploited. This applies especially for Pangnirtung and

Eastern Hudson Bay.

Status of narwhal aggregations in the North Atlantic
The Working Group identified 18 putative stocks of narwhal in the North Atlantic. However, there was very little information available on stock delineation for narwhal. Although abundance estimates were available for some stocks, virtually all estimates were incomplete, out of date or both. Harvesting is carried out in Canada and Greenland. For some stocks that are harvested, the number of whales landed is uncertain, and the number of whales struck and lost is unknown for all areas.

Of the 18 putative stocks identified, 10 were considered to be "not threatened", while the status of 6 was uncertain given the information available. Like the beluga, the narwhal is a highly migratory species, and a group that aggregates in one area may be harvested in another during migration. For some smaller aggregations (e.g. Peel Sound and Eclipse Sound), potential exploitation in other areas (e.g. Disko Bay and Uummannaq) may pose a threat. For most areas where harvesting is carried out, a status could not be assigned with any certainty.

Conclusion
Within the North Atlantic, beluga and narwhal are mainly harvested in Canada and Greenland, with the largest catches taken in Greenland. Recent studies of population structure suggest strong philopatry, which implies that stock status should be assigned for local aggregations of whales.

- The present harvest level of beluga in West Greenland is likely not sustainable as the estimate of stock size is small relative to the high and incompletely reported catch levels, and a decline in relative abundance has been detected. Continued monitoring of population trend and more information on stock structure in the area are needed. With the observed decline, a reduction in harvesting seems necessary to halt or reverse the trend.
- The Pangnirtung and Eastern Hudson Bay aggregations in Canada are small and may be overexploited. Monitoring of population trend as well as no increase in harvesting is recommended.
- Less is known about the population structure of narwhal, and for some smaller aggregations (e.g. Peel Sound and Eclipse Sound), exploitation in other areas (e.g. Disko Bay and Uummannaq) may pose a threat. For most aggregations, no accurate population estimates are available, and enumeration of narwhal is needed before a status can be assigned (e.g. Avanersuaq and Uummannaq).
- For both narwhal and beluga it is mandatory for future management that more reliable catch statistics (including loss rates) are collected from Canada and Greenland.

Heide-Jørgensen noted that the first report of this Working Group will provide an excellent background for the Scientific Committee to respond to more focussed requests from Council concerning narwhal and beluga.

iv) Fin whales

In 1998, the Management Committee of NAMMCO asked the Scientific Committee to "...undertake an assessment of the status of fin whales in the North Atlantic based on all available data". NAMMCO Council later refined the request as follows:

"Acknowledging the large amount of work involved in such a comprehensive assessment of all possible fin whale stocks in the North Atlantic, the Council requests the Scientific Committee, when conducting such comprehensive assessment, particularly to

i) assess the stock structure of fin whales in the whole North Atlantic.
ii) assess the long-term effects of annual removal of 50, 100 and 200 fin whales in the stock area traditionally assumed to have a main concentration off East Greenland and Iceland (EGI stock area),
iii) identify maximum sustainable yield (MSY) exploitation levels for that stock area."

The Working Group on North Atlantic Fin Whales worked first by correspondence to review the available information and determine computations to be carried out, then met in April 1999 under the chairmanship of Gísli Víkingsson.

Stock structure

It appears that fin whales in the North Atlantic may be divided into a number of stocks, with limited gene flow between adjacent stocks. There is some indication that the western North Atlantic and Iceland areas both have populations different from those found off the coasts of Spain and north Norway. Furthermore, there are indications of a difference between Iceland and the Canadian east coast. Genetic studies also indicate that there may be differences within the EGI Stock Area. Historical harvest and depletion patterns as well as marking studies suggest site fidelity within the EGI area. A similar pattern of site fidelity has also been observed in the western North Atlantic. Much more information on population structure is needed before firm conclusions can be reached on stock delineation.

Assessment in the EGI Stock Area

Population trajectories incorporating past catch series were conducted to hit the recent abundance estimates, and projected with catch levels of 0, 50, 100 and 200 whales per year until the year 2020 using the HITTER technique. The Scientific Committee chose a conservative value of maximum sustainable yield rate (MSYR) of 2% for assessing the effects of future catches.

In summary, a short to medium term (next 10 years) catch of up to 200 fin whales per year is unlikely to bring the population down below 70% of its pre-exploitation level under the least optimistic scenarios. However, catches at this level should be spread throughout the EGI stock area. An appropriate way of doing this would be to spread the catches roughly in proportion to the abundance of fin whales observed in NASS surveys. It is also suggested that no catches should be taken in the immediate vicinity of shore-based whaling stations, to avoid localised depletions. In addition, catches should be spread over time within the season to safeguard against depletion of aggregations.

The Scientific Committee agreed that determination of MSY and MSYR levels for fin whales and other whale stocks does not seem possible given the present knowledge about the dynamics of whale populations.

Future research
The Scientific Committee agreed on the following priorities for research on North Atlantic fin whales:

- Stock delineation is the most critical issue in fin whale assessment at this time. While it is evident that the stock structure of fin whales is more complex than reflected by the present stock areas, the details of stock structure are not clear. Several approaches to resolving this problem were identified, including genetic analyses of existing samples and of samples collected over a broader area, involving additional microsatellite loci and statistical analyses to determine if there are natural genetic groupings; mark-recapture studies using genetic marks or other techniques; stock delineation studies using pollutant or isotopic signatures; and satellite telemetry.
- Regular abundance surveys are essential for monitoring the trend in the stocks. This will be particularly important should harvesting resume. The higher the level of exploitation, the more frequently surveys should be conducted. For exploitation levels of the order being considered here, sightings surveys conducted at intervals of about 5 years were considered a satisfactory method of obtaining abundance estimates and their trends.
- A population model incorporating the history of local depletions and their apparent recovery, with immigration options from other groups, should be developed and applied to the EGI stock area.

The Council noted the conservative nature of the advice, which was based on very conservative assumptions and took account of possible stock substructure within the EGI stock area. With regard to the need for more information on stock structure, Heide-Jørgensen indicated that while such information would improve the ability of the Scientific Committee to provide advice on fin whales, the Scientific Committee had been able to answer the question put to it to its own satisfaction with the information at hand. Should hunting of fin whales resume, the greatest need will be to continue synoptic abundance surveys at regular intervals, so that trends in abundance can be detected.

v) *Minke whales*
At its 8th meeting in Oslo in 1998, the Council recommended that the Scientific Committee should investigate the possibility of supplementing present sampling with existing older material from NAMMCO countries and other countries in joint genetic analyses. The Scientific Committee noted that such exchanges of samples are ongoing between Norway and Greenland. Samples collected in the past from Iceland and Norway have already been analysed concurrently, and there are no recent samples from Iceland. The Scientific Committee concluded that available samples are being utilised effectively.

vi) White-beaked and white-sided dolphins

At its 8th meeting in Oslo in 1998, the Council recommended that the Scientific Committee should undertake an assessment of distribution, stock identity, abundance and ecological interactions of white-beaked and white-sided dolphins in the North Atlantic area.

The Scientific Committee considered that there is insufficient information on stock structure, abundance and feeding ecology to carry out a meaningful assessment of these species at this time. Some new information on abundance may become available from the NASS-95 survey, but these data have not yet been analysed. The Scientific Committee agreed to begin compiling available information on these species in member countries, with the objective of identifying knowledge gaps and creating a basis for assessment in the longer term.

While noting the conclusion of the Scientific Committee that there is insufficient information to carry out a meaningful assessment of these species presently, the Council noted that these species are subject to a direct harvest in the Faroes. The Council therefore referred the matter to the Management Committee to develop further requests for advice on these species.

3.1.5 Future North Atlantic Sighting Surveys

The Scientific Committee noted that sighting surveys carried out at regular intervals were a requirement for the effective management of most species. Iceland tentatively plans to carry out a synoptic survey for cetaceans, similar to previous NASS surveys, in 2000, and Norway carries out such surveys annually. The Scientific Committee considered that it would be beneficial if member countries and neighbouring countries could co-ordinate their survey efforts to the fullest extent possible to gain a broader coverage of the North Atlantic. The Scientific Committee assigned the task of co-ordinating surveys to the Working Group on Abundance Estimates. While it was considered unlikely that synoptic coverage similar to the NASS 95 survey could be achieved in 2000, the Working Group will seek to broaden the coverage to the maximum extent feasible.

3.1.6 Storage and handling of data at the Secretariat

In 1998, NAMMCO Council instructed the Secretariat to prepare a report on the storage and handling of marine mammal catch data in the Secretariat (the report was presented to the meeting as NAMMCO/9/6). This report was to outline present procedures for data submission and handling, as well as analyse the implications of different types and extent of data storage in the Secretariat. The question of a catch database in the Secretariat has previously been discussed in the Scientific Committee (see NAMMCO Annual Report 1993 and 1996), and in the NAMMCO Council (see NAMMCO Annual Report 1995).

The report noted that at the 1998 meeting of the Scientific Committee, some members concluded that it would be better to compile relevant data in response to specific tasks generated by requests from the Council, rather than maintaining large and detailed datasets at the Secretariat. This view was reiterated at the 1999 meeting, when it was

noted that the use of catch data generally required a very detailed level of information such as knowledge of accuracy, precision, catch composition and exact location of the catch. It was therefore concluded that the catch database at NAMMCO was of little use to the Scientific Committee. However, it was noted that it might be of use to the Secretariat for other purposes.

The NAMMCO catch database is presently complete for six cetacean and five pinniped species (including walrus and ringed seal in Greenland) up to the year 1995. It covers all areas of the North Atlantic, and generally identifies the stock area and nation responsible for the catch. The database was compiled from both published and unpublished sources. In each case, the source of the data is identified.

The Secretariat considered that there remained a need for NAMMCO to maintain a catch database, outside of the needs of the Scientific Committee. NAMMCO does receive enquiries from the public, non-government organisations, member and non-member governments and other international organisations about the past and present marine mammal harvesting activities of member countries, and a simple catch database could be useful for answering these requests. Such a database would also be useful if NAMMCO wishes to include a compilation of catch data in the Annual Report.

The Report made several recommendations for the structure and maintenance of a catch database at the Secretariat, and for obtaining catch data through the National Progress Reports. The Council agreed to refer this matter to the Management Committee for consideration.

3.1.7 Publications

Heide-Jørgensen noted with satisfaction that the first volume of NAMMCO Scientific Publications, *Ringed Seals in the North Atlantic*, was now published and had been widely distributed by the Secretariat. Comments on the volume had been quite positive, and the Scientific Committee looked forward to the publication of future volumes on different topics in the near future.

The following volumes of NAMMCO Scientific Publications are presently planned or in progress:

i. Minke whales, harp and hooded seals: Major predators in the North Atlantic ecosystem
ii. Sealworm Infections
iii. NASS 95
iv. Harbour Porpoises in the North Atlantic
v. Population Status of Narwhal and Beluga in the North Atlantic

3.1.8 Concluding remarks by Chairman

The Chairman, Heide-Jørgensen concluded his presentation with some personal remarks on the functioning of the Scientific Committee. He noted that the Scientific Committee was functioning well, with a high level of openness and mutual trust between the members. However it was critical to the functioning of the Scientific

Committee that all members from each country are given the time, means and encouragement to participate to the fullest extent possible. For this to occur, it was mandatory that the work of the Scientific Committee be held in high esteem, and be clearly related to management objectives. Members must feel that it is not just honourable and prestigious, but also influential to be a member of the NAMMCO Scientific Committee.

Heide-Jørgensen proposed that the Scientific Committee be given the option of conducting its own research with funding provided by the Council. This would facilitate closer co-operation between members intersessionally, and enable the Scientific Committee to play a more active role in addressing Council requests for advice. Projects could include the development of new assessment procedures, addressing key questions on stock delineation, multispecies interactions, or generally address the priorities of both the Scientific Committee and the Council.

The Council expressed its appreciation to Heide-Jørgensen for his remarks and proposal. The Council asked the Scientific Committee to develop a full proposal for a scientific research program within the Scientific Committee, and to bring it to the Council for consideration at the next annual meeting.

The Chairman of the Council thanked Heide-Jørgensen for his comprehensive report. Matters regarding scientific requests and advice from the Scientific Committee were forwarded to the Management Committee for further consideration (see under 4.1 and 4.2 below, and the Report of the Management Committee, which is contained in Section 2.1 of this volume).

4. MANAGEMENT COMMITTEE

4.1 Report of the Management Committee

The Chairman of the Management Committee, Kaj P. Mortensen (Faroe Islands) reported to the Council on the meeting of the Management Committee, which was held in Akureyri from 6 to 7 October. A preliminary report was distributed as NAMMCO/9/9 – Draft, containing the substantive issues agreed to by the Management Committee. (The final, edited version of the report was adopted by correspondence after the meeting. See Section 2.1 of this volume.)

4.1.1 National Progress Reports

The Council noted the Management Committee's appreciation to the member countries for the National Progress Reports.

The Reports on marine mammal research in member countries submitted to the Management Committee are contained in Section 4 of this volume.

4.1.2 Proposals for conservation and management

Earlier proposals

Atlantic walrus

With reference to the Management Committee's earlier proposal for conservation and

management of Atlantic walrus, the Council noted Greenland's report that no new measures had been implemented beyond those taken in 1998.

New proposals

Advice from the Scientific Committee

The Council noted the Scientific Committee's clarification, as requested by Greenland, that previously given advice, unless the request for advice is a standing one, is not updated when new information is available. Updates are only provided if requested by the Council.

Harp seals in the White Sea/Barents Sea and the Greenland Sea and hooded seals in the Greenland Sea

The Council noted the conclusions of the Management Committee that the 1998 catch levels of harp and hooded seals were well below the calculated replacement yield. From a resource management point of view, future quota levels approaching the replacement yield are advised for these areas (see Report of the Scientific Committee, Section 3.1, items 9.1 & 9.2 , page 131 of this volume).

North Atlantic beluga and narwhal

Beluga in West Greenland

The Council noted with concern that the abundance of beluga wintering in West Greenland is declining, and that a reduction in harvesting seems necessary to reverse this trend (see Report of the Scientific Committee, Section 3.1, items 9.4 & 9.5, page 137 of this volume).

Narwhal in West Greenland

The Council noted that the Management Committee drew attention to the information that the present exploitation level in Avanersuaq seems sustainable, while the substantial catches in the Uummannaq area in some years do cause concern for this aggregation. The Council took further note of the Management Committee suggestion that the abundance of narwhal in this area should be estimated (see Report of the Scientific Committee, Section3.1, items 9.4 & 9.5, page 137 of this volume).

North Atlantic fin whales

The Council noted that the Management Committee accepted that for fin whales in the East Greenland – Iceland (EGI) stock area, removals of 200 animals per year would be unlikely to bring the population below 70% of its pre-exploitation level in the next 10 years, even under the least optimistic scenario. Furthermore, the Council noted that the Management Committee stressed that regular monitoring of the trend in the stock size should follow the utilisation of this stock (see Report of the Scientific Committee, Section 3.1, item 9.6, page 143 of this volume).

Incorporation of users' knowledge in the deliberations of the Scientific Committee

The Council noted the Management Committee endorsement of the proposals contained in the Scientific Committee report (see Section 3.1, item 6, page 127 of this volume).

4.1.3 Report on the Working Group on By-Catch

The Council noted the Management Committee's endorsement of the Working Group's working definition of by-catch:

"Recognising that by-catch of marine mammals may be a valuable contribution to the total catch, an appropriate definition of marine mammal by-catch is: marine mammals taken incidentally in fisheries targeting other species."

The Council further noted the agreement of the Management Committee to the following terms of reference for the Working Group:

- to look at different procedures to collect by-catch information and to compare benefits and drawbacks from the experiences in the member countries;
- to prepare for discussion of quality control of the by-catch data by the Scientific Committee
- to prepare a NAMMCO policy on the use of marine mammal by-catch data.

4.2 Requests for advice

The Council noted the Management Committee's endorsement of the research recommendations from the Scientific Committee for North Atlantic beluga and narwhal (see Section 3.1, Annex 1, item 11, page 177 of this volume), fin whales (see Section 3.1, item 9.6, page 143 of this volume) and white-beaked and white-sided dolphins (see, Section3.1, item 9.8, page 145 of this volume).

4.2.1 Former and outstanding requests from the Council

The Council took note of the document NAMMCO/9/MC/4, which was an updated list of requests for scientific advice agreed to by the Council since 1992. (This list is updated to include requests agreed to at the present meeting. It is contained in the Report of the Management Committee, Section 2.1, Appendix 4 of this volume.)

NASS-95

The Council **agreed** to the Management Committee's recommendation to request the Scientific Committee to complete abundance estimates for all species in the North Atlantic.

White-sided and white beaked dolphins

The Council **agreed** to the Management Committee's recommendation to task the Scientific Committee with facilitating the requested assessment of these species (see Report of the Management Committee, Section 2.1 item 6.2, page 89 of this volume).

4.2.2 New requests

The Council **agreed** to forward the following new requests for advice to the Scientific Committee, as recommended by the Management Committee:

i) North Atlantic beluga and narwhal

The Scientific Committee is requested to provide advice on the level of sustainable utilisation of West Greenland beluga in different areas and under different management objectives, and with respect to narwhal to identify the information that is

lacking in order to answer the same question proposed for beluga.

ii) *Fin whales*

The Scientific Committee is requested to continue its assessment of fin whale stocks in the North Atlantic, focussing in the near term on the status of fin whales in Faroese waters. The Scientific Committee should in particular focus on the following issues:

i. assess the long-term effects on annual removals of 5,10 and 20 fin whales in Faroese waters;
ii. information gaps that may need to be filled in order to complete a full assessment in this area.

With respect to fin whales the Council **agreed** to forward a request to the NAMMCO Member Countries to initiate the research required to elucidate the stock structure of this species, as recommend by the Management Committee.

iii) *North Atlantic Sighting Surveys*

The Scientific Committee is requested to continue its efforts to co-ordinate future sighting surveys and analyses of the results from such surveys in the North Atlantic. Priority species should be minke whales and fin whales, and the survey design should be optimised for these species. The survey should also be optimised to cover those areas where abundance estimates are most urgently required.

iv) *Bottlenose dolphins*

The Scientific Committee, in connection with the updated request for advice on white-sided and white-beaked dolphins, is requested to include the bottlenose dolphins in this assessment (see Report of the Management Committee, Section 2.1, item 6.2.2, page 90 of this volume).

v) *Language used in the Report of the Scientific Committee*

The Council **agreed** to convey to the Scientific Committee that the language in the Report of the Scientific Committee should be kept precise and simple.

4.3 International Observation Scheme

The Council noted the Management Committee's review of the implementation of the International Observation Scheme in 1999 under the Joint NAMMCO Control Scheme for the Hunting of Marine Mammals (see Report of the Management Committee, Section 2.1, item 9, page 92 of this volume).

The Council noted the decision of the Management Committee to establish an *ad hoc* Working Group on the Observation Scheme, with the following mandate:

"To review the implementation of the Observation Scheme to examine practical and administrative matters requiring consideration and development, and seek better co-ordination of the observation activities."

4.3.1 Report on the Working Group on Inspection and Observation

In reference to the Report of the Management Committee Working Group on Inspection and Observation, the Council noted the endorsement of the Management

Committee of the rewording of article 15 of the Guidelines (see Management Committee Report Section 2.1, item 8, page 91 of this volume).

"Appointed observers receive a letter of appointment and a copy of the provisions of the Joint NAMMCO Control Scheme from the Secretariat. When a detailed plan of observation activities for the year is finalised, those observers who will be called upon for active observation will receive an employment contract from the Secretariat. When both parties sign this, the observer will receive an identification card, as well as other relevant documentation necessary for his/her duties. The observer shall return his/her identification card to the Secretariat together with the final report of activities, and shall then receive a letter from the Secretariat confirming his/her completion of duties according to the Scheme."

The Council **adopted** the amended wording. The Council further **endorsed** the Management Committee's recommendation that the Finance and Administration Committee considers the financial and administrative aspects of the Joint NAMMCO Control Scheme.

4.4 Other business

The Council **endorsed** the Management Committee's recommendation that a catch database should be maintained at the Secretariat, to enable the Secretariat to respond to enquiries about harvesting activities of member countries, and that catch data be transmitted to the Secretariat on an annual basis.

5. HUNTING METHODS

5.1 Report of the Committee on Hunting Methods

The Chairman of the Committee on Hunting Methods, Jústines Olsen (Faroe Islands) presented the report of the Committee to the Council.The Committee met in Copenhagen on 6 September, 1999. (The report is contained in Section 1.2 of this volume).

5.1.1 Updates on hunting methods in member countries

The Council noted the updated information on developments in hunting methods in the Faroe Islands, Norway and Greenland, which was presented to the Committee at its September meeting. (see Report of the Committee on Hunting Methods, Section 1.2, item 3, page 51 of this volume).

The Chairman presented the updated lists of regulations and references on hunting methods in member countries developed by the Committee. These lists were appended to the Committee Report (see Section 1.2, Appendices 1 and 2).

5.1.2 Workshop on Hunting Methods

The Chairman presented the Report from the Workshop on Hunting Methods, which was held in Nuuk, Greenland from 9 to 11 February 1999 (see Section 1.3 of this volume). The Workshop had the following terms of reference:

- to review existing marine mammal hunting methods in member countries,

including technical developments with respect to equipment and methods, with the view to providing a technical evaluation of different methods of hunting (fin and minke whaling; hunting of small whales; seal and walrus hunting);

- to examine possibilities for technical innovation and further enhancement of efficiency and safety in hunting methods, with a view to providing recommendations for improvements where relevant.

The Chairman informed the Council that due to weather conditions the Icelandic delegation unfortunately was prevented from participating in the Workshop.

The Chairman reported that the Workshop had organised the discussion on hunting methods and hunting regulations by region and marine mammal species. The Workshop began by discussing the existing and recent improvements to pilot whale hunting methods in the Faroe Islands. The Chairman pointed out that a new knife and a new improved hook were being developed. One of the problems involved in utilising the new equipment, in particular the new hook, was the high cost to the hunters.

A number of small cetaceans are hunted in Greenland and the knowledge of hunting these animals is passed on from generation to generation. The hunters combine traditional knowledge, gleaned from direct observation and participation, with the restrictions of current regulations. These regulations are primarily concerned with efficiency of the equipment and with the catch reporting system.

In reference to the Norwegian minke whale hunt, Norway has since 1984 continued to develop a more efficient penthrite grenade. A study is underway to find the best method of determining the exact moment a whale loses consciousness or dies.

The Chairman reported that Greenland had recently initiated a renovation program of all the harpoon canons used in minke and fin whale hunting. He noted that Greenlandic minke and fin whale hunters found the penthrite harpoon grenades to be expensive and destructive to the meat. Minke whales are also hunted with rifles in Greenland, and the hunters must follow strict regulations on the minimum number of skiffs involved in each team of hunters, and on the other types of equipment required for this type of hunt. Norway had expressed scepticism about this type of hunting, but Greenland explained that the economic conditions in the isolated villages that engage in this type of hunting precludes the adoption of other techniques at present.

The participants at the Workshop from Japan and Russia outlined the various hunting methods used in marine mammal hunting by their countries.

The Council was informed about seal and walrus hunting in Greenland. It was reported that seals continue to have cultural and dietary importance. The method of seal hunting varies with species and season, but in each case the hunters are always seeking to improve their methods.

In reference to Norwegian sealing it was reported that all sealers must pass a

marksmanship test and a general sealing course prior to boarding the vessel. Studies have been undertaken on the efficiency of the various seal killing methods.

The Chairman presented to the Council the Recommendations drafted by the Committee (see Section 1.3, item 7, page 71 of this volume). These recommendations, which are a part of the Workshop on Hunting Methods Report, outline areas for improvements to hunting methods used in the different NAMMCO member countries and for specific species.

The Council noted with satisfaction the report from the Committee on Hunting Methods, and in particular the Report from the Workshop on Hunting Methods. The **Faroe Islands** expressed its full support for the suggestions from the Committee, and **Norway** and **Iceland** commended the Committee for its valuable work. **Greenland** noted that many of the recommendations pertained to Greenland and that these were **accepted** and would be acted upon in a timely fashion.

The Council **endorsed** the Recommendations from the Workshop on Hunting Methods.

The Council noted the valuable contributions of the hunters to the Workshop, and stressed the importance of ensuring the involvement of the hunters in future meetings.

The Chairman reported that the Committee in considering plans for future work, agreed that it was evident from the Workshop on Hunting Methods in Nuuk in 1999, that basic knowledge and understanding of weapon-types, ammunition and ballistics is lacking.

The Council **endorsed** the Committee's intentions to pursue this topic further with the goal of increasing the understanding of ammunition types and ballistics for the hunters, administrators and other personnel.

The Council thanked the Chairman for his report and commended the work of the Committee in organising the Workshop, which had been a constructive contribution to co-operation through NAMMCO on hunting methods.

6. THE NAMMCO FUND

6.1 Report of the NAMMCO Fund

The acting Chairman of the Board of the NAMMCO Fund, Kate Sanderson (Faroe Islands) presented the report of the NAMMCO Fund, which met in Akureyri prior to and during the 9th meeting of the Council, 5 - 8 October, 1999.

6.1.1 Policy and Application Procedures for the NAMMCO Fund

In 1998, the Board of the NAMMCO Fund instructed the Secretariat to develop a set of requirements for applications and administrative guidelines for the Fund. The draft prepared by the Secretariat was reviewed and discussed in detail. The Secretariat was tasked with the final editing before releasing the document to the public. The Council

welcomed the Board's development of the NAMMCO Fund Policy and Application Procedure.

6.1.2 Advertising the Fund

The Council noted the Board's decision to advertise the Fund on an annual basis in one major newspaper in each NAMMCO member country in the local languages. The Council noted that the Board **agreed** to entrust the Secretariat with investigating other appropriate venues for distributing information about the Fund.

The Council **endorsed** the Board's **recommendation** that the costs of advertising the Fund should come from the general budget and should not be taken form the Fund itself.

6.1.3 Update and progress on outstanding projects

Projects supported by the Fund, which had been completed since the Council's last meeting included:

Større enn kval (*"Bigger than whales")* – A documentary film, by Norwegian filmmaker Knut Skoglund was completed in late 1998. The Council noted that this film has been screened at a number of major Nordic and other film festivals.

Villini sugdjor i Utnordi – An illustrated text book, with accompanying posters, on marine mammals in the North Atlantic, by Dorete Bloch and Edvard Fuglo was published by Skúlabókagrunnurin in the Faroe Islands in July 1999. Copies will be distributed to member countries in due course. The book will be displayed at a book fair in Germany.

The Poster on Whales in Norwegian Waters – by Tore Dillingøen and Egil Ole Øen (Norway) was finalised soon after the last Council meeting in 1998. Copies had been distributed to member countries and others by the Secretariat.

Inuit, whaling and sustainability – A publication by the ICC (Inuit Circumpolar Conference) was published late in 1998. The Council noted that the Board requested the Secretariat to follow up with ICC on information and distribution of the book.

6.1.4 New proposals

The Council noted that the Board had **agreed** to postpone consideration of unsolicited proposals received by the Secretariat during the last year, until the Policy and Application Procedure was activated and the Fund had been advertised properly.

6.2 Other business

The Board noted that the remaining funds in the NAMMCO Fund totalled NOK 254,663. The Council **endorsed** the Board's recommendation that no funding should be included in the NAMMCO budget for 2000, but that an additional NOK 200,000 should be budgeted for 2001.

The Chairman thanked the Board of the NAMMCO Fund for their report.

7. ENVIRONMENTAL QUESTIONS

At its 8th meeting in Oslo in 1998, the Council instructed the Secretariat to continue to pursue issues concerning contaminant levels in the marine environment with relevant international bodies, including establishing an information exchange (see NAMMCO Annual Report 1998 pp 26-28).

The Council **agreed** to a proposal from the Faroe Islands that the Secretariat prepare a review of organisations addressing marine environmental questions and the types and scope of these issues. The particular focus of the review should to be on how contaminants studies can be distinguished between their relevance to the management of marine mammal stocks and to the management of marine pollution.

In this regard it would be useful to focus on where work is being carried out to examine the effects of contaminants on marine mammals and the effects of these contaminants on the health of humans consuming these animals. The Council agreed that more information on marine mammal research and co-operation with respect to human health issues is needed.

8. EXTERNAL RELATIONS

8.1 Co-operation with other international organisations.

Under this item the Secretary informed the Council of the meetings officially attended by NAMMCO, and reviewed relations with organisations with which NAMMCO has established an exchange of observers.

IWC International Whaling Commission

The Council noted that the Secretary had represented NAMMCO as observer at the 51st annual meeting of the IWC that was held in Grenada in May 1999.

In following previous practice NAMMCO submitted an opening statement to the IWC, providing updated information on the recent activities of the organisation. The statement was available to the Council meeting as document NAMMCO/9/14.

Arctic Council- Senior Arctic Officials Meeting

The Secretary informed the Council that she had attended the Sustainable Development Working Group (SDWG) and the Senior Arctic Officials (SAO) Meeting of the Arctic Council in Anchorage, Alaska, 3 - 6 May 1999. NAMMCO had applied for and received *ad hoc* observer status to these meetings.

The Council noted that the Arctic Council meetings in Anchorage had addressed three main topics:

i. environmental protection;
ii. sustainable development including the health of Arctic peoples;
iii. public awareness and education.

The Council further noted the discussion in the Arctic Council on developing a strategy for the SDWG.

The Secretary further informed the Council that NAMMCO had been invited to apply for *ad hoc* observer status to the upcoming SDWG and SAO meetings in Washington D.C. in November 1999. The Council noted that NAMMCO will apply for permanent observer status before the next Ministerial Meeting of the Arctic Council in autumn 2000, at which time the decision on the application will be made.

NEAFC – North-East Atlantic Fisheries Commission
Norway distributed the report from Inger Lavik Opdahl, who had been NAMMCO's observer at the 1998 Annual Meeting of NEAFC in London 17 – 20 November 1998, and at the extraordinary Annual Meeting in Brussels 8 - 9 February 1999.

NEAFC had received and discussed the Report of the ICES Advisory Committee on Fisheries Management. The annual meeting agreed on regulations for Norwegian Spring Spawning herring, for Oceanic type redfish, and for mackerel, in waters beyond the areas of national jurisdiction of the Contracting Parties.

NEAFC adopted a Scheme to promote compliance by non-contracting party vessels. The Scheme came into force on 1 July 1999.

NAFO – Northwest Atlantic Fisheries Organisation
Iceland distributed the report from Mr Kolbeinn Árnason (Iceland) who had represented NAMMCO at the 21st annual meeting of NAFO, held in Nova Scotia 13 - 17 September 1999.

Mr Árnason reported on a number of intersessional Working Groups that have direct relevance for NAMMCO, such as the Working Group on Precautionary Approach, the Working Group on Dispute Settlement and the Working Group on Allocation of Fishing Rights to Contracting Parties of NAFO and Chartering of Vessels between Contracting Parties.

Mr Árnason reported in particular on the discussions of admittance of observers to NAFO meetings. This issue was resolved during the annual meeting. It was decided to require NGOs who wish to be observers to file an application with NAFO, and in cases of objections by NAFO Parties applications were to be decided upon by simple majority vote.

The Council noted that the new NAFO guidelines for the admittance observers could be used as a model for NAMMCO in developing similar guidelines.

ICES – International Council for the Exploration of the Sea
The Secretary reported that NAMMCO had been invited to but had not attended the first of the ICES Centenary Celebrations, "The Evolution of ICES", held in Sweden 29 September – 2 October 1999.

The Secretary informed the Council that the Secretariat is continuing to work on the Memorandum of Understanding between NAMMCO and ICES.

CITES

The observer from the Government of Japan distributed the Japanese CITES COP 11 Position paper to the Council. The next CITES meeting COP/11 will be held in Nairobi, Kenya in April 2000, which will be attended by the Secretary to NAMMCO.

8.2 Other business

The observer from Nunavut Tunngavik Incorporated, Mr Glenn Williams, informed the Council about his organisation's activities. Nunavut Tunngavik Incorporated (NTI) represents the Inuit of Nunavut, the beneficiary of the Nunavut Land Claim Agreement (NCLA), in land claim cases. In connection with the recently formed Canadian territory, Nunavut, Mr Williams explained to the Council about the connection between NTI, the NCLA and the Institutions of Public Government. The Institutions of Public Government allow Inuit to participate in decision-making concerning the use, management and conservation of land, water and resources. There are five different boards and councils; the Nunavut Wildlife Management Board, the Nunavut Planning Commission, the Nunavut Impact Review Board, the Nunavut Water Board and the Nunavut Marine Council. The NCLA also defines the rights and privileges that Inuit have under the Canadian Constitution. Mr Williams explained to the Council that the establishment of Nunavut on 1st April 1999, is a continuation of the development of Canada as a nation.

Greenland took this opportunity to congratulate Nunavut on the recent establishment of their government.

9. INFORMATION

The Secretary informed the Council of work and plans about information on NAMMCO aimed at the general public.

The NAMMCO website www.nammco.no continues to be expanded and updated. The website is organised around general information about NAMMCO, news from the Secretariat, documents and publications from NAMMCO, information about meetings and conferences, and an area with contacts and links to other relevant organisations. The area on information on marine mammals in the North Atlantic is under construction. Information about the NAMMCO Fund, the Application Policy and Procedure will also be available on the website.

The Secretary introduced to the Council the brochure for the NAMMCO Scientific Publications Volume 1, *Ringed Seals in the North Atlantic*, edited by Mads Peter Heide-Jørgensen and Christian Lydersen. The Council noted that the book has been well received, with a number of favourable reviews both for content and layout.

The Secretary informed the Council that plans are under way to edit a selection of papers presented at the international conference *Sealing: The Future*, organised by

NAMMCO in 1997. The plan is to establish an editorial board from both NAMMCO member countries and non-member countries in order to select and prepare manuscripts for the book.

The Council noted that the Secretariat is in the early stages of developing a set of posters, targeting the general public, containing readily accessible information about NAMMCO, and the use and importance of marine mammals in the NAMMCO member countries. The information would be presented with photographs and short texts, in the local language and in English, illustrating the significance of marine mammals to communities in NAMMCO member countries. The Secretary explained that the idea is to permanently place the posters in prominent places in each country, exemplified by Katuaq, the cultural centre in Nuuk.

10. ELECTION OF OFFICERS

10.1 Election of Chairman 1999/2000

The Council elected Amalie Jessen of Greenland as its Chairman for the next two years (1999/2000).

Amalie Jessen thanked the Council for entrusting her with this important task. She expressed thanks to the outgoing Chairman, Arnór Halldórsson for his excellent chairmanship and for the many long constructive discussions. She wished him all the best for the future. The new Chairman expressed pride in being part of NAMMCO, and judging from the development of the first years she expected the future of the organisation to be even more successful. The Host Agreement between Norway and NAMMCO is pending, and expanded membership of the organisation is another area of importance. She concluded that one secret to the success of NAMMCO is the fact that the organisation is concerned with good foods from the sea. Ms Jessen wished everyone at the meeting a safe trip home.

10.2 Election of Vice-Chairman 1999/2000

The Council elected Kaj P. Mortensen of the Faroe Islands, as its Vice-Chairman for the next two years (1999/2000).

Kaj P. Mortensen thanked the outgoing chairman, Einar Lemche, for his guidance and skilled leadership of the Management Committee over the past years.

11. ANY OTHER BUSINESS

The observer from the Government of St.Lucia Horace Walters thanked the Council for the invitation and the opportunity to participate at the meeting. The Caribbean Islands were discussing the possibilities of setting up a regional organisation last year. The name of the organisation would likely be the Eastern Caribbean Cetacean Commission. The countries involved in this organisation are not wealthy and they need financial assistance. Mr Walters will recommend to his government the establishment of this commission. In this regard he will be requesting advice, in

particular from the NAMMCO Secretariat. He felt confident that by next year there will be an organisation formed in the Caribbean.

The Council wished St. Lucia every success and expressed hope that NAMMCO can be of assistance in the process.

In response to an enquiry from the Russian Federation the Council **agreed** to renew the offer of membership in NAMMCO, with a voluntary payment to 2004, inclusive. The Council agreed to send a letter to the Russian Federation with such an offer.

Before concluding the meeting, the outgoing Chairman to the NAMMCO Council, Mr Arnór Halldórsson took this last opportunity to address the Council with some personal remarks upon leaving the Chairmanship after two years, and also NAMMCO as an organisation. He explained that he had been involved with NAMMCO since 1993. He thanked the member countries and the Secretariat, and said he enjoyed the spirit of co-operation in the organisation. Although he was pleased with the progress through the years he also expressed regrets at not having finalised the Host Agreement between Norway and NAMMCO during his tenure as Chairman. Mr Halldórsson nevertheless expressed optimism that the Host Agreement would be finalised in due course. He concluded his remarks by expressing to the Council that it had been an honour to work with its members over the years.

12. CLOSING ARRANGEMENTS

12.1 Next meeting

The next annual meeting, to be hosted by Norway, would be held in Sandefjord, 26 - 29 September 2000.

12.2 Adoption of press release

A press release summarising the main decisions and recommendations of the 1999 Annual Council Meeting, as contained in Appendix 6, was adopted.

Appendix 1

LIST OF PARTICIPANTS

DELEGATES

Faroe Islands
Dr Dorete Bloch
Mr Hans Jacob Hermansen
Mr Regin Jespersen
Mr Kaj P. Mortensen (C)
Mr Jústines Olsen
Ms Kate Sanderson

Greenland
Mr Siverth Amondsen
Ms Amalie Jessen (Vice-Chairman)
Mr Jesper Koldborg Jensen
Mr Einar Lemche (C)

Iceland
Mr Kolbeinn Árnason
Mr Einar K. Gudfinnsson
Mr Eiður Guðnasson
Mr Jón Gunnarsson
Mr Sævar Gunnarsson
Mr Arnór Halldórsson (Chairman)
Ms Kristín Haraldsdóttir (C)
Mr Gunnlaugur Konraðsson
Mr Helgi Laxdal
Mr Kristján Loftsson
Mr Armann K. Olafsson
Mr Gudmundur Steingrimsson
Mr Gísli A. Víkingsson

Norway
Mr Bjørn Hugo Bendiksen
Dr Arne Bjørge
Ms Rannveig Bøthun
Mr Halvard P. Johansen (C)
Mr Elling Lorentsen
Mr Jon Ramberg
Mr Øyvind Rasmussen
Ms Lisbeth W. Plassa
Dr Egil Ole Øen

Scientific Committee
Dr Mads Peter Heide-Jørgensen

OBSERVERS

Governments

Canada
Ms Jill Ringius

Denmark
Mr Henrik Fischer

Japan
Mr Yasuo Iino
Mr Masayuki Komatsu

Russian Federation
Mr Roudolf Borodine
Mr Mikhail Botvinko
Mr Iouri Riazantsev

Saint Lucia
Mr Horace Walters

Intergovernmental organisations

International Council for the Exploration of the Sea (ICES)
Dr Arne Bjørge

International Whaling Commission (IWC)
Mr Henrik Fischer

North-East Atlantic Fisheries Commission (NEAFC)
Mr Jon Ramberg

North Atlantic Fisheries Organization (NAFO)
Ms Lisbeth W. Plassa

Non-governmental organisations

High North Alliance (HNA)
Mr Rune Frøvik
Mr Sveinn Guðmundsson
Mr Jan Odin Olavsen
Mr Geir Wulff Nilssen

International Wildlife Management Consortium (IWMC)
Mr Jaques Berney

Nunavut Tunngavik Incorporated
Mr Glenn Williams

Researcher
Mr Steinar Andresen

SECRETARIAT
Dr Grete Hovelsrud-Broda
Mr Daniel Pike
Ms Tine Richardsen

C = Councillor

Appendix 2

AGENDA

1. Opening procedures *
    - 1.1 Welcome address
    - 1.2 Opening statements
    - 1.3 Admission of observers
    - 1.4 Adoption of agenda
    - 1.5 Meeting arrangements
2. Finance and Administration Committee
    - 2.1 Report of the Finance and Administration Committee
    - 2.2 Commission Budget 2000 and Forecast Budget 2001
    - 2.3 Rules of Procedure
    - 2.4 Other business
3. Scientific Committee
    - 3.1 Report of the Scientific Committee
    - 3.2 Other business
4. Management Committee
    - 4.1 Report of the Management Committee
    - 4.2 Requests for advice
    - 4.3 International Observation Scheme
    - 4.4 Other business
5. Hunting Methods
    - 5.1 Report of the Committee on Hunting Methods
    - 5.2 Other business
6. The NAMMCO Fund
    - 6.1 Report of the NAMMCO Fund
    - 6.2 Other business
7. Environmental questions
8. External relations
    - 8.1 Co-operation with other international organisations
    - 8.2 Other business
9. Information
10. Election of Officers
    - 10.1 Election of Chairman 1999/2000
    - 10.2 Election of Vice-Chairman 1999/2000
11. Any other business
12. Closing arrangements
    - 12.1 Next meeting
    - 12.2 Adoption of press release

* open to the press

Appendix 3

LIST OF DOCUMENTS

NAMMCO/9/1	List of Participants
NAMMCO/9/2	Agenda
NAMMCO/9/3	List of Documents
NAMMCO/9/4	Report of the Finance and Administration Committee
NAMMCO/9/4 – Annex 1	Draft Budget 2000 and Forecast Budget 2001
NAMMCO/9/4 – Annex 2	Draft Rules of Procedure for the Council
NAMMCO/9/5	Report of the Scientific Committee, 8-12 February 1999
NAMMCO/9/6	Report on the Storage and Handling of Catch Data in the Secretariat
NAMMCO/9/7	Status of Marine Mammals in the North Atlantic: Draft Minke Whale Stock Status Report
NAMMCO/9/8	International Symposium on Harbour Porpoises in the North Atlantic: Preliminary Report
NAMMCO/9/9	Report of the Management Committee (6 October 1999)
NAMMCO/9/10	Report of the NAMMCO Workshop on Hunting Methods
NAMMCO/9/11	Report of the NAMMCO Fund
NAMMCO/9/12	Report of the Committee on Hunting Methods
NAMMCO/9/13	Ringed seals in the North Atlantic. Brochure for the NAMMCO Scientific Publications,Volume 1
NAMMCO/9/14	NAMMCO Opening Statement to the IWC

Appendix 4

ADDRESS AND OPENING STATEMENTS TO THE COUNCIL BY MEMBER DELEGATIONS AND OBSERVER GOVERNMENTS

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ICELAND – ADDRESS OF WELCOME

The minister of Fisheries of Iceland, Arni M. Mathiesen

First of all I welcome you to this 9th meeting of NAMMCO.

For Iceland the utilisation of the living marine resources is of vital importance. For you that rely so much on the living marine resources I do not have to explain why the whaling issue continues to be an unsolved issue for Iceland until whaling is resumed in Icelandic waters. Therefore it may not have come to you as a surprise when on 10 March 1999 the Icelandic Parliament, Althingi, passed a resolution regarding the resumption of whaling in the waters around Iceland. This is a resolution I co-sponsored. I assume many of you are acquainted with the main message carried with the resolutions. It provides that whaling should resume promptly and that Althingi's resolution of 2 February 1983 (where the Parliament resolved that Iceland should not lodge a formal objection against the whaling ban imposed by IWC) should not hinder such whaling.

It is the policy of the Icelandic government to have whaling resumed in Icelandic waters as soon as possible, and it is my hope that this meeting of NAMMCO will bring us one step closer to that goal.

This year the Marine Research Institute (MRI) has, as in the years before, provided the Ministry with scientific advice regarding recommended allowable catch for minke whales, fin whales and sei whales. In terms of science it is of great value for Iceland to be able to rely on the work of NAMMCO's Scientific Committee regarding the assessment of these stocks. The recommendations of NAMMCO's Scientific Committee with respect to minke whales in 1998 and with respect to fin whales this year are therefore highly appreciated.

The recommendations of the MRI regarding whale stocks have until now focused on what should be the total allowable catch for these stocks. One should anticipate that in the future the scientists will, when recommending Total Allowable Catch (TAC) for the commercial fish stocks, take to a greater extent into account the role of individual components of the marine ecosystem, including the role of marine mammals. In Iceland scientists have already started applying a multi-species approach when advising on TAC for cod, shrimp and capelin, where the interactions of these species are taken into account in the recommendation of their TAC.

It appears to be not less important to know the interrelation between marine mammals and the commercially important fish stocks. The nations that are relying on the

utilisation of the living marine resources at high-northern latitudes where the stocks of seals and whales are much more abundant than at lower latitudes, cannot afford to ignore when managing their fisheries. These stocks are significant components of the ecosystem and thus their interaction with other components of the ecosystem must be considered. Preliminary results from Icelandic research indicate that the long-term yield of the cod stock around Iceland could differ by as much as 20% depending on whether we allow certain whale stocks to grow to pre-exploitation levels or whether we harvest the stocks at levels where they can produce maximum long term yield. In this context it is encouraging to note that NAMMCO is keeping its focus on the role of marine mammals in the ecosystem.

To reduce the uncertainty associated with the role of marine mammals in Icelandic waters it is especially important to have the feeding habits of minke whales studied further by analyses of stomach samples obtained from scientific whaling or commercial whaling operations. This must of course be done together with continued monitoring of the abundance and distribution of this stock.

