Report of the Scientific Committee

The meeting was held at the Estrel Hotel and Convention Centre, Berlin, Germany, from 26 May – 6 June 2003 and was chaired by Doug DeMaster. A list of participants is given as Annex A.

1. INTRODUCTORY ITEMS

1.1 Chair's welcome and opening remarks

DeMaster opened the meeting with a welcome to participants. He introduced the German Commissioner, Mr Peter Bradhering who welcomed all to Berlin on behalf of Ms Renata Künast, the Minister of Consumer Protection, Food and Agriculture.

A moment of silence was observed for the sad death of Mike Newcomer – a seasoned observer who had participated in several IWC Antarctic surveys, well known to many in the Committee as a colleague and friend.

1.2 Appointment of rapporteurs

Donovan was appointed rapporteur with assistance from Last and various members of the Committee as appropriate. Chairs of sub-committees and Working Groups appointed rapporteurs for their individual meetings.

1.3 Meeting procedures and time schedule

Grandy summarised the meeting arrangements. The Committee agreed to a work schedule prepared by the Chair.

1.4 Establishment of sub-committees and working groups

The meeting was preceded by a two-day (24-25 May) Working Group on the Implementation Review of North Atlantic minke whales. The agenda items covered by this meeting were subsumed into the main agenda and the report of the sub-committee on the Revised Management Procedure (Annex D). A number of Sub-Committees and Working Groups were established. Their reports were either made annexes (below) or subsumed into this report.

Annex D – Sub-Committee on the Revised Management Procedure (RMP);

Annex E – Standing Working Group on the Development of an Aboriginal Whaling Management Procedure (AWMP);

Annex F – Sub-Committee on Bowhead, Right and Gray Whales (BRG);

Annex G – Sub-Committee on In-Depth Assessments (IA);

Annex H – Sub-Committee on Other Southern Hemisphere Whales (SH);

Annex I – Working Group on Stock Definition (SD);

Annex J – Working Group on Estimation of Bycatch and other Human-Induced Mortality (BC);

Annex K – Standing Working Group on Environmental Concerns (E);

Annex L – Standing Sub-Committee on Small Cetaceans (SM);

Annex M – Sub-Committee on Whalewatching (WW);

Annex N – Working Group on DNA (DNA);

Annex O – Working Group on Scientific Permits (SP);

Annex P – Working Group to Review Sanctuaries and Sanctuary Proposals (SAN).

1.5 Computing arrangements

Allison outlined the computing and printing facilities available for delegate use and informed participants that the German Government had kindly offered to provide free Internet access.

2. ADOPTION OF AGENDA

The adopted Agenda is given as Annex B1. Statements on the Agenda are given as Annex V. The Agenda took into account the priority items agreed last year and approved by the Commission (IWC, 2003d, pp.82-83). Annex B2 links the Committee's Agenda with that of the Commission.

3. REVIEW OF AVAILABLE DATA, DOCUMENTS AND REPORTS

3.1 Documents submitted

Donovan reported that the new Committee procedure for pre-registration had been successful in that the majority of people had signed-up using the website. Pre-specifying which papers were required had saved over 50% of the amount of paper usually copied. The efficiency of the procedures for pre-specifying documents and sub-committees will be further assessed following experience gained at the meeting (see Item 22).

The list of documents is given as Annex C.

3.2 National progress reports on research

Progress reports presented at the 2001 and 2002 meeting are now accessible on the IWC website. Reports from previous years will also become available in this format as possible.

The Committee reaffirmed its view of the importance of national progress reports and **recommends** that the Commission continues to urge member nations to submit them following the approved guidelines (IWC, 1998b). Non-member nations wishing to submit progress reports are welcome to do so.

A summary of the information included in the reports presented this year is given as Annex Q.

The Committee noted that several National Progress Reports referred to work conducted on whalewatching platforms. The sub-committee on whalewatching (Annex M) noted it is not clear when platforms of opportunity refer to whalewatching vessels, when scientists were using whalewatching boats as data collection platforms and when the operators themselves were completing sighting records and providing them to researchers. Given the priority for that sub-committee to assess and monitor scientific data collected from whalewatching vessels, the Committee **agreed** to request member governments, when possible, to report and clearly identify the data obtained from whalewatching vessels. In addition, clarification of whether data are collected by scientist(s) on whalewatching platforms or whalewatching operators/ crews and methodology would be useful.

It was also **agreed** that references to fishing gear should, to the extent possible, follow FAO guidelines (see Item 7.1.1).

3.3 Data collection, storage and manipulation

3.3.1 Catches and other statistical material

Table 1 lists data received by the Secretariat since the 2002 meeting.

3.3.2 Progress of data coding and validation projects

The Committee **agreed** that it was important to determine ways to deal with incomplete or unreliable catch data. The first task should be to consider the new Soviet Southern Hemisphere catch data for which no more information is expected to be forthcoming. It believed that this could act as a prototype for working with other incomplete catch datasets. The Secretariat is currently encoding the basic individual records from the revised Soviet Southern Hemisphere catch data (IWC, 1999c, p.2) from 1957-1971, but the dataset is incomplete.

The Committee **agreed** that Allison should produce a summary showing the best data available for each expedition and time period (e.g. individual animal data, daily totals, summaries by species/management area/month/sex etc). This will require knowledge of the range of the individual data but is not dependent upon the data coding being completed first. A Steering Group (Annex U) was appointed to assist with this work, to review Allison's summary and to provide direction on resolution of non-individual data and methods of interpolation. Once this task has been completed, a small technical group (consisting of Allison, Brownell, Donovan, Mikhalev and Tormosov plus interpreter) will meet intersessionally to consider how best to fill in the gaps (see Item 21). If interpolation is considered appropriate, it must take into account how the data might be used in the future. Such interpolated data may be added to the IWC database provided that the records indicate clearly how any interpolation had been done. This would enable data to be extracted quickly in different formats, for example for use by the *CLA* and in stock assessment work.

The Committee **agreed** that the new Soviet data coding should not be released in a partial form, but should rather wait until the coding and summarisation work has been completed.

Data from the 2001/02 SOWER sightings cruises had been validated and incorporated into the DESS database together with validated data from the joint IWC-CCAMLR cruise in 2000. Resightings data from past SOWER cruises are currently being validated and added into DESS, as these data had not previously been used.

Table 1

List of data and programs received by the IWC Secretariat since the 2002 meeting.

Date	From	IWC ref.	Details
Catch data			
19-05-03	Norway: N. Øien	E42	Individual catch records from the Norwegian 2002 commercial catch. Access: restricted.
30-05-03	Japan: J. Morishita	C02	Individual catch records from the Japanese 2002 North Pacific Special Permit catch (JARPN2) and 2002/03 Antarctic Special Permit catch (JARPA).
24-04-03	K. Mathiasen		Revised catch data by Greenland 1995–2001.
Sightings data			
20-09-02	D. Thiele	CD29-36	SO-GLOBEC April-May 2002 cruise data on the USA programme (vessels *LM Gould* and *NB Palmer*).
09-05-03	S. Hedley		Validated IWC-CCAMLR data (which has been added into DESS).
10-03-03	P. Ensor	E43	2002/03 SOWER cruise data including blue whale data (sightings, effort, weather, ice-edge, inter-stratum and way points). 2003 report with figures and tables.
19-03-03	G. Víkingsson		Letter confirming access to Icelandic survey data for use in stock assessment work.
26-05-03	L. Burt	CD37	New version of DESS database: version 3.3 (includes 2001/02 data + IWC-CCAMLR 2000 data).
Data for North Atlantic Minke *Implementation Review*			
21-02-03	Norway: H. Skaug	E40	Revised dive time data for 13 individuals from 1991-2001.
10-04-03	Norway: H. Skaug	E41	Genetic data from 2002 Norwegian minke catch; revised catch positions 1997-2002. Access: for *Implementation Review.*

Finally, it was **agreed** that the Secretariat should develop a list of the datasets held by the Secretariat, together with their access conditions by the next meeting.

3.3.3 Progress on computing tasks

Allison reported on progress with the computing work identified last year (IWC, 2003d, p.84).

The control program for the North Pacific minke whale trials had been amended to include all the changes and options specified last year and at the intersessional workshop (see Item 6.1). The large set of trials had been conditioned and results were reviewed during the current meeting (see Item 6.1).

Simulation trials specified by the Committee to assist in understanding the implications for the choices of modelling density-dependence and defining *MSYL* and *MSYR* in the *Implementation Simulation Trials* had been run (see Item 5.2).

Changes had been made to the Common Control Program for the Fishery type 2 (gray whale) trial model, to implement some changes agreed last year (IWC, 2003g, pp.190-192) and a subset of the trials had been conditioned and circulated to the Steering Group. The full set of Evaluation Trials had not been completed due to the time spent on the other tasks (see Item 8.1).

Allison expressed her gratitude to Punt for his great assistance with modelling issues.

Progress made on the DESS contract is reported and discussed under Item 10.1.1.

4. COOPERATION WITH OTHER ORGANISATIONS

4.1 Convention on the Conservation of Migratory Species (CMS)

4.1.1 Scientific Council and Conference of Parties

The report of the IWC observer at the 2002 meeting of the CMS Scientific Council held in Bonn, Germany is given as IWC/55/8A. A Working Group, chaired by Perrin, reviewed Australian proposals to list Antarctic minke, Bryde's, fin, sei, pygmy right and sperm whales on Appendix I (endangered, with full protection) and Appendix II (would benefit from cooperative conservation action) of the Convention. Australia also proposed inclusion of all currently unlisted populations of killer whales on Appendix II. The Working Group and the Council recommended against Appendix I listing of Antarctic minke, Bryde's and pygmy right whales, on the grounds that they are not endangered. The other proposals were supported, primarily in line with IUCN status (with the exception of the sperm whale, classified by IUCN as Vulnerable, considered 'near-endangered').

The 7th Conference of Parties (COP) followed the Scientific Council meeting and the whale-listing recommendations were adopted by consensus. A proposal by India to list the Gangetic river dolphin on Appendix I was also passed. Additional recommendations passed endorsed initiatives for regional cooperative conservation action on marine mammals in West Africa, southeast Asia and south Asia. A budget resolution was adopted for start-up support of the south Asian initiative (including a Bay of Bengal cetacean survey, currently in preparation), two training workshops in 2004, and a regional workshop in 2005 to review conservation progress and needs.

The Committee thanked Perrin for attending on its behalf and **agreed** that he should represent the IWC at the next meeting.

4.1.2 Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS)

The report of the IWC observer at the 10th Advisory Committee meeting held in Bonn, Germany is given as IWC/55/8J.

An Advisory Group was established to aid implementation of the Recovery Plan for harbour porpoises in the Baltic (the 'Jastarnia Plan') by overseeing: (1) the process of identifying high-risk areas for bycatch; (2) collation of data on the distribution and timing of porpoise bycatches and observations in the Baltic; (3) a modelling exercise to investigate pinger function; (4) coordination with other relevant bodies; and (5) a review of previous experiments with alternative gear and fishing practices as possible replacements for the current use of drift nets and bottom-set gillnets in the Baltic. It is anticipated that the Jastarnia Plan will be formally accepted at the next Meeting of Parties.

The objectives of the SCANS II abundance survey for cetaceans in European waters are: (1) to estimate abundance during the summer 2005/06; (2) to develop and test methods for monitoring cetaceans during periods between absolute abundance estimates; and (3) to develop a framework to assess the effects of bycatch and provide scientific information to managers to achieve conservation objectives. Relevant papers presented at the meeting discussed harbour porpoise habitat use, summer distribution and a boat-based acoustic and visual survey on relative abundance conducted during 2001/02.

Bycatch issues concerned national reporting, the potential threat of bycatch to porpoises in Polish Baltic waters and a report by the UK on its Small Cetacean Bycatch Response Strategy. ASCOBANS is also involved in the implementation of the new European Commission Fisheries Policy Regulation concerned with marine mammal bycatch.

Shipping disturbance (including high speed ferries) and sound disturbance from active sonar seismic testing were addressed. A presentation by a representative of NATO SACLANT Under Sea Research Centre discussed the military use of sonar, summarising the information on recent beaked whale strandings and the sonar systems involved. The possible connection between acoustic energy and physical trauma was highlighted. It was noted that a workshop on active sonar was held in Las Palmas, Gran Canaria (March 2003) and the final report will contain a section identifying potential areas of conflict with cetaceans.

The Committee thanked Reijnders for attending on its behalf and **agreed** that Donovan should represent the IWC at the next ASCOBANS meeting.

4.1.3 Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)

The report of the IWC observer at the 1st meeting of the ACCOBAMS Scientific Committee held in Tunis, Tunisia is given as IWC/55/8L. The Committee comprises 12 members, including a permanent representative from the IWC. There is considerable overlap between the work of ACCOBAMS and that of the IWC, and the priority actions of relevance included *inter alia* issues relating to: whalewatching activities in the ACCOBAMS area; interactions between cetaceans and fisheries; bycatch; habitat degradation; small cetaceans; sperm and fin whales; photo-identification programmes; and implementation of stranding networks. The ACCOBAMS Scientific Committee agreed that close contact between itself and the IWC Scientific Committee should be continued.

The Committee thanked Read for attending on its behalf (due to the unavailability of Donovan) and **agreed** that Donovan should represent the IWC at the next ACCOBAMS meeting.

It was noted that the IWC Scientific Committee has been asked to review the ACCOBAMS draft guidelines for whalewatching at the current meeting (see Item 14).

4.2 International Council for the Exploration of the Sea (ICES)

The report of the IWC observer documenting the 2002 activities of ICES is given as IWC/55/8E. During the year, the ICES Working Group on Marine Mammal Population Dynamics and Habitats (WGMMPH) further developed advice to the European Commission on cetacean bycatch and mitigation measures. It was noted that bottom-set gillnet fisheries are particularly problematic as large numbers of porpoises are incidentally caught. Various bycatch mitigation measures were discussed including use of gear limitations, time/area closures, pingers and Marine Protected Areas. The Group's name was changed to the ICES Working Group on Marine Mammal Ecology (WGMME). A subsequent meeting of the WGMME (held in March 2003) further developed information on fisheries that have a significant impact on small cetaceans and other marine mammals; developed monitoring methods to assess small cetacean populations in the Baltic; and continued to develop Ecological Quality Objectives (EcoQOs) for mammals in the North Sea. A Workshop on marine mammal health in relation to habitat quality is in preparation.

At the Annual Science Meeting held in Copenhagen (October 2002), the session on Environmental Influences on Trophic Interactions included several papers on cetaceans, including links between oceanography and predator-prey relationships.

The Committee thanked Haug for his report and **agreed** that he should represent the IWC at the next ICES meeting.

The Advisory Committee on Ecosystems (ACE) of ICES met in Copenhagen the week prior to the 55th IWC Annual Meeting. ACE drew on reports from a number of ICES subsidiary working groups, such as the Working Group on Marine Mammal Ecology, earlier this year. The focal points of work were the status of small cetacean and pinniped populations in the Baltic, and bycatch issues of small cetaceans in various fisheries in European waters. New information became available on fisheries affecting small cetacean populations in waters adjacent to the North Sea (Irish – Celtic Sea, Western Channel, Gulf of Biscay, Spanish and Portuguese coasts). The Committee thanked Kock for this additional information update.

4.3 Inter-American Tropical Tuna Commission (IATTC)

There was no IWC observer at the last IATTC meeting. The Committee **agreed** that Reilly should represent the IWC at the next meeting.

4.4 International Commission for the Conservation of Atlantic Tunas (ICCAT)

The report of the IWC observer at the 2002 annual meeting of the Standing Committee on Research and Statistics (SCRS) of ICCAT held in Madrid, Spain is given as IWC/55/8I. The main issue of relevance to the IWC is information collected by ICCAT on the bycatch of marine mammals. The SCRS recommended that a database management system is developed to accommodate scientific observer data. Scientific observer data containing information on bycatches of mammals, birds, turtles and other species is currently available on the ICCAT website (*www.iccat.es*).

The Committee thanked Kell for attending the meeting on its behalf and **agreed** that he should represent the IWC at the next SCRS meeting.

4.5 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)

The report of the IWC observer at the 21st meeting of the CCAMLR Scientific Committee held in Hobart, Australia is given as IWC/55/8B. With regard to CCAMLR/IWC collaborative efforts, it was reported that a paper submitted for inclusion in a forthcoming special issue of Deep Sea Research describes the analyses of krill and whale data collected during the CCAMLR-2000 survey. Further collaboration between the two organisations includes the whale sightings survey conducted by the British Antarctic Survey in early 2003 to South Georgia and the Scotia Sea. Analyses of these data will be carried out in close collaboration between CCAMLR and IWC researchers. The increased effort in establishing cooperative research programmes should be viewed in light of the forthcoming revision of the Southern Ocean Sanctuary by the IWC in 2004.

Results from the SO-GLOBEC programme are of direct relevance to CCAMLR and these were presented at the Second GLOBEC Science Meeting (held in China, October 2002). The preliminary results of studies carried out off the western Arctic Peninsula during autumn and winter 2001 and 2002 were presented. Meeting papers of relevance to the IWC included topics of long-term changes in Antarctic populations; estimates of krill condition and biomass; krill relationship to sea-ice; relationships between krill predators and krill distribution; and spatial

and temporal variability in Antarctic marine ecosystem processes at various scales.

Further discussions related to CCAMLR are given in Annex K.

The Committee thanked Kock for attending on its behalf and **agreed** that he should represent the IWC at the next CCAMLR Scientific Committee meeting.

4.6 Southern Ocean GLOBEC

Hofmann provided an update on recent and future activities; she thanked the IWC on behalf of SO-GLOBEC for its participation and contribution to the programme. The scientific results from SO-GLOBEC will be published in the first special issue of *Deep Sea Research II* scheduled for publication in 2003/04. Several papers of relevance to the IWC will be published in this volume.

Future SO-GLOBEC work includes German and Australian field programmes scheduled for 2004-2006; IWC observers will participate on these cruises. The USA SO-GLOBEC programme is entering a three-year synthesis and modelling phase that will extend its programme through 2007/08. Current data from this programme have contributed to the US SO-GLOBEC database and these data are available to IWC researchers and other scientists.

A follow-on programme entitled Integrated Analysis of Circumpolar Climate Interactions and Ecosystem Dynamics in the Southern Ocean (ICCED) is now in development. The programme is being proposed as part of the International Geosphere Biosphere Program and its new initiative on Ocean Biogeochemistry and Ecosystem Analysis. The ICCED programme is a coordinated circumpolar effort designed to understand climate interactions in the Southern Ocean and implications for ecosystems and impacts on biogeochemical cycles. The programme is scheduled for 2007 onwards. The food web focus includes the affects of top predators and it is hoped that the IWC will participate in this new initiative as a full partner, as was done with SO-GLOBEC. More information on the ICCED programme is given in SC/55/E14.

Matters relating to IWC collaboration are discussed further in Annex K. The Committee thanked Hofmann for her report and Thiele for her work in promoting the collaboration. It was noted that the IWC received considerable benefit from this collaboration for a relatively modest financial contribution (see Item 21).

4.7 North Atlantic Marine Mammal Commission (NAMMCO)

The report of the IWC observer at the 10th NAMMCO Scientific Committee meeting held in Hvalfjörður, Iceland is given as IWC/55/8H. A NAMMCO Workshop held in September 2002 on Modelling Marine Mammal-Fisheries Interactions in the North Atlantic favoured the approach of using limited models that encompassed the major species of interest, rather than all-encompassing models.

Progress had been made in the implementation of a quota system for white whales and narwhals in Greenland. However, it was noted that recent harvest figures indicated little or no reduction in the catch. It was stressed that the apparent delay in reducing the catch of West Greenland white whales to about 100 animals per year will result in further population decline and will further delay, if not prevent, the recovery of the stock.

The NAMMCO Scientific Committee noted that the success rate of deploying satellite tags on fin and other large whales had been low and variable between research teams. A correspondence group was established to: identify progress in NAMMCO member countries and elsewhere; explore technical aspects of satellite tagging; consider previous experiments and success rates; and recommend ways to further tagging development and success.

Abundance estimates for several species from NASS-2001 were considered at the Working Group meeting on abundance estimation (February 2002). The NAMMCO Scientific Committee accepted the fin whale estimates from the Icelandic and Faroese surveys, and further work on other estimates was planned (NAMMCO, 2000 provides the Working Group report). The Working Group met to further develop the NASS-2001 estimates in March 2003. This report will be reviewed and discussed at the NAMMCO Working Group on North Atlantic Fin and Minke Whales (November 2003) and the next NAMMCO Scientific Committee meeting.

The Committee thanked Walløe for attending the meeting on its behalf and **agreed** that he should represent the IWC at the next NAMMCO Scientific Committee meeting.

4.8 FAO – Committee on Fisheries (COFI)

The report of the IWC observer at the 25th meeting of the FAO Committee on Fisheries (COFI) held in Rome, Italy is given as IWC/55/8F. The main topic of relevance to the IWC concerned interactions between marine mammals and fisheries. There was support among many members of the need for continued research and further development of ecosystem models, while it was noted by other members that the ecosystem approach considered more than just predator/prey relations and the possible impact of mammals. Some believed that predator/prey relations and their impact on fish resources should be accorded low priority, compared to other relevant aspects such as reduced bycatch, habitat protection and climate change, etc. The primacy of the IWC and its consideration of the role of whales in the marine environment were highlighted by some members, along with the view that discussions on whales in COFI detracted from more important fisheries issues.

The Committee thanked Morishita for attending on its behalf and **agreed** that he should represent the IWC at the next COFI meeting.

4.9 Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)

The report of the IWC observer at the 12th meeting of the CITES Conference of Parties held in Santiago, Chile is given as IWC/55/8G. Three proposals to amend Appendix listings were submitted. The IWC had been asked to provide scientific information to assist in these discussions. A proposal to up-list Black Sea populations of the bottlenose dolphin from Appendix II to Appendix I was not adopted. However, an amended proposal to retain

the population in Appendix II with a zero export quota was adopted. The proposals to down-list Northern Hemisphere populations of minke whale (except the Yellow Sea, East China Sea and the Sea of Japan stock) and the western North Pacific population of Bryde's whale were not adopted.

Following the IWC Special Meeting in October (2002), the IWC Chair and Vice-Chair had prepared and circulated a report to its members and CITES on IWC efforts in relation to on-going work on the Revised Management Scheme (RMS). Cooperation between the organisations was discussed in general, in relation to the down-listing proposals and to the RMS report.

4.10 North Pacific Marine Science Organisation (PICES)

The report of the IWC observer at the 11th meeting of PICES held in Qingdao, China is given as IWC/55/8K. The Marine Birds and Mammal (MBM) advisory panel reviewed time-series data to evaluate predator/diet dynamics in the North Pacific, in addition to time-series data on predators in conjunction with global warming and climate change. A Workshop will be held to examine time-series data of specific predators in relation to changes in environment and diet, and to compare the east and west regions of the North Pacific. A short symposium considered the responses of top predators to variations in prey availability.

In addition to the usual MBM advisory panel meeting, the next PICES meeting will include a workshop on the distribution and diets of marine birds and mammals. This will consider linkage dynamics of higher trophic level predators and physical and chemical variations, focusing specifically on two species of marine birds and two species of mammals.

The Committee thanked Kato for attending the meeting on its behalf and **agreed** that he should represent the IWC at the next PICES meeting.

4.11 Eastern Caribbean Cetacean Commission (ECCO)

Walters provided a summary report of the research and activities conducted by ECCO. ECCO participated in the FAO inaugural meeting in October 2002 as a member of the Steering Committee for the Project to undertake multi-species research on marine resources including cetaceans in the Eastern Caribbean. The Research Project could not begin as intended early in 2003, due to problems with employment of a project leader; November is the likely commencement date.

Coastal cetacean sightings surveys within the waters of the member states of ECCO intended for March were delayed and have now been planned to take place following this year's IWC meeting. The hosting of the annual meetings (Scientific and Ministerial) of the members of ECCO is intended to take place after execution of these activities.

The Committee thanked Walters for his report and **agreed** that he should attend as IWC observer at the next ECCO meeting.

5. REVISED MANAGEMENT PROCEDURE – GENERAL ISSUES (ANNEX D)

This section of the report represents a summary of the Committee's work on the RMP. Interested readers will find details in Annex D.

5.1 Adjustment of the convergence criteria for the CATCHLIMIT program

Allison reported that this task, identified two years ago (IWC, 2002g, p.5), presented no difficulty in principle and will be completed when time permits.

5.2 Implications of choice of component of population to which MSYR, MSYL and density-dependence apply in RMP trials

Three years ago there was a recommendation that simulation trials be performed to examine the effects of alternative definitions and assumptions for the MSY rate (*MSYR*), the MSY level (*MSYL*) and the component of the stock (i.e. mature animals only, or all animals aged 1+) on which density-dependence operates. Several combinations of factors were involved in the trials (see Annex D, item 5.2) and the results are given in Annex D, Appendix 2.

From the results, the Committee reached the conclusions below.

(1) The different biological assumptions make little difference to the performance of the RMP for an assumption of 'minke-like' biology.
(2) The effects of the biological assumptions were slightly greater for the bowhead-like biology (i.e. high age at maturity, low adult mortality), but still small compared with the effect of changing the definition of *MSYR*.
(3) The choice of depletion statistic has only a small effect. Relative to K, the mature stock tends to be slightly more depleted than the 1+ stock. Relative to the *MSYL*, the 1+ stock tends to be slightly more depleted than the mature stock.
(4) For a given *MSYR* value, it makes a substantial difference whether *MSYR* is defined as referring to the mature stock or to the 1+ stock. Taking *MSYR*(mature) = 1%, for example, is approximately equivalent to a value of *MSYR*(1+) = 0.67%.

Comments from various sub-committee members are given in Annex D, item 5.2.

The Committee concluded that depletion statistics could continue to be reported in terms of the mature female stock, and that the various biological assumptions (e.g. the component on which density-dependence operates) make little difference. Therefore, the choices in trials conducted so far can be retained. The Committee did not address the plausibility of specific *MSYR* values under this item, but stressed that when choosing or comparing values for *MSYR*, it is essential to specify whether these refer to *MSYR*(1+) or to *MSYR*(mature). Provided this is recognised, it is acceptable to continue to specify input values for trials in terms of *MSYR*(mature).

5.3 Levels of information required for *pre-implementation assessments* and for proceeding to an *Implementation*

Last year, the Committee recommended a schedule for an RMP Implementation and for subsequent Implementation Reviews. However, it did not address the question of what level of information was required for conducting a *pre-implementation assessment* and for proceeding to an Implementation (IWC, 2003d, pp.10-11). The Committee's conclusions this year are summarised below.

5.3.1 Information required to initiate a pre-implementation assessment

The Committee agreed that a *pre-implementation assessment* is not the same as an in-depth assessment. Its primary objective is to develop a set of plausible stock structure hypotheses that would be specified in terms of an operational model to be used in the *Implementation Simulation Trials* (ISTs). In addition, abundance estimates and the likely temporal and spatial aspects of intended whaling operations will be considered. As detailed in Annex D (item 5.3), the Committee identified six items of information required for a *pre-implementation assessment* (abundance, catch, stock structure, whaling operational details (past and future), rates of mixing and increase), and **recommends** the procedure given below.

(1) Any IWC Member(s) who seek(s) an RMP implementation shall arrange for a summary of data and related information (see below), to be submitted to the Scientific Committee at least one meeting before the proposed meeting in which a *pre-implementation assessment* is to begin. This summary should be accompanied by an initial suggestion for a set of inclusive stock structure hypotheses for consideration.
(2) The Committee will review the summary and determine if there is sufficient information to initiate a *pre-implementation assessment*.
(3) If the Committee determines that there is insufficient information, it will specify additional data/ information requirements.
(4) If the Committee determines that there is sufficient information, the plans for a *pre-implementation assessment* (including data requirements at the appropriate resolution) will be included in its annual Work Plan submitted to the Commission.
(5) If the Commission approves the Work Plan, then the newly adopted Procedure A regarding data availability will apply (see Item 22).

If all the above conditions are met, the Committee will be in a position to carry out the *pre-implementation assessment* at its next meeting (IWC, 2003d, pp.11-12).

5.3.2 Information required for proceeding to Implementation Simulation Trials

The Committee **recommends** that to proceed to *Implementation Simulation Trials*, or to conclude that they are not necessary, the information given below should be available.

(1) Abundance estimates:
   (i) for use in the *CLA* (data meeting the specification for abundance estimates in the RMP);
   (ii) for use in conditioning *IST*s (data needs to have sufficient temporal and spatial resolution to allow estimates to be developed at the scale of sub-areas that would be likely to be used in simulation trials).
(2) Catches:
   (i) catch history to be used in the *CLA* - as complete as possible and with sufficient spatial resolution for the management areas likely to be considered in the *Implementation*;
   (ii) where appropriate, alternative possible catch histories for use in *IST*s in cases of uncertainty over catch history including incidental catch.
(3) An inclusive set of stock structure hypotheses which, it is agreed, cover the plausible range that needs to be tested in the trials.
(4) Any data intended to be used for conditioning the simulation operating model.
(5) Any data to be used to estimate dispersal rates among putative stocks within the simulation operating model.

5.4 Spatio-temporal considerations in the RMP

The Committee noted that Japanese coastal minke-whaling is traditionally conducted in a migratory corridor, where estimated abundance at any one time is relatively low. However, most of the estimated abundance comes from surveys on the summer feeding grounds where the species has not traditionally been exploited. Various suggestions to solve this difficulty have been proposed and the matter was considered further this year. A number of options were identified and these are given in Annex D, Appendix 3. These will require further discussion at next year's meeting.

5.5 Data availability

The question of data availability and the RMP is covered under Item 22.

5.6 Implications of restricting whaling to within 200 miles of a whaling nation's coast (EEZ)

At its meeting last year, the Commission had requested the Scientific Committee 'to comment on the management implications in terms of yield and risk of … restricting whaling to … within EEZs or other waters within 200 miles of the coast' (IWC, 2003a, p.27). This request had been made as part of discussions of the *RMS*; the Committee thus considered this request in the context of the *RMP*.

The Committee noted that baleen whales, the species for which the *RMP* sets catch limits, make large-scale migrations and are widely distributed in coastal and offshore waters. Segregation by age and sex is known to occur in coastal feeding areas (e.g. North Atlantic minke whales) and there are potentially complex interactions amongst migrating and feeding animals of different stocks in coastal waters (e.g. North Pacific minke whales). Some species have coastal breeding areas (e.g. humpback whales). For operational reasons, whaling may be focussed

in coastal areas. Generally, therefore, baleen whales might be expected to be more vulnerable to whaling in coastal waters than in offshore waters. The Committee noted that there were operational implications of restricting catches to within 200 miles of the coast but these were not discussed.

A fundamental feature of the *RMP* is the need to take account of uncertainty in knowledge of whale populations. The *Catch Limit Algorithm* at the heart of the *RMP* has been shown to be robust to a wide range of uncertainty in the single stock case; in any likely implementation to manage catches of a species in a Region (typically an ocean basin) there will inevitably be more than one stock involved and uncertainty as to how those stocks mix spatially on whaling grounds. In multi-stock implementations of the *RMP*, therefore, catches are distributed spatially to reduce the risk of inadvertently depleting a stock.

The mechanism for achieving this is by setting catches at the level of *Small Areas*, defined as areas which are believed to contain only one stock or, if more than one, those multiple stocks are believed to mix throughout the area so that catches will be taken in proportion to their abundance. It should therefore not be possible for any stock to be inadvertently depleted. Because of the assumption of mixing, catches can be taken anywhere in the *Small Area*. This stresses the importance of selecting appropriate *Small Areas* for management under the *RMP*. The more uncertainty in stock structure, the smaller the *Small Areas*.

In an implementation of the *RMP*, a number of contiguous *Small Areas* are defined to cover a *Region* in which whaling is proposed. Catch limits are set by *Small Area*. If catches were additionally to be restricted to within 200 miles, there are three possible cases to consider (Fig. 1).

In (a), the *Small Area* lies completely within 200 miles of the coast. In this case catches would be allowed in the normal way and there are no implications for yield or risk.

In (b), the *Small Area* lies completely outside the 200 mile limit. No catches would be allowed in this *Small Area*. These catch limits would not be redistributed among other *Small Areas* under the RMP. The implications are therefore that less catch would be taken which would reduce the risk but also reduce the yield. Where most or all *Small Areas* fall outside the whaling nation's coast, e.g. in the Southern Hemisphere, the reduction in catch would be substantial.

In (c), the *Small Area* straddles the 200 mile limit. Catches would be allowed inside the limit but not outside it. However, under the *RMP* catches can be taken anywhere within a *Small Area* (see above), so all the catch allocated to the *Small Area* could be taken in that part of the area within 200 miles of the coast. In this case, as long as the *Small Area* had been adequately defined, there would be no additional risk and no loss in catch.

In conclusion, the Committee **draws attention** to the risk-averse nature of the *RMP* in distributing catches among *Small Areas*. It notes that any variant of the *RMP* recommended by the Committee for any species has been judged as displaying satisfactory performance with respect first to risk and then to yield. The Committee is aware of the vulnerability of species to whaling close to the coast and takes this into account in the process of conducting *Implementation Simulation Trials* (see IWC, 2003d, pp.11-12) before the recommendation of an *RMP* variant to the Commission.

