Annex 1

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

Copenhagen, 2 February 1995

1. Chairman's welcome and opening remarks

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

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

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

2. Adoption of agenda and appointment of rapporteur

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

3. Review of available documents and reports

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

4. Northern bottlenose whales; modelling and management implications

4.1 Catch history

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

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

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

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

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

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

4.2 Estimation of abundance

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

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

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

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

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

4.3 Population modelling

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

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

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

5. Management objectives

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

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

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

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

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

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

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

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

6. Future work and requirements

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

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

7. Adoption of report

The report was adopted on 2 February 1995.

References

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abundance of cetaceans", *Rep. int. Whal. Commn 40*: 499-511.
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Appendix 1

List of Participants

Dorete Bloch
Museum of Natural History
Fútalág 40
FR 100 Tórshavn, Faroes
Telephone +298 1 85 88
Telefax +298 1 85 89
E-Mail dorete@nsavn.fo

Þorvaldur Gunnlaugsson
Marine Research Institute
Skúlagata 4, P.O.Box 1390
IS- 121 Reykjavik, Iceland
Telephone +354 1 20240
Telefax +354 1 623790
E-Mail thg@althingi.is

Tore Haug (Chairman,WG-NBK)
Norwegian Institute of
Fisheries and Agrculture
P.O.Box 2511
N 9002 Tromsø, Norway
Telephone +47 776 44 491
Telefax +47 776 71 832
E-mail toreh@fiskforsk.norut.no.

Mads Peter Heide-Jørgensen
Greenland Fisheries Research Institute
Tagensvej 135, 1
DK 2200 Copenhagen, Denmark
Telephone +45 33 85 44 44
Telefax +45 35 8218 50
E-mail grfimphj@inet.uni-c.dk

Finn Larsen
Greenland Fisheries Research Institute
Tagensvej 135, 1
DK 2200 Copenhagen, Denmark
Telephone +45 33 85 44 44
Telefax +45 35 8218 50
E-mail grfifla@inet.uni-c.dk

Eyðfinnur Magnussen
Department of Natural Science
University of the Faroe Islands
Nóatún
FR-100 Tórshavn, Faroes
Telephone +298 15306
Telefax +298 16844

Jóhann Sigurjónsson
Marine Research Institute
Skúlagata 4, P.O.Box 1390
IS-121 Reykjavik, Iceland
Telephone +354 1 20240/26533
Telefax +354 1 623790
E-Mail johann@hafro.is

Gísli Arnór Víkingsson
Marine Research Institute
Skúlagata 4, P.O.Box 1390
IS-121 Reykjavik, Iceland
Telephone +354 1 20240
Telefax +354 1 623790
E-Mail gisli@hafro.is

Nils Øien (Chairman, WG-MP)
Institute of Marine Research
P.O.Box 1870, Nordnes
N 5024 Bergen, Norway
Telephone + 47 55 23 86 05
Telefax +47 55 23 83 87
E-Mail nils@imr.no

Appendix 2

List of documents

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

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

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

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

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

Appendix 3

Table 1

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

Appendix 3

Figure 1 (a)

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

Appendix 3

Figure 1 (b)

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

Appendix 3

Figure 1 (c)

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