Looking at things politically, discussions and recommendations within the Management Committee of NAMMCO on the management of whale stocks demonstrate the readiness of the member countries to withstand political pressure from outside not to unite in a meaningful discussion on the utilisation of the larger whales in a formal organisation other than IWC. This readiness comes from their absolute need to secure that such discussion takes place.

This co-operation is also important because thereby we are able to fulfil the requirements of international law regarding the duty to co-operate within the appropriate international organisation regarding the conservation and management of whale stocks.

Again, I welcome you to this meeting and I hope it will be fruitful for our future co-operation.

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THE FAROE ISLANDS - OPENING STATEMENT

Mr Chairman, Distinguished Delegates, Ladies and Gentlemen.

It is a great pleasure to be here in Iceland at the 9th Annual Meeting of NAMMCO. My delegation would like to thank our Icelandic colleagues for hosting this meeting. It is always a pleasure to be here in Iceland and many links have been made between the people of the Faroe Islands and the people of Iceland. We are particularly pleased to have this opportunity to visit the beautiful town of Akureyri and to experience a part of Iceland which is close to the sea and its resources.

The year that has passed since our last Commission meeting has been a very active one indeed in a number of specific areas through NAMMCO, and we look forward to

reviewing the results of this work here this week.

Recent activities have included the Workshop on Hunting Methods held in Nuuk, Greenland in February, in which Faroese expertise in whale killing methods was well represented. We are pleased to note that the Workshop generated a constructive dialogue between veterinary experts and those who hunt whales and seals, and we hope that this open exchange and interaction will continue to be the basis for future discussions in both national and international contexts.

The NAMMCO International Observer Scheme under the Joint NAMMCO Control Scheme has now been implemented for the second year in NAMMCO member countries. In 1999 the Faroese pilot whale hunt was subject to international observation under this Scheme for the first time. We are pleased to be an active part of this Scheme, which enables other NAMMCO members the opportunity to review the regulation and supervision of our whaling activities.

The Science Committee has also worked effectively since our last meeting to address both outstanding and new requests for advice, including assessments of fin whales, beluga and narwhal in the North Atlantic through special working groups, as well as the recently concluded international symposium on harbour porpoises.

In this connection we wish to commend the work of the Secretariat in coping so efficiently and professionally with the many demands of this busy year. This is particularly noteworthy given the fact that the new General Secretary and Scientific Secretary first began in their positions earlier this year. The Faroese delegation extends to them a warm welcome to NAMMCO.

Having generated the advice provided by the Scientific Committee, it is our responsibility in the Council and Management Committee to review new information in detail and to reach consensus on what significance this may have for management and conservation. As well, we need to take stock – perhaps to a greater extent than has been the case so far – of continued information gaps and needs in relation to earlier and outstanding requests for advice to the Scientific Committee and agree on clear priorities for the Committee's future work.

In addition to taking stock of the details, the Faroe Islands would like to see some more general stock-taking in relation to the priorities and goals of the Commission. We have achieved a great deal and filled many important gaps in international co-operation on marine mammals since NAMMCO was established in 1992. But now, instead of continuing to remind ourselves of how our co-operation got started, we need to ask ourselves quite seriously what we want to achieve through NAMMCO in the future.

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GREENLAND - OPENING STATEMENT

Mr Chairman, Mr Secretary of State, Delegates and Observers.

The Greenland delegation is very pleased to participate in this 9th meeting of the Council here in Akureyri.

Greenland would like to extend our appreciation of the meeting facilities and the hospitality we are enjoying.

As the NAMMCO Secretariat in Tromsø has entered a new phase with a new staff (2 out of 3), Greenland anticipates and welcomes a satisfactory Host Agreement with the Norwegian Government.

Greenland would in the following days welcome a revival of the Inspection and Observation Committee for an ongoing monitoring and evaluation of the progress in the NAMMCO Inspection and Observation Scheme.

This year Greenland hosted the annual meeting of NAMMCO Scientific Committee as well as the Workshop on Hunting Methods. We certainly welcome the new series of "NAMMCO Scientific Publications", successfully launched by the Scientific Committee and the Secretariat. We feel sure that these volumes will effectively show the profile of NAMMCO to the outside world.

Finally, Greenland welcomes and supports the Scientific Committee when starting to implement the Council decision to have an open dialogue between the scientists and the user-side to highlight the hunters' local knowledge of the marine mammal species and their habitats.

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NORWAY - OPENING STATEMENT

Mr Chairman, Delegates, Observers and Guests; Dear Friends.

It is a great pleasure for the Norwegian delegation to attend the 9th meeting of the NAMMCO Council here in Akureyri at the invitation of the Icelandic Government.
We look forward to enjoy the Icelandic hospitality in this exciting city in Arctic surroundings. We expect fruitful discussions and decisions that will result in the further building of NAMMCO.

Norway continues to attach great importance to the work of NAMMCO and the co-operation between our countries in order to defend the rights of the coastal people to sustainable use of all marine living resources. This work is vital for the survival of the traditional livelihood of the scattered populations along our coasts.

During the seven years since NAMMCO was founded we have experienced that its

reputation has been growing. NAMMCO is gradually being more and more respected as the serious management organisation we are developing it into. NAMMCO has embarked upon work that other management organisations are incapable of because of lack of political will to stick to the principle of sustainable harvesting of the natural resources of the sea.

The foundation for the success of NAMMCO is – and will continue to be – the work of the Scientific Committee. The quality of that work is an important point of NAMMCO's credibility. Our countries have very capable scientists dedicated to provide the best scientific basis for the management of marine mammals. Still, it must be a goal to broaden our scientific base. We therefore need to engage scientists from observer countries and other countries to make sure that we can draw upon all available knowledge and produce the best scientific recommendations for management possible. Consequently, it is important that the Scientific Committee establishes and develops close relations with scientists of other international bodies that have expertise in the field of marine mammals.

Norway attaches importance to the ongoing work on interaction between the fish stocks and the marine mammals. We have already information about the importance in this with respect to seal stocks and minke whales in the North Atlantic. We are now looking forward to knowing more about the interactions between fish and certain dolphin species. The economic aspects of this interaction are of particular interest as a basis for sound ecosystem management.

Another economic aspect of the management of marine mammals might be to improve the public appreciation of marine mammal products. This is a topic we will propose to discuss during this meeting of the council.

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JAPAN - OPENING STATEMENT

The Government of Japan is pleased to be present at this 9th meeting of the NAMMCO Council. As you know, we have been an observer of NAMMCO since its beginning. The spirit of co-operation among NAMMCO members and common objectives related to the sustainable use of marine resources has resulted in substantive achievements.

These achievements, including the work of the Scientific Committee related to stock assessment and consideration of species interactions, the implementation of an international observer scheme and the work of the Committee on Hunting Methods provide a sound basis for NAMMCO to expand its role in the management of marine mammals.

NAMMCO's implementation of an international observer scheme and the work of the committee on hunting methods also provide a stark contrast to the way in which the IWC has managed similar issues.

I am sure you will recall that even the IUCN in its opening statement to the IWC earlier this year expressed concern about the current situation in the IWC and the IWC's credibility as a serious management body, noting that "Recent Annual Meetings have yielded many adversarial resolutions but relatively little in the form of concrete decisions to address the problems threatening whales today and in the future".

The same dissatisfaction with IWC that was the impetus for discussions among North Atlantic countries on the subject of co-operation in research and management of marine mammals more than a decade ago still persists. It is now the impetus for our efforts to increase this kind of co-operation among countries in the western North Pacific.

Our ultimate goal is to establish a regional organisation modelled after NAMMCO. We would indeed be satisfied if we could achieve the kind of progress that has been demonstrated by this organisation and hope that other regional organisations to manage marine mammals in a sustainable manner with en ecosystem approach might be established.

We intend therefor to continue to co-operate with NAMMCO in whatever way we can and we look forward to NAMMCO's continuing progress in both its scientific work and its establishment of management regimes for all marine mammals in the north Atlantic region.

Where the IWC has failed, it is clear that regional organisations together with intergovernmental organisations such as the FAO could sustainably manage these resources with a science based approach as envisioned in the United Nations Conference on Environment and Development's Agenda 21 and the FAO's Kyoto Declaration and Plan of Action on the Sustainable Contribution of Fisheries to Food Security. This is now accepted as the world's standard. The IWC is the anomaly.

I am sure NAMMCO members are aware that there was collaboration between Japanese and Norwegian scientists during this past minke whale hunting season in Norway and that a number of documents submitted by Japan to the IWC related to hunting methods are relevant to the work of NAMMCO's Committee on Hunting Methods.

As I noted earlier, we are pleased to co-operate with NAMMCO and its individual members. We share your objectives and note that there is an opportunity for co-operation with respect to proposals for the downlisting of whale species at the CITES COP 11. It is our strongly held view that these proposals should be judged on the basis of scientific finding and CITES own criteria, not on some ill-advised linkage with the IWC. I am sure that NAMMCO members will agree and we look forward to working together to achieve a common success in this matter.

Appendix 5

AUDITED ACCOUNTS FOR 1998

1. PROFIT AND LOSS ACCOUNT (NOK)

Income	**1998**	***1997***
Contributions	2,730,000	*2,730,000*
Interest received (net)	84,000	*56,000*
Total Income	2,914,000	*2,786,000*
Expenditure		
Secretariat costs	2,653,000	*2,359,000*
Meetings	54,000	*50,000*
Scientific Committee	38,000	*415,000*
Projects, NAMMCO Fund	0	*215,000*
Conference Sealing the Future	-26,500	*282,000*
Total operating expenses	2,718,500	*3,321,000*
Operating result	**195,500**	***-535,000***

2. BALANCE SHEET 31 DECEMBER 1998

Current assets		
Bank deposits (restricted 194,108)	1,557,805	*898,034*
Outstanding claims	11,600	*122,969*
Total assets	1,569,405	*1,021,003*
Current liabilities		
Employees tax deduction & tax	33,806	*59,538*
Creditors	11,210	*30,584*
Other	409,200	*11,000*
Total current liabilities	454,216	*101,122*
Restricted equity		
Relocation fund	200,000	*200,000*
NAMMCO Fund	304,663	*104,663*
Total restricted equity	504,663	*304,663*
Distributable equity (General reserve)	610,526	*615,215*
Total equity	1,115,189	*919,881*
Total liabilities and equity	1,569,405	*1,021,003*

Appendix 6

PRESS RELEASE

The North Atlantic Marine Mammal Commission (NAMMCO) held its Annual Meeting in Akureyri, Iceland from 5 to 8 October 1999. The meeting was attended by delegations from the member countries, Norway, Iceland, Greenland and the Faroe Islands, as well as observers from the governments of Canada, Denmark, Japan, the Russian Federation and Saint Lucia. A number of inter-governmental and non-governmental organisations also attended the meeting.

White-sided and white-beaked dolphins

The Scientific Committee was tasked in 1998 with assessing the status of white-sided and white-beaked dolphins throughout the North Atlantic, particularly pertaining to their ecological interactions. However, there is very little information available on these species. These species are also harvested for food in the Faroe Islands. The Scientific Committee was requested to co-ordinate the efforts of member countries to conduct research to fill the noted information gaps, taking advantage in particular of the sampling opportunities provided by the Faroese catch, as well as dedicated sampling programs in other areas.

North Atlantic beluga and narwhal

The Scientific Committee provided detailed recommendations for research on beluga and narwhal stocks throughout the North Atlantic. The stock structure of these species appears to be much more complex than previously thought, and more research is needed to elucidate stock boundaries. In addition, more information is needed on abundance, distribution and migration. The Council urged member and non-member countries to continue or initiate research to answer these questions.

The Management Committee noted that, with the present levels of harvest, the aggregations of beluga in the Maniitsoq – Disko areas of West Greenland are likely declining due to overexploitation. It also noted that, since the beluga occurrence in the Avanersuaq – Upernavik area is likely a component of those beluga wintering in the Maniitsoq – Disko area, it also is likely declining due to overexploitation. The Management Committee noted the conclusion by the Scientific Committee that, with the observed decline, a reduction in harvesting in both areas seems necessary to halt or reverse the trend. The Council expressed its concern about this matter.

The Management Committee noted that the present level of exploitation of narwhal in the Avanersuaq and the Disko Bay areas is probably sustainable. It also noted that the substantial catches of narwhal in the Uummannaq area do cause concern for this aggregation. The Council expressed its concern about this matter. Future management decisions regarding beluga and narwhal would require more reliable catch statistics and better information on stock delineation.

North Atlantic fin whales

In 1999, the Scientific Committee completed an assessment of the stock structure of

fin whales in North Atlantic, noting that more information is needed before firm conclusions can be drawn. NAMMCO therefore recommended that member and non-member countries initiate the research required to elucidate the stock structure of fin whales. In addition, NAMMCO recommended that the Scientific Committee continue its assessment of fin whale stocks in the North Atlantic, focussing in the near term on the status of fin whales in Faroese waters.

For fin whales in the area around Iceland and East Greenland, the Management Committee accepted that removals of 200 animals per year are sustainable even under the least optimistic scenarios. However, catches at this level should be spread throughout the area, roughly in proportion to the abundance of fin whales observed in the North Atlantic Sightings Surveys.

North Atlantic sightings surveys

North Atlantic Sightings Surveys have been carried out co-operatively by NAMMCO member countries in previous years. The NAMMCO Council tasked the Scientific Committee with co-ordinating future sightings surveys in the North Atlantic, with priority given to surveys of minke and fin whales.

Harp and hooded seals

The Management Committee accepted that the catch levels of harp seals in the White Sea/Barents Sea, and the Greenland Sea, and hooded seals in the Greenland Sea, were well below the calculated replacement yield, and that future catches at the same levels may result in population increases. It was therefore advised that, from a resource management point of view, future quota levels should approach the replacement yields.

User knowledge

Last year, the Scientific Committee was tasked with incorporating the knowledge of users into the advice it conveys to Council. NAMMCO accepted a proposal to use stock status reports, produced initially by the Scientific Committee, as a basis for dialogue between users and scientists. The stock status reports will be modified through face-to-face meetings between scientists and users, to incorporate their knowledge of the ecology, distribution and abundance of marine mammals in the deliberations of NAMMCO. The stock status report on minke whales in the North Atlantic, recently completed by the Scientific Committee, will be used as a pilot project for this process.

International observation of whaling and sealing

The NAMMCO International Observation Scheme, under the Joint NAMMCO Control Scheme for the Hunting of Marine Mammals adopted by the Council in 1996, was implemented for the second time in 1999. Observation activities this year involved land-based observation of sealing and whaling in Norway and Greenland, and of pilot whaling in the Faroes, carried out by international observers appointed by NAMMCO.

Hunting methods

NAMMCO held a workshop on hunting methods in Nuuk in February this year. The workshop provided an excellent opportunity for exchanging information between hunters, veterinarians and other experts about existing marine mammal hunting methods, technical developments of equipment, and ways to enhance the efficiency and safety of hunting methods. The workshop provided a set of recommendations for improvements to hunting methods and the equipment used, all of which were endorsed by NAMMCO Council.

Marine mammal by-catch

The Management Committee accepted a definition of marine mammal by-catch proposed by its Working Group on By-Catch: "Recognising that by-catch of marine mammals may be a valuable contribution to the total catch, an appropriate definition of marine mammal by-catch is: marine mammals taken incidentally in fisheries targeting other species." Further work will be carried out to develop procedures for the collection of by-catch data, and to develop a policy for the use of by-catch data.

International symposium on harbour porpoises

The NAMMCO International Symposium on Harbour Porpoises in the North Atlantic, held in September 1999 in Norway, was attended by scientists from member and non-member countries. The report from this Symposium will be used by the Scientific Committee in its assessment of the status of this species.

Scientific publications

The Council welcomed the publication of the first volume of the NAMMCO Scientific Publication series, *Ringed Seals in the North Atlantic*, and looked forward to future volumes in this series based on the work of the Scientific Committee.

Marine mammal products

The Council recommended that the Secretariat develop a discussion paper addressing issues related to the utilisation, trade and marketing of marine mammal products among NAMMCO member countries.

Co-operation on marine mammals in the Northwest Pacific and Eastern Caribbean

Representatives from the governments of Japan and Saint Lucia informed NAMMCO of efforts presently being made to formalise regional co-operation on marine mammal conservation and management in the Northwest Pacific and the Eastern Caribbean. The Chairman of the Council of NAMMCO, Arnór Halldórsson, expressed the hope that these new regional initiatives could benefit from the experiences already gained by the work of NAMMCO.

Election of officers

Amalie Jessen of Greenland was elected as Chair of the NAMMCO Council for the next two years, and Kaj P. Mortensen from the Faroe Islands was elected as Vice-Chair. Council members expressed their thanks to outgoing Chair Arnór Halldórsson, who expressed his best wishes for the future work of NAMMCO.

1.2
REPORT OF THE COMMITTEE ON HUNTING METHODS

Copenhagen, Denmark, 6 September 1999

The Committee met at the Home Office of the Faroe Islands in Copenhagen on 6 September 1999. Attending the meeting were Jústines Olsen, Faroe Islands (Chairman), Amalie Jessen, Greenland, Kristjan Loftsson, Iceland, Egil Ole Øen, Norway, Kirsti Larsen, Norway, and Grete Hovelsrud-Broda from the Secretariat.

1. - 2. OPENING PROCEDURES

The Chairman of the Committee, Jústines Olsen, welcomed Committee members to the meeting. The present meeting was called in order to a) review the report (both the Norwegian and the English versions) from the Hunting Method Workshop held in Nuuk, Greenland, February 1999, b) to review updated information from member countries and c) to discuss the future work of the Committee.

The draft agenda was adopted and the General Secretary, Grete Hovelsrud-Broda, functioned as rapporteur.

In connection with Item 6 on the agenda, the Chairman pointed out that it had been agreed last year that the group should be referred to as the Committee, rather than the Working Group as it was previously called.

3. UPDATES ON HUNTING METHODS IN MEMBER COUNTRIES

The Chairman invited members of the Committee to provide updated information on developments with respect to hunting methods in their respective areas and types of hunting. An updated list of laws and regulations in member countries, as well as a list of references on hunting methods, had been provided in advance, as NAMMCO/HM/doc-1 and NAMMCO/HM/doc-2, and some additions to these would be made after the meeting. Updated versions are contained in Appendices 1 and 2.

Greenland

Jessen (Greenland) reported that the Home Rule Government has given dispensation to hunters for the use of a thinner harpoon line in the rifle hunt. The new thinner lines are stronger than the old thicker lines. However, the ultimate break strength of the thinner line is not known, although this type of information is important to the hunters in order for them to follow the regulations.

There have been a number of incidents where the grenades have not detonated when fired. The Greenland Trade Company (KNI Pilersuisoq), who sells the grenades, does not provide a warranty for these. All coastal communities have been informed about the possibilities for encountering unexploded grenades. The government and the KNI are planning to hold courses for the hunters in handling harpoon grenades. KNI has prepared a brochure, written in a clear language, with handling instructions. This

brochure is included with the purchase of the grenades.

A manual, in the Greenlandic and the Danish languages, has been developed by KIS, the vessel inspection agency, describing how to renovate and maintain harpoon guns. The folder has been distributed to the harpoon gun owners.

The government has increased the subsidies for the grenades by 50 percent since 1998, including all shot grenades.

The minke whale hunt has been slow this year, and fewer whales have been caught compared to last year. One fin whale has been caught. Royal Greenland and now NuKa Inc., which process Greenlandic foods, have enough fin whale meat stored from last years catches and do not have the capacity to buy more from the hunters. This is in part because people prefer fresh to frozen meat.

The hunters are satisfied with the new Danish-made flensing knives.

Faroe Islands
Olsen (Faroe Islands) reported that there are no new regulations or executive orders in connection with pilot whaling in the Faroe Islands, since the last update in 1998.

This year, a new longer knife, developed by a whaler for use in the pilot whale hunt, has been tested on 8 – 10 animals. The knife was found to work well.

Island
Loftsson (Iceland) explained that there is presently no whaling in Iceland and therefore no updates to report. In connection with seal hunting Loftsson referred to the document contained in the report from the Hunting Method Workshop (NAMMCO/99/WS-10).

Norway
Øen (Norway) reported that minke whaling had been slow this year, mostly due to bad weather conditions. Of a quota of 753 minke whales, 589 were caught. Two Greenpeace demonstrations stalled the hunt for one of the vessels. In one incident the demonstrators positioned themselves, in a rubber boat, between the harpooned whale and the whaling vessel. The demonstrators claim that the whaling crew shot at their boat. The case will be tried in the courts in October, this year.

A new regulation this year stipulates that whaling captains are responsible for instructing the crew in how to process meat, and in the hygiene on board the whaling vessels.

The minimum calibre, permitted in whaling, has been changed from 9-mm to 9.3-mm. It is expected that 9.5-mm (.375) will eventually replace 9.3-mm as the minimum calibre.

Norway has since 1997 been experimenting with a new grenade, which is safer to use

and with fewer "blind shots". This year, five vessels were equipped with this grenade, and it is possible that production will begin this fall. A problem with the current grenades is that they do not always fire. There are no time warranties for these grenades, because it is not possible to check whether they have been used properly or not.

Tests of the new grenade show that if they miss the target, they can be fired into the water up to 12 times, and still remain functional. With proper use these grenades may last 50 years or more.

In comparing the new and the current grenades, Øen concluded that the field trials in 1997-99 showed that the new grenades perform better than the current ones. The cost of production may be lower for the new, but with the added development costs; it is likely to be priced at the same level as the current grenades.

Several of the 60mm guns have been rebuilt with new firing mechanisms. These were exchanged six years ago, but did not function properly. The defunct triggers are being replaced by mechanisms from old Remington rifles.

In response to Jessen's inquiry regarding prices, Øen informed the Committee that the retailers in Greenland and Norway pay a similar price for the grenades. The difference in the prices to the users in the two countries may be attributed to the high profit margins the importers and retailers in Greenland operate with.

Larsen (Norway) explained that the seal hunting regulations in Norway are updated yearly basis. The most recent regulations are included in Appendix 5.

The sealing season was not successful this year. Boats from both Vestisen and Østisen returned with small catches. A research vessel was permitted to catch part of the quota for Østisen. The Norwegian inspectors aboard the vessels reported of no violations.

A discussion is underway focussing on the weak economy of the ship owners. The general feeling is that something must be done to improve the economy of sealing.

4. THE WORKSHOP ON HUNTING METHODS, NUUK, 1999

The Committee discussed the report (both the English and the Norwegian version) from the Hunting Method Workshop in Nuuk. The additions made to the report during the meeting are included in the final version. The Committee **agreed** that the recommendations prepared by the Workshop would be included as an item in the report.

The Committee also **agreed** to include a list of marine mammal names in several languages, as an appendix to the report.

The Committee **agreed** that it was obvious from the discussions at the Workshop in Nuuk that further clarification and increased knowledge about various ammunition

types and ballistics would be necessary. See Item 6 in this report, for further elaboration on this topic.

5. IWC-WORKSHOP ON WHALE KILLING METHODS 1999

Norway and Greenland had both participated in the Workshop held at the IWC meeting in Grenada, in May 1999.

Egil Ole Øen and Amalie Jessen reported to the Committee from the IWC Workshop.

6. FUTURE WORK OF THE COMMITTEE

In considering plans for future work, the Committee discussed ballistics, weapon types and ammunition. These are topics that have proven to be of great interest and a cause for confusion in discussions pertaining to hunting methods. The Committee **agreed** that it was evident from the Workshop in Nuuk in February 1999, that basic knowledge and understanding of weapon-types, ammunition and ballistics is lacking.

The Committee **agreed** to pursue this topic further with the goal of increasing the understanding of ammunition types and ballistics for the hunters, administrators and other personnel.

Further planning is necessary before the Committee will be able to propose how the topic can best be addressed. The question is whether the topic should be addressed in the form of a Workshop, a Seminar or through other venues.

7. ANY OTHER BUSINESS

No concerns were raised under items.

8. ADOPTION OF REPORT

The final report of the meeting was adopted by correspondence.

Appendix 1

LIST OF CURRENT LAWS & REGULATIONS FOR MARINE MAMMAL HUNTING IN NAMMCO MEMBER COUNTRIES

(Last updated 26 September 1999)

Faroe Islands

Løgtingslóg	nr 57 frá 5. juni 1984 um hvalaveiði
	nr 54 frá 20. mai 1996 um broyting í løgtingslóg um hvalaveiði
Kunngerð	nr 19 frá 1. mars 1996 um undantak fyri friðing av hvali
	nr 126 frá 23. juni 1997 um friðing av hvali
	nr 46 frá 8. april 1998 um grind
	nr 107 frá 21. november 1989 um góðkenning av hvalvágum, sum broytt við kunngerð nr. 64 frá 11. mai 1992, kunngerð nr 127 frá 27. august 1992, kunngerð nr. 141 frá 23. juni 1993 og kunngerð nr 34 frá 24. mars 1994.
	nr 166 frá 27. august 1993 um fyribilis góðkenning av hvalvágum
	nr 118 frá 23. oktober 1996 um fyribilis góðkenning av hvalvágum

Greenland

Landstingslov	nr 15 af 6. november 1997 om fangst og jagt
Bekendtgørelse	nr 26 af 9. september 1993 om betalingsjagt og -fiskeri
	nr 20 af 11. maj 1994 om fangst af isbjørne i Grønland
	nr 30 af 11. oktober 1995 om fangst af hvid- og narhvaler
	nr 6 af 29. februar 1996 om ændring af bekendtgørelse
	nr 26 af 24. oktober 1997 om ekstraodinær syn og godkendelse af harpunkanoner
	nr 7 af 26. februar 1998 om fredning og fangst af hvalros ved Grønland
	nr 13 af 3. april 1998 om rapportering ved fangst og anskydning af store hvaler
	nr 12 af 3. april 1998 om fangst af store hvaler
Fangstregistreringsskema (1993)	
	nr 32 af 18. december 1997 om erhvervsjagtbeviser
	nr 31af 18. december 1997 om fritidsjagtbeviser
Landsrådsvedtægt af 31. august 1959, stadfestet den 12. februar 1960 om fredning af spraglet sæl	

Iceland

Whaling Act	no 26, May 3, 1949
Regulation	no 163, May 30, 1973 on whaling
Regulation	no 304, May 9, 1983 on amendments to Regulation No. 163 of May 30, 1973 on whaling
Regulation	no 239, May 10, 1984 on amendments to Regulation no. 163 of May 30, 1973 on whaling (cf. Regulation no. 304/1983)

Agreement no 9 of 26. June 1991 between Iceland and Spain on an international observer scheme for land-based whaling stations in the North Atlantic area.

Norway

Lov av 16. juni 1939 om fangst av hval
Lov av 3. juni 1983 nr 40 om saltvannsfiske mv.

Melding fra Fiskeridirektøren:

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J-33-99, 5.3.99. Forskrift om regulering av fangst av sel i vesterisen og østisen i 1999.

Appendix 2

LIST OF REFERENCES ON HUNTING METHODS

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GHR, Designation of Types of Rifles in Greenland, IWC Document TC/43/AS 1, 1991.

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GHR, Introduction of the Detonating Grenade Harpoon in Greenland, 1992, IWC Document TC/44/HK1, 1992.
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Jessen, A., Modern Inuit Whaling in Greenland, 1992.
GHR, Greenland Action Plan on Whale Hunting Methods, 1992, IWC Document TC/45/HK3,1993.
GHR, Greenland Action Plan on Whale Hunting Methods, IWC/46/AS 3
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1.3
REPORT OF THE NAMMCO WORKSHOP ON HUNTING METHODS

Nuuk, Greenland, 9 – 11 February 1999

At its 8th Annual Meeting held in Oslo, Norway 1 – 4 September 1998, NAMMCO received the report from the Committee on Hunting Methods in which it was recommended to hold a Workshop on Hunting Methods. The Council approved the following terms of reference for the Workshop:

- to review existing marine mammal hunting methods in member countries, including technical developments with respect to equipment and methods, with the view to providing a technical evaluation of different hunting methods (fin and minke whaling; hunting of small whales; seal and walrus hunting);
- to examine possibilities for technical innovation and further enhancement of efficiency and safety of hunting methods, with a view to providing recommendations for improvements, where relevant.

1. APPOINTMENT OF CHAIRMAN

Professor Knud Nielsen (Denmark) chaired the Workshop (see Appendices 1 and 2, for Agenda, Programme and List of Documents for the Workshop).

2. APPOINTMENT OF RAPPORTEURS

Kirsti Larsen, Norway and Lotte Rosing Videbæk, Greenland were appointed as Rapporteurs.

3. OPENING ADDRESS AND INTRODUCTORY PRESENTATIONS

Pâviâraq Heilman, member of the Greenland Parliament, in his welcoming address explained that his ancestors successfully used simpler technology than what we have today. Weather, sea and ice conditions, the routines and skills of the hunters are all-important factors for a successful hunt. It is important to continue to improve hunting methods and technology, but the safety of hunters must also be considered along with such goals as improved efficiency and faster killing.

The Chairman, Mr Nielsen, welcomed the participants (listed in Appendix 3). In his opening remarks he said that it was an important aspect of the Workshop that the users and hunters themselves were active participants in the meeting. In reference to the extensive campaigns against hunting and use of marine mammals, he noted that killing a whale is the same as killing any other large game animal provided that the hunt is sustainable and as humane as possible. He echoed Mr Heilman's comment that it is desirable to always strive for better hunting methods and introduced the next two introductory presentations, a video interview (NAMMCO/99/WS-18) with whaler Schønning Eysturoy (Faroe Islands) and a presentation by Dr Egil Ole Øen (Norway) (NAMMCO/99/WS-1). The presentations had two common themes: a) animal welfare based attitudes about the treatment and killing of animals, and b) that hunters must act

in a responsible manner. They both stressed the importance of being open for improvements and that the customary ways should not be kept solely in the name of tradition when better methods are available. As an example, Eysturoy explained that the pilot whale hunt (see Appendix 4 for a list of marine mammal names in different languages) proceeded in a much more calm and orderly fashion after the traditional spear had been discarded as a weapon. He also expressed doubt about the necessity of always using the customary hook to immobilise the whales in connection with the killing. Øen explained that the rules and regulations issued by the authorities are to be viewed as guidelines, and concluded that each hunter has the full responsibility for killing animals using the best method available, without jeopardising his or her own safety or the safety of others.

4. SMALL CETACEANS

4.1 Faroe Islands: Pilot whale hunting

Jústines Olsen (Faroe Islands) presented an overview of the pilot whaling regulations (see Section 1.2, Appendix 1 in this volume for a list of Current Laws and Regulations in NAMMCO Member Countries). The first catch statistics for the pilot whale fishery dated back to the 1600's. The existing regulations are based on laws from 1984 (NAMMCO/99/WS-3 and NAMMCO/99/WS-4). The regulations stipulate research, conservation and management of whales and seals through NAMMCO and through a separate law for the protection of animals.

Hans Jakob Hermansen (Faroe Islands) explained that pilot whale hunting in the Faroe Islands is opportunistic because the animals are hunted only when observed along the coast (NAMMCO/99/WS-5). Before the whales can be driven into one of the 23 approved bays distributed throughout the country to be killed, the hunt has to be authorised by government officials. He explained that the pilot whale hunt is an important source of food, in addition to helping maintain a way of life and important cultural values, but he felt that the hunt is threatened by misinformation.

Finnbogi Joensen (Faroe Islands) presented an overview over the regulations governing the use of the bays for killing whales (NAMMCO/99/WS-5). To be approved the sites must have certain geomorphologic characteristics. Only bays with gentle slopes and shallow water are presently in use. The foreman of the team decides which bay to use in co-operation with Government officials. Distance to the bay, currents, weather and previous geographical distribution of whales killed in the region, determine the location chosen.

In a second presentation Olsen (Faroe Islands) gave an overview of hunting methods currently in use (NAMMCO/99WS-2) (see Section 1.2, Appendix 2 in this volume for References on Hunting Methods). The basic tenet is that the hunt must proceed so that the animals that are not killed are able to swim away unharmed. When the whales reach the bay the whaling teams on the beach drag the whales ashore and kill them by cutting the spinal cord and surrounding blood vessels in the neck using a knife (*grindekniv*). One point of contention is the traditional pointed hook, which is driven into the whale's flesh for dragging it ashore before it is killed. A Faroese pilot whale

hunter has developed a new and improved blunt hook that is inserted in a pocket in connection with the blowhole. This does not injure the whale, and allows the animal to be dragged onto the beach using much less force. Measurements show that the average time it takes for the whales to loose consciousness or die when using the pointed hook is 65.4 s. The average time is reduced to 29.2 s when using the new blunt hook. More research is needed to determine whether the new blunt hook can altogether replace the old one.

Regin Jespersen (Faroe Islands) gave an account of the district governor's (*Sysselmann*) tasks in relation to the pilot whale hunt and in relation to the other official participants (NAMMCO/99WS-5). The district governor is in charge of distributing the meat to the population in the region free of charge, and according to specific rules after each whale has been measured and numbered. He has the mandate to recommend to the authorities to halt the hunt if the meat supply is saturated. During the drive, the district governor communicates with the boats via radio and can swiftly get to the whaling site. Upon completion of the hunt, he makes a report to the authorities including statistical information, distribution of the meat, weather and current conditions, the progress of the hunt, and whether the particular site should be used again.

Hanus Højgaard (Faroe Islands) described how the hunt is organised in practical terms (NAMMCO/99/WS/5). Each site has several whaling teams that can be contacted by phone, and one in "stand-by mode" to quickly get to the shore and be ready when the driving begins. The beach is blocked, and the police direct traffic before the whales are driven into the bay.

Questions and discussion

Øen (Norway) commended Faroe Island for the work, in recent years, in developing improved hunting and killing methods. Referring to the results obtained with the new hook compared with the old, he asked why it has not completely replaced the old pointed one. Based on presentations of the anatomical features in the neck region of the pilot whale, he also asked whether it had been considered to produce a longer knife. A longer knife could be stabbed into the neck to sever the spinal cord and the surrounding blood vessels with only one cut, while the current knife requires two or more cuts.

Olsen (Faroe Islands) answered that the long-term plan was to replace the old hook with the new, but more research had to be done to ensure that the new hook worked in a satisfactory manner. In addition, enough hooks had to be produced before they could be generally used in the hunt. He also noted that a Faroese pilot whale hunter has designed a longer knife, but that it has not yet been used. Hermansen (Faroe Islands), however, pointed out that the traditional method of making a cut on either side of the whale's head had several advantages as the head falls forward making it easier to cut the spinal cord and blood vessels.

Nielsen (Chairman) supported Norway's suggestion for designing and testing a longer

knife.

Øen (Norway) also referred to information that stranded northern bottlenose whales were killed by the same method as pilot whales. He argued that this method is inadequate for this big animal, and suggested that the use of firearms would be more appropriate. He appealed to the Faroe Islands to replace the knife with a rifle and suitable ammunition for this purpose. Olsen (Faroe Islands) answered that only two or three stranded bottlenose whales are killed every year. He agreed that a rifle would be more suitable than a knife. Jespersen (Faroe Islands) also agreed to this and proposed to ensure that such equipment would be in place around the islands.

4.2 Greenland: Small cetaceans

Albert Fleischer (Greenland) (NAMMCO/99/WS-8) gave a presentation on the hunting of pilot whales, beluga, narwhal and other small cetaceans. He explained that beluga and narwhal remain important as a source of food, and that the hunt has always been sustainable. Hunting knowledge is passed on from generation to generation through direct observation and participation. Greenlandic hunters combine traditional hunting methods with the restrictions of contemporary regulations. The municipalities of Qaanaaq, Upernavik and Uummannaq have developed regulations stipulating that the hunters may only use kayaks and harpoons, limiting the number of animals taken. Narwhal are caught along the ice edge or in the fjords. They are first harpooned and then shot with a rifle of calibre 30.06. When hunting from the ice edge, the harpoon line is secured in the ice. While hunting from the kayak, a float is fastened to the line. In other areas, narwhal and beluga are also hunted from skiffs. Bjørn Rosing (Greenland) explained that when many boats are hunting in open water, the hunters tend to concentrate their chase on the same animals (NAMMCO/99/WS-6). This complicates the hunt and reduces the possibilities of killing a whale with one shot.

Amalie Jessen (Greenland) gave an account of the rules and regulations for small whale hunting in Greenland (NAMMCO/99/WS-7). These regulations are primarily concerned with the efficiency of the equipment, the size of the vessels and the calibre of the rifles in relation to various whale species, and the permitted types of ammunition. She explained that it is prohibited to hunt whales by surrounding, trapping or blocking them against land or the ice edge. A hunting license and a follow-up hunting report are required of each hunter.

Questions and discussion

A discussion of the efficiency of various weapons and ammunition ensued. Øen (Norway) asked how many shots were needed to kill these small cetaceans. Danielsen (Greenland) answered that 30.06 were the minimum calibre used and that an experienced hunter could kill a whale with one shot. His experiences, as a hunter in Qaanaaq, showed that the pointed bullet is more efficient than the blunt nosed bullet. Øen (Norway) in disagreeing with the Greenlandic position, maintained that pointed and expanding bullets do not easily penetrate the cranium and that they easily tip or ricochet on the scull bones. He argued that this is not the case for blunt full metal jacket bullets. Rosing (Greenland) felt that the discussion was about different hunting

methods. When hunting from a kayak, the hunter has the whale at eye level, at 10-15-metre distance. Under these circumstances the bullet will go straight into the animal and will not ricochet. Øen explained that the concern is not that the bullet will ricochet against the whale's skin, but that it will ricochet of the cranial bone.

5. BALEEN WHALES

5.1 Norway: Minke whale hunting

Egil Ole Øen, Siri Knudsen, Ole Mindor Myklebust and Per Johnny Mathiassen presented document NAMMCO/99/WS-10.

Only minke whales are hunted in Norway, using small fishing boats that are rigged for whaling in the season. The boats are equipped in the bow with a harpoon canon of calibre 50 or 60 mm, and the harpoons are equipped with a detonating penthrite grenade. Rifles with a minimum calibre of 9,3 firing blunt full metal jacket bullets are used as secondary weapons. If the harpoon grenade does not kill the whales, the rifle is used as a backup. In 1999, some 30 boats, 15 – 40 metres long, will participate in the hunt.

Due to the size of the vessels the hunt can take place only in good weather. When a whale has been spotted, the boat moves slowly towards the area where it is expected to surface to breathe next. The maximum recommended shooting distance is 30 metres. As soon as the whale is shot, it is pulled alongside the boat. If it is not dead or if it moves, a rifle shot to the brain is required.

Until 1984, the traditional cold harpoon (harpoon without a grenade) was used on minke whales. Only 17% of the animals died immediately or quickly with this method. Development and testing of the new penthrite grenade in 1984 increased the percentage of animals dying immediately or quickly to 45%. By 1998, after increased training of the crews, further development of the equipment and a large field study of a new penthrite grenade, the percentage of animals dying immediately or quickly reached 64%.

It can be difficult to determine accurately when an animal is dead. A study of the effects of a grenade detonation on the brain has therefore been initiated. The objective is to find a method to determine the exact moment the whale loses consciousness or dies.

Kirsti Larsen (Norway) gave an overview of the Norwegian minke whale regulations, which pertain to the qualifications of the participants, their equipment, rifles and ammunition, and to the killing methods. The Department of Fisheries sets the yearly quota for the season. Each vessel is required to carry an inspector, generally a veterinarian, during the course of the hunt.

Questions and discussion

Mikkelsen (Faroe Islands) inquired whether the recent increase in the maximum

survival time for some whales is related to the increased number of whales caught by each boat. Øen (Norway) answered that these figures refer to whales that have been able to get loose and have to be caught again. In such situations the maximum survival time can reach one hour.

Olsen (Faroe Islands) asked whether rifles are always used, and Øen answered that some whalers routinely use rifles, while others first check to see if the grenade has killed the whales.

Hermansen (Faroe Islands), in reference to the quota system, asked whether there was a limit to the number of whales each boat could carry aboard each trip. Myklebust answered that there are no official limits and that the maximum number depends on the boat size. In addition, Hermansen asked about the location of the brain. Knudsen, in reference to a drawing, explained that the brain, in general terms, is located on a middle plane between the eye and the top of the scull.

Fleischer (Greenland) commended Norway's work on the harpoon grenade, and asked whether this type of grenade destroys a lot of the meat. Øen (Norway) answered that when a shot is fired perpendicular to the whale very little meat is lost. When a shot is fired at an angle from behind, (the way the old cold harpoons were used) large amounts of meat might be destroyed, because the grenade might detonate in the muscle tissue. Myklebust (Norway), upon a request from Jessen (Greenland), explained that Norwegian whalers try to shoot at a 90-degree angle, and that the boat speed follows that of the whale.

5.2 Greenland: Minke whale and fin whale

Isak Vahl (Greenland) explained that minke whales are hunted with 50-mm harpoon canons, or with 30.06 calibre rifles and handheld harpoons from skiffs. There are currently 72 harpoon canons in Greenland. Harpoon grenades are seen as expensive and destructive to the meat, and should therefore not be used on minke whales.

Amalie Jessen (Greenland) gave an account of the Home Rule Government's regulations pertaining to large whales (NAMMCO/99/WS-7). For fin whale hunting a vessel must be at least 36 feet in length. For minke whale hunting, the boat must be less than 70 feet in length. For both species, the 50-mm harpoon canon with detonating grenade is used. The hunters must attend a course on how to handle the grenade. In rifle hunting, a minimum of 5 skiffs are required, all equipped with rifles, handheld harpoons and floats. All catches, including incidental catches in nets and animals that are struck and lost, must be reported to the authorities.

Peter Siegstad (Greenland) described the renovation program for the seventy-two 50-mm harpoon canons. Parts, oil and gaskets are changed in the process. They will subsequently be rechecked every two years. It is estimated that the canons will last for 25 years if they are maintained according to instructions.

Questions and discussion

The debate that followed focussed on the rifle hunt. Øen remarked that the rifle hunt is problematic, meaningless, and unnecessary. He mentioned that this is a relatively new hunting method, without long a tradition. He explained that it is not efficient to shoot an animal before it is harpooned, as it is done in rifle hunting.

Hovelsrud-Broda (NAMMCO) found it questionable to characterise a form of hunting as traditional or untraditional. All peoples develop their technology and methods in relation to the existing resources, technology and knowledge, and external influences. Jessen (Greenland) pointed out that none of the current hunting methods are traditional, but have been improved and developed through time.

Jessen (Greenland) explained that the rifle hunt would continue because hunters in smaller villages cannot afford harpoon canons and do not have access to the vessels that could be so equipped (NAMMCO/99/WS-11). It is important for Greenland to keep the small hunting villages viable. Vahl (Greenland) explained that the rifle hunt is critical for the supply of meat to these villages.

Rosing (Greenland) in reference to the previous comments, asked how much of the whale meat is consumed in Norway. Myklebust (Norway) answered that all the meat is consumed, but that the blubber currently is stored in freezer facilities awaiting export licenses.

Vahl (Greenland) said that one problem for the hunters are that the stores no longer offer the best ammunition. Øen (Norway) expressed concern that retailers determine the efficiency of hunting. He asked how many whales are lost and how many shots are fired before the whale is killed. Jensen (Greenland) answered that efficiency of the rifle hunt is 80% while the harpoon canon hunt is 100% efficient.

Olsen (Faroe Islands) asked, in relation to the rifle hunt, about the number of boats, the number of hunters and the time involved, and about the risk to the hunters. Vahl (Greenland) answered that one leader is in charge of the rifle hunt. He decides when to leave the village and which whale to pursue. The hunters communicate via radio. Only the most experienced hunters shoot at the whale. Shots are fired repeatedly, but the objective is to expend as few bullets as possible. As soon as the whale is secured with the handheld harpoon, the floats are fastened, and the whale is killed within 10-15 minutes. Jessen (Greenland) added that the whale is shot in the lungs before it is chased and killed (NAMMCO/99/WS-16).

Olsen (Faroe Islands) asked if netted beluga and narwhal would voluntary swim into, or were chased into the nets. He also asked whether the nets are kept under constant surveillance and if the whales are shot or die on their own. Fleischer (Greenland) explained that the hunters check the nets every day. If the animals are found alive they are killed immediately.

Nielsen (Chairman) summed up the discussion by pointing out that there are various

positions on the rifle hunt of minke whales. It is agreed that the rifle hunt should be reduced as much as possible, but how fast and how soon is not clear. The debate, he said, reflected the fact that neither the rifle hunts nor the harpoon canon hunts are traditional hunting methods.

5.3 Iceland: Whaling

Ed. Note. The participants from Iceland, due to inclement weather, were unable to attend the meeting in Nuuk. As a result there is no discussion of the Icelandic contributions. The following summaries are based on their written contributions.

Thorður Eythorsson (Iceland) explained that Iceland stopped whale hunting in 1986 as a result of IWC's moratorium on commercial whaling (NAMMCO/99/WS-12). Fin whale, sei whale, minke whale and sperm whale had been hunted from land based stations since 1883. By 1915, the stocks around Iceland had been drastically reduced, due to extensive Norwegian whaling. At this time, whaling was halted by law. In 1948 whaling was resumed and continued until 1986. Icelandic authorities initiated extensive biological research, including stock estimates of large cetaceans and the impact of whaling on these stocks. On the basis of these studies, the scientists suggest that the stock can sustain a take of 100 – 200 animals per year. (Ed. Note. In March 1999 the Icelandic "Alting" (parliament) decided to resume whaling sometime in the future.)