The Committee therefore **advises** that under the *RMP*, the restriction of whaling to waters within 200 miles of the coast will have no effect on catches permitted in *Small Areas* that fall entirely or partly within 200 miles of the coast. However, because no catches would be taken in *Small Areas* entirely outside 200 miles of the coast, this additional management measure would reduce risk (to beyond that incorporated in the *RMP*) but also reduce yield.

5.7 Data required: value of collecting *tympanic bullae*

The Commission had asked the Committee to consider the utility of including a requirement in the Schedule to collect *tympanic bullae* for the purpose of age determination from each whale caught. The Committee agreed that reliable age determination beyond the first few years was not possible using *tympanic bullae* (IWC, 2002h, p.105), and recommends that such a requirement not be included in the Schedule.

5.8 Comparison of RMP and AWMP

The Committee recalled its discussion last year (IWC, 2003d, p.23) that:

> A strict comparison of the *Bowhead SLA* with the *CLA* is not possible for a number of reasons, particularly with respect to: (1) the different objectives for each, notably the difference between management aimed at producing the highest possible continuing yield and management aimed at satisfying a limited need requirement in perpetuity; and (2) the case-specific nature of the *Bowhead SLA* that was tailored to manage a data rich population as opposed to the generic *CLA*, that has to be able to cope with a variety of situations.

Where relevant, specific points raised in the sub-committee under this item, in the available papers or during discussion, were considered in subsequent deliberations on the RMP Implementations for North Pacific common minke whales (see Annex D).

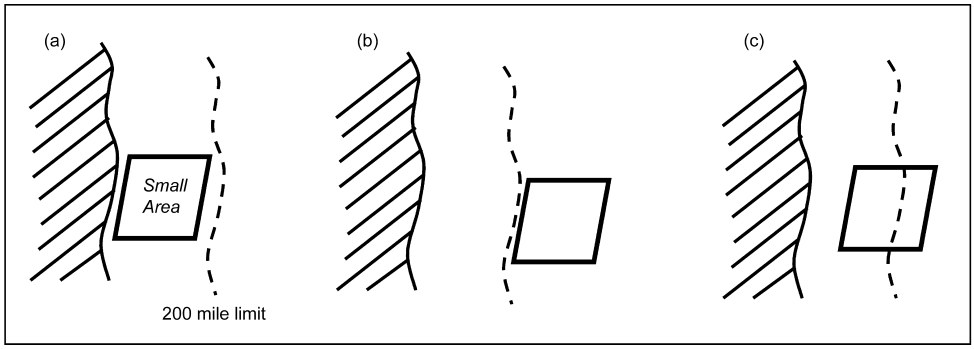

Fig. 1. Three possible *Small Area* scenarios of catches restricted to within 200 miles.

6. RMP – PREPARATION FOR IMPLEMENTATION

This section of the report represents a summary of the Committee's work on this issue. Interested readers will find details in Annex D.

6.1 Complete North Pacific common minke whale Implementation

6.1.1 Report of the Implementation Simulation Trials *Workshop (SC/55/Rep2, this volume)*

Donovan provided a general overview of the trials process and a summary of work in recent years, leading to the finalisation of the *Implementation Simulation Trials* (*IST*s) agreed in Seattle in January 2003.

He summarised the development of the generic *CLA* in terms of simulation trials and the role of *IST*s in the transition from the single stock generic to multi-stock case-specific situations. The aim of such trials is to encompass the range of plausible scenarios involving *inter alia* stock structure, MSY rates (*MSYR*), removals and surveys. These trials are used to investigate the implications of various choices of RMP variants such as *Catch-cascading* from a risk- and catch-related perspective, with a view to recommending an appropriate variant for implementation of the RMP for a specific species/area.

He then summarised the final trials agreed at the Seattle Workshop (SC/55/Rep2), concentrating in particular on stock structure hypotheses and management variants. He noted that one reason for the complexity of the situation for western North Pacific minke whales was the need to reflect the spatio-temporal factors involved in scenarios with whaling occurring on migration (as discussed in Item 5.4 above); the RMP was initially designed for the simpler situation of whaling on the feeding grounds.

For stock structure, the procedure is to identify sub-areas that can be used when specifying possible hypotheses. For western North Pacific common minke whales, 18 such areas have been identified during the development process (Fig. 2). Although certainly not the only possible approach, the Committee had agreed that provided there was some support that a stock structure hypothesis was plausible, it would be considered in the trials; full discussion of plausibility was expected to occur after the trials had been agreed and run but before the results were known.

Four such stock structure scenarios were developed ('Baselines' A-D), as described in Annex D, Appendices 8a-8c (and see item 6.1.3.2). All scenarios involved a separate 'J-stock', found mainly to the west of Japan, and found mixed with other whales to the east of Japan in some months. That stock is not the focus of the Implementation in terms of applying the *CLA*, but is included in the simulations; there are implications of the results that are considered below (see Item 6.1.5).

The Workshop (and previous meetings) had spent considerable time discussing the 'conditioning' of the trials. Conditioning involves selecting values for the data, and (2) the dynamics of the particular scenario in operating models such that they adequately mimic (1) the data, and (2) the dynamics of the particular scenario in

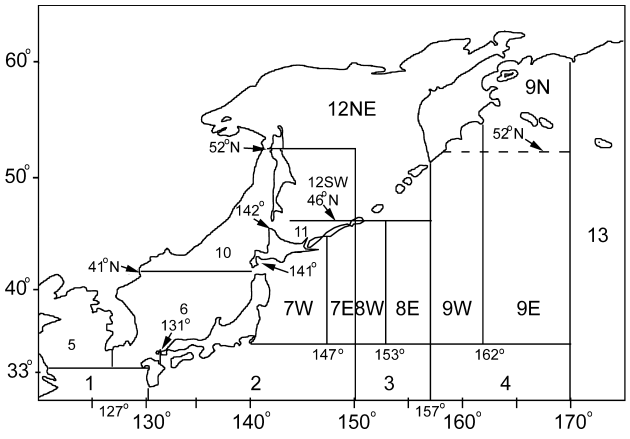

Fig. 2. The 18 sub-areas considered in the *Implementation* process.

variant to be selected.

The Committee **agreed** that conditioning had been adequately addressed at the Workshop.

As noted above, the aim of the *IST* process is to arrive at a recommended variant for the implementation of the RMP in a specific case. To that end, the Workshop confirmed that the trials would examine the six variants and the sub-areas from which catches are taken when a *Small Area* consists of more than one sub-area, specified at the Workshop (Annex D, item 6.1.1). Two additional variants were added because there is a not insubstantial fraction of 'J' stock animals in one sub-area in June and in another in all months.

The full list of trials **agreed** at the Workshop is given in Annex D, Table 1[1]. They comprised the four baseline cases (for each scenario, *MSYR* of 1% and 4% and J-stock at 30%K in year 2000) and a large number of sensitivity trials investigating *inter alia* J-stock depletion ranging from 15-70%K, various levels of mixing and intrusion, differing assumptions about bycatches from Japan and Korea, and survey bias. The Workshop also spent some time developing a recommended format for presentation of results. Other issues discussed but not resolved at the Workshop included how to address questions of plausibility, as described in Annex D, item 6.1.1.

SC/55/IST8 detailed work done since the Workshop to evaluate dispersal rates for certain trials.

It was **agreed** that the *IST*s agreed at the Workshop constituted a sufficient set upon which to base a recommendation of an RMP variant for implementation.

6.1.2 Report of the Intersessional Steering Group

Butterworth, who had chaired the group, reported on activities since the intersessional Workshop (Annex D, item 6.1.2). Essentially these had comprised facilitation of the process of completing conditioning and running of the *IST*s as finalised in SC/55/Rep2.

[1] This Table includes changes made intersessionally and the additional six trials added during the meeting.

6.1.3 Relative plausibility of trials

The Committee first discussed three general considerations to be taken into account when determining relative plausibility, i.e. the process to be used, 'new' data and 'other' matters. Details of those discussions are given in Annex D, item 6.1.3.1. They occurred within the context of the need: (a) to reduce the large number of trial results to a manageable volume; and (b) for those judging the results not to see them until the debate on their relative plausibility had been completed.

To facilitate the process, a 'Winnowing Sub-group' was appointed by the sub-committee to assess the results and identify 'uninformative' (as far as differentiating performance amongst the six RMP variants under consideration was concerned) trials, thus reducing the large number for consideration. In addition, a procedure was agreed to be used in formulating a recommendation (detailed in Annex D, Appendix 4). The procedure involved allocation of one of four plausibility rankings (high, medium, low or 'in dispute') to each factor in the trials.

Much debate revolved around the 'in dispute' categorisation, which was to be treated as equivalent to 'medium' plausibility in terms of the decision rules advanced. It was **agreed** that a factor could not be placed in the 'in dispute' category by an objection not supported by data or analysis. It was further **agreed** that the process set out in Annex D, Appendix 4 would serve as a guideline, and not as a final determinant of the RMP variant to be recommended. The overall process should, *inter alia*, seek to ensure that circumstances of greater uncertainty lead to the choice of a more conservative variant, reflecting more robust performance.

Considerable discussion took place both at the Seattle Workshop and in the sub-committee, as to whether 'new' data/information/analyses forthcoming after final agreement on information used in conditioning the *IST*s, could be used in discussions of plausibility. Despite some expressed concerns (Annex D, item 6.1.3.2), the Committee finally **agreed** that new data and associated analyses could be considered in the process of assigning plausibility and that it was up to individuals to decide what relative weight to accord to such information in the light of the issues raised. This was not to be necessarily the case for future *Implementations* or *Implementation Reviews*.

SPECIFIC CONSIDERATIONS

Considerable discussion took place on this item, as detailed in Annex D, item 6.1.3.2. The main conclusions are summarised below.

MSYR

Much discussion centred around the inferences to be drawn from a paper (SC/55/RMP10) that reviewed available *MSYR* estimates for baleen whales. For a variety of reasons, it was **agreed** to treat trials with *MSYR*(mat) = 4% as having a 'high' plausibility ranking, and those with *MSYR*(mat) = 1% a 'medium' ranking.

STOCK STRUCTURE

As noted above, four sets of stock hypotheses characterised as baselines A, B, C and D (Annex D item 6.1.3.2) were considered in the trials.

(1) Baseline A: 3-stock scenario ('J' 'O' and 'W') with W found only sporadically in sub-area 9W.

(2) Baseline B: 2-stock scenario ('J' and 'O') with no W stock as a limiting case of Baseline A.

(3) Baseline C: 4-stock scenario ('J', 'Ow', 'Oe' and 'W').

(4) Baseline D: 3-stock scenario ('J', 'O' and 'W') with O and W mixing over 147°-162°E, O being dominant to the west and W to the east.

It was **agreed** that there was no need to consider Baseline B (which effectively gave identical results to Baseline A) further, on the advice of the 'winnowers'.

To reflect views supporting and questioning the plausibility of each hypothesis, it was **agreed** that those who had provided the original motivations for the hypotheses should prepare brief summaries of their views on the different stock structure hypotheses, as in Annex D, Appendix 8 and SC/55/RMP7, SC/55/IST2, 3, 4, 6, 9. An additional set of views was provided in Annex D, Appendix 9.

After considerable discussion it was **agreed** that all three remaining hypotheses for stock structure although 'in dispute' would be ranked as 'high' in the context of the agreed selection process guidelines.

SIZE AND DEPLETION OF THE 'J' STOCK AND INCIDENTAL CATCHES

It was **agreed** that a number of trials related to the size and depletion of J-stock (Annex D, item 6.1.3.2) could be excluded from further consideration, on the advice of the 'winnowers'.

For the remaining trials, the Committee agreed that, since the primary purpose of the *Implementation* was to examine the effect of whaling under the RMP on the O and W stocks, there was no immediate need to debate the relative plausibility of different sizes assumed for the J-stock and incidental catches. Instead, recommendations on which RMP variant to implement would be based on performance statistics related to the O and W stocks. The implications for the J-stock of the variant to be recommended would then be considered. More details of the motivation underlying this approach are reflected in Annex D, Appendix 11.

OTHER FACTORS

Different views were expressed with respect to how the one trial with $g(0)=0.5$ (i.e. negative survey bias) should be considered compared to the default assumption of $g(0)=1.0$ applied in conditioning all other trials (Annex D, item 6.1.3). Recent estimates (of 0.25-0.67) for Antarctic minke whales and for common minke whales in the northeastern Atlantic were noted but there was no consensus that these values could be used to infer values of $g(0)$ for common minke whales in the North Pacific. Nevertheless it was **agreed** that $g(0)=0.5$ had higher plausibility than $g(0)=1$. Trials covering the situations of negative past and future surveys bias, and negative past survey bias only, were considered.

There were differing views on the value of CPUE data (SC/55/IST16) in discussions of plausibility of trials (Annex D, item 6.1.3).

6.1.4 Review results of trials

The six RMP variants considered were defined in terms of four alternative *Small Area* definitions and two other management variants in Annex D, item 6.4 (Variants (1)-(6)).

(1) *Small Areas* equal sub-areas. For this option, the *Small Areas* for which catch limits would be set are 7W, 7E, 8W, 8E, 9W, 9E, 11, 12SW and 12NE.
(2) 7+8, 9, 11 and 12 are *Small Areas* and catches are taken from sub-areas 7W, 9W, 11 and 12SW.
(3) 7+8+11+12 and 9 are *Small Areas* and catches are taken from sub-areas 11 and 9W.
(4) 7W, 7E+8+12, 9 and 11 are *Small Areas* and catches are taken from sub-areas 7W, 9W, 11 and 12SW.
(5) 7+8+11+12 and 9 are combination areas and catches are *Catch-cascaded* to the sub-areas within each combination area i.e. *Small Areas* are the same as for variant 1.
(6) As (3) except that the catches from the 7+8+11+12 *Small Area* are taken from sub-areas 7W and 11 using *Catch-cascading* across those two sub-areas.

The results of the trials, summarised by catch- and risk-related statistics, are given in Annex D, Appendix 12. The full results and output are to be stored at the Secretariat and are available to interested Committee members. The Committee noted the enormous amount of work involved in producing them and expressed its appreciation to Allison in particular, and to Punt.

As already agreed, the Committee considered the results in terms of two specific issues: (a) selection of a preferred RMP variant from the six considered in the trials, based on results for the 'O' and 'W' stocks; and (b) consideration of the impact of the selected RMP variant on the status of the 'J' stock. To address issue (a), it reviewed the results of those trials identified by the 'winnowers' as having a notable impact on the performance statistics for the 'O' stock (indicated by 'O' in Appendix 12).

Issue (b) was addressed by developing a risk table summarising the impact for trials where the future incidental catch is assumed to be linearly proportional to abundance, and (for reasons explained in Annex D, item 6.4) by changes in median time to extinction for trials in which the future incidental catch off Korea is assumed to be constant and equal to 89 (Ki) or 148 (Kii). However, there was insufficient time to discuss the relative plausibility of the assumptions regarding the relationship between the level of incidental catch and abundance. Further consideration of risk is detailed in Annex D, item 6.4.

6.1.5 Implementation options - recommendation

RMP VARIANT

The Committee noted the fact that regardless of which stock structure hypotheses are considered plausible, two (variants 1 and 5) are acceptable based on the risk-related statistics (see Annex D, Table 2); of these, one (variant 5) is preferable based on the catch-related statistics.

Some members, however, believed that only Baseline A was plausible and therefore that all variants under this scenario were acceptable, based on the risk-related statistics. They believed that variant 6 was preferable, based on the catch-related statistics and the preferred whaling operation scenario expressed by Japan. Those members also noted that variant 5 was not acceptable from the perspective of coastal whaling.

Table 2

RMP variants that are acceptable in terms of risk-related statistics for the 'O' and 'W' stocks for each combination of *MSYR* and stock-structure.

Stock structure hypothesis	$MSYR_{mat}$	Acceptable variants
A	1%	1, 2, 3, 4, 5, 6
B	1%	1, 2, 3, 4, 5, 6
C	1%	1, 5
D	1%	1, 5
A	4%	1, 2, 3, 4, 5, 6
B	4%	1, 2, 3, 4, 5, 6
C	4%	1, 5
D	4%	1, 2, 4, 5, 6

Given the above, most members **recommend** that variant 5 is the preferred management option if the RMP is implemented. Other members **recommend** that variant 6 should be the preferred management option if the RMP is implemented.

In light of discussions under Item 5.4, the Committee **agreed** that should the Commission approve variant 6 for the RMP *Implementation* for North Pacific minke whales, *Small Areas* should be delineated using option II(b) of Annex D, Appendix 3.

The Committee **agreed** that stock structure was the key source of uncertainty for this *Implementation*. It noted that the range and relative plausibility of stock structure hypotheses might change given additional research and new data.

It suggested that, in the light of the concerns about catch performance in coastal *Small Areas*, it would be useful to examine the effect of additional abundance information, definition of alternate sets of *Small Areas*, specification of alternate RMP variants for cascading, and alternate seasonal-area restrictions. Such information could be used to improve the implementation's catch performance in coastal areas, and could be considered in an *Implementation Review*.

Some members suggested that uncertainty in performance extended to climate change and habitat degradation and the possible interaction of these factors with stock structure. They believed that additional research in this area would assist the *Implementation Review* process.

Other members noted that although robustness to interactions among demographic proxies for such environmental change and stock structure hypotheses had not been examined, the generic *CLA* had been examined with various combinations of factors such as episodic events, changing carrying capacity and changing *MSYR* (IWC, 1993, pp.158-61; IWC, 1995b, pp.113-5) and found to be robust.

'J' STOCK

Annex D, Table 3 lists the values for the statistics used to evaluate the impact of an RMP variant on the status of the 'J' stock for the scenarios in which the level of incidental catch is fixed linearly proportional to abundance. It gives results for variants 5 and 6. The Committee **agreed** that variant 5 has relatively little impact on the status of the 'J' stock and that variant 6 has a slightly larger impact. Those members who recommended variant 6 noted that Annex D, Table 3 included results for trials they considered to reflect implausible scenarios.

The range of the median time to extinction for the J-stock for the trials in which the future Korean incidental catch is constant over time is 95-98 years (J1/Ki[2] incidental catches) and 61-63 years (J2/Kii incidental catches) when there are only incidental catches. When RMP variant 5 is used to determine commercial catch limits, the ranges are the same. When RMP variant 6 is used to determine commercial catch limits, these ranges are 89-92 years and 60-62 years.

The Committee noted that in some scenarios there is a severe decline in the size of the 'J' stock due solely to the impact of incidental catches (Annex D, table 3). It noted its comments previously (IWC, 2003d, p.14) and **strongly endorsed** conducting an in-depth assessment of North Pacific minke whales next year to improve understanding and reduce uncertainty (see Item 19).

6.1.6 Review survey plans

Annex D, item 6.1.6 provides details of surveys completed in 2002 or 2003, together with an outline of eight undertaken since 1999. Surveys covered areas in the Yellow Sea, nearshore waters of the western Sea of Japan, parts of the Sea of Japan[3] and Yellow Sea, and the Japanese side of the Sea of Japan.

The Committee noted that surveys in the Sea of Japan occurred in spring, whereas the survey in the Yellow Sea occurred in September. The possibility of migration from the Sea of Japan to the Yellow Sea was discussed. Concern was expressed that whales counted during a spring survey in the western part of the Yellow Sea could be counted again in late summer and autumn in the Yellow Sea. The Committee agreed this was an issue meriting further discussion before these surveys could all be used in the RMP calculations.

Detailed plans for future surveys were also provided, as discussed in Annex D, item 6.1.6. For one Korean survey where unaided (naked eye) searching is employed, the Committee **recommends** certain experiments, if possible, to verify distance estimation. It also **recommends** that a survey planned for middle offshore waters, which may overlap with other surveyed areas, should as far as possible focus on previously unsurveyed areas. The Committee also **endorses** proposals for surveying in Russian EEZ waters in May-June 2004, and **recommends** that the Commission requests the relevant authorities of the Russian Federation to grant permission in timely fashion for the survey vessels to its EEZ. It also **requests** that the Commission express its appreciation to the Russian Federation for granting permission to conduct survey work in its EEZ in the Sea of Okhotsk in summer 2003.

The Committee noted that although not necessary for RMP work, the collection of photographs of right whales and gray whales in the Sea of Okhotsk could be extremely valuable, and complimented Japanese scientists on planning to collect such data. It **recommends** that biopsy sampling and photo-identification of right, gray and bowhead whales, if encountered, should be carried out as possible this year and in future years.

Appreciation was expressed to the Korean and Japanese scientists for providing the details of past and future surveys.

REQUIREMENTS UNDER THE RMP

Annex D, item 6.1.6 (sub-items 2.1-2.5) gives details of the requirements and guidelines for conducting surveys and analysing data under the RMP, including its **agreement** on scientists to provide oversight on the Committee's behalf.

6.2 North Atlantic minke whale *Implementation Review*

6.2.1 Report of the pre-meeting Working Group

The pre-meeting Working Group on the North Atlantic Minke Whales RMP Implementation Review met from 24-25 May. Its report is attached as Annex D, Appendix 14.

The Working Group reviewed stock structure and abundance estimates and the discussions of those items are given in Annex D, items 6.2.1.1 and 6.2.1.2.

The Working Group's evaluation of the available abundance estimates is contained in Annex D, Appendix 14, table 1. It considered that all the estimates from Norwegian shipborne surveys were suitable for use in the RMP. The SCANS estimate for the North Sea (Hammond *et al.*, 2002) was also found to be suitable for use in the RMP, provided that the data are submitted to the IWC.

Most of the Icelandic shipborne and aerial survey estimates were found to be suitable for use in the RMP, but in some cases this was conditional on further analyses resolving certain potential problems with the estimates. The estimates from the Greenlandic and US surveys are not required for use in the RMP, because no commercial whaling is envisaged in these areas, but can be used for conditioning trials. The Committee endorsed these conclusions.

6.2.2 Recommendations

6.2.2.1 RMP MANAGEMENT AREAS AND IMPLEMENTATION OPTIONS

Based on discussions in Annex D, item 6.2.2.1, the Committee **recommends** that the *Medium Areas* remain unchanged, because of the detection of clear genetic differences between the three *Medium Areas* and the lack of unequivocal genetic differences within each *Medium Area*.

Based on genetic and non-genetic information discussed in Appendix 14, the Committee **recommends** the following changes to *Small Area* boundaries within the Eastern Medium Area (Fig. 3):

[2] Simplified, these options represent: J1 = Japanese bycatch levels based on progress report values (see Table 3, SC/55/Rep2); Ki = Korean bycatch of 89; J2 = 100 each year from 1900-present; Kii = 148.

[3] Called East Sea/Sea of Japan in SC/55/RMP12, 13 and 15.

(1) move the northern border of the EN *Small Area* from 65°N to 62°N;
(2) amend the EB *Small Area* by adding a new western boundary at the 28°E meridian;
(3) eliminate the EC *Small Area* as defined in 1992 and merge it into a new *Small Area* called EW (for **E**astern Stock in the Nor**W**egian Sea).

The Committee further **agreed** that *Catch-cascading* at the Medium Area level remain the preferred management option.

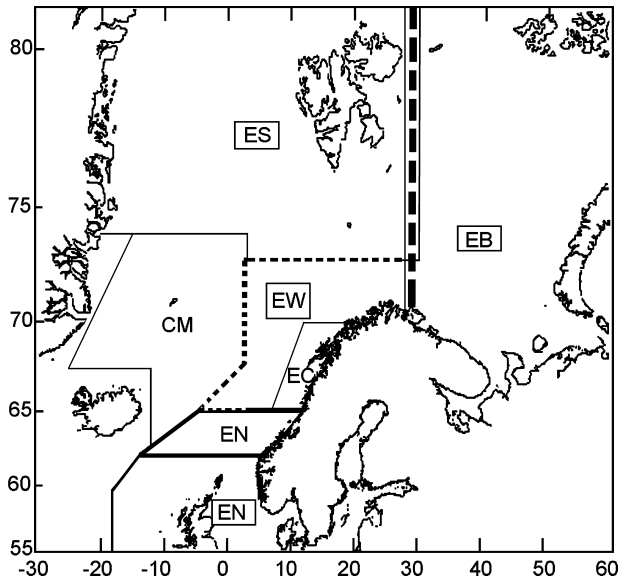

Fig. 3. Old and proposed new boundaries for *Small Areas* in the North Atlantic.

6.2.2.2 IMPLEMENTATION SIMULATION TRIALS

The Working Group had recommended that a limited set of simulation trials be conducted to examine the effects of including additional variance into the trials framework used for the 1992 *Implementation*, as described in Appendix 14, item 4.3. Allison, Skaug and Punt were to develop detailed specifications for these trials and report to the Plenary.

Their report has been attached to Annex D as Appendix 15. The Committee accepted their conclusion that the trials conducted in 1992 already adequately captured the level of additional variance estimated in SC/55/NAM1, such that no new trials are required to address this issue. The Committee **agreed** that the current *Implementation Review* for North Atlantic minke whales has now been completed.

The Committee noted that the trials conducted to date account for some degree of lifetime site fidelity in feeding behaviour, but not heritable site fidelity that could lead to genetic differences with Medium Areas. The Committee **recommends** that this issue be revisited at the next *Implementation Review*, taking into account any stock structure information acquired in the meantime.

6.2.2.3 ABUNDANCE ESTIMATES

The Committee **endorsed** the Working Group's recommendations regarding the acceptability of abundance estimates for use in the RMP (Annex D, Appendix 14, table 1), and the **recommendation** that data and reports from the 1994 SCANS survey be submitted to the IWC. It noted in this context that the Working Group's evaluation of estimates from Icelandic surveys as acceptable or conditionally acceptable, was based on the surveys' broad consistency with the Committee's Guidelines, and that the survey data and relevant auxiliary information, such as cruise reports, had been submitted to the IWC.

The Committee noted the importance of ensuring that the Requirements and Guidelines for Conducting Surveys and Analysing Data within the Revised Management Scheme remain up to date. It recommends that Donovan and Hammond draw up an updated version of the Requirements and Guidelines with a view to their adoption by the Committee next year.

6.3 Western North Pacific Bryde's whales: work plan for detailed consideration at 2004 meeting

6.3.1 Report of Working Group on the reconstruction of past catches

An intersessional Working Group had been established last year (IWC, 2003e, p.122) to try to develop an accurate catch history series for Japanese land station operations. Their report has been added as Appendix 16 to Annex D. They were unable to obtain additional data on Bryde's whale catches but it was **agreed** that they should continue to work during the intersessional period (see Item 6.3.3).

6.3.2 Sightings surveys

The Committee received reports on two systematic sightings surveys, one in summer 2002 (SC/55/RMP1), the other in winter 2002 (SC/55/RMP2). Details are provided in Annex D, item 6.4.1. The summer sightings survey was designed to estimate abundance and distribution whereas the winter survey was designed to study the winter distribution of Bryde's whales, not to estimate abundance. The Committee noted the successful collection of one biopsy sample during the winter survey and **encourages** further collection of biopsy samples from winter areas.

Shimada, who had responsibility for oversight of the sightings survey in July-September 2002 (IWC, 2003e, p.122), reported that the series of sightings surveys designed to estimate abundance had been completed according to the procedure approved by the Committee.

6.3.3 Work plan

The Committee noted that no progress had been possible this past year by the intersessional Bryde's whale data group established in 2002 (IWC, 2003e, p.122). Assistance from Japanese government managers and scientists is needed to make progress.

In Plenary, the Committee noted that last year it had agreed that for a variety of reasons (largely related to new genetic information and questions over the historic catch series) it was appropriate to consider that it was in the *pre-implementation assessment* stage for western North Pacific Bryde's whales (IWC, 2003d, pp.10-13). However, it noted the considerable work already undertaken in developing *Implementation Simulation Trials* in previous years and **agreed** that it should be possible to move faster

towards *Implementation* than envisaged in the process developed last year (ibid, Table 2), which had been developed for new situations.

The Committee **agreed** to establish an intersessional Steering Group (Annex U) to forward this work. In particular it would identify data and analysis needs as specified under Item 5.3 (following Procedure A in the new data availability agreement – see Item 22.1) with a view to trying to complete the *pre-implementation assessment* as quickly as possible.

6.4 Initial planning for in-depth assessment of North Pacific minke whales

The Committee noted that the need for an in-depth assessment of North Pacific minke whales was motivated by concerns regarding the status of the J-stock. It agreed that the in-depth assessment of common minke whales should focus on the western North Pacific and give priority to establishing the status of that stock.

A list of data collected so far to contribute to the improvement of knowledge of minke whales off the Korean peninsula was provided in SC/55/RMP16.

The Committee established an intersessional Steering Group (Annex U) with Terms of Reference to: (1) identify what is needed to be included in this in-depth assessment; (2) facilitate preparation of material; and (3) correspond with the Chair of the Committee regarding the Committee agenda for 2004 as to whether there is sufficient information to be able to proceed with an assessment at that meeting.

7. ESTIMATION OF BYCATCH (ANNEX J)

7.1 Estimation of bycatch based on fisheries data and observer programmes

7.1.1 Collation of information from fisheries

Last year, the Committee had requested the Secretary to contact relevant authorities in member states to request a list of fisheries, broken down by gear type, target species and geographical area to the extent that this is routinely done in each country. The aim was to provide information on the nature of available fishery data in order for the Committee to determine whether better estimates of large whale bycatch could be obtained.

The Secretary had approached FAO and had learned that as a part of the FIGIS database (Fisheries Global Information System), FAO is currently in the process of collating detailed information on the gear types and fishing effort deployed globally on a country-by-country basis.

The Committee **agreed** that it would be appropriate to try to develop collaboration with FAO on this subject, and requested continued contacts with FAO, in order to see what fishery data could be obtained for consideration next year. This can best be achieved if Northridge travels to the FAO office in Rome (see Item 21).

The Committee **recommends** that contact with FAO should be maintained and that data on fishing gear and effort should be obtained when it became available. In addition, an illustrated glossary of gear types should be produced to enable compilers of the National Progress reports to be specific about types of fishing gears involved in bycatch and to use a common descriptor. The FAO fishery categories should be used in this glossary (see Annex J, Appendix 3).

7.1.2 Other

SC/55/BC5 presented existing bycatch data from published marine mammal stock assessments to calculate total cetacean bycatches for US gillnet, trawl and other fisheries. The authors used these figures to generate very rough approximations of possible global cetacean bycatches. Different assumptions and methods led to estimates ranging from 60,000 to 300,000. Recognising the limitations of the approach, the authors concluded that the estimates provided at least an initial idea of the likely scale of cetacean bycatch globally and the potential problems this may cause populations.

It was noted that US fisheries are unlikely to be representative of fisheries worldwide, and that better stratification by area, species and gear type would improve this crude estimate. The Committee **recommends** that the analysis in SC/55/BC5 be refined (e.g. split into mortality estimates for large and small cetaceans and stratified by area to the extent possible). One of the authors indicated that this task would be undertaken for next year's meeting.

The Committee welcomed the information discussed in Annex J (item 5.2) relating to the potential use of photographs of scarred animals in catalogues to examine entanglement rates (SC/55/BC3) and the statistics on the proportion of whales that had died or were presumed dead as a result of entanglement (SC/55/BC4).

The Committee noted that entanglement of whales is not always defined in the same way in all countries. There may be a need in the future to agree on common definitions for use in Progress Reports. It was suggested that the data from Progress Reports might be improved if whales that were known to have become entangled, but subsequently broke free, were also recorded. Photo-identification studies could potentially also be used routinely to assess possible entanglement rates. The Committee welcomed the increased detail on fishing gear involved in bycatch in some Progress Reports and **reiterates** the **recommendation** that member states be encouraged to report details about the type of fishing gear involved in large whale entanglements. In this regard Annex J, Appendix 3 provides a guide to FAO standard terminology, which should be followed to the extent possible.

Finally, the Committee **reiterates** its **recommendation** of last year that modelling exercises should be undertaken to assess the levels of coverage required for reliable estimation of large whale bycatches from observer programmes. No papers on this topic had been received this year.

7.2 Estimation of bycatch based on genetic data

The details of discussions of several papers reporting on the results of market sampling from Japanese and Korean markets are given in Annex J, item 6.2. Discussion of these papers highlighted the difficulties of interpreting such data and the need to examine the most appropriate way (if any) to estimate bycatch numbers from such data

(see Item 7.2.1) and to establish whether, and if so how, such information can be incorporated into RMP *Implementation Simulation Trials* (see Item 7.2.1).

The Committee noted these discussions and **recommends** that member nations should improve their bycatch reporting systems and encourage fishermen to report bycatches of large whales in order to gain a better understanding of the nature and scale of bycatch.

7.2.1 Report of Bycatch Workshop Feasibility Steering Group

The Steering Group to investigate the feasibility of holding a workshop to review the use of genetic methods to provide information on bycatch had continued its efforts intersessionally. It had been agreed last year that initially the focus should be on the western North Pacific. Several market sampling specialists who have conducted research on food product market surveillance and distribution in Japan were identified. It was more difficult to identify individuals with detailed knowledge of the different pathways for whale bycatch products to reach markets. The Steering Group had noted that assistance in this task from other members of the Committee, particularly those from the relevant region, would be appreciated. In order to proceed towards holding a workshop the Steering Group had suggested the following four-stage approach.

