Report of the Scientific Committee

The meeting was held at the Hilton Sorrento Palace Hotel, Sorrento, Italy, from 29 June - 10 July 2004 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 in which he thanked the Government of Italy as hosts. With over 200 participants attending the meeting, the customary introductions took several entertaining minutes.

1.2 Appointment of rapporteurs

Donovan was appointed rapporteur with assistance from 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 and information for participants. The Committee agreed to follow the work schedule prepared by the Chair.

1.4 Establishment of sub-committees and Working Groups

Two meetings preceded the start of the Scientific Committee. The AWMP Standing Working Group (SWG) met to extend the time it had available to work towards selecting an *SLA* for eastern North Pacific gray whales (27-28 June). The agenda items covered were subsumed into the SWG's main agenda and report (Annex E). An intersessional Working Group to review the Southern Ocean Sanctuary (SOS) met on 28-29 June; the report is given as SC/56/Rep2 and is discussed in the report of the Working Group to Review Sanctuaries and Sanctuary Proposals (Annex O).

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 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 Whale Stocks (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 to Review Sanctuaries and Sanctuary Proposals (SAN);
Annex P – Working Group on Scientific Permits (SP).

1.5 Computing arrangements

Allison outlined the computing and printing facilities available for delegate use. Requests for Secretariat computing would be addressed according to priority assigned by the Convenors. The Committee expressed its great appreciation to the Government of Italy for the excellent computing facilities.

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, 2004a, pp.50-52). Annex B2 links the Committee's Agenda with that of the Commission.

The Committee recognises that human health issues surrounding consumption of cetacean products is a valid scientific subject, however, it reiterates its view that for a number of reasons it is not an appropriate topic for consideration and review by the Scientific Committee (IWC, 2002b, p.56).

3. REVIEW OF AVAILABLE DATA, DOCUMENTS AND REPORTS

3.1 Documents submitted

Donovan noted that the number of primary papers submitted this year was over 250 and that the new pre-registration procedure had again been successful. With such a large number of documents, pre-specifying papers had reduced the amount of photocopying and unnecessary paper dramatically (and see Item 22).

The list of documents is given as Annex C.

3.2 National progress reports on research

Progress reports presented at the 2001-2003 meetings are accessible on the IWC website. Reports from previous years will also become available in this format in the future.

The Committee reaffirmed its view of the importance of national progress reports and **recommended** that the Commission continues to urge member nations to submit them following the approved guidelines (IWC, 1998). 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 modified report template, taking account of the updates made last year, is available on the IWC website (*www.iwcoffice.org/commission/sci_com/scprogress.htm*). This will be updated to take into account the modifications agreed this year (see Items 7.1.1, 7.1.2 and 14.1.3).

3.3 Data collection, storage and manipulation

3.3.1 Catch data and other statistical material

Table 1 lists data received by the Secretariat since the 2003 meeting.

3.3.2 Progress of data coding and validation projects

Allison reported that the first phase of work to encode the revised Soviet individual catch data from the Southern Hemisphere was nearing completion, and the data are expected to be available to Scientific Committee members within the next six months. The detailed biological data are not being coded in this first phase of the coding work.

Work to summarise the best data available for each expedition and time period of the revised Soviet Southern Hemisphere catch data (IWC, 2004a, p.2 and p.55) was progressing well. The small technical workshop (consisting of Allison, Brownell, Donovan, Mikhalev and Tormosov plus interpreter) to consider how best to fill the gaps in the data, for example by interpolation, had not yet taken place, but is expected to be arranged shortly. The Steering Group (Allison, Bannister, Best, Brownell, Cooke, Donovan, Reeves and Smith) appointed to assist with this work was retained.

A minority statement on these catch data is given as Annex V.

Allison reported on the current progress of a programme by the IWC Secretariat, working in conjunction with the Alfred E. Sloan Foundation's Census of Marine Life, to summarise 20th century whaling catch data (SC/56/O27). This database is expected to be substantially completed over the next year. Review of the database by members of the Scientific Committee would be appreciated. In particular, assistance in identifying any errors, identifying additional sources of catch data, and obtaining additional information especially for operations where little is known and/or where the data are potentially or known to be inaccurate is welcomed.

Data from the 2002/03 SOWER sightings cruises have been validated and incorporated into the DESS database. The remaining resightings data from past SOWER cruises have now been validated and are ready to be added into DESS.

3.3.3 Progress on computing tasks

Allison reported on progress with the computing work identified last year (IWC, 2004a, p.53). The Common Control Program was amended to implement all of the trials agreed for the gray whale *SLA,* both from last year's meeting and the intersessional workshop. The trials were conditioned and run. The results were made available to the SWG on the AWMP (see Annex E). Allison expressed her gratitude to Punt for his assistance with modelling issues.

3.3.4 Archiving of simulated datasets to test abundance estimation methods

Progress made on this issue is discussed under Item 10.2.1 and in Annex G.

4. COOPERATION WITH OTHER ORGANISATIONS

4.1 Convention on the Conservation of Migratory Species (CMS)

4.1.1 Scientific Council

The report of the IWC observer at the 12th meeting of the CMS Scientific Council held in Glasgow, UK is given as IWC/56/11E. No new listings of cetaceans were proposed for the CMS Appendices. Two proposals for research on cetaceans were approved in principle: (1) a regional workshop on biology and conservation of small cetaceans of the western Indian Ocean in 2005/06; and (2) a series of two training workshops on cetacean research methods, to be held in the South Pacific in 2004/05. The next meeting of the Council will be in connection with the next Conference of Parties in mid- to late 2004. In addition, the Second Workshop on the CMS and Marine Mammal Conservation in the South Pacific (Samoa, 17-19 March, 2004) brought together delegates and scientists from 12 South Pacific nations, CMS representatives and the South Pacific Regional Environmental Programme (SPREP) to explore possibilities for a regional cooperative arrangement on marine mammal research and conservation. The group agreed this arrangement would be beneficial, and a committee was appointed to take this further.

Table 1

List of data and programs received by the IWC Secretariat since the 2003 meeting.

Date	From	IWC ref.	Details
Catch data			
11-05-04	Norway: N. Øien	E46	Individual catch records from the Norwegian 2003 commercial catch. Access: restricted.
29-06-04	Japan	C02	Individual catch records from the Japanese 2003 North Pacific Special Permit catch (JARPNII) and 2003/04 Antarctic Special Permit catch (JARPA).
12-04-04	D. Bloch		1894-1985 Faroese catch data.
02-06-04	USA: T. Smith	E47	Annual Alaska bowhead catch numbers.
Sightings data			
12-03-04	P. Ensor	E45+ CD43-45	2003/04 SOWER cruise data including blue whale data (sightings, effort, weather, ice-edge, inter-stratum and way-points). 2004 Report with figures and tables. Photographs.
10-04-04	L. Burt	CD40-41	New version of DESS database: version 3.4 (includes 2002/03 data) + 'standard' data files.
28-12-03	Japan: H. Shimada	E44	Data from western North Pacific Bryde's whale sightings surveys 1998-2002.

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

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

The report of the IWC observer at the 4th Meeting of Parties (MOP) held in Esbjerg, Denmark is given as IWC/56/11I. The MOP agreed to extend the geographical coverage under the Agreement to cover parts of the North Atlantic and waters adjacent to Ireland, Portugal, France and Spain; the name was changed to the Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas. If ratified, this will close the gap between the Agreement areas of ASCOBANS and ACCOBAMS. The Advisory Committee was also asked to consider the possibility of extending the agreement to all cetacean species.

Several relevant Resolutions were adopted, including:

(1) a request for Parties and Range States to introduce guidelines on measures and procedures for seismic surveys, and to conduct further research into the effects of vessels on cetaceans (and see Annex K of this plenary report);
(2) various issues concerning incidental takes of small cetaceans including *inter alia*: support for the Jastarnia Plan for the recovery of harbour porpoises; a recommendation for reduction (without delay) of harbour porpoise bycatch in the Celtic Sea; and support for the development of a recovery plan for harbour porpoises in the North Sea (and see Annex L);
(3) commendation of the research plan (SCANS II – see Item 13.2.3) for abundance surveys in the ASCOBANS area, with a recommendation that funding and resources are provided to support it (and see Annex L);
(4) further implementation of ASCOBANS by *inter alia*: continued support for the IWC's POLLUTION 2000+ programme (and see Annex K); and
(5) further research on abundance, life history parameters, migration etc, particularly for less well-known species.

The full report of the MOP is available on the ASCOBANS website (*www.ascobans.org/index0501.html*). The Committee thanked Donovan for attending on its behalf.

The report of the IWC observer at the 11th meeting of the Advisory Committee held in Poland is given as IWC/56/11F. The major items of interest to the IWC were the Jastarnia Plan for Baltic harbour porpoises, a recovery plan for harbour porpoises in the North Sea, SCANS II and bycatch issues (see Annex L).

Implementation of the Jastarnia Plan was considered highest priority. A meeting of the Plan's executive committee is scheduled for September 2004.

Work began on development of a recovery plan for harbour porpoises in the North Sea. A Scientific Group was established and will be responsible for drafting the plan; the group will be composed of scientific experts in relevant disciplines, comprising participants from ASCOBANS member countries, Range States and external experts i.e. members of the IWC Scientific Committee.

A follow-up project (SCANS II) to the 1994 cetacean abundance surveys in the North Sea (SCANS) is planned for 2005 and 2006. Preparatory planning meetings have been held to discuss objectives, logistics and recommendations. SC/56/SM4 contains further information.

Extensive discussion was held on the relevance to ASCOBANS of the EU Council Regulation on Incidental Catches of Cetaceans in Fisheries. There was general appreciation for the EU addressing this issue, but there was concern about several missing elements such as no observers on vessels under 15m, pingers would not be mandatory for vessels under 12m, the total phase-out of driftnet fisheries in the Baltic will not occur until January 2008, with no immediate restriction to 2.5km as initially suggested. The value of cooperation between the IWC and ASCOBANS on POLLUTION 2000+ and the work of the IWC sub-committee on small cetaceans was acknowledged.

The Committee thanked Reijnders for attending on its behalf and **agreed** that either he or Donovan should represent the IWC at the next ASCOBANS Advisory Committee 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 representative at the 2nd meeting of the ACCOBAMS Scientific Committee held in Istanbul, Turkey is given as IWC/56/11J. Topics of interest to the IWC Scientific Committee included:

(1) an agreement that the highest research priority is to obtain baseline population estimates and distributional information of cetaceans within the area (Donovan is a member of a Steering Group developing a research proposal on this issue);
(2) a recommendation arising from the continued concern over incidental mortality caused by pelagic gillnets used in the Agreement area (see further discussion under Item 7.1.2);
(3) establishment of a workshop to provide practical guidelines for the use of acoustic alarms and/or other mitigation methods for immediate use in the ACCOBAMS area;
(4) extensive discussion on the actual and potential negative effects of anthropogenic noise on cetaceans in the area, with a view to developing common sets of guidelines for the use of military sonar (see Annex K);
(5) recognition of the potential threat of ship collisions, particularly in relation to fin and sperm whales, including recommendations on assessment of impact at the population level and development of mitigation measures;
(6) a recommendation for a joint workshop on regional fin whale research and management in order to develop a coordinated research plan;
(7) conservation plans for bottlenose dolphins in the Mediterranean Sea, and Black Sea cetaceans;
(8) designation of protected areas within the Agreement area;
(9) updated guidelines for the regulation of whale-watching; and
(10) development of appropriate strandings networks.

The full report of the meeting is available on the ACCOBAMS website (*www.accobams.org*). The Committee thanked Donovan for attending on its behalf and **agreed**

that he should represent the IWC at the next ACCOBAMS meeting.

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

The report of the IWC observer documenting the 2003 activities of ICES is given as IWC/56/11A. During the year, the ICES Working Group on Marine Mammal Ecology (WGMME) further developed its response to the European Commission's standing request regarding fisheries and their impact on small cetaceans and other marine mammals. The group concluded that more information on abundance and the magnitude of bycatches is required, with highest priority accorded to work on new mitigation methods. The WGMME also reviewed the status of harbour porpoises in the Baltic Sea, and further discussed Ecological Quality Objectives (EcoQOs) for the bycatch of harbour porpoises in the North Sea.

During the Annual Science Conference held in Tallin, Estonia (September 2003) several theme sessions incorporated discussions on marine mammals:

(1) size-dependency in marine and freshwater ecosystems;
(2) the scope and effectiveness of stock recovery plans in fishery management;
(3) mixed and multi-stock fisheries – challenges and tools for assessments, prediction and management; and
(4) reference point approaches to management within the precautionary approach.

Further details under these topics are given in the observer's report. The Committee thanked Haug for the report and **agreed** that he should represent the IWC at the next ICES meeting.

4.3 Inter-American Tropical Tuna Commission (IATTC)

The report of the IWC observer documenting the activities of IATTC in 2003/04 is given as IWC/56/11G. The 72nd meeting of IATTC was held in Lima, Peru in June 2004. Bycatch issues were given particular attention and a resolution was agreed specific to juvenile tunas and sea turtles. A satellite-based Vessel Monitoring System was accepted, and agreement reached to establish it by January, 2005.

Three meetings of Parties to the Agreement on the International Dolphin Conservation Program (AIDCP) took place during the period. Issues of relevance to the IWC were the adopted action plan to enhance the Agreement including: establishment of a Scientific Advisory Board; consideration of possible dolphin takes by unobserved, smaller purse-seiners; consideration of limits on dolphin herd sizes set upon; and promotion of the AIDCP's own version of the dolphin safe labelling scheme for canned tuna. On two occasions, a proposal to up-date per stock mortality limits to use recent abundance estimates for targeted dolphin species were considered, but not adopted.

Full resolution text and meeting minutes are available on the IATTC website (*www.iattc.org*). The Committee thanked Reilly for attending on its behalf and **agreed** that he should represent the IWC at the next IATTC meeting.

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

The report of the IWC observer at the 18th meeting of ICCAT held in Dublin, Ireland is given as IWC/56/11C. Many topics were discussed and numerous recommendations made, although none directly relevant to cetaceans. The Committee thanked Escobar for attending the meeting on its behalf and **agreed** that he should represent the IWC at the next ICCAT meeting.

The report of the IWC observer at the 2003 annual meeting of the Standing Committee on Research and Statistics (SCRS) of ICCAT held in Madrid, Spain is given as IWC/56/11M. The main issue of relevance to the IWC is information on the bycatch of marine mammals collected through observer programmes. The SCRS has recommended that a database management system is developed to accommodate scientific observer data, and progress is being made on this. The ICCAT website (*www.iccat.es*) currently contains the available scientific observer data with information on bycatches of marine mammals, birds, turtles and other species.

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

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

The report of the IWC observer at the 22nd meeting of the CCAMLR Scientific Committee held in Hobart, Australia is given as IWC/56/11B. Results from the 2003 IWC meeting relevant to CCAMLR were presented by Kock, including progress with collaboration, results from the 2002/03 SOWER cruise, new abundance estimates, the upcoming 2004 review of the Southern Ocean Sanctuary, and whale catches within the CCAMLR Convention area. The main items considered at the CCAMLR meeting of relevance to the IWC included status and trends of Antarctic fish stocks and krill, incidental mortality of marine mammals, ecosystem monitoring and management, and management under conditions of uncertainty.

The Working Group on Ecosystem Monitoring and Management (WG-EMM) noted the IWC Scientific Committee's discussions concerning definition of the ice-edge, and drew attention to the definitions commonly used in the CCAMLR community (and see Annex K). The WG-EMM also suggested that the IWC Scientific Committee should take note of current CCAMLR activities involving separation of CCAMLR sub-areas into smaller scale units with respect to future krill harvest and setting of Total Allowable Catches (TACs) in the krill fishery. These small-scale units are not too dissimilar from those developed by the IWC with respect to potential future harvesting of whales.

The WG-EMM also highlighted the increasing records in CCAMLR of observed encounters of killer and sperm whales with the Patagonian toothfish long-line fishery; both species take fish off the lines which poses an increased risk of entanglement and damage to gear.