Guðmundur Haraldsson (Iceland) gave an account of minke whale hunting explaining that prior to the 1960's, the number of minke whales caught was low (NAMMCO/99/WS-15). Between 1977 and 1985 the IWC quota for Iceland was 200 animals per year. The product from these whales was sold in Iceland only. After a profitable market in Japan opened up, the whaling activities increased. The whalers used 50-mm harpoon canons to kill minke whales, and later they employed .458 calibre rifles as secondary weapons.

Kristján Loftsson (Iceland) gave an account of the development of hunting equipment and methods for hunting large whales (NAMMCO/99/WS-14). He explained that the Icelanders used the technique developed by Sven Foyn: a 90-mm harpoon canon with a grenade loaded with black powder. Later, successful experiments were carried out using the Norwegian penthrite grenade for large whales. The boats were equipped with winches and lines made, early on, from hemp, and later from polyester and finally wire. The dead whales were brought ashore for flensing and processing.

5.4 Japan: Minke whale hunting

In his presentation of Japanese whaling Dr Hajime Ishikawa (Japan), explained that Japan take a few hundred minke whales per year in the Antarctic and North Pacific waters for research purposes. Improved hunting methods have reduced the time to death significantly the last few years. In Japan, 75-mm harpoon canons with Japanese penthrite grenades are used for minke whale hunting. Electric lances have been used in the past as a secondary killing method. A 1998 study of the use of rifles with different types of ammunition as a secondary killing method, indicated that calibre

.375 (9,5 mm) full-jacketed bullets were very effective and penetrated the skull of the minke whale. Comparison between 300 grain round nosed bullet and 250 grain sharp-nosed bullets revealed that the former had more effective power of penetration than the latter. In spite of reductions in the average time to death, the instantaneous death rate was stable at 30% in the Japanese hunt. The rough sea conditions prevalent in these pelagic hunts seem to be the main reason for the low (compared to the Norwegian hunt) instantaneous death rate.

6. SEALS AND WALRUS

6.1 Greenland: Sealing and walrus hunting

Amalie Jessen (Greenland) summarised the regulations for seal and walrus hunting in Greenland (NAMMCO/99/WS-7). Municipal rules are developed on the basis of the hunters' experiences. For walrus, some adjustments have recently been made to the hunting areas. There are no regulations for seals, with the exception of harbour seals. The Home Rule Government is currently in the process of developing general regulations for seal hunting. Greenland is also monitoring the Canadian quota system for harp and hooded seals. The two countries share these seal populations, and decisions made by Canada have consequences for Greenland. Jessen added that the Home Rule Government has initiated a study of the diving physiology of seals in connection with seal netting.

Ejnar Jacobsen (Greenland) stressed the continued dietary and cultural importance of seals for the Greenlandic people (NAMMCO/99/WS-8). As an example he mentioned that in 1998, 160,000 seals were caught. The hunters are always interested in improving the existing methods and equipment. As a result, seals are now killed more efficiently than before. Seal netting is an important method during the dark winter months. The nets are placed near an iceberg or through holes in the sea ice. They are checked daily, weather permitting.

Bjørn Rosing (Greenland) stated that it is difficult to speak of seal hunting in general terms because the methods vary from species to species (NAMMCO/99/WS-6). Hunting from a small skiff in constant motion is difficult and may require the hunter to fire more than one shot. One method is to tire out the seal by firing shots around it. When it surfaces to breathe, it is shot at close range and dies immediately.

Jens Danielsen (Greenland) explained that walrus are either caught on the ice in the fall or from skiffs during the summer (NAMMCO/99/WS-8). The technique is to harpoon them before they are shot. The co-operation between the hunters is part of the traditional hunting method. It is important to understand walrus behaviour in order to be a successful hunter. They are dangerous animals and may attack a man in his kayak.

Questions and discussion

Øen (Norway) began by asking about the rifle calibre used on walrus. No direct answer was provided, but Krohn (Greenland) answered that military ammunition was

used in the past, and that regular hunting ammunition is currently in use.

Mikkelsen (Faroe Islands) explained that in his experience, both seals and harbour porpoise sink easily, and asked about the struck and lost ratio of seals. Kreutzmann (Greenland) answered that this varies with the season and the thickness of the blubber. During the spring, when the seals have little blubber, about 10% sink. Harbour porpoise are hunted from skiffs and 2–3 % are lost.

6.2 Norway: Sealing

Atle Brudevik and Bjørne Kvernmo (Norway) explained that Norwegian sealing takes place from boats 44-57 metres long, equipped with smaller boats for manoeuvring between the ice floes. Adult seals are shot with .308 calibre rifles with expanding ammunition, while the .222 is used for killing the young seals. A total of 1.2–1.5 shots are fired per animal caught. The hunters must pass a marksmanship test prior to boarding the vessel. The seals congregate on the ice floes, and if the ice is strong enough the hunters are dropped directly onto the floes. If not, the sealing is conducted from the smaller boats. The seals are first shot in the head by the shooter, and then another crewmember jumps on the ice and gives the seals a blow to the head with the *hakapik*. The seals are bled immediately afterwards and then hoisted aboard the mother-vessel for flensing and butchering.

Kirsti Larsen (Norway) gave an overview over the Norwegian sealing regulations. One part pertains to the quota, the sealing area and the season. The other pertains to hunting and killing methods and requirements for the hunters. In addition, all vessels are required to have an officially appointed inspector onboard.

Egil Ole Øen (Norway) gave a brief summary of the various seal killing methods, and their efficiency. In connection with accusations against Norwegian sealers that they skin seals alive, he explained that a careful investigation into the matter revealed that these accusations are false. Muscle reflexes allow an animal to move both head and limbs long after the brain has stopped functioning. One result of the investigation was an implementation of stricter requirements for the hunters. He explained further that another study showed that 98.7% of seal pups shot from skiffs died instantaneously from one shot.

Questions and discussion

Gelså (Greenland) asked how long time it takes after an adult seal has been shot until it is hit with the *hakapik*. Brudevik (Norway) answered that it might take up to 10-20 minutes. The second hunter has to keep a certain distance prior to the shooting in order to avoid disturbing the seals and the hunt.

Mikkelsen (Faroe Islands) asked why the ammunition has been changed from 6,5 mm to 7.62 mm. Brudevik (Norway) explained that this has to do with the availability of ammunition.

6.3 Faroe Islands: Sealing

Bjarni Mikkelsen (Faroe Islands) gave an historical overview of sealing in Faroe Islands (NAMMCO/99/WS-17). In the past, seals were caught in their birthing caves and killed by giving them a blow to the head with a club. Today only rifles are permissible as a weapon. There is no management strategy for seals, but hunting is to a degree limited by general hunting rules, and very few Faroese have a rifle license.

6.4 Russia: Sealing and beluga hunting

Vladimir A. Potelov (Russia) gave an overview of seal and beluga hunting in the White Sea area of the north-western Russia (NAMMCO/99/WS-9). He explained that in this area the harp seals are usually hunted on the ice floes using larger boats. Helicopters may be used for transporting the seals ashore for flensing and butchering. The pups are killed with the *hakapik*, while adult seals are shot with rifles of calibre 5,6 mm and 7,62 mm. Ringed seals are caught mainly in seal nets. Beluga are usually hunted by being driven into shallow water, where they are caught in nets and killed by rifles of calibre 7,62 mm.

Questions and discussion

Nielsen (Chairman) asked why the *hakapik* was not used in the Faroe Islands. Mikkelsen (Faroe Islands) answered that a myth about sealing says that seal blood in the birthing caves will deter the seals from returning.

6.5 Iceland: Sealing

Pétur Guðmundsson (Iceland) explained that pups, at about the end of their weaning, are the main targets for hunters (NAMMCO/99/WS-13). They are hunted mostly for their pelts but also for their meat. He gave an historical overview of sealing in the last 1,000 years. In the past, clubbing was the main method of killing seals. Methods now include the use of clubs, nets and rifles of calibre .22, and .222 - .243. Farmers have the right to hunt seals within the boundaries of their property. The methods are to a degree determined by the local terrain.

7. RECOMMENDATIONS

1. Faroe Islands: Hunting of long-finned pilot whale (*Globicephala melas*)

The Workshop noted with satisfaction that Faroe Islands has accomplished a number of improvements in the pilot whale hunt. These include a gentler driving of the whales, prohibition against the use of the spear, and the use of a new blunt hook for securing the animals. In addition, other efforts such as educational programs in the schools on how to hunt whales are under way. The Workshop notes, however, that the pointed hook is still in use and recommends that further effort be made to replace this with the new blunt hook for securing the animals.

2. Faroe Islands: Killing of stranded northern bottlenose whale (*Hyperoodon ampullatus*)

Stranded bottlenose whales are killed in the same way as pilot whales. Questions were

raised over whether this is an adequate method of killing such a large animal, and it was recommended that rifles with adequate ammunition be used for killing stranded whales of this species.

3. Greenland: Hunting of small cetaceans

a) In Greenland hunters use full metal jacket, pointed bullets to kill harpooned small whales (beluga, *Delphinapterus leucas* and narwhal, *Monodon monoceros*). Investigations have shown that when a pointed bullet meets bone (such as cranium), it tends to tip or ricochet, while a full metal jacket, blunt-nosed bullet penetrates bone better. The Workshop therefore, recommends that Greenland initiates studies in co-operation with the hunters, testing both pointed and blunt bullets on whale carcasses to determine the best ammunition for use in the hunt.

b) It was further recommended that Greenland develop objective descriptions of hunting methods, equipment and how efficient these are in small cetacean hunting, considering regional variations.

c) Greenlandic hunters informed the Workshop that work had been started on the development of a new handheld harpoon that can improve the efficiency of beluga, narwhal, walrus (*Odobenus rosmarus*) and seal hunting. The Workshop views this as a positive initiative and recommends that Greenland continue to support this project.

4. BALEEN WHALE HUNTING

a) A Norwegian hunter has taken the initiative to develop a new whale harpoon that can be adjusted for each individual harpoon canon. This is a notable initiative that can contribute to better marksmanship and thereby to more efficient killing. The Workshop recommends that Norway continues to support this project.

b) During the Workshop there were several expressions of concern that Greenland hunts minke whales using rifles and handheld harpoons as the only weapons. An in-depth discussion revealed that there is significant disagreement in this area, and it was agreed to note the discord. Some delegates felt that animals should always be killed as quickly and painlessly as possible, and doubted if this was achievable using only rifles and handheld harpoons. It was also asserted that this hunting method is relatively new (introduced in the 1950s), and if it was to continue, there was a need for adjustments and improvements based on accumulated experience. Also the Greenlandic Home Rule Government wishes to limit the rifle hunt as much as possible.

The Greenlandic rifle hunt of minke whales has several times received significant criticism. The Workshop finds that this type of hunting can negatively influence the attitudes towards all Greenlandic hunting. The Workshop recommends that this hunting method be subject to a critical analysis and an objective description of methods and equipment, with the goal of determining necessary adjustments.

c) The Workshop recommends that Greenland continue to work towards the goal of using the harpoon grenade in all hunts for baleen whales. It is, however, a source of concern that the penthrite harpoon grenade is so costly in Greenland that many hunters cannot afford to use it. The Workshop recommends that Greenland initiate an enquiry into the reasons for the price policies and work towards a price change.

d) Greenland has carried out a number of improvements on weapons and equipment used in whale hunting with the harpoon canon. In addition, the hunting regulations for large whales have been developed and improved. The Workshop notes with approval that Greenland has made these improvements and recommends that the work will continue in the future.

e) It was emphasised that the hunters were not able to buy the ammunition determined by experts to be the most efficient for killing whales, because it was not available in Greenland. The Workshop finds it questionable that market considerations have higher priority than professional judgement and justification, and recommends that Greenland investigate the situation.

5.
The Workshop notes with approval that the Greenlandic Parliament has decided to formulate an animal protection law, and in this manner create an authoritative body that can introduce the element of animal protection in hunting regulations.

6.
In conclusion the Workshop agreed that the meeting had been valuable, in professional terms, and that it was desirable to plan a similar meeting in the future, but with a focus on particular hunting methods.

Appendix 1

AGENDA & PROGRAMME

1. Address of welcome - Greenland Minister of Fisheries, Pâviâraq Heilmann
2. Chairman's opening remarks (15 min)
3. Appointment of rapporteurs
4. Introductory presentations
   - 4.1 Video interview with Schönning Eysturoy, whaler in the Faroe Islands
   - 4.2 Hunting and killing techniques for large mammals Dr Egil Ole Øen, Associate Professor, Norwegian School of Veterinary, Science
5. Review and evaluation of seal & walrus hunting
   - 5.1 Greenland

     Presentation on seal and walrus hunting - KNAPK (Fishermen and Hunters' Organisation)

     Presentation on sealing - Bjørn Rosing

     Regulation of seal and walrus hunting in Greenland - Amalie Jessen (DFFL)

     Questions/discussion

   - 5.2 Norway

     Hunting activities - Atle Brudevik and Bjørne Kvernmo, seal hunters

     Hunting regulations - Kirsti Larsen, Directorate of Fisheries

     Hunting techniques and killing efficiency - Egil Ole Øen, Norwegian School of Veterinary Science

     Questions/discussion

     Video: "Sealers - killers or hunters?". Norwegian documentary film on seal hunting produced in 1996 by Knut Skoglund (52 min.).

   - 5.3 Faroe Islands

     Seal hunting activities and regulations - Bjarni Mikkelsen, Fisheries Research Laboratory

   - 5.4 Iceland

     Seals and sealing in Iceland: past and present - Pétur Guðmundsson, Seal Farmer's League

     Questions/discussion (on 5.3 and 5.4)

   - 5.5 Evaluation/recommendations

6. Review and evaluation of the hunting of small cetaceans

6.1 Faroe Islands

Video: "Pilot Whaling". Produced in 1992 by Z. Hammer, (7 min)

Hunting regulations - Jústines Olsen, Veterinary Service (10 min)

Driving techniques - Hans Jacob Hermansen, Pilot Whalers' Organisation (15 min)

Regulation of whaling bays - Finnbogi Joensen, whaling foreman, including footage of hunts from 1957 (Nordenskjold, 3 min.) and 1996 (Búgvi Joensen, 5 min.) (15 min)

Hunting techniques and killing efficiency- Jústines Olsen, Veterinary Service (20 min.)

Review of hunting accidents: insurance, sheriff's duties - Regin Jespersen, sheriff (15)

The organisation of the hunt - Hanus Højgaard, whaling foreman in Tórshavn - (15)

Video: Unedited footage of a pilot whale hunt, 13.11.97 produced by Árni C. Joensen (9 min)

Questions/discussion

6.2 Greenland

Hunting of beluga, narwhal and other small cetaceans in Greenland - KNAPK

Beluga and narwhal hunting - Bjørn Rosing

Regulations on the hunting of beluga and narwhal - (Amalie Jessen)

Questions/discussion

6.3 Other

6.4 Evaluation/recommendations

7. Review and evaluation of the hunting of baleen whales

7.1 Norway

Hunting activities - Ole Mindor Myklebust, minke whale hunter

Hunting regulations - Kirsti Larsen, Directorate of Fisheries

Hunting techniques and killing efficiency - Egil Ole Øen, Norwegian School of Veterinary Science

Questions/discussion

Video: "Større enn kval". Norwegian documentary film on minke whale hunting produced in 1998 by Knut Skoglund (52 min.).

7.2 Greenland
Greenland hunting of minke and fin whales - KNAPK

Video: "Whaling in Greenland" - produced in 1998 by Inuk Media for the Ministry of Fisheries, Hunting, Industry and Agriculture (c. 30)

Whaling regulations - Amalie Jessen

Report on the renovation of harpoon guns in Greenland - Peter Siegstad, KIS (vessel inspection agency)

Questions/discussion

7.3 Iceland
Historical overview of whaling in Iceland & status today - Þorður Eyþorsson, Ministry of Fisheries

Former whaling for large whales (fin, sei and sperm) in Iceland - Kristján Loftsson, Hvalur h.f.

Hunting of minke whales in Iceland - Guðmundur Haraldsson, Minke Whalers' Association

Questions/discussion

7.4 Other

7.5 Evaluation /recommendations

8. Any other business
9. Adoption of report

Appendix 2

LIST OF DOCUMENTS

NAMMCO/99/WS-1	Egil Ole Øen, "Fangst og avlivingsmetoder for store pattedyr".
NAMMCO/99/WS-2	Jùstines Olsen, "Om avlivningsmetoder og utstyr for færøsk grindefangst".
NAMMCO/99/WS-3	Jùstines Olsen, "Kort oversigt over lovgivning om hvaler og hvalfangst i historisk sammenheng på Færøerne".
NAMMCO/99/WS-4	Dorete Bloch, "Oversigt over love og bekendtgørelser og færøsk hval- og sælfangst".
NAMMCO/99/WS-5	Dorete Bloch, "Færøernes grindefangst med en tilføjelse om døglingefangsten".
NAMMCO/99/WS-6	Bjørn Rosing, "Oplæg om aflivning af sæler, småhvaler samt fangst af sildepisker".
NAMMCO/99/WS-7	Amalie Jessen, "Udvalgte regler for fangst af store hvaler, sæler, hvid- og narhvaler samt hvalros i Grønland".
NAMMCO/99/WS-8	KNAPK Document prepared for the hunting method workshop. February 1999.
NAMMCO/99/WS-9	Vladimir A. Potelov, "Equipment and procedure of marine mammals hunting process used by Russian sealers in the Seas of North-East Atlantic".
NAMMCO/99/WS-10	Egil Ole Øen, "The Norwegian minke whale hunt".
NAMMCO/99/WS-11	R.A. Caulfield, "New technologies, new traditions: Recent developments in Greenlandic whaling".
NAMMCO/99/WS-12	Thordur Eythorsson, "Hvalfangst ved Island".
NAMMCO/99/WS-13	Pètur Guðmundsson, "Seals and seal hunting methods in Iceland".
NAMMCO/99/WS-14	Kristjàn Loftsson, "Former whaling of large whales (fin, sei and sperm) in Iceland. Development of the equipment used in the hunt".
NAMMCO/99/WS-15	Guðmundur Haraldsson, "Minkewhale-hunting in the waters of Iceland and hunting methods".
NAMMCO/99/WS-16	Svend E. Larsen and Klaus Georg Hansen, "Inuit and whales at Sarfaq (Greenland)", (1990) (Case Study for the Greenland Home Rule Government at the occasion of the 42nd Annual Meeting of the International Whaling Commission), Aboriginal Subsistence Whaling Subcommittee.
NAMMCO/99/WS-17	Bjarni Mikkelsen, "Sæl og sælfangst på Færøene – før og nu. Fangsthistorie".
NAMMCO/99/WS-18	Video: "The pilot whale hunt in the Faroe Islands", Árni C. Joensen, Faroe Islands, January 1995
NAMMCO/99/WS-19	Video: "Større enn kval", Knut Skoglund og Svein Andersen, Norway 1998

NAMMCO/99/WS-20	Video: "Polarfangst – de siste selfangere?", Knut Skoglund, Norway 1996
NAMMCO/99/WS-21	Video: "Hvalfangst i Grønland", Greenland 1997-1998

Appendix 3

LIST OF PARTICIPANTS

Danmark
Mr Knud Nielsen

Faroe Islands
Mr Hans Jakob Hermansen
Mr Hanus Hójgaard
Mr Regin Jespersen
Mr Finnbogi Joensen
Mr Bjarni Mikkelsen
Mr Jústines Olsen

Greenland
Mr Jens Danielsen
Mr Siverth Amondsen
Ms Ivalo Egede
Mr Alberth Fleischer
Mr Hans Gelså
Mr Niels Holm
Mr Aleqa Hammond
Mr Ejnar Jakobsen
Ms Augusta M. Jerimiassen
Ms Amalie Jessen
Mr Jesper Koldborg-Jensen
Mr Lauritz Kreutzmann
Mr Poul Krohn
Mr Arild Landa
Mr Mogens MøllerWalsted
Mr Peter Nielsen
Mr Peter Olsen
Mr Frederik Olsen
Mr Bjørn Rosing
Mr Peter Siegstad
Mr Isak Vahl
Ms Lotte Rosing Videbæk

Iceland
Mr Thordur Eythorsson
Mr Pétur Guðmunsson
Mr Gudmundur Haraldsson
Mr Kristján Loftsson

Japan
Mr Hajime Ishikawa

Norway
Mr Atle Brudevik
Ms Siri Kristine Knudsen
Mr Bjørne Kvernmo
Ms Kirsti Larsen
Mr Per Johnny Mathiassen
Mr Ole Mindor Myklebust
Dr Egil Ole Øen

Russian Federation
Mr Vladimir Potelov

NAMMCO Secretariat
Dr Grete Hovelsrud-Broda, General Secretary
Mr Daniel Pike, Scientific Secretary
Ms Tine Richardsen, Administrative Assistant

Interpreter
Mr Kullak Berthelsen, Greenland Home Rule

Appendix 4

MARINE MAMMALS IN DIFFERENT LANGUAGES - WHALES

MARINE MAMMALS IN DIFFERENT LANGUAGES - SEALS

SECTION 2 - MANAGEMENT COMMITTEE

2.1
REPORT OF THE MANAGEMENT COMMITTEE

Akureyri, Iceland, 6 – 7 October 1999

1. – 3. OPENING PROCEDURES

The Chairman of the Management Committee, Kaj P. Mortensen, welcomed delegations and observers to the meeting. Participants were as listed in Appendix 1 of the Report of the Council. The agenda, as contained in Appendix 1, was adopted. Documents available to the meeting are listed in Appendix 2. The General and Scientific Secretaries agreed to act as rapporteurs.

4. NATIONAL PROGRESS REPORTS

National Progress reports were available to the Management Committee from the Faroe Islands, Iceland and Norway for 1998, and from Greenland for 1997 (see Section 4 of this volume).

With respect to the National Progress Report submitted by Norway, the Faroe Islands enquired about the quota for minke whales in the Jan Mayen area, and whether there was any directed harvest of small cetaceans in Norway. Norway indicated that the 1998 quota was 66 minke whales in the Jan Mayen area. Norway further replied that it was forbidden by law to catch any cetacean without a permit, and that permits were only issued for minke whales

The Management Committee took note of the reports and thanked the member countries for this information.

5. PROPOSALS FOR CONSERVATION AND MANAGEMENT

5.1 Earlier proposals

The Chairman drew the attention of the meeting to the updated list of proposals for conservation and management decided by NAMMCO since its establishment (NAMMCO/9/MC/3). He invited information from the Parties on developments with regard to earlier proposals. See Appendix 3 for the updated list of proposals for conservation and management including this meeting.

Atlantic walrus

With respect to the proposal for conservation and management of Atlantic walrus agreed in 1995, Greenland reported that no new measures had been implemented in addition to those taken in 1998 (see NAMMCO Annual Report 1998: 74).

5.2 New proposals

5.2.1 Advice from the Scientific Committee

In response to an enquiry from Greenland, the Chairman of the Scientific Committee clarified that the Committee does not automatically update previously given advice as

new information is made available. The Scientific Committee operates only on the basis of requests from Council. There are however, certain standing requests, such as that to monitor stock levels and trends in stocks of all marine mammals in the North Atlantic, which are updated as new information is received.

i) *Harp seals in the White Sea/Barents Sea*

The Management Committee noted the stock status and catch options presented by the Scientific Committee.

The Management Committee concluded that the catch level in 1998 was well below the calculated replacement yield. Catches at the same level in the future may result in population increase. From the point of view of resource management, future quota levels approaching the replacement yield are advised.

ii) *Harp seals in the Greenland Sea*

The Management Committee noted the stock status and catch options presented by the Scientific Committee.

The Management Committee concluded that the catch level in 1998 was well below the calculated replacement yield. Catches at the same level in the future may result in population increase. From the point of view of resource management, future quota levels approaching the replacement yield are advised.

iii) *Hooded seals in the Greenland Sea*

The Management Committee noted the stock status and catch options presented by the Scientific Committee.

The Management Committee concluded that the catch level in 1998 was well below the calculated replacement yield. Catches at the same level in the future may result in population increase. From the point of view of resource management, future quota levels approaching the replacement yield are advised.

iv) *North Atlantic beluga and narwhal*

1. Beluga in West Greenland

Maniitsoq – Disko Bay

The Management Committee noted that a series of surveys conducted since 1981 indicate a decline of more than 60% in abundance in the area from Maniitsoq to Disko Bay.

The Management Committee further noted that with the present harvest levels (estimated at 400/yr) the aggregation of beluga in this area is likely declining due to overexploitation.

Avanersuaq – Upernavik

The present harvest in the area Avanersuaq - Upernavik is estimated to be more than 100/yr. The Management Committee noted that since this beluga occurrence must be considered part of those wintering in the area from Maniitsoq to Disko Bay, it is

considered to be declining due to overexploitation.

Finally the Management Committee noted the conclusion by the Scientific Committee that with the observed decline a reduction in harvesting in both areas seems necessary to halt or reverse the trend.

2. Narwhal in West Greenland

Avanersuaq

The Management Committee noted that the present exploitation level in Avanersuaq of 150/yr seems to be sustainable, assuming that the same stock is not harvested in other areas.

Melville Bay – Upernavik

The Management Committee noted that the Scientific Committee could give no status for the Melville Bay – Upernavik summering stock.

Uummannaq

The Management Committee noted that the substantial catches (several hundreds) in some years do cause concern for the status of this aggregation. The Management Committee further noted that the abundance of narwhal in this area should be estimated.

Disko Bay

The Management Committee noted that present catches in this area are probably sustainable.

Catch statistics

The Management Committee noted that for both narwhal and beluga it is mandatory for future management that more reliable catch statistics (including loss rates) are collected from Canada and Greenland.

v) North Atlantic fin whales

The Management Committee accepted that for fin whales in the East Greenland/Iceland (EGI) stock area, removals of 200 animals per year would be unlikely to bring the population down below 70% of its pre-exploitation level in the next 10 years, even under the least optimistic scenarios. However, catches at this level should be spread throughout the EGI stock area, roughly in proportion to the abundance of fin whales observed in the NASS surveys.

Furthermore, the Management Committee stressed that the utilisation of this stock should be followed by regular monitoring of the trend in the stock size.

The Management Committee also noted the conservative nature of the advice from the Scientific Committee on which the conclusion of the Management Committee was based (see Report of the Scientific Committee, Section 3.1, item 9.6, page 143 of this volume).

vi) Incorporation of the users' knowledge in the deliberations of the Scientific Committee

The Management Committee endorsed the proposals and viewpoints contained in Section 3.1, item 6 (page 127) in the Report of the Scientific Committee.

The Committee suggested that the "Draft Minke Whale Stock Status Report" (NAMMCO/9/7) could usefully serve as a pilot project for co-operation with the hunters.

In order to solve the many practical questions in the pilot project process the Committee agreed that the proposed Assessment Committee should carefully prepare for the meeting on the "Draft Minke Whale Stock Status Report", and in particular work with the Secretariat with respect to the following questions:

- define areas and type of information subject to dialogue between scientists and minke whale hunters;
- should the scientists meet minke whale hunters from all interested countries at the same time, or should there be meetings between scientists and minke whale hunters in each of the interested countries?;
- time and venue for meetings;
- papers to be distributed before the meetings;
- language / interpretation;
- how to select hunters with relevant knowledge;
- planning of questions to be asked to hunters.

This preparatory work will take place through correspondence and telephone meetings.

The Assessment Committee should report to the Management Committee on the pilot project.

5.2.2 Other proposals

None

6. RECOMMENDATIONS FOR SCIENTIFIC RESEARCH

6.1 Recommendations from the Scientific Committee

The Chairman of the Scientific Committee reiterated the recommendations for scientific research from the Report of the Scientific Committee.

North Atlantic beluga and narwhal

The Management Committee noted and endorsed the research recommendations conveyed in Section 3.1, Annex 1, item 11 (page 177) of the Report of the Scientific Committee, and urged member and non-member states to act on these recommendations.

North Atlantic fin whales

The Management Committee noted and endorsed the research recommendations

conveyed in Section 3.1, Annex 2, item 5.6 (page 197) of the Report of the Scientific Committee, and urged member and non-member states to act on these recommendations.

White-beaked and white-sided dolphins
The Management Committee noted the conclusion of the Scientific Committee that there is insufficient information on stock structure, abundance and feeding ecology to carry out a meaningful assessment of these species at this time, and urged member and non-member states to initiate research to fill these information gaps. (See also under 6.2.1 below).

6.2 Other recommendations

6.2.1 Former requests from the Council

The Chairman referred the meeting to the document entitled *Summary of Requests by NAMMCO Council to the Scientific Committee and Responses by the Scientific Committee* (Appendix 4). The Management Committee commented on the usefulness of this documentation, and urged that it be maintained and updated on a regular basis.

NASS-95
The Management Committee noted particularly that abundance estimates from NASS-95 have not been completed for some species. The Management Committee therefore recommended that the Scientific Committee complete abundance estimates for all species, as part of its efforts to monitor the abundance of all species in the North Atlantic.

White-sided and white-beaked dolphins
At its 8th meeting in Oslo in 1998, the Council agreed to the recommendation of the Management Committee to request the Scientific Committee to perform an assessment of distribution, stock identity, abundance and ecological interactions of white-beaked and white-sided dolphins in the North Atlantic area.

The Management Committee noted the conclusion of the Scientific Committee that there is insufficient information on stock structure, abundance and feeding ecology to carry out a meaningful assessment of these species at this time.

The Management Committee further noted that, in addition to the focus of the Management Committee's former request for advice on these species in relation to their ecological interactions with fisheries, these dolphin species are harvested in significant numbers in the Faroe Islands.

The Management Committee therefore agreed to recommend that the Scientific Committee be tasked with facilitating the requested assessment of these species, with an emphasis on the following:

- to analyse results from NASS 95 and other sightings surveys as a basis for establishing abundance estimates for the stocks;
- to co-ordinate the efforts of member countries to conduct research to fill the noted information gaps, taking advantage in particular of the sampling

opportunities provided by the Faroese catch, as well as dedicated sampling in other areas.

6.2.2 New recommendations from member countries

i) North Atlantic beluga and narwhal

The Management Committee noted its appreciation for the comprehensive status reports on beluga and narwhal in the North Atlantic.

In this respect, the Management Committee agreed to recommend that the Scientific Committee be requested to provide advice on the level of sustainable utilisation of West Greenland beluga in different areas and under different management objectives.

For narwhal, the Management Committee agreed to recommend that the Scientific Committee be requested to identify the information that is lacking in order to answer the same question proposed with respect to beluga.

ii) Fin whales

The Management Committee noted that the Scientific Committee has completed its assessment of the stock structure of fin whales in North Atlantic, and that more research on stock structure is required before firm conclusions can be drawn. The Management Committee therefore recommended that member countries initiate the research required to elucidate the stock structure of fin whales.

The Management Committee recommended that the Scientific Committee continue its assessment of fin whale stocks in the North Atlantic, focussing in the near term on the status of fin whales in Faroese waters. The Scientific Committee should focus particularly on the following issues:

- assess the long-term effects of annual removals of 5, 10 and 20 fin whales in Faroese waters;
- information gaps that may need to be filled in order to complete a full assessment in this area.

iii) North Atlantic Sightings Surveys

The Management Committee recommended that the Scientific Committee continue its efforts to co-ordinate future sightings surveys and analyses of the results from such surveys in the North Atlantic. Priority species should be minke whales and fin whales, and the Management Committee recommended that the survey design be optimised for these species. The survey should also be optimised to cover those areas where abundance estimates are most urgently required.

iv) Bottlenosed dolphins

The Management Committee noted that bottlenosed dolphins, like white-sided and white-beaked dolphins, are also harvested in the coastal drive fishery in the Faroe Islands.

The Management Committee agreed to recommend that, in connection with the updated request for advice from the Scientific Committee on white-sided and white-

beaked dolphins, that bottlenosed dolphins also be included in this assessment (see item 6.2.1).

v) *Language used in the Report of the Scientific Committee*

With respect to the language used in the Report of the Scientific Committee, Greenland and the Faroe Islands suggested that it be kept precise and simple. The Management Committee agreed to convey this as a suggestion to the Scientific Committee.

7. REPORT OF THE WORKING GROUP ON BY-CATCH

The Chairman referred to the Report of the Working Group on By-Catch (see Appendix 5). The Working Group met in Akureyri on 5th October and was attended by representatives from all member countries. Arne Bjørge (Norway) was elected as Chairman.

Noting the Working Group's recommendation to approve a definition of marine mammal by-catch, the Management Committee agreed that the following would be a working definition for the Working Group:

"Recognising that by-catch of marine mammals may be a valuable contribution to the total catch, an appropriate definition of marine mammal by-catch is: marine mammals taken incidentally in fisheries targeting other species."

The Management Committee further agreed to the recommendations of the Working Group to establish an intersessional correspondence group with the following terms of reference:

- to look at different procedures to collect by-catch information and to compare benefits and drawbacks from the experiences in the member countries;
- to prepare for discussion of quality control of the by-catch data by the Scientific Committee;
- to prepare a NAMMCO policy on the use of marine mammal by-catch data.

It was further agreed that the intersessional correspondence group should meet prior to the next annual meeting of the Management Committee to discuss progress achieved by member nations and the work undertaken by the group itself, and to report on this to the Management Committee.

8. REPORT OF THE WORKING GROUP ON INSPECTION AND OBSERVATION

The Chairman referred to the Report of the NAMMCO Management Committee Working Group on Inspection and Observation, which had met in November 1998.

The Management Committee accepted the recommendations of the Working Group that article 15 of the Guidelines (see NAMMCO Annual Report 1997, Section 2.2) be reworded as follows:

"Appointed observers receive a letter of appointment and a copy of the provisions of the Joint NAMMCO Control Scheme from the Secretariat. When a detailed plan of observation activities for the year is finalised, those observers who will be called upon for active observation will receive an employment contract from the Secretariat. When both parties sign this, the observer will receive an identification card, as well as other relevant documentation necessary for his/her duties. The observer shall return his/her identification card to the Secretariat together with the final report of activities, and shall then receive a letter from the Secretariat confirming his/her completion of duties according to the Scheme."

The Management Committee agreed to forward the amended wording of the Provisions to the Council for formal adoption.

The Management Committee recommended that the Finance and Administration Committee consider the financial and administrative matters of the Joint NAMMCO Control Scheme.

9. IMPLEMENTATION OF THE JOINT NAMMCO CONTROL SCHEME

9.1 NAMMCO International Observation Scheme 1999

The Chairman referred to the report of the NAMMCO International Observation Scheme under the Joint NAMMCO Control Scheme for the Hunting of Marine Mammals, prepared by the Secretariat. The General Secretary presented the report to the Management Committee.

Recognising that there were some operational and administrative matters with regard to the Scheme that needed to be dealt with, the Management Committee agreed to task an *ad hoc* Working Group on the Observation Scheme with the following mandate:

"To review the implementation of the Observation Scheme to examine practical and administrative matters requiring consideration and development, and seek better co-ordination of the observation activities."

The Management Committee recommended that the group meets early November 1999, in order to meet the deadline of the appointment of observers by the member countries.

9.2 NAMMCO International Observation Scheme 2000

The Secretary will implement the Scheme after consulting the *ad hoc* Working Group on the Observation Scheme. The Management Committee highlighted the need to start this work as soon as possible.

9.3 Other matters

There were no other matters.

10. ANY OTHER BUSINESS

Storage and handling of marine mammal catch data at the Secretariat

The Chairman noted that Council had referred the matter of the storage and handling of marine mammal catch data in the Secretariat to the Management Committee for advice, and in this respect referred the meeting to the report prepared by the Secretariat on this matter (NAMMCO/9/6). While noting that the catch database was not detailed enough to be of use to the Scientific Committee for assessment purposes, the Management Committee nevertheless agreed to recommend that a catch database should be maintained at the Secretariat. This was to enable the Secretariat to respond to enquiries about the harvesting activities of member countries. The Management Committee furthermore recommended that the catch database be expanded to include species not covered so far, that catch data be transmitted to the Secretariat on an annual basis through the National Progress Reports, and that the formats of the Reports be modified according to Appendix 1 of NAMMCO/9/6.

Improving the public perception of marine mammal products

Norway introduced a paper dealing with enhancing the utilisation and marketing of marine mammal products (see appendix 6). The Management Committee agreed that NAMMCO might have a role to play in this area, particularly in the area of utilisation and marketing. The Management Committee therefore agreed to recommend that the Council should have the Secretariat prepare a discussion paper for the next meeting, dealing with the following general issues:

- the possibilities for enhancing trade and marketing in marine mammal products among NAMMCO member countries;
- the economic opportunities for coastal peoples in member states afforded by an increased utilisation and trade in marine mammal products;
- options for increasing the marketing and utilisation of marine mammal products, in NAMMCO member countries.

11. ADOPTION OF REPORT

A draft report of the meeting, containing all matters of substance agreed by the Management Committee, was reviewed and approved. The final, edited version of the report was adopted by correspondence after the meeting.

Appendix 1

AGENDA

1. Chairman's opening remarks
2. Adoption of agenda
3. Appointment of rapporteur
4. National Progress Reports
5. Proposals for conservation and management
   - 5.1 Earlier proposals
   - 5.2 New proposals
     - 5.2.1 Advice from the Scientific Committee
     - 5.2.2 Other proposals
6. Recommendations for scientific research
   - 6.1 Recommendations from the Scientific Committee
   - 6.2 Other recommendations
     - 6.2.1 Former requests from the Council
     - 6.2.2 New recommendations from Member Countries
7. Report of the Working Group on By-catch
8. Report of the Working Group on Inspection and Observation
9. Implementation of the Joint NAMMCO Control Scheme
   - 9.1 NAMMCO International Observation Scheme 1999
   - 9.2 NAMMCO International Observation Scheme 2000
   - 9.3 Other matters
10. Any other business
11. Adoption of report

Appendix 2

LIST OF DOCUMENTS

NAMMCO/9/MC/1	List of documents
NAMMCO/9/MC/2	Agenda
NAMMCO/9/MC/3	List of proposals for conservation and management (up to and including NAMMCO/8)
NAMMCO/9/MC/4	Summary of requests by NAMMCO Council to the Scientific Committee, and responses by the Scientific Committee
NAMMCO/9/MC/5	Report of the Management Committee Working Group on Inspection and Observation 1998
NAMMCO/9/MC/6	Report of the NAMMCO International Observation Scheme 1999
NAMMCO/9/MC/7	Report of the Management Committee Working Group on By-catch

National Progress Reports

NAMMCO/SC/7/NPR-F	Faroe Islands - Progress Report on Marine Mammal Research in 1998
NAMMCO/SC/7/NPR-G	Greenland - Progress Report on Marine Mammal Research in 1997
NAMMCO/SC/7/NPR-I	Iceland - Progress Report on Marine Mammal Research in 1998
NAMMCO/SC/7/NPR-N	Norway - Progress Report on Marine Mammal Research in 1998

Council documents

NAMMCO/9/5	Report of the Scientific Committee, 13-15 April 1999
NAMMCO/CS/1998	Provisions of the Joint NAMMCO Control Scheme for the Hunting of Marine Mammals (as adopted by the Council of NAMMCO at its Sixth Meeting in Tromsø, Norway, March 1996)

Appendix 3

LIST OF PROPOSALS FOR CONSERVATION AND MANAGEMENT

(Last updated 26 October 1999)

PINNIPEDS

Atlantic walruses

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 recognising 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 co-operatively with Greenland to assist in the achievement of these objectives (*NAMMCO Annual Report 1995*: 49).

Ringed seals

The Management Committee noted the conclusions of the Scientific Committee on the assessment of ringed seals in the North Atlantic, which had been carried out through the Scientific Committee Working Group on Ringed Seals. In particular, the Management Committee noted that three geographical areas had been identified for assessing the status of ringed seals, and that abundance estimates were only available for Area 1 (defined by Baffin Bay, Davis Strait, eastern Hudson Strait, Labrador Sea, Lancaster, Jones and Smith sounds - see *NAMMCO Annual Report 1996*:149 (Fig.1)).

While recognising the necessity for further monitoring of ringed seal removals in Area 1, the Management Committee endorsed the Scientific Committee's conclusions that present removals of ringed seals in Area 1 can be considered sustainable (*NAMMCO Annual Report 1996*: 81).

Harp seals in the Northwest Atlantic

1) The Management Committee noted that a new abundance estimate for Northwest Atlantic harps seals of 4.8 million was available, based on a pup production estimate for 1994 of 702,900. The Management Committee also noted the conclusion that the Northwest Atlantic population of harp seals has been growing at a rate of 5% per year since 1990, and that the 1996 population was estimated to be 5.1 million, with a calculated replacement yield of 287,000.

The Management Committee concluded that catch levels of harp seals in Greenland and Canada from 1990 to 1995 were well below the calculated replacement yields in this period (*NAMMCO Annual Report 1996*: 81).

2) The Management Committee noted that combined estimated catches of harp seals in Canada and Greenland are in the order of 300,000 and that these catches are near, or at, the established replacement yields (NAMMCO *Annual Report 1998: 22).*

3) The Management Committee noted the stock status and catch options presented by the Scientific Committee and concluded that the catch level in 1998 was well below the calculated replacement yield. Catches at the same level in the future may result in population increase. From a resource management point of view, future quota levels approaching the replacement yield are advised (see NAMMCO/9/5 item 9.1).

Harp seals in the White Sea/Barents Sea

The Management Committee noted the stock status and catch options presented by the Scientific Committee, and concluded that the catch level in 1998 was well below the calculated replacement yield. Catches at the same level in the future may result in population increase. From a resource management point of view, future quota levels approaching the replacement yield are advised (see NAMMCO/9/5 item 9.1)

Harp seals in the Greenland Sea

The Management Committee noted the stock status and catch options presented by the Scientific Committee, and concluded that the catch level in 1998 was well below the calculated replacement yield. Catches at the same level in the future may result in population increase. From a resource management point of view, future quota levels approaching the replacement yield are advised.

Hooded seals in the Northwest Atlantic

1) Noting the Scientific Committee's review of available analyses of hooded seal pup production, which recognised that calculations are dependent on the particular rate of pup mortality used, as well as the harvest regimes, the Management Committee concluded that present catches of hooded seals in the Northwest Atlantic (1990-1995) were below the estimated replacement yields of 22,900 calculated for a harvest of pups only, and 11,800 calculated for a harvest of 1-year and older animals only (*NAMMCO Annual Report 1996*: 81-82).

2) The Management Committee noted that the total catch of hooded seals in the Northwest Atlantic in 1996 slightly exceeded the replacement yield while in 1997 the total number of seals taken was much lower (*NAMMCO Annual Report 1998: 23*).

Hooded seals in the Greenland Sea

The Management Committee noted the stock status and catch options presented by the Scientific Committee, and concluded that the catch level in 1998 was well below the calculated replacement yield. Catches at the same level in the future may result in population increase. From a resource management point of view, future quota levels

approaching the replacement yield are advised (see NAMMCO/9/5 item 9.1).

CETACEANS

Northern bottlenose whales
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 (*NAMMCO Annual Report 1995*: 48)

Long-finned pilot whales
The Faroe Islands informed the Management Committee of their wish to continue to utilise pilot whales in an opportunistic manner as has been done for centuries. Catches of pilot whales may vary from year to year and total allowable catches are not considered appropriate for this form of hunt. In some years catches may exceed 2,000 whales, and in other years they may be much smaller, while the average annual catch since 1971 (1971-96) has been c. 1,400.

The Management Committee noted the findings and conclusions of the Scientific Committee, through its review of the ICES Study Group Report and the analysis of data from NASS-95 with respect to the status of long-finned pilot whales in the North Atlantic (Section 3.1, item 3.1), which also confirmed that the best available abundance estimate of pilot whales in the Central and Northeast Atlantic is 778,000. With respect to stock identity it was noted that there is more than one stock throughout the entire North Atlantic, while the two extreme hypotheses of i) a single stock across the entire North Atlantic stock, and ii) a discrete, localised stock restricted to Faroese waters, had been ruled out.

The Management Committee further noted the conclusions of the Scientific Committee that the effects of the drive hunt of pilot whales in the Faroe Islands have had a negligible effect on the population, and that an annual catch of 2,000 individuals in the eastern Atlantic corresponds to an exploitation rate of 0.26%.

Based on the comprehensive advice which had now been provided by the Scientific Committee to requests forwarded from the Council, the Management Committee concluded that the drive hunt of pilot whales in the Faroe Islands is sustainable (*NAMMCO Annual Report 1997*: 64-65).

Central North Atlantic minke whales
The Management Committee accepted that for the Central Stock Area the minke whales are close to their carrying capacity and that removals and catches of 292 animals per year (corresponding to a mean of the catches between 1980-1984) are sustainable. The Management Committee noted the conservative nature of the advice

from the Scientific Committee (see Annual Report 1998:22).