(1) A letter explaining the issues and objectives should be sent on behalf of the Committee (by the Secretary), to market sampling specialists asking whether they can assist in determining the nature and level of information that would be needed to design a sampling programme to provide estimates of bycatch with an estimable degree of precision. The specialists will also be asked to participate (1) in a planning meeting and, if recommended (2) a workshop to discuss this issue and, if possible, to develop detailed methods and approaches.
(2) A planning meeting will be held comprising of a small group (10-12 participants) that will identify the information needed to design a sampling programme that would allow estimation of total bycatch with suitable precision. Participants will include up to two specialists familiar with each of the following areas: food/markets surveillance systems; statistical design and analysis of market sampling; the outlets for whale meat in specified countries and the pathways to those outlets; whale bycatch and fisheries involved.
(3) The planning meeting will decide whether it appears possible to obtain the necessary information and expertise needed to hold a full workshop. If so, a proposal for a workshop will be finalised by the Steering Group, including Terms of Reference, a draft Agenda, a list of participants and suggestions for workshop papers, dates, venue and budget.
(4) This proposal for a workshop will be submitted to the IWC and other potential funding sources, and if approved, a workshop will be held.

The Committee **endorsed** this approach.

At the 2001 meeting, Morishita had noted that:

> ...aside from legal issues and the position of Japan he had a great doubt about the utility of such a workshop. The participation of people with expertise on the Japanese market for whale products is essential for the objectives of the workshop. Such experts work in industry and are not employed by the Government. In addition, those involved in the marketing of whale products in Japan may have doubts about the competence of the IWC. Japan would not block such a workshop but participation would be limited. However, he would try to help with identifying relevant contacts and sources of data. (IWC, 2002k, pp. 367-368).

Representatives from Japan wished to confirm that Japan has not changed its position and does not support the workshop being held. Further comments can be found in Annex J, item 6.1.

7.3 Work plan

The work plan agreed by the sub-committee on estimation of bycatch and other human induced mortality is given in Annex J, item 8. The Committee's overall work plan is discussed under Item 19.

8. ABORIGINAL SUBSISTENCE WHALING MANAGEMENT PROCEDURE (ANNEX E)

This Item continues to be discussed as a result of Commission Resolution 1994-4 (IWC, 1995a, pp.42-43). The report of the Standing Working Group (SWG) on the Development of an Aboriginal Whaling Management Procedure (AWMP) is given as Annex E. The Committee's deliberations, as reported below, represent a summary of that Annex, and the interested reader is referred to it for a more detailed discussion. A glossary of terms is given in Annex E, Appendix 2. Full trial structure specifications are given in Annex E, Appendix 3. For ease of reading, 'last meeting' refers to the last meeting of the SWG.

The *Bowhead SLA* and scientific aspects of the Aboriginal Whaling Scheme had been recommended to the Commission last year. Papers describing the two component *SLA*s of the *Bowhead SLA* have now been published (Givens, 2003; Dereksdóttir and Magnússon, 2003). The Commission had also been informed that, from a purely scientific perspective, the *Bowhead SLA* represents the best tool for providing management advice to the Commission on the bowhead whale harvest. Several delegations had congratulated the Committee on its work. In conclusion, the Commission 'endorsed and adopted the *Bowhead SLA*' but required more time to consider other aspects of the scheme (IWC, 2003b).

Adoption and endorsement of the *Bowhead SLA* has implications for the work of the Committee. This is discussed further in Annex E (item 6.1) and the results of this discussion were forwarded to the sub-committee on bowhead, right and gray whales (Annex F) for their consideration in planning the in-depth assessment of Bering-Chukchi-Beaufort Seas bowhead whales next year. This is discussed under Items 9.1 and 9.6.

The primary topic for discussion at this meeting was finalisation of the simulation trials for eastern North Pacific gray whales.

8.1 Review intersessional progress

Given the workload of the computing section of the Secretariat with respect to North Pacific common minke

whales, the planned Workshop to finalise gray whale trial structure had been postponed. A subset of Evaluation Trials had been made available to developers to allow them to begin work (see Item 8.2.1).

8.2 Eastern North Pacific gray whales (and see Annex E, item 2)

8.2.1 Consideration of potential SLAs

The SWG had received an interesting developmental paper on a generic *SLA* (SC/55/AWMP5) and looked forward to further elaboration of this work. Two candidate *SLA*s specifically designed for the gray whale situation were received, both adapted from previous candidate *SLA*s for the bowhead whale case (SC/55/AWMP4 and 6). Progress had been relatively slow due to the unavoidably small subset of trials available. However, preliminary results were promising and some potential improvements were identified.

8.2.2 Review of trial structure

The SWG carried out a review of the trial structure for gray whales and identified a number of general issues that needed to be incorporated more fully, including consideration of the inertia model (Witting, 2003) and investigation of the sensitivity of the results to the prior assumed for K (carrying capacity). From these discussions, a number of additional *Evaluation and Robustness Trials* were developed. The former largely comprised incorporation of the inertia model and assumptions concerning survey intervals, bias in past and future survey results and the treatment of most recent abundance estimates. Changes to the latter again largely involved further incorporation of the inertia model.

The Committee **agreed** that at the next intersessional workshop (see Item 21), the SWG would examine whether the new trials sufficiently capture the need to consider different, yet plausible, dynamics to those produced by the conventional Pella-Tomlinson model. A decision of how many Robustness Trials to base on the inertia model will be deferred until the results from the trials specified are available. A final decision on the *Evaluation and Robustness Trials* for eastern North Pacific gray whales will be taken at the workshop.

Full trial specifications are listed in Tables 1 and 2 of Annex E.

8.3 Greenlandic fisheries and the Greenland Research Programme (see Annex E, item 3)

The need for a Greenland Research Programme had been first identified in 1998. The Committee had informed the Commission that it would be extremely difficult, if not impossible, to develop an *SLA* for the Greenlandic fisheries that will satisfy all of the Commission's objectives. This is particularly important in the light of the Committee's inability to provide management advice (see Item 9.3). Recent progress by the Greenland Institute of Natural Resources (GINR) is summarised in Annex E (Appendix 4).

8.3.1 Stock structure, range and movement

Information on stock structure is essential if the Committee is to develop potential *SLA*s that will satisfy all the Commission's management objectives. Present information suggests that the fin and minke whales found off West Greenland do not comprise complete stocks but the range and extent of the full stocks are unknown.

Last year, the Committee recommended that every effort be made to obtain tissue samples for genetic samples from the catch and that efforts to compare these samples with those from neighbouring countries be continued. It was disappointed to hear that in 2002, only 30 samples were collected, compared to 110 in 1998, although the reasons for this were not clear. A number of suggestions were made to try to improve the situation. These included: explaining the importance of the collection of such samples to the hunters and providing feedback to them as studies progress; enlisting the help of local hunter representatives and others to collect and return samples from their areas (including payment, if appropriate); and reinstating the special programme that was in force in 1998.

The Committee **strongly recommends** the collection of genetic and other biological material from the catch that can be used to elucidate stock structure. It **requests** the Commission to encourage the Government of Denmark and the Greenland Home Rule authorities to assist with logistical and, if necessary, financial support. The value of such material will be greatly enhanced if material can be obtained from neighbouring waters, particularly to the south and west. The Committee **encourages** scientists from GINR to contact biologists in eastern Canada and the USA to try and locate further samples, as well as investigating its archives for other tissue that may be suitable for genetic analysis. It requests that the Commission encourages the USA and Canada to assist in any such efforts to the extent possible.

In recent years, the Committee has provided funds towards an annual programme of satellite tracking based on a target of four informative tracks per year (IWC, 2003d, p.23). Two fin whales have been tagged successfully to date, but this year no tags were successfully placed on either fin or minke whales. The Committee **reiterates** the potential value of such studies to the issue of stock structure (as well as potentially providing useful dive time information for cue-counting surveys). It **strongly recommends** that telemetry efforts continue that focus on fin and minke whales. It further **agreed** that marking later in the season should be also considered (to provide information on migratory routes and breeding areas). Given that last year's effort was concentrated in the Nuuk region, where only two minke whales were seen between 18 May and 17 October by the tagging team, the Committee **agreed** that serious consideration be given to operating in other areas (e.g. to the southwest).

8.3.2 Abundance and trends

Annex E (Appendix 4) described the results of a survey using a new photographic method, initially discussed by the SWG at the last meeting. These were disappointing but it was unclear whether the few photographs obtained (2 fin, 1 common minke, 1 humpback and 1 sperm whale in over 33 hours of effort) represent the true situation or reflect problems with the technique. Given this, the GINR

proposed that an experimental survey using two planes be undertaken in 2003 in an area of known high densities in Iceland, to validate the technique before it is used for a full scale survey off West Greenland in 2004 (Appendix 4).

The SWG had discussed this new technique at length last year and whilst noting some potential advantages, several comments were made that a full-scale feasibility study should ideally have been carried out before using it for a full survey. Although welcoming the decision to carry out an experimental survey this year, the SWG discussed whether this represented the best use of resources in the circumstances.

Noting that the most recent fin whale abundance estimate dated from 1987/88 and the most recent common minke whale estimate from 1993, the Committee **strongly recommends** that a traditional aerial cue-counting survey be carried out this summer in Greenland if logistically and financially possible. In making this recommendation, it was noted that under the grace-period provision considered for the AWS, catch limits would begin to be reduced from year 10-14 after an abundance estimate was last obtained depending on the scenario (IWC, 2003f, p.164). It recognised that the most critical factor in a survey resulting in an acceptable population estimate was the weather and that there was no guarantee that a survey will provide an estimate this year. It **urges** the relevant authorities to ensure that sufficient funds are made available to allow surveys to be attempted until a successful survey occurs.

8.3.3 Preliminary consideration of management procedures

In previous years, a small group has been nominated to consider the possibility of exploratory simulation studies to begin to look at the case of the Greenlandic fisheries. Recognising the difficulties of the lack of data, the Committee **encourages** this group (Annex U) to correspond intersessionally on possible future approaches, noting that these might also provide information on data needs.

8.4 Scientific aspects of an aboriginal whaling scheme

At last year's meeting, the SWG developed scientific aspects of an aboriginal whaling management scheme that would be used in conjunction with the *Bowhead SLA* (IWC, 2003f, pp.161-166) and these were agreed by the Scientific Committee (IWC, 2003d, pp.24-26) and recommended to the Commission; several member nations had requested further time to consider these. The Committee again **recommends** these to the Commission, noting that they form an integral part of the long-term use of the *SLA*.

8.5 Dialogue with Commission and hunters

As in previous years, the Committee **agreed** that the Chair of the SWG should present the results of its deliberations to the Aboriginal Subsistence Whaling Sub-Committee of the Commission. He will also be available for formal or informal discussions with delegates and representatives of hunters' organisations.

8.6 Work plan

The Committee **agreed** that the postponed workshop to finalise gray whale trial specifications should take place during the intersessional period (probably early January in Seattle). Depending on progress made, it may then be in a position to recommend a gray whale *SLA* at the next annual meeting. The SWG developed a timetable for its work and this is given in Annex E (Table 1). The Committee's work plan is discussed further under Item 19.

The Committee also noted the importance of maintaining the Developer's fund if it is to continue to make progress. This and other financial aspects are discussed further under Item 21.

9. ABORIGINAL SUBSISTENCE WHALING STOCK ASSESSMENTS (ANNEXES E AND F)

9.1 Bering-Chukchi-Beaufort Seas stock of bowhead whales (Annex F)

9.1.1 New scientific information

SC/55/BRG7 presented the completed analysis of the 2001 ice-based census of bowhead whales at Barrow, Alaska using the N_4/P_4 methodology. Last year, a preliminary estimate was presented with incomplete acoustic data (P_4 = proportion of acoustic locations within 4km of the lead edge). The N_4 estimate (N_4 = number of whales within 4km of the lead edge) did not change in this analysis (8,637) from the estimate presented last year. Using the revised P4 estimate (0.862), based on acoustic locations from the entire census period, the 2001 abundance estimate is 10,020 (95% CI of 7,800 to 12,900). The SE of the estimate is over twice that of 1993, which is expected given the poor viewing conditions in 2001. The annual rate of increase (ROI) was also calculated. A generalised least squares (GLS) model resulted in a ROI of 3.4% (95% CI 2.1% to 4.8%), which is nearly identical to the previous estimate of 3.3% based on the 1978-1993 time series.

Schweder and Ianelli (2000) and SC/55/BRG10 considered aspects of the consistency of the age-length data (George *et al.*, 1999; Braham, 1995) with other data available for assessing the B-C-B stock of bowhead whales. Details of these discussions are given in Annex F, item 4.1.1, and further consideration of this topic will occur during the in-depth assessment next year (see Item 9.1.1.3).

Other new scientific information was reviewed and discussed as detailed in Annex F, item 4.1.1.

9.1.2 Catch information

SC/55/BRG5 reported catch information for the 2002 Alaskan subsistence harvest. A total of 50 bowhead whales were struck resulting in 39 animals landed. The efficiency (the ratio of the number landed to the number struck) of the hunt was 78%, which is similar to the average efficiency over the past 10 years (77%). Two of the landed whales had to be abandoned before butchering when ice and ocean current conditions became unsafe for the hunters. Of the remaining 37 whales, 16 were males and 21 were females. Of the 21 females, 7 were presumably mature (>14.2m in length). Two of these

large females were closely examined and determined not to be pregnant.

It was noted that landed whales are measured and sampled in cooperation with local hunters. Tissue samples are obtained for analysis of genetics, contaminants, endocrinology and anatomical studies. Reproductive tracts are generally taken. The majority of the sampling is performed in Barrow, where snowmobiles are used to get to the ice edge. Although sampling is also performed in Kaktovik, it has not been practical to station biologists in areas where fewer whales are landed. Many of these data will be available for the in-depth assessment in 2004 (see Item 9.1.1.3 and Item 22.1).

Borodin reported that two bowhead whales (1 male, 1 female) were landed, and 1 struck and lost during Russian aboriginal subsistence whaling operations. The female was 17.2m and weighed 86.6 metric tonnes. The male was 14.8m and weighed 34.6 metric tonnes.

9.1.3 Preparation for in-depth assessment

The Committee reviewed the availability of existing data and additional data needs for the in-depth assessment planned for 2004, particularly given the Commission's endorsement of the *Bowhead SLA* last year.

Following discussions in Annex E (item 6.1) and Annex F (item 4.1.4), the Committee noted that the primary focus of the in-depth assessment should be: (a) the data required for the *Bowhead SLA*; and (b) examining whether the present situation is within the tested parameter space for that *SLA*. The latter effort will include consideration of such issues as stock identity and biological parameters. Previous assessment models can be used to investigate this, but it will not be necessary to determine the 'best' model (in the time-consuming manner of previous assessments) or to calculate management-related quantities such as replacement yield, Q_0 and Q_1 (Wade and Givens, 1997).

It was noted that there will be no anticipated modifications to the 2001 N_4/P_4 abundance estimate (SC/55/BRG7). Given the discussion detailed in Annex F, item 4.1.1, the Committee agreed that there was no need for a Bayes empirical Bayes (BEB) estimate to be presented for the 2001 data; the N_4/P_4 estimate carries the same weight and the methodology is more straightforward.

It was noted that DeMaster *et al.* (2000) had summarised the Committee discussions that led to the conclusion that Bering-Chukchi-Beaufort Seas bowheads comprise a single stock. Genetic data for investigating possible sub-stocks had been limited, but studies completed to date provide no evidence of sub-stock structure. Additional samples from times and places in which a putative Chukotka sub-stock was found would need to be analysed if tests of population differentiation were to have adequate power to identify such a substock.

The Committee **agreed** that, as the *Bowhead SLA* was developed and tested under a single stock assumption, it was important for the 2004 assessment to examine data acquired since the DeMaster *et al.* (2000) review, as well as old data, to determine whether they support this assumption.

It was noted that additional data would be required to reconcile issues surrounding the consistency of age-length data and other available information for this population (Item 9.1.1.1). However, it was **agreed** that this issue will not necessarily prevent the Committee from providing advice based on an in-depth assessment in 2004.

9.1.4 Management advice

The Committee **agrees** that there is no reason to change its previous management advice, namely, that it is very likely that a catch limit of 102 whales or less annually would be acceptable (IWC, 2003d, p.28).

9.2 Eastern North Pacific stock of gray whales (Annex F)

9.2.1 Catch and stranding information

Nine gray whale strandings were reported from the west coast of the Baja California Peninsula, Mexico (SC/55/BRG21). Sex and length measurements were reported for five animals: two males (9.0-10.69m) and three females (5.10-13.6m). The remaining animals were estimated to be adult (n=2) or calves (n=2) based on aerial observations.

SC/55/BRG22 reported that 131 gray whales (70 male and 61 female) were taken by Russian aboriginal subsistence whaling operations. The length range of the animals was 8.0-14.0m, and the weight ranged from 6.0-29.3 metric tonnes, averaging 11.2 tonnes.

9.2.2 New scientific information

SC/55/BRG13 reported on the southbound migration of the Eastern North Pacific stock of gray whales in the years 1998 to 2002. Abundance estimates were 27,958 whales in 1997/98 (95% log-normal CI=22,901 to 34,131), 18,246 in 2000/01 (95% log-normal CI=15,195 to 21,910) and 16,848 in 2001/02 (95% log-normal CI=13,995 to 20,283). The latter two estimates were well below the estimate in 1997/98, which was the highest estimate since this project began in 1967/68. These low estimates might have been caused by an unusual number of whales that did not migrate as far south as Granite Canyon in these seasons, or the abundance may have declined following high mortality rates observed in 1999 and 2000. These issues are being taken into account in the trial structure for gray whales under the AWMP (see Item 8.2).

SC/55/BRG11 presented a project to recover historical photographic identification for Eastern North Pacific gray whales, converting this information to digital format, and archiving these datasets for analyses aimed at better understanding changes in reproductive and other population parameters. The Committee noted the importance of this work for understanding trends in biological parameters in this population over time, and **strongly endorses** this project.

Other new scientific information was also presented and discussed (see Annex F, item 6.1).

9.2.3 Management advice

Last year, the Committee carried out an in-depth assessment of the Eastern North Pacific stock of gray whales and agreed that a take of up to 463 whales per year is sustainable for at least the medium term (~30 years), and is likely to allow the population to remain above

MSYL. No information was presented this year to change that advice. Furthermore, the Committee was encouraged to hear that strandings have returned to pre-1999 levels (e.g. the 2001 stranding level was less than 30), and that calf production has improved to approximately the mid-range of pre-1999 levels (after low levels in 1999, 2000 and 2001).

9.3 Common minke and fin whales off Greenland (Annex E)

Last year, the Commission adopted by consensus annual strike limits of 175 common minke whales and 19 fin whales from West Greenland and 12 common minke whales from East Greenland, for the five-year period 2003-2007.

In 2002, SC/55/ProgRep Denmark reported catches of 13 (5 males and 8 females) fin whales and 139 (33 males, 88 females, 17 unknown sex, 1 struck and lost) common minke whales off West Greenland and 10 (all females) common minke whales off East Greenland. One fin whale and one common minke whale were bycaught in fishing gear.

From 1998 to 2002, the (nominal average) strike limit on common minke whales in West Greenland was constant at 175. In 1998-1999, strikes averaged about 95% of the limit, and in 2000-2002, about 83%. Effort and other factors have not been studied.

The Committee has never been able to provide satisfactory management advice for either the fin or minke whales off West Greenland. This reflects the lack of data on stock structure and abundance and is the reason for the Committee to first call for the Greenland Research Programme in 1998 (IWC, 1999e).

This **inability to provide any advice on safe catch limits is a matter of great concern**, particularly in the case of fin whales where the best available abundance estimate dates from 1987/88 and is only 1,096 (95% CI=520-2,100); that for West Greenland common minke whales dates from 1993 and is 8,371 (95% CI=2,400-16,900). The Committee **strongly recommends** that an abundance survey be carried out this year if at all possible (and see Item 8.3).

The Committee stresses that obtaining adequate information for management must be seen as of very high priority by both the national authorities and the Commission (see Recommendations under Item 8.3). Without this information, the SWG will not be able to provide safe management advice in accord with the Commission's management objectives, or develop a reliable *SLA* for many years, with potentially serious consequences for the status of the stocks involved. The Committee notes the grace-period provision of an AWS, in which catch limits would begin to be reduced from year 10-14 after an abundance estimate was last obtained depending on the scenario (IWC, 2003f).

Catches off East Greenland are believed to come from the 'Central' stock. As discussed in Annex D (Appendix 14), recent abundance estimates from there are such that a catch of 12 whales poses no risk to the stock.

9.4 Humpback whales off St Vincent and The Grenadines (Annex E)

The Committee received a report planning for the research programme, MoNAH (more North Atlantic humpbacks), a follow-up to the successful YoNAH project (Smith *et al.*, 1999). It welcomes this initiative and endorses the approach outlined in SC/55/AWMP2.

Discussion of scientific aspects of SC/55/O21, which attempted to estimate the length of a dead humpback whale on a beach in St Vincent and The Grenadines from a tourist photograph taken after a hunt, is given in Annex E (item 8.2).

In recent years, the Committee has examined the stock structure of humpback whales in the North Atlantic. Three matches have been found between the southeastern Caribbean and elsewhere: one to Greenland, one to Puerto Rico and one to the Barents Sea (IWC, 2002g, pp.39-44; IWC, 2003d, pp.44-46). Given this, the Committee concurs with previous statements that it is most plausible that these animals are part of the West Indies breeding population (ca 10,750 in 1992). However, further data to confirm this are desirable and it repeats previous recommendations (made since 1987) that every effort be made to obtain photographs and genetic samples from St Vincent and The Grenadines. It particularly welcomed news that for the first time, genetic analyses of three samples from the hunt (1 in 2001, 2 in 2002) are being undertaken, in a collaborative study between Pastene and Palsbøll. The Committee looked forward to receiving the final report at next year's meeting.

There was no report of catches occurring since the two taken on 27 March 2002 and reported last year (IWC, 2003d, p.31) but there was no scientist from St Vincent and The Grenadines present and no national progress report.

The Commission had adopted a total block catch limit of 20 for the period 2003-2007. The Committee **agreed** that if the humpback whales are part of the West Indies breeding population, this catch limit will not harm the stock.

9.5 Catches by non-member nations (Annex F)

The Committee welcomed the information on bowhead whales from Canadian stocks (see Item 10.5.1 and Annex F).

Cosens of the Department of Fisheries and Oceans, Winnipeg, Canada, informed the Committee that a 14.1m female was landed by Inuit hunters in August 2002, near Igloolik, Nunavut, Canada. One animal was struck. There was no evidence that the landed female was lactating or pregnant. There are no plans for a hunt in Canada in 2003.

The Committee recognised that it is the policy of Canada to authorise the harvest of a single whale from the Hudson Bay/Foxe Basin stock of bowheads every two years. Nonetheless, the Committee expressed concern about these limited catches from this stock.

9.6 Work plan

The work plan agreed by the sub-committee on bowhead, right and gray whales is given in Annex F and considered further under Item 19.

10. WHALE STOCKS (ANNEXES F, G AND H)

10.1 Matters relevant to more than one stock

10.1.1 DESS: progress with data entry and analysis options

The data from the 2001/2002 SOWER circumpolar survey and the 2001 NASS Icelandic aerial and shipboard surveys have been incorporated into DESS. New import facilities have been written for DESS that have enabled four years of SOWER resightings data (1998/99-2001-02) and data from two vessels on the 2000 IWC-CCAMLR surveys to be incorporated into DESS. Financial aspects are dealt with under Item 21.

10.1.2 SOWER circumpolar cruises

10.1.2.1 SOWER 2002/03

SC/55/IA1 presented the report of the 2002/03 SOWER circumpolar survey. Details are discussed under Annex G, item 2.2.1.

It had been anticipated that this cruise would complete the third circumpolar series (CPIII). Unfortunately, abnormally high pack-ice concentrations precluded the vessels entering the Ross Sea and contingency plans to extend the research area westward to 150°E to complete coverage of the other remaining gap in coverage in CPIII were implemented.

The Committee expressed its gratitude to the Government of Japan for providing the vessels to conduct the survey. It also thanked the officers and crew of each vessel, the Cruise Leaders of both the SOWER and JARPA surveys (who had managed, with one exception, to ensure that SOWER vessels surveyed areas before JARPA operations as outlined at the planning meeting[4]), and the other researchers for their efforts to ensure that the cruise successfully achieved its objectives.

Consideration of the oceanographic circulation patterns in the Ross Sea region due to the ice conditions (which have detrimentally impacted land-based predators, such as penguins) is given in Annex G, item 2.2.2.

The Committee noted that the planned minke whale biopsy feasibility study (IWC, 2002i, p.216) had not yet been completed and it **recommends** that it be completed this year if at all possible.

10.1.2.2 PLANS FOR FUTURE CRUISES

The Committee **endorses** the proposal for the 2003/2004 cruise and expresses its thanks to the Government of Japan for the offer to make the survey vessels available; especially, as once again, the duration of the cruise will be longer than the normal SOWER cruises.

The Committee noted that contingency plans needed to be developed in case the Ross Sea was closed again. Possibilities were discussed (Annex G, item 2.2.2) and it was agreed that a final plan will be developed at the next planning meeting.

The Committee recognised the great importance the SOWER surveys have been to its work. It **recommends** that sufficient time be set aside next year to adequately discuss further plans, given the completion of the third circumpolar set of surveys. To facilitate that discussion the Committee **recommends** an intersessional Steering Group (see Annex U) produce a paper for next year's meeting for discussion by the Committee. Initial consideration will take place at the planning meeting.

10.1.3 Evaluation of abundance estimators against simulated datasets

Last year, it was recommended that simulated datasets be used to investigate the robustness of the new analysis methods. Progress has been made and simulated data more similar to those data collected during the IDCR/SOWER surveys were created (SC/55/IA9). Further details are given in Annex G, item 2.4.

Additional features for incorporation into simulated datasets were discussed. The most challenging and realistic cases will occur when there are (positively or negatively) correlated spatial patterns in school density, school size distribution and weather conditions. The Committee agreed that the proposals in Annex G, Appendix 4, were important and represented a useful way to proceed. An intersessional e-mail group was established to consider this further (Annex U).

The Committee also **recommends** that a standardised DESS dataset for use by all methods under consideration be created (Annex G, Appendix 8). In addition to this, data from the Estimated Distance and Angle Experiments and a PDF version of the DESS manual should be included.

10.2 Antarctic minke whales (Annex G)

10.2.1 Review of new data and analyses

10.2.1.1 IDCR/SOWER DATA

The 2001/02 IWC-SOWER circumpolar cruise covered the western part of Area V, from 130-150°E (with additional limited coverage from 150-155°E). SC/55/IA2 presented estimates of minke whale abundance from this survey, obtained using the standard IWC method. The combined estimate from IO and Closing mode including the correction for Closing mode bias was 9,600 (95% CI=6,000-15,500). Although the inclusion of sightings classified as 'like minke' had only a small effect on the Closing mode estimate (an increase of about 5%), the IO mode estimate was increased by some 30% to 11,200 (95% CI=6,600-19,200).

10.2.1.2 NEW METHODS TO ESTIMATE ABUNDANCE AND ADDITIONAL VARIANCE

The Committee continues to consider new methodological approaches to analyse IDCR/SOWER data.

SC/55/IA5 and SC/55/IA10 were discussed. These both dealt with mis-estimation of school sizes, a prevalent feature of the IO (or passing) mode data collected on IDCR/SOWER surveys (see discussion in Annex G, item 3.3.1). Such issues will be considered further by the intersessional e-mail group (Annex U).

The Committee also discussed methods to estimate minke whale abundance using JARPA survey data (SC/55/IA3). Details are provided in Annex G, item 3.3.2.

[4] See Annex G, item 2.2.1.

Additional variance is the extent to which the variability of combined surveys exceeds the contribution from sampling variability that is estimated from each survey separately. This can occur, for example, when parts of a population move between strata. For IDCR/SOWER surveys, complicating factors that have to be accounted for include: the survey strata and ice-edge position differ between surveys, and the assumptions made about the degree to which whales move between Areas, north of 60°S and into the pack ice.

The Committee **agreed** that due to the constantly varying nature of the IDCR/SOWER survey strata, additional variance should be calculated based on the estimates of abundance from the surveys, and that population dynamics should be incorporated into the estimation. Details are presented in Annex G, item 3.3.3 and Appendix 6.

It also **agreed** that for comparability purposes, all abundance estimation methods should use the same approach for estimating additional variance, like that outlined above (or a variant thereof).

SC/55/IA12 provided useful information on where to focus methodological developments related to $g(0)$. It is clear that any method adopted for analysing IDCR/SOWER data will need to take account of $g(0)$ varying by school size. The reasons for the apparent change in true school size distribution between CPII and CPIII are not well understood, but this is evidently an important biological issue and may have further implications for interpreting trends.

10.2.3 Inter-year comparisons and trend

10.2.3.1 EXTRAPOLATION TO UNSURVEYED REGIONS

10.2.3.1.1 NORTH TO 60°S

In previous years, the Committee has **agreed** that methods that are able to model density gradients are probably the most appropriate for extrapolating density to 60ºS for unsurveyed areas.

SC/55/IA11 carried out sensitivity tests to assess the impacts of assumptions made for extrapolation and interpolation. The authors noted that a large contribution to the CPIII estimates was from an extrapolation for the unsurveyed area on the 1991/92 cruise in Area V. Comparisons excluding Area V indicated an increase in the CPIII to CPII abundance ratio from 53% to 59% for Closing mode, and from 41% to 45% for IO mode, when extrapolations are adjusted similarly. The authors concluded that such an appreciable contribution to the difference (about a 10% effect) warrants careful consideration of the methods used to extrapolate northwards.

10.2.3.1.2 INTO THE PACK ICE

Minke whales are known to occur within the pack ice during the time period that the IDCR/SOWER surveys are conducted. However, the IDCR/SOWER survey vessels cannot survey within pack ice of more than about 30% ice concentration. Last year, the Committee recommended (IWC, 2003i) that efforts be made to identify other possible data sources that could be used to estimate whale density in the pack ice region.

Enquiries made by the Secretariat concerning the availability of data from the APIS (Antarctic pack ice seals) programme suggested that such data would probably not be of value to the IWC as sightings were incidental and cetacean effort was unquantifiable. APIS coordinator Marthan Bester offered to put out a request for incidental cetacean sightings data to seal researchers via the Antarctic seal researcher distribution list.

However, a systematic sightings survey that was part of the Australian APIS project had collected cetacean data in the pack ice region (Thiele *et al.*, 2002) and preliminary results were presented to the Committee last year. The Committee **agreed** these data warrant further investigation to determine if any further analyses could estimate minke whale density in the pack ice.

In conclusion, the Committee has been unable to find new data sources for cetaceans within the pack ice other than APIS data. The analysis of data from cetacean sightings surveys within the pack ice remains, however, important to the work of the Committee.

It had also been recommended that national programmes with vessels operating in the pack ice should be requested to conduct dedicated cetacean observations from their vessels. The Committee welcomed the news that the National Research Institute of Far Seas Fisheries (Japan) and the Institute of Cetacean Research (Japan), in collaboration with the Japanese National Institute of Polar Research, plan to study the distribution pattern of marine mammals and sea birds in relation to sea ice condition. The collaboration will begin in the 2003/2004 season; a sightings survey within the pack ice will be conducted from an icebreaker, during transit between homeports and the Antarctic base. It is hoped that, in the near future, aerial sighting surveys may be possible using helicopters.

The Committee **agreed** that, in the long-term future, it is important to be able to estimate minke whale density in the ice, and develop appropriate practical and analytical methods for doing so. For the period of the IDCR/SOWER surveys however, density in the ice cannot be retrospectively estimated, and so any analyses that describe the likely effect on the IDCR/SOWER abundance estimates are of value.

In this regard, SC/55/IA7 presented a qualitative analysis of the relationship between the distribution of minke whales and Antarctic sea ice coverage in the austral summer using satellite data for the 1988/89 (CPII) and 1998/99 (CPIII) IDCR/SOWER circumpolar surveys in Area IV. The author concluded that, for the years investigated, the relatively low abundance estimate for open water was due to a correspondingly high number of minke whales in the pack ice region.

The Committee agreed that such qualitative analyses are useful to understand the effects of oceanographic processes, sea ice condition and dynamics on minke whale density. However, it may be difficult to extrapolate findings from small-scale studies to the entire circumpolar region.

SC/55/E19 provided definitions of 'ice-edge' as used by other marine science disciplines in the Antarctic, and it was suggested that such a physically-based definition should be used in modelling the IDCR/SOWER data. The Committee agreed that is was important to state clearly

what definition of 'ice-edge' was being used in analyses, and that a climatological definition may be more appropriate for some models. An intersessional group (Annex U) was established to investigate this, and to try to discover information on other explanatory variables (such as shelf break, coastlines, southern boundary, the Antarctic circumpolar current) that may influence whale distribution. This is also discussed under Item 12.2.2.2 with respect to standardising 'at-sea' definitions.