The WG also noted that whale sightings surveys are now included in a number of CCAMLR and SO-GLOBEC activities, namely in the Scotia Arc region and west of the Antarctic Peninsula.

Further discussion of IWC-CCAMLR collaboration appears under Item 12.2.2 and in Annex K. The Committee thanked Kock for attending on its behalf and **agreed** that he should represent the IWC at the next CCAMLR meeting.

4.6 Southern Ocean GLOBEC (SO-GLOBEC)

Details of SO-GLOBEC activities and collaboration with the IWC are given under Item 12.2.2 and in Annex K. The Committee thanked Thiele for promoting and coordinating the collaboration.

4.7 North Atlantic Marine Mammal Commission (NAMMCO)

The report of the IWC observer at the 11th meeting of the NAMMCO Scientific Committee held in Nuuk, Greenland is given as IWC/56/11K. The Working Group on Population Status of Narwhal and Beluga in the North Atlantic met in Canada in February (and see Annex L). Narwhal stock structure was investigated using genetic analyses and contaminant levels in samples from diverse areas; in general these tools provided weak evidence of stock differences between areas. Results of visual aerial surveys conducted by Canada in 2002 and 2003 will be available in 2005. Uncorrected estimates of narwhals from aerial digital photo surveys conducted by Greenland in Inglefield Bredning and adjacent fjords in Northwest Greenland in August 2001 and 2002 were compared with the results of visual line-transect surveys conducted in 1985 and 1986; an annual decline of 10% in the abundance of whales visible at the surface was observed. Total estimated abundance in 2002 was about 15% of the total estimated abundance in 1986. Results of assessments on narwhal stocks in West Greenland showed that stocks are depleted to approximately one quarter of their pre-harvested abundance, and that a future harvest at the present level may result in extinction in the near future. It was recommended that the total removals should be reduced to no more than 135 individuals. This is discussed in Annex L.

The Council had previously requested the NAMMCO Scientific Committee to conduct assessments on white-beaked, white-sided and bottlenose dolphins, but to date insufficient information has been available to initiate the work; work is currently in progress.

The Working Group on Abundance Estimates continued its work to evaluate estimates for target and non-target species. New, fully corrected estimates for minke whales from the 1987 and 2001 Icelandic aerial surveys were reviewed and accepted. Other new estimates for minke, humpback, pilot, northern bottlenose and blue whales were also reviewed. The Scientific Committee emphasised the importance of the North Atlantic Sightings Surveys and recommended that they continue in some form at regular intervals. It was also recommended that Iceland, the Faroes, Greenland and Norway make every effort to coordinate their survey activities with other countries into an integrated NASS in 2006, as has previously occurred.

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

4.8 International Union for the Conservation of Nature (IUCN)

The IUCN Conservation Action Plan for the World's Cetaceans 2002-2010, prepared by the IUCN Cetacean Specialist Group, has been printed and distributed. It contains a range of priority research topics, many of which reflect priorities identified by the IWC Scientific Committee. A new feature of this Action Plan, not contained in the previous plans, is a section on recommended conservation action. This focuses on species and populations under especial threat, and contains recommendations on: baiji, vaquita, franciscana, Hector's dolphin, Mahakam river and Malampaya Sound populations of the Irrawaddy dolphin, and short-beaked common dolphins in the Mediterranean Sea. Details can be found on *www.iucn.org/themes/ssc/pubs/sscaps.htm.*

The status of many cetaceans on the IUCN Red List is also being revised, both to reflect new information, and to take into account recent changes in the criteria for the different categories of threat.

The Committee thanked Cooke for his report.

4.8.1 Nomenclature

In response to a request from IUCN, the Committee reviewed its list of recognised species. SC/56/O4 presented a critique of the status of the new whale species *Balaenoptera omurai* (Wada *et al.*, 2003). While recognising the efforts of Wada *et al.*, to advance the taxonomy of the Bryde's whale complex, the Committee **agreed** that inclusion of the species in the IWC list of recognised species would be premature at present, particularly due to uncertainties about the genetic identity of the holotype specimen of *B. edeni* (in a museum in Calcutta) and about the range of variation in the diagnostic morphological characters used.

However, Pastene noted that the mtDNA control-region sequence of a 'Kochi' (South China Sea) specimen (labelled *edeni* in Wada *et al.*, 2003, fig. 3) has now been compared with that of the *B. omurai* holotype and found to differ from it and a large series of 'ordinary' Bryde's whales (the unlabelled lower clade in Wada *et al.*, 2003, fig. 3). He also noted that contrary to the statement in SC/56/O4, more than one marker has been used in the genetic analyses, as the original discovery of the Solomon Islands-type whale was based on allozyme data (Wada and Numachi, 1991).

The Committee **recommended** that the Bryde's whale complex continue to be listed under the name *B. edeni* on a provisional basis and that research to resolve the uncertainties go forward. In particular, it **recommended** that the Government of India be requested to facilitate collection and genetic analysis of a bone sample from the holotype specimen of *B. edeni* in Calcutta, so that the taxonomy and nomenclature can be resolved.

4.9 FAO

The report of the IWC observer at the Sub-Committee on Fish Trade held in Bremen, Germany is given as IWC/56/11L. The main issues discussed were the ongoing national and international work on fish trade issues, and cooperation with CITES including: provision of advice on the CITES criteria for Appendices listings; advice on specific proposals for the listing of commercially exploited aquatic species in the Appendices; and the development (and subsequent agreement on text) of a Memorandum of Understanding (MOU) between FAO and CITES. The sub-committee also agreed that further advice to CITES would be provided by two expert consultations: one dealing with issues related to implementation of CITES listings of commercially exploited aquatic species; and the second

dealing with legal issues. An *ad hoc* Expert Advisory Panel was established to assess proposals for the listing or downlisting of commercially exploited aquatic species at the Conference of Parties.

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

In addition, a progress report was presented on the four-year FAO project: 'Scientific basis for ecosystem based management in the Lesser Antilles including interactions with marine mammals and other top predators'. The project is currently examining the major interactions within the ecosystem, including fisheries, and their implications for ecosystem management. It will include modelling and GIS components as well as fishery and cetacean surveys to improve knowledge of the abundance and distribution of major ecosystem components. The first scientific planning meeting was held in October 2003 and the first sightings survey took place between April and May 2004 although poor weather conditions affected the survey. It is expected that a second survey will be conducted in 2005.

The Committee thanked Rambally for this additional information.

4.10 North Pacific Marine Science Organisation (PICES)

The report of the IWC observer at the 12th annual meeting of PICES held in Seoul, Korea is given as IWC/56/11H. The Marine Birds and Mammals Advisory Panel (MBM-AP) reviewed the region-specific trend of diet and feeding habits of marine birds and mammals in the North Pacific; the following points were noted:

(1) diet composition varied between west and east regions of the North Pacific;
(2) diet composition of top predators has switched dramatically at decadal levels, probably related to regime shift;
(3) several species, including minke whales, can be used as an ecosystem indicator; and
(4) a hot spot exists around 40°N-160°E supported by a higher chlorophyll concentration (and likely other oceanographic factors).

Future proposals for MBM-AP workshops on further diet and distribution relationships, and investigation of hot spots were accepted. These will be held in the intersessional period. 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)

The report of the IWC observer documenting the activities of ECCO during 2003/04 is given as IWC/56/11O. A Symposium on the Sustainable Utilisation of Renewable Resources for ministers of 12 CARICOM (Caribbean community) countries was held in Trinidad and Tobago in March, 2004. The role of member States in the management of marine resources, both individually and collectively as a region, was reviewed. The meeting re-emphasised its commitment to the sustainable utilisation of marine mammals based on sound scientific information. An ECCO Workshop for Caribbean fisheries scientists was held in Dominica (June 2003) to discuss the preliminary results of the first survey of the FAO Lesser Antilles Ecosystem Project (see report under Item 4.9), the small-scale cetacean surveys, and issues of common interest in preparation for IWC 56.

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

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

5.1 Review progress on adjusting convergence criteria for the CATCHLIMIT program

No progress had been made on the task to adjust the convergence criteria for the CATCHLIMIT program for use in simulation trials (IWC, 2002b, p.5). However, the Committee noted it may no longer be necessary owing to improvements in computing speed that may allow the version of CATCHLIMIT to set actual catch limits for use in simulation trials. It is hoped that this matter can be finalised at the next Annual Meeting.

5.2 Review the *Implementation* process in the light of experience with western North Pacific minke whales

The Committee reviewed SC/56/RMP5 and RMP6. It **agreed** that these papers would assist in the development of a more streamlined and practical approach to implementing the RMP.

SC/56/RMP5 considered the Committee's accumulated experience in implementing the RMP for minke whales in three oceanic regions. Particular issues highlighted included those surrounding hypothesis development, plausibility and the human integration approach to determining acceptable performance of the RMP under different management options. The author noted that consideration should be given to developing approaches that allow hypotheses to be included even if they can only be tested using data from research, or whaling itself, beyond those required as direct input to the RMP.

In the light of past Committee experience, the authors of SC/56/RMP6 developed a practical approach to try to minimise the problems encountered in previous *Implementations* and to try to prevent the RMP from becoming unworkable in real situations. The authors considered a number of 'philosophical' issues and on this basis developed a series of guidelines documenting the complete process from *pre-implementation assessments* to *Implementation*. This included a development of the suggestion in IWC (2003d, p.11) and SC/56/RMP5 to include 'less conservative' (but still acceptable under RMP conservation measures) variants for the initial *Implementation* that incorporated research requirements.

The Committee recalled that these ideas and proposals had arisen from its discussions in previous meetings (IWC, 2003e; 2004b) regarding the substantial delays that had occurred in the implementation process for western North Pacific minke whales. The papers presented to this meeting (SC/56/RMP5, RMP6) provided the impetus for the establishment of a sub-committee Working Group to determine the technical specifications for the Requirements and Guidelines for *Implementations* (Annex D, Appendix 2). The key elements of these Requirements and Guidelines are summarised below.

(1) A structure and timetable for the Committee's work to avoid the *Implementation* process taking an extended period of time. The important development here is that the *pre-implementation assessment* is the forum for ensuring that sufficient information is available to enter into an *Implementation* with the expectation that the latter can then be completed within two years.
(2) Practical ways to deal with issues that have caused the Committee significant difficulties in the past, including:
    (i) how to deal with the plausibility of alternate hypotheses (on, *inter alia*, stock structure, historical catch/bycatch, $g(0)$ for abundance estimates);
    (ii) how to assign weights to simulation trials that implement combinations of these hypotheses; and
    (iii) how to interpret trial results.
(3) A way to encourage the provision of information whilst whaling operations were taking place by giving the Commission an option to initiate the RMP by:
    (i) using a hybrid variant for an initial period whilst ensuring that the objectives of the RMP (particularly with respect to conservation performance) are still met; and
    (ii) linking this specifically to a research programme designed to reduce key uncertainties.

Following discussion of SC/56/RMP6 and a considerable amount of work in the sub-committee as documented fully in Annex D, Appendix 2, the Committee **agreed** that, in addition to those RMP variants that performed 'acceptably' for all trials, a combination of one of those and a 'less conservative' variant that did not perform 'acceptably' in some trials could also be recommended with research requirements under certain limited and highly specified situations. Only RMP variants that performed 'acceptably' or 'borderline' on all the 'high' weight trials would be considered as candidates for the 'less conservative' variant. Most importantly, a 'less conservative' variant would only be considered as an option for recommendation if its conservation performance is 'acceptable'[1] for all trials when it is used to set catch limits for the first 10 years after which catches are set by a 'more conservative'[2] variant[3]. This hybrid procedure must have been thoroughly tested in *Implementation Simulation Trials* and found to have fully acceptable conservation performance both in the short term (10-20 years) and in the usual 100-year term used in RMP trials. The associated research programme will be developed and guided by the Committee and will be formulated such that it identifies expected progress in a manner that will allow the Committee to review annually whether the programme is being adequately followed.

After 10 years, catch limits would be set using the 'more conservative' RMP variant that performed 'acceptably' on all the trials unless the Committee agrees that the research programme has shown that the trials on which the 'less conservative' variant did not perform 'acceptably' should then be assigned 'low' weight. The Committee **agreed** that if the research programme associated with the RMP variant has not progressed to its satisfaction, a recommendation will be made that catch limits immediately be based on the 'more conservative' RMP variant. The Committee also **agreed** that consideration could be given to phasing out of the 'less conservative' RMP variant in favour of a 'more conservative' variant following additional research over five years (rather than moving immediately from the 'less' conservative to a 'more conservative' variant) as long as the risk associated with this phase-out process was accounted for in *Implementation Simulation Trials* when the Committee selected among RMP variants. This process and a detailed worked example are given in Annex D, Appendix 2. Fig. 1 summarises the process.

It was noted that this agreement is a change from the guidelines agreed last year (IWC, 2004b, pp. 80-82 and IWC, 2004c, p.97), whereby 'acceptable' variants needed to perform 'acceptably' in all high plausibility trials, and 'borderline' or better in 'medium' plausibility trials. However, it was also noted that the hybrid variant must perform to the same agreed level of acceptability.

The Committee noted its earlier discussions (IWC, 1994, p.44) regarding the provision of data other than those required to calculate catch limits using the *CLA*; collection of some of these data may be part of a research programme linked to a recommendation for a 'less conservative' RMP variant.

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

The draft guidelines in SC/56/RMP6 provided an excellent starting point for refining the process of *Implementing* the RMP for a specific species and *Region*. As noted earlier, these formed the basis of the Guidelines and Requirements for those IWC Member(s) who seek(s) an RMP *Implementation*, and for the Committee itself when it attempts to *Implement* the RMP for a given species and *Region* as detailed in Annex D, Appendix 2. It noted that some aspects of the guidelines require more detailed specification during the intersessional period of the further work. The guidelines relate to:

(1) the information needed to initiate a *pre-implementation assessment*;
(2) the nature and outcomes from a *pre-implementation assessment*;
(3) the steps in conducting an *Implementation* and expected input and outcomes at each stage.

An *Implementation* will normally be completed two years after the Committee recommends that the *pre-implementation assessment* is complete and the *Implementation* can start. The *Implementation* will occur during two intersessional workshops and two Annual meetings. The primary objectives of these are summarised below and in Fig. 2.

[1] See Annex D, Appendix 2 for the criteria that define 'acceptable' performance.
[2] The words 'more conservative' and 'less conservative' here refer to unchanged application over a 100-year period.
[3] This variant need not be the variant among those that are 'acceptable' without a research programme that leads to the best catch performance.

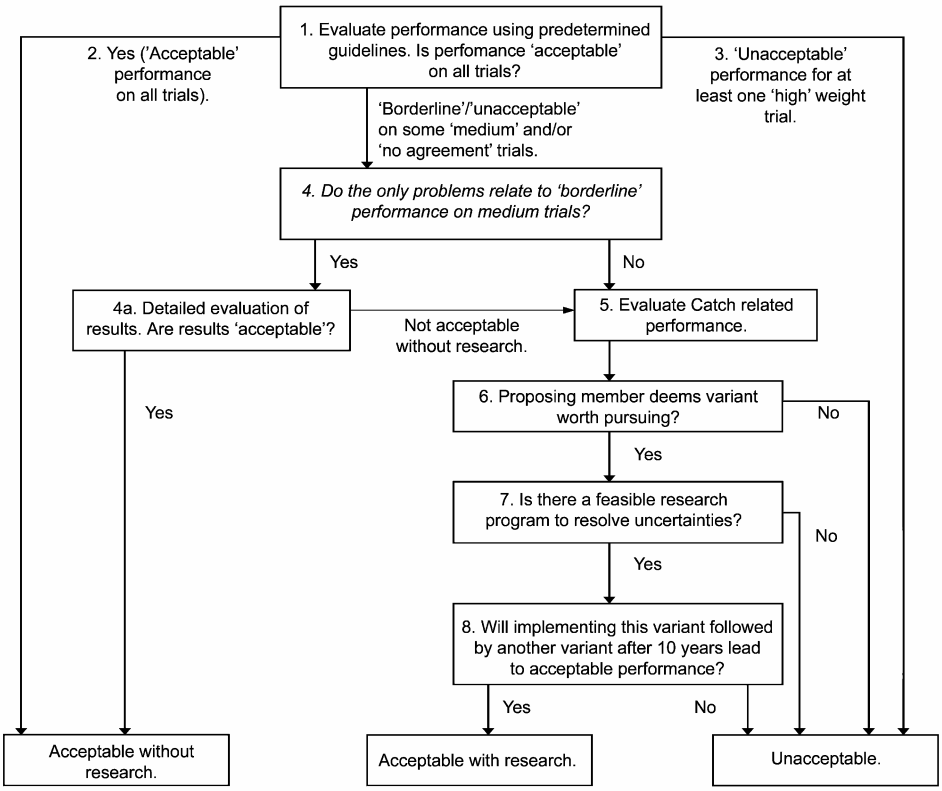

Fig. 1. See text for details.