North Atlantic beluga and narwhal
Beluga in West Greenland
Maniitsoq – Disko
The Management Committee noted that a series of surveys conducted since 1981 indicate a decline of more than 60% in abundance in the area Maniitsoq to Disko. It further noted that with the present harvest levels (estimated at 400/yr) the aggregation of beluga in this area is likely declining due to overexploitation.

Avanersuaq – Upernavik
The present harvest in the area Avanersuaq - Upernavik is estimated to be more than 100/yr. The Management Committee noted that since this beluga occurrence must be considered part of those wintering in the area from Maniitsoq to Disko, it is considered to be declining due to overexploitation.

Finally the Management Committee noted the conclusion by the Scientific Committee that with the observed decline a reduction in harvesting in both areas seems necessary to halt or reverse the trend.

Narwhal in West Greenland
Avanersuaq
The Management Committee noted that the present exploitation level in Avanersuaq of 150/yr seems to be sustainable, assuming that the same whales are not harvested in other areas

Melville Bay – Upernavik
The Management Committee noted that the Scientific Committee could give no status for the Melville Bay – Upernavik summering stock.

Uummannaq
The Management Committee noted that the substantial catches (several hundreds) in some years do cause concern for the status of this aggregation. The Management Committee further noted that the abundance of narwhal in this area should be estimated.

Disko Bay
The Management Committee noted that present catches in this area are probably sustainable.

Catch Statistics
The Management Committee noted that for both narwhal and beluga it is mandatory for future management that more reliable catch statistics (including loss rates) are collected from Canada and Greenland (see NAMMCO/9/5, items 9.4 and 9.5)

North Atlantic fin whales
The Management Committee **accepted** that for fin whalesx in the East Greenland –

Iceland (EGI) stock area, removals of 200 animals per year would be unlikely to bring the population down below 70% of its pre-exploitation level in the next 10 years, even under the least optimistic scenarios. However, catches at this level should be spread throughout the EGI stock area, roughly in proportion to the abundance of fin whales observed in the NASS surveys. Furthermore, the Management Committee stressed that the utilisation of this stock should be followed by regular monitoring of the trend in the stock size.

The Management Committee also noted the conservative nature of the advice from the Scientific Committee on which the conclusion of the Management Committee was based (see NAMMCO/9/5 item 9.6)

INCORPORATION OF THE USERS' KNOWLEDGE IN THE DELIBERATIONS OF THE SCIENTIFIC COMMITTEE

The Management Committee endorsed the proposals and viewpoints contained in section 6 in the Scientific Committee report, and suggested that the "Draft Minke Whale Stock Status Report" (NAMMCO/9/7) could usefully serve as a pilot project for co-operation with the hunters.

In order to solve the many practical questions in the pilot project process the Committee agreed that the proposed Assessment Committee should carefully prepare the meeting on the "Draft Minke Whale Stock Status Report", and particular work with the Secretariat with respect to the following questions:

- Define areas and type of information subject to dialogue between scientists and minke whale hunters
- Should the scientists meet minke whale hunters from all interested countries at the same time, or should there be meetings between scientists and minke whale hunters in each of the interested countries?
- Time and venue for meetings
- Papers to be distributed before the meetings
- Language / interpretation
- How to select hunters with relevant knowledge
- Planning of questions to be asked to hunters

REFERENCES

NAMMCO Annual Report 1995. North Atlantic Marine Mammal Commission, Tromsø. 186pp.

NAMMCO Annual Report 1996. North Atlantic Marine Mammal Commission, Tromsø. 227pp.

NAMMCO Annual Report 1997. North Atlantic Marine Mammal Commission, Tromsø. 260pp.

NAMMCO Annual Report 1998. North Atlantic Marine Mammal Commission, Oslo, 181 pp

NAMMCO/9/5 – Scientific Committee. Report of the Seventh Meeting, Nuuk, 13-15 April 1999

NAMMCO/9/9 – (Draft) Report of the Management Committee, Akureyri, October 6-7 1999

Appendix 4

SUMMARY OF REQUESTS BY NAMMCO COUNCIL TO THE SCIENTIFIC COMMITTEE, AND RESPONSES BY THE SCIENTIFIC COMMITTEE

The following provides a summary of all requests by NAMMCO Council to the Scientific Committee **(**including the 9th meeting), and notes the response of the Scientific Committee (SC) to these requests. Requests forwarded from NAC (North Atlantic Committee for Co-operation on Research on Marine Mammals) to ICES (International Council for the Exploration of the Sea) prior to NAMMCO's establishment, and which were carried over to NAMMCO in 1992, are included. This document will be continually updated to serve as a resource for both the Council and the Scientific Committee.

1. ROLE OF MARINE MAMMALS IN THE ECOSYSTEM

Marine mammal – fish interactions:

Code/Meeting: 1.1/ NAMMCO/1
Request:

To provide an overview of the current state of knowledge of the dependence of marine mammals on the fish and shrimp stocks and the interrelations between these compartments

Response of the Scientific Committee:

See 1.2, 1.4, 1.7, 1.9, 1.10.

Code/Meeting: 1.2/NAMMCO/1
Request:

In the multispecies context ... to address specific questions related to the Davis Strait ecosystem such as: - the apparent increase in harp seal stocks; - its influence on the economically important shrimp and cod stocks; - the impact of the fisheries on marine mammals, particularly harp seals; - the southward shift of minke whale distribution in recent years, and - observed changes in oceanographical conditions after the 1970s; - and to the East Greenland-Iceland-Jan Mayen area interactions between capelin stocks, fishery and marine mammals

Response of the Scientific Committee:

- Questions related to harp and hooded seals were forwarded to the ICES/NAFO Joint Working Group on Harp and Hooded Seals (SC/2) - Specific questions related to the Davis Strait ecosystem were not addressed. - See also 1.4, 1.7, 1.9, 1.10.

Code/Meeting: 1.3/NAMMCO/2
Request:

To assess the impact of marine mammals on the marine ecosystem, with special emphasis on the availability of economically important fish species

Response of the Scientific Committee:

See 1.2, 1.4, 1.7, 1.9, 1.10

Code/Meeting: 1.4/ NAMMCO/6
Request:

The Scientific Committee was requested to focus its attention on the food consumption of three predators in the North Atlantic: the minke whale, the harp seal and the hooded seal, with a particular emphasis on the study of the potential implications for commercially important fish stocks.

Response of the Scientific Committee:

The SC established a Working Group on the Role of Minke Whales, Harp Seals and Hooded Seals in the North Atlantic. The SC used to report of this Working Group to provide advice to Council, and to recommend further research. (SC/5) Many of the papers presented will be published in Volume 2 of NAMMCO Scientific Publications. (SC/7)

*Code/Meeting:*1.5/NAMMCO/7
Request:

The Council encourages scientific work that leads to a better understanding of interactions between marine mammals and commercially exploited marine resources, and requested the Scientific Committee to periodically review and update available knowledge in this field.

Response of the Scientific Committee:

See 1.9, 1.10

Multispecies approaches to management:

*Code/Meeting:*1.6/NAMMCO/1
Request:

To consider whether multispecies models for management purposes can be established for the North Atlantic ecosystems and whether such models could include the marine mammals compartment. If such models and the required data are not available then identify the knowledge lacking for such an enterprise to be beneficial to proper scientific management and suggest scientific projects which would be required for obtaining this knowledge.

Response of the Scientific Committee:

See 1.4, 1.7, 1.9, 1.10

*Code/Meeting:*1.7/NAMMCO/5
Request:

In relation to the importance of the further development of multispecies 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.

Response of the Scientific Committee:

It was clarified that the purpose of this request was to ensure that data on marine mammals was available for input into multi-species models for management. The Committee agreed that updated information on abundance and indications of trends in abundance of stocks of marine mammals in the North Atlantic should be clearly described in a new document for the internal reference of the Council, to replace the List of Priority Species. This document would be entitled Status of Marine Mammals in the North Atlantic and should include those cetacean and pinniped species already contained in the List of Priority Species, as well as other common cetacean species in the NAMMCO area for which distribution and abundance data is also available (fin, sei, humpback, blue, and sperm whales). (SC/5)

Sealworm infestation:

*Code/Meeting:*1.8/NAMMCO/6

Request:

Aware that the population dynamics of the sealworm (*Pseudoterranova decipiens*) may be influenced by sea temperature, bathymetry, invertebrate and fish fauna, the Scientific Committee was requested to review the current state of knowledge with respect to sealworm infestation and to consider the need for comparative studies in the western, central and eastern North Atlantic coastal areas, taking into account the priority topics recommended by the Scientific Committee and its *ad hoc* Working Group on grey seals.

Response of the Scientific Committee:

The SC established a Working Group on Sealworm Infection to address this question. The SC used their report as the basis for providing advice to Council, and developing recommendations for further research. (SC/5) Many of the papers considered by the Working Group will be published in a future volume of *NAMMCO Scientific Publications.* (SC/7)

Economic aspects of marine mammal-fisheries interactions:

*Code/Meeting:*1.9/NAMMCO/7

Request:

The Council requested that special attention be paid to studies related to competition and the economic aspects of marine mammal-fisheries interactions

Response of the Scientific Committee:

The SC established a Working Group on Economic Aspects of Marine Mammal-Fisheries Interactions. The SC concluded that inclusion of economic considerations is a valuable addition to multispecies models of interactions between marine mammals and fisheries. The work presented at the Working Group was considered the first step towards more complete analyses of these interactions and it was recommended, in light of the economic impacts, that more complete models should be developed and presented. The Scientific Committee showed a continued interest in the development of the models and it was decided to maintain the Working Group and seek further guidance from the Council on matters of particular interest. (SC/6)

*Code/Meeting:*1.10/NAMMCO/8
Request:

The Scientific Committee is requested to investigate the following economic aspects of marine mammal – fisheries interactions:

- to identify the most important sources of uncertainty and gaps in knowledge with respect to the economic evaluation of harvesting marine mammals in the different areas;
- to advise on research required to fill such gaps both in terms of refinement of ecological and economical models and collection of basic biological and economical data required as input parameters for the models;
- to discuss specific cases where the state of knowledge may allow quantification of the economic aspects of marine mammal – fisheries interactions:
  a) what could be the economic consequences of a total stop in harp seal exploitation versus different levels of continued sustainable harvest?
  b) what could be the economic consequences of different levels of sustainable harvest vs. no exploitation of minke whales?

Response of the Scientific Committee:

The Working Group On The Economic Aspects Of Marine Mammal - Fisheries Interactions will be reactivated to meet this request, and will report to the SC in 2000. (SC/7)

2. ENVIRONMENTAL ISSUES

Code/Meeting: 2.1/NAMMCO/1
Request:

To describe the possible pathways of radioactive material from blowouts and leakage in existing nuclear power plants, leakage from dumped material and possible accidents in planned recycling plants in the northern part of Scotland into the food web of the North Atlantic and hence into the top predators like marine mammals.

Response of the Scientific Committee:

No response.

*Code/Meeting:*2.2/NAMMCO/1
Request:

To review the contaminant burden (especially organochlorines) in marine mammals in the North Atlantic and evaluate the possible sources of these contaminants.

Response of the Scientific Committee:

No response from the SC. In 1995, NAMMCO hosted the International Conference on Marine Mammals and the Marine Environment. The Conference covered the following themes: Marine mammals and the marine environment-impacts and management approaches; Contaminants in marine mammals – sources, levels and effects; Coastal communities and marine pollution – social, economic and health considerations; Addressing the questions – problems and future needs. The proceedings were published as a special issue of *The Science of the Total Environment* (186, 1,2).

3. MANAGEMENT PROCEDURES

*Code/Meeting:*3.1/NAMMCO
Request:

to review the basis for, and develop assessments necessary to provide the scientific foundation for conservation and management of the stocks relevant for management under NAMMCO.

Response of the Scientific Committee:

A Working Group on Management Procedures was established to consider this matter. (SC/2). The Scientific Committee noted that there were many different management needs requiring different management procedures. It was agreed that there was need for more guidance on management objectives before any concrete work can be started on developing appropriate management procedures, and in turn this was likely to be case- (species and/or area) specific. Related to this it was also noted that NAMMCO may prefer to assume an advisory and evaluative role in developing its management. (SC/2)

*Code/Meeting:*3.2/NAMMCO/4
Request:

Further development of RMP-like procedures.

Response of the Scientific Committee:

The SC decided to develop management procedures on a case-by-case basis: "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". (SC/3)

4. STOCKS/SPECIES

Monitoring marine mammal stock levels and trends in stocks /North Atlantic Sightings Surveys (NASS):

*Code/Meeting:*4.1/NAMMCO/3
Request:

To plan joint cetacean sighting surveys in the North Atlantic by co-ordinating national research programmes.

Response of the Scientific Committee:

The Scientific Committee agreed to establish a Working Group to plan the sighting survey for the summer of 1995. Finn Larsen was elected as Chairman, and other members are Geneviève Desportes, Aqqalu Rosing-Asvid, Mads Peter Heide-Jørgensen, Þorvaldur Gunnlaugsson, Jóhann Sigurjónsson, and Nils Øien. It was agreed that additional Working Group members could be appointed at a later stage.
The terms of reference for the Working Group were agreed upon as follows:

1) to plan a large-scale cetacean sighting survey in the North Atlantic;
2) to identify priority species and define main areas to be covered;
3) to properly define the organisation and survey techniques necessary for the particular target species;

4) to make recommendations, where necessary, for the involvement of external expertise to ensure the best possible basis for an effective survey;
5) to suggest efforts to involve other North Atlantic states in the survey to ensure the best possible coverage of the North Atlantic. (SC/2)

The SC 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. (SC/3)

The SC 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. (SC/3)

*Code/Meeting:*4.2/NAMMCO/5
Request:

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.

Response of the Scientific Committee:

The Scientific Committee agreed to establish a Working Group on Abundance Estimates. The task of the Working Group on Abundance Estimates would be to review analyses and where relevant also analyse data from NASS-95 to ensure its compatibility, both between NASS-95 survey areas, as well as with data from other sightings surveys, in order to provide a basis for calculating abundance estimates for the relevant cetacean stocks in the North Atlantic. (SC/4)

*Code/Meeting:*4.3/NAMMCO/6
Request:

The Management Committee noted the successful completion of the North Atlantic Sightings Survey in 1995, and commended the process initiated by the Scientific Committee to conclude the analysis of NASS-95 data. It was expected that the results on abundance will be dealt with by the newly established Scientific Committee Working Group on Abundance Estimates and will be presented at the next annual meeting. It was noted that the Working Group would at least to some extent address last year's request from the Council regarding monitoring of stock levels and trends in stocks. However, it was also noted that one outstanding matter from last year is the request to the Scientific Committee to review results of NASS-95 in the light of recent assessments of North Atlantic whale stocks. The Council agreed to the suggestion from the Management Committee that this be drawn to the attention of the Scientific Committee to secure a follow-up to last year's request.

Response of the Scientific Committee:

To address this request, a Working Group on Abundance Estimates had been established with the task of reviewing the analyses, and where relevant, also to analyse data from NASS-95 to provide a basis for calculating abundance estimates for the relevant cetacean stocks in the North Atlantic. The Working Group had focused on

describing synoptic distributions of the cetacean species encountered during NASS-95, and abundance estimates for minke, fin, sei and pilot whales, which were the target species of the survey. The Scientific Committee concluded that the updated abundance estimates for the target species as reviewed by the Working Group on Abundance Estimates represented the best available estimates for the stocks concerned, and used them as a basis to provide advice to Council. The SC also recommended that the results of NASS-95 be compiled to a future volume of *NAMMCO Scientific Publications*. (SC/5)

Code/Meeting: 4.4/NAMMCO/7
Request:

The Scientific Committee was requested to continue its work to monitor stock levels and trends in all stocks of marine mammals in the North Atlantic in accordance with previous recommendations (see *NAMMCO Annual Report 1996*:131-132). In this context the Scientific Committee was encouraged to prioritise calculation of the abundance of species covered by NASS-95, in particular those species presently harvested and species considered to be important with respect to interactions with fisheries.

Response of the Scientific Committee:

See 4.3.

*Code/Meeting:*4.5/NAMMCO/9
Request:

*NASS-95:*The Management Committee noted particularly that abundance estimates from NASS-95 have not been completed for some species. The Management Committee therefore recommended that the Scientific Committee complete abundance estimates for all species, as part of its efforts to monitor the abundance of all species in the North Atlantic.

Response of the Scientific Committee:

To be addressed by the SC in 2000.

*Code/Meeting:*4.6/NAMMCO/9
Request:

The Management Committee recommended that the Scientific Committee continue its efforts to co-ordinate future sighting surveys and analyses of the results from such surveys in the North Atlantic. Priority species should be minke whales and fin whales, and the Management Committee recommended that that the survey design be optimised for these species. The survey should also be optimised to cover those areas where abundance estimates are most urgently required.

Response of the Scientific Committee:

To be addressed by the SC in 2000.

Central North Atlantic minke whales:

*Code/Meeting:*4.7/March 1997
Request:

In the light of the new survey abundance results the Scientific Committee is requested

to undertake an assessment of the status of the Central North Atlantic minke whale stock, including to evaluate the long-term effects of past and present removal levels on the stock.

Response of the Scientific Committee:

The Scientific Committee agreed to assign the task of assessing the status of the stock to the Working Group on Management Procedures. The Council had requested the SC to provide its advice on this matter prior to the next meeting of the Council, however it was the general view of the Committee that it was unlikely that this work could be completed within this time frame. (SC/5)

The SC used the report of the Working Group on Management Procedures as the basis for providing advice and research recommendations to Council. (SC/6)

*Code/Meeting:*4.8/NAMMCO/8

Request:

In order to ascertain the stock structure of minke whales in the North Atlantic, the Scientific Committee is requested to investigate the possibility of supplementing present sampling with existing older material from NAMMCO countries and other countries in joint genetic analyses. If possible, such analyses should be undertaken.

Response of the Scientific Committee:

It was noted that such exchanges of samples are ongoing between Norway and Greenland. Samples collected in the past from Iceland and Norway have already been analysed concurrently, and there are no recent samples from Iceland. The SC concluded that available samples are being utilised effectively. (SC/7)

Northern bottlenose whales:

*Code/Meeting:*4.9/NAMMCO/2

Request:

To undertake an assessment of the status of the northern bottlenose whale (*Hyperoodon ampullatus*) stock in the North Atlantic.

Response of the Scientific Committee:

A Working Group on Northern Bottlenose and Killer Whales established, and provided a preliminary assessment which was used as the basis of advice and recommendations for further research given by the SC. (SC/2)

*Code/Meeting:*4.10/NAMMCO/4

Request:

To undertake the necessary modelling of the species using catch series and abundance estimates.

Response of the Scientific Committee:

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. Their report was used as the basis for advice and research recommendations conveyed by the SC. (SC/3)

Killer whales:

*Code/Meeting:*4.11/NAMMCO/2
Request:

To advise on stock identity for management purposes; to assess abundance in each stock area; to assess effects of recent environmental changes, changes in the food supply and interactions with other marine living resources in each stock area.

Response of the Scientific Committee:

A Working Group on Northern Bottlenose and Killer Whales established by the SC, and provided a preliminary assessment. This provided the basis for advice and research recommendations given by the SC. (SC/2) The Chairman noted that it had not yet been possible to complete a full assessment of the killer whale as requested by the Council. Few new data were available, other than recent sightings data from NASS-95 which had not been analysed. (SC/5)

Long-finned pilot whales:

*Code/Meeting:*4.12/NAMMCO/1
Request:

To provide an assessment of the state of the pilot whale stock in the north eastern Atlantic, based on the information sampled from the Faroese drive fishery and the NASS sighting surveys.

Response of the Scientific Committee:

The SC decided to base its advice on the report of the ICES Study Group on Long-Finned Pilot whales. They concluded that an evaluation of status could not be provided without further work.(SC/2)

Code/Meeting: 4.13/NAMMCO/2
Request:

To analyse the effects of the pilot whale drive hunt in the Faroe Islands on North Atlantic pilot whales (*Globicephala melas*), especially whether the numbers taken are consistent with sustainable utilisation.

Response of the Scientific Committee:

This matter was addressed by the SC, based on the findings of the ICES Study Group and the review of the results of NASS-95. The SC agreed to endorse the list of future research requirements listed by the ICES Study Group in its report, and provided advice on the sustainability of the Faroese catch. (SC/5)

Narwhal and beluga:

Code/Meeting: 4.14/NAMMCO/7
Request:

The Scientific Committee was requested to examine the population status of narwhal and beluga (white whales) throughout the North Atlantic.

Response of the Scientific Committee:

The SC established a Working Group on the Population Status of Narwhal and Beluga in the North Atlantic, which met in March 1999. The SC used the report of the

Working Group to evaluate the stock status of the various narwhal and beluga aggregations, and provided recommendations to Council. (SC/7)

*Code/Meeting:*4.15/NAMMCO/8
Request:

The Management Committee noted its appreciation for the comprehensive status reports on beluga and narwhal in the North Atlantic. In this respect, the Management Committee requested advice from the Scientific Committee on the level of sustainable utilisation of West Greenland beluga in different areas and under different management objectives. For narwhal, the Management Committee requested that the Scientific Committee identify the information which is lacking in order to answer the same question proposed with respect to beluga.

Response of the Scientific Committee:

To be addressed by the SC in 2000.

Harbour porpoises:

Code/Meeting: 4.16/NAMMCO/7
Request:

The Council noted that the harbour porpoise is common to all NAMMCO member countries, and that the extent of current research activities and expertise in member countries and elsewhere across the North Atlantic would provide an excellent basis for undertaking a comprehensive assessment of the species throughout its range. The Council therefore requested the Scientific Committee to perform such an assessment, which might include distribution and abundance, stock identity, biological parameters, ecological interaction, pollutants, removals and sustainability of removals.

Response of the Scientific Committee:

The SC decided that the matter could best be dealt with by convening an international workshop/symposium on harbour porpoises, which would involve experts working on this species throughout its North Atlantic range. The agenda would include the following themes: distribution, abundance and stock identity; biological parameters; ecological interactions; pollutants; removals and sustainability of removals. (SC/6)
The International Symposium on Harbour Porpoises in the North Atlantic was held September 10-14 onboard the Hurtigruten enroute from Bergen to Tromsø. The report and recommendations of the Symposium will be presented to the SC in 2000.

Atlantic walrus:

Code/Meeting: 4.17/NAMMCO/2
Request:

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.

Response of the Scientific Committee:

The assessment was postponed pending report of Walrus International Technical and

Scientific Committee (WITS). (SC/2) It was subsequently decided in late 1994 to request Erik Born of the Greenland Fisheries Research Institute in Copenhagen to co-ordinate the compilation of a status report on the Atlantic walrus in time for the present Scientific Committee meeting. The result of this collaboration was the report, E.W. Born, I. Gjertz and R.R. Reeves, "Population assessment of Atlantic walrus (*Odobenus rosmarus rosmarus*)" This report was used by the SC as the basis of its management and research recommendations to Council. (SC/3)

Harp and hooded seals:

Code/Meeting: 4.18/NAMMCO/2
Request:

To assess the stock size, distribution and pup production of harp seals in the Barents Sea and White Sea, and of harp and hooded seals in the Greenland Sea and the Northwest Atlantic;
To assess sustainable yields at present stock sizes and in the long term under varying options of age composition in the catch;
To provide advice on catch options in the White Sea/Barents Sea/Greenland Sea and NAFO areas;
To assess effects of recent environmental changes or changes in the food supply and possible interaction with other living marine resources in the areas.

Response of the Scientific Committee:

- These requests forwarded to Joint ICES/NAFO Working Group on Harp and Hooded Seals. A partial assessment was completed, but more work was required. (SC/2)
- The SC considered the report of the Joint ICES/NAFO Working Group on Harp and Hooded Seals which had met in Dartmouth, Canada, 5-9 June 1995. The SC endorsed the recommendations in the report and identified further research needs. However the required assessments had not yet been completed. (SC/4).
- The SC considered the report of the Joint ICES/NAFO Working Group on Harp and Hooded Seals which had met in Copenhagen in 1997. The SC used this report as the basis for its advice to Council, while noting that catch options had not been completed for Greenland Sea harp and hooded seals, and White Sea and Barents Sea harp seals. (SC/6)
- The Joint ICES/NAFO Working Group on Harp and Hooded Seals met in 1998 to complete the assessments for Greenland Sea harp and hooded seals, and White Sea and Barents Sea harp seals. The SC used their report as the basis of its advice to Council, and noted that the required assessments had now been completed. Assessment of the effects of recent environmental changes or changes in the food supply and possible interaction with other living marine resources in the areas is ongoing. (SC/7)

Code/Meeting: 4.19/NAMMCO/8
Request:

The Scientific Committee is requested to co-ordinate joint feeding studies of harp and hooded seals in the Nordic Seas (Iceland, Greenland and Norwegian Seas) and off West Greenland.

Response of the Scientific Committee:

The SC noted that preparations to co-ordinate such studies between member countries were already under way, outside of the NAMMCO SC. The SC therefore emphasised its support for such joint studies and urged member countries to participate. (SC/7)

Ringed seals:

Code/Meeting: 4.20/NAMMCO/5
Request:

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 (i.e. disturbance, pollution) and changes in the food supply, and interactions with other marine living resources.

Response of the Scientific Committee:

The SC established a Working Group on Ringed Seals. The SC considered the report of the Working Group and provided advice to Council. They also provided recommendations for future research. (SC/5) Papers considered by the Working Group as well as other papers were published in the first volume of NAMMCO Scientific Publications, *Ringed Seals in the North Atlantic.*

Code/Meeting: 4.21/NAMMCO/7
Request:

The Scientific Committee was requested to advise on what scientific studies need to be completed to evaluate the effects of changed levels of removals of ringed seals in West and East Greenland.

Response of the Scientific Committee:

It was noted that the exploitation level of ringed seals in Greenland has shown considerable variability over decades in this century. The Scientific Committee chose to focus on scenarios where exploitation is raised by more than twice the level reported in recent years. The SC then identified the main gaps in knowledge, and recommended research required to address them. (SC/6)

Grey seals:

Code/Meeting: 4.22/NAMMCO/5
Request:

To 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.

Response of the Scientific Committee:

The SC established a Working Group on Grey Seals. The SC considered the report of the Working Group and provided advice to Council, including recommendations for further research. (SC/4)

Dolphin species *(Tursiops* and *Lagenoryhncus* spp*.)*:

Code/Meeting: 4.23/NAMMCO/7
Request:

The Council recommended that NAMMCO member countries study the ecological interaction between dolphin species (e.g., *Lagenorhynchus spp.*) and fisheries, with the view to future assessments of such interactions.

Response of the Scientific Committee:

Not addressed.

Code/Meeting: 4.24/NAMMCO/8
Request:

Noting that ecological interactions between dolphin species of the *Lagenorhynchus* genus and fisheries have caused concern in NAMMCO countries, the Scientific Committee is requested to perform an assessment of distribution, stock identity, abundance and ecological interactions of white-beaked and white-sided dolphins in the North Atlantic area.

Response of the Scientific Committee:

The SC noted that the IWC Scientific Committee had dealt with these species in 1996. Generally, it was considered that there is insufficient information on stock structure, abundance and feeding ecology to carry out a meaningful assessment of these species at this time. Some new information on abundance may become available from the NASS-95 survey, but these data have not yet been analysed. The SC agreed to begin compiling available information on these species in member countries, with the objective of identifying knowledge gaps and creating a basis for assessment in the longer term. (SC/7)

Code/Meeting: 4.25/NAMMCO/9
Request:

At its Eighth Meeting in 1998, the Council agreed to the recommendation of the Management Committee to request the Scientific Committee to perform an assessment of distribution, stock identity, abundance and ecological interactions of white-beaked and white-sided dolphins in the North Atlantic area. The Management Committee noted the conclusion of the Scientific Committee that there is insufficient information on stock structure, abundance and feeding ecology to carry out a meaningful assessment of these species at this time. The Management Committee further noted that, in addition to the focus of the Management Committee's former request for advice on these species in relation to their ecological interactions with fisheries, these dolphin species are harvested in significant numbers in the Faroe Islands. The Management Committee therefore agreed to recommend that the Scientific Committee be requested to facilitate the requested assessment of these species, with an emphasis on the following: to analyse results from NASS 95 and other sightings surveys as a basis for establishing abundance estimates for the stocks; to co-ordinate the efforts of member countries to conduct research to fill the noted information gaps, taking advantage in particular of the sampling opportunities provided by the Faroese catch, as well as dedicated samples in other areas.

Response of the Scientific Committee:

To be addressed by the SC in 2000.

Code/Meeting: 4.26/NAMMCO/9
Request:

The Management Committee noted that bottlenosed dolphins, like white-sided and white-beaked dolphins, are also harvested in the coastal drive fishery in the Faroe Islands. The Management Committee agreed to recommend that, in connection with the updated request for advice from the Scientific Committee on white-sided and white-beaked dolphins, that bottlenosed dolphins also be included in this assessment

Response of the Scientific Committee:

To be addressed by the SC in 2000.

Fin whale:

Code/Meeting: 4.27/NAMMCO/8
Request:

The Scientific Committee is requested to undertake an assessment of the status of fin whales in the North Atlantic based on all available data. (This request was later elaborated as follows: "Acknowledging the large amount of work involved in such a comprehensive assessment of all possible fin whale stocks in the North Atlantic, the Council requests the SC, when conducting such comprehensive assessment, particularly to:
- assess the stock structure of fin whales in the whole North Atlantic.
- assess the long-term effects of annual removal of 50, 100 and 200 fin whales in the stock area traditionally assumed to have a main concentration off East Greenland and Iceland (EGI stock area),
- identify MSY exploitation levels for that stock area.")

Response of the Scientific Committee:

The SC established a Working Group on Fin Whales to deal with this request. The Working Group met in April 1999. Their report dealt with the stock structure of fin whales throughout the North Atlantic, and with assessment of the EGI stock. The SC used the report of the Working Group to formulate advice and research recommendations to NAMMCO Council. Detailed assessment of other fin whale stocks was not carried out, but will be if further requests from Council are forthcoming.

Code/Meeting: 4.28/NAMMCO/9
Request:

The Management Committee noted that the Scientific Committee has completed its assessment of the stock structure of fin whales in North Atlantic, and that more research on stock structure is required before firm conclusions can be drawn. The Management Committee therefore recommended that member countries initiate the research required to elucidate the stock structure of fin whales.
The Management Committee recommended that the Scientific Committee continue its assessment of fin whale stocks in the North Atlantic, focussing in the near term on the status of fin whales in Faroese territorial waters. The Scientific Committee should

focus particularly on the following issues:
- Assess the long-term effects of annual removals of 5, 10 and 20 fin whales in Faroese waters;
- Information gaps that may need to be filled in order to complete a full assessment in this area.

Response of the Scientific Committee:

To be addressed by the SC in 2000.

5. OTHER

Code/Meeting: 5.1/NAMMCO/8
Request:

Greenland noted the need for greater input from hunters and users in the work of the Scientific Committee. While noting the need for scientists to be able to conduct their work on their own scientific terms in the context of their Committee meetings, it was suggested that scientists and users of marine mammal resources which are the subject of examination by the Scientific Committee could, for example, meet prior to meetings of the Scientific Committee in order to exchange information relevant to the work planned by the Scientific Committee. With these ideas in mind, Greenland recommended that concrete steps should be taken to provide for a more active dialogue between scientists and resource users. This recommendation was endorsed by Council.

Response of the Scientific Committee:

The SC agreed to consider a proposal put forward by the Secretariat, to use the "Status of Marine Mammals in the North Atlantic" stock status reports as a means of incorporating the knowledge of marine mammal users. This proposal will be presented to NAMMCO Council for approval. (SC/7)

Code/Meeting: 5.2/NAMMCO/9
Request:

With respect to the language used in the Report of the Scientific Committee, Greenland suggested that it must be kept precise and simple. The Management Committee agreed to convey this as a suggestion to the Scientific Committee.

Response of the Scientific Committee:

To be addressed by the SC in 2000.

Appendix 5

REPORT OF THE MANAGEMENT COMMITTEE WORKING GROUP ON BY-CATCH

Akureyri, Iceland, 5 October 1999

1. ELECTION OF CHAIRMAN

Arne Bjørge, Norway was elected as chairman

2. ADOPTION OF AGENDA

The agenda in NAMMCO/MC/BC/1 rev. was adopted.

3. APPOINTMENT OF RAPPORTEUR

Jesper Koldborg Jensen, Greenland was appointed as rapporteur.

4. DEFINITION OF BY-CATCH

The chairman pointed to the need for a definition of marine mammal by-catch, which also was addressed at last years meeting (see Annual Report 1998, pp 73-74).

The Working Group members discussed paper NAMMCO/MC/BC/2, prepared by the chairman.

Koldborg Jensen (Greenland) pointed out that a definition of marine mammal by-catch should reflect the combined fishing and hunting culture found in Greenland. The Working Group agreed that incidental catches may be regarded as an important extra value from some fisheries, and that it is the responsibility of each member country to define the target species of their fisheries in their own progress reports. With this, the Working Group agreed to put forward the following definition of marine mammal by-catch for the Management Committees approval:

"Recognising that by-catch of marine mammals may be a valuable contribution to the total catch, an appropriate definition of marine mammal by-catch is: Marine mammals taken incidentally in fisheries targeting other species."

5. PROGRESS IN THE DEVELOPMENT OF PROCEDURES TO RECORD BY-CATCH INFORMATION

Koldborg Jensen (Greenland) reported on the first Greenlandic initiative to make a special marine mammal report from the Greenlandic Fisheries Licenses Control from their control of the high seas fishing fleet. During the first eight months, the Greenlandic Fisheries have received less than 15 reports of by-catch of pinnipeds caught in trawl net.

Mortensen (The Faroe Islands) reported that a recording system has been implemented in connection with the fisheries logbooks. No by-catch was reported in 1998 in Faroese fisheries. Mortensen further informed the Working Group that the use of gill nets is prohibited in the Faroese Fishery Zone.

Haraldsdóttir (Iceland) reported that a recording system is being established in Iceland in which by-catch should be reported in fisheries logbooks. However, no report was available at the time of the Working Group meeting because the recording system has not yet been fully implemented.

In Norway, the Ministry of Fisheries initiated, in April 1999, a process to develop a strategy for recording marine mammal by-catch data. Several items of the issue have been considered, including specifying the guidelines for how to properly keep the fishing logbooks. Later, procedures for evaluating the quality of the data will be established.

The chairman concluded that work to record by-catch data has been initiated and in some cases implemented in the member countries. However, a quality control of the procedures for obtaining data in the member countries was needed.

6. ADDRESSING BY-CATCH ISSUES THROUGH NAMMCO

By-catch information may include data that require careful scientific consideration before it is released. The chairman therefore requested a NAMMCO policy on how the data should be collected, stored, used and published.

The Working Group agreed that there is a need for such a policy, and this policy should underline the necessity of a quality control by the Scientific Committee and approval by the Council before by-catch data is published.

7. INTERSESSIONAL WORK

7.1. Establishment of a correspondence group

In order to facilitate progress in discussions of by-catch issues, the Working Group agreed to establish a correspondence group who should communicate by e-mail before the next annual meeting of the Council.

The Correspondence Group would be Arne Bjørge, Norway (chairman), Kristín Haraldsdóttir, Iceland, Kaj P. Mortensen, Faroe Island and Jesper Koldborg Jensen, Greenland.

7.2. Terms of Reference for the Correspondence Group

For the approval of the Management Committee, the Working Group put forward the following Terms of Reference:
The Correspondence Group should:

a) look at different procedures to collect by-catch information and to compare benefits and drawbacks from the experiences in the member countries.

b) prepare for discussion of quality control of the by-catch data by the Scientific Committee.
c) prepare a NAMMCO policy on the use of marine mammal by-catch data.

8. INFORMATION ON THE DEVELOPMENT OF TECHNICAL MEASURES FOR REDUCING/AVOIDING BY-CATCH

For discussion under this item the Secretariat had prepared the document NAMMCO/MC/BC/2.

The Working Group agreed on the procedure laid out by the Secretariat to monitor the new information available in this field without duplicating work done in other organisations.

9. RECOMMENDATIONS

The Working Group recommends to the Management Committee that:

- The Management Committee approves the definition of marine mammal by-catch as outlined in item 4.
- An intersessional correspondence group is established to undertake the tasks identified in the proposed terms of reference (item 7.2.)
- The Working Group should meet prior to the next annual meeting of the Management Committee to discuss progress achieved by member nations and the work undertaken by the intersessional Correspondence Group.

10. ADOPTION OF REPORT

The report was adopted after a draft version had been circulated to working group participant.

LIST OF PARTICIPANTS

Mr Kaj P. Mortensen (Faroe Island)
Mr Jesper Koldborg Jensen (Greenland)
Mr Siverth Amondsen (Greenland)
Ms Kristín Haraldsdóttir (Iceland)
Mr Gísli A. Víkingsson (Iceland)
Mr Bjørn Hugo Bendiksen (Norway)
Dr Arne Bjørge (Norway)
Ms Rannveig Bøthun (Norway)
Mr Elling Lorentsen (Norway)
Ms Lisbeth W. Plassa (Norway)
Dr Egil Ole Øen (Norway)

NAMMCO Secretariat
Dr Grete Hovelsrud-Broda

Appendix 6

IMPROVING PUBLIC APPRECIATION OF MARINE MAMMAL PRODUCTS. A FUTURE STRATEGIC OBJECTIVE OF NAMMCO

Arne Bjørge
Institute of Marine Research, Bergen, Norway

In the past, marine mammal populations were overexploited and depleted. Marine mammals became icons for environmental concern, and they were focused in the strive for the protection of nature. Following this development, exploitation was brought under strict control or terminated with subsequent recovery of the marine mammal populations. Recently, warnings have been issued by fisheries scientists due to consumption of exploitable fish resources by the increasing marine mammal populations. In some areas, allowances for marine mammal consumption are considered when Total Allowable Catch (TAC) are set for fish stocks. From a fisheries management point of view, an enhanced harvest of the recovering marine mammal populations may therefore be beneficial.

At present, small scale marine mammal harvests continue in some coastal communities of the northern North Atlantic. The products are utilised in local barter economy as well as in commercial international trade. These harvests are no longer hampered by dwindling stocks or strict quota regulations. The apprehension of marine mammals as victims of mankind's misuse of the marine environment and the previous overexploitation, is now the main impediment for further development of the harvest. In the past thirty years, conservation-based trade embargoes and political implications degraded the economy of the marine mammal harvest. At present, some set quotas are not fully utilised because harvest is unprofitable. Therefore, improved profitability may be an important incitement for rebuilding the harvest of marine mammals.

The public opinion in urbanised areas of Europe and North America seems to favour reduction in fish quotas to allow for increasing marine mammal populations. In this situation, presentations of marine mammals as vermin and competitors to fisheries fail as arguments for augmentation of the marine mammal harvest. Thus, there is a demand for alternative approaches to support rebuilding profitable harvests. An obvious alternative approach is to present the marine mammals as fascinating creatures inhabiting the pristine waters of the high north, and market marine mammal products as genuine, environmentally sound and wholesome.

Representing the interests of coastal communities harvesting and utilising marine mammals, NAMMCO may wish to take initiative to develop strategies for enhancing the value of marine mammal products and thereby establish a basis for rebuilding marine mammal harvest. Increased value of marine mammal products may be achieved through development of new high quality products and improving the appreciation of these products in wider domestic and international markets. Traditional or novel high quality marine mammal products should be marketed within holistic concepts encompassing culture, tradition, craftsmanship, product design,

genuineness and quality that attend our present concerns of health aspects, ambient environment, conservation of biodiversity and animal welfare.

In order to substantiate such holistic concepts, interdisciplinary effort including biology, ecology, environmental sciences, anthropology, design, marketing and economy is required. Further, research and development within the fields of nutritional products and pharmacy, clothing and fashion may be emphasised. This task is extensive and probably beyond the scope of NAMMCO. However, NAMMCO may stimulate and facilitate research and development within member nations. NAMMCO may also offer a forum for presentation of progress and results of the activities conducted within member nations and elsewhere, and NAMMCO may act as co-ordinator of these efforts.

SECTION 3 - SCIENTIFIC COMMITTEE

3.1
REPORT OF THE SEVENTH MEETING OF THE SCIENTIFIC COMMITTEE

Nuuk, Greenland, 13 – 15 April 1999

1. CHAIRMAN'S WELCOME AND OPENING REMARKS

Klaus Nygård, Director of the Greenland Institute of Natural Resources (GINR), welcomed the participants to Nuuk and to the Institute. He noted that this was the first international scientific meeting to be held at the Institute, and wished the committee well with its deliberations.

The chairman welcomed participants to the meeting (Appendix 1), noting especially the addition of two new members, General Secretary Grete Hovelsrud-Broda and Scientific Secretary Daniel Pike. The following observers were accepted by the Scientific Committee:

- Amalie Jessen, Head of section for wildlife management at Greenland Home Rule, NAMMCO Council member;
- Arild Landa, Head of section for bird and mammal studies, GINR;
- Ivalo Egede, public relations officer at GINR.

2. ADOPTION OF AGENDA

The agenda (Appendix 2) was accepted with the addition of Item 10, Planning for a possible NASS-2000 survey.

3. APPOINTMENT OF RAPPORTEUR

Daniel Pike, Scientific Secretary of NAMMCO, was appointed as Rapporteur.

4. REVIEW OF AVAILABLE DOCUMENTS AND REPORTS

4.1 National Progress Reports

National Progress Reports for 1998 from the Faroes, Iceland, Norway, and Greenland for 1997 (SC/7/NPR - F,G,I & N) were submitted to the Committee.

4.2 Working Group Reports

Working Group Reports and other documents available to the meeting are listed in Appendix 3.

5. CO-OPERATION WITH OTHER ORGANISATIONS

It was noted that the Scientific Committee has no formal agreements with any other organisations regarding exchange of observers. This was considered desirable in the case of the IWC, where there is a considerable overlap in interests. For other

organisations, such as ASCOBANS and ICES, relevant reports of meetings should be obtained by the Secretariat and given to the Scientific Committee chairman for review. It will be up to him or her to decide if the report(s) should be circulated to the rest of the Scientific Committee. Some Scientific Committee members had attended meetings of interest this year and reported back to the Scientific Committee.

5.1 IWC

Nils Øien reported from the annual meeting of the International Whaling Commission Scientific Committee (IWC/SC) held in May 1998. At this meeting The IWC/SC finished its work on validation of the Norwegian estimate of minke whale abundance in the Northeast Atlantic based on the 1995 survey, and agreed that these estimates are adequate for use in the Revised Management Procedure (RMP). There was an extensive discussion of the reanalyses of the Icelandic 1987 aerial survey data made by Borchers and co-workers. The IWC/SC was not able to resolve the problems and decided not to accept the new estimates. A reanalysis of the NASS-87 shipboard data for the CM (Jan Mayen Central stock) area was also discussed at the meeting, but several concerns were raised that required reanalyses. An estimate for the CM area based on NASS-95 was however accepted, the abundance of minke whales being 12,043 (cv. 0.277). There was also a discussion on data availability, since management under the RMP requires data to be available on a continuing basis. This is a problem in cases where non-member states, like Iceland, hold data of interest to the IWC/SC. In general, the IWC/SC would not recommend the use of published estimates in the RMP if the estimates are based on data that does not meet the requirements and guidelines of the procedure. Greenland was requested to table a research programme at the annual meeting in 1999 to address management questions related to large whales off Greenland.

Gísli Víkingsson reported on a meeting of a working group under the IWC Scientific Committee, held in Barcelona in March 1999, to plan a multinational research programme on the effects of pollutants on cetaceans. A framework for a 5 year research project on harbour porpoises and bottlenosed dolphins in the North Atlantic was developed at the meeting. Although the long-term objective of the study is to assess the effects of pollutants at the population level, the research project focuses on the early links of the cause-effect relationships, in particular the relationship between contaminant levels in certain tissues as indicators of certain effects.

5.2 ICES

ICES has now completed its response to the NAMMCO request for advice on catch options for harp and hooded seals in the North Atlantic (SC/7/8) (Agenda 9.1 and 9.2).

The General Secretary informed the Committee that negotiations were continuing with ICES to develop a formal Memorandum of Understanding between NAMMCO and ICES.

Tore Haug informed the Committee about the new structure of ICES. Two new formal Working Groups had been established under the Living Resources Committee: the Working Group on Marine Mammal Population Dynamics and Trophic Interactions

and the Working Group on Marine Mammal Habitats. The work of these groups will be relevant to NAMMCO. The Secretariat will obtain reports from these working groups when they become available and provide them to the chairman.

Tore Haug also noted that some of the theme sessions at the ICES annual science conference would be of interest to the Scientific Committee; for example, a theme session on marine mammal telemetry. It was generally agreed that members attending such meetings should provide briefings to the Scientific Committee.

6. INCORPORATION OF THE USERS KNOWLEDGE IN THE DELIBERATIONS OF THE SCIENTIFIC COMMITTEE

At its 8th meeting in Oslo in September 1998, the Council recommended that the Scientific Committee should develop a strategy on how to incorporate the knowledge of marine mammal users in the advice provided by the Scientific Committee. Daniel Pike presented a briefing note detailing one option for moving forward on this issue to the Scientific Committee (SC/7/6).