The Committee **recommends** that further efforts be made to examine the available data (including past data) such as that collected in the IDCR/SOWER, SO-GLOBEC or APIS surveys to try to estimate the order of magnitude of the numbers of minke whales in the ice.

10.2.3.2 TRENDS

The Committee has considered three methods to estimate trends in abundance: a simple comparison of the abundance estimates from the three series of circumpolar (CP) surveys; growth rate parameter value(s) from the additional variance analysis (see item 3.3.3 of Annex G); and use of catch-at-age population dynamic models.

The Committee noted that the types of population dynamic models useful for examining trends were not limited to traditional Virtual Population Analyses (VPA) and noted that a variety of general catch-at-age methods could be used. The experience of the intersessional Working Group established last year to further VPA analyses provided useful background to the Working Group on Data Availability (Item 22.1). The Committee identified seven specific catch-at-age related issues for further investigation (see item 3.4.2.1 in Annex G). It was noted that part of one issue would be facilitated through assistance from the Standing Working Group on Environmental Concerns, since *a priori* hypotheses relating recruitment to environmental variables over given time frames are required.

The Committee **agreed** that investigation of all seven issues was of high priority for its work in order to complete the Southern Hemisphere minke whale review.

It was further agreed that the Committee will attempt to ensure that sufficient analyses are developed to address the above issues in order that the Committee can complete the Antarctic minke whale review.

In Plenary, the Committee reviewed a proposal (Annex G, Appendix 10[5]) that specified the principal investigators, data requirements, and likely analytical techniques to be used to investigate the above issues, in accordance with the rules under Procedure B of the new Data Availability Process (Item 22.1). The proposal requests JARPA data from the main study areas, Areas IV and V. It was noted that data from Areas III and VI, although of some use to the proposed catch-at-age analyses, are not as high priority as JARPA data within Areas IV and V, as explained in Annex G, Appendix 10. It was **agreed** that the request for data within Areas III and VI should be reviewed next year in light of progress made into the investigations of the above seven issues. The Committee **endorsed** this proposal and thus a formal request for data under the new data availability procedures will be submitted to the Data Availability Group.

It was noted that work undertaken under the auspices of this group does not preclude other analyses being submitted.

SC/55/IA4 concluded that given estimated consumption rates of killer whales and their estimated abundance, it was not possible for killer whales to have killed enough minke whales to explain a possible decline of the magnitude estimated in Branch and Butterworth (2001a). After discussion, the Committee **agreed** that whilst multi-species analyses may provide consistency checks for examination of trends, they should not be viewed as the primary tool for trend estimation.

The Committee noted that the power to detect and interpret a trend is implicitly tied to factors influencing additional variance, such as longitudinal movement of whales. In conclusion, the Committee **agreed** that any trend estimation method should not extrapolate between Areas, since any changes in biological parameters could be Area-specific.

10.2.4 Other

10.2.4.1 RESPONSE TO RESOLUTION 2001-7

The Committee noted that it had made progress in addressing the hypotheses listed in the response to Resolution 2001-7 (IWC, 2002a), which requests the Committee to provide a list of plausible hypotheses that may explain the apparent population decline. However, the Committee **reiterates** its view that the most appropriate time to fully address this Resolution will be after completing its work on reviewing the IDCR/SOWER abundance estimates and trends.

10.2.4.2 STOCK STRUCTURE

SC/55/IA8 presented the results of a restriction fragment length polymorphism (RFLP) analysis of mitochondrial DNA (mtDNA) in Antarctic minke whales from Areas IIIE, IV, V and VIW sampled during the 1987/88-2001/02 JARPA surveys. The pattern of longitudinal and temporal mtDNA heterogeneity is consistent with the hypotheses of a core stock in Areas VIW, V and IVE. Heterogeneity found in Area IVW can be interpreted as an 'intrusion' of a different stock in some years or the overlap of two stocks with a temporal component.

The analyses presented in SC/55/IA8 have a number of implications for trend estimation from the catch-at-age analyses. Since the results of the catch-at-age analyses will need to be robust to assumptions about stock structure, there was discussion about where to draw the stock boundary line in Area VI. The Committee **recommends** that the alternative analyses suggested by the authors of SC/55/IA8 be conducted.

10.2.5 Plans for completion of Antarctic minke review

Annex G, Appendix 9 details the tasks identified by the Committee to further the review of Antarctic minke whale abundance estimates. Noting the need to explain why the estimates of abundance using the standard methods for CPIII are appreciably lower than estimates for CPII (IWC, 2002a), the Committee **strongly recommends** that substantial progress be made on all tasks given high

[5] Although submitted to Plenary, it was agreed that it was appropriate to append this to Annex G.

priority. The overall work plan of the Committee is discussed under Item 19.

To successfully complete its review of the IDCR/SOWER abundance estimates and trends and to address Resolution 2001-7, resources are required. In regards to these IWC objectives, the Committee **agreed** that the highest priority request is to complete the last year of the IDCR/SOWER survey, and high priority is given to requests to maintain and use the DESS database, and to develop and test new analytical methods that result in less biased abundance estimates and trends. Financial details of the IDCR/SOWER cruise were discussed in Appendix 2 in Annex G. The Committee's budget is discussed under Item 21.

10.3 Southern Hemisphere blue whales

10.3.1 Abundance and trends estimation

10.3.1.1 ABUNDANCE AND TRENDS ESTIMATION

SC/55/SH6 and SC/55/SH20 presented analysis providing evidence of increases in Antarctic blue whale populations.

There was considerable discussion of these papers and the details can be found in Annex H (item 6.1).

In conclusion, the Committee **agreed** that there was evidence for an increase in blue whales in some areas of the Antarctic, but without sufficient time to explore issues of potential bias that were raised, it was not possible to accept specific estimates of abundance and trends at this time.

In SC/55/SH18, indices of relative abundance for baleen whales on the Durban (South Africa) whaling ground were compared which suggested that blue whales may have fallen to less than 3% of their level in the 1920s by the time protection was given in the mid-1960s. It was **agreed** that the information presented in SC/55/SH18 could be useful in terms of corroborating modelling assessments.

SC/55/SH14 presented results from an acoustic and visual census of mysticetes in the SO-GLOBEC West Antarctic Peninsula region. Blue whale calls were recorded year-round although visual sightings of blue whales were comparatively rare. The Committee **recommends** that this important work continue.

10.3.2 Progress on sub-species identification

The Committee recalled that a primary aim of the blue whale research undertaken on the SOWER cruises was to determine a reliable method of distinguishing between true and pygmy blue whales at sea. Last year, the Committee received a paper that indicated that pygmy blue whales could be identified by their 'tadpole' body shape (vs 'torpedo') and the fact that the front tip of the central blowhole groove extends beyond the front tip of the nostrils (Kato *et al.*, 2001).

This year, the Committee received further information on this issue using acoustic and genetic methods. SC/55/SH5 and Appendix 8 examined acoustic recordings made from SOWER cruises. Both suggested that vocalisations may be a reliable indicator of sub-species. SC/55/SH7 provided a valuable review of blue whale songs worldwide. Details of the discussions of these papers are found in Annex H, item 6.3.2.

In light of the potential value of such data, the Committee **recommends** that efforts be made to continue collecting acoustic recordings of blue whales worldwide. It also noted that satellite tagging could serve as a useful complement to acoustic investigations of this type.

10.3.2.1 GENETICS

In SC/55/SH9, patterns of genetic variation in Southern Hemisphere blue whales were examined using 110 samples from the southeastern Pacific Ocean, the Indian Ocean and around the Antarctic (including samples from IWC/SOWER cruises). Each of these strata were found to be distinctly different but the differentiation between the geographic ranges of the nominal sub-species (true blue whales in the Antarctic versus pygmy blue whales in the Pacific and Indian Oceans) was not markedly greater than between the populations of pygmy blue whales. Despite high statistical differentiation, there were no diagnostic differences that would allow confident identification to sub-species of a single sample. The Committee **recommends** that additional effort to obtain biopsy samples of blue whales, together with length measurements for potential assignment of sampled animals to sub-species, should be a priority in future work. The question of the relative utility of sloughed skin, biopsies and other sources of DNA (including samples fixed in formalin) for blue whale genetic analysis was raised; a review of this issue is given in Annex G, Appendix 6.

10.3.3 Other

The Committee also received reports of blue whale research during the IWC/SOWER cruise (SC/55/IA1) and the JARPA programme (SC/55/O6). In welcoming this research, the Committee recommends that:

(1) additional time be allocated to blue whale research on future SOWER cruises; and
(2) additional effort be made to obtain biopsy samples in the JARPA programme.

Other research on blue whales is detailed in Annex H, item 6.

10.3.4 Work plan

The Committee **recommends** that the assessment of blue whales starts in 2006. In order to ensure that the necessary materials are available for the review, the Committee established an intersessional Working Group (Annex U).

10.4 Southern Hemisphere humpback whales

10.4.1 New estimates of abundance, rate of increase and stock structure information

10.4.1.1 REPORT FROM INTERSESSIONAL GROUP

A report from the intersessional Working Group on Southern Hemisphere humpback whales (Annex G, Appendix 7) was received. It was noted that some further sub-division of certain breeding stocks[6] has been suggested, notably the F group, which may require sub-division into two elements (Cook Islands and French

[6] A = western South Atlantic; B = eastern South Atlantic; C = western Indian Ocean; D = eastern Indian Ocean; E = western Pacific (i) east Australia, (ii) 1 New Caledonia, (ii) 2 Tonga; F = Oceania and G = eastern Pacific.

Polynesia). Breeding grounds are reasonably well known for most groups except for the F group. Migration routes are quite well known for four groups (B, C, D and E(i)), while feeding grounds are well-defined for only one group (D, eastern Indian Ocean) and either poorly defined or not defined at all for the remainder. There are moderate to good estimates of abundance for four groups (A, C, D and E(ii)1), but only poor estimates, or none at all, for the others. Moderate to good estimates of trends exist for only the D and E groups, and only poor estimates, or none at all, for the remainder. Most catch histories are more or less complete with the exception of the central Pacific (BS E(ii)2 – F), where the coverage is generally poor.

The Committee thanked Bannister and the Working Group for their hard work and **recommends** that it continues to work intersessionally to provide an updated review of information (Annex U). This review should also include the Arabian Sea population of humpback whales. The Committee **recommends** that the spatial allocation of catch data (see Item 3.3.1) should be given high priority over the next year.

10.4.1.2 NEW ESTIMATES OF ABUNDANCE AND RATES OF INCREASE, AND NEW STOCK STRUCTURE INFORMATION

The Committee received a number of papers on this item, including research on Brazilian coastal breeding grounds (SC/55/SH10), indices of abundance off Durban up to 1975 (SC/55/SH18), abundance off Fiji (SC/55/SH3), shore-based surveys at Pt Lookout, east Australia (SC/55/SH21), suspended migration due to prey availability off South Africa (SC/55/SH19), abundance and stock identity off New Caledonia (SC/55/SH8), abundance off the Antarctic Peninsula (SC/55/H13), acoustic monitoring of the same area (SC/55/SH14) and movements and stock-identity in the South Pacific (SC/55/SH2).

SC/55/SH12 explored the migratory relationship between humpback whales in the Magellan Strait and the Antarctic Peninsula using photo-id and mtDNA data. No matches were found in a comparison of photos and the mtDNA analysis found three haplotypes, two of which were shared with Antarctic Peninsula animals. The Committee noted the value of this work and **recommends** that these studies continue.

The Committee welcomed the provision of information on humpback whale distribution and the southern boundary of the Antarctic Circumpolar Current (Matsuoka *et al.*, 2003). It also received a brief report on activities of the Indo-South Atlantic Consortium on Humpback Whales (ISACH), which coordinates research among scientists from 12 member countries. The Committee **recommends** that this extensive collaboration continue. It also **endorsed** a South African-supported cruise off Mozambique.

The Committee received a review of research on the apparently non-migratory population of humpback whales off Oman (SC/55/O10). It appears that the population is small (in the hundreds) and perhaps has yet to recover from Soviet whaling in the 1960s (Mikhalev, 1997). The Committee acknowledged the value of this research to an understanding of this unique and apparently small population and **recommends** that it continue.

Further details on all this work can be found in Annex H, item 7.

Finally, SC/55/SH15 reported on the status of the IWC-funded Antarctic Humpback Whale Catalogue curated by the College of the Atlantic. Photographs from this region date back to 1987. During the last year, 695 images representing 352 individual humpback whales were added to the Catalogue, bringing the total number of individuals represented to 1,693. The Committee **recommends** that the IWC continue to fund this effort (see Item 21).

10.4.2 Work plan

The Committee agreed that considerable progress had been made in some areas of the work plan from last year. However, many items still required further effort. The sub-committee on other Southern Hemisphere stocks had identified a number of items in its work plan presented in Annex H, item 7.7. The overall Committee work plan is discussed under Item 21.

10.5 Other small stocks – bowhead, right and gray whales

10.5.1 Small stocks of bowhead whales

10.5.1.1 DAVIS STRAIT/BAFFIN BAY AND HUDSON BAY/FOXE BASIN STOCKS OF BOWHEAD WHALES

The Committee received a report of satellite tracking results from 11 bowhead whales tagged in northwest Disko Bay, West Greenland (SC/55/BRG3) in May 2002. The results confirm that whales wintering off West Greenland move into Canadian waters in summer periods and suggest that Hudson Strait may be a wintering location. They also suggest that there may be interchange of bowheads between Baffin Bay and Hudson Bay/Foxe Basin.

SC/55/BRG17 reported on bowhead whale research in Canada. In 2003, seven bowheads were satellite tagged which revealed extensive and variable movement patterns. There are plans to: (1) further survey the Hudson Bay/Foxe Basin stock incorporating the new range information; and (2) use a discovery curve approach to estimate stock size from genetic samples taken in Foxe Basin. Work on Baffin Bay/Davis Strait bowheads continued and abundance estimates from surveys conducted in 2003 were 128 (95% CI=28-228) bowheads in Eclipse Sound and 256 (95% CI=154-358) whales in Prince Regent Inlet and northern Gulf of Boothia. Skin samples were collected and have been analysed for mtDNA haplotypes. The Committee expressed its appreciation to Cosens for providing this information.

Ongoing efforts to compare ancient and modern bowhead whales on the basis of mitochondrial DNA were reported. This work will also evaluate changes in bowhead whale genetic variation over the last 1,500 years in all current populations.

Details of this research can be found in Annex F, item 4.2.

10.5.2 North Atlantic right whales

Updated information on recent research and management activities for North Atlantic right whales was given in SC/55/BRG15. This population remains critically endangered, and several analyses have concluded that

survival has declined within the last decade. However, reproduction has improved substantially in the last three years: the calf count to date this year is 18, with no observed mortalities. In 2001 and 2002, 31 and 21 calves were born, respectively. There were five known mortalities in the population in 2002: two were due to probable ship strikes, one was due to entanglement, and the other two were of unknown cause.

The US National Marine Fisheries Service (NMFS) has implemented regulations designed to reduce the likelihood of entanglement; these include gear modifications and closing of specific areas to fishing. The effectiveness of these measures is not yet clear. The International Maritime Organisation has approved moving shipping lanes in the Bay of Fundy away from the major right whale habitat. The US NMFS has developed a comprehensive package of regulatory options intended to mitigate ship strikes on right whales; this is currently undergoing review.

In recent years (e.g. IWC, 2001b, p.34) the Committee has expressed grave concern over the status of this population. In particular it has noted that it is **a matter of absolute urgency** that every effort be made to reduce anthropogenic mortality in the population to zero. The Committee reiterates this **recommendation.**

Other new scientific information was also presented and discussed and details can be found in Annex F, item 5.3.

10.5.3 Southern Hemisphere right whales

SC/55/O23 presented an analysis of 30 years of photo-identification studies of the southern right whales which congregate in the waters surrounding Peninsula Valdés, Argentina, between June and December each year. The updated estimates of mean demographic parameters are very similar to previous analyses: mean calving interval 3.42 years (SE=0.11 yr); mean age at potential first calving 9.1 years (SE=0.4 yr); adult female annual mortality rate 0.020 (SE=0.004); annual percentage rate of population increase 6.8% (SE=0.5%). The reproductive female population in 2000 in this area was estimated at 700 individuals (SE=50).

Other new scientific information was also presented and discussed and details can be found in Annex F, item 5.3.

10.5.4 Other small stocks of right whales

The Committee believes that the situation of eastern North Pacific right whales is equal to, if not worse than, the situation in the western North Atlantic. Numbers are estimated to be of the order of tens of individuals, with only two sightings of possible juveniles or calves this century. Both the photographic and biopsy catalogues contain several individuals that were sampled in multiple years. The Committee **strongly recommends** that research into the status of eastern North Pacific right whales be continued and intensified; specifically that:

(1) visual and acoustic surveys to establish the summer distribution and feeding ground be continued;
(2) photo-identification and photogrammetry effort be combined with attempts to obtain photographs suitable for examination of evidence of entanglement and ship strikes; and
(3) genetic sampling of individuals be continued and the use of genotypic mark-recapture methods for population estimation be investigated.

10.5.5 Western North Pacific stock of gray whales

SC/55/Rep4 (this volume) presented the results of a Workshop on Western Gray Whale Research and Monitoring Needs, held in Ulsan, Korea, in October 2002. Topics discussed included stock identity, migration, distribution, catch history, population estimates, biological parameters, habitat-related problems, population assessment, existing research programmes and objectives for future research. Specific recommendations and conclusions of this Workshop are summarised in Annex F, item 6.2.

Overall, the Workshop agreed with the conclusions of previous reviews on western gray whales. Specifically, that the population is very small, and suffers from a low number of reproductive females, low calf survival, male-biased sex ratio, dependence upon a restricted feeding area and apparent nutritional stress (as reflected in a large number of skinny whales). Other major potential concerns include behavioural reactions to noise (notably in light of increasing industrial activity in the area) and the threat of an oil spill off Sakhalin which could cover all or part of the Piltun area and thus potentially exclude animals from this feeding ground. The Workshop had noted that assessments of the potential impact of any single threat to the survival and reproduction of western gray whales were insufficient and had strongly recommended that risk assessments consider cumulative impact of multiple threats (from both natural and anthropogenic sources).

The Committee adopted the Workshop report and **endorsed** its recommendations, including the research and monitoring plan. Furthermore, the Committee expressed its appreciation to Brownell and Kim for their efforts in organising the meeting, the Government of the Republic of Korea for hosting the meeting, and to Bannister for agreeing to serve as Chair. The involvement of range state scientists was particularly welcomed.

Since 1997, ongoing studies of western gray whales have resulted in a photographic dataset that can be used for mark-recapture survival estimation. SC/55/BRG14 provided a good example of how such data can be used to estimate demographic parameters. Non-calf and calf survival were estimated as 0.952 (95% CI=0.912-0.975) and 0.709 (95% CI=0.443-0.882), respectively.

SC/55/BRG18 used the same robust model design to estimate the abundance of western gray whales off northeast Sakhalin Island, Russia. Abundance in the study area in a given year ranged from 52-78, and the estimates were only slightly more than the total number of whales identified in the same year, indicating the very high capture probability within a year.

The analysis showed that the number of whales using the study area increased over the six-year study, but there was no conclusive evidence that the population was increasing. Available evidence suggests that the abundance estimates may closely approximate the size of the entire western gray whale population. Discussion of these papers can be found in Annex F, item 6.2.

Plans for the US-Russian research collaboration and national research plans were presented. As in previous years, the Committee **strongly recommends** that the ongoing Russia-US western gray whale research and monitoring programme continues and expands into the future, and that the proposed Russian National Programme also be carried out. Results from these two programmes combined will be the only way to assess the status of this critically endangered population.

The Committee also **strongly recommends** that other range states (Japan, China and the Republic of Korea) develop national research and management programmes on this population.

SC/55/SD4 proposed an international transfer of tissue sub-samples from gray whale products purchased in Japanese markets in 1999 to allow further investigation of stock and individual origins. Although the authors noted that the proposal involves a scientific exchange, Nagatomo stated that Japan's position is that this is a domestic issue. The Government of Japan will investigate it, and pursue the matter according to Japan's domestic law.

The Committee **recommends** that the proposed investigations be carried out, and encourages the relevant governments to facilitate the transfer of specimens between laboratories. It did not express an opinion on whether the IWC Secretariat should be involved (see Annex F, item 6.2).

10.6 Other

10.6.1 Report of Steering Group on an in-depth assessment of sperm whales

Last year, the Committee endorsed the idea of planning for an in-depth assessment of sperm whales (IWC, 2003d). To accomplish this, the Committee had identified a Steering Group to work intersessionally. That group was unable to complete the work needed to finalise a plan for the in-depth assessment and so a Working Group met during the Committee meeting.

The Working Group proposal is given as Annex R. The Committee **endorsed** the general proposal while recognising the difficulty there will be in securing funding. The process requires convening an in-depth assessment planning workshop. The workshop objectives would be to identify: (1) the key new methodological developments that apply to sperm whale research; (2) critical tests for such methods and how they might be conducted; and (3) relevant spatial scales for conducting regional field studies to address key uncertainties. The cost of such a workshop was estimated at £7,500 to contract for a review of assessment related information and £25,000 to pay for the cost of travel and logistics for a 4-5 day workshop requiring 25-30 participants. The Committee's budget is given under Item 21.

The successful completion of such an in-depth assessment would depend on the necessary information being available. Without considerable support for 2-3 years of field-work, it is unlikely that these data will be available in the near future. It was therefore recognised that the in-depth assessment of sperm whales could be completed no sooner than 2007 or 2008. Hatanaka commented that the in-depth assessment for western North Pacific Bryde's whales (see Item 6.3) should occur before an in-depth assessment for sperm whales.

The Committee formed a Steering Group under Smith (Annex U) to work intersessionally to undertake the actions needed to move forward in preparing for this in-depth assessment.

10.6.2 Southern Hemisphere fin whales

The Committee briefly considered new information on Southern Hemisphere fin whales. Details can be found in Annex H, item 8.1.

In SC/55/SH18 the analysis of historical indices of abundance from the Durban (South Africa) whaling grounds that indicated far greater levels of depletion than suggested by contemporary analyses of stock condition.

In SC/55/SH14 and Sirovic *et al.* (2003), acoustic monitoring from the West Antarctic Peninsula region found a strong seasonality in fin whale calls, with a peak in April-May 2001 and an absence of calls from July 2001 to January 2002.

SC/55/SD6 presented a phylogenetic analysis of fin whale mtDNA control region sequences worldwide using samples and published sequences from the western and eastern North Pacific, the North Atlantic, the Mediterranean Sea, and the Antarctic. The phylogeographic pattern of the fin whale does not appear to be as clear-cut as for some other species. The Committee **recommends** that, when possible, analyses should use the 460-bp segment at the 5' end of the mtDNA control region, which in mysticetes probably captures approximately 98% of variation within the control region (Baker and Medrano-Gonzalez, 2002). The Committee also **recommends** that efforts be made to obtain biopsies of fin whales from SOWER cruises.

10.6.3 Humpback whales off Gabon

The potential impact of ongoing seismic surveys on a humpback whale breeding and calving ground in Gabon was raised. Seismic surveys are planned for May-July 2003 and coincide with humpback whale breeding and calving in the area. The Committee expressed serious concern about the spatial and temporal overlap of surveys and humpback breeding and noted that future seismic surveys should be completed prior to the arrival of whales on their wintering grounds off Gabon.

10.6.4 Consideration of proposals for further in-depth assessments

SC/55/RMP8 suggested that a *pre-implementation assessment* of North Atlantic fin whales should become a priority activity for the Committee. There has been insufficient time during the meetings of the sub-committee on the RMP for this to be discussed. After brief discussion, it was **agreed** that an intersessional Steering Group (Annex U) would develop a recommendation for the Committee regarding whether the available data are sufficient to allow a *pre-implementation assessment* to occur, following guidelines given under Item 5.3.1.

11. STOCK DEFINITION (ANNEX I)

11.1 Statistical and genetic issues pertaining to population structure and modelling

11.1.1 Report of intersessional workshop

An intersessional Workshop on the Testing Of Spatial Structure Models (TOSSM) had been held in January 2003. Donovan, the Workshop's Chair, presented the report to the Committee (SC/55/Rep3, this volume). A number of disciplines were represented, including population genetics, cetacean biology and management procedure evaluation. About a third of the expert participants had no prior cetacean background.

The main aim of the Workshop was to develop ways of examining the performance, particularly in a management context, of existing (and future) genetic techniques that provide population structure information which feeds into an assessment process. Experience (e.g. in developing *Implementation Simulation Trials* for common minke whales in the North Pacific) has shown that genetic information does not usually provide unequivocal evidence for specific boundaries for use in management. Furthermore, few boundary-placement techniques have been subject to any form of simulation testing. Even those that have, cannot be considered to have undergone the level of extensive simulating testing to incorporate uncertainty that has been a feature of, for example, the IWC's work on the RMP and AWMP. This is perhaps not surprising, given the scope and complexity of developing suitable genetically-specified simulation datasets. The task of the Workshop was thus to set out a suitable simulation framework to allow evaluation of genetic methods used in inferring population structure both in general terms (because the issue is of widespread relevance in conservation and management outside the IWC) and from a specifically IWC viewpoint.

Such a complex project inevitably has to proceed in an iterative fashion, as with the development of the RMP and AWMP. The Workshop concentrated on specifying the various modular tasks needed for Phase I of the process (c.f. *Initial Exploration Trials* in the AWMP process), for which some results might be expected within a year, while also identifying the types of scenarios that would need to be covered in Phase II and beyond. The modules for Phase I are shown in Fig. 4, along with the key details either decided or left to be decided.

Further discussion of the modules can be found in Annex I and in SC/55/Rep3, but there are a few details to emphasise here:

(1) the most challenging module is the development and validation of a program to simulate realistic genetic datasets;

(2) the archetypes are at present confined to baleen whales – this is not to say that odontocetes are unimportant but reflects both the need for simplicity (odontocetes have far more complex and variable social systems) and the fact that both the RMP and AWMP apply to baleen whales;

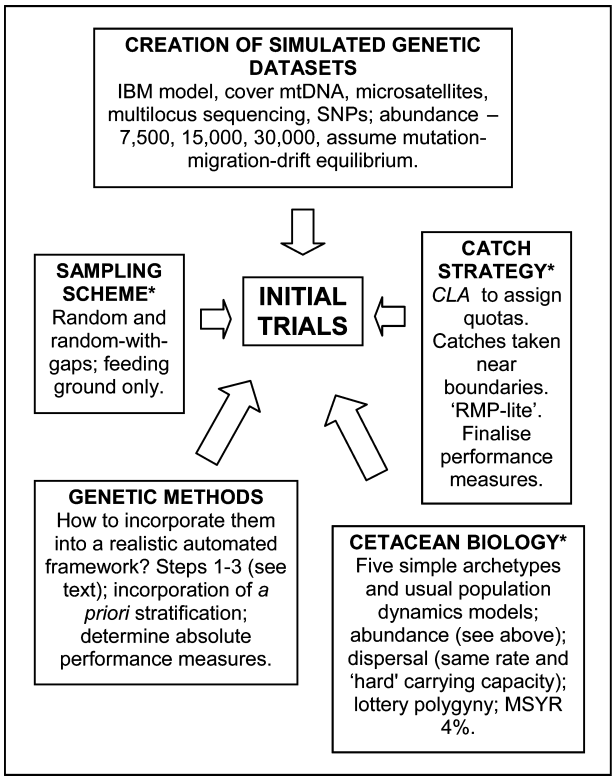

Fig. 4. Phase I of the TOSSM project: work modules needed to arrive at an initial set of trials. Those marked with an asterisk are largely complete (apart from coding). The remainder require further work (see SC/55/Rep3).

(3) management performance measures can largely be based on those used in the RMP/AWMP, but with extra measures to show how the spatial distribution of whaling effort is affected by boundary placement - in order to allow performance to be measured with respect to various different definitions of unit-to-conserve (the latter being a policy rather than scientific choice) the simulated spatial extent of the population will be divided into a sufficient number of cells to allow results to be reported at a variety of spatial scales (levels of genetic depletion will also be recorded);

(4) all existing genetic methods for studying population structure require some adaptation in order to fit into TOSSM - for example, methods based on hypothesis tests need to be provided with an initial set of possible boundaries, and a threshold for deciding how much differentiation is enough to warrant separate management.

Phase I of TOSSM is exploratory; it will improve our understanding of the basic (comparative and absolute) properties of the methods and how they are implemented, as well as providing a sense of the behaviour and interaction of the various factors included in the simulation framework. It will also provide an opportunity for new methods to be developed; an important function of the TOSSM project is to draw the attention of scientists outside the IWC to the management and conservation implications of population structure in general, and to inspire more development of practical methods. On the basis of the results of Phase I, Phase II can be developed to

provide a more thorough and increasingly realistic examination of methods used in setting management boundaries in space and time, perhaps ultimately expanding into more than exclusively genetic techniques.

COMMITTEE DISCUSSION

The Committee welcomed the Workshop report and thanked Donovan and the Steering Group, especially Martien and Taylor. Although the complexities of setting up the TOSSM genetic simulation framework must of necessity be greater than those in setting up other simulation tests within the IWC, it was **agreed** that simulation tests are nevertheless feasible in the near future and that a clear roadmap can be laid out.

It was emphasised that TOSSM is not trying to produce a 'black box' procedure to provide automated input to the RMP or AWMP in situations when population structure is unclear. Rather, it has become evident that it is difficult to devise informative ways to learn about the performance of boundary placement methods using only absolute 'biological' measures (e.g. number and location of boundaries selected), especially when the true population structure is complex. It is almost a truism, but nevertheless true, to say that when evaluating performance in a management context, it is important to use management-based performance measures (e.g. catches, depletion). This necessitates a simulation framework incorporating population structure, dynamics and management.

In such a framework, it is necessary to specify not just the boundary-placement method, but also the catch-control rule. It makes sense to use the RMP's *CLA* for this in TOSSM, both because of its obvious relevance to the IWC and because the *CLA*'s behaviour and RMP adjustment mechanisms (*Catch-cascading* etc.) are well-understood. This makes the conclusions somewhat contingent on details of the RMP, but as long as simulation parameters are chosen appropriately, the results of TOSSM on the comparative effectiveness of different management-boundary-placement methods should generally remain relevant to management and conservation situations besides the RMP. In any case, if more specificity is required, the modular nature of the computer program envisaged for TOSSM (see below) ensures that it will be straightforward for the IWC or others to adapt the TOSSM programs to use other catch-control rules (for instance those used in the AWMP) or in considering spatial distributions of bycatch.

The Committee discussed further specifications of the TOSSM modules. The most substantial task is developing the simulation program itself. SC/55/SD9 proposes a specific programming framework for TOSSM, extending the existing freely-available METASIM software. After the appropriate extensions have been made, the new program will also be made freely available for use in generating simulated data both within and outside the IWC.

It is proposed that the development of METASIM and the other TOSSM modules be conducted intersessionally, co-ordinated by a Steering Group (Annex U). The first sets of simulated data should become available in February or March 2004, in time to get results for at least some methods by next year's Scientific Committee meeting.

In summary, the Committee **strongly endorses** the TOSSM project as laid out above, encourages its intersessional development, and looks forward to the first results next year. More detailed specifications may be found in Annex I.

11.1.2 Further statistical and genetic issues

Boundary Rank (BR) is a hierarchical clustering method designed to generate population structure hypotheses from genetic data, that has been applied in several IWC and non-IWC contexts. Studies of BR's performance with simulated data have been described in IWC (2003j, pp.326-327) and IWC (2002j) and the TOSSM project (Item 11.1.1) will provide a more comprehensive evaluation. Experience from practical applications is also valuable and SC/55/SD10 summarised several case studies in which it was used (North Atlantic minke whales, South Pacific humpback whales, Western Florida bottlenose dolphins, Eastern Pacific harbour porpoises and Alaskan harbour seals). In all of these cases, considerable information is already available from non-genetic data and from previous genetic analyses using more traditional analytical approaches. In all five cases, the authors noted that results of the BR analyses were consistent with previous work, providing empirical validation of the BR method.

Several issues arising from SC/55/SD10 and other experiences of BR were discussed including the degree of sensitivity to choice of initial grouping of samples and choice of connectivity matrix, possible bias in *post-hoc* dispersal rate estimates, likely behaviour when applied to data from clinal populations. These issues will be explored further in the TOSSM project.

The Committee also noted the difficulty of deciding what should be the appropriate response when different genetic analyses suggest different boundaries. One problem is that the outputs from most tests of genetic structure do not explicitly show the 'estimation uncertainty'. In the case of BR, for example, there may be other hierarchies that 'fit' the data almost as well; and in the case of hypothesis tests it is far from clear how to present 'uncertainty'. For this reason it is not always clear whether different methods are really giving inconsistent answers.