(1) First intersessional workshop: develop an appropriate *Implementation Simulation Trials* (*IST*s) structure and specify the associated conditioning so that it can be carried out before the following Annual Meeting.
(2) First Annual Meeting: review the results of conditioning and finalise the *IST*s.
(3) Second intersessional workshop: review the results of the final trials and develop recommendations for consideration by the full Committee on:
    (i) management areas;
    (ii) RMP variants (e.g. Catch-cascading, Catch-capping);
    (iii) associated operational constraints (e.g. temporal restrictions);
    (iv) suggestions for future research (either within or outside whaling operations) to narrow the range of plausible hypotheses/eliminate some hypotheses; and
    (v) 'less conservative' variant(s) with their associated required research programmes and associated duration.
(4) Second Annual Meeting: review the results of the Second Intersessional Workshop (including any additional trials) and agree recommendations for implementation.

The Committee **agreed** that the 'simple model filter' developed by Punt (2003) should be developed further (see Item 20) and could be used to focus discussions on the development of *Implementation Simulation Trials* and to calculate initial estimates for mixing rates among putative stocks. It could be used to evaluate the qualitative consequences of different stock structure hypotheses and provide approximate values for stock-specific pre-exploitation population sizes.

The Committee **recommended** the adoption of the complete guidelines given in Annex D, Appendix 2 and summarised in Fig. 2.

5.4 Spatio-temporal considerations in the RMP

At last year's meeting, it was noted that whaling on migrating populations, as would be the case for western North Pacific minke whales, could cause potential difficulties in defining *Small Areas*. At that time three options had been developed, one requiring changes to the annotations to the RMP specifications, but they could not be fully discussed due to a lack of time. A possible annotation to the RMP specifications was drafted (Annex D, Appendix 8) which will be discussed and finalised at next year's meeting.

5.5 Updated guidelines for surveys

SC/56/RMP4 provided suggestions for updating the Committee's Requirements and Guidelines for Conducting Surveys and Analysing Data within the RMP, last published in IWC (1997b).

No modifications were proposed to the Requirements section except to incorporate a new sub-section 2.3.1 on Nomination of Scientists to Participate in Surveys. The text of that sub-section does not appear in the previously published Requirements and Guidelines as they had subsequently been agreed by the Committee.

The Guidelines section had received a major update in light of recent methodological and practical developments, as detailed in Annex D, item 5.5.

The Committee **agreed** to adopt the revised Requirements and Guidelines (Annex D, Appendix 3).

Fig. 2. Recommended schedule for an *Implementation* and subsequent *Implementation Reviews*.

(1) x+ Annual Meetings		(2) First Intersessional Workshop		(3) First Annual Meeting		(4) Second Intersessional Workshop		(5) Second Annual Meeting
'Pre-implementation assessment'	→	Trial structure development	→	Conditioning and final trial structure	→	Review results of final trials	→	Committee recommendations
The *pre-implementation assessment* will take place during one or more Annual Meetings and will focus on the following issues: (1) the establishment of plausible stock hypotheses consistent with the data (taken *inter alia* from an agreed list of archetypes) that are inclusive enough that it is deemed unlikely that the collection of new data during the *Implementation* process would suggest a major novel hypothesis (e.g. a different number of stocks) not already specified in the basic trial structure; (2) examination of available abundance estimates; and (3) information on the geographical and temporal nature of 'likely' whaling operations - taking into account the complexity of the situation with regard to spatio-temporal issues. On the basis of this assessment, the Committee will make a recommendation as to whether or not to formally begin the *Implementation* process.		The primary objective is to develop an appropriate *Implementation Simulation Trials* structure and to specify the associated conditioning so that it can be carried out before the First Annual Meeting. Workshop discussions will include: (1) A final review of the plausible hypotheses taking into account the probable management implications to avoid unnecessary work; (2) An examination of more detailed information on expected operations; (3) The determination of the small geographical areas that will be used in specifying the stock structure hypotheses and operational pattern; (4) The development of (options for) potential Small Areas and management variants; (5) The specification of the data and methods for conditioning the trials; (6) Further consideration of experimental ways to distinguish amongst competing stock hypotheses. It is important to note that after this stage: (1) there shall be no changes to the agreed trials structure that implements the agreed plausible hypotheses; (2) no new data will be considered.		The primary objective is to review the results of conditioning and to finalise the *IST*s. This review may include new analyses of data but not new data. The Trials may be changed but not the overall structure. Final *IST*s based on: (1) final consideration of plausibility, including weighting trials in terms of the overall balance of the *IST*s; (2) discussion of what data/research may reduce number of hypotheses; (3) updates to standard data sets (i.e. abundance, catches, bycatches) for use in final trials; (4) specification of operational features and management variants: (5) specification and classification of final trials: (6) develop timetable for remaining work		The primary objective is to review the results of the final trials and develop recommendations for consideration by the full Committee on: (1) management areas; (2) RMP variants (e.g. Catch-cascading, Catch-capping); (3) associated operational constraints (e.g. temporal restrictions); (4) research needs (either within or outside operations) to narrow range of plausible hypotheses; (5) use of 'a less conservative' variant with appropriate research and associated time period.		The primary objective is to review the results of the Second Intersessional Workshop (including any additional trials) and agree recommendations for *Implementation*. If this includes a recommendation for a 'less conservative' option, integral to this will be an agreed research programme guided and approved by the Committee. A progress report on this programme must be submitted annually to the Scientific Committee.

(9) Annual Meeting		(8) Intersessional Workshop		(7) Annual Meeting		(6) Intervening period
	←		←		←	Data collection: see box 5
Carry out *Implementation Review*. Make recommendations to Commission.		Determine new trials to account for new information (depending on complexity, this may resemble either stage (2) or stage (3)).		Examine new information and determine if this is inside/outside tested parameter space and/or if it has narrowed hypotheses. If yes, need new trials and at least one workshop. If no, straight to *Implementation Review* at Annual Meeting (9).		RMP annotation 9 specifies that an *Implementation Review* should normally be scheduled no later than 5 years since completion of the previous *Implementation (Review)*, but earlier if important new evidence on stock identity, major changes to abundance estimation methodology, etc.

One member welcomed the revised guidelines but believed that in the interests of transparency, they should incorporate additional guidelines for the nomination of independent scientists to assess the adequacy of survey conduct, irrespective of the proposers. It was suggested that the issue be discussed more fully next year.

In response, it was noted that what amounts to inspection of survey conduct does not need to be incorporated in the guidelines; provisions are adequate for cases where the Committee believes the proposers have insufficient experience. It was noted that the Committee had discussed this matter extensively in the past and neither then, nor in the light of experience to date has it been felt necessary to include such requirements.

5.6 Other

On behalf of the Norwegian Government, Walløe formally notified the Committee that Norway intends to develop and propose a change to the *CLA* of the RMP for minke whales in the North Atlantic. This notification is in accordance with the guidelines for such a process given in IWC (1993, p.97). The scientific reasons for the proposal, and comments by some Committee members, are given in Annex D (item 5.6).

5.7 Work plan

The work plan agreed by the sub-committee is given in Annex D (item 5.7). The Committee's deliberations on its work plan are given under Item 19.

6. RMP – PREPARATIONS FOR IMPLEMENTATION

6.1 Western North Pacific Bryde's whales

Last year, the Committee recalled that it had agreed that for a variety of reasons (largely related to new genetic information and questions over the historic catch series) that 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). Given the considerable work already undertaken in developing *Implementation Simulation Trials* in previous years it had agreed that it should be possible to move faster towards *Implementation* than envisaged in the process developed in 2002 (IWC, 2003d, p.11, table 2)[4], which had been developed for new situations.

6.1.1 Report of the intersessional group

The report of the intersessional group established at last year's meeting to identify data and analysis needs is given in Annex D, Appendix 4. The Committee thanked the intersessional group for its work, noted the summary of available data produced, and **agreed** that the summary would form a 'living document' to be updated as additional data become available. The final data summary will form part of the documentation of the *pre-implementation assessment*. The Committee **endorsed** the nine recommendations detailed in Annex D, item 6.1.1.

The Committee noted that the previous trials did not explicitly consider the effects of harvesting of whales on both feeding and breeding grounds, and recognised that the decision not to do this would need to be re-evaluated during the specification of *IST*s.

6.1.2 New information

Three documents related to stock structure were presented: SC/56/PFI5 examining stock structure for the ordinary (or offshore) form Bryde's whales from the western North Pacific, the Hawaiian Islands and off the Baja California Peninsula using mitochondrial DNA control region sequencing analysis; SC/56/PFI4 describing the results of mitochondrial DNA control region sequencing and microsatellite analyses of Bryde's whales samples obtained from different localities in the western North Pacific; and SC/56/PFI3 reporting the results of three clustering analyses of North Pacific Bryde's whale data.

Based on those papers, the Committee **agreed** that:

(1) the limited genetic data from the Hawaiian Islands do not suggest the occurrence of a small-form Bryde's whale in those waters;
(2) there is no direct evidence to support the existence of more than one stock in sub-area 1; and
(3) there are too few samples in sub-area 2 to allow firm conclusions to be drawn on the basis of genetic data regarding stock structure there.

It noted that the possibility that there may be a different stock in sub-area 2 had been considered in the *IST*s specified in 1999 primarily because of the lack of genetics data for that sub-area (and hence a lack of power of genetics methods to assess stock-structure), and that this has not effectively changed. One member noted that there was no evidence from either operational or sightings data to suggest different stocks in sub-areas 1 and 2.

Abundance estimates of the western North Pacific stock of Bryde's whales using new sightings data obtained from summer surveys during 1998-2002 for use in the RMP/*IST*s were provided in SC/56/PFI6. The surveys followed the Guidelines for Conducting Surveys within the RMS. The population size was estimated to be 26,172 (CV=0.2401), not significantly different from the estimate based on data for 1988-96. The Committee noted the importance of quantifying the extent of additional variance for these surveys. This could be substantial owing, for example, to the surveys having taken place over several years and using several vessels. It **agreed** a number of analytical improvements that should be undertaken as detailed in Annex D.

One of the tasks of a *pre-implementation assessment* is to establish a baseline catch history and identify alternative catch histories if the catch history is uncertain. This is discussed further in Annex D. The Committee **agreed** to formally request these data for use in the *pre-implementation assessment* using its data availability rules (IWC, 2004a, p.57).

6.1.3 Pre-implementation assessment

The Committee commended the Japanese and US scientists for the considerable amount of work accomplished during the intersessional period and **agreed** that substantial progress had been made towards completion of the *pre-implementation assessment*. It expressed its regret, however, that due to lack of time it was unable to complete

[4] The clarification of the work to be conducted during a *pre-implementation assessment* and the expected outcomes from this process agreed this year are detailed in Annex D, Appendix 2, Section 1.

the *pre-implementation assessment* during this meeting as it had hoped to do.

Given this, the Committee discussed how best to proceed to try to ensure that the *Implementation* itself will take no longer that two years (see Item 5.3). It **agreed** that the best way was to ensure that all the issues requiring attention in the *pre-implementation assessment* are resolved before the next Annual Meeting so that a recommendation to initiate the *Implementation* can be made then. It **strongly recommended** that an intersessional workshop should take place (see Item 21). Such workshops have been a key feature of the development of both the RMP and the AWMP. An annotated draft agenda specifying the necessary work and issues to be addressed is given in Annex D, Appendix 5.

The Committee welcomed the invitation from Japan to host the workshop. It noted that the existing Data Availability Agreement would continue during the coming year (see Item 22.2). An intersessional Steering Group (Convenor: Kawahara; see Annex U) was established to facilitate the workshop.

The Committee looked forward to receiving, at next year's meeting, a strong recommendation from the proposed workshop that the *pre-implementation assessment* is complete.

6.2 Review of information on North Atlantic fin whales

6.2.1 Report of the intersessional group

The Committee **endorsed** the recommendations of the intersessional group established to determine whether there was sufficient information to warrant the initiation of a *pre-implementation assessment* for North Atlantic fin whales (see Annex D, Appendix 6) and **recommended** to the Commission that the Committee initiate the *pre-implementation assessment*.

The Committee noted that an *Implementation* is for a species in a *Region*, and that in this case the *Region* is the entire North Atlantic. If the *Implementation* is to focus on one part of the *Region* (e.g. the waters near Iceland) the remainder of the *Region* should be designated as a *Residual Area* in terms of the RMP.

6.2.2 New information

Three papers were reviewed in this context (SC/56/SD6, SC/56/PFI2 and SC/56/PFI1). Details are provided in Annex D, item 6.2.2. The Committee welcomed these papers noting that they will be of considerable value to the *pre-implementation assessment.*

6.2.3 Planning for the pre-implementation assessment

The Committee **endorsed** the proposal of a small group established to identify topics requiring attention before the next Annual Meeting so that the *pre-implementation assessment* can progress as fast as possible (see Annex D, Appendix 7).

It noted that the NAMMCO Scientific Committee is assessing North Atlantic fin whales as part of its long-term research activities. It **agreed** that aspects of the *pre-implementation assessment* of North Atlantic fin whales would benefit from coordination between the Committee and the NAMMCO Scientific Committee. Allison reported that she and Dorete Bloch were collaborating on assembling a catch history for fin whales in the northeast North Atlantic (Faroes, northern Norway, UK).

6.3 Western North Pacific minke whales

Last year, the Committee finally completed its work on this *Implementation*. However, the Committee noted that it had not defined the specific abundance estimates, past catches and past and future anthropogenic removals needed to apply the RMP to the western North Pacific stock of minke whales and **agreed** that this issue should be taken up should the Commission request that the *CLA* be applied to that stock.

6.4 Work plan

The work plan agreed by the sub-committee is given in Annex D (item 6.3). The Committee's deliberations on its work plan are given under Item 19.

The Committee noted that limited resources (both in personnel and time) meant that it was not feasible for the Committee to start two *Implementations* in the same year. As a result, it will not be possible to complete the *pre-implementation assessment* for North Atlantic fin whales at next year's meeting even if all the data/analyses are available, hence the focus on one key aspect of the necessary work.

The Committee **agreed** that highest priority should be given to being in a position to commence the *Implementation* for western North Pacific Bryde's whales by the end of the 2005 Annual 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 agreed to initiate collaboration with FAO to investigate fishery data that may allow better estimates of large whale bycatch (IWC, 2004a, p.14). FAO is the holder of at least three potentially useful datasets for IWC purposes: the Global Fishing Fleet database, the Global Discard Study database, and the Inventory of Fisheries project, particularly the latter. The Inventory of Fisheries is currently only partially complete, although it is well advanced for several areas. FAO staff have indicated their willingness to collaborate in an attempt to use the Inventory to determine how easily some measure of fishing activity or effort by gear category can be extracted from the database, while also determining how easily the Inventory might be populated with existing information on cetacean bycatch. To formalise this arrangement, a letter of agreement would need to be exchanged between organisations. In the longer term, an appropriate formal mechanism for collaboration might be through the recently established Fishery Resources Monitoring System (FIRMS). The principal objective of FIRMS is to establish a framework between partners involved in fisheries management to enable reporting in an objective way on fisheries status and trends, and to develop, share and maintain services for the collation, management and dissemination of information through the partnership. Existing partners include regional fishery bodies and FAO. It was noted that the IWC already shares some information with FAO through the Working Party on Fishery Statistics, although these are chiefly confined to statistics on whale catches. The Committee **recommended** that the

Secretariat investigate the practicalities and implications of the IWC joining the FIRMS partnership.