The proposal was to integrate both scientific knowledge and the knowledge of hunters in the NAMMCO "Status of Marine Mammals in the North Atlantic" report (SC/7/7, Agenda 7.). This report will consist of stock status reports for each species in the North Atlantic. The stock status reports will contain most of the information that is important to user groups, such as stock definition, distribution, population estimates, population trend, harvest levels and suggested safe harvest level. The information will be presented in a non-technical format and distributed widely through the NAMMCO website and other means. It is likely that these reports will become very important to NAMMCO, as they will be definitive statements about the status and allowable harvests of stocks that will have a wide and public circulation.

For stocks for which there is considerable hunter knowledge, for example West Greenland Beluga, an assessment committee would be formed which would bring together scientists, knowledgeable hunters and managers. The committee would consider a draft stock status report prepared by the NAMMCO Secretariat with appropriate expertise. The objective of the committee would be to integrate all relevant knowledge in the report. Agreement and disagreement between hunter knowledge and scientific knowledge would be explicitly noted, and all statements would be clearly referenced.

The final stock status report produced by the committee would go to NAMMCO Council for approval. It would then be published widely through the internet and otherwise as appropriate.

An approach similar to this has been used in Canada, and an example of a stock status report produced in this way was reviewed by the Scientific Committee.

There was general agreement that this might be a viable approach in some cases. It was agreed that, if scientific and hunter knowledge did not coincide, they must both be

presented separately in the reports. In cases where scientific and hunter knowledge were in agreement, this should also be clearly noted. There should be no attempt to reach a ”compromise” between scientific and hunter knowledge. It would then be up to the NAMMCO Council to decide which knowledge base to use in their decision making process.

There was some discussion over what kinds of ”marine mammal users” should participate in this process. It was generally agreed that the limiting factor should not be the type of use, but the knowledge of the users. It should be clearly stated at the outset that NAMMCO is seeking relevant knowledge, not politically motivated opinions. With this in mind, it should be left to user organisations to choose participants for this process.

It was agreed that the Secretariat should further develop this proposal and carry out consultations with hunter organisations. The proposal should then be presented to the NAMMCO Council for approval.

7. UPDATE ON STATUS OF MARINE MAMMALS IN THE NORTH ATLANTIC

At its 5th meeting in 1997, the Scientific Committee agreed that the “List of Priority Species” should be replaced by a new document, entitled ”Status of Marine Mammals in the North Atlantic”. The new document would incorporate status information on all marine mammal species in the North Atlantic. The Scientific Committee also agreed that the document should be further developed by the Secretariat, using the current update of the “List of Priority Species” as a basis.

Since that time, little progress has been made on this document. The working draft is a slightly re-formatted version of the “List of Priority Species” document, with reports for other species, such as sperm whale, humpback whale, blue whale, fin whale, and sei whale, as yet uncompleted.

Daniel Pike presented a briefing note on plans for preparation, format and publication of stock status reports (SC/7/7). Stock status reports could be central to the function of NAMMCO as an organisation. They can be definitive statements about the current knowledge and management issues for each stock. They can be written in a non-technical format, and published widely through various means, such as the NAMMCO Web Site and NAMMCO Scientific Publications. The publication of such reports demonstrates that the organisation is operating in a transparent and defensible manner. The process of developing such reports can also be a means whereby NAMMCO can incorporate the knowledge of marine mammal users, as well as scientists, in defining stock status (See Agenda Item 6).

There was some discussion over whether reporting should be on species rather than stocks. For most species, there is not enough knowledge on stock delineation to warrant reporting by stock. However, information on stock delineation would certainly be presented, and reporting could be done on a stock by stock basis in some

cases. The proposed format was considered acceptable. It was agreed that the secretariat should proceed with the development of this report, with priority given to the eight species (minke whale, fin whale, walrus, pilot whale, bottlenose whale, beluga, narwhal, ringed seal) for which the Scientific Committee has generated advice. Reports for species/stocks could be published separately as they are completed.

8. ROLE OF MARINE MAMMALS IN THE MARINE ECOSYSTEM

8.1 Economic aspects of marine mammal-fishery interactions

At its 8th meeting in Oslo in September 1998 the Council recommended that the Scientific Committee should investigate the following economic aspects of marine mammal-fisheries interactions:

i) to identify the most important sources of uncertainty and gaps in knowledge with respect to the economic evaluation of harvesting marine mammals in different areas;

ii) to advise on research required to fill such gaps, both in terms of refinement of ecological and economic models, and collection of basic biological and economic data required as input for the models;

iii) to discuss specific cases where the present state of knowledge may allow quantification of the economic aspects of marine mammal-fisheries interactions;

   a) what could be the economic consequences of a total stop in harp seal exploitation, versus different levels of continued sustainable harvest?

   b) what could be the economic consequences of different levels of sustainable harvest vs. no exploitation of minke whales?

It was noted that the Working Group on the Economic Aspects of Marine Mammal - Fisheries Interactions could be reactivated to meet this request.

Points i) and ii) were considered to be a first step in fulfilling the request, and it was therefore decided to separate the request into two sections. Aqqalu Rosing-Asvid agreed to replace Gunnar Stefánsson as chairman of the Working Group, and to meet within a year to consider points i) and ii) of the request. Grete Hovelsrud-Broda informed the Scientific Committee that she had been in contact with some American researchers who had expressed interest in participating, and agreed to work with Aqqalu to identify relevant expertise for the Working Group. This Working Group is expected to meet before the Scientific Committee meeting in March 2000. The treatment of iii) will await the conclusions from the Working Group report on i) + ii).

8.2 Other matters

For the information of the Scientific Committee, some recent results from studies in this field were presented and are summarised below:

Food consumption of Barents Sea harp seals

The consumption of various prey species, required by the Barents Sea harp seal (*Phoca groenlandica*) stock in order to cover their energy demands, has been estimated by

combining data on the energy density of prey species and on seasonal variations in the energy expenditure and body condition of the seals (Nilssen et al. 1999). Data on diet composition and body condition were collected in the period 1990-1996 by sampling harp seals during different seasons, in various areas of the Barents Sea. All diet composition data were based on reconstructed prey biomass, and adjustments were made for differences in digestibility of crustaceans and fish. The number of seals representing different age and sex groups were calculated for the entire population, and the monthly food requirements were estimated.

In 1998, Russian aerial surveys revealed a total mean pup production of 301,000 for the Barents Sea stock of harp seals, which was estimated to comprise 2,22 million seals. After adjustments for a pup mortality of 30%, the total annual food consumption of the stock was estimated to be in the range of 3,35-5,05 million tonnes (depending on the choice of input parameters). In one case, the annual food consumption of the stock was estimated assuming that there are seasonal changes in basal metabolic rate associated with changes in body mass, and that the field metabolic rate of the seals corresponded to two times their predicted basal metabolic rate. If capelin (*Mallotus villosus*) was assumed to be abundant, the annual total consumption was estimated to be 3,35 million tonnes, of which 1,223,800 tonnes were crustaceans, 807,800 tonnes were capelin, 605,300 tonnes were polar cod (*Boreogadus saida*), 212,400 tonnes were herring (*Clupea harengus*), 100,500 tonnes were cod (*Gadus morhua*) and 404,200 tonnes were "other fish". A very low capelin stock in the Barents Sea (as it was in the period 1993-1996) led to switches in seal diet composition, with increased consumption of polar cod (from c. 16-18 % to c. 23-25 % of total consumption), other gadoids (dominated by cod, but also including haddock and saithe), herring, and "other fish". Using the same set of assumptions as in the previous estimate, the total consumption would have been 3,47 million tonnes, divided between various prey species as follows (in tonnes): polar cod 876,000, codfish (cod, saithe and haddock) 359,700, "other fish" 618,800, herring 392,500, and crustaceans 1,204,200. Overall, the largest quantities of food were estimated to be consumed in the period June-September.

Variation in minke whale diet in response to environmental changes in the Barents Sea

Substantial changes have occurred in the Barents Sea ecosystem over the past 30 years, the most conspicuous being related to the rises and falls of stocks of the two dominant pelagic shoaling fish species: capelin and herring. Thanks to extensive annual studies since 1992, the effects of these ecological changes on the diet and food consumption of one of the most important top predators in the system, the minke whale (*Balaenoptera acutorostrata*), can be assessed (Haug et al. 1999). Following a collapse in the capelin stock in 1992/1993, minke whales foraging in the northern Barents Sea apparently switched from a capelin-dominated diet to a diet almost completely comprised of krill (*Thysanoessa* sp.).

The southern region of the Barents Sea includes important nursery areas for the Norwegian spring-spawning herring. Good recruitment to this stock gives strong cohorts and large numbers of young, adolescent herring (0-3 years old), which serve as the main food for minke whales feeding in the area. Recruitment failure with

subsequent weak cohorts seems, however, to reduce the availability of adolescent herring to such an extent that minke whales switch to other prey items such as krill, gadoid fish and capelin.

Harbour seal diets in North Norway

Harbour seals (*Phoca vitulina*) are very numerous in Vesterålen, North Norway. Tore Haug informed the Scientific Committee about results from analyses of stomach contents and faeces collected in the area from 1990 - 1995. The harbour seals fed mainly on saithe (*Pollacius virens*). Little variation occurred in the diet throughout the year, probably due to large and stable abundance of saithe in the area. Other prey items that were important were herring, cod, sandeel (*Ammodytes sp*.) and various flatfishes. The harbour seals seemed to prefer small fish, and older seals had a more various diet than the young seals.

Grey seal diets in Faroese waters

The ecological role of grey seals (*Halichoerus grypus*) as predators in Faroese waters has been assessed in joint Faroese-Norwegian work, based on reconstruction of the diet composition from stomach contents obtained from animals taken for scientific purposes during summer in 1993-1995 (Mikkelsen and Haug 1999). Tore Haug informed the Scientific Committee about the results. Gadoids, sandeels and catfish (*Anarhichas lupus*) dominated the seal diet in all three years of sampling. Observed year-to-year variation in diets was generally due to shifts in relative importance among these three main prey groups. Also, some regional variations were found in the grey seal diet. Gadoids were most important in the Svínoy area, catfish and flatfish most important in the Sandoy area, and sandeels most important in the northwest area. Both the annual and regional variations in diet may reflect variations in the abundance and availability of potential prey. Grey seals of different ages were found to have somewhat different feeding habits. Juveniles fed most frequently on sandeels, pre-adults on sandeels and saithe, and adults on cod and catfish. Adults also fed on larger prey than the younger seals. The grey seals in Faroese waters were observed to feed only on fish, generally smaller than 30 cm in length, but the size differed among prey species.

9. MARINE MAMMAL STOCKS - STATUS AND ADVICE TO THE COUNCIL

9.1 and 9.2 Harp seals and hooded seals

Based on a request from NAMMCO in May 1995, the Joint ICES/NAFO Working Group on Harp and Hooded Seals met in 1997 to provide assessment advice on harp seals in the White Sea and Barents Sea, and harp and hooded seals in the Greenland Sea. The Working Group was, however, unable to deal with the entire request, and decided to meet again in Tromsø, Norway from 29 September to 2 October 1998 to complete the work. The terms of reference formulated by ICES Advisory Committee on Fisheries Management in response to this were:

a) to complete the assessment of stock size, distribution and pup production of harp seals in the White Sea/Barents Sea and hooded seals in the Greenland Sea;

b) to assess the sustainable yield at present stock sizes and provide catch options for these two stocks.

Harp seals

Stock identity, distribution and migrations

Results of studies of the stock identity of harp seals using DNA analysis support the view that there is a separation between western and eastern Atlantic groups.

Results from satellite tracking experiments have shown that adult female harp seals undertake feeding migrations out of the White Sea and westwards in the Barents Sea in the period between breeding and moult. The seals migrated northwest into the Barents Sea after moult. In July and August they dispersed along the southern edge of the pack-ice belt from 5°W in the Norwegian Sea to 87°E in the north-eastern Kara Sea, occasionally as far north as 82°N. While the seals spent much of their time in close association with the pack-ice, frequent foraging trips were made into open waters of the Barents Sea. In late autumn and early winter the seals moved south gradually with the expanding ice cover.

The Greenland Sea stock

Recent catches

Only Norway took catches of harp seals in the Greenland Sea pack ice in 1998. As in 1997, the total quota (13,100 animals one year of age and older, denoted 1+) could be taken as 1+ animals or as weaned pups, one 1+ animal considered equal to two pups. Only 1,884 animals (1,707 pups and 177 1+ animals) were taken. Between 1990-1998, less than 60% of the quota has been taken.

Abundance

No current estimate of pup production for this stock is available.. The estimated pup production in 1991 was 67,300 (95% C.I. 56,400–78,113).

The total population of harp seals in the Greenland Sea during 1998 was estimated using a model incorporating the 1991 estimate of pup production (Table 1). Natural mortality for adults (M_{1+}) was varied between 0.09 and 0.11, a range similar to that seen in other harp seal stocks, while natural mortality for pups (M_0) was estimated as three times that of adults ($M_0 = 3M_{1+}$).

	Numbers		
M_{1+}	0	1+	Total
0.09	97,000	456,000	549,000
0.1	85,000	416,000	501,000
0.11	79,000	379,000	458,000

Table 1: Estimated 1998 abundance of harp seals in the Greenland Sea using the 1991 pup production estimate of 67,300 and a range of adult mortalities (M_{1+}).

Catch options

Catch options for all stocks were developed using a model that calculates a constant exploitation rate that will stabilise the total population at or slightly below its current level. Once the population has stabilised, this exploitation rate then becomes equivalent to the replacement yield rate for population. Inputs to the model include estimates of pup production, catches, pup and adult mortality, maturity-at-age, and pregnancy rate. Biological parameters for this stock and other stocks were derived from the best available information.

Two options were calculated for each of the mean, upper and lower 95% CI estimates of 1,991 pup production. In the first, only 1+ animals are taken ($u_0 = 0$; i.e. no catch of pups) and in the second, only pups are harvested (i.e. $u_{1+} = 0$). In practice, of course, a combination of pups and 1+ animals will likely be harvested, and the catch options will have to be adjusted for a mixed harvest. Table 2 presents the catch options and projected stock sizes for 1999 and 2009, given a 1,991 pup production estimate ($N_{1991,0}$) of 67,000 with upper and lower 95% confidence limits of 78,000 and 56,000, respectively.

Catch options range from about 30,000 to 44,000 pups or 14,000 to 21,000 1+ animals in 1999. Estimates of pup abundance stabilise fairly quickly (approximately 15 years) while adult numbers continue to decline slowly for some time. Given this trend in abundance, lack of current data on reproductive rates and the lack of current pup production estimates for this stock, caution should be used when considering these catch options.

The White Sea and Barents Sea stock

Recent catches

The combined Russian and Norwegian catches in 1998 were 14,202 animals, of which 13,368 were pups. This is considerably lower than the 1989-1997 level, which ranged between 36,399-42,877. The total quotas during 1998 remained the same as during 1989-1997 (40,000 animals).

Abundance

Aerial surveys of White Sea harp seals were conducted in March 1998 as a co-operative effort between Russian and Canadian scientists. The Scientific Committee accepted an estimate of 301,000 (95% C.I. 243,000 to 359,000) pups. This estimate is likely to be conservative as no correction for reader error was applied.

The total population of harp seals in the White and Barents Sea during 1998 was estimated using a model incorporating the 1998 estimate of pup production (Table 3). Natural mortality for adults (M_{1+}) was varied between 0.09 and 0.11, a range similar to that seen in other harp seal stocks, while natural mortality for pups (M_0) was estimated as three times that of adults ($M_0 = 3M_{1+}$), and also as five times that of adults ($M_0 = 5M_{1+}$) due to concerns about the possibility that pup mortality rates can vary substantially in the White Sea region, and that in recent years, these rates have been very high.

M_{1+}	M_0	Numbers ('000)		
		0	1+	Total
0.09	0.27	301	2,980	2,281
0.1	0.30	301	1,922	2,223
	0.50	301	1,736	2,037
0.11	0.33	301	1,873	2,174

Table 3:. Estimated 1998 abundance of harp seals in the White Sea and Barents Sea based upon the 1998 pup production estimate of 301,000.

Catch options

The same modelling approach was used for this stock as for the Greenland Sea stock (see explanation above). Catch options are detailed in Table 4. Catch options range from about 96,000 to 142,000 pups or 50,000 to 72,000 1+ animals in 1999. Because of concerns that pup mortality may be greater than three times that of adults in some years, catch options were also derived under the assumption that pup mortality was five times that of adults, with results as outlined in Table 5. The option derived under this assumption is lower than the others, with catches of 76,000 pups or 32,000 1+ animals in 1999.

Given that historical estimates of abundance of this population are poorly documented, the 1998 pup production estimate is based on new methods for which no comparable data exists, and that no information on population trends is available, the Scientific Committee recommends that a conservative approach be adopted in establishing harvest quotas. The recent anecdotal evidence for high pup mortality rates would also provide support for a conservative approach.

Hooded seals

Stock identity, distribution and migrations

Results from satellite tracking experiments have shown that the seals remained within the Greenland and Norwegian Sea for the majority of the year. Several seals spent extended periods at sea west of the British Isles, or in the Norwegian Sea, between the breeding and moulting periods.

The Greenland Sea stock

Recent catches

Only Norway took catches of hooded seals in the Greenland pack ice in 1998 The total quota (5,000 1+ animals) was allowed to be taken as weaned pups with one adult equal to two pups. The catches totalled 6,351 animals, where 5,597 were pups and 754 were 1+ animals.

Abundance

Estimated abundance from a survey carried out in the Greenland Sea in March 1997 was 23,762 pups (95% C.I. 14,819 - 32,705). This should be considered a minimum estimate as it was not corrected for the temporal distribution of births or pups born outside of the whelping patches surveyed.

The 1998 population size of hooded seals in the Greenland Sea was estimated using the model incorporating the 1997 pup production estimate of 24,000 (Table 6). Natural mortality of adults (M_{1+}) was varied between 0.09 and .11, and pup mortality (M_{0}) was assumed to be three times that of adults ($3M_{1+}$).

M_{1+}	Numbers		
	0	1+	Total
0.09	26,700	113,500	140,200
0.1	26,300	109,100	135,400
0.11	26,100	105,700	131,800

Table 6: Estimated 1998 abundance of hooded seals in the Greenland Sea under different assumptions of 1+ mortality and a 1997 pup production estimate of 24,000. M_0 is assumed to be $3M_{1+}$.

Catch options

The same modelling approach was used for this stock as for the Greenland Sea harp seal stock (see explanation above). Catch options are detailed in Table 7 (see page 136**)**. Catch options range from about 11,000 to 25,000 pups or 7,000 to 15,000 1+ animals in 1999.

Harp seals and hooded seals: Future work

Co-ordination of joint feeding studies

At its 8th meeting in Oslo the Council recommended that Scientific Committee should co-ordinate joint feeding studies of harp and hooded seals in the Nordic seas and off West Greenland. Tore Haug noted that preparations to co-ordinate such studies between member countries were already under way, outside of the NAMMCO Scientific Committee. The Scientific Committee therefore emphasised its support for such joint studies and urged member countries to participate.

9.3 Harbour porpoise

9.3.1 Update on progress

Tore Haug informed the Scientific Committee that plans for the International Symposium on Harbour Porpoises in the North Atlantic were well underway. The Symposium will be held September 10 - 14 onboard the Hurtigruten enroute from Bergen to Tromsø. To date there are 24 contributions covering five theme areas: Distribution and Stock Identity, Biological Parameters, Ecology, Pollutants, and Abundance, Removals and Sustainability of Removals. The Symposium Planning Committee will report the findings of the Symposium to the Scientific Committee in 2000. The Committee will also act as an editorial board for a future volume of *NAMMCO Scientific Publications* assembling the contributions to the symposium. The Scientific Committee will develop its advice to the Council on the basis of the report from this symposium.

9.4 and 9.5 North Atlantic beluga and narwhal

In 1997 the Council of NAMMCO requested the Scientific Committee to "examine

the population status of narwhal and beluga (white whales) throughout the North Atlantic". Since the two species inhabit the same areas, and the development of status reports for both species would draw upon the same expertise, it was decided to deal with both species in one Working Group. Thus the Scientific Committee established a Working Group on the Population Status of Narwhal and Beluga in the North Atlantic, and decided to invite experts from Canada, Russia and other countries to contribute. The Working Group met at the Zoological Museum in Oslo during 1-3 March 1999 under the chairmanship of Øystein Wiig. The report from the Working Group is contained in Annex 1.

A considerable amount of new information on the population structure of narwhal and especially beluga has appeared during the last 5 years. A number of methods, including tooth morphology, satellite tracking, genetic studies of mtDNA and microsatellites, and studies of trace elements of both anthropogenic and natural origin, have contributed to the elucidation of a much more complex population substructure of beluga stocks than hitherto believed. A general picture of a seasonally strong philopatry to certain areas has emerged, and previous assumptions about the probable connections between nearby beluga occurrences have been challenged. On the basis of this new information, it seems necessary to redefine beluga stocks as smaller or larger herds that are seasonally present at restricted localities. The splitting of beluga stocks into smaller units has important management implications, in that a status of the North Atlantic beluga needs to be developed on the basis of beluga aggregations that are seasonally but regularly present at specific fjords, coast lines, promontories or estuaries. Well-known aggregations were listed by the working group, and basic information on stock-identity, population size, level of exploitation, other potential threats and present status was given when available (Annex 1, Table 1).

For narwhal, much less information was available, but the limited studies of population structure suggested a level of philopatry similar to that evident for beluga. Therefore, water bodies with known aggregations of narwhal were listed for the entire North Atlantic and the same basic information as for beluga was included (Annex 1, Table 2).

Status for beluga aggregations in the North Atlantic

Russia.

Since the late 1980's, beluga have only occasionally been harvested in Russia, and this is unlikely to have had any effect on the stocks. Potential threats include ice breaking, boat traffic and pollution, but none of these are known to pose a threat to the beluga in the Russian part of the North Atlantic at present. However, although no accurate information on beluga population structure and abundance in Russian Atlantic waters is available, all available evidence suggests that the total abundance of beluga is lower than in the western part of the North Atlantic. Small population size may potentially make the beluga from western Russia vulnerable to perturbations of their habitats.

Svalbard and Norwegian coast.

In Svalbard, beluga have not been harvested since 1961, but from 1945-1960, 3,281

beluga were caught. The stock has apparently not completely recovered from the exploitation, although they are regularly observed, especially during the summer. However, no estimates of abundance exist, and the population structure and potential connection to other beluga aggregations remain unknown. Disturbance from ship traffic and oil spills are potential threats.

In Finnmark in the northern part of Norway, beluga are regularly seen during spring and summer, and conflicts with the local fishery have been reported.

East Greenland.
Beluga are occasionally killed in East Greenland, but nothing is known about the stock relationships of these whales. It is likely that they are animals from other concentration areas, perhaps Svalbard or West Greenland, at the outer limits of their normal distribution.

West Greenland.
The aggregation of beluga that occurred from October through June in South Greenland (Qaqortoq to Maniitsoq) apparently disappeared after a period with intensive hunting that ended in the late 1920s. The aggregation may have consisted of more than one stock.

Southwest Greenland (Maniitsoq to Disko) is probably a wintering ground for beluga from two or more summering grounds. Present harvests levels are more than 400/yr. A series of surveys conducted since 1982 indicate a decline of more than 60% in abundance in this area. A preliminary estimate of population size from a survey conducted in 1998 suggest that 6,722 (95% CI 3,562-12,688) beluga winter in the area. Although the stock identity of this aggregation needs to be resolved, the aggregation is likely declining due to overexploitation.

Northwest Greenland (Avanersuaq and Upernavik) is primarily an area where beluga migrate through on their way to wintering grounds in Southwest Greenland or summering grounds in Canada. The present harvest is more than 100/yr. Since this beluga occurrence must be considered part of those wintering in Southwest Greenland, it is considered to be declining due to overexploitation.

North Water
This is clearly a wintering ground for a large proportion of the beluga that spend their summer in the Canadian High Arctic. Despite several attempts, no realistic estimates of total abundance have been made in this area. Present harvesting in Canada and Greenland is low (<50/yr) and is considered sustainable.

Canadian High Arctic
This is probably a summer aggregation of beluga that winters both in the North Water and in West Greenland. It was estimated in 1996 to number 28,499 whales (95%CI 13,886-58,491). Canadian harvest is low (<50/yr), however a proportion of these beluga are harvested in Greenland during the fall, winter and spring (see above), and this portion of the aggregation may be threatened by overexploitation.

Southeast Baffin Island
Several stocks exist in this area and all are harvested at low rates (<50/yr). There is evidence that the Pangnirtung aggregation has declined due to past overexploitation. The present population is small and at continuing risk of overexploitation. Nothing is known about the size or status of the other aggregations in this area

Saint Lawrence River
This is a small, isolated population that has been depleted by past over-harvesting. However, it is not presently harvested and is known to be increasing in number. Potential threats to the stock include pollution and harassment.

Hudson Strait
The summer occurrence of beluga in Ungava Bay was essentially extirpated by past overexploitation. It is uncertain if the area is being recolonized by beluga from other areas. Hudson Strait is a seasonal migration route to and from summer aggregation areas in Hudson Bay and Foxe Basin. Present harvest levels are 150-200/yr, but the stock origin of the take is uncertain, as several stocks may mix in the area.

Hudson Bay
Several summering aggregations of beluga exist in Hudson Bay: north Hudson Bay, east Hudson Bay, Belcher Islands, west Hudson Bay, south Hudson Bay, Foxe Basin and James Bay. Of these, at least the beluga harvested at Belcher Islands, west Hudson Bay and east Hudson Bay can be distinguished from one another and the other stocks. Except for James Bay, exploitation at variable levels takes place in all areas. Exploitation may potentially pose a conservation problem in east Hudson Bay, where the stock size estimates are low compared to the exploitation level. For James Bay and west Hudson Bay, stock size is large and the aggregations are probably not threatened by harvesting. For north and south Hudson Bay, and the Belcher Islands populations are harvested but the status is not known and these aggregations have not been reliably enumerated.

Status for narwhal aggregations in the North Atlantic
Russia and Svalbard.
No sizeable concentrations of narwhal could be identified in the eastern North Atlantic, including Russian Arctic waters, the Polar Basin and the Greenland Sea. Little if any harvesting is conducted in this area. No potential threats to narwhal in this area could be identified.

East Greenland.
In summer, narwhal can be found in low numbers all along the east coast of Greenland. However, harvesting takes place only at a few coastal localities in the vicinity of Ittoqqortormiut (Scoresby Sund), Kangerlussuaq and Ammassalik. The narwhal that are found in East Greenland are genetically distinct from narwhal found in West Greenland, but no other information on stock delineation is available. The relatively small catches in East Greenland are assumed to be taken from a larger stock of narwhal wintering in the Greenland Sea. Considering the large area from which the whales are recruited relative to the restricted areas where hunting is conducted,

present harvesting probably does not pose an immediate threat to the stock. The catch statistics are, however, incomplete and no reliable abundance estimates are available.

West Greenland.
Narwhal are harvested in four main areas in West Greenland; Avanersuaq, Melville Bay-Upernavik, Uummannaq and Disko Bay. Narwhal from the first three areas are genetically distinct from one another, whereas Disko Bay seems to be an area where different stocks mix during the winter. This is also suggested by satellite tracking of whales from Eclipse Sound in Canada and Melville Bay.

Catch statistics from Avanersuaq are incomplete, but for 1993-95, a mean of 144/yr was taken. In some years, however, the low reported catch cannot account for the volume of narwhal products that are traded from this area. An abundance estimate of 3,539 narwhal in the Avanersuaq area in 1986 (which is not corrected for diving whales), suggests that an exploitation level of 150/yr is sustainable, assuming that the same whales are not harvested in other areas.

The Melville Bay-Upernavik summering stock is believed to be small, although no surveys have been conducted. If reliable, the catch statistics indicate a relatively low level of exploitation in Upernavik. Some of the catches are taken from the ice edge and consist of migratory whales that may not be summering in this area. No status could be given.

Judging from the catches, the occurrence of narwhal in the Uummannaq area in November fluctuates widely. In some years substantial catches (several hundreds) are taken, which alone or in conjunction with catches from the same stock in other areas do cause concern for the status of this aggregation. The abundance of narwhal in this area should be estimated.

Since winter catches in Disko Bay consist of animals taken from several summering stocks, no status can be assigned for Disko Bay alone. Also, although the number of narwhal in Disko Bay varies seasonally, there is a minimum estimate of 5,210 in 1998 from a survey that did not cover the complete range of narwhal in the area. This indicates that present catches are probably sustainable.

Canada.
Satellite tracking of whales from Eclipse Sound showed no exchange with narwhal on other summering grounds. Assuming this stock is supplying most of the harvest in the Eclipse Sound area, as well as in some settlements along Baffin Island, the population estimate of less than 1,000 (uncorrected for submerged narwhal) cannot sustain the catches. However, many of the narwhal taken here are hunted in the spring during migration, when catches probably consist of a mixture of stocks. Also, the narwhal stock in this area has sustained present catches for several decades, with no apparent sign of depletion.

Harvesting in Admiralty Inlet, Prince Regent Inlet and Peel Sound is likely sustainable given the population estimates from 1984 of 5,556, 9,754 and 1,701 whales

(uncorrected for submerged narwhal), respectively. Again, whales from these summering aggregations are likely harvested in other areas during migration, so it is presently impossible to assign harvest levels to particular aggregations.

When combining all summering stocks in the Canadian High Arctic, the most recent total population estimate is 14,240 narwhal (95% CI 6,658-30,931), which is on the edge of what can sustain the combined Canadian and Greenlandic catches of more than a thousand narwhal. However, this estimate is a minimum as the survey did not cover the complete range of narwhal in the area and was uncorrected for diving animals. All evidence suggests, however, that assessment of status should be given on a stock basis, which will not be possible until more information on stock delineation is elucidated.

An uncorrected 1979 estimate of the number of narwhal wintering in the pack ice in the Baffin Bay is 34,363 narwhal (SE 8,282), but again status should be assigned after examining the population structure of these whales.

Northern Hudson Bay is a summering ground for low numbers of narwhal (1984 estimate with partial coverage of 1,355 whales), but harvesting is also low and could be sustained by the numbers observed. Again, the stock discreteness of these whales is unknown, but their distribution is quite distinct from that of other narwhal aggregations in Canada.

Conclusion

Within the North Atlantic, beluga and narwhal are harvested only in Canada and Greenland, with the largest catches taken in Greenland. Recent studies of population structure suggest strong philopatry, which implies that stock status should be assigned for local aggregations of whales.

- The present harvest level of beluga in West Greenland is a concern because the estimate of stock size is small relative to the high and incompletely reported catch levels, and a decline in relative abundance has been detected. Continued monitoring of population trend and more information on stock structure in the area are needed. With the observed decline, a reduction in harvesting seems necessary to halt or reverse the trend.
- Some beluga stocks in Canada are small and therefore at risk of being overexploited. This applies especially for Pangnirtung, Ungava Bay and Eastern Hudson Bay. Monitoring of population trend as well as no increase in harvesting is recommended.
- Less is known about the population structure of narwhal, and for some smaller aggregations (e.g. Peel Sound and Eclipse Sound), exploitation in other areas (e.g. Disko Bay and Uummannaq) may pose a threat. For most aggregations, no accurate population estimates are available, and enumeration of narwhal is needed before a status can be assigned (e.g. Avanersuaq and Uummannaq).
- For both narwhal and beluga it is mandatory for future management that more reliable catch statistics (including loss rates) are collected from Canada and Greenland.

9.6 Fin whales

In 1998, the Management Committee of NAMMCO asked the Scientific Committee to "...undertake an assessment of the status of fin whales in the North Atlantic based on all available data". The NAMMCO Council later refined the request as follows:
"Acknowledging the large amount of work involved in such a comprehensive assessment of all possible fin whale stocks in the North Atlantic, the Council requests the Scientific Committee, when conducting such comprehensive assessment, particularly to

i) assess the stock structure of fin whales in the whole North Atlantic.
ii) assess the long-term effects of annual removal of 50, 100 and 200 fin whales in the stock area traditionally assumed to have a main concentration off East Greenland and Iceland (EGI stock area),
iii) identify MSY exploitation levels for that stock area."

In preparation for the assessment, a working group was established, in December 1998, to review the available information and determine computations to be carried out before the meeting. The WG worked first by correspondence, then met in April 1999. A report from that meeting is contained in Annex 2.

Stock structure

It appears that fin whales in the North Atlantic may be divided into a number of stocks, with limited gene flow between adjacent stocks. Whales sampled at locations in the North Atlantic are different from those sampled in the Mediterranean Sea. There is some indication that the western North Atlantic and Iceland areas both have populations different from those found off the coasts of Spain and north Norway. Furthermore, there are indications of a difference between Iceland and the Canadian east coast. Genetic studies also indicate heterogeneity within the EGI Stock Area. Historical harvest and depletion patterns as well as marking studies suggest site fidelity within EGI area. A similar pattern of site fidelity has also been observed in the western North Atlantic. More information on population structure is needed before firm conclusions can be reached on stock delineation.

Assessment in the EGI stock area

Population trajectories incorporating past catch series were conducted to hit the recent abundance estimates, and projected with catch levels of 0, 50, 100 and 200 whales per year until the year 2020 using the HITTER technique.

The Scientific Committee chose a conservative value of MSYR of 2% for assessing the effects of future catches. In summary, a short to medium term (next 10 years) catch of up to 200 fin whales per year is unlikely to bring the population down below 70% of its pre-exploitation level under the least optimistic scenarios. Even with an unrealistically low MSYR of 1%, a catch of 200 whales leaves the population in 2020 at a level above the level in 1990. However, catches at this level should be spread throughout the EGI stock area. It was suggested that an appropriate way of doing this would be to spread the catches roughly in proportion to the abundance of fin whales observed in NASS surveys. Thus, based on an average for the two past surveys, an appropriate catch distribution across Blocks A, B and C+D (see Annex 2, Figure 1)

could be in the neighbourhood of the ratios 15%:55%:30%. It was also suggested that no catches should be taken in the immediate vicinity of shore-based whaling stations, to avoid localised depletions. In addition, catches should be spread over time within the season to safeguard against depletion of aggregations.

In the longer term (10-50 yrs), with a view towards optimal utilisation of this resource, continued monitoring of trends in abundance at regular intervals will be essential to ensure that harvest is sustainable. It is also important that research be continued to improve understanding of stock structure and dynamics (see Research Recommendations below).

The Scientific Committee agreed that determination of MSY and MSYR levels for fin whales and other whale stocks does not seem possible given the present knowledge about the dynamics of whale populations .

Future assessments could seek to determine sustainable harvest levels under predetermined management objectives. Such objectives may include target stock size and trend, or minimisation of risks associated with different harvesting strategies.

Recommendations for future research

i) Abundance estimates

Regular abundance surveys are essential for monitoring the trend in the stocks. This will be particularly important should harvesting resume. The heavier the level of exploitation, the more frequently surveys should be conducted. For exploitation levels of the order being considered here, sightings surveys conducted at intervals of about 5 years were considered a satisfactory method of obtaining abundance estimates and their trends.

ii) Stock structure

The Scientific Committee accepted the conclusion of the WG that stock delineation is the most critical issue in fin whale assessment at this time. While it is evident that the stock structure of fin whales is more complex than reflected by the present stock areas, the details of the stock structure are not clear. Several approaches to resolving this problem were identified: genetic analyses of existing samples and of samples collected over a broader area, involving additional microsatellite loci and statistical analyses to determine if there are natural genetic groupings; mark-recapture studies using genetic marks or other techniques; stock delineation studies using pollutant or isotopic signatures; and telemetry to provide immediate and unequivocal answers to questions on distribution, migration, and activity patterns.

iii) Population model incorporating immigration

A population model incorporating the history of local depletions and their apparent recovery, with immigration options from other groups, could be developed to generate testable hypotheses about the population dynamics of fin whales in this area.

9.7 Minke whales

At its 8th meeting in Oslo, the Council recommended that the Scientific Committee

should investigate the possibility of supplementing present sampling with existing older material from NAMMCO countries and other countries in joint genetic analyses. It was noted that such exchanges of samples are ongoing between Norway and Greenland. Samples collected in the past from Iceland and Norway have already been analysed concurrently, and there are no recent samples from Iceland. The Scientific Committee concluded that available samples are being utilised effectively.

9.8 White-beaked and white-sided dolphins

At its 8th meeting in Oslo, the Council recommended that the Scientific Committee should undertake an assessment of distribution, stock identity, abundance and ecological interactions of white-beaked and white-sided dolphins in the North Atlantic area.

The Scientific Committee noted that the IWC Scientific Committee had dealt with these species in 1996. Generally, it was considered that there is insufficient information on stock structure, abundance and feeding ecology to carry out a meaningful assessment of these species at this time. Some new information on abundance may become available from the NASS-95 survey, but these data have not yet been analysed. The Scientific Committee agreed to begin compiling available information on these species in member countries, with the objective of identifying knowledge gaps and creating a basis for assessment in the longer term.

10. FUTURE NORTH ATLANTIC SIGHTINGS SURVEYS

Gísli Víkingsson informed the Scientific Committee that Iceland plans to carry out abundance surveys in their waters at regular intervals, with the next survey tentatively planned to take place in 2000. He noted that both the Fin Whale Working Group and the Working Group on Abundance Estimates in their assessment of minke whales, had recommended that synoptic abundance surveys be carried out at regular intervals. He suggested that it would be most productive if all member countries and other neighbouring countries would co-ordinate their efforts to gain a broader coverage of the North Atlantic.

The Scientific Committee agreed to assign this task to the Working Group on Abundance Estimates. While it was considered unlikely that synoptic coverage similar to the NASS 95 survey could be achieved in 2000, this WG would be tasked with co-ordinating efforts to the extent possible, and with seeking funding to broaden the surveys. Gísli Víkingsson also noted that the Icelandic surveys could be rescheduled if this would facilitate a broader coverage in the survey.

11. DATA AND ADMINISTRATION

Daniel Pike briefed the Scientific Committee on the catch databases that presently exist in the Secretariat. There are also procedures for regular submission of catch data by member countries, however these have not been consistently followed.

The Scientific Committee noted that the use of catch data generally required a very

detailed level of knowledge of accuracy, precision, catch composition, exact location of catch etc, which was not achievable in a simple database such as the ones held at the Secretariat. For scientific/assessment purposes, detailed catch data would have to be compiled on a case-by-case basis by national research institutes. It was therefore concluded that the catch database at NAMMCO is of little use to the Scientific Committee. However, it was noted that it may be of use to the Secretariat for other purposes.

12. PUBLICATIONS

The Scientific Committee noted with satisfaction that the first volume of NAMMCO Scientific Publications, *Ringed Seals in the North Atlantic*, was now published and being widely distributed by the Secretariat. Comment on the volume had been quite positive, and the Scientific Committee looked forward to the publication future volumes on different topics in the near future.

The following volumes of NAMMCO Scientific Publications are presently in progress:

Marine Mammals in the Ecosystem
Co-editor Gísli Víkingsson informed the Scientific Committee that 12 contributions are in various stages of preparation for this volume. All should be in to the Secretariat for final editing by June 1999. It is hoped to have this volume published in 1999.

Sealworm Infections
Co-editor Geneviève Desportes informed the Scientific Committee that there were 9 confirmed and 3 potential contributions for this volume. The deadline for contribution of papers is April 30, 1999. However, these papers will require peer review, so the volume will not be ready for publication until sometime in 2000.

NASS 95
Co-editor Nils Øien noted that a volume on the results of this survey would be highly desirable, however preparations may take some time as data analysis for some species is still at an early stage.

Harbour Porpoises in the North Atlantic
Tore Haug informed the Scientific Committee that the Symposium Steering Committee believed that the contributions to the symposium would make an excellent volume of NAMMCO Scientific Publications, and recommended that the Scientific Committee approve its publication. The Scientific Committee agreed to do so. The Symposium Steering Committee will act as an editorial board for the volume, which they hope to publish sometime in 2000.

Population Status of Narwhal and Beluga in the North Atlantic
Mads Peter Heide-Jørgensen noted that the contributions to this WG, along with other potential contributions, would make an informative volume of NAMMCO Scientific Publications, and recommended that the Scientific Committee approve its publication,

which they did. Mads Peter Heide-Jørgensen and Øystein Wiig will act as editors, and the volume should be published in 2000 or 2001.

13. BUDGET

Daniel Pike circulated an expenditure report for the Scientific Committee budget of 350 K, which showed that remaining funds should be sufficient to cover projected expenditures for 1999.

14. FUTURE WORK PLANS

14.1 Scientific Committee

Dorete Bloch invited the Scientific Committee to meet in the Faroe Islands in 2000. The meeting will be held in late February-early March.

14.2 Working groups

It was generally agreed that the practice of holding working group meetings outside of the regular meeting was preferable and should be continued. There was also discussion of the role of the Working Group on Management Procedures, which was originally intended to deal with management procedures in a generalised sense, but had carried out an assessment of minke whales in 1998. There was general agreement that this Working Group should be left to its original purpose, and that stock assessments should be carried out by species-specific working groups.

Working Group on the Economic Aspects of Marine Mammal-Fishery Interactions
See 8.1.

Working Group on North Atlantic Fin Whales
This Working Group will remain dormant, awaiting future requests for advice.

Working Group on the Population Status of Narwhal and Beluga in the North Atlantic
This Working Group will remain dormant, awaiting future requests for advice.

Working Group on Abundance Estimates
See 10.

Harbour Porpoise Symposium Steering Committee
This committee is functioning as a working group, and will provide a report on the results of the Symposium to the Scientific Committee in 2000.

14. ELECTION OF OFFICERS

Dorete Bloch resigned as Vice Chairman, and was replaced by Gísli Víkingson. Mads Peter Heide-Jørgensen was confirmed as chairman for another year.

15. ANY OTHER BUSINESS

On behalf of the Committee, the Chairman thanked the Greenland Institute of Natural Resources for their hospitality and the excellent facilities they provided, and the Secretariat for their assistance with practical arrangements, reporting and contributions to the meeting.

The Committee members and the Secretariat thanked the Chairman for efficiently leading the Committee through its agenda.

16. ADOPTION OF REPORT

The report was adopted on April 15, 1999 at 16:30.

18. REFERENCES

Haug, T., Lindstrøm, U. and Nilssen, K.T. 1999. Variation in minke whale Balaenoptera acutorostrata diets in response to environmental changes in the Barents Sea. Int. Whal. Commn SC / 51 / E7: 13 pp.

Mikkelsen, B. and Haug, T. 1999. Summer diet of grey seals in Faroese waters. ICES Working Group on Marine Mammal Population Dynamics and Trophic Interactions, ICES Headquarters, Copenhagen, Denmark 12-15 March 1999. Working Paper 3: 19 pp.

Nilssen, K.T., Pedersen, O.P., Folkow, L.P. and Haug, T. 1999. Food consumption estimates of Barents Sea harp seals. *NAMMCO Sci. Publ*. 2: in press

Appendix 1

LIST OF PARTICIPANTS

COMMITTEE MEMBERS:

Faroe Islands
Dr Dorete Bloch (Vice-Chairman)
Dr Geneviève Desportes

Greenland
Dr Mads Peter Heide-Jørgensen (Chairman)
Mr Aqqalu Rosing-Asvid
Dr Lars Witting

Iceland
Mr Þorvaldur Gunnlaugsson
Mr Gísli A. Víkingsson

Norway
Dr Tore Haug
Dr Nils Øien

NAMMCO SECRETARIAT

Dr Grete Hovelsrud-Broda
Mr Daniel Pike
Ms Tine Richardson

OBSERVERS

Ms Amalie Jessen (Greenland)
Dr Arild Landa (Greenland)
Ms Ivalo Egede (Greenland)

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. Co-operation with other organisations
6. Incorporation of the users knowledge in the deliberations of the Scientific Committee
7. Update on Status of Marine Mammals in the North Atlantic
8. Role of marine mammals in the marine ecosystem
   - 8.1 Economic aspects of marine mammal-fishery interactions
   - 8.2 Other matters
9. Marine mammal stocks -status and advice to the Council
   - 9.1 Harp seals
     - 9.1.1 Update on progress
     - 9.1.2 Future work
   - 9.2 Hooded seals
     - 9.2.1 Update on progress
     - 9.2.2 Future work
   - 9.3 Harbour porpoise
     - 9.3.1 Update on progress
     - 9.3.2 Future work
   - 9.4 Narwhal
     - 9.4.1 Update on progress
     - 9.4.2 Future work
   - 9.5 Beluga
     - 9.5.1 Update on progress
     - 9.5.2 Future work
   - 9.6 Fin whales
     - 9.6.1 Update on progress
     - 9.6.2 Future work
   - 9.7 Minke whales
     - 9.7.1 Update on progress
     - 9.7.2 Future work
   - 9.8 White-beaked and white-sided dolphins
     - 9.8.1 Update on progress
     - 9.8.2 Future work
10. Future North Atlantic Sightings Surveys
11. Data and administration
12. Publications
    - 12.1 The role of marine mammals in the North Atlantic ecosystem
    - 12.2 Other publications

13. Budget
14. Future work plans
    - 14.1 Scientific Committee
    - 14.2 Working groups
    - 14.3 Other matters
15. Election of Officers
16. Any other business
17. Adoption of Report

Appendix 3 - **LIST OF DOCUMENTS**

SC/7/1	List of Participants
SC/7/2	Provisional Annotated Agenda
SC/7/3	List of Documents and Working Papers
SC/7/NPR-F	National Progress Report – Faroe Islands
SC/7/NPR-G	National Progress Report – Greenland
SC/7/NPR-I	National Progress Report – Iceland
SC/7/NPR-N	National Progress Report – Norway
SC/7/4	Scientific Committee Working Group On The Population Status Of Belugas And Narwhals In The North Atlantic – Report.
SC/7/5	NAMMCO Scientific Committee Working Group on North Atlantic Fin Whales – Report.
SC/7/6	Briefing Note – Incorporation Of The Knowledge Of Marine Mammal Users In The Deliberations Of The Scientific Committee.
SC/7/7	Briefing Note – Update on the *Status of Marine Mammals in the North Atlantic* Report.
SC/7/8	Report of the Joint ICES/NAFO Working Group on Harp and Hooded Seals.