The Committee recalled its recent experience of using BR to generate stock structure hypotheses for this year's *Implementation Review* for North Atlantic minke whales (Annex D, Appendix 14). The total sample size is large (data from *ca* 2,600 animals were used in the analysis) but the level of genetic differentiation between sub-areas is relatively low. In general, the boundaries suggested by BR were similar to those ultimately adopted by the Committee, but often after adjustment and further investigation. Some boundaries suggested were thought to be implausible, e.g. in a sub-area in the eastern Central area; BR may have a tendency to identify areas of stock mixing as being different from both contributing stocks. In the case of the North Sea, results were thought to be sensitive to assumptions about connectivity to other areas. Non-genetic data had sometimes proved valuable in making final decisions about the appropriateness or otherwise of a suggested boundary. The p values for 2-, 3-

and 4-stock hypotheses calculated by BR for NA minke whales were all non-significant. However, power was expected to be low due to the large number of comparisons made. Consequently the suggested boundaries were retained despite their lack of significance.

The Committee concluded that BR can be useful for identifying potential stock structure hypotheses, but that the proposed boundaries require further close case-by-case examination before being adopted. This is consistent with the stated purpose of BR in SC/53/SD7. Plans for development of BR were encouraged, including the incorporation of stochastic (non-greedy) optimisation methods, and provision for the use of nuclear markers.

SC/55/SH8 investigated both the abundance and reproductive autonomy of humpback whales from the New Caledonia wintering grounds using: (i) photo-identification data; and (ii) genetic data allowing paternity inference. Two independent estimates of the number of males were made, one from each dataset. The two estimates were very similar, consistent with an assumption of reproductive autonomy for the New Caledonia wintering grounds. The approach does not require samples from neighbouring putatively-separate units, so could be of particular value where data are limited. It also allows reproductive (near-)closure to be established for very small stocks and short timescales, a task which is difficult or impossible for frequency-based methods. The timescales may actually be too short for some management purposes, in that dispersal events occurring less often than once per generation could be missed. The Committee recognised the potential utility of this novel approach, and encourages its further development.

SC/55/SD1 extended previous work on Bayesian methods to choosing between one- and two-stock hypotheses using mtDNA data. The methods do not incorporate any direct measure of the degree of differentiation between population units; this seems computationally quite intractable within a Bayesian framework, at least when large numbers of alleles are involved. The Committee encourages further development, noting that a full genetic simulation framework such as TOSSM would be useful here.

SC/55/IST6 explored the possibility of using Akaike's Information Criterion (AIC) as a means of choosing between stock structure hypotheses. It is not obvious exactly how to use AIC when, as is usually the case, there are many rare haplotypes in a population. The three definitions tried in the paper varied in how well they dealt with simulated data. However, all performed poorly at identifying multiple stocks when dispersal rates exceeded 20 individuals per generation, a level well below that at which separate management would usually be required. Various proposals for improving the statistical properties were made.

Further details on these methods can be found in Annex I, item 6.

11.2 Options for units to conserve, including management implications

Last year, the Committee had noted that continued attempts at 'stock definition' were not likely to be very useful in the IWC context, and decided instead to concentrate on considering possible definitions of 'unit-to-conserve', and their corresponding implications for management (see IWC, 2003d, p.49). There were no papers directly on this topic this year, although the Committee noted that SC/55/SH8 was relevant to the operational delineation of one possible unit-to-conserve: small groups of animals that are reproductively isolated but perhaps only over short time scales.

The Committee noted that the TOSSM project was deliberately structured to allow investigation of how different units-to-conserve would respond to management, and that the results from the first phase of TOSSM should help to inform discussions of unit-to-conserve in future.

11.3 Review instances of recovery of cetacean sub-stocks/units to conserve after severe depletion

No papers were received on this topic, which had been reviewed in 2000. The Committee noted that in-depth studies of long-term demographic changes are underway, and confirmed its interest in reviewing the results when available.

11.4 Development of population and harvesting archetypes suitable for consideration in management

The specifications for Phase I of TOSSM include a preliminary list of population archetypes and a simple harvesting archetype, listed in Annex I, item 5.1. This list is meant to be a simple and informative basis for simulations, rather than a comprehensive checklist for consideration when contemplating assessment of a population as envisaged in IWC (2003j). It is expected that further archetypes will be added to the list as TOSSM progresses.

11.5 Work plan

Annex I, item 8 shows the work plan agreed by the Working Group on Stock Definition. The Committee's overall work plan is discussed under Item 19.

12. ENVIRONMENTAL CONCERNS (ANNEX K)

12.1 Modelling cetacean-fisheries interactions

12.1.1 Report of intersessional workshop on modelling cetacean-fishery interactions (SC/55/Rep1, this volume)

Northridge summarised the results of the Workshop, held in La Jolla in June 2002. He thanked the SWFSC for having been able to host the meeting at short notice. The Workshop had been held in response to a request by the Commission (IWC, 2002b). The main long-term objective of the Committee on this topic is to answer the question 'how are changes in abundance of cetaceans likely to be linked (in the short- and long-term) to changes in fishery catches?'

The focus of the La Jolla Workshop was much more limited in scope. Its aim was to evaluate existing modelling approaches, including identifying their constraints and data requirements, in order to identify those approaches most likely to answer the above question. The Workshop reviewed all the available major modelling approaches that deal with top predators and multi-species fisheries interactions. The three-day

Workshop had been attended by 13 invited participants and 10 members of the Scientific Committee.

The Workshop concluded that despite recent advances, most multi-species models are still in the development phase. It therefore agreed that no single approach could be recommended at this stage to provide reliable information of value to consideration of cetacean dynamics in an ecosystem context. However, this does not necessarily rule out the possibility that useful inferences might be drawn if a number of different modelling approaches yield qualitatively similar results. The Workshop also agreed that despite these difficulties, the consideration of ecosystem interactions between fish stocks and cetaceans is a potentially important research topic.

The Workshop agreed that there is currently no system for which we have suitable data or modelling approaches to be able to provide reliable quantitative management advice on the impact of cetaceans on fisheries or fisheries on cetaceans. If the Commission wishes to pursue this further, the Workshop warned that a considerable investment in time and resources would be required. The most important consideration in all modelling approaches concerns the issue of functional responses, and the Workshop recommended that these should be looked at in more detail, possibly through another workshop. The Workshop also highlighted the fact that cetaceans are just one part of the system that needs to be modelled, and recommended that the most productive way forward would be for the IWC to seek to collaborate with other bodies with a broader range of expertise in other parts of the system.

COMMITTEE DISCUSSION

The Committee thanked Northridge and the other members of the Steering Group for their considerable work. It reiterated that the Workshop was not intended to address the possibility of cetacean-fishery interactions for any specific system, but rather to evaluate existing modelling approaches for their potential use in addressing these issues. The Committee endorsed the Workshop conclusion that for no system at present are we in the position, in terms of data availability and model development, to provide quantitative management advice on the impact of cetaceans on fisheries, or of fisheries on cetaceans. However, this does not rule out the possibility of providing qualitative advice if a number of different approaches yield qualitatively similar results. It also endorsed the conclusion that consideration of ecosystem interactions between fish stocks and cetaceans is a potentially important research topic in a general sense; however, there was disagreement as to whether further pursuit of this matter was likely to be helpful to the Committee in providing advice to the Commission regarding the management of whale populations.

12.1.2 Other contributions on multi-species modelling

The Committee received a number of contributions on multi-species modelling. SC/55/SH17 presented results of an initial model of minke whale-blue whale-krill interactions, developed as a first step in investigating the major predator-prey interactions in the Antarctic. For details of the discussion of this paper see Annex K, item 6. It was agreed that no conclusions can be drawn from such an analysis at this time, and the authors were encouraged to extend their model to better capture the Antarctic food web.

SC/55/IA4 considered a speculative hypothesis about the impacts of killer whale predation on marine mammal populations in the Southern Hemisphere, arising out of a similar hypothesis from the North Pacific and Bering Sea. The paper used simple population models and estimated consumption rates for killer whales, to show that observed declines in some populations of southern sea lions and southern elephant seals could be explained by a 1% increase in these prey items in year-round killer whale diets. However, an appreciably lower recent estimate for Antarctic minke whales (Branch and Butterworth, 2001b) would require too many additional deaths to be caused by increased killer whale predation. Details of the discussion of this paper can be found in Annex K, item 6. The Committee noted that further work was envisaged and urges the authors to take into account the comments in Annex K in any future analysis.

SC/55/E16 presented a method for DNA-based identification of prey species represented in whale faeces. The authors concluded that use of DNA-based methods for examining whale diet is widely applicable and potentially more accurate as a means of reconstructing the species composition of whale diet than morphology-based methods. SC/55/E15 presented a two-stage simulation /empirical model to examine the potential biases that result from three methodological approaches for determining whale diet. The simulation results suggest that a simple measure of presence or absence of prey DNA in faeces provides the most accurate and precise estimator of proportional importance of prey types. There was considerable discussion of these papers (Annex K, item 6) but no consensus on the authors' conclusions. The Committee looks forward to further consideration of the method.

12.2 High latitude climate change effects on cetaceans

12.2.1 Special session on Southern Ocean climate change and cetaceans

Thiele and Moore had hoped to provide a substantive update on joint activities with both Southern Ocean Global Ocean Ecosystems Dynamics Program (SO-GLOBEC) and Convention on Antarctic Marine Living Resources (CCAMLR) but a lack of funding had made it necessary to scale back the original plan to include two invited talks and eight posters (see Reference list in Annex K for paper titles). It is hoped that sufficient funding will become available to support the full symposium in the future.

Jon Watkins (British Antarctic Survey) gave a presentation summarising BAS-CCAMLR studies, and Eileen Hofmann of Old Dominion University (USA), and chair of International SO-GLOBEC, gave a synopsis of that programme's work.

Watkins summarised the BAS-CCAMLR work that focused on krill, its physical environment, competitors and predators, and emphasised major findings and current hypotheses. There are marked interactions between the physical environment and population dynamics of krill. For example, current hypotheses of krill population

dynamics in the Scotia Sea suggest that sea ice conditions impact krill population dynamics. Simple population models can be used to reproduce the general patterns of fluctuation in biomass caused by variation of year *CLA*s strength as a result of environmental variations.

Long-term environmental variation can be seen in sea ice and air temperature data over the last century in the South Orkney region. There has been a marked decline in the probability of encountering cold years since 1950. Using such data within the krill model leads to a change in estimated krill biomass over the last century with a large reduction in biomass occurring between 1950 and 1970 and current biomass remaining at the lower levels. Future climate change scenarios for the Southern Ocean remain somewhat unclear due to the relatively unpredictable effect of sea ice. To better understand possible changes, it is important to not only maintain present long-term datasets but also extend these to increase coverage throughout the Southern Ocean. In particular, there is now a need for improved understanding of circumpolar processes that can only come through international collaboration to conduct large-scale observations and develop suitable large scale models.

Hofmann's presentation stressed that the choice of the Southern Ocean as a study site for the GLOBEC resulted from the strong linkage to climate and close coupling between trophic levels. SO-GLOBEC has as a primary objective understanding the physical and biological factors that contribute to enhanced krill growth, reproduction, recruitment and survivorship throughout the year. This objective includes the predators and competitors of Antarctic krill, and in this respect is a first in international interdisciplinary Antarctic science. SO-GLOBEC integrates efforts of German, UK, USA and Australian national programmes, located within the Weddell Sea, the Scotia Sea-South Georgia region, and along the western Antarctic Peninsula.

Hofmann focused primarily on the US programme, and described the integrated study of physical and biological oceanography, krill and krill predators. During 2001 and 2002, that programme undertook 11 cruises: 4 process cruises, 4 survey cruises and 3 mooring deployment/ retrieval cruises. IWC observers participated in eight of these cruises. The mooring cruises deployed current meter mooring and Acoustic Recording Packages (ARPs) for recording whale sounds. The moorings remained in the water for one year, were retrieved, and redeployed for a second year. These represent the first long-term moored current and acoustic measurements made in Antarctic continental shelf waters.

Preliminary results show the importance of Circumpolar Deep Water in structuring the marine food web along the west Antarctic Peninsula. Areas where this water mass is found are characterised by higher phytoplankton production, increased krill abundance and increased abundance of top predators, including humpback and minke whales. There is a strong correlation between the presence of whales and hydrographic boundaries produced by the onshelf intrusion of Circumpolar Deep Water.

Planning is now ongoing for a 10+ year follow-on programme (SC/55/E14) entitled Integrated analyses of Circumpolar Climate interactions and Ecosystem Dynamics in the Southern Ocean (ICCED), to begin in 2007. It will include extensive deployment of remote instrumentation to measure a broad suite of variables and, if funding can be secured, acoustic recorders to detect whale calls. The instrument locations will be linked via ship-based studies. The IWC is recognised as the single international body with a focus on and management responsibility for whales, and it is hoped that the IWC will participate in this programme.

The Committee expressed its appreciation to Watkins and Hofmann for participating in this meeting and for their interesting and informative presentations. In discussion, it was noted that the time series of krill biomass (estimated as a function of ice extent) Watkins presented for the 20th century through the present indicated staged but overall and in some periods dramatic declines, with current levels at 50% or less in relation to levels estimated for the 1950s. If this model result reflects true patterns, it could contribute to an explanation of putative declines in minke whale abundance during the past 30 years, and may have other substantial implications for the management advice provided by the Committee on Southern Hemisphere whales.

Concern was expressed by some Committee members that these model results not be taken as documented evidence of actual patterns of change in krill biomass, especially given the difficulties encountered in attempts to link fish recruitment or biomass changes to environmental measures. Watkins noted that of course direct measurements of krill biomass for this long period and throughout the Antarctic did not exist. He explained that this model expectation of changes in krill biomass was based on a strong association observed in the Scotia Sea during recent decades, but like all models it was a simplification of patterns that may have occurred.

12.2.2 Progress reports on SO-GLOBEC/CCAMLR

In efforts led by Thiele, the IWC has participated in five multidisciplinary research cruises in the Southern Ocean since the 2002 Annual Meeting. Integral to the IWC SO-GLOBEC and CCAMLR cooperation was the participation of Committee representatives at planning and pre-analysis collaboration meetings, proposal development and the presentation of work at international conferences. Two cetacean papers are to be published in late 2003 in the first volume of the US SO-GLOBEC special issue of Deep Sea Research. However, the main phase of synthesis and analysis is just beginning, so many more published contributions should be forthcoming, especially if resources are made available to support IWC participation in this essential stage. More details are available in documents SC/55/E9 and SC/55/E10.

The IWC has been invited to continue its participation in national and international efforts in the Southern Ocean in the next few years through collaborative synthesis and analysis projects and fieldwork. In the longer term, the IWC is well placed to build on recent collaboration and to ensure whale ecology becomes a core component of the next major phase of marine science focus in this region (i.e. the OCEANS/ICCED initiative discussed above by Hofmann and in SC/55/E14).

Thiele also reported on similar multidisciplinary cruises that included whale components conducted by the Australian national SO-GLOBEC programme (but where the IWC/SC was not represented: SC/55/E12 and SC/55/E17).

Moore reported on acoustic-related research conducted as part of SO-GLOBEC (e.g. SC/55/SH14) and two related papers that analysed blue whale calls recorded worldwide (SC/55/SH7), and solely in the Antarctic (SC/55/SH5). The latter papers were also considered under Item 10.3. Some notable initial results from the collaborations include: detection of minke whales throughout the year within the Antarctic pack ice; the detection of many thousands of calls from blue and fin whales along the Antarctic Peninsula (an area where only 10 blue whale and 27 fin whale sightings have been recorded during three IWC circumpolar sighting surveys), blue whale calls recorded nearly year-round at the northernmost location, and the close coupling between whale occurrence and onshore intrusions of Circumpolar Deep Water.

In discussion of IWC-CCAMLR, IWC-GLOBEC and related efforts, it was noted that the multidisciplinary cruises cover times of the year not previously studied. This, and in particular the new acoustic approaches, will allow a broader view of whale distribution than has to date been possible. In addition, the combination of acoustic and genetic investigations will now allow improved resolution of related questions of population structure and habitat use. However, much work remains to enable the use of acoustic detections as indices of whale abundance.

Possible implications of results to date for interpreting data from the IDCR/SOWER cruises were briefly discussed. It was noted that most of the sightings and all of the acoustic records of minke, blue and other whale species from these efforts had occurred farther south, closer to and within the ice, than the area covered by the IWC sighting surveys. This will be considered further next year.

As noted under Item 10.2.3.1, SC/55/E19 summarised definitions used by sea ice specialists. During the discussion, those involved in at-sea data collection expressed concern that such definitions (based on remote sensing data) would not be practical to use at sea. It was **agreed** that papers and reports should in all cases be explicit about the definition being used to avoid confusion. Work is in progress to develop an improved system for recording information on sea ice during cruises (SC/55/E8).

Further details on all these discussions can be found in Annex K, item 7. In closing, the Committee expressed its strong endorsement of the collaborative work with CCAMLR and GLOBEC, and **recommends** this work be continued.

12.3 Habitat-related issues

12.3.1 POLLUTION 2000+ and related studies

An interim report on POLLUTION 2000+ activities during 2002-2003 is given in Annex K, Appendix 4. Many analyses have been completed for the bottlenose dolphin sub-project, while for the harbour porpoise sub-project, progress has been made on immunohistochemistry analyses. Reijnders described plans for completion of Phase I and presented a workplan and related budget for 2003-2004. After prioritising the planned activities, a request was put forward for the IWC to co-fund the project with an amount of £52,000. This is considered under Item 21.

At least four papers from the bottlenose sub-project will be presented at next year's meeting. In addition, a major multivariate analysis undertaken to integrate results from all the biomarkers should be completed by then. However, the ability to attract additional funding for this project will ultimately determine the products that are completed and the projects success. It was noted that throughout the planning of this programme, the Committee explained that it would require a level of funding not normally considered by the Commission (e.g. see Reijnders *et al.*, 1999). The Commission has rarely funded this project at a level close to that requested (e.g. last year the IWC only funded £5,000 out of £54,410). However, the principal investigators have obtained considerable outside funding and in-kind support.

The Committee still **strongly supports** this programme and endorses its continuation.

The Committee also received SC/55/E18 wherein the authors used skin biopsies in a preliminary assessment of the ecotoxicological status of a SW Mediterranean segment population of striped dolphin. The Committee thanked the authors and detailed discussion is given in Annex K, item 8.

12.3.2 State of Cetacean Environment – consideration of the format of SOCER

Following discussions last year, the preliminary version of the State of the Cetacean Environment Report (SOCER) SC/55/E7 was presented by its editors. The SOCER originated in response to a request from the Commission for such an overview (IWC, 1998a; IWC, 2001a, pp.56-57). The focus this year was the Atlantic Ocean, Black Sea and the Mediterranean Sea. It also includes an additional global section relating information of global importance. All entries were referenced regarding source or submitter – the majority came from peer-reviewed publications. The SOCER is not intended to be exhaustive, but rather to provide a brief 'snapshot' of the cetacean environment for the non-specialist reader. Notable entries for this year included a Prestige tanker oil spill off the coast of Spain, a report in *Nature* of a 90% decline in predatory fish stocks from pre-exploitation levels, and the recent Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) cetacean status review.

It was concluded that the process leading to the current SOCER draft had been satisfactory and that a useful product had been produced. The Committee **recommends** that the SOCER should be appended to Annex K of its report to the Commission. The report is available from *www.iwcoffice.org*.

12.3.3 Arctic issues

SC/55/E3 reported five parameters measuring lipid and contaminant characteristics that had been measured by blubber depth in two cetacean species, white and killer whales. The study indicated that blubber biopsy techniques seldom result in samples that give information completely

representative of that obtained from full-thickness or even outer layer blubber samples obtained via necropsy. However, if carefully interpreted, biopsy samples can provide useful information for several types of analyses.

Moore reported that a new research initiative focused on the sub-Arctic is taking form under the GLOBEC organisational umbrella. The new initiative is called Ecosystem Studies of Sub-Arctic Seas (ESSAS) and will provide opportunities for collaborative studies of cetacean ecology (*http://www.globec.org*).

Further details are given under Annex K, item 8.2.

12.3.4 Habitat degradation (including plans for workshop)

SC/55/E2 reported on the current state of the 'Nautical Steps' (NS) tourist development. A recent analysis of the project by a market research firm concluded that demand for marina space had been overestimated by 600%. Plans available to date do not include sufficient information to evaluate potential threats to cetaceans and other marine life.

Last year, the Committee recommended that: (1) the Commission request information from the Government of Mexico on the specific locations and types of construction comprising NS; and (2) the Commission request the Government of Mexico take steps to ensure the maintenance of habitat important to cetaceans. The Committee thanked the Government of Mexico for providing a response (SC/55/O25). After considering the available information, the Committee expressed concern about the potential negative effects of this commercial development on local cetaceans and their habitats. It expressed disappointment that specific information requested last year was not made available in SC/55/O25, and therefore reiterated its request made last year, i.e. (1) the Commission requests information from the Government of Mexico on the specific locations and types of construction that comprise the development, referred to as the Nautical Steps; (2) the Commission requests that the Government of Mexico take steps to ensure the maintenance of habitat important to cetaceans.

The Habitat Degradation Workshop has been under consideration by the Committee for some years (see IWC, 2002g, p.73). A scoping workshop was held in Rome in June 2001 (Simmonds *et al.*, 2002). The workshop proposal was endorsed by the 2001 and 2002 meetings of the Scientific Committee. It was also recognised as important by ACCOBAMS. However, to date, funding has not been made available to conduct the workshop. The Committee reiterated its ongoing support for the workshop and **recommends** that it be held this year if funds are made available (and see Item 21). Further details can be found in Annex K, item 8.3.

SC/55/E6 reviewed recent work on habitat degradation in the context of climate change and was intended to represent a resource to assist planning and research decisions. The author offered a general conclusion that comparative studies are likely to be the mainstay of research connecting environmental effects with cetacean health and demography by seeking correlations for populations that experience a wide array of different levels of putative factors.

The SWG also received two studies on epidermal lesions in cetaceans and potential links to environmental stressors (SC/55/E1 and Wilson *et al.*, 1999). Discussion of SC/55/E1 highlighted the need to carefully control such studies for phylogenetic associations. The latter study indicated the strong association of water temperature and salinity levels with lesion occurrence, and the need to account for these variables when studying potential effects of chemical or other anthropogenic factors.

12.3.5 Acoustic issues

SC/55/E4 considered the development of wind farms in the marine environment. These constitute a new development in the marine environment and one for which the associated environmental impacts remain largely unexplored. Some trends in the present and future development of marine wind farms are evident. At present, all marine wind farms are limited to shallow, less than 10m deep, near-shore waters, within approximately 5km of the coast. However, plans are now being made for large-scale development further offshore out to EEZ boundaries. Current marine wind farms have been on a small scale, generally less than 20 turbines, but future plans are considering farms with hundreds of turbines.

A number of Committee members expressed their concerns about marine wind farm development and its potential environmental effects, including but not limited to effects on cetaceans and their habitats. The Committee regarded the rapid development of marine wind farms to be of potential concern and **recommends** that full independent and publicly-accessible environmental impact assessments are conducted wherever they are planned.

SC/55/E5 provided a brief review of some of the most recent research relating to noise in the marine environment, including studies on particular noise sources (i.e. vessels, aircraft, ocean experiments, acoustic harassment devices, seismic surveys and military activities). The debate about how powerful noise (military or otherwise) may precipitate strandings or otherwise harm cetaceans continues and recent events where some coastal cetaceans appeared to be exposed to powerful sonar has added to concerns (see Annex K for initial information on two events). The Whale and Dolphin Conservation Society (WDCS) has recently completed a review of the marine noise pollution issue (Dolman *et al.*, 2003) and concluded an action plan (see SC/55/E4). In addition, the US Marine Mammal Commission (MMC) had recently received substantial funding to investigate these matters.

It was noted that considerable progress has been made in understanding noise pollution, including the development of tools to quantify exposure levels for individuals and populations. The challenge remains to interpret the biological impact of physiological or behavioural responses to anthropogenic noise exposure.

The Committee expressed concern about the emerging threats to cetaceans from man-made sound, including *inter alia* deliberate deployment of powerful acoustic sources. Noting the emerging role of the US MMC in addressing these issues, the Committee **recommends**:

(1) that the Secretariat contact the US MMC with a request for exchange of information and potentially

the development of cooperative research in order to combine the expertise of both bodies;
(2) that workshops generated under the auspices of the US MMC 'noise programme' should include Scientific Committee representation where appropriate; and
(3) that appropriate representatives of the US MMC should be invited to attend the next Scientific Committee meeting to discuss progress in this field.

An intersessional Working Group was established to advance this work (Annex U).

12.4 Work plan and priorities for coming year

The work plan agreed by the SWG on Environmental Concerns is given in Annex K.

Following completion of scheduled business, the SWG engaged in a discussion of the general status of the group and the ways it conducts its business. There was agreement that it would be beneficial to link more closely with the other sub-committees. It would also be helpful to focus contributions and discussions at each meeting on a major topic, rather than discussing many topics in less depth. Both goals could be achieved by selecting a priority topic in advance of each meeting (as is done by SM). The selection could be coordinated with the other sub-committees, and could be either a region, discipline, or specific category of particular concern. An intersessional Working Group was established to pursue the matter for the 2004 meeting (Annex U). The overall Committee work plan is given in Item 19.

13. SMALL CETACEANS (ANNEX L)

13.1 Review of status of small cetaceans in the Black Sea

On several occasions in the past, the Scientific Committee has expressed concern regarding the status of small cetaceans of the Black Sea (e.g. IWC, 1983; IWC, 1992). This concern has arisen as a result of large directed takes, bycatches in gillnet fisheries and extensive habitat degradation. The Agreement on the Conservation of Cetaceans of the Black Sea, the Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS) entered into force in June 2001, providing the impetus for a new review of the status of cetaceans in the Black Sea.

13.1.1 Distribution and stock structure

Harbour porpoises (*Phocoena phocoena*), short-beaked common dolphins (*Delphinus delphis*) and common bottlenose dolphins (*Tursiops truncatus*) occur in the Black Sea. All three are found in the Turkish Straits System (TSS) but only harbour porpoises and bottlenose dolphins are present in the Azov Sea. There is very limited recent information on the distribution of small cetaceans in the Black Sea region. In general, harbour porpoises and bottlenose dolphins are found in coastal waters, while common dolphins are more pelagic. Bottlenose dolphins and harbour porpoises are found in the waters of all Black Sea states.

The Black Sea population of harbour porpoises is effectively isolated from those in the Atlantic by the Mediterranean and it was **agreed** that it comprises a separate stock for conservation purposes.

Based on the limited information available (SC/55/SM11 and Tomilin, 1957) the Committee provisionally concluded that common dolphins in the Black Sea are distinct from those in the Mediterranean Sea and should be treated as a discrete unit for conservation purposes.

More information is available for bottlenose dolphins (microsatellites, mtDNA morphometry). Based on this (SC/55/SM11 and Birkun, 2003), the Committee concluded that bottlenose dolphins in the Black Sea should be treated as a separate and discrete unit for conservation purposes.

With respect to stock identity, the Committee **recommends** that additional research be conducted: (1) on the population discreteness of common bottlenose dolphins and short-beaked common dolphins from the Black Sea, using additional samples from this and adjacent regions; and (2) on the population structure of all three species within the Black Sea, Azov Sea and TSS. It also **recommends** that a coordinated photo-identification programme be conducted throughout the Black Sea and TSS to provide information on movements, stock structure and ranging patterns.

13.1.2 Abundance

There have been few recent surveys to estimate abundance of cetaceans in the Black Sea and adjacent waters. This year, results from two line transect aerial surveys conducted in the Azov Sea and adjacent waters in 2001 and 2002 by Birkun and colleagues (SC/55/SM15) were presented. The Committee welcomed these surveys and the results are discussed in detail under Annex L, item 5.4. The Committee **recommends** that systematic abundance surveys should be conducted for all three species throughout their range in the Black Sea, Sea of Azov and TSS.

13.1.3 Life history

No new information was presented to the Committee on life history parameters of Black Sea cetaceans. The Committee **recommends** that further work be conducted on the life history of these species using samples from stranded or bycaught specimens.

13.1.4 Habitat

The Black Sea is one of the most highly modified marine ecosystems in the world and the habitats of cetaceans in this basin have been degraded by numerous human activities. These are discussed in Annex L, item 5.7 and include:

(1) a major increase in shipping throughout the Black Sea and particularly in the TSS and Kerch Strait;
(2) oil and gas development in several areas of the northwestern Black Sea and Azov Sea;
(3) chemical pollution (e.g. high concentrations of organochlorines have been found in Black Sea cetaceans);

(4) invasive species (e.g. *Mnemiopsis leidyi* a ctenophore probably brought in by ballast water) that can cause dramatic changes to the ecosystem.

For most of these, the effects on cetaceans in the region are unknown. The Committee **recommends** research into these, and in particular an assessment of the potential for disturbance caused by maritime traffic in the TSS and the Kerch Strait.

13.1.5 Directed catches

Uncontrolled directed takes were the primary threat to cetaceans in the Black Sea until a ban on this harvest was imposed in 1983 (SC/55/SM16); all three species were harvested from the 1830s to the late 20th century and up to 5,000,000 individuals may have been removed during this time (Birkun, 2003). There is no evidence of continued directed takes. For reasons given in Annex L, item 5.8, the Committee **recommends** that the possibility of conducting a retrospective analysis of directed catches and bycatches should be explored.

After the ban on directed harvest, removals of live bottlenose dolphins continued, primarily for use in dolphinaria, scientific institutions and military facilities in Black Sea states and elsewhere. There have been a number of recent initiatives to reduce or eliminate these captures. In view of the many other threats faced by this species in the Black Sea, the Committee **recommends** that any removals of live cetaceans be preceded by a rigorous assessment of the impacts of such removals.

13.1.6 Incidental catches

All three species are taken as bycatch, but incidental takes of harbour porpoises are of greatest concern. Common dolphin bycatches (of unknown magnitude) occur primarily in pelagic trawling operations (SC/55/SM16). Bottlenose dolphins and harbour porpoises are caught in a variety of fisheries, but bottom-set gillnets set for turbot pose the greatest threat; these bycatches occur in all Black Sea states (SC/55/SM2; SC/55/SM16; SC/55/SM23, SC/55/SM27; Radu *et al.*, 2003). In all areas, harbour porpoises are the most frequently entangled and preliminary indications suggest that bycatch rates of this species are very high. Illegal, unreported or unregulated (IUU) fisheries are widespread in the Black Sea and have a significant bycatch. The Committee **recommends** that the magnitude of bycatches should be determined for all three species of cetaceans in Black Sea fisheries. This is a matter of some urgency for bycatches of harbour porpoises in bottom-set gillnet fisheries for turbot. Whenever possible, independent observer monitoring programmes should be used to estimate bycatch rates in these fisheries. Efforts should also be made using indirect means to estimate fishing effort and cetacean bycatches in IUU fisheries.

To date, no attempts have been made to mitigate cetacean bycatch in the Black Sea. Although the Committee has agreed that acoustic alarms will reduce bycatches of harbour porpoises in bottom-set gillnet fisheries (IWC, 2000b, pp.46-49), there is some doubt as to whether they can be used successfully in the Black Sea because of the small scale nature of gillnet fisheries, the existence of widespread IUU fisheries and the lack of an effective management system to ensure the proper use of such devices. The Committee **recommends**, therefore, that any efforts to implement acoustic alarms to reduce bycatch rates of cetaceans in Black Sea fisheries should be preceded by a comprehensive evaluation of the potential efficacy of these devices with respect to each fishery's scale, methods, economic value and management regime.

13.1.7 Status

The Committee was unable to fully evaluate the status of small cetaceans in the Black Sea due to a lack of information. It concluded, however, that all three species probably declined dramatically in the 20th century as a result of large directed catches; fisheries bycatch and habitat degradation pose the most significant current threats to these species.

Globally, bottlenose dolphins are listed as 'data deficient' by the World Conservation Union (IUCN) and are listed in Appendix 2 of CITES. The 2002 CITES conference has established a zero export quota for Black Sea bottlenose dolphins that effectively prohibits international trade for 'primarily commercial purposes'. Given the degradation of their habitat, the existence of current bycatches and past directed catches, the Committee expressed concern regarding the status of bottlenose dolphins in the Black Sea.

The IUCN lists the Black Sea harbour porpoise population as 'vulnerable', although critical information on absolute abundance, and population trends is lacking. The primary current threats to harbour porpoises in the Black Sea are incidental captures and habitat degradation, including the potential effects of contaminants. The Committee expressed particular concern over the large but unquantified bycatches of harbour porpoises in gillnet fisheries and concluded that the conservation status of this population would be greatly improved if existing fisheries regulations restricting fishing effort and the use of certain gear types were enforced.

The global status assigned to common dolphins by the IUCN is 'least concern', although there is a current proposal to list the population in the Mediterranean Sea as 'endangered'. Of all the Black Sea cetaceans, least is known about common dolphins. This population has experienced at least one morbillivirus epizootic and animals are taken in unknown numbers in trawl fisheries. The Committee recognised the existence of these threats, but in the absence of appropriate information was unable to evaluate the status of this population.

The Committee noted that cooperation among range states (e.g. ACCOBAMS), will be essential to the conservation of cetaceans in the Black Sea. It also **agreed** that existing collaboration between the IWC Scientific Committee and ACCOBAMS should be encouraged (see Item 4.1.3).