The Committee also **recommended** that Northridge continues to work with FAO on the Committee's behalf. In particular he will:

(1) explore how the Inventory of Fisheries might best be used in developing methods to estimate whale bycatch;
(2) explore how information on cetacean bycatch held by the IWC might best be represented in the Inventory; and
(3) determine whether FAO has access to statistics on Taiwanese fisheries[5].

The Committee has previously noted that the level of gear information provided when reporting bycatch in Progress Reports is often poor. The Committee **agreed** that it would be appropriate to adopt internationally recognised standard descriptions that have been put forward by FAO (Annex J, Appendix 3) in reporting whale bycatches and entanglements, although more detailed typographies should also be encouraged in addition to these standard categories. It was noted in discussion that the FAO codes do not include reference to shark exclusion nets, and the Committee **agreed** that in view of the importance of these nets with respect to bycatch, that this additional category should be included. This information will be appended to the guidelines for national progress reports.

7.1.2 Other

SC/56/BC8 presented estimates of large whale bycatch in US fisheries, and used these to extrapolate to an estimate of around 1,800 large whales bycaught in fisheries globally per year. Despite the necessary oversimplification of the approach, the Committee **agreed** that, with nearly 300 whales of all species reported as entanglements or captures in fishing gear in Progress Reports to the Committee for 2003 (see Annex J, table 1), a global estimate of 1,800 does not seem improbably high. The Committee **agreed** that while the approach is useful in drawing attention to the possible scale of incidental catches of whales in fishing gear, it cannot be considered reliable. Potential improvements to the approach are given in Annex J (item 5.2).

The Committee **agreed** that while scarring rates might provide some idea of encounter rates with fishing gear, it is necessary to correlate these directly with bycatch rates before scarring rates alone can be used as indicators of bycatch rates. Such an approach will need to await more detailed data availability from other areas and fisheries, but such studies should be encouraged.

Northridge and Thomas (2003) described methods used to address monitoring requirements in UK and, more generally, EU fisheries. The approach taken was to determine in advance what level of bycatch is considered a conservation threat (a take limit), and then to calculate how much sampling would be needed for managers to be sure that bycatch rates really were lower than the take limit. This approach could be adapted for whale catches in some fisheries. The Committee acknowledged that this was a promising avenue for further research and **recommended** that this work is extended, if possible by applying it quickly to any suitable available data (see Annex J, item 5.3).

SC/56/BC2 presented information on an initiative to categorise and describe the major cetacean bycatch issues around the world. The emphasis will be on situations of critical conservation concern, where the application of appropriate resources would result in rapid resolution, situations where bycatch is believed to pose a threat to cetaceans but where a quantitative assessment is needed to verify the risk, and fisheries in which a currently available solution (technical, social or economic) appears feasible. The Committee **endorsed** this approach but **requested** the Commission to **urge** IWC members to take the lead in establishing whale bycatch monitoring programmes, particularly for pelagic fisheries, thus leading by example.

SC/56/BC7 addressed right and humpback whale entanglements in fishing gears in the USA. It was concluded that any type and part of fixed gear is capable of entangling a whale, and that any body part can be involved.

SC/56/BC10 and SC/56/IA7 reported on sperm whale strandings and entanglements in the Mediterranean. One or more peaks in strandings were associated with time periods coinciding with high driftnet fishing activity. The Committee **agreed** that bycatch mortalities of sperm whales in the late 1980s and early 1990s were a cause for concern and, given that strandings and sightings of sperm whales have declined since that period, recognised that there is a possibility that these bycatches could have had an adverse affect at the population level. There have also been reports that driftnetting continues both illegally (though at reduced levels) and legally in the Mediterranean (e.g. Tudella *et al.*, 2004) and this highlights the problem of trying to estimate bycatch where Illegal, Unregulated or Unreported (IUU) fisheries exist. The Committee recalled its previous advice with regards to IUU fisheries and their relevance to bycatch assessment (e.g. IWC, 2004a, p.35) and took note of Recommendation 2.2 on pelagic gillnets in the ACCOBAMS area (from the second meeting of the ACCOBAMS Scientific Committee – see Item 4.1.3). The Committee **endorsed** the call made therein for better data collection and reporting in this region as a matter of some urgency.

The Committee also noted that at present, national progress reports generally provide no information on the nature or level of on-board monitoring. This makes it difficult to determine whether an absence of whale bycatch records reflects lack of information or some degree of assessment. To address this issue, and the information reported for strandings and ship strikes, the Committee **recommended** that the recommendations given in Annex J, Appendix 4 be incorporated into the template for national progress reports.

The Committee reviewed information available through the national Progress Reports (see Annex Q). Of the 232 records of whales entangled in fishing gear, 214 were minke whales, mostly from trap nets in Korea and Japan. A further 15 whales were recorded in Progress Reports as ship struck. Numbers of large whales reported taken in Japanese trap net fisheries had increased dramatically

[5] There are known to be substantial numbers of cetaceans taken in Taiwanese coastal and far seas fisheries, with at least two recent records of humpback whale entanglements in coastal trap nets, and the occasional occurrence of baleen whale meat in markets.

(roughly four-fold) after the introduction of domestic legislation to allow bycaught whales to be taken to market. The reasons for this increase remain unclear, but seem likely to be linked to the change in legislation. A North Pacific right whale had been taken in a Japanese trap net and, contrary to previous information (IWC, 2002h, p.366), it was noted that domestic Japanese legislation only prevents bowhead whales, blue whales and finless porpoises from being killed and the products sold. One member commented that it was regrettable that right and gray whales are not included under this legislation, given their severely endangered status in the western North Pacific.

Two North Pacific right whales with extensive scarring from fishing gear were seen off Sakhalin in August of 2003 (SC/56/BRG41). In view of the possible parallels with right whale entanglement elsewhere the Committee **recommended** that a long-term photo-identification programme is undertaken to document the occurrence of human induced scars, mainly from fishing gear, on right whales in the Okhotsk Sea. This can best be achieved under the joint Japanese-Russian sightings survey programme in the Okhotsk Sea. The Committee also **recommended** that a release programme for right and gray whales entangled or entrapped alive in fishing gear in the entire northwest Pacific region should be established (see Item 10.5.5).

The Committee noted the proposal (SC/56/SM22) for a series of regional workshops to address cetacean bycatch issues discussed in Annex L and under Item 21(b)(4). In particular, it noted the value of this approach for large whales in the context of its discussions under Item 7 and it **endorsed** the proposal.

7.2 Estimation of bycatch based on genetic data

7.2.1 Report of Bycatch Workshop Feasibility Steering Group

The rationale behind and proposal for a workshop on the use of market sampling to estimate bycatch (Annex J, Appendix 5) was discussed. Nakatsuka reiterated Japan's position that it has serious doubt about the utility of market sample data for stock management and that the participation from Japan will be limited. Kim stated that Korea has an efficient and improving bycatch reporting system and that the Korean government is doubtful whether market sampling is an efficient method of bycatch estimation. It was noted that the background to the workshop proposal was that the Committee has been unable thus far to reach agreement over the utility or otherwise of market based approaches to estimating bycatch levels in an RMP context (see Item 7.2.2 below). It is for this reason that the objectives of the workshop are:

(1) to review available methods that have been used to provide estimates of large cetacean bycatches via market samples, including a consideration of their associated confidence intervals in the context of the RMP;
(2) to provide advice as to whether market-sampling-based methods can be used to reliably estimate bycatch for use in addressing the Commissions objectives regarding total removals over time and, if so, the requirements for such methods.

It was also noted that the workshop will be interested in the question of markets only insofar as determining whether or not such data can be used to provide reliable estimates of bycatch.

The Committee **strongly recommended** that the methodological workshop takes place as described in the proposal (see Item 21 and Annex U).

7.2.2 Data from market surveys

SC/56/BC3 reported on species and stock identification of whale and dolphin products available on the commercial markets of Japan and Korea in 2003 and 2004 based on phylogenetic analysis. A total of 82 products from Japanese markets included six species of baleen whale: humpback, fin, Bryde's, sei, North Pacific common minke and Antarctic minke whales. In Korea, a total of 56 products included 45 North Pacific minke whales. The paper, including aspects related to sei whale stock structure and the level of certainty to which whales could be assigned to ocean basins is discussed in detail in Annex J (item 6.2). As a result of that discussion it was agreed that issues surrounding enforcement are beyond the remit of the Committee.

SC/56/BC4 provided a summary of genetic information from North Pacific minke whale products purchased on commercial markets in Korea and Japan.

There was considerable discussion of this in the sub-committee, particularly with respect to interpretation of the results in terms of inferences on stock structure and sex ratios in catches, bycatches and the total population(s). This is detailed in Annex J (item 6.2).

SC/56/NPM1 presented information on the genetic diversity of bycaught minke whales in Korean waters. This is discussed in detail in Annex J (item 6.2) where suggestions for alternative analyses were made.

7.2.3 Analytical tests for assignment to stocks and/or areas

SC/56/SD1 considered detection of contemporary population structure when gene-flow is high from the distribution of close-kin. Results demonstrated that by focussing the analysis on close relatives, molecular genetic approaches were capable of detecting structure at time scales relevant to conservation and management, even in high-gene flow populations. In this latter situation, traditional population genetic approaches were shown not to detect any structure. Hence focussing the genetic analysis on close relatives provided improved statistical power.

7.2.4 Use of capture-recapture methods for estimating bycatches from market data

SC/56/BC11 conducted an analysis of recaptures of individual minke whales sampled on Korean markets. A model was developed which enables the simultaneous estimation of the supply of new whales to the market and the average residence time. The supply estimates were greater than the officially reported bycatch for this period but not significantly so. The estimates of supply are considered to be negatively biased because all identified sources of potential bias for the estimate using only between-survey recaptures involved negative bias. It was concluded that the method can be used to provide an approximate estimate of bycatch and that it may be

especially useful in cases where records of bycatch are in doubt or lacking.

The Committee welcomed the paper that addressed a request made for this type of analysis in 2003. It was noted that the results suggested that bycatch reporting is fairly accurate and Kim stated that he did not believe that market surveys would give improved figures. This paper is relevant to discussions under Item 7.2.1.

7.3 Estimation of cetacean mortality from ship strikes

SC/56/BC6 described simulation modelling of collisions between whales and vessels to assess the potential for vessels to take avoiding action in response to sightings of whales. Results showed that even under optimum sighting conditions with an alert observer and a fast response time, there is a very limited scope for large ships to avoid whales. For such vessels, model based predictions of interactions between vessels and whales are unlikely to be sensitive to assumptions about vessel response.

The Committee welcomed this paper that had addressed a request made in 2002 (IWC, 2003d, p.18). It was also noted that there were additional reasons which would result in lower estimates of successful avoidance of whales by vessels. It was suggested that the model should also be applied to fast ferries and hydrofoils. A review of worldwide collisions between cetaceans and fast ferries was presented in SC/56/BC9. Of 24 collisions reported with ferries, 11 were with fast ferries travelling at speeds greater than 30 knots and six were with slower ferries. These records are likely to be a notable under-representation of the actual number of collisions that took place. The Committee noted that more detailed information is needed from all areas where whales occur on high speed ferry routes including encouragement of collision reporting and detailed necropsies of beach-cast or floating carcasses. It **encouraged** the collection and provision of such data as this would help illuminate the actual risk to whales from rapidly expanding ferry traffic.

7.4 Estimation of cetacean mortality from other human activities

The Committee noted that one of the multiple stranding events reviewed by the Standing Working Group on environmental concerns was associated with concurrent naval activities involved two minke whales. The Committee **agreed** that considerations of possible mortalities due to acoustic sources should be closely co-ordinated with the work of the Standing Working Group on environmental concerns.

7.5 Work plan

The work plan agreed by the sub-committee on estimation of bycatch and other human induced mortality is given as Annex J (item 9). The Committee's overall work plan is discussed under Item 19.

8. ABORIGINAL SUBSISTENCE WHALING MANAGEMENT PROCEDURE AND STOCK ASSESSMENT (ANNEX E)

This Item continues to be discussed as a result of Resolution 1994-4 of the Commission (IWC, 1995). 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, are largely 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. The primary topics for discussion at this year's meeting were the selection of a *Strike Limit Algorithm* (*SLA*) for the eastern North Pacific gray whale and further consideration of the Greenlandic fisheries. Last year, the Committee had informed the Commission that it expected to be able to make a recommendation for an *SLA* for the eastern North Pacific gray whales at the 2004 Annual Meeting (IWC, 2004a, p.17).

8.1 Review intersessional progress

The primary objective for the first part of the intersessional Workshop (SC/56/Rep1, hereafter 'last workshop') held in March 2004, was to finalise the *Evaluation* and *Robustness trials* for the eastern North Pacific stock of gray whales and agree a timetable for the work needed to arrive at a recommended gray whale *SLA*. The primary focus of the second part of the Workshop was to review progress with the Greenland Research Programme and in particular to begin to work on development of an *SLA* for the Greenlandic fisheries. The Workshop made good progress with both these objectives as discussed under Items 8.2 and 8.3.

8.2 Eastern North Pacific gray whale – selection of *SLA*

8.2.1 Description of potential procedures

Six candidate *SLA*s were tested, the D-M (2 variants), J-B (2 variants) and two GUP[6] variants based on the other 4 variants. Each of the procedures had a 'high' and a 'low' tuned variant. The two GUP variants corresponded to combinations of the 'low' and 'high' variants. The procedures are described in detail in Annex E (Appendix 4) thus only a brief summary is given here.

8.2.1.1 THE D-M PROCEDURE

This is essentially the same procedure as used for the *Bowhead SLA*. It is described in detail in SC/56/AWMP5. It is based on the concept of Adaptive Kalman Filtering (AKF): a combination of state estimation by Kalman filters (a method widely used in engineering for estimating the state of a dynamical system with noise in the dynamics (process noise) and observation noise) and Bayesian methodology. It is thus based on well-established methodologies and has a sound theoretical basis; the stock estimates are obtained by the filters in a well understood way. It is also transparent in the sense that the conditional estimates of the state and their associated probabilities are always available, as is the cumulative distribution function for the strike limit. The catch control law is of a general form which has been used in the past by the IWC.

8.2.1.2 THE J-B PROCEDURE

This is described in detail in SC/56/AWMP6. It fits a simple population model to survey data to estimate the

[6] D-M= The Dereksdóttir-Magnusson procedure, J-B= The Johnston-Butterworth procedure, GUP='Grand Unified Procedure'.

intrinsic rate of growth (r) and the carrying capacity (K). Given limited data, the time series of these estimates tends to be very variable. To enhance their stability, a penalised maximum-likelihood approach is adopted, where the penalty is the equivalent of a Gaussian prior for r, whose two parameters are tuneable control parameters of the procedure. Further stability is provided by bounding the parameter K above at 50,000. The population model commences in 1930 with population size αK, where α is another tuneable parameter of the *SLA*. The contribution of earlier survey data in the fitting process is downweighted to make the performance of the algorithm more sensitive to recent data trends. The (fitted) population model projects the resource abundance forward 20 years under catches set equal to need. If either an abundance above *MSYL* or an increase in abundance of at least 20% occurs, catch is set equal to need. If not, catch is reduced below need to the extent necessary for at least one criterion to be attained. In the interests of stability, a further constraint is added to the *SLA* that the strike limit may not drop by more than 15% from one 5-year block quota period to the next.

8.2.1.3 THE 'GRAND UNIFIED PROCEDURE'

The *Bowhead SLA* adopted by the Committee involved combining the results from two different *SLA*s. The advantages of such an approach are given in IWC (2003f, p.158). The strike limits for the gray whale GUP reviewed by the SWG were calculated by finding the arithmetic average of the strike limits from the J-B and a slightly modified version of the D-M *SLA* and then applying the snap-to-need[7] feature to the resulting average.