ANNEX 1

REPORT OF THE NAMMCO SCIENTIFIC COMMITTEE WORKING GROUP ON THE POPULATION STATUS OF BELUGA AND NARWHAL IN THE NORTH ATLANTIC

The Working Group on the Population Status of Beluga and Narwhal in the North Atlantic met at the Zoological Museum in Oslo from 1 to 3 March 1999. The participants in the Working Group are listed in Appendix 1.

At its 7th meeting in May 1997, the Council of the North Atlantic Marine Mammal Commission requested its Scientific Committee to "examine the population status of narwhal and beluga (white whales) throughout the North Atlantic." The Working Group convened to address this request.

1. OPENING REMARKS

Chairman Øystein Wiig and NAMMCO General Secretary Grete Hovelsrud-Broda welcomed the participants to the Working Group meeting.

2. ADOPTION OF AGENDA

The agenda was adopted without changes (Appendix 2). The Chairman instructed participants to focus their presentations on the particular agenda item being considered.

A draft tabular format for summarising stock information was adopted by the group.

3. APPOINTMENT OF RAPPORTEUR

Daniel Pike, Scientific Secretary of NAMMCO, was appointed Rapporteur.

4. REVIEW OF AVAILABLE DOCUMENTS AND REPORTS

A revised document list was reviewed by the Chairman. Each document was related to its relevant Agenda items (Appendix 3)

5. DISTRIBUTION, MIGRATIONS AND STOCK IDENTITY OF BELUGA

Locations referred to in this report are shown in Figure 1.

5.1 Russia

SC/7/BN/6 and SC/7/BN/7 summarised the known distribution and migrations of beluga across the Russian Arctic, based on observations from Aerial Reconnaissance of Sea Ice (ARSI), and other data sources.

Two main groups of beluga inhabit the Russian Arctic:

- The Karskaya group inhabits the western and central portions of the Russian Arctic, including the Barents, White, Kara and Laptev Seas. Beluga apparently winter in the Barents Sea, and migrate to areas farther east in the spring and summer. Most beluga leave the central Russian Arctic seas by October and return to the Barents Sea. However, some may winter in the White Sea and in the Kara Sea off Novaya Zemlya and Severnaya Zemlya. Beluga also inhabit the central Arctic Basin during the summer, both in the areas of the continental shelf and the deep sea.
- The Bering Sea group winters in the Bering Sea. A portion of these beluga move into the Chukchi Sea by late June, but few animals occupy the area in the summer. In August-September beluga occupy the northern part of the Chukchi Sea north of Wrangel Island. By October, these beluga begin to move south towards their wintering area in the Bering Sea.

These groups have a disjunct distribution, with few beluga occupying the eastern Laptev and East Siberian Seas, which are areas with very heavy ice conditions. However, in years with light ice conditions, exchange between the groups would be possible.

SC/7/BN/13 and SC/7/BN/20 gave more information on the beluga inhabiting the White Sea. White Sea beluga cannot be distinguished from those of other areas by morphometrics. However, SC/7/BN/13 described 5 summer aggregations of beluga, which are apparently stable for the entire summer. Each of these aggregations may number in the low hundreds. These aggregations are composed mainly of females and calves, with few adult males. Some beluga also overwinter in the White Sea in recurring polynias, but most winter in the Barents Sea.

5.2 Svalbard-Barents Sea

Beluga are found throughout most of the archipelago in the summer. They are, however, most frequently observed in the fjords on the west coast of Spitsbergen. SC/7/BN/24 described the summer movements of some beluga around Svalbard, based on satellite telemetry. Beluga occupied the southern and southeastern parts of the archipelago. The whales stayed close to shore, and tended to congregate near glacier fronts. No long-term trackings were available and the relationship of Svalbard beluga to other stocks is not known. However, their distribution overlaps the winter distribution of the Karskaya group (see 5.1), so exchange is certainly possible.

5.3 East Greenland

No working papers describe the distribution of beluga in East Greenland, however, reference was made to Dietz et al. (1994) that describes beluga as being rare in East Greenland, with only occasional catches per decade.

5.4 West Greenland

The distribution of beluga in West Greenland was described in SC/7/BN/10 and SC/7/BN/12, and in Heide-Jørgensen (1994). Beluga occur from Qaanaaq in the north

to Paamiut in the south in the fall, winter and spring. During the summer, there are no beluga in W Greenland except for a few stragglers in Qaanaaq.

Beluga migrate southwards down the W Greenland coast beginning in September (Qaanaaq), passing through Upernavik in October. They reach their known overwintering area between Disko Bay and Nuuk by December, and begin their northward migration from Disko Bay in May. They are thought to summer in Canadian High Arctic. However, of the 20 beluga outfitted with satellite transmitters in the Canadian High Arctic that lasted into October, only 1 has travelled to W Greenland (SC/7/BN/5). The rest remained in the North Water until contact was lost in late October and November. The application of satellite tags has been biased towards those that inhabit certain estuaries, so the portion that migrates to W Greenland may be under-represented.

There are at least two stocks of beluga hunted in W. Greenland, based on tooth morphology (SC/7/BN/12), genetic information (SC/7/BN/12), and concentrations of trace contaminants (SC/7/BN/14). One stock migrates past the Upernavik region in October, while the other is caught later in the fall between Disko and Sisimiut.

5.5 Canada

SC/7/BN/4 presented a description of the stock structure of beluga in Canadian and adjacent waters, based on genetic analyses using both mitochondrial and nuclear DNA. Mitochondrial DNA (mtDNA) is inherited only maternally, while microsatellite nuclear DNA is inherited from both parents. Results from the mtDNA analyses indicated that the Canadian Arctic was recolonized after the last ice age by at least two founding groups. The St. Lawrence and Eastern Hudson Bay beluga were founded by one group, while other Canadian stocks were founded by one or more other groups.

A combination of mtDNA and microsatellite DNA analyses can detect differences in samples from many locations in the Canadian Arctic. In general, it appears that there are many more genetic populations than previously thought. This is apparent for the southeast Baffin Island area, once believed to hold one common stock of beluga. These analyses demonstrate that the communities of Pangnirtung, Iqaluit and Kimmirut are probably hunting separate stocks. Similarly, beluga hunted by Sanikiluaq in the Belcher Islands are different from beluga taken on the eastern Hudson Bay coast. Beluga harvested in W Greenland are similar to beluga harvested at some locations in the Canadian High Arctic.

SC/7/BN/14 and SC/7/BN/16 presented analyses of stock structure in Canadian and adjacent waters, based on concentrations of $\geq$49 organochlorine contaminants. At all locations, samples were found to have distinct organochlorine “signatures”, which are related to their diet and hence the range of the beluga stock. These results confirm those of the genetic analyses for southeast Baffin Island and eastern Hudson Bay. They also demonstrate a difference between beluga, landed at Grise Fjord in the Canadian High Arctic, and West Greenland beluga. In addition, they confirm the

difference between West Greenland beluga landed at Upernavik, and those taken further south in Greenland.

SC/7/BN/5 reported the results of satellite tagging experiments conducted in Canada. Tagging has been conducted in the Canadian High Arctic, the Beaufort Sea, western Hudson Bay, Eastern Hudson Bay and Cumberland Sound with results as outlined below:

Baffin Bay and adjacent waters
A total of 27 beluga have been outfitted with satellite transmitters since 1995, both in the estuaries on Somerset Island and during the fall migration past southern Devon Island. During the summer, beluga are found in Prince Regent Inlet, Lancaster Sound, Barrow Strait and Peel Sound. In the fall, beluga migrate east out of Lancaster Sound and north to the waters of E Devon Island and into Jones Sound. Most remained in this area at least until October-November when the tags stopped functioning. One beluga migrated down the W Greenland coast as far south as the latitude of Disko Island before the tag ceased functioning. These results appear to indicate that the major part of the beluga summering in the Canadian High Arctic winter in the North water, while a small proportion migrate to W Greenland. However, it is recognised that tag application is biased and that some stocks are over-represented and others under-represented.

Pangnirtung
A total of 7 beluga were outfitted with satellite tags in 1998. All remained in Cumberland Sound, extending their movements farther SE as the fall progressed. None had left Cumberland Sound before the tags ceased functioning in mid-November.

Western Hudson Bay
A total of 9 beluga were outfitted with satellite tags near Churchill in western Hudson Bay. They remained relatively close to the tagging area and within the area surveyed in 1987. None had left the area by the time the tags ceased functioning in September.

Eastern Hudson Bay
The movements of Eastern Hudson Bay beluga were outlined in SC/7/BN/5 and SC/7/BN/28. Five beluga were outfitted with satellite tags in estuaries, and one was outfitted with a tag later in the fall and further to the north. Beluga remained relatively close to the tagging area in the summer, but did not go to the Belcher Islands. The one beluga tagged in the fall migrated into Hudson Strait. These limited results are in agreement with other evidence (see 5.5) that indicates that Belcher Island beluga are different from East Hudson Bay coastal beluga.

Aerial surveys conducted in E. Hudson Bay in 1993 and in 1985 show a discontinuity of beluga distribution between E. Hudson Bay and James Bay, but none between E. Hudson Bay and the Belchers.

6. POPULATION SIZE AND TRENDS OF BELUGA

6.1 Russia

Population estimates for the Karskaya group are based on a combination of aerial surveys covering only a part of the range, ship surveys, land based surveys and expert opinion (SC/7/BN/7, SC/7/BN/20). A total of 15-20 thousand animals are thought to occupy the area.

More intensive aerial survey effort has concentrated on the White Sea between 1971-1990 (SC/7/BN/13, SC/7/BN/20). Estimates here range from 200-3000 beluga during the summer, with no discernible trend over the years when surveys were conducted.

6.2 Svalbard-Barents Sea

No population surveys have been conducted.

6.3 East Greenland

No population surveys have been conducted.

6.4 West Greenland

SC/7/BN/10 summarised the results of aerial visual surveys conducted in March on the wintering area off W Greenland between Disko Bay in the north and Nuuk in the south. Surveys have been carried out using essentially the same methodology in 1981, 1982, 1990, 1993 and 1994, and have shown a decline of about 62% over that period. The 1998 survey was extended to the south because of hunter reports of wintering beluga there, and corrected using a video camera system for beluga missed by observers. The estimated number of beluga visible at the surface and seen by observers was 929 (516-1674, 95% CI), similar to the 1994 estimate of 1,028 (775-1,532 95% CI). When corrected for whales missed by observers, and for diving whales, the estimated abundance is 6,722 (3,562-12,688, 95% CI). These figures confirmed the decline of beluga between 1981and 1994, but are not precise enough to confirm that the decline of beluga off W Greenland is continuing. They also strengthen the contention that W Greenland beluga must be only a small proportion of the whales summering in northern Canada.

SC/7/BN/8 described the results of helicopter reconnaissance surveys intended to ascertain an "order of magnitude" estimate of the number of beluga migrating past Upernavik in October. Surveys were conducted with the co-operation and help of local hunters, to come to a common understanding of the results, and were timed to coincide with the migratory period for beluga in the area. Hunters have contended that very many beluga migrate through this area in the fall. The results suggest that 1,700 to 2,000 beluga passed through the area during the period of the survey.

6.5 Canada

SC/7/BN/29 is a tabular presentation of population estimates for Canadian beluga stocks, while SC/7/BN/15, SC/7/BN/27 and SC/7/BN/28 give detailed descriptions of surveys for the Canadian High Arctic, St. Lawrence River and eastern Hudson Bay respectively. It is noted that many of the estimates are not corrected for whales missed

by observers, for diving whales, and/or do not cover the entire known range of the stock. In these cases, the estimates have a negative bias.

Information on population trend is available for the St. Lawrence River (SLR) and eastern Hudson Bay (EHB). The SLR stock has shown an annual increase of 2.9% (SE 1.2%) over 5 similar surveys conducted from 1988 to 1997. Surveys detected no change in the EHB stock, but changes in survey methods may have concealed a negative trend.

7. EXPLOITATION AND SUSTAINABILITY OF HARVEST OF BELUGA

Table 1 summarises the population status of all known beluga aggregations in the North Atlantic and adjacent waters. It should be noted that these aggregations may be discrete, or a mixture, of stocks. Given the known stock structure of beluga in some areas, it is prudent to base putative management units on local aggregations and/or harvesting areas until more information on stock structure is available. Here, the term "stock" is used where there is documented evidence that beluga in the catch are distinguishable from beluga caught in other areas, through analyses of genetics, contaminants, morphology and/or movements. Numbers in square brackets below refer to the numbered aggregation in Table 1.

7.1 Russia

Russian catch statistics are presented in SC/7/BN/7, SC/7/BN/19 and SC/7/BN/21. Harvests from the Barents, Kara and White Seas were as high as 3000 annually in the late 1950's and early 1960's. Since that time, harvests have been much lower, and have virtually ceased since 1987. Removals are now limited to accidental captures in fishing gear, occasional live captures for aquaria, and a few kills by local hunters.

All Russian aggregations are considered to be not threatened by exploitation. However, potential threats to some aggregations include:

- Noise and disturbance from potential increased traffic through the Northern Sea Route;
- Increased oil exploitation in the Barents Sea, leading to increased ship traffic, disturbance and possible spills;
- Pollution from industrialised areas transported to beluga concentration areas by major rivers, including the Ob, Dvina and Yenisey Rivers.

It should be emphasised that these are potential threats only and that there is no evidence that they are having an impact at present.

7.2 Svalbard-Barents Sea

Beluga have been totally protected in Norwegian waters since 1961. The aggregation has probably recovered or is recovering from past exploitation. Oil exploration and exploitation, leading to increased ship traffic, disturbance and possible spills, pose potential threats.

7.3 East Greenland

Catches of beluga in East Greenland have averaged only a few per decade since 1955 (Dietz et al, 1994), and they are therefore considered not to be threatened.

7.4 West Greenland

Recent catch reporting in Greenland has not been very accurate. Estimates of recent harvests are provided in SC/7/BN/34, and range from 509 in 1994, to 784 in 1993. Of this total, about 80% are taken from the southwest Greenland stock [8], and most of the remainder are taken from the stock migrating past northwest Greenland [9]. Only a few are taken from the North Water winter aggregation [10].

There is evidence that the number of beluga wintering off West Greenland has declined since 1981. This aggregation is likely composed of two or more stocks [8 and 9], but the allocation of catch to each stock is not known. Given the estimated number of beluga (6722), and the total harvest of more than 400 per year, the stocks are likely declining due to over-harvesting.

7.5 Canada

SC/7/BN/35 provides reported catch statistics for Canadian-Northwest Territories waters for the past 9 years, while SC/7/BN/36 provides catch-at-age information by community. Catch statistics for Nunavik communities are provided in Brooke (1997). Total annual catch for the period 1989-1998 (excluding the Beaufort Sea) has ranged between 492 and 820, with no apparent trend over the period.

New methods of stock delineation have increased the number of beluga stocks now recognised, and make the designation of status difficult in many cases. It is also difficult to assign a harvest level to some aggregations, since a particular aggregation may be harvested by several communities during migration.

The North Water winter aggregation [10] and Canadian High Arctic summer aggregation [11] are apparently large and not heavily harvested. However, stocks that summer in the Canadian High Arctic and winter off W. Greenland may be exposed to overexploitation in Greenland (see 7.4).

The Southeast Baffin Island area now has 3 recognised stocks, where one was recognised previously. The Pangnirtung stock [12] has been reduced by past overexploitation, and is vulnerable as an apparently small population that is heavily harvested. The recent population trend is unknown, however.

The Iqaluit [13] and Kimmirut [14] areas have only migratory stocks and/or sporadic summer incursions of beluga. The status of these stocks is not known.

The St. Lawrence River stock [15] is small and isolated, and was reduced in the past by overexploitation. The population is now increasing in number. Other potential threats to the stock include pollution and harassment.

The Ungava Bay aggregation [16] was probably extirpated by past over-harvesting. Very small numbers of beluga are seen and sometimes harvested. They may be remnant, transient or re-colonizing animals.

The North Hudson Bay area [17] includes both summer resident beluga, and migrants from other areas in the spring and fall. Although the harvest seems high relative to the survey estimate, it should be noted that:

- The survey estimate is negatively biased because it did not cover the range of the aggregation, and was not corrected for observer bias or submerged whales;
- Much of the harvest occurs in the fall, when migrants from other areas are passing through.

The status of this aggregation is therefore not known.

The Eastern Hudson Bay – Coastal stock [18] has a high harvest relative to the size of the population. Status is uncertain because no trend in abundance has been confirmed. However, the stock is considered vulnerable as it is small and heavily exploited.

The Belcher Islands area [19] may have both summer and winter resident beluga. The status of this stock is not known.

Western Hudson Bay [21] has a large number of resident summer beluga. Exploitation is not high relative to the size of the aggregation. However, an unknown amount of harvesting may occur in other areas during migration. Given the large size of the aggregation, it is probably not threatened by present harvest levels.

Coastal Southern Hudson Bay [22] and James Bay [23] have summer resident and possibly some winter resident beluga. The aggregations are not known to be harvested, however an unknown amount of harvesting may occur during migration. The status of the James Bay aggregation is considered not threatened, while status of the Coastal Southern Hudson Bay aggregation is considered unknown because of the lack of a good estimate of the size of the aggregation.

8. DISTRIBUTION, MIGRATIONS AND STOCK IDENTITY OF NARWHAL

8.1 Russia

SC/7/BN/6 summarised the known observations of narwhal across the Russian Arctic, based on observations from Aerial Reconnaissance of Sea Ice (ARSI), and other data sources. Narwhal are rare in the Russian Arctic. Most observations were from the area around Franz-Joseph Land. Some were occasionally seen in the northern parts of the Kara, Laptev, East Siberian and Chukchi Seas. All but a few observations were north of 75°N along the continental slope.

8.2 Svalbard-Barents Sea

SC/7/BN/24 refers to Gjertz (1991), which summarises the known distribution of narwhal around Svalbard, and concludes that narwhal are presently and were historically rare in the Svalbard region. Narwhal occur in the northern and eastern

parts of the archipelago. Three narwhal were outfitted with satellite transmitters in 1998, and moved locally for 4-46 days (SC/7/BN/24).

8.3 East Greenland

Narwhal have been seen in small numbers throughout eastern Greenland waters from 64°N to 77°N (Dietz et al. 1994). The main concentration areas are Scoresby Sund, Kangerlussuaq and Sermilik, where narwhal are regularly seen in summer. They are also seen in the E. Greenland Sea pack ice between May and September, and in Denmark Strait in October and November.

8.4 West Greenland

Narwhal are mainly found in summer in the areas of Inglefield Bay and Melville Bay (Heide-Jørgensen 1994). They are often captured in November in Uumannaq and in Disko Bay throughout the winter. In winter, they are also found throughout Baffin Bay. Palsbøll et al. (1997) describe genetic results obtained from narwhal sampled at Canadian (Baffin Island) and Greenlandic locations. Mitochondrial DNA analyses suggest that there are differences between narwhal from E. Greenland and all other areas sampled. Narwhal sampled at Baffin Island and Avanersuaq (NW Greenland) were also different from narwhal sampled in Melville Bay, Uummannaq and Upernavik but not from narwhal sampled in a Disko Bay ice entrapment. Satellite tracking of narwhal tagged at Melville Bay in Greenland and in the Eclipse Sound Area in Canada indicates that these narwhal did not move into areas with other summer aggregations. The tracking also shows that some male and female narwhal from both areas migrate in the fall to the southern end of Baffin Bay where they occupy the same area. These genetic and tracking results suggest that summer aggregations represent seasonally segregated stocks, and also that at least one Canadian stock occupies Greenlandic waters where they may be hunted in the winter.

8.5 Canada

8.5.1 Baffin Bay and adjacent waters

In the summer, narwhal occupy four main areas of aggregation: Peel Sound, Prince Regent Inlet, Admiralty Inlet and the Eclipse Sound (SC/7/BN/32; Richard et al. 1994). They migrate east through Lancaster Sound in the fall to the wintering areas that are shared with W. Greenland narwhal and which extend throughout Baffin Bay from shore ice to shore ice.

8.5.2 Hudson Bay

During the summer, narwhal are most concentrated in the waters north of Somerset Island (SC/7/BN/31). They are also occasionally seen along the Keewatin coast south to Arviat. Narwhal are known to migrate eastward though Hudson Strait and an aggregation has been observed during March surveys in eastern Hudson Strait, with numbers similar to those estimated in the summer range (Richard 1991). On the basis of this distribution information, they are assumed to be a stock separate from the Baffin Bay narwhal.

9. POPULATION SIZE AND TRENDS OF NARWHAL

9.1 Russia

There is no information on the size and trend of the Russian narwhal population.

9.2 Svalbard

There is no information on the size and trend of the Svalbard narwhal population.

9.3 East Greenland

The numbers of narwhal in Scoresby Sund and adjacent fjords in September have been estimated to be 300 (95% CI 165-533) (Larsen et al. 1994). However this survey did not cover the complete range of the narwhal and was not corrected for observer bias or submerged animals. There are no estimates of numbers from other areas.

9.4 West Greenland

SC/7/BN/10 reports survey estimates of narwhal in March 1998 in the waters south of Disko Bay. An estimate of 5,210 (95% CI: 1,285-21,115) was derived from those surveys, using correction factors obtained from video track line recording and time-depth recordings. However, this survey did not cover the entire range of narwhal in the area. Born et al. (1994) estimated the number in Ingelfield Bay in summer as between 800-1500. That estimate was not corrected for diving animals or observer bias. Survey coverage was also incomplete.

9.5 Canada

9.5.1 Baffin Bay and adjacent waters

SC/7/BN/32 reported a total estimate of 18,000 (90% CL. 15,000-21,000) for August aggregations in the Canadian High Arctic. Richard et al. (1994) provided details by area. The numbers estimated in each of the four aggregation areas are presented in Table 2. These surveys were photographic and therefore have less observer error than visual surveys, however they did not cover the complete range of narwhal in the area. They were also uncorrected for diving animals.

9.5.2 Hudson Bay

SC/7/BN/31 reports an estimate of 1,355 (90% CL 1,000-1,900) derived from photographic surveys conducted in July 1984. No correction was made for diving animals and the area surveyed did not cover the entire summer range of narwhal.

10. EXPLOITATION AND SUSTAINABILITY OF HARVEST OF NARWHAL

Table 2 summarises the population status of all known narwhal aggregations in the North Atlantic and adjacent waters. It should be noted that these aggregations may be discrete, or a mixture of stocks. Until further information on stock structure is available, it is prudent to base putative management units on local aggregations and/or harvesting areas. Here, the term “stock” is used where there is documented evidence that narwhal in the catch are distinguishable from narwhal caught in other areas,

through analyses of genetics, contaminants, morphology and/or movements. Numbers in square brackets below refer to the numbered aggregation in Table 2.

10.1 Russia

There are no hunts for narwhal in Russian waters. The species is considered rare and is listed as a protected species in the Russian Federation's Red Book.

10.2 Svalbard

There are no hunts for narwhal in Svalbard.

10.3 East Greenland

Up to 150 narwhal a year are caught in E. Greenland (Dietz et al 1994). Narwhal in this area are probably not threatened because of their wide dispersal and the very localised and relatively low level of harvest. However, the sustainability of this hunt is unknown due to an absence of estimates of total population size.

10.4 West Greenland

Catches in West Greenland vary from about 500 to about 700 annually (SC/7/BN/34). The catch would be sustainable if there was only one panmictic population shared between Canada and Greenland. However, the existence of several stocks is suggested by the results of recent satellite tracking and genetic studies. Of particular concern are small summer aggregations which, if they are discrete stocks, could become depleted by large hunts in Greenland or Canada. The sustainability of the overall harvest is therefore uncertain.

10.5 Canada

10.5.1 Baffin Bay and adjacent waters

Catches from the Baffin Bay narwhal stock are about 240-320/year (SC/7/BN/35). This combined with the West Greenland catch would be sustainable if there were one shared panmictic population. The same problem of seasonal stock delineation mentioned in 10.4 precludes the evaluation of sustainability of the summer aggregations individually. The Prince Regent Inlet aggregation is large and least susceptible to over-exploitation. The Peel Sound and Eclipse Sound aggregations are smaller and, if they are discrete stocks, could become depleted by large hunts in Greenland and/or Canada. There is evidence through satellite tracking that Tremblay Sound (Eclipse Sound area) narwhal migrate to a wintering area in southern Baffin Bay where they might be subject to Greenlandic hunts (SC/7/BN/9). However, present harvest levels in Canada have been sustained for some decades with no evidence of depletion or range reduction (SC/7/BN/32).

10.5.2 Hudson Bay

The catches in Northern Hudson Bay are small relative to the population estimate (<1%) (SC/7/BN/31). The hunt is therefore considered sustainable, however stock discreteness must be further clarified.

11. RECOMMENDATIONS FOR FUTURE RESEARCH

11.1 Beluga

Aggregation	Research Priority
Russian Arctic and Finnmark Coast [1-4]	1. Stock Identification: It is not known if the aggregations within the Karskaya group are discrete stocks. 2. Stock Enumeration: This should not be attempted until stock identification is completed. 3. Potential Threats: The potential effects of industrial development on these aggregations, including shipping and pollution, should be studied.
Svalbard [5]	1. Stock Identification: The relationship of this aggregation to those in the Barents Sea and Russian Arctic should be addressed.
West Greenland [8-9]	1. Movements and Migrations: There is a need to determine where beluga from these aggregations go in the summer, and to what extent they are harvested during the summer and during migrations. 2. Improved reporting of catch and loss rates. It is necessary to know with certainty the number of beluga landed, and the number of beluga killed but lost, to determine total removals from stocks, and hence to determine stock status.
Canadian High Arctic and North Water [10,11]	1. Stock Identification: The stock identity of beluga from the numerous concentration areas in the Canadian High Arctic, and their relationship to beluga wintering off West Greenland, should be determined. 2. Movements and Migration: We need to know what proportions of the beluga in the Canadian High Arctic winter in the North Water and off West Greenland, and whether these proportions are constant from year to year.
SE Baffin-Pangnirtung [12]	1. Stock Enumeration: Surveys should be conducted using identical methods to those used previously, to index the population and determine the trend in numbers. 2. Movements and Migration: We need to find out where these whales go in the winter, to see if there is a connection between this stock and those wintering off W Greenland. 3. Improved reporting of catch and loss rates. We need to know with certainty the number of beluga landed, and the number of beluga killed but lost, to determine total removals from the stock, and hence to determine stock status.

Aggregation	**Research Priority**
SE Baffin- Iqaluit and Kimmirut [13, 14]	1. Stock Identification, relation to other stocks: We need to know if the stocks hunted in these areas are hunted in other areas, and what aggregations of beluga, if any, support these harvests. 2. Improved reporting of catch and loss rates. We need to know with certainty the number of beluga landed, and the number of beluga killed but lost, in order to determine total removals from these stocks, and hence to determine stock status.
St. Lawrence River [15]	1. Relationship of contaminants to observed pathologies. We need to know if pollutants are causing increased morbidity and mortality in this stock, and inhibiting stock recovery.
North Hudson Bay [17], Southern Hudson Bay [22], James Bay [23], Foxe Basin [24]	1. Stock Identification: We need to know if these aggregations are distinct stocks. 2. Movements and Migration: We need to know if the stocks hunted in these areas are hunted in other areas, and what aggregations of beluga, if any, support these harvests. 3. Stock Enumeration: This should be done after stock delineation is complete and stock ranges are defined. 4. Improved reporting of catch and loss rates. We need to know with certainty the number of beluga landed, and the number of beluga killed but lost, to determine total removals from these stocks, and hence to determine stock status.
Ungava Bay [16]	1. Stock Recovery: This depleted stock provides an opportunity for studying the dynamics of beluga stock recovery, or the recolonization of areas by other stocks.
Eastern Hudson Bay [18]	1. Stock Enumeration: We need to know whether this stock is increasing or decreasing in number. 2. Improved reporting of catch and loss rates. We need to know with certainty the number of beluga landed, and the number of beluga killed but lost, to determine total removals from these stocks, and hence to determine stock status.
Belcher Islands [19]	1. Stock Identification, relation to other stocks: We need to know if the stock hunted in this area is hunted in other areas, and what aggregation of beluga, if any, support this harvests. 2. Improved reporting of catch and loss rates. We need to know with certainty the number of beluga landed, and the number of beluga killed but lost, to determine total removals from these stocks, and hence to determine stock status.

Aggregation	Research Priority
Hudson Strait [20]	1. Stock Identification: We need to know the proportional representation of stocks in the mixed stock hunt. 2. Improved reporting of catch and loss rates. We need to know with certainty the number of beluga landed, and the number of beluga killed but lost, to determine total removals from these stocks, and hence to determine stock status.
West Hudson Bay [21]	1. Improved reporting of catch and loss rates. We need to know with certainty the number of beluga landed, and the number of beluga killed but lost, to determine total removals from these stocks, and hence to determine stock status.

11.2 Narwhal

Aggregation	Research Priority
NE Atlantic including Svalbard, Russia Severnaya Zemlya, Franz Josef Land and E. Greenland. [1-5]	1. Stock identity through opportunistic sampling. This group does not have high priority for research as narwhal are not abundant in these areas and are not heavily harvested. If samples become available, stock delineation work should be carried out.
West Greenland [6-9]	1. Abundance surveys at Avernasuaq [9], Melville Bay [8] and Uummanaq [7].These are summer aggregations [9 and 8] and a fall migration route [7] that are subject to substantial harvests. 2. Movements from Disko Bay [6] to summering areas. It is known that narwhal from at least two areas [8 and 10] winter in this area. It is necessary to determine if beluga from this area summer in other areas, and where they are subjected to harvesting in their summering areas and during migration. 3. Improved reporting of catch and loss rates. It is necessary to know with certainty the number of narwhal landed, and the number of narwhal killed but lost, to determine total removals from stocks, and hence to determine stock status.

Aggregation	Research Priority
Baffin Bay, Canadian High Arctic. [10-16]	1. Stock identification. It is necessary to determine if the aggregations summering in this area [10-14] are actually distinct stocks. 2. Improved catch and removal reporting. It is necessary to know with certainty the number of narwhal landed, and the number of narwhal killed but lost, to determine total removals from stocks, and hence to determine stock status. 3. Studies of movements/migration. It is necessary to determine the migration routes and wintering areas of these aggregations, to assign harvest to specific stock units.
Northern Hudson Bay. [17]	1. Stock Identification. It is necessary to determine if the aggregation summering in this area [17] is actually a distinct stock. 2. Improved catch and removal reporting. It is necessary to know with certainty the number of narwhal landed, and the number of narwhal killed but lost, to determine total removals from this aggregation, and hence to determine stock status.

12. ADOPTION OF REPORT

The report was adopted in draft form, with noted editorial changes, by all participants.

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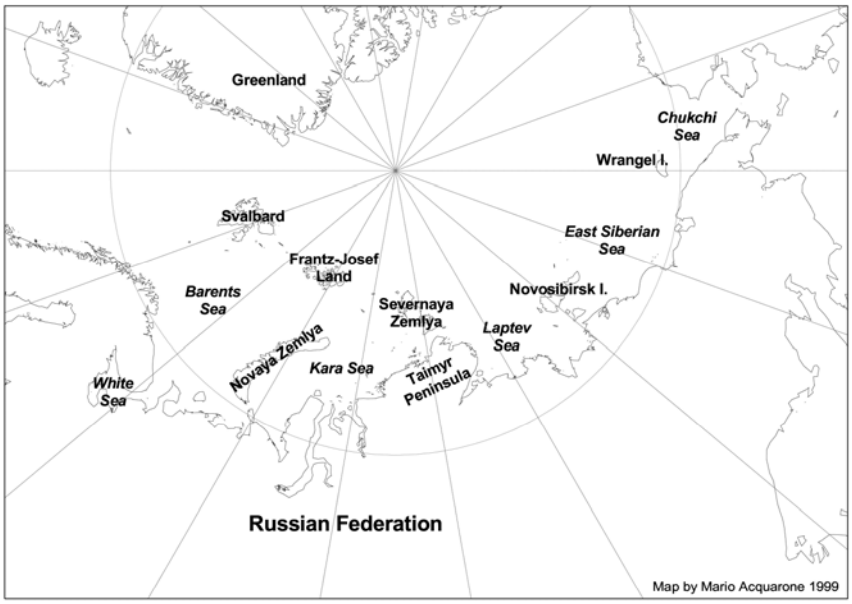
Figure 1a: *Overview of the Russian, Norwegian, Greenlandic and Canadian Arctic.*



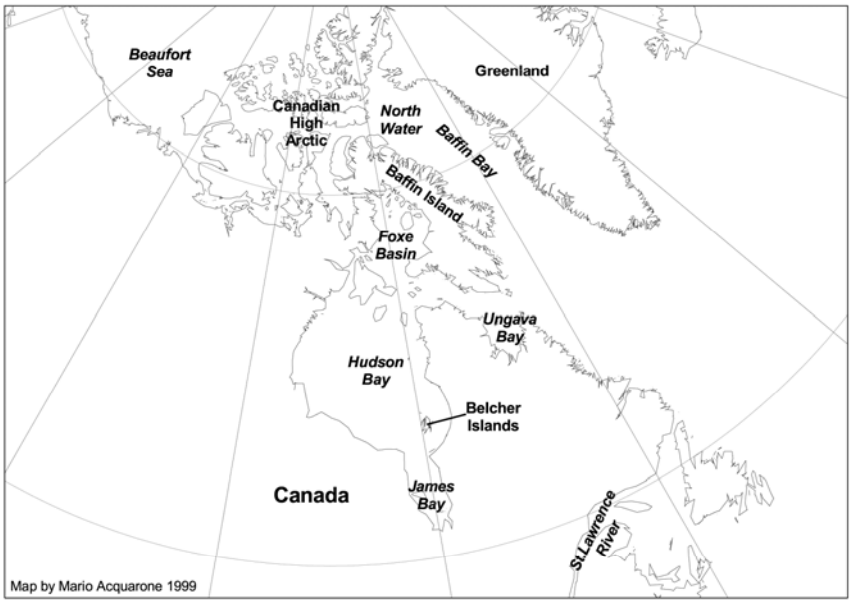


Figure 1b: *The Russian Arctic.*

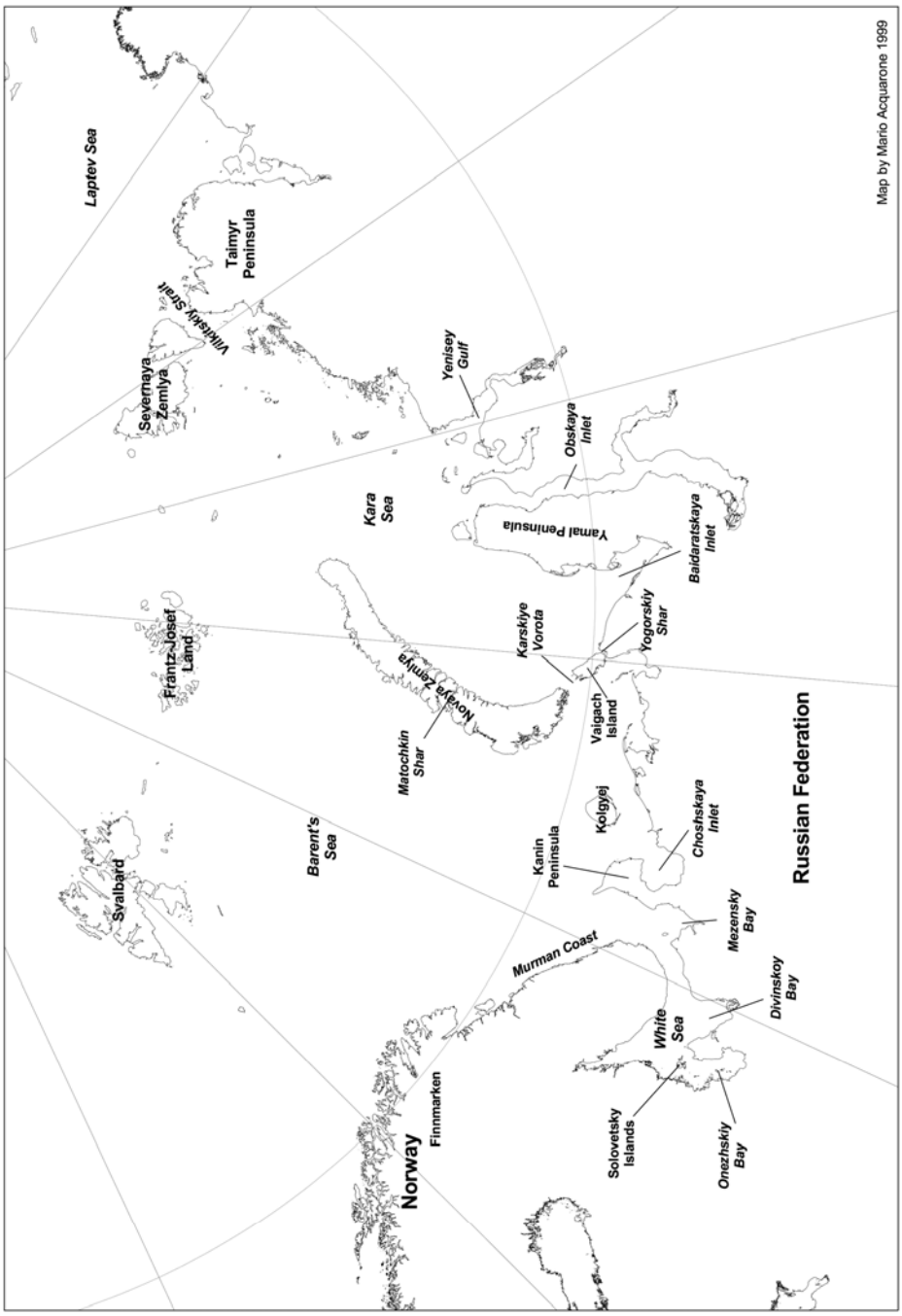


Figure 1c: *Greenland.*

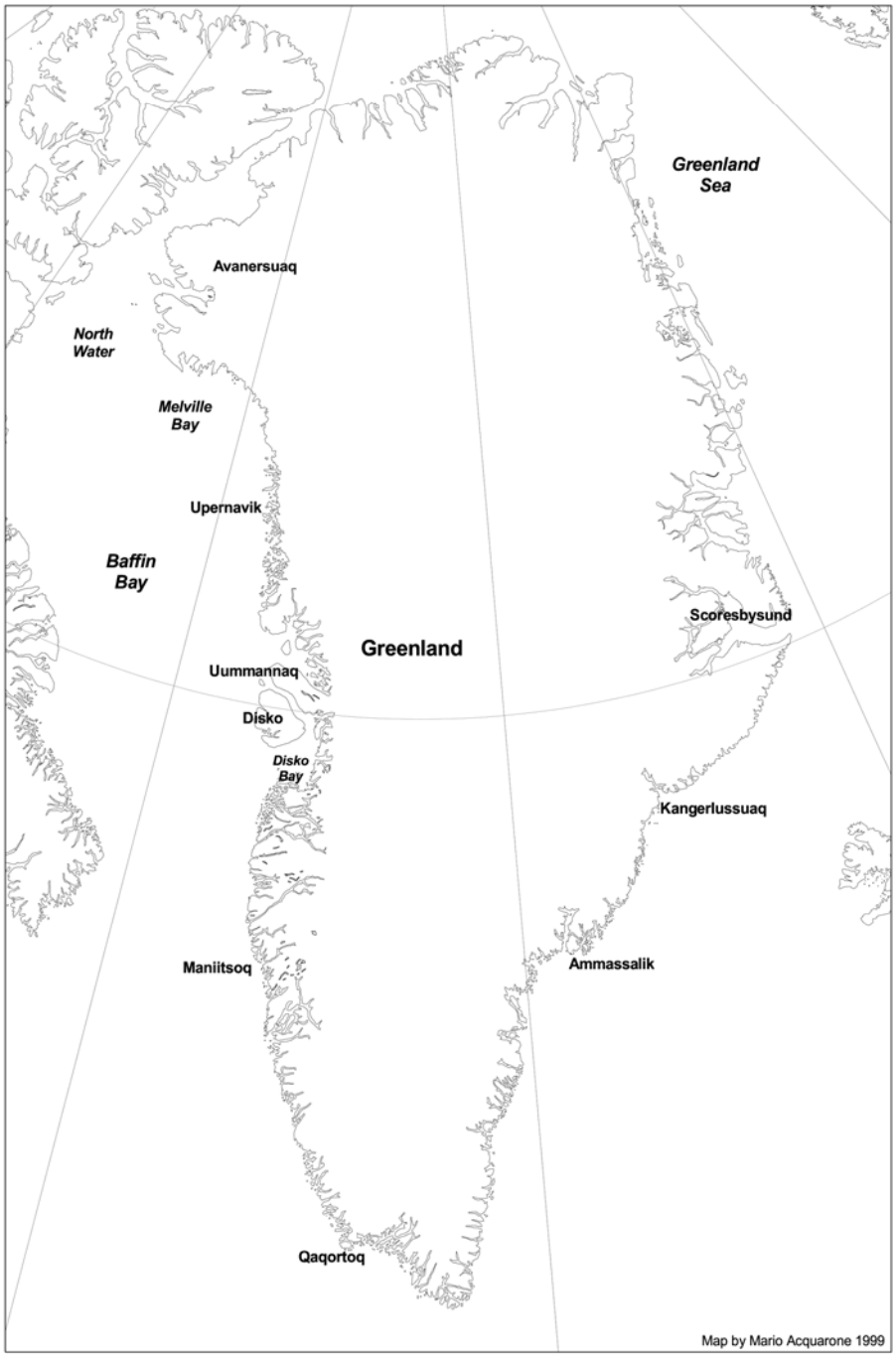
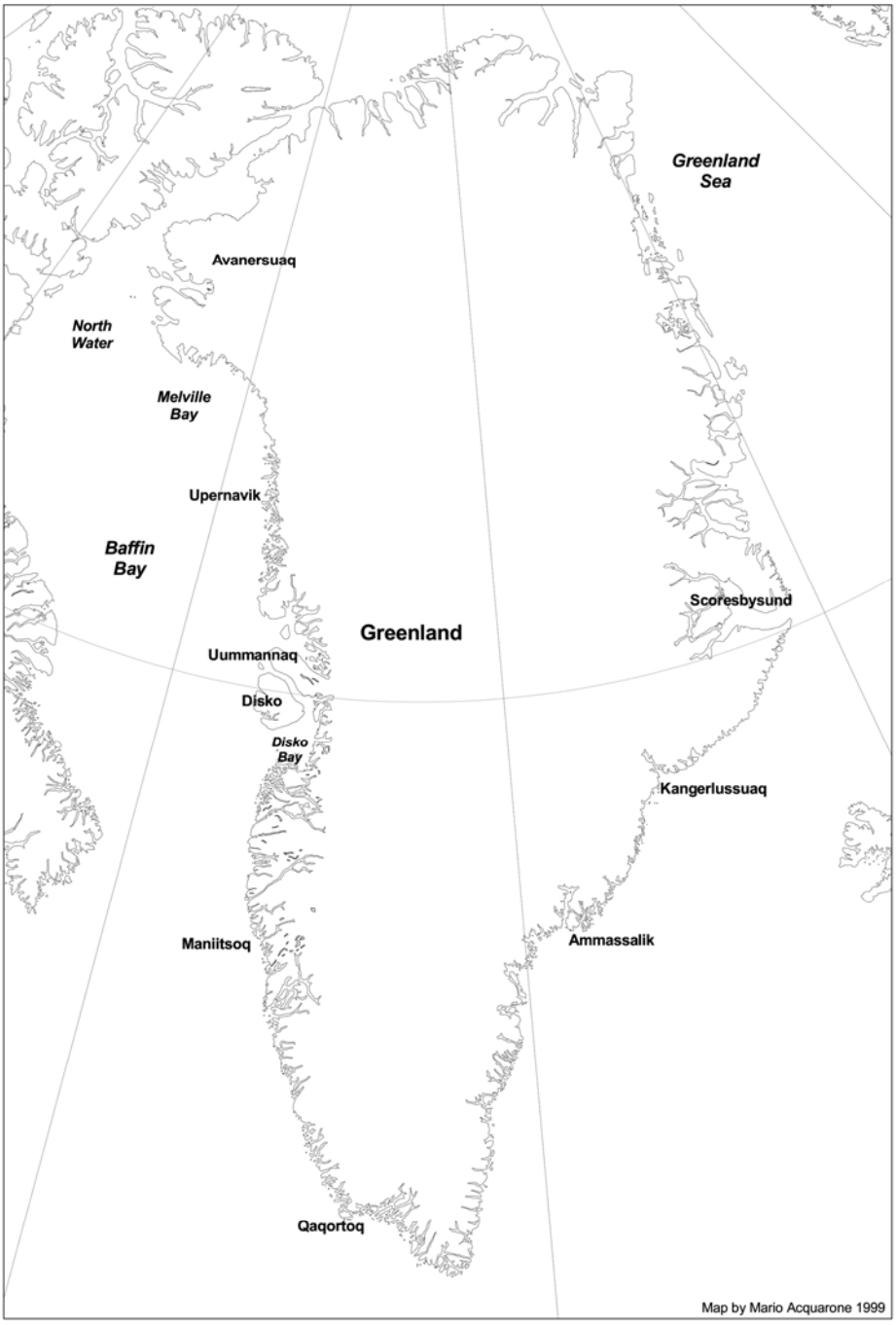


Figure 1d: *The Canadian eastern Arctic.*



ANNEX 1 – Appendices 1,2 & 3

Appendix 1 – **LIST OF PARTICIPANTS**

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Dr Grete Hovelsrud-Broda (NAMMCO)
Mr Dan Pike (NAMMCO)
Ms Tine Richardsen (NAMMCO)

Appendix 2 - **AGENDA**

1. Opening remarks
2. Adoption of Agenda
3. Appointment of Rapporteur
4. Review of available documents and reports
5. Distribution, migrations and stock identity of beluga
   - 5.1 Russia
     - 5.1.1 Laptev Sea
     - 5.1.2 Kara Sea
     - 5.1.3 White Sea
     - 5.1.4 Barents Sea
   - 5.2 Svalbard
   - 5.3 East Greenland
   - 5.4 West Greenland
   - 5.5 Canada
     - 5.5.1 Baffin Bay and adjacent waters
     - 5.5.2 Pangnirtung
     - 5.5.3 Hudson Bay
     - 5.5.4 Saint Lawrence River
   - 5.6 Beaufort Sea and Alaska
6. Population size and trends of beluga – by areas as above
7. Exploitation and sustainability of harvest of beluga – by areas as above
8. Distribution, migrations and stock identity of narwhal
   - 8.1 Russia
   - 8.2 Svalbard
   - 8.3 East Greenland
   - 8.4 West Greenland
   - 8.5 Canada
     - 8.5.1 Baffin Bay and adjacent waters

8.5.2 Hudson Bay

9. Distribution, migrations and stock identity of narwhal – by areas as above
10. Exploitation and sustainability of harvest of narwhal – by areas as above
11. Recommendations for future research
12. Adoption of report

Appendix 3 - **LIST OF DOCUMENTS**

SC/7/BN/1	List of participants
SC/7/BN/2	Agenda
SC/7/BN/3	List of documents and working papers
SC/7/BN/4	B.G.E. de March. Genetic differences among North American and adjacent beluga stocks as determined by mitochondrial DNA and 15 nuclear DNA microsatellites.
SC/7/BN/5	P.R. Richard. Summer and autumn movements of belugas from Canadian Arctic stocks, in Greenlandic, Canadian and Eastern Russian waters.
SC/7/BN/6	S.E. Belikov and A.N. Boltunov. Distribution and migrations of cetaceans in the Russian Arctic according to observations of aerial ice reconnaissance.
SC/7/BN/7	A.N. Boltunov and S.E. Belikov. Beluga (*Delphinapterus leucas*) of the Barents, Kara and Laptev seas.
SC/7/BN/8	M. Acquarone and M.P. Heide-Jørgensen. Helicopter surveys for belugas in northern Upernavik, West Greenland, 1998.
SC/7/BN/9	R. Dietz and M.P. Heide-Jørgensen. Satellite radio tracking of narwhals captured in Tremblay Sound in 1997 and 1998.
SC/7/BN/10	M.P. Heide-Jørgensen and M. Acquarone. Abundance and population trends of belugas (*Delphinapterus leucas*) and narwhals (*Monodon monoceros*) wintering in West Greenland.
SC/7/BN/12	M.P. Heide-Jørgensen and P.Palsbøll. Evidence of heterogeneity in belugas from West Greenland.
SC/7/BN/13	V. Bel´kovich. The determinative factors of the population structure of Beluga Whales.
SC/7/BN/14	S. Innes, D. C. G. Muir, R.E.A. Stewart, R. Dietz and M. P. Heide-Jørgensen. Stock identity of beluga (*Delphinapterus leucas*) based on multivariate analysis of the concentrations of organochlorine contaminants.
SC/7/BN/15	S. Innes, H. Cleator, and P. Richard. A Population estimate for Baffin Bay beluga and survey estimates for narwhal and bowhead whales in the Canadian High Arctic.
SC/7/BN/16	G. Stern and S. Innes. Stock identity of beluga in the Southeast Baffin Island based on organchlorine contaminant residues.
SC/7/BN/17	S. Innes and G. Williams. Use by narwhal of the ice-edge based on photo-identification of individuals.
SC/7/BN/18	A.D. Chernezky, V. M. Bel'kovich and E.Isikeeva. Peculiarities of the beluga's acoustic vocalization in a reproductive concentration (Solovetsky Island, the White Sea).