13.2 Progress on previous recommendations

IWC Resolution 2001-13 (IWC, 2002d) directs the Scientific Committee to review progress on recommendations and resolutions relating to critically endangered stocks of small cetaceans on a regular basis.

13.2.1 Status of the Baiji

The baiji (*Lipotes vexillifer*) is the most endangered cetacean. Its range is restricted to the Yangtze River and its population size is probably only a few tens of animals (IWC, 2001b, pp.50-51). Given its critically endangered status, the Commission has requested that the Government of China report progress on the conservation of this species to the Scientific Committee on an annual basis. This year the Committee was pleased to receive information by way of the 2002 Commission meeting and welcomed the news that the government of China had introduced a seasonal fishing moratorium in the middle and lower reaches of the Yangtze River, and was planning further such measures in the upper reaches of the river. The Committee also noted the publication of the results of baiji surveys conducted by Chinese scientists from 1997 to 1999 (Zhang *et al.*, 2003). Baiji were seen in each year of the study, confirming the continued existence of the species. There was agreement among Committee members that these new initiatives and information offered a glimmer of hope for the future of the baiji, but that prospects for its survival continue to be extremely poor. The Committee **reiterates** its **grave concern** regarding the future of the baiji and looks forward to receiving further news of any developments regarding its status.

13.2.2 Status of the vaquita

The Committee has followed with great interest progress on conservation efforts for the highly endangered vaquita (*Phocoena sinus*) and this year reviewed three papers on this topic. Acoustic surveys in the northern Gulf of California in 2002 and 2003 (SC/55/SM5) suggest that the current distribution of this species may have contracted further during the past few years. The remaining area of vaquita occupancy is fished intensively and it is likely that bycatches continue. The Government of Mexico, its scientists, and several non-governmental organisations have been working together to implement the recommendations of the International Committee for the Recovery of Vaquita (CIRVA) (SC/55/SM4, SC/55/SM28). It is clear that implementation of such conservation measures has been extraordinarily difficult. The Committee welcomed the progress achieved over the last year and greatly commended Rojas-Bracho, Manzanilla-Naim, the Government of Mexico, and the Coalition for the Upper Gulf of California, for their considerable efforts to improve the prospects for the vaquita. The Committee **reiterates** its **grave concern** about the survival of this species. It noted that CIRVA would meet later in 2003 and looked forward to receiving an update of progress next year.

13.2.3 Harbour porpoises in the Baltic Sea

The harbour porpoise has experienced major declines in parts of its range, perhaps most notably in the Baltic Sea. Recent surveys confirm low abundance (SC/55/SM21 and SC/55/SM3) and highlight the endangered status of this population and the urgent need for immediate actions to prevent future anthropogenic mortality. Last year, the Committee made a series of recommendations concerning the draft ASCOBANS recovery plan for harbour porpoises in the Baltic Sea and endorsed the plan. These recommendations were incorporated into the final draft, which is to be considered for formal acceptance at the next Meeting of the Parties in August 2003. The Committee **reiterates** its strong endorsement of the plan and hopes that it will be adopted and implemented by the Parties.

13.2.4 Bycatch mitigation

SC/55/SM26 presented an overview of trials of new methods used to mitigate dolphin bycatch in a UK pelagic trawl fishery. Details are given in Annex L, item 6.4 and the Committee looks forward to receiving an update on this work next year.

The Committee had expressed concern over the magnitude of bycatches of common dolphins and other small cetaceans in this and other similar trawl fisheries, based on observer programme data (SC/55/SM26) and the high number of stranded animals on the coastlines of England, France and Ireland that appear to have been taken in these fisheries. The Committee **recommends** that independent observer programmes be established to document the extent of bycatches in pelagic trawl fisheries of all nations in this region where such programmes do not already exist.

13.2.5 Dall's porpoise

IWC Resolution 2001-12 directed the Scientific Committee to complete a full assessment of the status of exploited Dall's porpoise stocks as soon as sufficient information becomes available (IWC, 2002c). In 2001, the Committee had been unable to complete this assessment because the Government of Japan had decided not to provide the relevant data to the Scientific Committee. This position has not changed (see Annex V) and scientists from the Japanese delegation did not participate in the work of the sub-committee again this year. Catch statistics and information on quotas for Dall's porpoises are made available by the Government of Japan on the website of the Fisheries Research Agency of Japan (*http://www.jfa.maff.go.jp/whale/index.htm*). The Committee will explore the use of these data for future assessments of these populations.

13.2.6 Other recommendations

In previous years, the Committee has expressed concern about catches and quotas from some stocks of white whales and narwhals (IWC, 1992; IWC, 2000b, pp.40-46). The Committee noted that the NAMMCO Scientific Committee has recently expressed concern that the West Greenland stock of white whales is substantially depleted and that failure to reduce the annual catch to about 100 will result in further decline (e.g. IWC/55/8, Appendix H). The Committee **reiterates** its previous **recommendation** that this stock should be considered to be 'of highest conservation concern' and that 'efforts to improve its current status should be undertaken and supported'. For reasons documented in Annex L, item 6.6.1 the Committee also **reiterates** its concern over white whales taken in east Hudson Bay and various regions of the Russian Arctic. It repeats earlier **requests** that:

(1) relevant governments (Russian Federation, Canada) provide catch data to the IWC;

(2) catch limits are only set by the Russian Federation after population assessments have been undertaken and impacts of catches addressed.

No new or recent information has been provided in response to these and other recommendations. The Committee **reiterates** the importance of obtaining these basic data and encouraged rigorous assessment of white whale stocks that are subject to direct exploitation or significant disturbance from various human activities.

Similarly, the NAMMCO Scientific Committee noted in 2001 that catches of narwhals in some areas of Greenland had increased over the past decade. In a joint meeting of the Scientific Committee of the Canada/Greenland Joint Commission on Conservation and Management of Narwhal and NAMMCO it was concluded that 'mortality due to hunting has been in excess of 1,000 narwhals annually through the 1990s and there is a high likelihood that removals due to hunting have increased recently'. The Committee **reiterates** its previous **recommendations** concerning the desirability of better information on stock identity and catch reporting of narwhals.

Further details on these issues are given in Annex L, item 6.6.

13.3 Takes of small cetaceans

The Committee noted that as in the past the table of recent catches (Annex L, Appendix 2) is incomplete and it **urges** Contracting Governments to provide this information to the IWC through national progress reports. Last year, the Committee received a report of predation on bowhead whales by killer whales in Disko Bay in April 2002 (IWC, 2003h, p.240; IWC, 2003d, p.46). Subsequently, a number of these killer whales were killed by hunters. The Committee requests that the relevant authorities in Greenland provide more details on this and other similar takes of killer whales at next year's Committee meeting.

13.4 Work plan

The Committee reviewed its schedule of priority topics on small cetaceans (IWC, 2003k, p.373) and, in light of recent research efforts and the availability of new data on stock structure, abundance estimates and bycatches, agreed to adopt a review of the franciscana (*Pontoporia blainvillei*) as its priority topic for small cetaceans at next year's meeting. The Committee agreed to include a review of the population structure and systematics of killer whales on its list of future priority topics. In addition, given the location of next year's meeting in Sorrento, Italy, the Committee suggested that the feasibility of holding a one-day workshop examining the issue of depredation of fisheries catches by small cetaceans in the Mediterranean region be investigated.

14. WHALEWATCHING (ANNEX M)

The Committee had identified three priority topics for discussion this year:

(1) review the progress of Intersessional Correspondence Groups on whalewatching data collection and the Whalewatching Management Workshop;
(2) review effectiveness of and compliance with national whalewatching guidelines and regulations; and
(3) review new information on whale and dolphin 'swim-with' programmes.

14.1 Whalewatching data collection

14.1.1 Report of intersessional correspondence group

SC/55/WW1 reported on progress with the development of the 'Data Recording System' (DRS), discussed in previous years (e.g. IWC, 2003l, pp.382-384) and designed to help standardise data collection from whalewatching operators. A number of improvements have been made in response to questionnaires and field trials (SC/55/WW3) as discussed in detail in Annex M, item 5. It was **agreed** that it is important to provide feedback on scientific results to data collectors to ensure their continued cooperation. Improvements were also made as a result of contacts made at the recent European Cetacean Society (ECS) conference (SC/55/WW7) and it was **agreed** that cooperation between the development of the DRS and the forthcoming ECS 'Good Practice Guide' for the collection of data from platforms of opportunity, would be desirable.

Results from the data collection programme for dwarf minke whales on the Great Barrier Reef (SC/55/WW11) and a feasibility trial in the Bay of Fundy (SC/55/WW12) were also considered. These studies illustrated that data collected during whalewatching operations can provide valuable insights into whale behaviour and distribution. Further details are given in Annex M, item 5.

14.2 Whalewatching management workshop

It was reported that funding has been obtained from outside the IWC to hold a whalewatching management workshop later in 2003 or early in 2004 in Cape Town, South Africa. The report of the workshop will be submitted to the Committee next year.

The Committee welcomed this news and it was recommended that workshop participants should be geographically representative and include scientists, managers, conservation organisations, whalewatching operators and representatives from other disciplines, such as economics and social sciences. The Committee established an intersessional correspondence group to provide scientific advice for the organisation of the workshop (Annex U).

14.3 National whalewatching guidelines and regulations

14.3.1 National guidelines and regulations for whalewatching

Guidelines and/or regulations for Tonga, the Great Barrier Reef (Australia) and the Canary Islands (Spain) were presented in SC/55/WW4, SC/55/WW11 and Ritter (2003). Details are given in Annex M, item 7.1.

SC/55/WW5 reported a study off Santa Caterina, Brazil, that examined right whale behavioural responses to whalewatching activities. The author found no clear evidence of disturbance to this population. The Committee welcomed this and other studies, emphasising the value of well-designed scientific studies in the development and monitoring of whalewatching guidelines.

The Committee's response to a request to review SC/55/WW10 (the ACCOBAMS whalewatching guidelines) is given in Annex M, item 7.1.

14.3.2 Review of guideline effectiveness

The Committee received an update on Englund and Berggren (2002), a study that examined behavioural responses of bottlenose dolphins in respect to compliance with guidelines in Zanzibar. Official guidelines have now been adopted and follow-up studies are planned to see if compliance increases now that the guidelines are official. The Committee's comments and endorsement last year had a positive impact on having the guidelines made official (IWC, 2003l, p.387).

The review of the effectiveness of the Code of Practice for Dwarf Minke Whale Interactions outlined under Annex M, item 7.1, had been reported to the Australian Government (Birtles *et al.*, 2001).

14.4 Whale and dolphin 'swim with' programmes

Last year, the Committee recognised the developing prevalence of commercial 'swim-with-whale' programmes, although its scope remained unknown (IWC, 2003l, p.387). SC/55/WW4 reviewed commercial operations offering opportunities to swim with whales worldwide and 38 operations were identified. Operations were most common on Silver Bank (humpback whales), around Tonga (humpback whales) and at the Great Barrier Reef (dwarf minke whales). The latter represented a unique model, combining research, regulation, guidelines and operator cooperation to maximise mitigation and contributions to science. SC/55/WW9 presented a preliminary review of swim-with-cetacean programmes in Latin America.

The Committee noted that swim-with-whale programmes are becoming widespread, and were identified in areas under the legal jurisdiction of Argentina, Australia, Brazil, Canada, Costa Rica, the Dominican Republic, Ecuador, Japan, Kenya, the Kingdom of Tonga, Maldives, Mexico, Portugal (Azores), Spain (Canary Islands), Togo, UK (Turks and Caicos Islands) and the USA. Formally, such programmes are illegal in the Peninsula Valdéz region of Argentina, Brazil (for large whales) and Mexico.

SC/55/WW11 reported the situation on the Great Barrier Reef and provided information on how the effectiveness of the established Code of Practice is being evaluated. The possibility of using photo-identification from this study to determine impacts on the species was considered and the Committee **encourages** submission of the photo-identification study results when they become available.

Many swim-with-whale operations take place on calving grounds, with young calves being the object of the swims. Calves might be particularly sensitive to long-term effects from disturbance and the Committee **agreed** that there was a need for good quality information about the potential impacts of swim-with-whale operations.

Further details on the submitted papers are given in Annex M, item 8.

The Committee **encourages** further dedicated studies on the effects of swim-with-whale programmes in all areas, especially those where calves are the subject of such activities, and looks forward to receiving further reports.

The Committee **encourages** further submissions on this issue.

14.5 Other

14.5.1 Directory of relevant researchers

SC/55/WW6 presented a Worldwide Directory of Whalewatching Research. Details are given in Annex M, item 9.1 and the Committee noted that this directory will be updated at future meetings.

14.6 Work plan

The work plan identified by the Sub-committee on Whalewatching is given in Annex M, item 10. The Committee's overall work plan is considered under Item 19.

15. DNA TESTING (ANNEX N)

15.1 Progress on genetic methods for species, stock and individual identification

SC/55/SD7 presented a new genetics method for cetacean species identification. The method is called SINE (short interspersed repetitive element) insertion analysis. Technical details can be found in Annex N. It represents an attractive method for whale species identification, which should be especially useful for management and conservation.

The Committee **agreed** that this is a very powerful tool, allowing for quick exclusion in forensic use and being relatively cheap and quick, it looks forward to receiving further information on its applicability to cetacean studies.

SC/55/BC2 reported on a new DNA extraction method and PCR primers used for species identification of whale products. It was developed in order to be able to analyse certain kinds of commercial products in which the DNA has been degraded during processing and/or which contain chemical inhibitors that prevent or limit amplification but it has wider applications, e.g. tissue that has been improperly preserved, or stranded carcasses that are decomposed or naturally mummified.

Technical details and a full discussion are given in Annex N.

Ross *et al.* (2003) and SC/55/SD8, presented an update on development and implementation of DNA Surveillance, a web-based service to assist with the species identification and, ultimately, population identification of cetaceans and other taxa subject to exploitation and/or protected by international agreements. The programme aligns a user-submitted DNA 'test' sequence with curated datasets of pre-aligned reference sequences and returns a phylogenetic tree showing the relationship of the test sequence to the reference sequences. In most cases, species are represented by several reference sequences obtained from different populations or 'stocks' allowing potential assignment of test sequence to geographic origin. The service, including instructions and sample data, is available at *http://www.dna-surveillance.auckland.ac.nz.* Technical details and discussion is given in Annex N.

15.2 Progress on collection and archiving of samples from catches and bycatches

All minke whales caught by Norway in 2002 have been entered in the Norwegian DNA register. No information on collection and archiving of samples in Japan was available to the Committee. It was noted that provision of a progress report on collection and archiving of samples would assist the Committee in meeting its terms of reference as given in Resolution 1999-8 (IWC, 2000a).

15.3 Reference databases and standards for a diagnostic register of DNA profiles

No new information was available on this topic. Progress reports on development of the databases and standards for the Norwegian and Japanese registers would aid the Committee in fulfilling its remit as assigned by the Commission. Pastene agreed to confer with Skaug intersessionally to develop a list of items that would be useful for inclusion in an annual report to the Committee.

16. SCIENTIFIC PERMITS (ANNEX O)

16.1 Review proposals to facilitate the review process

Last year, the Committee noted that the existing guidelines, which had developed over a number of years, inevitably include some duplication and overlap within the broad headings used (IWC, 2003d, p.63). With the aim of providing a proposal to the Commission on restructuring the guidelines, the Scientific Committee **agreed** to revisit this issue in a year in which there is no major new scientific permit proposal to review.

The Scientific Committee **agreed** to start planning for the review of the final JARPA results, which are expected in 2005, and **recommends** that a small intersessional Working Group be formed. It should include *inter alia* some Japanese scientists familiar with the programme (see Annex U).

16.2 Review of results from existing permits

16.2.1 JARPA – Southern Hemisphere minke whales

The JARPA 2002/03 survey was conducted in Area V and the western part of Area VI (SC/55/O6). A total of 7,290 (2,677 schools) Antarctic minke whales were sighted. Of 1,582 primary sightings (4,506 individuals) of the same species made by the sampling vessels, 479 schools (928 individuals) were targeted for sampling, resulting in 440 individuals being taken, including 128 pregnant females (131 foetuses). Mature males were dominant in the North strata in Area V and Area VIW. Mature females were dominant in the East-South stratum of Area V. A brief discussion is given in Annex O, item 5.1.

16.2.2 JARPNII – North Pacific minke whales, Bryde's whales, sei whales and sperm whales

SC/55/O7 outlined the offshore component (sub-areas 7, 8 and 9 in the western North Pacific) of the 2002 survey under JARPNII. A total of 11,497.3 n.miles was searched in 76 days. A total of 141 common minke, 129 Bryde's, 212 sei and 556 sperm whales were sighted by the sighting and sampling vessels, and 100 common minke, 50 Bryde's, 39 sei and 5 sperm whales were sampled. Major prey species identified in stomach contents of sampled whales are listed in Annex O.

SC/55/O8 reported on the coastal component of the JARPNII survey in 2002 (northern part of sub-area 7, off Northeast Japan). A total of 3,523 n.miles (330.4 hours) was surveyed for whale sampling, and 171 schools (177 individuals) of minke whales were sighted and 50 minke whales were sampled. The sampling was conducted within 30 n.miles from the newly established land station for biological research in Kushiro port, where all sampled whales were landed. Identified major prey items are listed in Annex O.

In discussion, an enquiry was made as to whether biopsy samples from sperm whales had been obtained, noting their usefulness in resolving issues of stock structure. In response it was noted that no biopsy samples had been collected on the recent cruise, but that it was planned for future cruises. The Committee recognised the value of non-lethal sampling to supplement lethal sampling methods.

The Scientific Committee **agreed** that a more detailed review should be undertaken after the completion of the two years of research under JARPNII. For this review, comprehensive results will be provided, including recalculation of sample sizes.

16.3 Review of new or revised proposals

16.3.1 JARPA

SC/55/O1 outlined the JARPA survey for the 2003/04 season, which has been planned taking into account the same objectives and using the same methods as in previous years. Results of genetic analyses are not yet conclusive (SC/55/IA8) and thus, in addition to Area IV, the eastern half of Area III will be covered in order to address the unresolved issues relating to the temporal and spatial distribution of stocks. The sample sizes are 300 animals in Area IV and 100 animals in Area III with a 10% allowance. Foreign scientists are invited to participate in the planned research.

The Committee noted that lethal sampling in Area III was proposed as a feasibility study in 1995. Given that this work is still ongoing, the Committee requested clarification as to whether it will continue as a feasibility study, or is now considered to be a part of the full programme. In response, it was explained that when JARPA research began, it was thought that two stocks occupied the study area. However, evidence now suggests that a core stock may straddle Areas IV and V, and therefore the sampling will continue to address this question. It was acknowledged that the shift from a feasibility study could have been spelled out more clearly.

The Committee called attention to comments made in previous years (IWC, 1999c, pp. 45-46; IWC, 2000b, pp. 54-56; IWC, 2001b, pp. 57-58, 64-65; IWC, 2003d, p.65) and held the view that these comments prevail. In response, the Committee was directed to the original JARPA proposal (IWC, 1988) that explained the objective and sample size in detail, recalling that the original sample sizes were set for the long-term programme to estimate natural mortality rate with sufficient precision.

16.3.2 A two-year feasibility study on cetaceans in Icelandic waters

Plans for research under special permit were provided to the Scientific Committee in document SC/55/O2 and presented orally. The Committee thanked Sigurjónsson, Víkingsson and Gunnlaugsson for their informative presentation.

During this presentation, the proposed research was presented in the broad context of an Icelandic resource perspective, and four main points were made:

(1) Iceland is extremely dependent upon harvest of marine living resources, which constitute about 65% of the country's export;
(2) in fisheries management, multi-species interactions are already taken account of as far as data allow;
(3) limited data, except for abundance, are available on cetaceans – the latter show a large cetacean biomass, and they are the basis for estimates showing cetacean consumption several times the total fishery landings in Iceland – thus the potential effect on fishery yield is uncertain, but may be considerable;
(4) it is therefore of utmost importance that data be collected for inclusion into the existing multi-species modelling efforts in Iceland.

The text below is structured according to the Guidelines for the Review of Scientific Permit Proposals (Donovan, 2001) and the outline of previous Committee reviews of scientific permit proposals. Details of the proposal are presented first, followed by comments by the Committee.

A. The Proposal

The relevant guidelines are as follows:

1. A statement as to whether the permit proposal adequately specifies the four sets of information required under paragraph 30 of the Schedule (*Rep. int. Whal. Commn* 36:133).
2. Objective of the research (Schedule Paragraph 30).
3. Number, sex, size and stock of the animals to be taken (Schedule Paragraph 30).

Summary of the proposal (SC/55/O2)

The proposal was submitted by the Marine Research Institute upon request by the Government of Iceland. The proposal is intended as a two-year feasibility study upon which the design of a future sampling scheme will be based.

The proposal specifies the four sets of information required under Paragraph 30 of the IWC Schedule: (1) The objectives of the research; (2) number, sex, size and stock of the animals to be taken; (3) opportunities for participation in research by scientists of other nations; and (4) possible effect on conservation of the stock. Three cetacean species, 100 common minke, 100 fin and 50 sei whales, respectively, will be lethally sampled for scientific purposes in each of the two study years. As gender is not distinguishable in the field, separate quotas for males and females cannot be set. For fin and common minke whales it is thus assumed that 50 animals of each sex will be caught per year and 25 of each sex for sei whales. Sampling will not be selective with regard to length except that lactating females and accompanying calves will not be sampled. All sampling will take place within the 200 n.mile EEZ of Iceland.

Comments and discussion by the Scientific Committee

The Scientific Committee **agreed** that the requirements of guidelines 1-3 had been adequately met.

B. Objectives

The relevant guidelines are as follows:

1. Comments on the objectives of the research to be carried out under the proposed scientific permit, including in particular how they might relate to research needs identified by the Scientific Committee (*Rep. int. Whal. Commn* 36:133);
2. The proposed research is intended and structured accordingly to contribute information essential for rational management of the stock (*Rep. int. Whal. Commn* 37:25);
3. Is required for the purposes of management of the species or stock being researched (Resolution 1999-2);
4. The research addresses a question or questions that should be answered in order to conduct the comprehensive assessment or to meet other critically important research needs (*Rep. int. Whal. Commn* 38:27-28);
5. The number, age and sex of whales to be taken are necessary to complete the research and will facilitate the conduct of the comprehensive assessment (*Rep. int. Whal. Commn* 37:25).

Summary of the proposal (SC/55/O2)

The overall objective of the research programme is to increase understanding of the biology and feeding ecology of important cetacean species in Icelandic waters for improved management of living marine resources based on an ecosystem approach. While the project is intended to strengthen the basis for conservation and sustainable use of cetaceans, it is equally important as a contribution to multi-species management of living resources in Icelandic waters.

This research programme has multiple specific objectives among which the order of priority differs between the whale species. For common minke whales the primary specific objective is to increase the knowledge of the species' feeding ecology in Icelandic waters. For fin and sei whales the primary specific objective is the study of biological parameters during the apparent increase in population size in recent decades. These objectives are the basis for the proposed sample sizes. Other important research objectives include studies of population structure, pollutants, parasites and pathogens, and the applicability of non-lethal methods. The different priorities of objectives for the three species are given in Annex O.

Comments and discussion by the Scientific Committee

FEASIBILITY ASPECTS

Some members questioned whether the proposal could appropriately be described as a feasibility study, as there is already a large amount of relevant information pertaining from previous studies, and this information should have been sufficient to draw up a more complete proposal. Furthermore, the performance criteria were not specified. Those members concluded that initiating the research on a feasibility basis is therefore not justified and the proponents should be encouraged to prepare a full research proposal that can be reviewed properly next year.

The question was again posed regarding performance criteria in the study. Specifically, the proponents were asked to provide, for any aspect of this feasibility study, an indication of results that would cause them to conclude that the proposed research was not feasible. The proponents reiterated that they, for example, will determine if it is practical or not, based on whether a clear

picture of feeding ecology and life history can be obtained from this sampling programme. Some members did not regard this an adequate answer to the question raised.

Other members welcomed the research initiative, recognising that the overall objective of the programme is to increase understanding of the biology and feeding ecology of important cetacean species in Icelandic waters for improved management of living marine resources based on an ecosystem approach. However, they noted that the proposal says too little about the future project that this feasibility study is intended to lead into. An ambitious long-term programme might be inferred from the proposed feasibility study, but they suggested that an explicit formulation of this intended study would have been helpful to set the feasibility study in context. Again, it is not very clear what feasibility is to be investigated in the two-year study.

In response, the proponents stated that the question of whether the proposal is called a feasibility study or a two-year pilot project of a full-scale research programme is merely semantic. The proponents felt that it is clear that the ultimate objectives of the investigations will not be met within the two-year time frame, but the results will undoubtedly clarify the situation and provide guidance as to how to proceed with these fundamental questions upon completion of the feasibility period. The proponents stressed that the approach adopted was a cautious one.

RELEVANCE TO IWC: MULTI-SPECIES INTERACTIONS

Some members expressed concerns similar to those expressed last year (Clapham *et al.*, 2002) about the Japanese scientific whaling programme in the North Pacific. Specifically, they observed that the major objectives of the Icelandic proposal are either not relevant to the management of whales by the IWC under the RMP, or that the subset of information which was relevant to those management procedures could be much more efficiently obtained by non-lethal methods that are already well-tested in this regard. They maintained that the first objective is contradictory to the principle of conservative sustainable management that is the foundation of the RMP, as managing whales to minimise their impact on commercial fisheries would be in effect management by culling, which was the opposite of what the RMP was established to achieve. Finally, they stated that Article VIII was intended for research relevant to 'whale fisheries' and not to other fisheries. Further discussion on cetacean-fisheries interactions and multi-species management is reflected in Annex O.

The proponents responded that in most relevant international fora, multi-species aspects are now regarded as a necessary part of management of the living ocean resources, and that the initiation of work on modelling interactions between whale stocks and fisheries within IWC Scientific Committee considerations is consistent with sound management practices. The report of the Modelling Workshop on Cetacean-Fishery Competition (SC/55/Rep1) demonstrates that this view is also held by the IWC. They noted that management decisions might also result in a reduction of the harvest of certain fishery resources that are preyed upon by marine mammals, if such an action was considered necessary by the management authority in question. Some members of the Committee agreed with this perspective and referred to IWC Resolution 2001-9 (2002f, p.58), and furthermore noted that many fishery regulatory bodies have also called for an ecosystem-based approach to management. It was also pointed out that although this is a difficult area of study, it is a legitimate one and that Norway has already reached some preliminary conclusions in their studies of interactions between whales and fisheries.

The proponents felt that it was far beyond the scope of members of the Committee to judge whether it was 'appropriate' or not for Icelandic authorities to issue scientific permits with reference to what was originally the intention of Article VIII, since the Convention does not specify the nature of scientific activity to be conducted under such permits. In addition, the proponents noted that these are legal questions that could be raised in the Commission if delegations so wish; the task of the Committee is only to judge whether the proposal meets the sets of criteria given in the guidelines.

RELEVANCE TO THE IWC: RMP

With regard to data requirements for the RMP, some members referred to comments last year (Clapham *et al.*, 2002) concerning JARPNII. The RMP requires a time series of annual catches, a time series of absolute abundance estimates together with their variance/covariance matrix, and a specification of the distributional form of the absolute abundance estimates (IWC, 1999d). Additional information, while not specified by the RMP, potentially served to clarify and restrict the set of plausible scenarios considered in *Implementation Simulation Trials* (ISTs). While it was agreed that population structure data were particularly important to this undertaking, these members argued that the most reliable information on this topic could be obtained from genetic analysis, and from genotype-based mark-recapture data on the movements of individual whales. These analyses are routinely conducted using skin tissue derived from biopsy samples and lethal sampling was not required

In response, the proponents noted that the second criterion of the guidelines calls for objectives that address the rational management of the stock. The proponents questioned whether the RMP is actually 'rational management', and added that the RMP is not the only reason for doing such research. The proponents held that updated information of vital parameters is extremely important when modelling stock dynamics to provide a better basis to manage whale stocks. This would also shed light on how rational the RMP is as a management tool. This question is addressed in a paper presented at this meeting (SC/55/RMP10).

Other members agreed with the proponents that the proposal addressed biological data that would be essential for the Comprehensive Assessment.

With regard to biopsy sampling, the proponents stated that while biopsy studies can be useful for genetic studies, some of the sub-projects proposed here required supplementary information such as age, age at sexual maturity and reproductive condition that are useful for interpretation of stock structure at a micro-geographic

scale as proposed in the research programme. Annex O provides further discussion on the applicability of biopsy sampling for genetic studies.

In response, some members pointed out that recent work had demonstrated that sex and reproductive status could be obtained by biopsy sampling. Further, they stated that age data are not required for population modelling, as demonstrated by modelling carried out during the recent Comprehensive Assessment of North Atlantic humpback whale populations that did not rely on data from lethal sampling.

ISSUES OF SAMPLE SIZE

Some members were concerned by the lack of a rigorous approach to the determination of sample size. Although some arguments are put forward in the proposal, these are not well argued and this makes it difficult to evaluate whether the samples sizes proposed would be adequate to address the objectives.

One member maintained that in terms of the justification of the sampling design and also the sample size, this proposal would not survive review by major national or international funding agencies.

Some members went further and maintained that under scientific criteria normally adhered to in review of scientific research proposals, this proposal is inadequate especially in its description of sample sizes. They maintained that it does not present useful information on either the effects of the proposed annual sample size or on the number of years that would be required to accumulate sufficient sample sizes to test any of the hypotheses implicit in the proposal.

In response, the proponents stated that roughly 20 pregnant fin whales would be expected in the proposed catch per year. The age at sexual maturity has shown significant trends with time, going from a high to a low in about 30 years, but significant differences between individual years can be detected over shorter time spans. Basing a ratio on a number smaller than 20 is generally avoided in statistical practice. However, the proponents said that if sample sizes were increased to exceed the numbers previously taken during the commercial catch period and subsequent scientific whaling period, there would be only a small increase in statistical power. It was also pointed out that whereas it is clear that small sample sizes are a constraint for the proposed research, many of the components of the programme are descriptive in nature, including the monitoring of parameters necessary for the future management of the stocks and related resources. The proponents also stated that for sei whales, the low sample sizes are a precautionary measure because no formal assessment has been conducted on this stock by an international organisation. Thus they conceded that sample sizes for sei whales were small, but noted that in 1986-1989 only half of the proposed catch was taken, so that this proposed catch is supplementary to the previous programme.

SUMMARY AND CONCLUSIONS

Relative to Guidelines 1 and 4, some members maintained that the proposal addresses two research areas that have been identified by the Committee. One is the need for research on fisheries-cetaceans interaction and some members believed that in this area the research would be useful. Other members maintained that such research has no bearing on the IWC's management of whale stocks. A second area is the need for research on pollutant loads. While some members believed that the proposed work would help to address this research area, others noted that the Committee had not recommended lethal sampling for pollutant studies. Further, it had also not given high priority to pollution studies for baleen whales generally. While not necessary for the application of the RMP, stock definition has proven important in the development of an *Implementation* of the RMP. The proposed research addresses this issue, although some members believed that more appropriate and effective non-lethal methods are available to address the question.

Relative to Guidelines 2 and 3, the proposal addresses the issue of the problem of deciding on the advisability of initiating whaling or changing fisheries to account for whale and fish interactions. Some members believed that this project does not address questions relevant for management of the respective whale stocks and does therefore not meet the criteria of Guidelines 2 and 3.

Relative to Guideline 5, the proposal did not provide a scientific justification for the proposed sample sizes, arguing that they were sufficient for the planning purposes of a feasibility study. Some members argued that the proposal should not be taken as a feasibility study because in many aspects it was an extension of the 1986-1989 research programme and, as such, evaluation of the sufficiency of sample sizes was appropriate. In contrast, the proponents argued that the proposal was primarily to determine the feasibility of sampling of common minke whales, and to a degree, fin whales in areas where they had not previously been sampled.

C. Methodology

The relevant guidelines are:

1. Comments on the methodology of the proposed research and an evaluation of the likelihood that the methodology will lead to achievement of the scientific objectives. These comments may also include evaluation of the methodology in terms of current scientific knowledge (*Rep. int. Whal. Commn* 36:133);
2. The objectives of the research are not practically and scientifically feasible through non-lethal research techniques (*Rep. int. Whal. Commn* 37:25);
3. . . .whether the information sought could be obtained by non-lethal means (Resolution 1999-2);
4. The research addresses a question or questions that cannot be answered by analysis of existing data and/or use of non-lethal research techniques (*Rep. int. Whal. Commn* 38:27-28);
5. Whales will be killed in a manner consistent with the provisions of Section III of the Schedule, due regard being had to whether there are compelling scientific reasons to the contrary (*Rep. int. Whal. Commn* 37:25);
6. The research is likely to yield results leading to reliable answers to the questions being addressed (*Rep. int. Whal. Commn* 38:27-28).