8.2.2 Review results

The complete set of results for the *Evaluation*[8]*, Robustness*[9] *and Cross-validation*[10] *Trials* (for details see Annex E, Appendix 3) are available from the Secretariat. A selected set of the most informative tables and plots in terms of the relative performance of the *SLA*s can be found as Appendices 5-7 of Annex E. A summary of the factors tested in the gray whale trials is given as Table 2.

As discussed a number of times by the Committee, while the Commission has not provided an explicit risk-need satisfaction trade-off for aboriginal whaling, it has provided the Committee with sufficient overall objectives for aboriginal subsistence whaling to guide its review of candidate *SLA*s (IWC, 1995; IWC, 2002b, p.20) as was the case for the *Bowhead SLA*. These are repeated below.

The objectives of any potential regime shall continue to be those accepted by the Commission at the 34th Annual Meeting, which are to:

(a) ensure that the risks of extinction to individual stocks are not seriously increased by subsistence whaling;
(b) enable aboriginal people to harvest whales in perpetuity at levels appropriate to their cultural and nutritional requirements, subject to the other objectives; and
(c) maintain the status of stocks at or above the level giving the highest net recruitment and to ensure that stocks below that level are moved towards it, so far as the environment permits.

Highest priority shall be accorded to the objective of ensuring that the risk of extinction to individual stocks is not seriously increased by subsistence whaling.

Further discussion on the process and principles used to review the trial results is given in Annex E and was taken into account when the SWG reviewed the results. In the light of this discussion, it was **agreed** to follow the same review process that led to the recommendation of the *Bowhead SLA* and that was accepted by the Commission. The review is guided by the objectives of the Commission given above.

The overall performance of candidate *SLA*s was judged by a combination of an examination of the detailed conservation and need satisfaction statistics for each of the *Evaluation Trials* and *Robustness Trials* and human integration of these results in the context of the relative plausibility each member assigns to the individual trials.

The first stage of the SWG review process was for the results to be examined to remove any *SLAs* that performed poorly in terms of resource conservation for some of the trials; on this basis two variants were excluded. The results of the *Evaluation Trials* for the remaining *SLA*s were then reviewed (see Annex E for a detailed discussion of the results).

The Committee recalled its previous discussions with respect to the development and selection of *SLA*s. It reiterated its views that:

(1) once an *SLA* was developed that fulfilled the objectives set by the Commission, further effort should not be spent in refining it still further;
(2) selection of *SLA*s should be based on the results of trials that were within plausible parameter space; and
(3) *Implementation Reviews*[11] are of integral importance to the process.

All four of the *SLA*s examined in detail performed adequately. As was the case for the *Bowhead SLA*, performance was relatively poor for the scenario in which natural mortality doubled over the 100-year period. Although this scenario is not considered to be very plausible, the Committee **agreed** that the monitoring of survival rates should be examined during *Implementation Reviews*. It also **agreed** that the sex-ratio of the catch (assumed to be around 50:50 for future catches) should continue to be monitored and considered at *Implementation Reviews*.

The Committee agreed with the SWG that the results showed that the best performance was for J-B2 and GUP2 (comprising J-B2 and D-M2), and that these were equally good. Under these circumstances, the SWG had examined other features that may be used to separate the two *SLA*s. The Committee recalled the discussions about the value or otherwise of the 'unified' (averaging) approach when recommending the *Bowhead SLA* (IWC, 2003c, p.493).

[7] 'Snap-to-need' involves increasing the strike limit to equal need if the value obtained after arithmetic averaging exceeds 95% of need.
[8] Trials used for formal comparisons of candidate *SLA*s.
[9] Trials to examine *SLA* performance for a full range of plausible scenarios.
[10] Case-specific trials to be held aside from *SLA* development so that resulting *SLAs* can be subjected to a subsequent independent test.
[11] These are scheduled every five years although unscheduled *Reviews* can occur to allow swift reaction if new information gives cause for concern. They will normally contain at least two elements: (1) a review of information required for the *SLA*; and (2) a review of biological and other information to ascertain if the present situation is within tested parameter space. Details can be found in IWC (2003d, p.25).

Table 2
Factors tested in gray whale trials.

Factors	Other levels (Reference levels shown bold and underlined)
$MSYR_{1+}$	1.5%, **3.5%**, 5.5%
$MSYL_{1+}$	U[0.4,0.8], **0.6**, 0.8, 0.9
Density dependent component	**1+** or mature
Population dynamics model	**Standard density dependent** (starting in 1930) Inertia model (starting in 1600)
Time dependence in *K**	**Constant**, Halve linearly over 100yr Double linearly over 100yr Sinusoidal from a base value in year 0 increasing to a maximum of 150% in year 40 Tent *K: K* doubles linearly from years -50 to 0 and halves from years 0 to 50
Time dependence in resilience*	**Constant,** Halve linearly over 100yr Double linearly over 100yr Step *MSYR* 2½%→1%→2½% every 33 yrs Step *MSYR* 2½%→1%→2½% every 33 yrs, in sync with halving/doubling *M* Tent *A: A* doubles linearly from years -50 to 0 and halves from years 0 to 50
Adult survival rate	**Estimated**, 0.95
Time dependence in natural mortality, *M**	**Constant,** Halve linearly over 100yr Double linearly over 100yr
Episodic events*	**None**, 3 events occur between yrs 1-75 (with at least 2 in yrs 1-50) in which 20% of the animals die, 1 event occurs in 1999/2000 in which 40% die
Time lag in density dependence	**None**; 20yr time lag in density dependence
Need in final year (linear change from 150 in 2003)	150, **340**, 530
Survey frequency	5yr, **10 yr**, 15 yr
Strategic surveys	**No**, Yes
Historic survey bias i) constant	0.5, **1.0**, 1.5
ii) time dependence	**None,** Increasing between 1967 to 2002 from 0.5→1
Future survey bias i) constant	**1.0**
ii) time dependence	**None,** Increasing between 2003-2103 from 0.5→1 Increasing between 2003-28 from 1→1.5 and constant thereafter Decreasing between 2003-28 from 1→0.5 and constant thereafter Decreasing between 2003-2103 from 1.5→1 Increasing between 2003-28 from 1→1.5 and then decreasing to 1 in 2103
Survey CV	**BaseCase,** ½ CV_{est} , CV_{true}=0.1 + base case value
Historic catch bias	0.5 (years 1940-70), 0.5 (pre 1943 aboriginal catch), 0.5 (1846-99 commercial catch) **1.0**, 1.5 (1846-99 commercial catch)
Historic catch sex ratio 1600-1964	**Best information**, 50:50
Sex ratio at start of model (m:f)	**50:50**, 70:30
Integrated	**NA**, priors for *MSYR* and *MSYL*
Historic abundance estimates used in conditioning	**All**, ignore low estimates

*Effects of these factors (except for the tent model) begin in year 2003 (i.e. at start of management).

The decision at that time was that the advantages of the GUP approach outweighed the disadvantages. In particular, it was noted that the GUP approach includes a built-in check and balance system in that if one of the component *SLA*s behaves poorly for a particular scenario, this effect may be balanced by the other *SLA* and *vice versa*. This had been accepted by the Commission. In selecting between J-B2 and GUP2 therefore, the Committee followed the philosophical approach established for the *Bowhead SLA* and it **agreed** that GUP2 was preferable.

The Committee then examined the *Cross Validation* trials (Annex E, table 5) to see whether the GUP2 *SLA* performed anomalously and **agreed** that it did not.

The Committee noted that it might be possible to 'polish' the GUP2 *SLA* and its two constituent *SLA*s further. However, the Committee, noting that the GUP2 *SLA* fully met the Commission's management objectives, **agreed** that it should not expend resources unnecessarily in further attempting to achieve some hypothetical level of 'perfection'. It **strongly believes** that these resources should be dedicated to addressing the serious issue of the Greenland fisheries for fin and minke whales, for which the Committee has never been able to provide management advice (see Item 8.5).

8.2.3 Conclusion and recommendations

The Committee **strongly recommended** that the GUP2 *SLA* (hereafter the '*Gray whale SLA*') be forwarded to the Commission. It believes that this *SLA* meets the objectives of the Commission set out in 1994 (IWC, 1995) and represents the best scientific advice that the Committee can offer the Commission with respect to the management of the Eastern North Pacific stock of gray whales.

The Committee thanked Eva Dereksdóttir, Kjartan Magnússon, Sue Johnston and Doug Butterworth for the enormous amount of work and thought they put into the development process. It also specifically thanked Cherry Allison and André Punt for the tremendous support they provided. The Chair of the SWG noted that this was the second *SLA* that had been developed by the SWG. He thanked the SWG as a whole for the atmosphere of co-operation that has always been present, even when there are genuine scientific differences of opinion at the various stages of the development process. He believed that a continuation of this mode of working will be essential if the SWG is to address successfully the most difficult case it has faced, that of the Greenland fisheries. The Committee thanked the SWG and its chair for the consistently high standard of its work and for completing its development of a second *SLA*.

8.2.4 Comparison with the RMP

The Committee recalled that early in the development process some members of the Commission had indicated an interest in a comparison of the AWMP and the RMP. That request predated the decision of the Commission to accept case-specific *SLA*s as part of an AWS. The SWG noted previously (2003f p.158) that a strict comparison of the gray whale *SLA* with the *CLA* is not possible for a number of reasons, particularly with respect to: (1) the different objectives of each, notably the difference between management aimed at producing the highest continuing yield and management aimed at satisfying a limited need requirement in perpetuity; and (2) the case-specific nature of the two *SLA*s recommended to date to the Commission (for bowhead and gray whales) which were designed for 'data rich' situations as opposed to the *CLA*, which had to cope with a variety of situations.

The results of the comparison revealed, not unexpectedly (e.g. see IWC, 2003f, p.158-9), that the *CLA* whilst performing adequately on the risk-related statistics performed poorly in satisfying need. Results are given in Annex E.

8.2.5 Presentation of results to the Commission

The Committee **agreed** that the SWG Chair should present the results of its deliberations to the Aboriginal Whaling Sub-Committee of the Commission in a similar way to that used when he presented the *Bowhead SLA* in 2002 (IWC, 2003d).

8.2.6 Scientific aspects of the Aboriginal subsistence whaling scheme

At the 2002 meeting, the SWG developed scientific aspects of an aboriginal whaling management scheme that would be used in conjunction with the *Bowhead SLA* (IWC, 2002c, pp.161-166). These proposals were agreed by the Scientific Committee and reported to the Aboriginal Whaling Sub-Committee of the Commission (IWC, 2003b). The Committee again **recommended** these to the Commission, noting that they form an integral part of the long-term use of *SLA*s.

8.3 Greenlandic Research Programme

The urgent need for a Greenland Research Programme had been first identified in 1998. This is primarily due to the lack of recent abundance estimates and the poor knowledge of stock structure (IWC, 2004d, p.191). 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 grave concern at its inability to provide management advice for these fisheries (e.g. IWC, 2004d, p. 191).

8.3.1 Stock structure, range and movement

The Committee discussed the nature and value of the available genetic information for the Greenlandic fin and minke whales, facilitated by a review document (SC/56/AWMP4). Discussions within the SWG focussed on how best to further the genetic work to provide information of benefit to the development of potential *SLA*s. The Committee **agreed** to a two-step process in which the possible initiation of a large-scale study on migration rates is dependent upon the results of suitable power analyses. Palsbøll (funding permitting, see Item 21), with the assistance of an intersessional Steering Group (see Annex U), will undertake simulation studies to *inter alia* determine whether a satisfactory percentage of correctly assigned individuals to the different areas can be obtained for realistic numbers of loci and sample sizes, given the F_{ST} values estimated among whales from different areas in the North Atlantic. The financial implications of this are discussed under Item 21.

The Committee has previously strongly recommended that genetic samples be taken for all of the catch. However, the numbers for 2003 (SC/56/Rep1) were very low (12 minke whale and 1 fin whale), even though it is mandatory to return a sample from each whale that is caught. The Committee echoes the SWG's disappointment at the lack of progress in obtaining genetic samples, although it noted new procedures were in place. It repeated its **strong recommendation** that samples for genetic analysis be collected from the catch as a matter of very high priority. It **urged** the Commission to encourage the Government of Denmark and the Greenland Home Rule authorities to assist with logistical and, if necessary, financial support. It also **encouraged** Greenlandic scientists to investigate other potential sources of samples (e.g. freezers, stores and other storage areas) as detailed in Annex E.

Given the importance of samples from eastern USA and Canada (e.g. SC/56/Rep1), the Committee welcomed the news that some 50 such samples are available in Palsbøll's laboratory and the Committee **urged** that these be appropriately analysed for comparison with other samples from the western North Atlantic.

8.3.2 Abundance and trends

Last year, the Committee had strongly recommended that a traditional aerial cue-counting survey be carried out in summer 2003 in Greenland if logistically and financially possible. This had not taken place but some experimental work had been carried out in 2003 as discussed in Annex E (item 3.1.2). A full aerial photographic (not cue-counting) survey is planned for 2004 (SC/56/AWMP1). There had been considerable discussion of both the practical and analytical aspects of the planned survey at both the last Workshop (SC/56/Rep1) and in Annex E (item 3.1.2). The Committee noted the great need for new abundance estimates and, in order to facilitate presentation of

appropriate analyses as quickly as possible, established an intersessional correspondence group (Annex U) to review the proposed analytical methods and to provide assistance to Witting as appropriate.

8.3.3 Biological data

The catch data for 2003 were: 6 landed fin whales (2 male and 4 female), with 3 struck and lost; 178 landed West Greenland common minke whales (58 male, 117 female, 3 unknown sex) and 7 struck and lost; and 13 landed East Greenland common minke whales (1 male, 11 female, and 1 unknown sex). The Committee **recommended** that the detailed catch data be submitted to the IWC Secretariat. Kingsley agreed to provide an analysis of recent catch data at the next meeting.

8.4 Consider progress on development of potential *SLA*(s) for Greenland fisheries

The SWG considered three papers relevant to this item (SC/56/AWMP2, 3 and 7). Full details can be found in Annex E (item 3.2.1). Although the results are very preliminary, the Committee welcomed the progress that they represented in providing a framework for future work and discussions. It was suggested that the differences between the relatively 'easy' data-rich cases of the bowhead and gray whales from a conservation perspective, and the data-poor Greenlandic cases, may also warrant a different approach to the examination of the trade-off between risk and need satisfaction.

The Committee **agreed** to develop such a statistic to add to the list of those it normally considers. These issues should be considered in depth at the next meeting.

The SWG had also considered how best to proceed with the development of one or more *SLA*s for Greenlandic aboriginal whaling, given the continuing uncertainties about stock structure, abundance, and mixing in the region. One approach would be to postpone *SLA* development until more and better data become available. The SWG rejected this approach, instead believing that *SLA* development was a matter of considerable urgency. The SWG intended to develop the best *SLA*(s) it could given the data available, and noting the potential of the simulation approach to help identify appropriate data collection programmes, it recognised that it might become necessary to improve the *SLA(s*) at future *Implementation Reviews* when more information is available. The Committee **endorsed** this approach.

8.5 Review of catch data and management advice for minke and fin whales off Greenland

As it has stated on many occasions, the Committee has never been able to provide satisfactory management advice for either the fin or minke whales off 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, 1999).

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 was only 1,096 (95% CI=520-2,100). The estimate for West Greenland minke whales dates from 1993 and is 8,371 (95% CI=2,400-16,900).

The Committee **stressed** that obtaining adequate information for management must be seen as of very high priority by both the national authorities and the Commission. It **urged** the Commission to encourage the Government of Denmark and the Greenland Home Rule authorities to provide the necessary logistical and financial support. Without such adequate 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.

The Committee **recommended** that every effort be made to ensure that the number of samples collected from the catch in 2004 will be considerably higher than in 2003 and close to 100%. It also **strongly recommended** that these and all existing samples held in Greenland be analysed as soon as possible in accordance with guidance to be given by the intersessional Working Group established under Item 8.3.1.