SC/7/BN/19 V.F.Prishchemikhin. Composition of ship catches of beluga in the Kara Sea.

SC/7/BN/20 G.N. Ognetov. A review of investigations on the white whale *Delphinapterus leucas* pall. 1776 of the western Russian Arctic in 1970-1997.

SC/7/BN/21 G.N. Ognetov. Catch history, statistics and modern exploitation of the beluga (*Delphinapterus leucas)* in the western Russian Arctic.

SC/7/BN/24 C. Lydersen, K.M. Kovacs and I. Gjertz. Studies of white whales (*Delphinapterus leucas*) and narwhals (*Monodon monoceros*) in Svalbard.

SC/7/BN/25 Kingsley, M.C.S. Statistical considerations in using an unbiased sub-survey to correct detection bias.

SC/7/BN/26 Kingsley, M.C.S. and I Gauthier. Visibility of St Lawrence belugas to aerial photography, estimated by direct observation.

SC/7/BN/27 Kingsley, M.C.S. Summary of the status of St Lawence belugas.

SC/7/BN/28 Kingsley, M.C.S. Summary of the status of belugas in eastern Hudson Bay, James Bay and Ungava Bay.

SC/7/BN/29 P. Richard. Summary table of published estimates of Canadian beluga and narwhal stocks.

SC/7/BN/30 M.P. Heide-Jørgensen, N. Hammeken, R. Dietz, S. Innes, J. Orr, P. Richard. Surfacing times for narwhals and belugas.

Other Documents:

SC/7/BN/31 Canada Department of Fisheries and Oceans. Hudson Bay narwhal. Stock Status Report E5-44 (1998).

SC/7/BN/32 Canada Department of Fisheries and Oceans. Baffin Bay narwhal. Stock Status Report E5-43 (1998).

SC/7/BN/34 Canada/Greenland Joint Commission on Conservation and Management of Narwhal and Beluga. 1997 Report, Scientific Working Group.

SC/7/BN/35 N.W.T Narwhal and Beluga Harvests

SC/7/BN/36 (Untitled) Age distribution of beluga in Canadian catches.

ANNEX 2

REPORT OF THE NAMMCO SCIENTIFIC COMMITTEE WORKING GROUP ON NORTH ATLANTIC FIN WHALES

1. OPENING REMARKS AND TERMS OF REFERENCE.

The chairman welcomed all participants to the meeting (see Appendix 1). He reviewed the terms of reference for the meeting.

The establishment of this Working Group (WG) was in response to the NAMMCO Council's request adopted at the meeting in the Management Committee in Oslo, September 2, 1998 where the Scientific Committee (SC) was asked to '...undertake an assessment of the status of fin whales in the North Atlantic based on all available data'. In a letter dated 31 December 1998, the Council sent out further guidelines on priorities for the work of the group:

"Acknowledging the large amount of work involved in such a comprehensive assessment of all possible fin whale stocks in the North Atlantic the Council requests the SC, when conducting such comprehensive assessment, particularly to

i) assess the stock structure for fin whale in the whole North Atlantic.
ii) assess the long-term effects of annual removal of 50, 100 and 200 fin whales in a stock area traditionally assumed to have a main concentration off East Greenland and Iceland (EGI stock area),
iii) identify MSY exploitation levels for that stock area."

The chairman emphasised that, for the purposes of this meeting, items ii) and iii) above applied only to the EGI stock area (as defined previously by the IWC, see SC/7/FW/4).

In preparation for the assessment, a working group was established, in December 1998, to review the available information and determine computations to be carried out before the meeting (see Appendix 1). In addition to examination of the published literature of relevance to the WG's terms of reference, advice on possible new unpublished data was received from the following: Phil Clapham, Phil Hammond, Tim Smith, Christina Lockyer, Christopher Clark, Debra Palka and Hal Whitehead.

2. ADOPTION OF AGENDA

The draft agenda was adopted without changes (see Appendix 2).

3. APPOINTMENT OF RAPPORTEUR

Daniel Pike, Scientific Secretary of NAMMCO, was appointed as Rapporteur for the Working Group.

4. REVIEW OF RELEVANT DOCUMENTS AND REPORTS

The documents considered by the Working Group are listed in Appendix 3.

5. REVIEW OF AVAILABLE DATA ON NORTH ATLANTIC FIN WHALES

5.1 Stock structure

The distribution of the North Atlantic fin whale has been described earlier mainly in general terms (Kellogg 1929, Sergeant 1977, Jonsgård, 1966, SC/7/FW/4). The model for population structure proposed by these authors, namely, the existence of relatively limited exchange between summer feeding concentrations, was later supported by the results of mark-recapture studies. Of 685 marked whales, 97 were later recovered. Only three of these 97 were recovered outside the traditional stock area (SC/7/FW/4) in which they were tagged. Only two fin whales tagged in Nova Scotia were recovered in Newfoundland (NFLD) and only one whale tagged in NFLD was recovered nine years later in Iceland (Sigurjónsson *et al*. 1991).

Within the EGI stock area, 77 marks have been placed on whales in areas outside the reach of the land-based whaling station in west Iceland. Five whales marked off east Greenland were recovered in the Icelandic fishery (Sigurjónsson *et al*. 1991). This rate of recovery is significantly lower than that from whales marked on the whaling grounds, indicating some site fidelity to the area.

Furthermore, photo identification studies have demonstrated the existence of site fidelity in Gulf of Maine fin whales (Agler *et al.* 1993, Clapham and Seipt 1991). Recently, a genetic study, which permitted the genetic identification of individual fin whales, detected between-year matches in the Gulf of Lawrence as well as in the Gulf of Maine fin whale samples (SC/7/FW/5).

Tracking of individual whales has revealed a capacity for rapid movement over relatively long distances. However, none of these studies has demonstrated exchange between traditional management areas (Watkins et al, 1996; Watkins et al, 1984).

Morphological (Jover, 1991) as well as genetic studies based on isozymes and mtDNA restriction fragment length polymorphism revealed the existence of significant differences between Icelandic and Spanish fin whales. Furthermore, analyses of 4 polymorphic loci demonstrated significant differences between the eastern coast of Canada, West and Southwest Iceland and North Norway (SC/7/FW/8, SC/7/FW/9).

Further investigation of mtDNA sequences has shown a significant level of heterogeneity between all the North Atlantic sampling areas and the Mediterranean Sea. Within the North Atlantic, heterogeneity has been detected between the western North Atlantic (Gulf of Maine and Gulf of St. Lawrence) and the eastern North Atlantic (coast of Spain). Samples collected off West Greenland and Iceland could not be assigned to either one of these two areas. In addition, the analysis of six

microsatellite loci has detected significant level of divergence only between the Mediterranean Sea and the Gulf of St. Lawrence or West Greenland (SC/7FW/5).

However, deviations from the Hardy-Weinberg (H-W) genotypic proportions within the western North Atlantic (more precisely the Gulf of St. Lawrence samples) as well as significant intra-annual deviation from H-W proportions in the Icelandic samples support the presence of substructure in the North Atlantic fin whales (SC/7/FW8, SC/7FW/5). This notion is reinforced by the population "phylogenies", where both mtDNA and microsatellite loci based relationship trees correspond. This is notable in light of the many possible branching patterns. Finally, the level and distribution at the mitochondrial locus indicated recent expansion in the western North Atlantic fin whale population (SC/7FW/5). Indeed, the western North Atlantic and the ocean of west Greenland and Iceland were covered by pack and sea ice during the last glaciation, some 18,000 years ago. Consequently, these areas became accessible to fin whales only recently on an evolutionary scale. Therefore, insufficient time has passed since these populations developed for genetic drift to produce significantly different allele frequencies at the nuclear loci.

In summary, the North Atlantic fin whale population studies indicate the presence of sub-populations with limited gene flow between adjacent sub-populations. The North Atlantic populations are all different from the Mediterranean Sea population. There is some indication that the western North Atlantic and Iceland areas have populations different from those found off the coasts of Spain and north Norway. Finally, deviations from H-W genotypic proportions within and between years in the Icelandic samples suggest the presence of more than one stock in this area.

5.2 Biological parameters

Biological parameters for fin whales adopted by the IWC in 1991 are listed in SC/7/FW/4 (see Table 1). The WG agreed that at present there is no new information to change any of these parameters. However, the WG chose to express MSYR in terms of the total population rather than the exploitable component of the population, as this was considered more biologically relevant (see section 5.5).

Table 1: Biological parameters of fin whales used in assessments. Adapted from SC/7/FW/4, Table 2.

Natural Mortality Rate, M	0.04 (annual)
Age at first parturition	9.5 yrs (50%); 12.5 yrs (95%)
Age at recruitment, males	5 yrs (50%); 7 yrs (95%)
Age at recruitment, females	4 yrs (50%); 5 yrs (95%)
MSYL (exploitable component)	$0.6K^E$

5.3 Catch data

Catch data for the EGI stock area are presented in SC/7/FW/16, which was replicated from SC/7/FW/13, and reflects agreement at the 1991 IWC Comprehensive Assessment meeting (SC/7/FW/4) (see Appendix 4). There have been no catches since 1989.

The assessments reported in section 5.5 also detail a sensitivity test for Block B alone of the EGI stock area. The historic catches for this case were taken to be those for the EGI (B)-high option (a conservative scenario) as detailed in Table 1 of SC/7/FW/13 (see Appendix 4).

5.4 Abundance estimates

Abundance estimates are available from the NASS87 and NASS89 surveys, taken to apply to 1988 (SC/7/FW/4, SC/7/FW/13), and from the NASS95 survey (SC/7/FW/10). These abundance estimates were subdivided into nearly common block areas for comparison (Figure 1, Table 2).

It was decided to base assessments on the HITTER approach (see below). This requires a single abundance estimate for a particular year, which a stock trajectory is computed to "hit". Given that two abundance estimates are available, it was agreed that the HITTER assessments would be based on an average of the two results taken to pertain to an intermediate year (1991). An inverse variance weighting approach was used, effected by weighting the logs of the abundance estimates by the squared inverses of their CV's in the weighting process. Thus for the standard EGI stock area (blocks A+B+C+D), averaging 15,614 (CV=0.216) and 18,932 (CV=0.16) in this manner yields 17,683 (CV=0.129).

Table 2: Abundance of fin whales from NASS87 and NASS89 surveys, taken to apply to 1988, and from the NASS95 survey. The surveys are divided into nearly equivalent block areas for comparison. See Figure 1 for locations of the blocks.

Block Area		*Average Proportion*	**1988**	**1995**
1988	**1995**			
A	4+7[1] 1/3 (A+B)	.17	4329	1097
B	2+3+9	.52	3893	15008
C+D	8+6+5+JMC+NVN	.31	7392	2827
Total		1.0	15614	18932

As a sensitivity test, assessments were also carried out for block B only. Here the estimate used for 1988 in the averaging process was the mean of the 1987 and 1989 survey results of 4,586 (SC/7/FW/4, Table 1. Note that this differs from the estimate of 3,893 given in Table 1 above, as the NASS-87 estimate was used here). Hence the two estimates combined were 4,586 (CV=0.132) and 15008 (CV=0.20), yielding a weighted average of 6,572 (CV=0.110). Note that this procedure heavily downweights the later higher estimate in the averaging process, so it is rather conservative.

[1] Block A only partly covered in 1995.

5.5 Assessments

The HITTER-FITTER package (de la Mare 1989; Punt 1996) can compute unique stock trajectories given, for example, estimates of absolute abundance and of trends in abundance from CPUE series. A difficulty with using all the available information of this nature in an assessment of the EGI fin whale stock is that incompatibilities become evident (SC/7/FW/13, SC/7/FW/16). The WG agreed that this likely reflected a problem with the model used rather than unreliability of the data. The model assumes that all indices apply to the overall stock, whereas there is likely spatial substructure within the EGI stock area (i.e., a certain degree of fidelity to different areas exhibited by different groups of animals, which the past fishery has exploited differentially). An assessment taking such substructure into account could not be attempted immediately as it would require the development of further software. The WG therefore decided to implement the "Hitting-with-fixed-MSYR" option of the HITTER-FITTER package, calculating stock trajectories passing through the total (1+) population size estimates in 1991 developed in section 5.4 for different values of MSY rate (MSYR- the ratio of MSY to the population size (MSYL) at which it is achieved). Projections for fixed future annual catches commencing in 1999 were also computed for each trajectory, assuming a 50:50 male:female ratio in such catches.

Technical specifications for these assessments are shown in Table 1. MSYL was expressed in terms of the exploitable component of the stock and set to 60% of the corresponding pristine level, with density dependence in fecundity acting on this same component of the stock. It was noted that Punt (1996) shows that variations of this last assumption make little difference to results, provided MSYR is not too high.

It was agreed that results be computed for three different values of MSYR of 1%, 2% and 4%, and also that MSYR be expressed in terms of uniform selectivity harvesting on the total (1+) stock. This convention more readily allows inter-stock comparisons, particularly as this measure of MSYR relates to the growth that an unexploited stock can achieve (a quantity which has been estimated from direct observations for a number of stocks (Best, 1992)).

Ideally, MSYR would be estimated directly in a FITTER application using the CPUE data, as well as the sighting survey estimates. However there are difficulties with such an approach as discussed above, and two sightings survey estimates alone are insufficient to give precise population trend information and hence a well-determined MSYR estimate. Inferences of likely MSYR values for the EGI fin whale stock thus have to be based on analogy with estimates for other baleen whale stocks. A variety of methods has been used to make such estimates, e.g. fitting population models to data, analyses of catch-at-age information, changes in values of biological parameters such as age at first parturition, and inferences from observed recovery rates of previously heavily depleted populations. None of the present applications of these approaches are above criticism. However the WG noted a gradual trend towards more evidence favouring "higher" MSY rates over recent years, e.g. estimates for Bering-Chukchi-Beaufort Seas bowheads and Eastern North Pacific gray whales in the 2-4% range (Best, 1992; IWC, 1999). Furthermore, growth rates of Southern Hemisphere right and humpback whale populations, currently at low population sizes, have been

measured from surveys to be in the vicinities of 7% and 10% respectively (Best, 1992), and arguments can be made that MSYR is at least 50% of such growth rate estimates (Butterworth and Best, 1990). Taking all such information into account, the WG agreed that focussing on assessment results for an MSYR(1+) value of 2% would constitute a conservative and precautionary approach.

The results of these computations are shown in Table 3 and Figures 2 and 3 for the conventional EGI fin whale stock area. They are shown both for trajectories hitting the weighted average estimate of 17,683 1+ population size for 1991, and the lower 5%-ile of the distribution for this estimate of 14,302. Table 3 shows the associated values of MSY, the pristine 1+ population size (K^{1+}) and the current stock status as reflected by the ratio of the present number of mature females to the number present prior to exploitation (N^{mat}_{1998}/K^{mat}). The mature female component of the stock is used for this measure, as it reflects the reproductive component of the resource.

Projection results are shown in Table 4 for the future levels of catch for which the Commission requested advice. For the reason given above, these are expressed in terms of the mature female component of the stock as a proportion of its pristine size.

For management purposes, it is suggested that attention be focussed on the results for MSYR=2%. Table 3 shows that MSY in this case exceeds 200 whales even if the lower 5%-ile is used for the population size hit. For this MSYR value, projections for annual catches of 100 or less suggest that the mature female numbers would continue to increase over the next 20 years (Table 4). Even if 200 whales per year are taken, though there would be a slight decrease in these numbers, this is of no concern as the final size remains well above MSY level.

The one result in Table 4 which might give rise to concern is for the most conservative combination shown, that of the lower 5%-ile population estimate of 14,302, an MSYR of 1%, and an annual catch of 200 whales. This reflects a decline in the proportion of mature females from 56% to 52% (below MSY level). However, this is over an extended period (20 years), so reflects only a very slight rate of decline, and it must be kept in mind that new data forthcoming over this period would allow assessments to be improved and hence catches to be adjusted accordingly if necessary. Figure 4 shows trajectories in terms of total population size as a fraction of the pristine level for the very conservative MSYR selection of 1%. Note that even in this case, a catch of 200 whales per year leaves the population in 2020 at a level above that in 1990.

A concern, however, with these results for the standard EGI fin whale stock area is that the trajectories in Figure 2 and 3 fail to reflect the major decline in relative abundance reflected by the CPUE data for the 1901-1915 period. However, these catches were all taken close to the coast of Iceland and thus may have depleted only localised aggregations. Thus these CPUE data may not reflect trends in the abundance of the entire stock..

As an extreme sensitivity test to examine this issue, the HITTER exercises above were

Table 3: Hitting weighted average (17,683) and lower 5%-ile (14,302) total (1+) population sizes in 1991 for various values of $MSYR^{1+}$ for the EGI stock catch series for North Atlantic fin whales (the inverse variance weighted average and lower 5%-ile of the survey abundance estimates for 1988 of 15,614 (CV=0.216) and that for 1995 of 18,932 (CV=0.16). Results are shown for *MSY*, the pristine (pre-exploitation) total population size (K^{1+}), and the current status of the mature female component of the population relative to pristine (N^{mat}_{1998}/K^{mat}).

	N^{1+}_{1991}	
$MSYR^{1+}$ (%)	**17683**	**14302**
MSY		
1	156	142
2	247	215
4	440	359
K^{1+}		
1	26789	24328
2	20836	18130
4	17944	14664
N^{mat}_{1998}/K^{mat}		
1	0.64	0.56
2	0.81	0.75
4	0.95	0.93

Table 4: Hitting weighted average (17,683) and lower 5%-ile (14,302) total (1+) population sizes in 1991 for various values of $MSYR^{1+}$ for the EGI stock catch series for North Atlantic fin whales and projecting forward under future annual catches of 0, 50, 100 and 200 animals from 1999 to 2020. Results are shown for the female component of the population.

$MSYR^{1+}$ (%)	N^{mat}_{1998}/K^{mat}	N^{mat}_{2020}/K^{mat}			
		$C_{1999+}=0$	$C_{1999+}=50$	$C_{1999+}=100$	$C_{1999+}=200$
$N^{1+}_{1991}=17683$					
1	0.64	0.76	0.72	0.68	0.60
2	0.81	0.96	0.91	0.87	0.78
4	0.95	1.00	0.96	0.92	0.85
$N^{1+}_{1991}=14302$					
1	0.56	0.69	0.65	0.60	0.52
2	0.75	0.93	0.88	0.83	0.72
4	0.93	0.99	0.95	0.91	0.81

Table 5: Hitting weighted average (6,572) and lower 5%-ile (5,484) total (1+) population sizes in 1991 for various values of $MSYR^{1+}$ for the EGI(B) High catch series for North Atlantic fin whales (the inverse variance weighted average and lower 5%-ile of the survey abundance estimates for 1988 of 4,586 (CV=0.132) and that for 1995 of 15,008 (CV=0.20) for block B. Notation is as for Table 3.

	N^{1+}_{1991}	
$MSYR^{1+}$ (%)	**6572**	**5484**
MSY		
1	95	91
2	141	134
4	199	184
K^{1+}		
1	16263	15590
2	11862	11312
4	8122	7525
N^{mat}_{1998}/K^{mat}		
1	0.38	0.33
2	0.51	0.44
4	0.72	0.64

repeated for catches and abundance estimates for Block B alone (see section 5.4). The comparative results are shown in Table 5 and Figures 5 and 6.

Some of the projection results (Table 6) for this scenario (those for MSYR=1% particularly, but also to some extent those for MSYR=2%) would be cause for concern for the higher levels of catch considered, though it must be kept in mind that these calculations make no allowance for likely trends of movement of animals from other parts of the conventional stock area into Block B over time. Furthermore, Figures 5 and 6 show markedly declining population trends over the 1962-1987 period for lower values of MSYR, which are inconsistent with the near flat CPUE trends for this period. Note also the considerable distribution changes for the stock reflected in the comparison of 1988 and 1995 survey results shown in Table 2, which is certainly evidence for movement of animals between different parts of the overall area in different years.

To address this matter in more detail would require the development of a model taking within-stock movements into account. In the meantime, however, as a safeguard against localised depletion by possible future catches, it is suggested that any catches towards the upper end of the range investigated here be spread over the complete stock area. Such a spread could appropriately be roughly in proportion to the abundance distribution across the area (see Table 2). Thus, based on an average for the two past surveys, an appropriate catch distribution across Blocks A, B and C+D could be in the neighbourhood of the ratios 15%:55%:30%. Furthermore, spreading catches over

time within the season would constitute an additional safeguard against depletion of aggregations.

Table 6: Hitting weighted average (6,572) and lower 5%-ile (5,484) total (1+) population sizes in 1991 for various values of $MSYR^{1+}$ for the EGI (B) High catch series for North Atlantic fin whales and projecting forward under future annual catches of 0, 50, 100 and 200 animals from 1999 to 2020. Results are shown for the female component of the population.

$MSYR^{1+}$ (%)	N^{mat}_{1998}/K^{mat}	N^{mat}_{2020}/K^{mat}			
		$C_{1999+}=0$	$C_{1999+}=50$	$C_{1999+}=100$	$C_{1999+}=200$
$N^{1+}_{1991}=6572$					
1	0.38	0.49	0.42	0.36	0.22
2	0.51	0.76	0.68	0.59	0.41
4	0.72	0.98	0.90	0.81	0.62
$N^{1+}_{1991}=5484$					
1	0.33	0.43	0.36	0.29	0.15
2	0.44	0.69	0.60	0.50	0.31
4	0.64	0.98	0.88	0.78	0.56

In summary, the WG considered that in the short to medium term (next 10 years), an annual catch of up to 200 fin whales per year posed no conservation threat to the fin whales in the EGI stock area, provided that such catches were appropriately spread both spatially throughout the area and temporally through the season.

However, with a view towards optimal utilisation of this resource in the longer term, it is important that research be continued to monitor abundance trends and to improve understanding of stock structure and dynamics (see below).

5.6 Recommendations for future research

Population model incorporating immigration

The WG agreed that the most likely explanation of the declining CPUE between 1901-1915 and the apparent recovery of the stock by 1930 was the existence of two or more aggregations in the EGI area, with relatively rapid mixing between such groups. The depletion of a relatively small nearshore Icelandic group was therefore followed by rapid recovery through both natural population growth and immigration from other groups within the EGI stock area. A population model incorporating these features could be developed, probably through modification of the HITTER/FITTER program.

Stock structure

The WG agreed that stock delineation is the most critical issue in fin whale assessment at this time. While it is evident that the stock structure of fin whales is

more complex than reflected by the present stock areas, the details of stock structure are not clear. Several approaches to resolving this problem were identified:

a. Further genetic analyses of existing samples, involving additional microsatellite loci and statistical analyses to determine if there are natural genetic groupings. This is in contrast to the present approach of discriminating between samples taken at different locations.
b. Obtaining additional genetic samples over a broader area, including areas not traditionally harvested.
c. Mark-Recapture studies using genetic marks or other techniques. This approach was considered promising as it could provide information on possible local aggregations..
d. Stock delineation using pollutant or isotopic signatures. This approach may be useful because it provides a reflection of the present-day migration and feeding activities of the animals, rather than the historical reflection inherent in conventional genetic studies.
e. Telemetry. The WG considered this to be a very promising and cost-effective approach if the tags can be made to function for 6 months or more. Tracking studies could provide immediate and unequivocal answers to questions on distribution, migration, and activity patterns.

Abundance estimates

The WG agreed that regular abundance surveys were essential for monitoring the trend in the stocks. This will be particularly important should harvesting resume. The heavier the level of exploitation, the more frequently surveys should be conducted. For exploitation levels of the order being considered here, sightings surveys conducted at intervals of about 5 years were considered a satisfactory method of obtaining abundance estimates and their trends.

6. OTHER BUSINESS

There was no other business.

7. ADOPTION OF REPORT

The report was adopted with the unanimous agreement of all WG participants.

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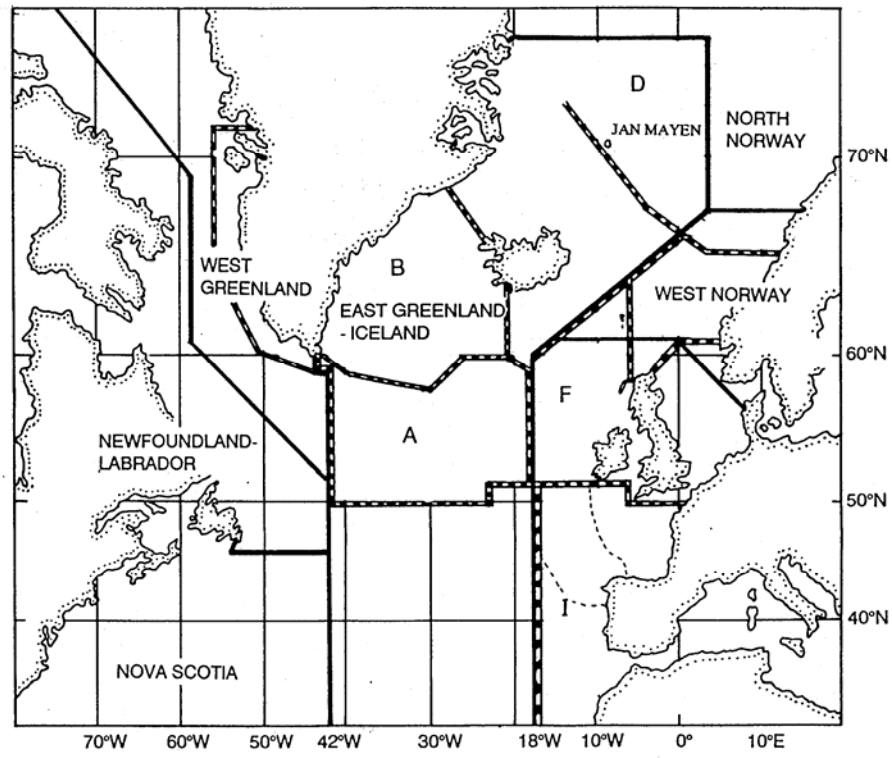

Figure 1: North Atlantic, showing the Schedule areas (enclosed by solid lines), and the block areas of the EGI Stock Area (A, B, C and D) used in these analyses. (Adapted from SC/7/FW/4, Fig. 3)

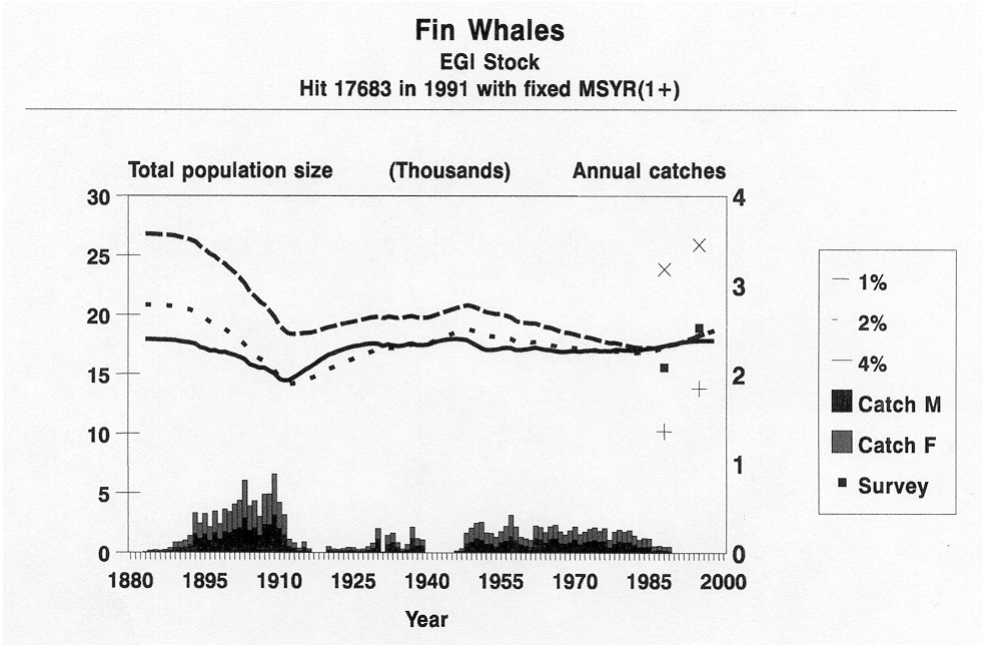

Figure 2: Total (1+) population trajectories from 1883 to 1998 when hitting a total population size of 17,683 for 1991 for MSYR(1+) values of 1 %, 2% and 4%. Annual catches are indicated at the bottom of the plot. The 1988 and 1995 survey estimates of abundance are shown with 95% confidence intervals.

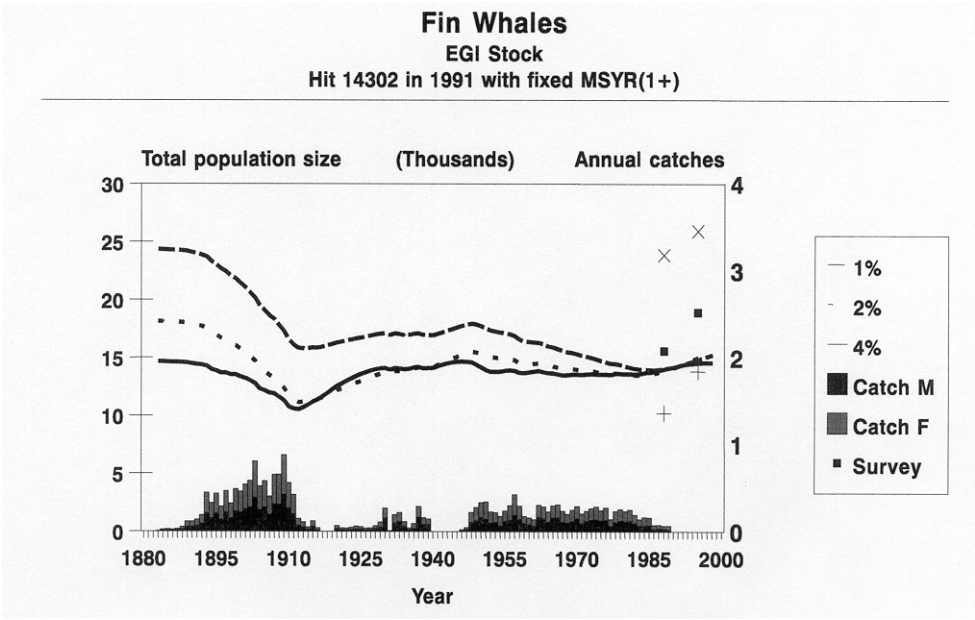

Figure 3: Total (1+) population trajectories from 1883 to 1998 when hitting a total population size of 14,302 for 1991 for MSYR(1+) values of 1 %, 2% and 4%. Annual catches are indicated at the bottom of the plot. The 1988 and 1995 survey estimates of abundance are shown with 95% confidence intervals.

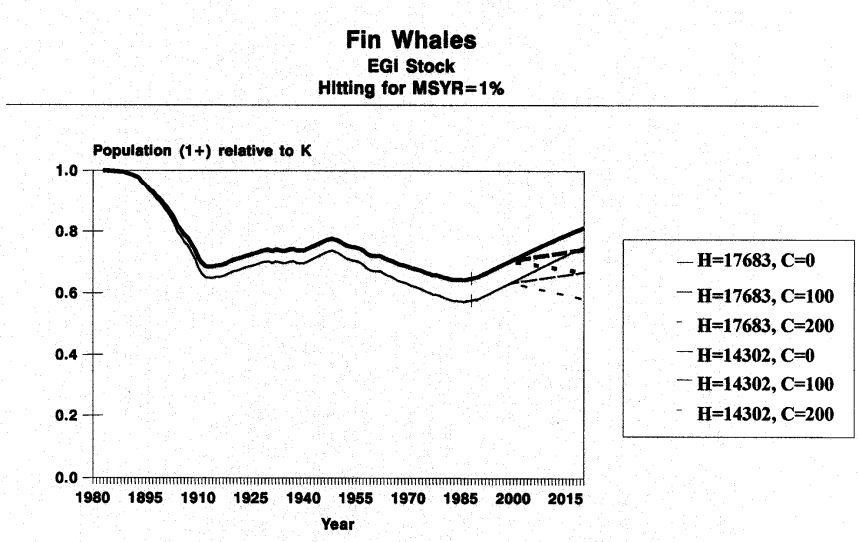

Figure 4: Total (1+) population trajectories as a proportion of the corresponding pre-exploitation equilibrium level K(1+), when hitting N1+(1991)=17,683 and 14,302 for MSYR(1+)=1% for future annual catches of 0, 100 and 200 animals.

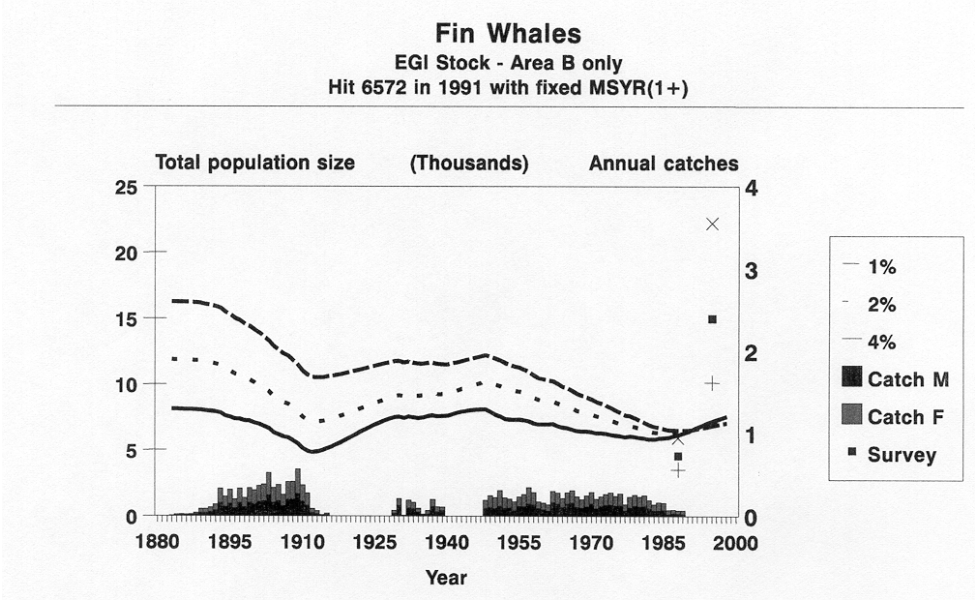

Figure 5: Total (1+) population trajectories from 1883 to 1998 when hitting a total population size of 6,572 for 1991 for MSYR(1+) values of 1 %, 2% and 4%. Annual catches are indicated at the bottom of the plot. The 1988 and 1995 survey estimates of abundance are shown with 95% confidence intervals.

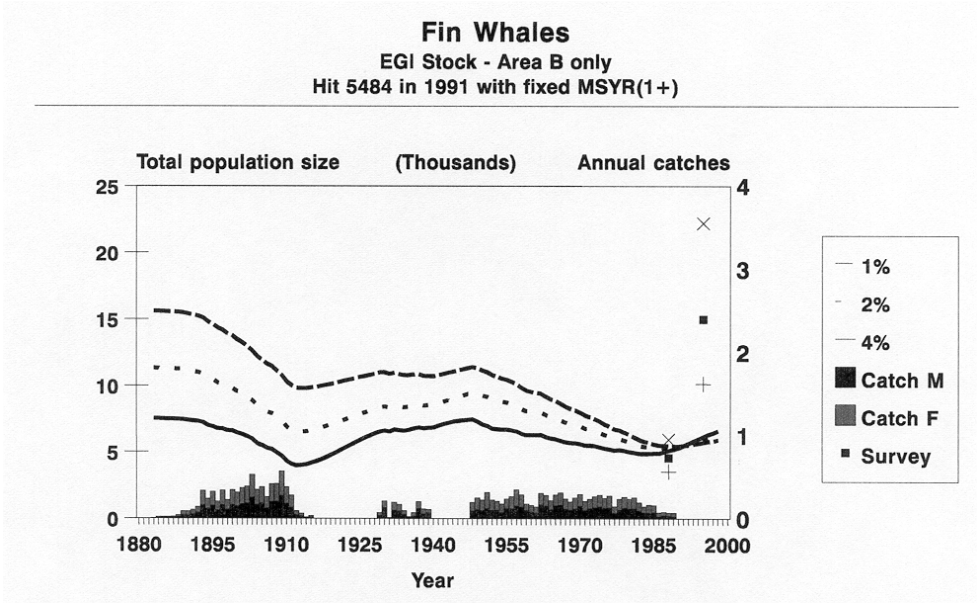

Figure 6: Total (1+) population trajectories from 1883 to 1998 when hitting a total population size of 5,484 for 1991 for MSYR(1+) values of 1 %, 2% and 4%. Annual catches are indicated at the bottom of the plot. The 1988 and 1995 survey estimates of abundance are shown with 95% confidence intervals.

Appendix 1 - **LIST OF PARTICIPANTS**

Dr Martine Bérubé (United Kingdom)
Dr Eric Born (Denmark)
Dr Doug Butterworth (South Africa)
Ms Helena Geromont (South Africa)
Mr Þorvaldur Gunnlaugsson (Iceland)
Dr Mads Peter Heide-Jørgensen (Denmark)
Dr Grete Hovelsrud-Broda (NAMMCO)
Mr Daniel Pike (NAMMCO)
Mr Gísli A. Víkingsson (Iceland)

Other Members (not at Meeting):

Dr Nils Øien (Norway)
Dr Lars Witting (Greenland)
Dr Dorete Bloch (Faroe Island)
Mr Jóhann Sigurjónsson (Iceland)
Ms Anna K. Daníelsdóttir (Iceland)
Mr Michael C.S. Kingsley (Greenland)

Appendix 2 – **AGENDA**

1. Opening remarks and terms of reference.
2. Adoption of agenda
3. Appointment of rapporteur
4. Review of relevant documents and reports
5. Review of available data on North Atlantic fin whales.
    - 5.1 Stock structure
    - 5.2 Biological parameters
    - 5.3 Catch data
    - 5.4 Abundance estimates
    - 5.5 Assessments
    - 5.6 Recommendations for future research
6. Other business
7. Adoption of report

Appendix 3 - **LIST OF DOCUMENTS**

SC/7/FW/1	List of Participants
SC/7/FW/2	Draft Annotated Agenda
SC/7/FW/3	List of Relevant Documents
SC/7/FW/4	International Whaling Commission, 1992. Report of the Comprehensive Assessment Special Meeting on North Atlantic Fin Whales. *Rep. int. Whal. Commn* 42: 595-669.

SC/7/FW/5 Bérubé, M., Aguilar, A., Dendanto, D., Larsen, F., Notarbartolo di Sciara, G., Sears, R., Sigurjónsson, J., Urban-R., J. And Palsbøll, P.J. 1998. Population genetic structure of North Atlantic, Mediterranean Sea and Sea of Cortez fin whales, *Balaenoptera physalus* (Linnaeus 1758): analysis of mitochondrial and nuclear loci. *Molecular Ecology* 7(5): 585-601.

SC/7/FW/6 Christensen, L., Haug, T. and Øien, N. 1992. Seasonal distribution, exploitation and present abundance of stocks of large baleen whales (*Mysticeti*) and sperm whales (*Physeter macrocephalus*) in Norwegian and adjacent waters. *ICES J mar. Sci.* 49: 341-355.

SC/7/FW/7 Christensen, L., Haug, T. and Øien, N. 1992. A review of feeding and reproduction in large baleen whales (*Mysticeti*) and sperm whales *Physeter macrocephalus* in Norwegian and adjacent waters. *Fauna norv*. Ser. A 13: 39-48.

SC/7/FW/8 Daníelsdóttir A.K., Duke E.J., Joyce P., Árnason A. 1991. Preliminary studies on the genetic variation at enzyme loci in fin whales (*Balaenoptera physalus*) and sei whales (*Balaenoptera borealis*) from North-Eastern Atlantic. *Rep. int. Whal. Commn* (special issue 13):115-124.