Summary of the proposal (SC/55/O2)

Common minke whale sampling will be performed within area divisions already used in Icelandic multi-species research (Stefánsson and Pálsson, 1997), as feeding ecology and multi-species interactions are the main objectives of that research. For fin whales, where biological parameters are the primary objective, most of the sampling will take place on traditional whaling grounds west and southwest of Iceland. However, to

examine feeding ecology and stock structure, attempts will also be made to sample 10 fin whales off eastern Iceland in the initial study year. If that work is deemed feasible and worthwhile, a larger portion of the sample may be taken in this area in the second year. Sei whale occurrence in Icelandic waters is irregular, and so this species will be sampled opportunistically upon encounter by the whaling vessels.

The dissection procedures are outlined in SC/55/O2. In summary: sexual maturity, pregnancy status and reproductive history will be studied based on histological analyses; stomach contents will be identified and fatty acid profiles from different layers of the blubber, as well as stable isotopes ratios in blood and skin will be analysed for comparison to the stomach content to test the validity of biopsy sampling in feeding studies. Stock structure will be revealed by genetic methods, satellite monitoring and other methods, including non-genetic chemical signals. Studies on health issues and pathology include blood chemistry, serology, microbiology, urinalysis and parasitology. Pollutant analysis will include trace elements, PCBs, pesticides, PBDEs, dioxins and dioxin-like PCBs and PAHs.

Seasonal variation in cetacean abundance will be determined by aerial surveys performed annually in July, August and September. This work will be combined with fish-oceanography-cetacean shipboard surveys.

Attempts will be made to instrument up to 10 common minke and 10 fin whales with satellite-linked radio transmitters in each of the study years. If sei whales are encountered during fin whale tagging cruises, attempts will be made to tag these as well. In addition, attempts will be made to instrument no more than 10 common minke whales with time-depth recorders.

All available information on potential prey species of common minke whales in Icelandic waters will be analysed in conjunction with stomach contents results with respect to prey preference. Based on the results of this analysis and the feasibility study to estimate plankton abundance, the need and feasibility for further sampling in the second year of sampling will be evaluated. Multi-species modelling will be done by extending the existing modelling framework to include common minke whales and other cetaceans.

Comments and discussion by the Scientific Committee

Some members noted that the proposed methods for animal dissection and measurement are well established and should be adequate to achieve sampling objectives. Concerns raised about other aspects of the methods are described for several specific areas of investigation are described below.

FEEDING ECOLOGY

Some members agreed with the need to obtain a better understanding of cetacean feeding ecology in Icelandic waters. However, concerns were raised regarding the adequacy of the sampling scheme to meet the intended objectives, especially the proposed spatial distribution and timing of the proposed sampling.

Fin and sei whale sampling will focus primarily on the areas investigated in 1986-1989 and some members maintained that this is sufficient for the study of biological parameters. It was, however, considered unlikely to provide an adequate picture of the feeding ecology of those species.

Concerns were expressed on insufficient plans to integrate prey research with stomach content sampling, as prey abundance and distribution from regular resource surveys would not be adequate to assess prey selectivity patterns on the micro-scale. Further, it was noted that that sampling of the common minke whale would occur primarily in regions of overlap with cod distribution, and that such samples will not provide information about what common minke whales eat elsewhere. They felt therefore that large-scale information about the prey base is, however, not sufficient to assess prey selectivity among individual whales or small groups of whales at the micro-scale. Other members pointed out that estimating the functional responses of these three predators at various temporal and spatial scales is theoretically a daunting, but not impossible, task.

In response to these criticisms, the proponents noted that as this is a feasibility study, use will be made of the numerous and extensive surveys regularly carried out in Icelandic waters to provide data on prey abundance at the macro-/meso-scale. In the future, micro-scale sampling will be considered as suggested above.

Reservations were also raised over the lack of overlap in the sampling periods proposed for the first and second years of the study and it was suggested that a delay in the start of the field programme was appropriate, so that the sampling could be balanced on season. The proponents responded that the decision as to whether or not to proceed with the project in 2003 would be determined by the Icelandic Government sometime after the end of this meeting.

The planned research will explore whether krill is the predominant prey of fin whales throughout Icelandic waters. Some members noted that considerable information already exists to suggest that fin and sei whale diet is comprised principally of krill and that it is possible to obtain sufficient faecal samples for DNA analysis when collection is performed in feeding aggregations of fin whales. They therefore suggested that the feasibility of such non-lethal methods for determining differences in diet should be tested.

BIOLOGICAL PARAMETERS

Some members noted that proposed work on biological parameters will contribute greatly to the Comprehensive Assessment and application of the RMP and its *IST*s. They further noted that biopsy sampling techniques cannot be used to obtain data on age at sexual maturity and pregnancy.

However, information was presented on a new technique developed by Memorial University of Newfoundland, to determine pregnancy from progesterone concentrations in biopsy samples. The technique has been tested on free-ranging Gulf of Maine humpback whales of known reproductive status. The proponents welcomed this new information, but noted that the technique provides no biological data on non-pregnant animals, such as males and resting females. Other potential non-lethal methods for studies of biological parameters are discussed in Annex O.

STOCK STRUCTURE

The view of some members was that non-lethal techniques, notably genetic analysis based upon skin biopsies, were widely accepted as a reliable method of investigating stock structure in a wide variety of taxa. They further noted that lethal sampling was not necessary for these investigations, and that this method compromised the statistical power of the analyses through limited sample sizes and the inability to detect individual movements through re-sampling of animals in different areas. They added that this and other non-lethal techniques have the added advantage of providing a longitudinal dimension to the study of stock structure, with the potential to contribute substantially to a long-term research programme such as the one envisioned here.

The proponents reiterated their view that although genetic samples and sex determination can be obtained by biopsy sampling, genetic studies are not a primary objective of the proposed research. Furthermore, biopsies cannot provide supplementary information, such as age, that is important to the interpretation, for example, of contaminant data.

PARASITES AND PATHOLOGY

The proposal was criticised for the absence of a clear testable hypothesis for the study of diseases and also for the lack of evidence that disease processes are likely to be operating at a population scale. It was noted that the general data gathering approach of the proposal was unlikely to yield useful results.

One member asked why necropsies for parasites and pathology would only be performed for half of the common minke whales obtained, particularly given that sample sizes would be further reduced when the data were stratified by age and sex. The proponents responded that sampled common minke whale would be landed at several locations and, as such, necropsies would have to be conducted either on board the vessel, or at land stations poorly suited for full necropsy. Thus, the limitation was primarily due to logistical constraints.

Some members expressed concern that not all animals taken in scientific whaling would be examined for this objective. They noted that the sampling limitation described by the proponents was not consistent with the otherwise large scale of the programme.

The proponents responded that the study of parasites and pathology is not a primary objective of the programme, but another use of the animals sampled. They clarified that all animals will be sampled for the study of biological parameters (SC/55/O2, table 3). Animals also selected for investigation of parasites and pathology will undergo a more extensive investigation of all internal organs by a veterinary specialist.

In response to a query, the proponents clarified that accurate measurement of parasite loads remains a subject of debate in the study of all large animals. However, both necropsies and examination of parasites would be conducted following standard procedures. Estimates of the number of lesions and parasites will be based on sub-samples from the various sites within each sampled whale.

POLLUTANTS

The proposal describes an urgent need for pollutant mapping of cetaceans off Iceland. However, the reason for this urgency was not clear to some members. They referred to the fact that a considerable amount of contaminant monitoring is already underway in the North Atlantic. Furthermore, a recent study of organochlorides in North Atlantic common minke whales found pollutant levels to be geographically homogenous, likely due to the highly mobile nature of the animals (Hobbs *et al.*, 2003).

The proponents pointed out that pollutant research is not a primary objective for any of the three cetacean species studied. However, as Iceland relies largely on marine resources, it considers investigations of pollutants in the ecosystem, and potential effects on animal health, to be important.

It was pointed out that a study of pollutants would be more effective if it were based on a defined concern, and there is no specific problem identified in the proposal. If the goal is to conduct more general screening, then other approaches could potentially be pursued, such as the use of published data, archived samples or use of blubber biopsy sampling. If the objective is to study the impact of pollution, then biomarkers can be used as general indicators of animal health and monitored using standard biopsy sampling techniques. They noted that the stable, outer layer of the blubber provides the best measure of pollutant exposure levels over time.

The proponents responded that although biopsy samples may provide information on chemicals in the skin and outer layer of the blubber, these tissues are not necessarily the most representative of an animal's exposure. Examining the chemical burden gradient in various tissues, along with immunological and physiological factors, may provide essential information on pollutants at an individual and population level. The proposed work will improve the application of biopsy techniques by calibrating results with inner tissues that may be of higher relevance to the cetacean's health.

It was also noted that the IWC has an agreed programme of work to investigate the relationship between health and chemical pollution and that this does not require these data. It was further noted that there have been several studies comparing pollutant levels in various cetacean tissues and also that existing data and tissue archives could be used to calibrate biopsy samples.

While it was clear that the proposed work is not part of POLLUTION 2000+, the proponents stated that work of this type is a national priority for Iceland. Furthermore, they argued that pollution studies on small cetaceans are not necessarily applicable to large whales, for which few data are available. In response to a query, the proponents clarified that the Fisheries Laboratory in Iceland is accredited according to the standard ISO 17025 and will coordinate the chemical analyses. The work will either be performed there or by other equally qualified laboratories.

Further discussion of methods including comments on blood chemistry in pursued and harpooned whales are given in Annex O.

SUMMARY AND CONCLUSIONS

With respect to Criteria 1 and 6 of the Guidelines, some members considered the sampling regime to be insufficient to meet the stated objectives. Spatial and temporal elements of the feeding ecology sampling, in particular, were considered unlikely by some to yield data suitable for the planned multi-species modelling. The proponents countered that this is a feasibility study in which sample sizes may not be large enough to fully address the feeding ecology objectives in two years. However, sample sizes should be both temporally and spatially sufficient to guide the design of a future study. Furthermore, they argued that the scale of prey monitoring both in time and space is always a difficult question and might be adjusted in future years of the project. Some members also felt that the proposed study of parasites and pathology would benefit from a more clearly identified hypothesis.

With respect to Criteria 2-4, some members recommended new non-lethal techniques for pregnancy testing. However, the proponents noted that neither age nor sexual maturity could be determined solely by non-lethal methods. Other members also noted that the objectives of the pollutant research could be satisfactorily addressed with standard biopsy sampling. The proponents, however, noted the importance of obtaining pollutant samples from internal organs, because the relationship between contaminant loads in skin and organs has not yet been assessed. With respect to the high priority given to lethal sampling to identify differences in fin whale diet, some members noted that this could initially be explored using stable isotope analyses of non-lethal samples (skin, faeces).

D. Effects on stocks

The relevant guidelines are:

1. A review of the most recent information on the stock or stocks concerned, including information on any exploitation, stock analysis and recommendations by the Scientific Committee to date (including, where appropriate, alternative analyses and conclusions and point of controversy) (*Rep. int. Whal. Commn* 36:p.133);
2. An evaluation of the specification in the permit proposal of 'possible effect on conservation of the stock'. As appropriate, the Scientific Committee may carry out its own analysis of the possible effects (*Rep. int. Whal. Commn* 36:133);
3. The research can be conducted without adversely affecting the overall status and trends of the stock in question or the success of the comprehensive assessment of such stocks (*Rep. int. Whal. Commn* 37:27-28).

COMMON MINKE WHALE

Summary of the proposal (SC/55/O2)

The IWC 1990 Comprehensive Assessment had assigned the central North Atlantic common minke whale stock as an initial management stock (IWC, 1991). Recent NASS surveys have yielded higher point estimates of population abundance than those used in the Comprehensive Assessment. The NAMMCO SC's Working Group on Management Procedures also assessed this stock and used the HITTER model with a fixed *MSYR* (focusing on values around 1-2%) to project past exploitation patterns through recent population estimates. Using conservative assumptions about stock size (lower 95% confidence interval) and stock structure (discrete stock in Icelandic costal waters) and a 2% *MSYR*, the NAMMCO SC concluded that the mean annual catch from 1961-1985 of 185 whales per year was sustainable.

Comments and discussion by the Scientific Committee

There was no dissention from the Icelandic position regarding the likely impact of the proposed take on common minke whale stocks. The Scientific Committee therefore **agreed** that it is unlikely that the proposed take of 100 common minke whales per year will have a significant impact on the Central North Atlantic stock of common minke whales.

FIN WHALES

Summary of the proposal (SC/55/O2)

The proposal refers to an assessment of fin whales in the East Greenland-Iceland stock area by the NAMMCO SC in 1999 (NAMMCO, 2000). A HITTER technique was applied to generate population trajectories using the catch series, and abundance estimates from the NASS-87, NASS-89 and NASS-95 surveys, and biological parameters identical to those used by the IWC in their assessment of fin whales in 1991. A variety of potential stock areas and *MSYR* values ranging from 1-4% were considered in the assessment, and the NAMMCO SC concluded that a short to medium term take of up to 200 whales is unlikely to bring the population down below 70% of its pre-exploitation level under the least optimistic scenarios. However, due to uncertainties in stock structure, the NAMMCO SC advised a spread of catches in proportion to the relative abundance within the area. Based on the 1991 IWC assessment, the recent assessment by the NAMMCO Scientific Committee, the observed increasing trend in abundance and the 2001 abundance estimate of 25,000 animals, the proposal concludes that a take of 100 animals per year will be unlikely to have a detectable effect on the stock.

Comments and discussion by the Scientific Committee

Some members expressed agreement with the proponents that the proposed takes would be highly unlikely to have any detectable effect on the stock. However, the Committee could not agree on the effects of the proposed take on the conservation status of fin whales, referring to the 1991 Special Meeting of the IWC for the Comprehensive Assessment of North Atlantic Fin Whales, which reached no consensus, mainly due to disagreements on stock structure.

Cooke re-ran the HITTER/FITTER analyses referred to in the proposal, with the inclusion of the more recent accepted abundance estimates (see Annex D). The programme yielded an *MSYR*(1+) estimate of 1.8% which is very close to the value of 2% assumed in the proposal. However, the HITTER/FITTER trajectory provides a very poor fit to the abundance data, in that it does not match the increasing trend observed in recent years. To explain the increasing trend, it would be necessary either to hypothesise an increase in carrying capacity, or to accept that the population may have been more severely impacted by the whaling occurring during 1948-89 than the HITTER/FITTER model predicts. Cooke concluded that the evidence presented in the proposal to justify that the catches would have no significant effect on the stock is

based on the predictions of a model that does not fit the available data, and such evidence cannot be considered adequate.

A further discussion on how shifts in distribution between survey years may influence fit between model and data is given in Annex O.

Butterworth and Cunningham (2001) had also run the HITTER/FITTER model using recent CPUE series, abundance estimates and historic CPUE series, but without using the most recent 2001 estimate. Like Cooke, they did not obtain a good fit to the data assuming a single stock. The stock was then split into two components with diffuse mixing between the two, these being nearshore and offshore components respectively. The nearshore component represents that from which historic catches have been taken. This two-component model structure resulted in a good fit to the data, including a predicted increasing population size. The global estimate of MSY is 386 if the stock is treated as a single management unit, but this drops to 275 if only the nearshore component is considered. This implies that during the 1960s and 1970s, Icelandic fin whales may have been exploited close to MSY, and that a take of 100 per year would be unlikely to affect the population adversely.

During discussion it was noted that the possibility of a coastal stock had been raised previously when mark recapture experiments among coastal animals had yielded population estimates that did not fit well with sightings survey estimates for the whole stock. Nevertheless some members believed that the most recent population estimates from 2001 do not fit with the split-stock model. This suggestion was refuted, and it was stated that the 2001 estimate was consistent with the model output, and this difference of opinion remained unresolved.

The Committee did not agree on a common interpretation of the model results. For some it seems clear that the existing data can be adequately explained by an increasing population trend and an MSY that is well above the proposed take of 100 animals per year. For others, the model predictions are not consistent with the observed data, and this lack of a good fit warrants caution in determining MSY levels, especially if there is uncertainty about the degree of mixing with adjacent stocks.

SEI WHALES

Summary of the proposal (SC/55/O2)

There has been no formal assessment of the Iceland-Denmark Strait sei whales stock, and previous catches (post-1948) had averaged 68 animals per year. Sei whales exhibit different migration patterns to fin whales and on the whaling grounds off west Iceland they peak in late August and September, which has restricted the possibility for doing joint assessment surveys. The NASS 1989 survey (late July - mid August) resulted in an estimate of 10,207 sei whales (CV 0.272). If this were taken as an estimate of the stock size, then the previous takes of 68 per year would represent 0.7% of the current stock, which by analogy with other baleen whale species is unlikely to approach MSY. It was also suggested that the 1989 estimate might have been negatively biased, as it did not cover the entire range of the sei whale.

Comments and discussion by the Scientific Committee

The NASS-89 survey covered an area extending from 55°N to 60°N, and sei whale sightings were concentrated in two main areas. The first was southwest of Iceland between around 60° and 63°N. This area was estimated to have contained around 1,600 animals at the time of the NASS-89 survey and covers the main whaling grounds for sei whales, and the area for the proposed scientific takes. The second area was further south, centred between 50° and 55°N, where higher densities were observed and most of the estimated remaining 8,400 whales were located. There was an apparent hiatus between the two areas. The question was therefore raised as to whether in fact the whales in the northern area represented the Iceland-Denmark Strait stock, or whether the two groups should be counted together.

The proposed catch of 50 sei whales represents 3.1% of the NASS-89 estimate of 1,589 (CV) for the Icelandic whaling grounds and adjacent waters. The IWC has long recognised that catches from an area should be supported by abundance from that same area, as for example is made explicit in the use of *Small Areas* in the RMP. It was noted that the abundance on the whaling grounds appeared to be low, if it assumed that the stock size in 1989 was 1,589, a simple HITTER-type calculation indicated the commercial catch might have caused depletion of the stock. Given the proposed scientific catch level is similar to the commercial catch level, some members agreed that there was concern about the effect of catches on the stock. One member expressed alarm about the resumption of catches without a formal assessment being done.

In response, the proponents reiterated that the relative seasonal abundance of sei whales peaked in late August and September on the former whaling grounds west of Iceland and most of the sei whale catch was taken in this period (Sigurjónsson and Víkingsson, 1997). The NASS-89 survey however, had taken place earlier in the season. The difference between mid-summer and late summer/autumn abundance in this area appears to be about 10 fold (Sigurjónsson and Víkingsson, 1997). However, in some years, sei whales appear somewhat earlier in the summer. One such occurrence was in 1995, when the NASS-95 survey estimated 8,768 sei whales, mainly in the area west of Iceland (NAMMCO, 1998). The proponents therefore held the view that the summer estimate from the former whaling grounds from a portion of the NASS-89 survey area should not be taken to represent the total abundance of the stock in the area.

Further discussion on the tempo-spatial distribution of sei whales in the waters west and south of Iceland is given in Annex O. Comments were also made on the usefulness of genetic samples from the animals observed in the more southerly region to determine whether they were from the same stock as those in the more northerly region. It was **agreed** that further research into this area would be useful.

The Committee was unable to agree on the interpretation of the NASS-89 data. For some, the abundance estimate of 10,207 is an estimate of the Iceland-Denmark Strait stock and a take of 50 animals will not represent a significant threat to the conservation status of the stock.

For others, there is no good reason to assume that the estimate is for animals from the same stock, and indeed some reason to suppose that the bulk of these animals may belong to another stock. If this is accepted, then scientific catch limits should be based on the abundance of the animals in the area where the sampling will occur, which is no more than 1,589.

SUMMARY AND CONCLUSIONS

In relation to the Guidelines 1-3, the most recent relevant information on the stocks concerned was presented and reviewed by the Committee for all three species.

The Committee **agreed** that the proposed take of 100 common minke whales per year would be unlikely to affect the conservation status of the stock in question. In terms of the possible effects on the conservation of the stocks, and the effects of the proposed research on the overall status and trends of the stocks, there was no overall agreement for fin and sei whales.

For fin whales there was no agreement over the interpretation of the results of modelling exercises. For some, these demonstrated that the stock is increasing and that the proposed take of 100 animals would be well below the MSY level and unlikely to effect stock status. According to other members, the models did not adequately fit the observed population estimates, casting doubt on the assumptions of stock identity in the region.

For sei whales, the Committee could not agree whether the proposed take should be considered in relation to an abundance estimate relating to an area extending well beyond the whaling grounds and possibly covering more than one stock, or whether it should be considered solely in relation to estimates from the intended whaling area. This disagreement prevented any consensus about the possible effects on the conservation status of the stock concerned.

E. Research cooperation

The relevant guideline is:

1. Comments on the adequacy and implications of specific arrangements for participation by scientists of other nations (*Rep. int. Whal. Commn* 36:133).

Summary of the proposal (SC/55/O2)

The proposal stated that the participation of external scientists in research on whales sampled in the programme will be welcome, provided that their research does not interfere with, or duplicate research planned in the present project. This could be either by direct involvement of foreign scientists in data collection at the dissection sites for their own research projects, or by arrangement that MRI collects data/samples on their behalf. Due to limited space onboard the vessels possibilities for data collection at sea by external scientists may be limited. Requests for participation should be directed to the MRI. The genetic study will be conducted in close cooperation with Norwegian and Japanese scientists for comparability and comparison of data.

Comments and discussion by the Scientific Committee

The Scientific Committee agreed that the proposal met the conditions of the guideline.

General comments by the Scientific Committee Working Group

The Working Group provided a significant number of constructive comments and criticisms and it was agreed that it would be useful to obtain specific details of how these were ultimately incorporated into the study design.

17. WHALE SANCTUARIES (ANNEX P)

The Commission is expecting a thorough review of the Southern Ocean Sanctuary (SOS) in 2004. An intersessional Steering Group was appointed to develop a process by which the Committee would complete the review and develop evaluation criteria (IWC, 2002g, p.67). The review process and evaluation criteria are to be based on previous reviews and in particular those used to review the IOS last year (IWC, 2003m, pp.402-415), where the Committee had listed five tasks to be addressed by the Steering Group as listed below.

(1) Further develop generic criteria for reviewing Sanctuaries (e.g. based on the criteria used in the IOS review), given feedback and clarification from the Commission.

(2) Initiate the review of the Southern Ocean Sanctuary based on instructions from the Commission, by beginning to collate the information required to follow the Instructions.

(3) Discuss a mechanism for reviewing IWC Sanctuaries in combination, where biologically relevant.

(4) Discuss a mechanism for introducing Marine Protected Areas (MPA) scientific concepts, such as critical habitat, into IWC Sanctuaries and Sanctuary Proposals. In addition, consideration should be given to cooperating with appropriate international organisations to consider ways to evaluate non-whaling threats to cetaceans included within appropriate sanctuary/MPA boundaries. This might best be achieved by creating linkages to international organisations that have the expertise to address non-whaling threats to cetaceans in the area covered by the sanctuary.

(5) Discuss a mechanism, such as a standard form to proposals, through which the Commission could assist Member Countries in developing Sanctuary Proposals, if the Commission would welcome such a mechanism. This mechanism would in particular include identifying the objectives of the sanctuary and establishing a scientific monitoring programme that allows evaluation of these objectives.

Given the need for the timely review of the SOS Sanctuary, focus was given to topics (1), (2) and (4).

17.1 Review proposals to facilitate the review process

What follows is largely a summary of discussions reported in Annex P. Interested readers are referred there for more details.

17.1.1 Existing criteria

The sanctuary review process was based upon the Instructions from the Commission (IWC, 2002e, p.65),

and the guidance provided in Resolution 2002-1 (IWC, 2003c, p.89).

In the latter, the Commission recognised that if there is no consensus, the Precautionary Approach should be applied in order to try to limit the negative impacts of environmental uncertainty (e.g. effects of climate change over sea-ice dynamics and feeding habitat accessibility and unforeseen problems in the RMP to the other regions where it was applied). Resolution 2002-1 also specified that the Scientific Committee considerations should include the following two principles (IWC, 2003c, p.89).

(1) Temporary overlap of management measures, for example Para 10(e) of the Schedule and a sanctuary, cannot be used to invalidate any long-term scientific and conservation value of a given Sanctuary.

(2) The application of the Precautionary Approach shall be determined in accordance to Principle 15 of the 1992 Rio Declaration.

17.1.2 Precautionary Approach in relation to Sanctuaries

Regarding the Precautionary Approach, the Committee recognised that the concept has been in existence for some time and that there is also ongoing debate in the marine arena regarding interpretation of the Rio wording.

It was noted that the FAO Code of Conduct for Responsible Fisheries considers the need to pre-specify action if a detrimental situation arises and that both the RMP and AWMP incorporate a feedback approach which is comparable with the spirit of the Code of Conduct wording. However, it was noted that the RMP would be implemented via the RMS and it was argued that a sanctuary could be a prudent complement to the RMS until experience proved the RMP to be satisfactory and that there are also other unknown potential risks that are not taken into account in these measures.

In conclusion, the Committee **agreed** that it is not the body to attempt a generic definition of the Precautionary Approach as there are many different definitions used in the different international fora, but that the Committee as instructed by the Commission, would use the Rio Declaration to work with the Precautionary Approach on a case-by-case basis.

17.1.3 Plenary comments on the review process

During discussions of the new instructions for reviewing sanctuary proposals given in Resolution 2002-1, it became clear that some members of the Committee felt that there were aspects of these that required further clarification, elaboration or perhaps reconsideration.

Other members felt that the Resolution required no further clarification and noted that this matter (especially issue (1) below) had received only limited discussion. They believed the instructions would enable the Committee to conduct a thorough review of sanctuaries and sanctuary proposals.

Those members seeking clarification believed that it was appropriate to draw the Commission's attention to the following broad issues:

(1) the apparent contradiction between the two phrases 'consider the relationship of the (proposed) Sanctuary with other existing measures to protect whales' (IWC, 2002e, p.65) and 'temporary overlap of management measures … cannot be used to invalidate any long-term … value of a given Sanctuary' (Resolution 2002-1; IWC, 2003c) – and the possibility that the latter might be interpreted as restricting legitimate scientific debate;

(2) the interpretation of the Principle 15 of the 1992 Rio Declaration (on the Precautionary Approach).

It was agreed that individual scientists should make known their concerns to their Commissioners.

Finally, the Committee noted that it always provides advice it believes is in accordance with the precautionary approach.

17.1.4 Appropriateness of simulation trials for evaluation of sanctuaries

The Committee has previously considered some simulation trials in its evaluation of Sanctuaries (e.g. Butterworth and De Oliveira, 1994; Butterworth and Punt, 1994). When considering trials, it was **agreed** that any such trials should be specified by the Committee. It was noted that appropriate simulation trials can only be conducted if there are clear objectives and in many cases, sanctuaries have broad objectives that render the specification of trials problematic. An argument was offered to the effect that simulation trials might take into account certain types of risks, but that the instruction from the Commission arose from the concern for unforeseen risks which may not be modelled today but may turn out to be a concern in the future. It was **agreed** that, although simulation trials might be useful to evaluate some aspects of sanctuaries, other aspects cannot be evaluated through this methodology.

The objectives of the SOS given by the Commission in Resolution 1998-3 (IWC, 1999a) include the provision of better estimates of population parameters and discussions occurred on how Sanctuaries could assist in this matter. These focused on the perturbation history and current status of stocks. It was noted that ideally time series of data from a range of population levels relative to the carrying capacity should be available. Also, by allowing currently depleted stocks to recover to their carrying capacity, better estimates of population parameters could be obtained and the ability to validate population models would be improved, especially in view of the fact that historic data on population abundance are generally poor. Furthermore, better estimation performance might be achieved by different treatment of different areas, such as a sanctuary in one and harvesting in the other. It was also noted that although simulation could be used to evaluate the ability to estimate population parameters, much work on this topic had already been conducted and may not be needed. Specification of trials to be conducted could include evaluating the power to examine model fits to population data in the presence or absence of a sanctuary. Trials might also help to determine the most appropriate duration of a sanctuary.

Noting discussions under Item 12.1, the Committee **agreed** that it was not currently in a position to model multi-species interactions reliably and that any simulations would have to be performed on a single species basis.

17.1.5 Introduction of MPA concept

In 2002, the Committee noted that the review process for sanctuaries and sanctuary proposals would benefit from the introduction of the Marine Protected Area (MPA) concept. The concept of a MPA is generally considered to be broader than that of a strictly no-take area and may include regulation of multiple uses and habitat protection measures. Setting clearly specified objectives was found to be a crucial step in allowing the success of management measures to be evaluated. Single MPAs may frequently be insufficient to meet multiple needs within a region. It may therefore be beneficial to establish networks of MPAs forming an array of sites with overall objectives for the network in addition to objectives for each individual area given that the majority of existing MPAs cover relatively small areas in terms of the distribution of most whale species. Evaluating effectiveness in terms of whale conservation is most likely to be best achieved by considering protected areas as a network. One common trend in designating areas for particular species is that the more mobile a species, the larger the area needs to be, and the more the emphasis is shifted to management measures to reduce direct mortality of that species rather than measures to protect the whole ecosystem. IWC sanctuaries are consistent with this approach in that they extend over large areas in order to protect highly mobile species from one source of direct mortality. The advantages of considering IWC sanctuaries in the context of a network of MPAs include the ability to specify objectives for the network and sanctuaries could provide a framework for evaluating the success of localised measures in combination.

17.1.6 Implications of the RMP for sanctuaries

The implications of restricting whaling to within 200 miles of a whaling nation's coast (EEZ) under the RMP were discussed under Item 5.6. The effect of a whale sanctuary is similar in that it restricts the areas in which baleen whales may be taken. The Committee advises that under the RMP, where catches are taken by *Small Area*, the banning of whaling within sanctuaries will have no effect on catches permitted in *Small Areas* that fall entirely or partly outside of the sanctuary. However, no catches would be taken in *Small Areas* entirely inside a sanctuary and in this case the sanctuary would result in reduction in yield and a reduction in risk (above that already incorporated in the RMP).

The Committee advises that the effect on baleen whale populations found within the sanctuary of catches taken under the RMP will depend on whether whales move beyond sanctuary boundaries since catches from a population found within a sanctuary may still be taken within a *Small Area* that straddles a boundary or in a *Small Area* entirely outside of the boundary.

17.2 Preparations for review of Southern Ocean Sanctuary

The Committee reiterated that specific and detailed objectives should be determined before the establishment of any sanctuary or MPA. The objectives should be scientifically quantifiable to allow for more effective evaluation, however, it acknowledged that not all sanctuary objectives can be scientifically evaluated.

The objectives of the SOS were given by the Commission in Resolution 1998-3 (IWC, 1999a):

(1) the recovery of whale stocks, including the undertaking of appropriate research upon and monitoring of depleted populations;
(2) the continuation of the Comprehensive Assessment of the effects of setting zero catch limits on whale stocks; and
(3) the undertaking of research on the effects of environmental change on whale stocks.

17.2.1 Relevant information and its preparation

The Convenor of the intersessional Steering Group (Annex U) is collating relevant material for the review in 2004, and a list of references is being assembled that includes the relevant research activities both by the IWC and other independent cetacean research projects in the Southern Ocean. The list will include papers dealing with MPAs and Sanctuaries of use to the group. Members of the Committee wishing to contribute to the list should forward references to Alex Zerbini (*azerbini@u.washington.edu*).

The intersessional Steering Group also considered other information that might be relevant to the SOS review. This includes a list of research programmes that present a cetacean research component and their overall objectives, as well as data collected under the IWC SO-GLOBEC and CCAMLR collaboration.

17.2.2 Review process

During the intersessional period, the Steering Group had discussed the possibility of holding an intersessional workshop before the 2004 meeting. The intention would be to incorporate feedback from external scientists and further discuss the review of the SOS. However, there was little support for this proposal as several members from developing countries would not have the means to attend such a meeting and would therefore be excluded from participating.

In order to develop the mechanism to review the SOS, discussion occurred on ways to include external non-IWC affiliated scientists with acknowledged international expertise on developing, managing and/or conducting research in sanctuaries or MPAs. Their task would be to produce independent reports, which would not be restricted to but focused on two major points:

(1) to provide advice on how to introduce MPA scientific concepts to the IWC Sanctuaries and Sanctuary proposals and on establishing monitoring programmes;
(2) to evaluate the SOS effectiveness given its objectives and the criteria developed by the Committee and approved by the Commission.

It was suggested that these scientists should be invited to attend the Committee meeting and be involved in the sanctuary discussions instead of working independently. It was noted that the mechanism to choose these scientists and agreement on their specific disciplines are important considerations. The choice of experts will be decided by the intersessional Steering Group.

It was agreed that a two-day pre-meeting scheduled directly before the Committee meeting would allow more time to conduct the review and reduce financial

implications for developing country participants. This will also more efficiently use the time of external scientists who will attend to discuss the SOS review and a range of topics pertaining to MPAs and cetaceans as well as reduce the necessary budget.

The Committee recognised that this schedule will effectively preclude the timely recognition, agreement and initiation of any potential simulation trials to aid the review. Specification of such trials cannot realistically be done by an intersessional correspondence group. However, the two-day pre-meeting could still specify trials to be conducted to facilitate the Committee's evaluation of sanctuary proposals in the longer term.

17.3 South Atlantic sanctuary proposal

Due to a lack of time, the Committee was unable to fully discuss an evaluation of the South Atlantic Sanctuary Proposal based on the Instructions from the Commission and the review criteria. There were, however, differing views provided by two evaluations of the Sanctuary Proposal (Annex P, Appendices 2 and 3).