The Committee drew attention to the grace-period provision[12] that it had agreed (Item 8.2.5) previously (IWC, 2002c, pp.154-225) in the context of a general aboriginal whaling scheme (although it has not yet been accepted by the Commission) associated with agreed *SLA*s. Under such a provision, catch limits would begin to be phased out 10-14 years after an abundance estimate was last obtained (IWC, 2003f, p.164) and catches would revert to zero at the end of the five-year period during which the catch limit would have been half the previous block. The Committee has not previously suggested that such a grace-period should have started for fin whales. However, it draws attention to the fact that if it had, such a period would now be nearing completion.

It is with **great concern** that the Committee **advises** the Commission that in the absence of an agreed abundance estimate for fin whales arising out of the 2004 survey, it will **likely recommend immediately** that the take of fin whales off West Greenland be reduced or eliminated. If, as hoped, an abundance estimate is obtained (through the process outlined under Item 8.3.2), the Committee will review this next year in its formulation of management advice.

8.6 Review of catch data and management advice for humpback whales off St Vincent and The Grenadines

In recent years, the Committee has examined the stock structure of humpback whales in the North Atlantic. The Committee reiterates its previous statements that it is most plausible that the animals harvested in the vicinity of St Vincent and The Grenadines are part of the West Indies

[12] Abundance estimates shall normally be available within a 10-year period. If a new block strike limit is to be set but there has been no new abundance estimate within a 10-year period, then the new five-year block strike limit set by the *SLA* shall be 0.5 times the total strike limit for the previous block. The maximum strike limit in any one year in the grace period shall be the same as the maximum annual strike limit in the previous block. If a survey is successfully conducted during the grace period, the *SLA* is applied and a quota generated - the quota is then applied retroactively to the current block and the 'used' strikes subtracted from the resultant block limit.

breeding population (*ca* 10,750 in 1992). However, further data to confirm this are desirable and it repeats previous recommendations that every effort be made to obtain photographs and genetic samples from animals harvested for subsistence purposes by aboriginal hunters from St Vincent and The Grenadines. The Committee was disappointed not to receive information on whether or not any catches had been taken last year. There were no scientists from St Vincent and The Grenadines present at the meeting and no national progress report had been submitted. However, Pastene noted that the genetic analyses of at least three samples from caught animals is being conducted in collaboration with Palsbøll. The Committee was also pleased to hear that sightings cruises are taking place in the region and looked forward to receiving a report in the future (see Item 4.9).

The Commission has 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.

8.7 Work plan

The work plan agreed by the SWG on the AWMP is given in Annex E (item 9). The Committee's deliberations on this are given under Item 19.

9. ABORIGINAL SUBSISTENCE WHALING STOCK ASSESSMENTS ON BOWHEAD, RIGHT AND GRAY WHALES (ANNEX F)

9.1 In-depth assessment of the Bering-Chukchi-Beaufort (BCB) Seas stock of bowhead whales

The primary sources of data available for the in-depth assessment were visual surveys, acoustic surveys, aerial transect surveys, photo-identification, aerial photo-grammetry and direct examination/sampling of landed animals. The vast majority of these data were obtained at Barrow. Data archives were provided as part of the data availability agreement adopted during the 2003 meeting of the Scientific Committee (IWC, 2004a, pp.56-57).

9.1.1 Abundance estimates

SC/56/BRG1 presented revised abundance estimates for 1978-2001, as well as a detailed review of the models and methods used to produce these estimates. Last year, the Scientific Committee agreed to use the 2001 N_4/P_4 abundance estimate of George *et al.* (2003) for the 2004 bowhead assessment. The N_4/P_4 estimate is based on the number of whales estimated to have passed within a 4km visual range of the observation 'perch' (N_4) and the estimated proportion of the whales that passed within this range based on aerial transect or acoustic data (P_4). Although the 2001 estimate was not expected to change prior to the assessment, revision was necessary to correct for several small errors that were discovered when the data archives were assembled for the Scientific Committee. New estimated detection probabilities, N_4 and P_4 values and standard errors, were computed using the corrected data. Estimates and their CVs and correlations were then recalculated using the methods of Cooke (1996) and Punt and Butterworth (1999). The resulting 2001 abundance estimate (George *et al.*, 2004) was 10,545 (CV=0.128)[13], close to the 2001 N_4/P_4 abundance estimate of 10,470 (CV=0.129). In addition to a recent abundance estimate, George *et al.* (2004) calculated a 3.4% annual rate of increase (95% CI=1.7%-5%) between 1978 and 2001.

9.1.2 Stock structure

The Committee discussed several papers that found evidence of temporal and/or spatial heterogeneity among genetic samples from BCB bowhead whales. As a first step in interpretation, the Committee considered the issue of genetic data quality (i.e. technical problems with collection and/or preparation of the genetic data), and the extent to which this might bias the results. Discussion then moved on to biological and hunt information important to interpretation, and to various hypotheses that might explain the apparent heterogeneities.

9.1.2.1 DATA QUALITY

To study the genetic structure of populations, animal tissue samples first have to be turned into sets of numbers on a computer. This is a complicated process, and many things can go wrong even when laboratory practice is as good as possible. Genetic data, and especially genetic data from nuclear DNA markers, are therefore not always as 'clean' as is sometimes thought. It is important to be aware of the possible problems associated with particular data-sets, of how they might be diagnosed (and of when diagnosis is difficult), and of how the problems might affect inferences about population structure. Details are given in Annex F.

SC/56/BRG18 described the procedures used to develop the data-sets used for bowhead whale studies at this meeting. The data-sets comprise new measurements of 12 microsatellite loci (i.e. markers) from 207 BCB bowhead whales, and include a re-analysis of the samples examined by Rooney *et al.* (1999). The Rooney *et al.* (1999) study was not designed specifically to study population structure, and a different set of loci proved to be necessary for this purpose. The authors of SC/56/BRG18 encountered considerable variability in DNA quality and quantity, and this was reflected in the number of loci successfully scored per individual, ranging from 1 to all 12.

In SC/56/BRG36, the microsatellite data were screened for signals that would be unrelated to population structure. The paper identified a technical problem with locus TV18: a strong correlation between heterozygote deficiency (i.e. excess homozygosity) and allele length, indicating short allele dominance in the amplification and scoring process. The Committee **agreed** that locus TV18 should therefore be excluded from further consideration. SC/56/BRG36 also checked for another common marker-specific problem, namely stutter band masking where smeared signals from alleles of similar size mistakenly led to scoring as homozygotes. No evidence was found for any marker. Concerns were also raised about the reliability of another locus, TV7. Unlike TV18, TV7 showed no evidence of short allele dominance. However, as noted in SC/56/BRG18 this was the only marker developed in genetic studies on *Tursiops*. Sometimes a primer derived from another species can work well, but sometimes there

[13] Following Buckland (1992): 10,545, (95%CI=8,200-13,500).

are problems of 'ascertainment bias' in analyses of amplification products in the target species.

The Committee noted evidence suggesting that data associated with TV7 might not be reliable due to technical problems. Nevertheless, since it is not yet possible to prove that the patterns exhibited by TV7 are due to technical problems, and since there will always be some trade-off between assuring data quality and obtaining a reasonable sample size of loci, the sensible course of action at the moment is to conduct analyses both with and without TV7. Unfortunately, this was not possible for some of the analyses discussed below, because of the lack of time since the discovery of the possible problems with TV7 locus.

Finally, the Committee noted that mtDNA data are of a completely different character to nuclear DNA data. This is not a reason to look only at the mtDNA data since, as discussed at length in previous Scientific Committee reports, mtDNA and nuclear DNA have quite different advantages and disadvantages for studying population structure. However, from a data quality perspective, mtDNA is certainly much less susceptible to technical problems, because mtDNA quantities are higher and because mtDNA sequencing involves fewer judgement calls than the length scoring required for microsatellites.

9.1.2.2 BIOLOGY AND HUNT INFORMATION RELEVANT TO STUDIES OF POPULATION STRUCTURE

SC/56/BRG29 showed strong age structure in the bowhead spring and autumn migrations. In spring, the first whales are almost all juveniles. There are a few adults (who may guide the migration) but the proportion is very low. As the migration continues, the relative proportions of juveniles and adults gradually reverse, and by the end of migration virtually no juveniles are passing through. Calves generally do not appear until the last part of migration, in late May. Depending on the village, there can be strong preferences for whales of certain sizes. It is important to be aware that samples from hunters are not necessarily representative of the animals nearby in terms of age, size or sex distribution. For this reason, the distribution of age, size and sex associated with biological samples from harvested animals are largely determined by hunt selectivity, and that this could severely bias results; in Barrow, for example, there is a strong preference for smaller whales.

9.1.2.3 GENETIC EVIDENCE CONCERNING HETEROGENEITY

SC/56/BRG32 reported a genetic analysis based on mtDNA control region sequences and microsatellites from samples of bowhead whale collected from different villages engaged in aboriginal whaling. The main objective was to evaluate the single BCB stock hypothesis adopted for management by the Scientific Committee. Significant mtDNA heterogeneity was found when comparing spring migrants to autumn migrants at Barrow. Furthermore, significant deviations from Hardy-Weinberg equilibrium at Barrow were observed for spring migrants, for autumn migrants, and for all samples combined.

SC/56/BRG36 looked at possible temporal trends in genetic composition during the migration seasons. Genetic similarity is significantly less among individuals caught in the same village and season about 5 to 11 days apart, than among those caught less than 5 or more than 11 days apart. This trend is highly significant for microsatellite data (p-value <0.001), and is also apparent, but far from significant, for mtDNA sequence data. Genetic similarity among whales caught at different times is significantly correlated with their dissimilarity in sex. During this meeting, the analysis was repeated separately by season. The same pattern emerges in both seasons, but is significant only in autumn.

Spatial sampling coverage of BCB bowhead whales is poor, with the great majority of samples coming from Barrow. Nevertheless, SC/56/BRG17 reported a number of comparisons of genetic distance and genetic frequency difference between villages/areas and seasons. Despite the small sample sizes and the possible data quality concerns, there seems to be a persistent significant difference between samples from Barrow and St Lawrence Island.

In its general discussion of the genetic papers, the Committee **agreed** that there was significant evidence of genetic heterogeneity in both space and time. However, the limited data and the confounding effects of age make interpretation far from straightforward, and some hypotheses are described in the following sections.

9.1.2.4 SPECIFIC HYPOTHESES

TEMPORALLY SEPARATED SUB-POPULATIONS

SC/56/BRG36 suggested one possible explanation for the significant dip in genetic similarity in pairs of whales caught 5-11 days apart: two genetically distinct sub-populations with sex-segregated migration passed Barrow. Whales of one sex from sub-population A would migrate before whales of the same sex from sub-population B, then followed by whales of the other sex, first from A and then from B.

In discussion, it was pointed out that this hypothesis, at least in its simplest form, would be difficult to reconcile with the biological data showing differences in migration timing depending on body length (established independently of the hunt, based on aerial photos). In particular, calves are only seen late in the migration. The authors suggested that different body sizes in the two suggested sub-populations might be able to explain the size patterns. This hypothesis needs to be developed in more detail before its plausibility can be fully evaluated.

GENERATIONAL GENE SHIFT

SC/56/BRG14 introduced the alternative hypothesis of generational gene shift. Following the severe depletion of bowhead whales by commercial hunting, there may have been a period of a few decades with few reproductive adults. The small size of this reproductive cohort, possibly coupled with substantial skew in reproductive success among individuals, may have resulted in a substantial shift in the genetic frequencies of their offspring. This mechanism would result in genetic frequency differences between different age groups. No overall loss of genetic diversity would be expected because whales that were immature at the end of commercial whaling would join the gene pool after a decade or two. SC/56/BRG17 and SC/56/BRG29 also presented some arguments and data analyses which supported the generational gene shift hypothesis. In discussion, while it was agreed that any age-related effects should be accounted for in the analysis, the difficulties of ageing bowheads, and the possible blurring

of age categories resulting from using length as a proxy, were highlighted. There was some discussion of whether a major generational gene shift would be compatible with the lack of evidence for a bottleneck. A simulation study was suggested to establish whether generational gene shift really is capable of generating heterogeneities of the magnitude observed. Preliminary studies have suggested that conclusions will be sensitive to assumptions about the initial numbers of reproductively-active females and males following severe depletion of the population. The Committee **agreed** that further work is needed to examine the plausibility of the generational gene shift hypothesis.

SPATIAL SUB-POPULATIONS

Any spatial population structure in BCB bowhead whales needs to be considered in the context of the known seasonal movement patterns. The predominance of Barrow animals in the hunt, and therefore in existing data, makes spatial comparisons difficult in any case. The differences between St Lawrence Island samples and Barrow samples (SC/56/BRG17) are interesting, but interpretation is confounded by differences in age distribution and the possibility of age-related gene frequency effects.

During discussion, it was suggested that there might be spatial structuring on the wintering grounds, and/or during the breeding season in March, and that this might explain the observed temporal and spatial heterogeneity. The Committee noted that no data are currently available to investigate this hypothesis further.

9.1.2.5 OTHER GENETIC ANALYSES

SC/56/BRG18 used the new data-sets to re-examine the evidence for a genetic bottleneck having occurred in BCB bowhead whales, a notion rejected by Rooney *et al.* (1999). Given that the maintenance of genetic variability is a key issue in the conservation and management of natural populations, and considering the interest in this population due to its assessment by the Committee and the subsistence harvest of bowhead whales by Alaskan Natives, the authors considered a re-examination of this issue to be timely. No significant evidence of bottleneck was found for the mainland groups, in accordance with Rooney *et al.* (1999).

9.1.2.6 FUTURE RESEARCH TO STUDY POPULATION STRUCTURE

Several papers contained discussions of research that would provide important information for examining population structure in BCB bowhead whales. The Committee **agreed** that further work on genetics and migratory movements of individuals is particularly important. Details are given in Annex F.

The Committee recognised that it is important to collect data in additional areas and time periods, and to obtain age estimates from sampled whales. Information on movements of individuals can be obtained from at least two sources: photographs and satellite tagging. An extensive photo-ID catalogue of BCB bowhead whales exists spanning many years. Most identified whales were photographed in spring near Point Barrow or in summer in the Beaufort Sea. Aerial photographic surveys in locations such as St Lawrence Island and Chukotka could provide photographs for comparison with those in the existing catalogue to determine whether whales from the latter locations had also been seen in the Beaufort Sea.

Satellite tags can also provide information on the movements of individuals, and can potentially provide more detailed movement data on BCB bowhead whales than is likely to be available from aerial photo-ID surveys.

More detailed discussions of certain specific issues relevant to future genetic studies are given in Annex F. Several of these issues related to the improvement of laboratory and analysis methods. The Committee **agreed** that it would be better to model genetic identity taking account of both age and days apart in migration, in order to investigate whether there were genetic differences in whales during the migration. To increase genetic samples from areas other than Barrow, it will be necessary to sample as many landed whales as possible and to collect biopsy samples from other whales. It was noted that biopsied whales will not have additional data from which to estimate the age of the whale. This is important for examining the generational gene shift hypothesis. Therefore, development of a method for placing biopsy sampled whales into age categories would be very valuable.

US scientists informed the Committee that a new research programme to investigate population structure of BCB bowhead whales has been initiated, pending funding. Russian scientists also support the proposed programme. Major areas of research in this plan include:

(1) additional genetic sampling and analysis, including the development of new markers and the collection of additional tissue samples from throughout the range of BCB bowhead whales, especially off Chukotka in Russia and near St Lawrence Island in the Bering Sea;
(2) aerial photographic surveys, particularly near St Lawrence Island in spring and off Chukotka in summer;
(3) investigation of spatial and temporal patterns in migration and occurrence through the recording of bowhead calls with moored autonomous acoustic recorder packages (three recorders were deployed in October 2003 in the western Beaufort Sea);
(4) application of satellite tags to bowhead whales in Barrow in spring and autumn, at St Lawrence Island, and potentially in Chukotka in summer; and
(5) isotopic analysis of baleen from whales caught at St Lawrence Island to investigate their migratory destination.