SC/7/FW/9 Daníelsdóttir, A.K., Sigurjónsson, J., Mitchell, E. and Árnason, A 1992. Report on a pilot study of genetic variation in skin samples of North Atlantic fin whales (*Balaenoptera physalus*). Paper SC/44/NAB16 presented to the IWC Scientific Committee, June 1992 (unpublished). 8pp.

SC/7/FW/10 NAMMCO, 1997. Report of the Scientific Committee working group on abundance estimates. NAMMCO Annual Report 1997: 173-202.

SC/7/FW/11 Witting, L . 1999. Review of Greenland Fin Whales. NAMMCO Working Paper.

SC/7/FW/12 Baldursson, F.M. 1995. Application of the RMP to East-Greenland/Iceland fin whale. NAMMCO WG-MP/2/3. An unpublished paper submitted to the 3rd meeting of the Scientific Committee of NAMMCO, Copenhagen 31. January-3. February, 1995.

SC/7/FW/13 Butterworth, D.S. and Punt, A.E. 1992 Assessments of the East Greenland-Iceland Fin Whale Stock *Rep. int. Whal. Commn* 42: 671-696.

SC/7/FW/14 Lockyer, C. and Sigurjónsson, J. 1992. Author's summary of SC/F91/F8: The Icelandic Fin Whale, (*Balaenoptera physalus*): Biological Parameters and their trends over time. *Rep. int. Whal. Commn* 42: 617-618.

SC/7/FW/15 Waring, G.T., Palka, D.L, Clapham, P.J., Swartz, S., Rossman, M., Cole, T., Bisack, K.D. and Hansen L.J. 1998. U.S. Atlantic marine mammal stock assessments – 1998. Fin whale (*Balaenoptera physalus*): Western North Atlantic Stock. pp. 26-30. National Marine Fisheries Science Center, Woods Hole, Mass.

SC/7/FW/16 Butterworth, D.S. and Geromont, H.F. 1999. Assessments of the East Greenland-Iceland fin whale stock using HITTER-FITTER.

SC/7/FW/17 Danielsdottir, A.K. Review on the genetic stock structure of North Atlantic fin whales (*Balaenoptera physalus*).

Appendix 4 - **CATCH DATA**

Historic sex-disaggregated catch series for North Atlantic fin whales in the EGI Stock Area. The EGI(B)-HIGH series is the estimated catch series for Block B (see Figure 1), under assumptions that place the catch at its probable upper bound. Adapted from SC/7/FW/13.

EGI Stock Area			**EGI(B)-HIGH**	
Year	**M**	**F**	**M**	**F**
1883	2	4	2	3
1884	10	12	8	9
1885	12	16	9	12
1886	10	12	8	9
1887	15	16	11	12
1888	25	28	19	21
1889	54	61	41	46
1890	55	61	41	46
1891	66	72	50	54
1892	90	97	68	73
1893	213	232	169	174
1894	156	171	113	124
1895	208	226	154	167
1896	137	149	97	107
1897	223	241	161	174
1898	155	168	106	116
1899	233	254	162	178
1900	221	237	149	161
1901	260	281	174	190
1902	280	304	183	200
1903	390	418	252	273
1904	251	271	164	179
1905	279	300	182	197
1906	195	209	123	134
1907	316	338	199	216
1908	316	339	201	218
1909	424	455	272	296
1910	270	291	180	196
1911	204	219	133	145
1912	72	77	44	47
1913	52	57	29	32
1914	24	26	7	8
1915	59	62	16	18
1916	21	21	0	0
1917	0	0	0	0

EGI Stock Area			**EGI(B)-HIGH**	
Year	**M**	**F**	**M**	**F**
1918	0	0	0	0
1919	0	0	0	0
1920	34	34	0	0
1921	22	22	0	0
1922	20	19	0	0
1923	24	24	0	0
1924	30	31	0	0
1925	29	28	0	0
1926	19	20	0	0
1927	23	20	0	0
1928	36	34	0	0
1929	53	56	37	32
1930	157	112	131	79
1931	1	8	1	8
1932	98	96	98	96
1933	118	102	90	80
1934	59	56	50	46
1935	21	23	12	13
1936	37	56	27	45
1937	165	124	119	85
1938	82	77	55	58
1939	84	63	66	43
1940	0	0	0	0
1941	0	0	0	0
1942	0	0	0	0
1943	0	0	0	0
1944	0	0	0	0
1945	0	0	0	0
1946	13	10	0	0
1947	27	22	0	0
1948	106	116	92	103
1949	123	156	107	142
1950	162	172	97	129
1951	143	200	123	189
1952	99	127	98	126
1953	107	111	101	106
1954	70	107	70	107
1955	120	120	118	118
1956	134	165	116	149
1957	190	235	150	198
1958	143	151	141	148
1959	97	81	97	81

EGI Stock Area			**EGI(B)-HIGH**	
Year	**M**	**F**	**M**	**F**
1960	81	79	81	79
1961	65	77	65	77
1962	166	139	165	138
1963	152	134	152	131
1964	114	116	110	107
1965	161	136	156	132
1966	163	149	162	148
1967	111	128	111	128
1968	102	101	101	101
1969	117	134	117	134
1970	153	138	153	138
1971	97	111	97	111
1972	122	116	122	116
1973	135	132	135	132
1974	142	143	142	143
1975	127	118	127	118
1976	132	143	132	143
1977	64	80	64	80
1978	106	131	105	131
1979	127	133	127	133
1980	117	120	117	120
1981	121	133	121	133
1982	96	98	96	98
1983	70	74	70	74
1984	67	100	67	100
1985	73	88	73	88
1986	27	49	27	49
1987	38	42	38	42
1988	31	37	31	47
1989	23	45	23	45
1990	0	0	0	0
1991	0	0	0	0
1992	0	0	0	0
1993	0	0	0	0
1994	0	0	0	0
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0

SECTION 4 - NATIONAL PROGRESS REPORTS

4.1
FAROE ISLANDS – PROGRESS REPORT ON MARINE MAMMAL RESEARCH IN 1998

Dorete Bloch, Maria Dam and Jústines Olsen

1. INTRODUCTION

This report summarises the Faroese research on cetaceans and pinnipeds conducted in 1998. Since 1984, the main bulk of research on marine mammals in the Faroes has been conducted by the Zoological Department of the Faroese Museum of Natural History, supplied with some assistance from the Faroese Fisheries Laboratory, the Department of Natural Science at the University of the Faroes and in recent years from the Food and Environmental Agency of the Faroes.

2. RESEARCH

2.1 Species and stocks studied

Pinnipeds

* Walrus (*Rosmarus rosmarus*)
  Grey seal *(Halichoerus grypus)*

Cetaceans

* Sperm whale (*Physeter macrocephalus*) - stranded animals
* Sowerby's beaked whale (*Mesoplodon bidens*) - by-catch
* Pilot whales (*Globicephala melas*) - landed animals
* White-sided dolphins (*Lagenorhyncus acutus*) - landed animals

2.2 Field work

Pinnipeds

A walrus was observed 23. March 1998, swimming south through Vestmannasound, and from the 24 March until 3 April it was observed at Nólsoy. It was a 270cm long male with 30 cm long tusks. Attempts were made to tag it with satellite-tags, but before everything was in place, the walrus had left, visibly fattened.

Questionnaires were prepared for distribution to boats fishing in Faroese waters to examine a possible by-catch of pinnipeds and cetaceans.

Cetaceans

Opportunistic sightings of whales were reported to the Museum of Natural History by the Faroese Fisheries Inspection Services, the Danish Fisheries Inspection Services, the Faroese fisheries research vessel (MH, Hvítiklettur), local ferries between the islands in the Faroes (Sam, Ternan, Ternan I, Tróndur), the weekly oil-boat between the Faroes and Stavanger, Norway (Magn I), as well as numerous local sources.

As in the previous years the most commonly observed baleen whales in Faroese waters were fin (*Balaenoptera physalus*) and minke (*Balaenoptera acutorostrata*) whales. One group of blue whales (*Balaenoptera musculus*) was also observed. Among the toothed whales the most commonly observed were sperm, bottlenose (*Hyperoodon ampullatus*), pilot, and killer (*Orcinus orca*) whales.

Pilot whales
Sex, *skinn* values and total body length (cm) have been recorded from all pilot whales caught in 1998 with kind assistance from the *sýslumen* and *grindamen*.

Further observations were made of the time used to kill the whales and of the use of the blunt hook.

The project to deploy satellite tags on seven pilot whales out of a pod and release the whole pod is still planned but awaits the right opportunity.

Samples were taken by the Food and Environmental Agency from pilot whales to examine the levels of heavy metals and organochlorines in meat and blubber respectively. The results will be available after further calibration measures are carried out, and will be compared to those found in the 1986-88 examination of environmental pollutants.

Sperm Whale
A very decayed whale, probably a sperm whale, was stranded in Sørvágur on 27 February 1998.

Sowerby's beaked whale
One specimen of *Mesoplodon bidens* was entangled and injured in the net of a Japanese boat fishing tuna (*Thunnus thynnus*) in Faroese waters on 30 October 1998. The whale was killed and the meat sold for consumption. The whale was about 5 m in length. No samples were taken, but some photos were obtained.

White-sided dolphins
Sex, *skinn* values and total body-length in cm have been recorded from most white-sided dolphins caught in 1998 with the kind assistance of the *sýslumen* and *grindamen*. Samples were taken 21 August 1997 at Klaksvík, to be analysed for environmental pollutants.

2.3 Laboratory work

Pinnipeds
Grey seal
Grey seals sampled for the dietary study in the period 1993 to 1995 (Mikkelsen 1998) were analysed for heavy metals (Hg, Cd, Pb and Cu) and organic pollutants (incl. PCB, toxaphene and polycyclic aromatic hydrocarbons). Pooled samples were first analysed as part of the implementation of Arctic Monitoring and Assessment Programme (Larsen and Dam), and later as individuals with funding from the Arctic Environmental Program administrated by the Danish Environmental Protection

Agency. The project is run by the Food and Environmental Agency of the Faroe Islands, and it will be completed and the results made available in 1999.

Cetaceans

Pilot whales

The Food and Environmental Agency conducted a screening for environmental pollutants (mercury, PCB, *p,p´*- and *o,p´*- DDT and metabolites, chlordanes, toxaphene and a selection of additional pesticides) on a total of 466 individuals randomly picked from 913 of the whales killed in 1997, and on 50 of the total of 55 pilot whales killed in Hvalvík on 25 November 1998. From the Hvalvík 25 November 1998 *grind* heart tissue samples from 10 individuals were also taken for mercury analyses. Samples from Vestmanna taken 26 June 1996 (samples from 50 spec.) and Hvannasund taken 30 June 1994 (samples from 19 spec.) were analysed for dioxins (PCDD and PCDF, not publ.) and flame retarders (PBDE, Lindström *et al*., in press) in addition to the above mentioned set of pollutants.

The standard procedure adopted by the Food and Environmental Agency involves sampling of muscle and blubber taken ventrally, caudal to the dorsal fin, ideally 50 individuals from each *grind*. The subsequent analyses for environmental pollutants are normally done on three pooled samples from each *grind*. The two first samples thus represent the adult females and males, i.e. the actively reproducing whales from the school. Juveniles of both sexes are combined in the third pool. The rationale for this is to monitor the concentration of pollutants from the consumer's point of view for a minimum cost. Results of earlier studies have shown that the sexually mature females deviate from the other individual in the school with respect to concentrations of especially the lipid soluble persistent organic pollutants.

With funding from the Arctic Environmental Program (administrated by Miljøstyrelsen, DK) the blubber samples from the *grinds* at Tórshavn on 24 September 1997 and at Sandavágur on 26 August 1997 were analysed for halogenated organic persistent pollutants individually, and the muscle samples from the Tórshavn 13 November 1997 and Leynar 2 December 1997 *grinds* were likewise analysed individually for mercury. The purpose of this was to define the range of concentrations of the relevant pollutants. Blubber samples from Sandavágur 26 August 1997, Leynar 2 December 1997, Hvalvík 25 November 1998 and Tórshavn 24 September 1997 are presently being analysed for flame retarders in co-operation with the University of Umeå, Sweden. The specimens from the first three schools were combined into pools of adults and juveniles, females and males (four pools from each *grind*) whereas a selection of 12 samples (3 specimens from each of the four groups) from Tórshavn 24. September 1997 were analysed individually.

White-sided dolphins

Samples of white-sided dolphins became available in Klaksvík on 21 August 1997, (Table 2). Muscle and blubber samples were taken from 50 specimens in a manner similar in every respect to the procedure used for pilot whales (above). The tissue samples were analysed for the same set of environmental pollutants as the pilot whale samples. As with the grey seals from 1993 – 1995 and the pilot whales from Tórshavn

24 September 1997 and Sandavágur 26 August 1997, the dolphins were analysed for mercury and persistent halogenated organic pollutants both in pools and subsequently as individuals. The work was funded by grants from the Arctic Environmental Program.

2.4 Other studies

Pinnipeds

No further studies have been conducted on Pinnipeds.

Cetaceans

The analysis of historical data from the National Archives in Tórshavn, has been continued.

2.5 Research results

Cetaceans

Research on the development of new techniques and monitoring of killing time for pilot whales continued in 1998. A blunt hook has been tested and adopted as equipment in the Faroese pilot whale drive hunt. This hook has been tested 1995-1998 and the Total Killing Time was 29.2 ± 4.15s; range 6-211s; 50% dispatched in 20.0s (N=52). When using the traditional hook the Total Killing Time was 36.1 ± 1.96s; range 3.5-195s; 50% dispatched in 25.2 s (N=199).

3. CATCH DATA

Sealing

A number of grey seals are shot every year in connection with salmon farming to prevent the seals from preying on the salmon, but there is no systematic reporting of these removals.

Whaling

Table 1: Pilot whale drives in the Faroe Islands, 1998.

Date	Locality	Number of whales
15 July	Hvalba	251
23 July	Bøur	54
24 July	Sandavágur	66
29 July	Hvannasund **	170
30 July	Gøta **	111
26 August	Hvannasund	49
2 November	Sandur	59
25 November	Hvalvík	55
Total	8 grinds	815 whales

** Part of pod

Table 2: Drives of species other than *G. melas* in the Faroe Islands, 1998

Date	Locality	Number	Species
27 July	Fámjin	167	L. acutus
13 September	Fuglafjørður	16	L. acutus
22 September	Tvøroyri	219	L. acutus
22 September	Vágur	36	L. acutus
Total		438	L. acutus

5. PUBLICATIONS AND DOCUMENTS

Bloch, D. 1998. Sustainable use of marine mammals. The Faroe Islands drive fishery. *The European Electronic Conference on research and Biodiversity.* 14th May 1998. 1999

Bloch, D. 1998. A review of marine mammals observed, caught or stranded over the last two centuries in Faroese Waters. *Shetland Sea Mammal Report*, 1997: 15-37.

Bloch, D. 1998. Long-term Fluctuations in Age and Sex Composition of Pilot Whale Schools in the Faroe Islands. Extended abstract. *In*: Bloch, D. and Enckell, P.H. (eds.). Proceedings from: *Environmental change in North Atlantic Islands Tórshavn, Faroe Islands, 17-20 May 1998. Fróðskaparrit* 46: 165-166.

Bloch, D. and Olsen, J. 1998. Faroe Islands - Progress Report on marine mammal research 1996. *North Atlantic Marine Mammal Commission, Annual Report 1997*: 205-214.

Bloch, D. and Olsen, J. 1998. Faroe Islands - Progress Report on marine mammal research 1997. *North Atlantic Marine Mammal Commission, Annual Report* 1998: SC/6/NPR-F: 1-4.

G. Lindström, Wingfors, H., Dam, M. and Bavel, B. v. in press. Identification of 19 brominated diphenylethers (PBDEs) in Long-Finned Pilot Whale (*Globicephala melas*) from the Atlantic. Accepted for publication in *Arch. of Environmental Contamination and toxicology.*

Larsen, R.B and Dam, M. in prep. "AMAP Faroe Islands phase I"

Lastein, L. 1998. Grindir í Føroyum 1850-1995. *Fiskirannsóknir* 8: 73-82.

Mikkelsen, B. 1998. Summer diet of grey seals *Halichoerus grypus* in the Faroe Islands. Department of Aquatic Resources and Environmental Biology, Norwegian College of Fishery Science, University of Tromsø, Norway. Thesis.

Schröder, J.H. 1998. Levels of polychlorinated biphenyls and life history in long-finned pilot whales (*Globicephala melas*) from New Zealand strandings. *Thesis. Victoria University of Wellington*: 1-145.

4.2
GREENLAND – PROGRESS REPORT ON MARINE MAMMAL RESEARCH IN 1997

1. INTRODUCTION

This report summarises the Greenlandic research on pinnipeds and cetaceans carried out in 1996. Most of the research was conducted by The Greenland Institute of Natural Resources, but some projects also involved the Department of Fisheries and Oceans, Canada (DFO), and The National Environmental Research Institute, Department of Arctic Environment, Denmark.

2. RESEARCH

2.1 Species and stocks studied

Pinnipeds

Ringed seals *Phoca hispida* – North West Greenland
Harp seals *Phoca groenlandica* – West Greenland
Walrus *Odobenus rosmarus* – West Greenland

Cetaceans

Narwhal *Monodon monoceros* – Tremblay Sound (Northeast Canada)
Beluga *Delphinapterus leucas* - West Greenland

2.2 Field work

Pinnipeds

Six ringed seals were equipped with satellite-linked transmitters in Avanersuaq, Northwest Greenland, in order to learn more about their use of the North Water Polynia.

Cetaceans

Five narwhals were equipped with satellite-linked transmitters in Tremblay Sound (Northeast Canada), in order to monitor their fall-migration.

2.3 Other Studies

Pinnipeds

Collection of data for a study on harp seal ecology was initiated in 1997.

Genetic studies to determine population boundaries of Atlantic Walrus were continued in 1997.

Cetaceans

The collection of lower jaws from harvested narwhals and beluga was continued in 1997.

2.4 Research results

Cetaceans

The transmitters on narwhals worked for up to five months and gave information on the fall migration from Tremblay Sound to the southern part of Baffin Bay.

3. CATCH DATA

Pinnipeds

Reported catches in 1996 were; 305 walrus, 255 harbour seals, 2,123 bearded seals, 9,888 hooded seals, 74,758 harp seals, 89,782 ringed seals.

Cetaceans

Reported catches in 1996 were; 19 fin whales, 172 minke whale, 67 long-finned pilot whales, 727 narwhal, 521 beluga, 1,824 harbour porpoise,

4. ADVICE GIVEN AND MANAGEMENT MEASURES TAKEN

None.

5. PUBLICATIONS AND DOCUMENTS

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4.3
ICELAND –
PROGRESS REPORT ON MARINE MAMMAL RESEARCH IN 1998

1. INTRODUCTION

The following are reports on studies conducted by or in co-operation with the Marine Research Institute (MRI) and the Research Committee for Biological Seafood Quality (RCBSQ), Reykjavík, Iceland.

2. RESEARCH

2.1 Species/stocks studied

Pinnipeds

The main emphasis was on studies of the local Icelandic seal stocks of common seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*). A research project on the feeding ecology of hooded seals (*Cystophora cristata*) north of Iceland was initiated in 1998.

Cetaceans

In 1998 research on cetaceans conducted by the MRI and co-operating institutions concentrated on the recently exploited minke (*Balaenoptera acutorostrata*), fin (*B. physalus*) and sei (*B. borealis*) whales. Special emphasis was also placed on laboratory work and analysis of data from a research project on the feeding ecology and biology of harbour porpoises (*Phocoena phocoena*) sampled from by-catch during 1991-1997. Long term photo-id studies were continued on blue (*Balaenoptera musculus*), humpback (*Megaptera novaeangliae*) and killer whales (*Orcinus orca*). Monitoring and sampling of stranded and beached cetaceans continued.

2.2 Field work

Pinnipeds

Grey seal haul-out sites were visited, for studying the dispersal of grey seals, and their times of breeding and moulting. Aerial surveys were undertaken to monitor the development of the common and grey seal stocks in Iceland. These surveys were compared with that of 1995, when the seals were last counted.

Cetaceans

The program of systematic sampling of bycaught harbour porpoises was discontinued in 1998. During 1991-1997 a total of 1,287 harbour porpoises were sampled; 482 females and 796 males. Information on stranded or beached cetaceans at the Icelandic coast in 1998 was collected by the MRI and the Icelandic Institute of Natural History. These include:

- 5 sperm whales (*Physeter macrocephalus*) at different locations in Iceland during April-November.
- 1 humpback whale in August in N-Iceland

- 5 white-beaked dolphins in the southern part of Iceland during April-June.
- 4 striped-dolphins (*Stenella caeruleoalba*) in September in SW-Iceland.
- 1 common dolphin (*Delphinus delphis*) in February in SE-Iceland.
- 2 killer whales in NW and SE Iceland during May and February, respectively.
- 1 Cuvier's beaked whale (*Ziphius cavirostris*) in May in South Iceland.
- 1 harbour porpoise during February in NW - Iceland.
- 1 long-finned pilot whale (*Globicephala melas*) during September in North Iceland.
- 2 Northern bottlenose whales (*Hyperodon ampullatus*) in Southwest Iceland in September and October.
- 1 unidentified Balaenopterid whale during November in NW- Iceland.
- 1 white-sided dolphin (*Lagenorhynchus acutus*) in South Iceland during September.

A long-term photo-id study on killer whales was continued. In 1998 photos were collected on the herring (*Clupea harengus*) grounds east of Iceland during autumn.

A research project on stock identification, migration and possible hybridisation of blue whales was continued in co-operation with Richard Sears and co-workers at Mingan Island Cetacean Study, Inc., Canada. The study involves the establishment of a photographic catalogue and biopsy sampling of blue whales in Icelandic waters and comparisons with data from Canada and other areas in the North Atlantic. During 11-14 July 1998, 3 biopsies from were collected off W-Iceland, and photographs of sufficient quality were obtained from approximately 10-15 individuals.

2.3 Laboratory work

Pinnipeds

Work on age determination from growth annuli in seal teeth from the catch of 1998, was started. Analysis of stomach contents from hooded seals caught in 1999 was completed.

Cetaceans

Analysis of data obtained as a part of the YONAH project (years of the North Atlantic humpback whale, 1992-1993), was continued in co-operation with other participating countries.

Analysis of MRI's photo-id catalogue of killer whales was continued and a systematic comparison with the Norwegian catalogue was made. The Icelandic catalogue now contains around 350 individuals.

Laboratory work and validation of data on stomach contents, age and reproduction of harbour porpoises was completed in 1998 and laboratory work on white-beaked dolphins is at a final stage.

Research on genetic variation in baleen whales was continued. The main objective of these studies is to investigate the population structure of fin, blue, sei and minke whales in Icelandic and adjacent waters.

2.4 Other studies

A study on dynamic interactions between five marine mammal species, and some fish resources in Icelandic and adjacent waters using a simulation model was continued.

2.5 Research results

Pinnipeds

According to recent surveys the stock of common seals in Iceland seems stable at about 15,000 animals (8,000-23,000). The grey seal stock has continued to decline. It was estimated at 6,000 (4,700-7,200) in the autumn of 1998. The estimates for the year 1995 were 14,000 (8,000-22,000) common seals and 8,000 (6,500-9,500) grey seals.

Cetaceans

Genetic analysis of blue whale biopsy samples taken in 1997-1998 was initiated. One of the animals biopsied in 1998 turned out to be a blue/fin whale hybrid, the fourth of its kind found in Icelandic waters. No photo-id matches have been made between blue whales off Iceland and animals photographed at other locations in the North Atlantic.

Capelin seems to be the most important food species of the harbour porpoise during March and April in Icelandic waters. Sand eel (*Ammodytes* sp.) and other fish species such as redfish and gadoids are more important at other times of the year.

Studies on growth and reproduction have shown mean maximum lengths 158cm and 152cm for females and males, respectively. Mean age at sexual maturity is 3.1 years for females and 2.8 years for males.

Preliminary results from studies on nematodes in digestive tract of harbour porpoises indicate that the species is not an important host for *Anisakis simplex*.

3. CATCH DATA

Pinnipeds

Preliminary catch figures for 1998 are 565 grey seals, 533 common seals and 65 seals of other species.

Cetaceans

No directed catch of cetaceans took place in Icelandic waters in 1997.

4. ADVICE GIVEN AND MANAGEMENT MEASURES TAKEN

No whaling permits were issued in 1998. A precautionary TAC of 100 fin whales and 250 minke whales was recommended by the MRI. No special management measures were taken regarding seals.

5. PUBLICATIONS AND DOCUMENTS (MRI, RCBSQ and co-operating institutions)

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4.4
NORWAY -
PROGRESS REPORT ON MARINE MAMMAL RESEARCH IN 1998

Sidsel Grønvik, Tore Haug and Nils Øien

1. INTRODUCTION

This report summarises the Norwegian research on pinnipeds and cetaceans conducted in 1998. The research was conducted at the University of Tromsø: the Department of Arctic Biology (UITØ-AAB) and the Norwegian College of Fishery Science (UITØ-NFH), the Norwegian College of Veterinary Medicine, Department of Arctic Veterinary Medicine in Tromsø (NVH-IAV), the Institute of Marine Research in Bergen (IMR), the Norwegian Institute for Fisheries and Aquaculture in Tromsø (NIFA), the Norwegian Institute for Nature Research in Oslo (NINA), the Polar Institute in Tromsø (NP), the University Studies at Svalbard (UNIS) and RC Consultants, Sandnes (RCC) .

2. RESEARCH

2.1 Species and stocks studied

Pinnipeds

Harp seals *Phoca groenlandica* - Greenland and Barents Seas
Hooded seals *Cystophora cristata* - Greenland Sea
Common seals *Phoca vitulina* - Svalbard, Norwegian coastal waters
Grey seals *Halichoerus grypus* – Norwegian coastal waters
Ringed seals *Phoca hispida* - Svalbard
Bearded seals *Erignathus barbatus* - Svalbard
Weddell seals *Leptonychotes weddelli* - Weddell Sea (Antarctic)
Crabeater seals *Lobodon carcinophagus* - Weddell Sea (Antarctic)
Ross seals *Ommatophoca rossi* - Weddell Sea (Antarctic)
Leopard seals *Hydrurga leptonyx* – Weddell Sea (Antarctic)

Cetaceans

Minke whales *Balaenoptera acutorostrata* - Northeast Atlantic, northwest Pacific
Humpback whales *Megaptera novaeangliae* - North Atlantic
Killer whales *Orcinus orca* - Norwegian coastal waters
White whales *Delphinapterus leucas* – Svalbard
Narwhals *Monodon monoceros* - Svalbard
Harbour porpoise *Phocoena phocoena* - North Sea, Norwegian coastal waters

2.2 Field work

Pinnipeds

The ecology of seal pups (growth, changes in condition and diets) through the initial stages of their independent life, i.e. from weaning until they have started to feed independently, were studied during commercial seal hunting in the Barents Sea (East Ice) and Greenland Sea (West Ice) in March-May. The pup ecology project includes both harp and hooded seals. Additional data on body condition were collected from

adult harp seals (NIFA).

A scientific cruise to the Greenland Sea was conducted between 26 March and 12 April 1998, with the purpose of studying various aspects of the physiology of harp and hooded seals. A total of 3 hooded seal pups and 4 harp seal pups were live captured and brought back to the University of Tromsø for use in various laboratory experiments. A total of 19 hooded seals (6 pups, 2 juveniles, 11 adults) and 23 harp seals (9 pups, 14 adults) were harvested, for use as follows: 1) Studies of the function of the pineal gland and its production of melatonin in relation to diving in seals; 2) Monitoring of health status in free-living harp and hooded seals, followed up by studies of the effects of maintenance in captivity on health status (based on repeated analyses of blood parameters (minerals, substrates, selected hormones) and bacterial composition on skin and in nasal, oral and ocular mucosal surfaces); 3) Studies of the extent and possible effects of PCB-exposure in harp and hooded seals (based on PCB-, cytochrome P450 and vitamin analyses in blood, liver, brain, blubber, adrenal and reproductive organ samples); 4) Studies of antioxidant activity in blood samples from hooded seals (UITØ-AAB).

Studies of bearded seals were conducted in Kongsfjorden, Svalbard, during two weeks of May. Sixteen pups were captured and tagged (NFR, UNIS, NP).

Densities of ringed seals in the pack-ice of the Barents Sea were studies by using snowmobiles following polar bear tracks during April/May in the area of "Smutthullet"(NP, UNIS).

Common seals were live-captured for studies of population dynamics, diets and pollution. A total of 98 seals was captured on the west coast of Prince Karls Forland during the first 2 weeks of September (NP, UNIS).

Visual, ship-borne surveys of coastal seals were conducted off northern Norway in June-August 1998 (common seals, breeding and moulting period) and in November (grey seals**,** breeding period) (NIFA).

Aerial photographic surveys of coastal seals (grey seals and common seals) were conducted in several counties of southern and northern Norway during their moulting seasons. Field assessments of seal abundance were carried out in fjord systems in southern Norway where aerial surveys are not feasible (IMR).

Ship-borne surveys of common seals were conducted in Rogaland County in June/July and September/October 1998. The surveys were conducted during the breeding and moulting seasons (RCC).

Ten common seals were instrumented with radio transmitters in 1998 (NINA).

Incidental observations of marine mammals have been collected from institute survey vessels and coastguard vessels. Data collected include date, position, species and numbers (IMR).

Cetaceans

During the commercial whaling season (May-June), stomach samples, body condition data and biological material for studies of demography, reproduction and stock identity were collected from minke whales by scientific personnel on 3 of the participating vessels. Concurrent estimates of prey abundance, using a research vessel fitted with acoustic and trawl gear, were made in the same areas where the sampled whales were caught. Additionally, governmental inspectors collected tissue materials for studies of stock identity from all whales taken by the other vessels participating in the Norwegian small type whaling (NIFA, UITØ- NFH).

During the summer 1998 a sighting survey was conducted in the North Sea and the southern Norwegian Sea. This was the third year of a six-year program to cover the northeast Atlantic to ensure a new abundance estimate of minke whales every 6 years as part of the management scheme established for this species (IMR).

During the whaling season in 1998 prototype II of a penthrite grenade developed and tested on one vessel in 1997 was tested in a large-scale trial that involved all 34 vessels. Six hundred and twenty-five minke whales were shot with the new grenade with good results. In 100 of the whales the sculls were opened and the brains were fixed in situ in 10% formalin and later examined macroscopically and histologically (NVH-IAV).

In September 1998 photo IDs of humpback whales were collected from the Barents Sea area (IMR).

Capture and satellite tagging studies of harbour porpoises were conducted in Sognefjord in June 1998 (IMR).

Three narwhals were live-captured and instrumented with satellite transmitters in the Hinlopen area, Svalbard. Blubber and blood samples were collected from all animals (NP).

Fifteen white whales were live-captured and biopsies were collected for studies of genetics and pollution. Two of the animals were instrumented with satellite transmitters (NP).

2.3 Laboratory work

Pinnipeds

Age readings from teeth have been conducted on harp seals taken during seal invasions and on their feeding grounds in the Barents Sea. Furthermore, data on body condition of adult harp seals (taken during the invasions and in the Barents Sea**)** and of harp and hooded seal pups (from breeding grounds) have been analysed (NIFA).

Blood samples were collected from captive juvenile hooded seals which were experimentally subjected to various light regimes (light-darkness rhythms; photoperiods), in order to study their effect on the dynamics and levels of melatonin production by the pineal gland (UITØ-AAB).

Harp seals were dehydrated using intravenous infusion of mannitol, to study whether subsequent drinking of seawater may restore homeostasis (UITØ-AAB).

A project to investigate health problems in harp and hooded seals in captivity was started in 1998. Nine seals were clinically examined routinely from the time they were caught in the ice and blood samples for serum-chemistry and haematology were taken from the animal at each examination (NVH-IAV).

Age, condition and stomach content data from ringed seals from the Barents Sea drift ice, have been analysed (NIFA, UITØ-NFH).

Data on bearded seal diving behaviour (collected using time-depth-recorders in Spitsbergen waters) are being analysed (UITØ-NFH).

Anatomical, histological and morphometric studies of the gastrointestinal tracts of a variety of Arctic and Antarctic seal species were performed and related to published data on the diving capacity of the various species. Studies of differences in transit times of gut contents in diving and non-diving harp seals were performed by combined use of chemical and radiopaque markers (using X-ray surveillance) (UITØ-AAB).

Cetaceans

Stomach content samples from minke whales have been analysed using traditional methods where the original biomass of prey items are reconstructed based on remaining hard parts in the contents. Acoustic and biological data from prey estimate surveys on the whaling grounds have also been analysed (NIFA, UITØ-NFH).

Tissues sampled for stock identity studies of minke whales have been analysed using DNA techniques (NIFA).

Data on white whale vocalisation (collected in Spitsbergen waters) are being analysed (UITØ-NFH).

Data on killer whale behaviour and ecology and problems concerning the use of photoidentification with the animals are being studied (UITØ-NFH).

2.4 Other work

Pinnipeds

Ecological data from harp seals, collected in Svalbard waters in 1996 and 1997, have been analysed and presented (NIFA).

Anatomical and feeding data from Barents Sea / East Ice harp seals, collected in the period 1990-1996, have been used to model the total annual consumption of the population (NIFA, UITØ-AAB, UITØ-NFH).

Work on a spatial energetic model for common seals based on data from Møre has continued (NINA).

Grey seal data were analysed and presented from the Faroe Islands (feeding ecology) and from northern Norway (breeding biology) (NIFA, UITØ-NFH).

Previously collected data and published work concerning the insulative capacity of seal and whale blubber, were compiled into a Dr. scient. thesis by Dr. Petter H. Kvadsheim. Previously collected data and published work concerning digestive physiology in pinnipeds and cetaceans were compiled into a Dr. scient. thesis by Dr. Per-Erik Mårtensson. Previously collected data and published work concerning the physiological role of the spleen in diving seals, were compiled into a Dr. scient. thesis by Dr. Arnaud J. Cabanac (all UITØ-AAB).

Previously collected data concerning the dive behaviour of harp and hooded seals in the Barents and Greenland Seas have been analysed and compiled into manuscripts, due to be published in 1999 (UITØ-AAB).

Cetaceans
Data on the body condition and feeding ecology of Northeast Atlantic minke whales, based on material collected in special permit catches in 1992-1994 and in commercial catches in 1995 and 1996, have been used to estimate the total annual consumption of the stock along the Norwegian coast and in the Barents Sea (NIFA, UITØ-NFH).

Questions concerning the consumption of herring by minke whales in the Barents Sea have been addressed, and the results presented (NIFA, IMR).

In co-operation with Japanese scientists, data on the feeding ecology of North Pacific minke whales have been analysed and prepared for publication (NIFA).

2.5 Research results

Pinnipeds
Biological data collected in the Svalbard area during summer in 1996 and 1997 seems to indicate that harp seal consumption during this important feeding period is particularly characterised by krill and polar cod. Data from acoustic and trawl surveys were obtained concurrently with the takes of seals, and used to assess the abundance of various species in the water column. Krill was the most abundant species. There were, however, no strong indications of positive or negative preferences for any particular prey species by the seals. Later, in autumn and early winter, these seals are known to shift from crustaceans to a menu dominated by fish (NIFA).

Using harp seal diet data, collected in the Barents Sea in 1990-1996, in combination with information on the energy density of various prey species and abundance and demography data on the seals, it was possible, under certain assumptions, to estimate the total consumption of various prey items required by the seals to cover their energy demands. The total consumption of the Barents Sea / East Ice stock (which, according to Russian aerial surveys in 1998, includes 2.1-2.2 million animals) was estimated to be in the range of 3.37 - 5.07 million tonnes, depending on the choice of input parameters in the model. Assuming a variable basal metabolic rate (BMR) throughout the year and a field metabolic rate of 2*BMR the estimated annual consumption by

harp seals was estimated at 3.37 million tonnes, including 1,229,750 tonnes crustaceans, 811,800 tonnes capelin (in years of high capelin abundance), 608,280 tonnes polar cod, 213,400 tonnes herring, 101,000 tonnes cod, and 608,280 tonnes of other (mainly Arctic) fishes. In years of low capelin abundance capelin consumption seemed to be replaced by other fish species, notably polar cod, and the total annual consumption would increase to approximately 3.49 million tonnes (NIFA, UITØ-AAB, UITØ-NFH).

Studies of the first independent feeding of harp and hooded seal pups in the West Ice indicated a considerable niche overlap, which may suggest some inter-specific competition between the two species. Pups of both species were observed to feed independently shortly after weaning, and their first food was almost exclusively crustaceans, in particular pelagic amphipods, to some extent also krill (NIFA).

Combination of direct measurements of heat production rates, and theoretical calculations of heat loss rates in harp seals show that these animals normally do not have extra thermo-regulatory expenses in Arctic waters. Similar considerations with regard to juvenile minke whales, however, suggest that thermo-regulatory expenses may be incurred under some conditions. The difference between the species in this respect may be explained in terms of differences in the thermal conductivity of their blubber (i.e. lower thermal conductivity in harp seal blubber than in minke whale blubber) (UITØ-AAB).

Analyses of data from previously conducted studies of the effect of diving on the fibrinolytic activity in seal blood, have shown that the ability of seals to avoid thrombosis due to blood clot formation while diving are not due to enhanced fibrinolytic activity in this situation (UITØ-AAB).

The vasomotor effects of sympathomimetic and parasympathomimetic drugs on isolated arteries and veins from the spleen of hooded seals have been studied during previous experiments. Analyses of data have shown that both vessel types constrict in response to α-adrenergic agonists, while β-adrenergic agonists and cholinergic agonists have little effect. The results are important for the understanding of how physiological control of the spleen as a blood-storing organ is exercised. Other previous studies suggest that the maximum oxygen stores that may be contained in the dilated spleen of hooded seals only correspond to about 10% of the total oxygen storing capacity, which suggests that the spleen is unlikely to have an important function as an oxygen reserve during routine diving, but that this function may be more prominent during long-duration dives (UITØ-AAB).

Studies of digesta transit times in relation to diving in seals have shown that diving does not affect transit times. This suggests that the reduced gastrointestinal blood flow, which is known to result particularly during long-duration diving, does not affect the efficiency of digestive processes in the guts of seals (UITØ-AAB).

Ecological studies of ringed seals in the northern drift ice areas of the Barents Sea indicate that the species feeds mainly on crustaceans (krill and *Parathemisto libellula*)

and polar cod, and that some competition for food exist between ringed and harp seals in the areas studied (NIFA, UITØ-NFH).

In May 1996 new rules for management of coastal seals were introduced. The management shall be based on sustainable use and this requires a survey program to be established. In 1998, simultaneous photographic aerial and visual ship borne surveys were conducted in moulting lairs of common seals in parts of northern Norway. Results from the visual surveys yielded stock estimates higher than observations made in the same areas 5-10 years ago, and may indicate increasing numbers of seals. Grey seals were surveyed aerially during moult and visually in ship borne surveys during breeding in parts of northern Norway. Results from the visual surveys seem to indicate a pup production in Finnmark of more than 200, which may indicate a total stock of nearly 1,000 grey seals in this county. Comparative analyses of the aerial photographic and ship borne visual data are under way (NIFA, IMR).

Results from two ship-borne surveys of common seals in Rogaland County revealed a breeding population of 202 observed animals (including 31 pups). The main breeding places were in Lysefjord, where more than 50% of the population was found. During moult, 497 common seals were observed. The main moulting areas were outside Kårstø and Kvitsøy where 80% of the population was found. The results indicate a significant increase in the common seal population in the county since the surveys conducted in the early 1980s and 1990s (RCC).

Studies of grey seal breeding biology in northern Norway have revealed a prolonged breeding period, starting in October and lasting to the middle of December. Certainly, this must be taken into consideration when stock estimate surveys are designed (NIFA, UITØ-NFH).

Ecological studies of grey seals in Faroese waters have revealed a diet dominated by fish, in particular gadoids (cod, saithe and haddock) and wolfish (NIFA, UITØ-NFH).

Cetaceans

It has been observed that minke whale diets in the Barents Sea are subject to year-to-year variations due to changes in the resource base in different feeding areas. Variations in abundance of herring and capelin have particularly been demonstrated to cause changes in minke whale diets. In the northern parts of the Barents Sea, krill appears to replace capelin on the whale diet when capelin stock size is low. In the southern parts of the Barents Sea, year class strength of herring is of very significant importance for the importance of herring on the whale menu. In cases of low abundance of adolescent herring, other fish species (gadoids and capelin) and/or krill increase in importance. Thus, the relative distribution of consumption of different prey items by minke whales is highly dynamic (NIFA).

Stock identity studies using DNA-techniques have revealed relatively clear differences between minke whales from the northeast Atlantic and the northwest Pacific. There were, however, much less clear differences between defined sub-areas within the Central and Northeast Atlantic. Nevertheless, the analyses revealed that a very small

part of the observed genetic variation between the Atlantic sub-areas might be explained with a possible existence of two clusters, or sub-populations in the North Atlantic. If so, the two components might have separated breeding areas in the south while mixing would be likely to occur on the northern feeding grounds. The observed heterogeneity is, however, very low, and all conclusions are therefore tentative. (NIFA).

Studies of the feeding habits of north Pacific minke whales reveal that the species is almost as euryphageous in this area as in the northeast Atlantic, feeding mainly on pelagic shoaling fish species and krill (NIFA).

3. CATCH DATA

3.1 Sealing

Norwegian sealing in 1998 included five vessels, four in the West Ice (the Greenland Sea) and one in the East Ice (the southeastern Barents Sea). In the West Ice the quotas were allowed to be taken as weaned pups and in the East Ice up to half the quotas allocated were allowed to be taken as weaned pups. The following table gives the Norwegian catches of harp and hooded seals in 1998.

Table III.1. Norwegian catches of harp and hooded seals in 1998. 1+ means one year or older seals.

Catching area:	The West Ice			The East Ice		
Species	Pups	1+	Total	Pups	1+	Total
Harp seals	1,696	161	1,857	18	814	832
Hooded seals	5,591	741	6,332			

3.2 Whaling

After a temporary halt in the traditional Norwegian minke whaling, commercial minke whaling was again allowed in 1993 and quotas established based on the Revised Management Procedure (RMP) developed by the International Whaling Commission's (IWC) Scientific Committee. 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). Table III.2 shows the number of minke whales taken during the traditional small-type whaling during the 1998 season.

Table III.2. Catches of minke whales in 1998 by management area as defined in RMP.

1998	Management area					
	EB	EN	ES	EC	CM	Total
Small-type whaling	285	139	129	15	57	**625**

4. ADVICE GIVEN AND MANAGEMENT MEASURES TAKEN

4.1 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. At its most recent meeting in fall 1998, focus was on finalising assessments of harp seals in the East Ice and of hooded seals in the West Ice but assessments were presented for all icebreeding seal stocks in the Northeast Atlantic. Based on the modelling work described under research, the Working Group was able to give advice on quotas for the seal stocks in the West Ice and the East Ice.

The 1998 TACs were 13,100 harp seals in the West Ice, 40,000 harp seals in the East Ice and 5,000 hooded seals in the West Ice, all quotas given as 1+ equivalents. Russia and Norway both take part in the sealing operations in the West Ice and the East Ice and therefore allocate quotas on a bilateral basis. The Norwegian quotas in 1998 were 13,100 harp seals and 5,000 hooded seals in the West Ice and 5,000 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 lifted from the 1996 season onwards.

For the 1999 season the total allowable quotas have been set as follow: Harp seals in the East Ice 31,600 1+ equivalents; harp seals in the West Ice 15,000 1+ equivalents; and for hooded seals in the West Ice 11,200 1+ equivalents. If pups are to be taken, 2.5, 2 and 1.5 pups are equivalent to 1 one year and older seals for the three stocks respectively. The Norwegian shares of the 1999 quotas will be 10,600 harp seals and 8,400 hooded seals in the West Ice and 5,000 harp seals in the East Ice.

In 1996 new regulations for sustainable hunting of coastal seals as well as compulsory catch reporting were introduced. Quotas were set for 1998 based on the available information on abundance and allocated along the coast according to abundance within counties (common seals) or regions (grey seals). The total 1998 quotas were 242 common seals and 267 grey seals, of which only about 20% were reported as taken. The quotas set for coastal seals for 1999 are 268 grey seals and 278 harbour seals.

4.2 Whaling

At the IWC Annual Meeting in 1992 Norway stated that it intended to reopen the traditional minke whaling in 1993. So far, IWC has accepted the RMP developed by its Scientific Committee as a basis for future management decisions but not

implemented it. The Norwegian Government therefore decided to set quotas for the 1993 and following seasons based on 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 1998 for the northeast Atlantic and the Jan Mayen area was set to 671 minke whales. The quota is based on the new estimates from the 1995 survey and the revised estimates for 1989 and also includes carry-overs from the previous year. The catch quotas are set for each of five management areas, and allocated on a per vessel basis, in 1998 13-18 whales per vessel for the 34 vessels which participated. However, due to the low interest in participation in the North Sea hunt, a maximum quota of 40 whales per vessel was established for that management area. The basic catching season was from 3 May to 10 July. All the participating vessels had inspectors on board to survey the whaling activity. The quota for 1999 will be 753 minke whales.

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