17.4 South Pacific sanctuary proposal

The South Pacific Sanctuary Proposal had not changed since it was submitted last year. Therefore, the Committee drew attention to its previous discussions of the proposal (IWC, 2001b, p.65; IWC, 2002g, p.67).

18. RESEARCH PROPOSALS AND RESULTS

18.1 Access to IWC/SOWER cruise biopsy samples

For many years, biopsy samples have been collected during the annual SOWER cruises; each sample has been divided in two after collection. Since the start of this aspect of the programme, it has been agreed that Japan should retain half of each sample whilst the other half of the sample was scheduled to be retained by the IWC. The IWC does not have the facilities to house these samples and in recent years an informal agreement has been made, given ongoing analyses, that the blue whale samples are stored on behalf of the IWC at the Genetics Archives at the Southwest Fisheries Science Center (SWFSC), La Jolla, California, USA. Requests for samples have been received at various times[7] but for a number of practical reasons (including difficulties with obtaining CITES permits; and timing of IWC annual meetings), considerable delays have sometimes occurred when responding to requests for samples. The Committee considered a proposal by Donovan, Brownell and Kato to ensure the safe archiving of the samples and to streamline the process of applications to use them. The Committee **endorsed** this proposal.

All IWC portions of the SOWER genetic samples will now be housed in the Genetics Archives at SWFSC on behalf of the IWC. All existing IWC/SOWER genetic samples will be shipped to SWFSC after obtaining the necessary permits (CITES). SWFSC has an existing CITES import permit in place for these samples. From now, after future SOWER cruises, the IWC portions of all genetic samples will be shipped as a unit to SWFSC.

Access to the IWC genetic samples will now follow the policy given in Annex S.

18.2 Research proposals

No research proposals had been received last year and none were received this year. Donovan informed the Committee that he had warned potential applicants that given the state of the research fund, it was unlikely that any unsolicited proposals would receive funding at present.

After the close of this Agenda item, a report was received from Jann concerning the study on humpback whales that the Committee had partially funded (£2,500) in 2001. During 2002, 168 hours of effort had resulted in 120 encounters of humpback whales; 17 animals were individually identified, bringing the total of 44 for this region. One (photographed 1999) had previously been photographed off west Iceland in 1982 (Jaan *et al.*, 2003).

19. COMMITTEE PRIORITIES AND INITIAL AGENDA FOR THE 2003 AND 2004 MEETINGS

19.1 Committee priorities for SC/55 (2003)

At this year's Scientific Committee meeting, 14 sub-committees (including standing working groups and ad hoc working groups) were established. As noted last year (IWC, 2003d, pp.82-83), the workload of the Committee at its annual meeting over the past few years has exceeded the time available for analysis, deliberation and report generation. Therefore, the convenors last year agreed an appropriate number of sessions to be allocated to each sub-committee and a limit on the primary topics. However, because of the loss of one working day for budgetary reasons the number of sessions available for sub-committee meetings during this year's Committee meeting had to be adjusted to reduce the total number of sessions from 105 to 90. This is based on three concurrent sub-committee meetings for each of five work sessions per day, starting at approximately 08:30 and ending typically at 21:30.

After discussion among the convenors, the Chair developed the following guide to the number of sessions at this year's meeting. (This does not include the 2-day pre-meeting (10 sessions) on North Atlantic minke whales.)

Sub-Committee	Sessions	Sub-Committee	Sessions
RMP	14	SM	8
AWMP	10	SD	7
BRG	4	SH	8
IA	10	Sanctuaries	2
BC	8	Scientific Permits	5
E	8	DNA	2
WW	5	EEZ	2
TOTAL SESSIONS			93

The implication of the above distribution of work sessions was a major topic of discussion for members of the Scientific Committee. Despite a work schedule of 8.5

[7] It has been agreed that such proposals should be submitted in accordance with protocol for the normal IWC research proposals and considered at annual meetings.

hour days, smaller groups had to work during the lunch and dinner breaks, bringing the total for some scientists up to 10 or more hours. In order to complete its business the RMP sub-committee chose to work throughout the scheduled day off (and had two post-midnight sessions). Assuming a normal 8.5 hour day, the present workload of the Committee would require 9 days, rather than the present 6 days of sub-committees. Some members were disappointed that insufficient time in sub-committee meetings was available to adequately discuss certain agenda items or issues, as reflected in some sub-committee reports.

Given this, the Committee **noted** that:

(1) over the last three years, the Committee has been asked by the Commission to provide advice or consider issues related to over 10 Resolutions, almost all of which require additional work and some of which have become standing requests;
(2) recent cuts to the research budget of the Committee has appreciably reduced the amount of work that can be completed intersessionally and has led to a reduction in the number of Invited Participants able to attend; and
(3) the recent reduction in the number of days for the Scientific Committee meeting from seven to six has exacerbated the workload problem for the Committee by reducing the maximum number of sub-committee sessions from 105 to 90.

19.2 Committee priorities for SC/56 (2004)

As in recent years and with the Committee's agreement, the Convenors met after the close of the Committee meeting and drew up the following as the basis of an initial agenda for the 2004 meeting. They took into account:

(1) the priority items agreed by the Committee last year and endorsed by the Commission, and within them the highest priority items agreed by the Committee on the basis of the sub-committee discussions;
(2) general discussions in the Plenary session and in particular the need to reduce the workload of the Committee;
(3) discussions over the budget in the full Committee.

The Committee recognised that priorities may have to be reviewed in light of decisions made by the Commission at IWC/55.

As last year, the convenors agreed a provisional number of sessions per sub-committee. It was agreed that the number of sessions allocated to each sub-committee will have to be strictly followed, as with only six days for sub-committee meetings there will only be 90 sessions available. The number of sessions per sub-committee is indicated in the table below. Items of lower priority on sub-committee agendas will only be discussed as time allows. It is again stressed that papers considering anything other than priority topics may not be addressed at next year's meeting. This will also depend on intersessional progress.

Sub-Committee	Sessions	Sub-Committee	Sessions
RMP	10	SM	8
AWMP	10	SD	7
BRG	8	SH	6
IA	11	Sanctuaries*	3
BC	4	Scientific Permits	3
E	8	DNA	2
WW	6	NP minke assessment	5
TOTAL SESSIONS			91

*In addition to a 2 day (i.e. 10 sessions) pre-meeting.

RMP

As last year, this sub-committee will concentrate on general issues as well as preparations for *Implementation*. The priority topics will be:

(1) review progress on adjusting convergence criteria for the CATCHLIMIT program;
(2) review the *Implementation* process in the light of the experience with western North Pacific common minke whales;
(3) review the level of information required for *pre-implementation assessment*s and for proceeding to an *Implementation*;
(4) work towards implementing the RMP for western North Pacific Bryde's whale;
(5) comment on whether there is sufficient information on North Atlantic fin whales to begin a *pre-implementation assessment*.

AWMP

This Standing Working Group will hold an intersessional workshop to finalise robustness trials for the eastern North Pacific gray whale and consider results from *Evaluation Trials*. Next year it will:

(1) work towards recommending a gray whale *SLA*;
(2) review results from the Greenlandic Research Programme and make recommendations;
(3) review progress on development of potential *SLA*s for Greenland fisheries;
(4) undertake annual review of catch data and management advice for minke and fin whales off Greenland;
(5) undertake annual review of catch data and management advice for humpback whales off St Vincent and The Grenadines.

Bowhead, right and gray whales (BRG)

This sub-committee will:

(1) complete in-depth assessment of BCB bowhead whales;
(2) undertake annual review of catch data and management advice for ENP gray whales;
(3) undertake annual review of catch data and management advice for BCB bowhead whales;
(4) if there is time, it will: review new information on small stocks of bowhead, right, and gray whales.

In-depth Assessment (IA)

This sub-committee will establish an *ad hoc* working group during next year's meeting to undertake an In-depth Assessment of western North Pacific common minke

whales providing the intersessional Steering Group determines sufficient progress has been made. In addition, it will:

(1) consider issues related to the abundance estimation of Antarctic minke whales;
(2) consider options for future SOWER cruises.

Bycatches and other anthropogenic removals (BC)

This Working Group will:

(1) further review methods to estimate bycatch based on fisheries data and observer programmes;
(2) further review methods to estimate bycatch based on genetic data, particularly with respect to the proposed workshop;
(3) review information and methods on estimates of cetacean mortality caused by vessel strikes;
(4) review information and methods on estimates of cetacean mortality caused by other human activities.

Environmental concerns (E)

Suggested priority topics will be developed intersessionally by a Working Group led by Rojas-Bracho. The Working Group will consider input from the Chair following the Commission meetings, as well as input from convenors. The primary objective of this exercise will be to better integrate the mission of the Standing Working Group on Environmental Concerns with the priority topics of the other sub-committees. The final decision will be taken by the Chair in consultation with the new convenor.

Whalewatching (WW)

This sub-committee will:

(1) review report from the intersessional workshop on Whalewatching in South Africa – although this is not being convened by the Committee, it will nonetheless provide an opportunity for furthering the objectives of this sub-committee;
(2) consider further development of the DRS;
(3) continue review of whalewatching guidelines and regulations.

If there is time, it will:

(4) review risk to cetaceans of high speed whalewatching boats;
(5) review potential impacts of 'swim-with' programmes on populations of cetaceans.

Small cetaceans (SM)

This Standing sub-committee will:

(1) review status of franciscana;
(2) plan and convene a one-day workshop on depredation of fisheries by small cetaceans in the Mediterranean region – if possible, this workshop will be held the day prior to the start of the Committee meeting;
(3) review progress on previous recommendations;
(4) review incidental catches and takes of small cetaceans by country.

Stock definition (SD)

This Working Group will:

(1) review progress on the TOSSM project;
(2) continue review of statistical and genetic issues related to population structure and unit-to-conserve;
(3) consider application of non-genetic data to stock identification.

Southern Hemisphere whales other than Antarctic minke whales (SH)

This sub-committee will:

(1) complete in-depth assessment of Southern Hemisphere humpback whales;
(2) investigate data from illegal Soviet catches;
(3) investigate use of abundance estimates from SOWER and JARPA in population dynamics models.

Sanctuaries (S)

A pre-meeting workshop will be convened to prepare recommendations regarding the review of the Southern Ocean Sanctuary. This Working Group will:

(1) complete review of SOS;

If there is time it will also:

(2) review process to facilitate review of future proposals and future sanctuary reviews.

Scientific Permits (P)

This Standing Working Group will:

(1) review proposals to facilitate the review process of the Committee;
(2) review research results from existing permits;
(3) review plans for new and continuing permit proposals.

DNA

This Working Group will:

(1) review genetic methods for species, stock and individual identification;
(2) collect and archive tissue samples from catches and bycatch;
(3) reference databases and standards for diagnostic DNA registries.

20. DATA PROCESSING AND COMPUTING NEEDS FOR 2003/2004

The Committee identified and agreed the requests for intersessional work by the Secretariat given in Table 3.

21. FUNDING REQUIREMENTS FOR 2003/2004

Table 4 summarises the complete list of recommendations for funding made by the Committee. The total required to meet its preferred budget is £391,700. The Committee **recommends** all of these proposed expenditures to the

Commission. However, it understood that the projected amount available for funding is £242,600 of which £27,000 is committed funds. It therefore reviewed the full list, taking into account its work plan, priorities and the possibility that some of the work requiring funding could be postponed to a future year. Should the Commission be unable to fund the full list of items in Table 4, the Committee **agrees** that the final column given in the table represents a budget that will allow progress to be made by its major sub-committees and working groups. Progress would not be possible in some important areas, as outlined below and the Committee **requests** that the Commission or individual member governments provide additional funding in these areas. The Committee **strongly recommends** that, at a minimum, the Commission accepts its reduced budget of £242,600.

A summary of each of the items is given below, by sub-committee or working group. Full details can be found under the relevant Agenda Items and Annexes as given in the table.

Table 3
Computing tasks/needs for 2003/04.

Task	Est. time
AWMP	
Amend control program to implement modifications to GE trials including the inertia model changes, condition trials and circulate to developers.	1-2 months
Create input files for and condition GR trials, produce population trajectories.	2-3 months
Run GE trials for candidate *SLA*s and prepare comparison plots and tables for intersessional meeting.	2 weeks
Work resulting from intersessional meeting.	-
RMP	
Adjust the convergence criteria in the new CATCHLIMIT program to be robust when less precise integration is used.	2 weeks
Sightings data	
Validation of the 2002/03 SOWER cruise data and incorporation into the sightings database.	6 months
Plan and carry out validation of the joint IWC/SO GLOBEC cruise data (in collaboration with Thiele and Hedley).	-
Catch data	
Continue to encode the basic individual records from the revised Soviet catch data and document inconsistencies in the data. The earliest data will be coded first (the detailed biological data will not be encoded in this first phase).	12-18 months
Prepare summary of revised Soviet Southern Hemisphere catch data and work towards creating interpolated dataset of missing data.	-
Investigate whether the historic blue whale catch data can be amended to distinguish between blue and pygmy blue whales.	-

*Committed or partially committed items.

(a) Items recommended for funding under the reduced budget or for which funds have already been committed in previous years

Aboriginal Whaling Management Procedure

(1) AWMP INTERSESSIONAL WORKSHOP

The Commission has agreed that development of the AWMP is a high priority item. Without intersessional workshops, it would have taken at least three more years to develop the *Bowhead SLA*. Work to complete a similar exercise for gray whales and make progress on the Greenland fisheries case requires a similar strategy. Due to the workload of the Secretariat computing facility as a result of the work on western North Pacific minke whale *Implementation Simulation Trials*, the Workshop was postponed. Holding the Workshop in Seattle in January 2004 may allow the Committee to recommend a gray whale *SLA* at next year's meeting; without one it will certainly not. The Committee therefore **strongly recommends** that a four-day intersessional workshop be held. £9,000 was made available last year, but that was for when the meeting was to be held in conjunction with one of the other 2002/03 workshops (RMP or SD). A further £3,000 is therefore requested. The Workshop will concentrate on reviewing the results of *Evaluation and Robustness Trials* for gray whales and reviewing the recent field season of the Greenland Research Programme. The US NMFS National Marine Mammal Laboratory has again offered to host the workshop, so the only cost to the Commission is for invited participants.

(2) AWMP DEVELOPERS FUND

The developers fund has been invaluable in ensuring fast completion of AWMP trials and other essential tasks of the Standing Working Group. The two primary developing teams for the gray whale *SLA* both comprise invited participants and the costs represent a small portion of the true costs. The Committee **strongly recommends** that at least the fund is kept at last year's level of £8,400.

(3) GREENLAND RESEARCH PROGRAMME

The Committee is unable to provide advice on the fin and common minke whale stocks off West Greenland. The Committee stresses that obtaining adequate information for management should be seen as of very high priority by both the national authorities and the Commission. Without this information, the Committee will not be able to provide safe management advice in accord with the Commission's management objectives, or develop a reliable *SLA* for many years, with potentially serious consequences for the status of the stocks involved. The Committee noted that the present money for satellite tagging to address issues of stock structure and movement is part of the longer-term funding request previously allocated.

In-depth Assessments

(4) SOWER CIRCUMPOLAR CRUISE

Completion of this set of surveys is essential to the work of the Committee in response to the Commission's resolution, in particular with respect to Antarctic minke whales but also blue whales and other species. The Government of Japan has kindly offered the use of two research ships in 2003/2004 and the preferred budget in Table 4 reflects the remaining costs of the cruise (Appendix 2 of Annex G). The reduced budget in Table 4 is the minimum required if the cruise is to take place. This requires cuts in the equipment budget and elsewhere. The total represents only a small fraction of the total cost – the vessels and crew are provided by Japan (£1,500,000).

Table 4
Scientific Committee recommendations for research funding in 2003/4 (amounts in £ sterling).

Item	For	Reference	Recommended budget	Reduced budget
AWMP				
Intersessional workshop*	Invited Participants	Item 8.6 and Annex E	12,000	12,000
Greenland Research Programme*	Satellite tagging	Item 8.3, 9.3 and Annex E	18,000	18,000
Developer's fund	Development of *SLA*s	Item 8.6 and Annex E	8,400	8,400
IA				
SOWER circumpolar cruise	Scientists, equipment, planning meeting	Item 10.1.2 and Annex G	92,000	80,000
Minke whale abundance estimates	Developmental work	Item 10.2.1 and Annex G	8,000	8,000
DESS–related *	Maintenance, data, improvements	Item 10.1.1 and Annex G	10,000	10,000
CAA analysis	Travel, salary	Item 10.2.3.2 and Annex G	22,000	0
Sperm whale	Travel, salary	Item 10.6.1	7,500	0
SH				
Antarctic humpback whale catalogue	Improving and maintaining catalogue	Item 10.4.3 and Annex H	5,100	5,100
SD				
TOSSM project	Develop simulated genetic datasets	Item 11.1.1 and Annex I	9,500	9,500
BC				
FAO fisheries statistics	Travel to FAO, Rome	Item 7.1 and Annex J	800	800
WW				
Intersessional workshop	Travel and subsistence	Item 14 and Annex M	5,000	0
E				
SO-GLOBEC related research	Planning meeting, cruise support, analysis	Item 12.2.2 and Annex K	86,900	25,000
POLLUTION 2000+	Complete Phase I	Item 12.3.1 and Annex K	52,000	25,000
Habitat degradation workshop	Invited Participants	Item 12.3.5 and Annex K	15,500	0
Preparation of SOCER	Editorial work	Item 12.3.3 and Annex K	3,000	0
SAN				
SOS review	Pre-meeting meeting	Item 17.2 and Annex P	7,000	7,000
SC				
Invited Participants	Invited Participants	Item 21	30,000	30,000
Catch data	Workshop in Cambridge	Item 3.3	2,300	2,300
Sundries (bank charges etc.)*			1,700	1,700
Total			391,700	242,600

(5) FURTHERING ESTIMATION OF ANTARCTIC MINKE WHALE ABUNDANCE

The Commission has given high priority to obtaining new abundance estimates and trends in Antarctic minke whales. Although a better understanding of the issues has been reached at this meeting, little progress can be made if the development project is not funded. A considerable amount of in-kind support is included in the latter project.

(I) DESS-RELATED WORK

The IWC's DESS (Database Estimation Software System) is vital to the Committee's work on abundance estimation, particularly with respect to future work on the abundance of Antarctic minke whales. The Committee agreed that the full contract for DESS-related work would not be renewed in its present form due to changing circumstances in the needs of the Committee. It agreed, however, that a sum of £10,000 was required to cover maintenance of DESS (including improvements) and work related to recent cruises.

(II) DEVELOPMENT OF ABUNDANCE ESTIMATION METHODS

Completion of this work is important in the context of the Commission's desire to receive advice on the abundance and trend in Antarctic minke whales. The amount applied for (£8,000) represents only part of the £72,000 total cost. Other funds will be provided by CSIRO (Australia), University of Glasgow (UK), National Research Foundation (South Africa) and NMFS (USA).

Environment

(6) SO-GLOBEC RELATED RESEARCH

Item 12.2.2 describes the Committee's collaboration with SO-GLOBEC. Research on Southern Ocean whales and their ecosystem is recommended by IWC Resolutions 1998-3 (IWC, 1999a) and 1998-6 (IWC, 1999b). Support for this activity complements the considerable in-kind support the IWC receives for the SOWER 2000 cruises. The benefits of this collaboration were apparent in the mini-symposium this year which illustrates the future benefits of this work to the other aspects of the Committee's business including abundance and trend of Antarctic minke whales. The reduced budget provides partial support for the coordinator and will enable analyses of existing data. Field studies will only be supported if at least two IWC observers are present on each vessel.

(7) POLLUTION 2000+ RESEARCH ON BIOLOGICAL EFFECTS OF CONTAMINANTS IN CETACEANS

The POLLUTION 2000+ programme is an important and fundamental research programme that has been given high priority in the past by both the Committee and the Commission (e.g. IWC Resolution 2000-7, IWC, 2001a, pp. 56-57). The results will provide a model for all

cetacean species. However, completion of Phase I was severely hampered by lack of funds last year. In addition to completion of analyses currently in progress, the 2003-2004 work plan for POLLUTION 2000+ includes an intersessional meeting to synthesise results among the laboratories involved and to determine activities to be conducted under Phase II. The highest priority projects are the completion of the harbour porpoise post-mortem calibration project and collection of samples and PCB analyses under the bottlenose dolphin sub-project. The budget to complete the entire 2003-2004 work plan will require £140,500, of which the majority will be sought through external direct or 'in-kind' funding. To complete the highest priority projects mentioned above, £52,000 from the IWC is required. The reduced budget amount will allow completion of most of the harbour porpoise sub-project.

Southern Hemisphere whales (other than Antarctic minke whales)

(8) ANTARCTIC HUMPBACK WHALE CATALOGUE

The Committee is already committed to funding this project, which represents only a partial cost of running the catalogue and is of great benefit to its in-depth assessment of Southern Hemisphere humpback whales. The work required to *inter alia* make the IWC/SOWER photographs more accessible is being carried out (see Annex H).

Stock definition

(9) TOSSM PROJECT

Consideration of stock structure is fundamental to the successful implementation of the RMP and is critical to the conservation and management of all cetacean species. The Committee reaffirmed the importance of simulation work in the light of the intersessional workshop held earlier this year. Setting up extensive simulation trials is complex, and the Committee **agreed** that the project outlined in Annex I be funded. It is a one-off cost for an extremely valuable resource and represents a small portion of the cost (two members will donate their time for free).

Sanctuaries

(10) PRE-COMMITTEE MEETING

The Commission requires a full review of the Southern Ocean Sanctuary at the 2004 meeting. The Committee agreed that it would be valuable to bring in outside specialists to assist in such a review, particularly those with international expertise on developing, managing and/or conducting research in Sanctuaries or Marine Protected Areas. The most efficient way to do this (and to ensure sufficient time to fully review the Sanctuary) would be to hold a two-day pre-committee meeting. The University of Sienna in Italy has kindly offered to host this meeting.

Bycatch

(11) LIAISON WITH FAO OVER FISHERIES STATISTICS

The Committee has recommended that cooperation with FAO be continued with respect to information on fisheries, fishing gear and effort, as part of its work to try and estimate bycatch levels. This is important in terms of assessment and RMP related work to determine total removals.

Scientific Committee

(12) INVITED PARTICIPANTS FUND

The Committee draws attention to the essential contribution made to its work by the funded Invited Participants. The reduced budget last year reduced the capacity of the Committee to carry out its work. IPs represent excellent value as they receive only travel and subsistence costs and thus donate their time.

(13) CATCH DATA

A good knowledge of historical catch data is required for much of the work by the Scientific Committee, in particular for assessments. The Secretariat is currently coding some new individual catch data from Southern Hemisphere Soviet operations but the data are incomplete. Allison will prepare a summary of the data held and then a small technical workshop will meet to try and find methods of completing the series for assessment purposes.

(b) Recommended items not included under the reduced budget

Environment

(1) HABITAT DEGRADATION WORKSHOP

The Commission (IWC Resolution 2000-7, IWC, 2001a, pp.56-57) has endorsed this project, as has the Committee on previous occasions. Progress on the conceptual framework that the workshop would consider was made at an intersessional meeting (Simmonds *et al.*, 2002) and a new workshop proposal was subsequently produced. The workshop did not take place last year. ACCOBAMS has endorsed the workshop plans. The University of Sienna in Italy has offered to facilitate the meeting, so the item in the Committee's preferred budget is needed only for invited participants. However, the Committee hopes that outside funding may be found to progress this workshop intersessionally.

(2) PREPARATION OF SOCER

The Commission (Resolution 2000-7) has encouraged work in this area. A working group within the SWG produced a draft SOCER (State of the Cetacean Environment Report) this year that is appended to the Committee's report. It is aimed at providing a non-technical summary of the positive and negative events and developments in the marine environment relevant to cetaceans.

In-depth Assessments

(3) CATCH-AT-AGE ANALYSIS OF ANTARCTIC MINKE WHALE DATA

This work will assist with the examination of the trends in Antarctic minke whales. It was noted that the work of the identified intersessional group does not preclude analyses by other scientists, or the use of other catch-at-age data.

(4) SPERM WHALES: PREPARATION FOR AN IN-DEPTH ASSESSMENT

The Committee has not considered the status of sperm whales for many years. This project will further the

planning work for an in-depth assessment including a review of assessment related information. Co-sponsorship will be sought.

(5) WHALEWATCHING

This is to cover travel for Scientific Committee participants to an intersessional workshop to be held early next year in South Africa. The workshop itself is not sponsored by the IWC.

22. WORKING METHODS OF THE COMMITTEE

22.1 Data availability

The Committee has noted that the question of data availability is a complex and sensitive one. A balance must be struck between the needs of the Committee and the rights of the scientists who have invested considerable time and effort in collecting the data. A number of issues were raised in the discussions last year with respect to this issue, particularly in the context of the RMP process. Although some progress was made, consensus was not reached. It was agreed that the Committee should try and reach either a consensus recommendation or a limited number of options to consider at this meeting (IWC, 2003d, p.14).

The Committee received the report of the Data Availability Working Group (Annex T). It welcomed the fact that the group had reached a consensus recommendation on such a sensitive matter. The rules apply only for matters that the Scientific Committee believes is particularly important to its work.

Procedure A is the process for obtaining access to data for analyses that are needed to provide the best management advice on catch limits (e.g. the RMP and AWMP).

Procedure B is the process for obtaining access to data for analyses the Committee believes would be valuable in providing other advice to the Commission.

Requests of a more academic or general scientific nature should be dealt with on a bilateral basis.

The Committee **strongly recommends** the process given in Annex T (and see below). It noted that these rules were developed in accordance with the following principles:

(1) data represent a significant temporal and financial investment by scientists and research institutes – use of their data by others should be accompanied by appropriate safeguards;
(2) the right of first publication is a generally accepted scientific norm;
(3) if important management decisions are to be made, they should be based on a full scientific review of both data quality and analysis that can be independently verified.

In adopting these rules, the Committee recognised that in their first year, flexibility would be needed particularly in terms of deadlines for documents, to allow for the fact that some scientists' work schedules may already have been set. This is the case for the in-depth assessment of bowhead whales scheduled for next year's meeting (see Item 9.1). It **agreed** that scientists should try and meet the new deadlines; however, if they believed that would not be possible, they should contact the newly established Data Availability Group (comprising the Chair, the Vice-Chair and the Head of Science) to request additional time as soon as possible.

23. ELECTION OF OFFICERS

The Committee **agreed** that there was no need for elections this year. It noted that the Commission referred back to the Committee the proposed changes to the Rules of Procedure regarding the appointment of a new Committee Chair and Vice-Chair made last year. Some Commissioners were concerned about certain aspects of the proposed rule change regarding the notification process following an election. The Committee referred to its discussions last year but spent little time on the issue, given that the rule would probably not be needed until 2005.

24. PUBLICATIONS

The year 2002 was another productive year with respect to the IWC's scientific publications. The fourth volume of *The Journal of Cetacean Research and Management* was completed, comprising three issues published in Spring, Autumn and Winter. Publication of some 37 papers (330pp.), covering a wide range of topics and with authors from 20 countries, illustrates its increasing contribution to the field of cetacean research. The policy of assisting scientists from countries for which cetacean research is relatively new, to produce papers of publication quality, continues to be successful. In addition, the 499pp. Supplement to the fifth volume of the Journal, containing the 2002 Report of the Scientific Committee and two Workshop reports, was published in April 2003 along with Issue 1 of Volume 5. Donovan thanked the Publications staff for their hard work.

Donovan reported that the third special issue should be available before the next meeting. It will consider the development of the Revised Management Procedure from the mid-1980s to the completion of the present *Implementation* and *Implementation Reviews* at the present meeting.

He also noted that the website now includes a downloadable file containing almost 6,000 references to documents that have been presented to the Committee since 1969. The file lists all of the documents by meeting and includes information on whether and where they have been published. It is searchable using the usual Acrobat search functions. He noted that the compilation of these lists represented a major undertaking and it is possible that there are some errors, particularly concerning papers that have been published elsewhere that the Secretariat are unaware of. He requested that any corrections be sent to the *Journal* e-mail address (*IWCJournal@iwcoffice.org*).

Finally, Donovan reiterated the importance of Committee members urging their respective institutes and colleagues to subscribe to the *Journal* and to submit high quality papers to it. The success of the *Journal* will be greatly increased as it becomes established in more institutional libraries.

The Committee congratulated Donovan and his team for maintaining the quantity and quality of the publications

produced since the last meeting, and it stressed the vital contribution the *Journal* makes to the work of the Committee and to the wider issues of the management and conservation of whales.

25. ADOPTION OF REPORT

The report was adopted on the proposal of Ohsumi, the Committee's longest serving member, at 15:30 on Friday 6 June. The Committee expressed its appreciation: (1) to the new Chair for his fair and good-humoured handling of the meeting; (2) the German Government for provision of the facilities; and (3) to the Secretariat staff for their usual efficiency and charm.

It was recognised that the Chair and Head of Science, in conjunction with the Convenors, would edit the final report in accordance with the agreement reached on the first day, i.e. that the main report would concentrate on the main issues and recommendations whilst pointing readers to the detailed discussions in the Annexes. This way would avoid unnecessary duplication of large sections of Annexes being included in the main report. It is hoped that the resultant document will prove more accessible to Commissioners and others who had not attended the meeting.

RULES FOR DATA AVAILABILITY IN THE SCIENTIFIC COMMITTEE

Data Availability Group

The Scientific Committee shall be represented by a small group comprising the Chair, the Vice-Chair and the Head of Science, hereafter called the Data Availability Group.

Conditions for data recipients

Applications deemed suitable under Procedure A or Procedure B below are granted under the following conditions:

(1) Data shall not be transmitted to third parties.
(2) Papers may only be submitted to a Committee meeting in accordance with the time restrictions given below. Such papers must not include the raw data or the data in a form in more detail than is necessary to understand the analysis.
(3) Papers must carry a restriction on citation except in the context of IWC meetings.
(4) Data owners are offered co-authorship.
(5) Publication rights remain strictly with the data owner.
(6) Data shall be returned, to the Secretariat or the data owner as appropriate, immediately after the meeting at which the paper is submitted and any copies destroyed, unless an extension is granted.
(7) Data requesters sign a form agreeing to the above conditions. Such forms will be held by the data owner and the Secretariat. In the case of Procedure B, the Data Availability Group will sign the agreement on the Committee's behalf and ensure that the conditions of any agreement are met by any individual scientists involved in the analysis.
(8) In the event of a breach of the conditions in (6), serious sanctions [to be determined] will apply.

Procedure A

The following shall apply with respect to data required for the process outlined in IWC (2003, pp.11-12) for the RMP, the AWMP (see IWC, 2003) and other information used to provide advice on aboriginal subsistence catch limits before the relevant SLAs have been completed. The rules apply to all data owners who wish their analyses to be considered as part of the process to provide advice on catch limits.

Data owners may submit data to be treated under this procedure, even if they do not intend to analyse the data themselves.

When an application for data under this procedure is submitted, the Data Availability Group shall (a) decide whether an application fulfils the criteria with respect to the objectives of the study and (b) determine whether the methods proposed are considered standard or novel. The small group may take advice from the data owner, applicant or other relevant scientists in this process.

(1) If they wish analyses to be considered by the Committee, data owners must make data used for the analysis available in an agreed form and specified resolution (if desired, to the Secretariat) no later than *6* months before the meeting at which they are to be used. Examples are given in Appendix 1. These data shall be made available to accredited persons only under the conditions listed above. Data owners shall be notified of any such requests, including a description of the objectives of the study and the methods to be used.
(2) The Secretariat or data owners shall respond (i.e. send the data) to requests for data approved by the small group promptly, normally within two weeks of receiving the request.
(3) If novel methods are to be used, Scientific Committee papers documenting data analysis and results shall be circulated no less than *3* months before the meeting at which they are to be considered. Any such papers should include sufficient documentation of the analysis for it to be fully reviewed and any associated analytical software shall be lodged with the Secretariat.
(4) If standard methods are used, Scientific Committee papers documenting data analysis and results shall be circulated no less than *2* months before the meeting at which they are to be used.
(5) Alternative analyses carried out in response to papers submitted under (3) or (4) shall be circulated no less than *1* month before the meeting at which they are to be used.

Procedure B

This applies to data required for analyses deemed important in providing advice to the Committee other than catch limits (e.g. on the status of stocks not subject to whaling). For data not subject to Procedure A, the data owners shall produce, in collaboration with the Committee, a published protocol for data access that applies to requests generated by the Committee, to ensure clarity and a mutual understanding of the process.

(1) The Committee shall specify the nature of the work and the data required during the meeting at which the recommendation is made, to the fullest extent possible in the time available at the meeting and in accord with the published protocol. It should also name the appropriate scientists to undertake the work and designate an appropriate timeline.
(2) Applications to the data owners following the published protocol referred to above, should be submitted by the Data Availability Group assisted by a nominated member of the relevant delegation or institute. The Data Availability Group will consult with relevant members of the Committee if further explanation or clarification is required.
(3) If the above process is followed, then the data owners will normally approve the applications within a specified time period in accordance with the published protocol.
(4) Applications shall only be granted under conditions given above.

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