Other areas of research identified in the plan include a re-analysis of historical catch data for seasonal distribution patterns, especially in the Bering Sea early in the history of the fishery, and a study of traditional knowledge of Eskimo and Chukchi whale hunters focusing on the distribution, relative abundance, and movements of bowhead whales. A research planning workshop will be conducted in autumn 2004.

9.1.2.7 CONCLUSIONS

The Committee **agreed** that substantial progress has been made in investigating possible stock or population structure among BCB bowhead whales. The Committee's data availability agreement (IWC, 2004a, pp. 56-57) has facilitated simultaneous analyses by Norwegian, American and Japanese scientists. The Committee **agreed** that there is insufficient information at this stage to fully support or

fully refute the hypothesis of a single stock. Nevertheless, the following conclusions can be drawn.

(1) The analyses reported here demonstrate that there is spatial and temporal genetic heterogeneity among BCB bowhead whales, but do not necessarily imply the presence of sub-populations with limited interbreeding. Of course, the analyses could be refined given more time. In addition, more data would improve the precision of the analyses, and their ability to test specific hypotheses. It is possible that more and better data might cause the qualitative conclusion of spatial heterogeneity to disappear, but this seems less likely with the temporal heterogeneity.
(2) Three broad hypotheses have been suggested that might explain the heterogeneity:

    (i) temporally-separated stocks;
    (ii) generational gene shift; and/or
    (iii) spatial subpopulation structure.

    These are not mutually exclusive, nor are they necessarily the only hypotheses that could explain the heterogeneity. Given the limited data and time for analysis so far, the Committee **agreed** that it is premature to reject any of the hypotheses, or even to draw conclusions about their relative plausibility. Further investigations should be made, based on existing data (both genetic and biological), on new simulation studies and on new data whose collection is being planned. In the course of this work, each hypothesis will need to be specified in more detail, so that its plausibility can be checked.
(3) The Committee **recommended**, as a priority, that the causes of the spatial and temporal genetic heterogeneity be studied further; specific areas for research are listed above. It was recognised that the important basic research needed to develop an understanding of population structure (if any) in BCB bowhead whales will take several years. Once a set of explicit and plausible hypotheses has been developed, the implications for management will be explored by the Scientific Committee through an AWMP *Implementation Review*, the outcome of which will have implications for subsequent research priorities.

9.1.3 Other biological information relevant for assessment

9.1.3.1 AGE, LENGTH AND REPRODUCTION

SC/56/BRG2 presented a new approach to estimating the length-frequency distribution on the basis of aerial survey images. SC/56/BRG6 described an update of George *et al.* (1999), which had presented age estimates for 42 bowhead whales based on aspartic acid racemisation (AAR) in their eye lens nuclei. The AAR aging technique is the only presently available ageing technique that can be used for all ages and both sexes of bowhead whales. The results, along with the recovery of 'traditional' whale hunting tools from five recently harvested whales, suggest that life spans in excess of 100 years are possible.

SC/56/BRG8 presented estimates of ovulation rates, length at sexual maturity and corpora albicans (CA) accumulations to estimate the age of bowhead whales. Data for 40 mature females (in which both ovaries were examined) were used in the analysis. Using logistic regression, length at maturity was estimated to be 13.41m for females. Estimates of age for the 40 mature females were computed by simply multiplying the individual CA counts by the ovulation interval and adding the age at sexual maturity. Corpora age estimates are quite consistent with the aspartic acid racemisation (AAR) ages. There is lack of evidence of reproductive senescence in this population.

In SC/56/BRG3, $\delta^{13}C$ data from baleen plates taken from 113 bowhead whales were compiled to estimate age in young whales. These age estimates were used with age estimates based on AAR (SC/56/BRG6) and counts of corpora albicantia in mature females (SC/56/BRG8) to fit separate von Bertalanffy growth equations for male and female bowheads based on body length and baleen length. Average maximum body length for males was estimated to be 15.0m and for females 17.7m. Based on the von Bertalanffy equations, it was estimated that males reach sexual maturity around 17-27 years and females 17-29 years.

SC/56/BRG10 presented pregnancy rate estimates using data from postmortem examinations of landed whales. Following methods described in SC/56/BRG8, logistic regression was used to estimate the length at maturity for landed whales and the probability that a whale, of a given length, was mature. The resulting pregnancy rate estimate was 0.333/yr, which was higher than estimates presented in past years using all data. The estimated pregnancy rate suggested a mean inter-birth interval (IBI) of 3.0 years.

9.1.3.2 DISTRIBUTION AND BEHAVIOR

Several papers (BRG 21, 24, 25 and 27) presented new data on patterns of movement and behavior of BCB bowhead whales. Both the spring and autumn migrations are demographically inhomogeneous with strong temporal patterns in the movement of cow-calf pairs and whales of different ages. Details can be found in Annex F.

9.1.4 Assessment using population dynamic models

SC/56/BRG20 provided an updated assessment of the BCB stock of bowhead whales; they had last been fully assessed by the Committee in 1998 (IWC, 1999, pp.33-35).

As part of the last BCB bowhead assessment, Punt and Butterworth (1999) recommended that the preferred assessment method should include two types of assessments. Both were included in SC/56/BRG20: (1) modelling the entire population trajectory from 1848 (using the 'backwards' method); and (2) modelling only the recent trajectory (where the population is projected forwards from 1978, which is not assumed to be carrying capacity).

New data that have become available since 1998 were incorporated into the assessments. This includes a new estimate of abundance for 2001 of 10,545 (CV=0.128), and a re-calculation of estimates of the proportion calves and mature individuals in the population from aerial photographs.

The results from the 'backwards' model indicated the population declined dramatically in the 1800s and gradually increased throughout the 1900s. The model was able to provide a relatively good fit to the data. The maximum population growth rate, R_{max}, is estimated to be 0.042, and *MSYR* (0+) was estimated to be 0.033. The posterior median for K was 11,120 (90% credibility interval 9,121-15,390). The population was estimated to have a high probability of being above *MSYL*, and was

estimated to be close to K. For populations close to K, Q_1 (Wade and Givens, 1997) is the appropriate catch related quantity to examine rather than replacement yield. The estimate of Q_1 had a posterior median of 243 (90% credibility interval 137-324). This lower bound for Q_1 was higher than the corresponding estimate obtained from the assessment in 1998.

In conclusion, both analyses indicate the population has approximately doubled in size since 1978, and the 'backwards' analyses suggest the population may be approaching carrying capacity, although there is no sign yet that the population growth rate has slowed. The population trend data, stage-proportion data and life-history data are broadly consistent with one another. Both assessment models give similar estimates for Q_1, so these estimates are robust to assumptions about the historic catch record and whether K has changed since 1848.

SC/56/BRG4 provided results of assessments of the BCB bowhead stock using variants of the Baleen II model fitted using a Bayesian estimation framework. The analyses focus on the sensitivity of the results to the choice of the data-set used when fitting the model. Previous assessments of the BCB bowhead stock have ignored the information on length-at-age, the length-frequency and age-composition of the harvests and the detailed length-frequency information from photogrammetry studies. The modelling framework used to assess BCB bowhead whales was therefore extended to make use of these data. The results of the assessment are not outside the range of hypotheses considered during the development of the *Bowhead SLA*.

The Committee noted that SC/56/BRG4 and SC/56/BRG20 gave very similar results.

Reference was made to the discussion about stock structure under Item 9.1.2, and it was asked whether use of the *SLA*, or indeed the above 'traditional' assessment methods, is still appropriate for assessment. The Committee **agreed** that the *SLA* is still appropriate at least in the short-term (see Item 9.1.6). The Committee **agreed** that the parameters most relevant for giving management advice are well within the range for which the *SLA* is tested.

Although the schedule requires no new block quota to be calculated this year, the Committee agreed to run the *Bowhead SLA* to assess the continued suitability of the current strike limit. The catch statistics held by the Secretariat (see Item 3.3.1), the abundance estimates for 1978, 1979, 1981, 1982, 1983, 1985, 1986, 1987, 1988, 1993, 2001 as agreed under Item 9.1.1 and the value of the need of 67 x 5, i.e. the current block quota (2003-2007), were used as input. The Committee noted that the result of the *SLA* calculations shows that this level of need can be satisfied while fully meeting the Commission's management objective.

9.1.5 Catch information

SC/56/BRG11 reported catch information for the 2003 Alaskan subsistence harvest. A total of 41 bowhead whales were struck resulting in 35 animals landed. The efficiency (the ratio of the number landed to the number struck) of the hunt was 85%, which is higher than the average efficiency over the past 10 years (77%). Of the 35 landed whales, 17 were males, 17 were females and the sex was not determined for one whale. Of the 17 females, 5 were presumably mature (>13.4 m in length). Three of these large females were closely examined; two had recently given birth and the other was not pregnant.

SC/56/BRG12 presented a summary of the Alaskan subsistence harvest of bowhead whales from 1974-2003. Hunters from 11 villages harvested a total of 832 whales, mostly taken during migration. Barrow landed the most whales (418) while Little Diomede and Shaktoolik each only landed one. The number of whales landed at each village varies greatly from year to year, as success is greatly influenced by ice and weather conditions. The efficiency of the hunt has increased since the implementation of the bowhead quota in 1978.

SC/56/BRG49 reported that 3 bowhead whales were taken as part of the Russian subsistence harvest in 2003 (two in the Chukchi Sea, and one in Sinyavina Strait).

9.1.6 Management advice

The Committee noted that the *Bowhead SLA*, previously agreed by the Scientific Committee to be the best available tool for provision of management advice for the bowhead aboriginal hunt (Crawford, 1981, p.22), was developed and tested under a single-stock hypothesis. An integral part of the AWMP process is the *Implementation Review*.

An *Implementation Review* is 'A major review of information carried out before calculation of a new block of quotas or in response to significant new information in the middle of a block if it is thought it might result in a significant change to a catch limit' (IWC, 2002d). Further:

> As in the RMP, the concept of an *Implementation Review* is central to the functioning of the AWMP. …*Implementation Reviews* will normally contain at least the following elements: (1) a review of information required for the *SLA* (i.e. catch data, abundance estimates); and (2) a review of information (e.g. biological and genetic data) to ascertain if the present situation is as expected and within tested parameter space (thus the review may result in the need to determine new trials). …[T]he SWG has also seen early *Implementation Reviews* as a safety feature if new information arrives that causes concern. It is recognized that calling such a review does not necessarily mean revising the Committee's advice to the Commission, although it may do so. (IWC, 2003f, pp. 164-5)

The discussions of uncertainty under Item 9.1.2 make it clear that stock structure issues must form a major component of the forthcoming *Implementation Review,* with planning for such a review being added to the AWMP agenda next year. This *Implementation Review* will examine the robustness of the *Bowhead SLA* with respect to plausible stock hypotheses via simulation trials. If shown to be necessary, this may result in changes to the *Bowhead SLA*. Therefore, the Committee **recommended** that an *Implementation Review* focusing on stock structure should begin at the 2006 Annual Meeting, with a view to ensuring that management advice at the 2007 meeting is based on the best science then available. Furthermore, it **recommended** that a report on the progress of the research programme (see Item 9.1.2) be provided each year to the Scientific Committee and it encouraged cooperative research amongst the various interested research groups.

In addition to the assessment result given under Item 9.1.4, the Committee noted:

(1) the continuing increase in the abundance estimates derived from the census under the recent catch limits and record high calf counts;

(2) the spatio-temporal distribution and opportunistic nature of the hunt and the low numbers of whales struck annually in St Lawrence Island and Chukotka; and
(3) the development of an extensive research programme that will address questions of stock structure and allow the formulation of one or more plausible stock structure hypotheses.

Given these factors, the Committee **agreed** that the *Bowhead SLA* remains the most appropriate tool for providing management advice for this harvest, at least in the short-term, and consequently the results from the *Bowhead SLA* (see Item 9.1.4) indicate that no change is needed to the current block quota for 2003-2007.

9.2 Eastern North Pacific gray whales

9.2.1 Catch and stranding information

SC/56/BRG49 presented Eastern North Pacific catch information. A total of 22 Chukotka aboriginal whaling organisations submitted requests for harvesting a total of 167 gray whales. However, according to permit regulations of the Russian Federation Ministry of Natural Resources, only 135 permits for gray whales were distributed among aboriginal whaling organisations and native settlements. As required by the IWC, for each whale, data such as species, sex, length and weight are collected.

A total of 126 gray whales (70 males and 56 females) were taken in 2003. The length of the whales varied from 8.0 to 15.0m. The average weight of gray whales was 14.6 tons. Also, in the 2003 season, two gray whales were struck and lost.

9.2.2 New scientific information

SC/56/BRG43 presented preliminary shore-based survey data for northbound gray whale calves in 2003 and 2004. A total of 269 calves were sighted in 2003 and 456 northbound calves were seen in 2004. It was estimated that 774 and 1,527 calves passed the site in 2003 and 2004, respectively. A simple linear model developed from calf estimates (1994-2000) and an index of seasonal ice distribution in the Arctic between 1993 and 1999, produced calf estimates of 894 for 2003 and 991 for 2004.

Urbán reported on the results of surveys performed in the breeding lagoons of Baja, Mexico. Nineteen days of survey were performed across three breeding lagoons January-April, 2004. A total of 1,105 mothers and calves were sighted, which was 32% higher than the previous highest count in 1997.

9.2.3 Management advice

In 2002, 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 calf production remains at the mid-range of pre-1999 levels (after low levels in 1999, 2000, 2001). The Committee was also pleased to receive the *Gray Whale SLA*, noting that this now represents its best method for providing management advice for this stock.

9.3 Catches by non-member nations

No catches were reported under this Item (see Item 10.5.1.2).

9.4 Work plan

The sub-committee work plan is given in Annex F (item 7). The Committee's deliberations on this issue are given under Item 19.

10. WHALE STOCKS (ANNEX G)

10.1 In-depth assessment of western North Pacific common minke whales, with a focus on J stock

10.1.1 Report from intersessional Steering Group

Last year, an intersessional Steering Group was established under the convenorship of Miyashita to identify data to be included in an in-depth assessment and the status of these data. The work of the group continued during this meeting and a report and summary table of the status of data on catch and effort, bycatch, abundance and stock structure are given in Annex G, Appendix 2.

10.1.2. Preparation for an in-depth assessment

The Committee reviewed the Steering Group's report. It **recommended** the following priority items of work that need to be accomplished prior to an assessment, where numbers 1-3 are the highest immediate priority:

(1) Analysis of sighting survey data to provide estimates of abundance, their variances, and any estimates of $g(0)$.
(2) Analysis of genetic and any other data to inform hypotheses of stock structure[14].
(3) Consider the linkage between points (1) and (2) above and in particular how to deal with the lack of information on the proportion of 'J' stock animals in the Sea of Okhotsk.
(4) Finalise the CPUE data and analysis.
(5) Obtain information on fishing effort for historical extrapolation of bycatch based on current information (see Annex J, Item 9, the work plan for BC, for more information).
(6) Obtain information on catches not already held by the Secretariat.

The Committee established a Steering Group under Pastene (Annex U) to pursue this work during the intersessional period to allow an in-depth assessment next year, with an emphasis on improving the estimate of abundance of the J stock using existing sighting data.

With respect to Committee oversight of the proposed surveys by Korea and Japan (see Annex G, Appendix 2), the Committee recalled its detailed consideration of similar proposals last year (IWC, 2004b, pp.87-88). It noted that the proposers had responded to the recommendations made by incorporating them in surveys conducted last year and in plans for future surveys presented this year. Given the experience of the proposers in conducting surveys using the planned methodology, the Committee **agreed** that Kim

[14] Although it was agreed that this should include analysis of data from the Pacific coast of Japan, there was no disagreement on the relative priority of the analyses of those data and those from the Sea of Japan.

and Sohn should provide oversight for the Korean surveys and that Miyashita should provide oversight for any Japanese surveys.

The Committee also received and endorsed information on data availability and analyses under Procedure B of its data availability agreement. This is given as Annex R.

The Committee expressed concern about the time that might be available at next year's meeting given the clear priority for the IA sub-committee to work towards finalising estimates of abundance for Antarctic minke whales (see Item 19).

10.2 Antarctic minke whales

10.2.1 Review of new data and analyses

The 2002/03 SOWER cruise data had been added to DESS. A new extraction facility to create a 'standard dataset' is being developed and will be completed intersessionally (SC/56/IA2). This 'standard data-set of IDCR/SOWER data' will be analysed by the different analytical methods developed within the Committee (see Annex G and Item 10.2.3.1).

The 2002/03 IWC-SOWER Circumpolar cruise was scheduled to cover the region 170ºE to 170ºW including the Ross Sea in Area V. However, abnormal ice conditions prevented the vessels from surveying in the Ross Sea and so the research area was modified to cover 150ºE to 170ºW. Using the standard IWC analytical methods (Branch and Butterworth, 2001), SC/56/IA1 presented an abundance estimate for this small portion of Area V, correcting for closing mode, of 54,170 whales (95% CI=35,570-82,500). This is discussed further in Annex G.

SC/56/IA13 presented the report of the 2003/04 SOWER circumpolar cruise. This, the 26th in the series, successfully completed the third circumpolar series (CPIII) co-operative. Details are discussed under Annex G, item 3.2. The Committee **welcomed** the news that this major survey has been completed. It expressed its gratitude to the Government of Japan for providing the vessels and support to conduct the cruise. In addition, it thanked the cruise leader of many years standing, Paul Ensor, and the many scientists and crew members who had participated over the years.

Given the apparently unusual spatial distribution and distribution of school sizes found during the 2003/04 cruise, the Committee **recommended** that an analysis of these data should not only include an analysis using the predefined strata, but should also redefine the strata so that the southwestern area of the northern stratum is treated as a separate stratum (see details in Annex G, item 3.2).

In addition, the Committee discussed the protocol for inclusion of all 'undetermined' minke whale sightings, which could include both Antarctic and dwarf minke whales, into the analysis to obtain an abundance estimate of Antarctic minke whales. The Committee **encouraged** the presentation of a combined IDCR/SOWER and JARPA analysis at next year's meeting to address this issue.

10.2.2 Updated estimates by Area

No updated estimates were produced this year since Area V had already been surveyed in 1991/92, although this did not cover the entire latitudinal range. With the 2003/04 survey covering the entire latitudinal range of Area V, including the Ross Sea, updated estimates by Area should be possible when these data are available.

10.2.3 Inter-year comparisons and trend

10.2.3.1 NEW ANALYTICAL METHODS

During the past three years, the Committee has encouraged the development of new analytical approaches suitable for analysing the IDCR-SOWER minke whale data. The status of three new methods (developed by Bravington, Cooke and Okamura) is discussed in Annex G, item 4.3.1.1.

10.2.3.2 RESULTS FROM SIMULATED DATA-SETS

Simulated line-transect sighting survey data-sets have been produced that included four new features (SC/56/IA6). To investigate the robustness of the new analysis methods to the effects of these new features, 16 scenarios (100 replicates of each) were developed where different combinations of the features were present. These simulated data-sets were analysed using the three new methods. The bias was higher than desired for a few scenarios (Annex G, item 4.3.1.2). It is expected that intersessionally the methods will be further developed and the entire set of scenarios will be analysed and presented next year.

10.2.3.3 FUTURE ANALYSES

The Committee **recommended** that, if possible, four additional features be added to the simulated datasets to make them more realistic (Annex G, item 4.3.1.3.1). The Committee **recommended** that for next year, the 'standard analysis' method be used to analyse the simulated data, in addition to the three new methods, and that all four methods be used to analyse the standard data-set for CPII and CPIII.

Ultimately, the following three estimates using IDCR/SOWER data from all three circumpolar surveys should be presented:

(i) stratum estimates for each individual survey;
(ii) estimates for each Management Area for each circumpolar survey using the 'survey-once' method;
(iii) 'best'[15] estimates for each Management Area for each circumpolar survey.

Where possible, analysts should provide abundance estimates, their variances and the appropriate variance-covariance matrix (between Areas and years or CP surveys) for use in the catch-at-age trend study.

An intersessional Working Group (Annex U) was established for further correspondence on these issues.

10.2.3.4 POSSIBLE REASONS FOR TRENDS

In IWC (2002e) and IWC (2003g) hypotheses were suggested that could account for the apparent change in abundance estimates from CPII and CPIII. Recent studies indicate that factors influencing differences between CPII and CPIII may be acting in complex and interrelated ways and that these may differ by areas. The Committee **agreed** that it would not be able to explain differences between CPII and CPIII without adequate consideration of these

[15] The definition of 'best' here is to be determined by the analyser concerned (e.g. use the 'survey-once' or 'combined-survey' method of dealing with gaps or overlaps in effort.

Table 3

Incomplete update of the hypotheses that may explain why the estimates of abundance for CPIII using the 'standard method' are appreciably lower than estimates for CPII.

	Hypotheses	Likely size of effect on the ratio	Sources of information describing the hypothesis and the size of its effect on the ratio between the abundance estimates from CPIII to CPII	Proposed methods to account for effect or to further investigate effect
A.1.	Changes in coverage of Management Areas over years.	Small	SC/56/IA8 and SC/56/IA11	Analyses of existing data, simulation and field experiments can be used to further investigation
A.2.	Changes in the location of the ice-edge and the proportion of animals south of the ice-edge.	Uncertain, potentially large	Shimada *et al.* (2001); SC/56/IA10; SC/56/IA14; SC/56/E23	Analyses of existing data, and field experiments can be used to further investigation
A.3.	Changes in the timing of the survey.	Small	JARPA studies	JARPA and JSV data analyses.
B.2.	Changes in the probability of observing animals on the track line $g(0)$.	Medium to large	Mori *et al.*(2002); Murase *et al.* (2002); Tanaka *et al.* (2002); Butterworth *et al.* (2003); SC/56/IA9	Analyses of existing data, simulation and field experiments can be used to further investigation
C.9.	Decrease in carrying capacity due to increase in competition from other predators (e.g. other whales).	Unknown	SC/56/SH11	Analyses of existing data, simulation and field experiments can be used to further investigation

hypotheses. A partial update to the table of hypotheses developed two years ago (IWC, 2003g) is provided in Table 3. The Committee will update this table.

10.2.3.4.1 SURVEY DESIGN

SC/56/IA8 and SC/56/IA11 investigated the effects of changes in the survey design on the abundance estimates. This work proved useful in obtaining an understanding of the magnitude of possible biases introduced by changing survey design. The Committee **recommended** expansion of this approach with additional factors (such as migration) being introduced into the model.

10.2.3.4.2 ENVIRONMENTAL FACTORS

Computerised datasets of potential explanatory variables that could be used to investigate associations with whale distribution and abundance have been identified (calculated water depth, closest distance to the coast and closest distance to the ice-edge for all sighting positions and the start and end positions of the transects). These and other potentially valuable datasets are discussed further in Annex G (item 4.3.2.1.2).

10.2.3.4.3 SEA ICE COVERAGE

SC/56/IA10 found that trends in minke whale abundance estimates were negatively correlated to trends in sea ice extent and this could negatively bias the CPIII abundance estimate of Antarctic minke whales; thus the impact of sea ice on abundance estimates should be investigated further. The Committee **agreed** that the hypotheses and conclusions drawn in this study were reasonable and **encouraged** members to attempt to quantify the effects of change in sea ice extent on minke whale abundance estimates, using these or other data-sets.

SC/56/IA14 described an unusually large sea ice-free area (polynya) that was present at the time of the IDCR-SOWER survey in 1997/98. To estimate the possible abundance of minke whales in the polynya, extrapolation from adjacent surveyed areas was used, resulting in an estimate that was almost twice the standard estimates but still lower than comparable estimates for CPII in Area II. The Committee welcomed this paper. It agreed that such a polynya could bias abundance estimation and noted that the paper suggested at least a rough idea of the magnitude of such a bias (for example, it is not sufficient to explain the whole difference in abundance between CPII to CPIII). It also **recommended** that other methods of extrapolating density into a polynya be explored (e.g. see Annex G, item 4.3.2.1.2.2).

SC/56/E23 and SC/56/E25 described a study where whale sightings were collected simultaneously with sea ice data in the Weddell and Ross Seas during 2003/04. The authors concluded that sea ice patterns appear to be important to minke whale distribution, with 80% of minke sightings on these surveys found in areas of level ice (generally new sheet ice) and 35% in brash ice. The Committee supported the work and **recommended** that the collection and analysis of this type of data continue.

Some other existing cetacean survey data-sets that include sections of survey tracks through sea ice that might be useful to this Committee were listed in Annex G, item 4.3.2.1.2.2. However, there are probably more such surveys, so the Committee **recommended** that the ASPeCt sea ice database and all national programme data for the Antarctic be interrogated to provide a list of concurrent cetacean survey and sea ice cruise data, determine which of these data are available to the IWC, describe the available data by region and season, and identify areas of particular interest (such as polynyas).

SC/56/IA12 outlined a plan for a cetacean sighting survey in the ice field during the 46th Japanese Antarctic Research Expedition. This survey will be carried out onboard of the ice breaker, Shirase, in the austral summer season 2004/05 with aerial support. The Committee welcomed the submission of this survey proposal and noted that it has been considered in detail in conjunction with the 2004/05 SOWER cruise (see Item 10.4).

In conclusion, the Committee recommended that further consideration of the influences of sea ice is required to accurately estimate abundance of, or at least understand the distribution of, minke whales and how this affects abundance estimates for CPII and CPIII.

10.2.3.4.4 FUTURE WORK WITH RESPECT TO SEA ICE COVERAGE

SC/56/E27 presented a summary of some of the environmental data and analyses currently available that could be used to improve stock assessments. The Committee **agreed** that these data should be utilised whilst recognising that analytical methods may have to be further developed to take full advantage of these data.

During a joint session between IA and the Standing Working Group on Environmental Concerns, the possibility of holding a Sea Ice Symposium at a future SC meeting (preferably next year's meeting) was discussed. Some questions that might be considered during this Symposium that would benefit the work of the IA sub-committee include: how to get access to and appropriately use the available actual and modelled environmental data; what analyses methods are most appropriate; what potentially could happen to minke whales when ice coverage changes, both on a short-term and long-term scale; are there other biological or physical factors that have changed at the same time that average group size of minke whales at the ice edge have changed during the CPI to CPIII time period; what is the historical view and how do polynya develop; and potentially how could these polynya influence the abundance and distribution of minke whales? A Steering Group (Annex U) to more fully develop this Symposium was formed.

10.2.3.4.5 METHODS TO ESTIMATE TRENDS

Attempting to estimate trends from the existing data is clearly of great importance to the Commission, and the Committee discussed a number of approaches that will assist in this, including: how to handle overlapping areas of coverage in multiple years (Appendix 4 in Annex G); and improved methods to estimate trends and additional variance (Kitakado, Okamura and Skaug are encouraged to further examine and develop the approach).

The intersessional Working Group established last year to examine catch-at-age analyses for Antarctic minke whales in Areas IV and V continued its work. As detailed in Annex G, the relevant data are now (May/June) available under Procedure B of the Data Availability Agreement (IWC, 2004a, p.57; IWC, 2004e, pp.244-5).

The Committee reconfirmed that resolution of the issues discussed last year (IWC, 2004a, p.22) remains a high priority and recommended that the intersessional Working Group continue to work with the same terms of reference.

The Committee also recommended that an integrated statistical catch-at-age model for Antarctic minke whales be developed. Such a modelling approach would allow for *inter alia* errors in catch-at-age data, more then a single stock, environmental covariates, fleet specific selectivities and changes in selectivities to be addressed and explored within a single model framework. In addition, other tasks that need to be completed include:

(1) development of a set of stock structure hypotheses for the animals found in Areas IV and V;
(2) compilation of time series of abundance estimates to use including both from IDCR/SOWER and JAPRA cruises including estimates of variances and co-variances; and
(3) compilation of a set of relevant environmental covariates.

With respect to (1), it was requested that a Japanese scientist(s) that has been involved in the analyses of the JARPA genetic data be identified who would be willing to liaise with the group to help develop a set of working hypotheses. With respect to (2), the IDCR/SOWER abundance estimates to use in the analyses would need to await the completion of this sub-committee's work. However, in the meantime, previously presented estimates using the 'standard' methodology will be used. It was noted that the development and analysis of an integrated statistical catch-at-age model for application to Antarctic minke whales represents a substantial amount of work and will require funding to ensure its development.

10.2.4 Work plan and budget resources

The work plan for the sub-committee is given in Annex G, item 5. The Committee's deliberations are given under Item 19.

10.3 Southern Hemisphere whale stocks other than minke whales (Annex H)

10.3.1 In-depth assessment of Southern Hemisphere humpback whales

10.3.1.1 REPORT OF INTERSESSIONAL GROUP

A report was given of the continued work by the intersessional group to summarise the state of knowledge and tasks required to complete a Comprehensive Assessment of Southern Hemisphere (which includes the Arabian Sea for this purpose) humpback whales (see IWC, 2004g). Information on the Arabian Sea humpback whale population was supplied (shown as breeding area X in fig. 1 of Annex H). The Committee thanked the group for its work, and **recommended** that an updated version of the table summarising current knowledge for Southern Hemisphere humpbacks be placed on the IWC website: *www.iwcoffice.org*.

10.3.1.2 NEW ESTIMATES OF ABUNDANCE AND RATE OF INCREASE, AND NEW STOCK STRUCTURE INFORMATION

The Committee noted that the existing IWC management areas and boundaries for Southern Hemisphere humpback whales may not be consistent with the present understanding of their biology and **agreed** that this matter requires further consideration. The hypothetical stock boundaries shown in fig. 1 of Annex H are for illustrative and discussion purposes only, and reflect approximate, rather than exact, boundaries.

10.3.1.2.1 AFRICA

The Committee received a number of papers on this item, including information on the abundance and distribution of whales in the coastal waters of Gabon (SC/56/SH2), genetic methods to investigate the population structure and genetic diversity of whales from wintering areas in the Indian and South Atlantic Oceans (SC/56/SH3 and SC/56/SH4), preliminary photographic comparisons of over 2,000 individually identified humpback whales from two South Atlantic wintering grounds off Brazil and Gabon (SC/56/SH8), estimates of abundance and rates of increase from a survey in Mozambique (SC/56/SH12). The Committee **welcomed** all of the results reported by groups working in Africa and expressed the hope that this research will continue in future years.

10.3.1.2.2 SOUTH AMERICA

The Committee received a number of papers under this item, including information on the satellite tracking of whales wintering off Brazil (SC/56/SH1), aerial surveys off Brazil (SC/56/SH6), an investigation of alternative vessel routes to mitigate disturbance and collision risk to whales in Brazil (SC/56/SH10), comparisons of photo-ids between the Antarctic Peninsula and Brazil (SC/56/SH16) and between the Magellan Strait and the Antarctic Humpback Whale Catalogue (SC/56/SH22), cetacean surveys in the

Magellan Strait (SC/56/O7), and the investigation of genetics of whales in the Straits of Magellan (SC/56/SH19).

It was noted that a British Antarctic Survey and a German research programme will be conducting studies in the Weddell and Scotia Seas over the next five years, providing opportunities to gather additional information on whales there. The Committee **encouraged** collaboration between the IWC and the institutions involved. The Committee **welcomed** all of the results reported by groups working in South America, and expressed the hope that this research will continue in future years.

10.3.1.2.3 OCEANIA

The Committee received two papers on this item, including information on the annual meeting of the South Pacific Whale Research Consortium (SC/56/SH7), results of the first marine mammal survey of Vanuatu (SC/56/SH18), and a verbal report of a whale survey at Tory Channel, New Zealand. The Committee **welcomed** all of the results reported by groups working in Oceania and New Zealand, and expressed the hope that this research will continue in future years.

10.3.1.2.4 ANTARCTICA

The Committee received a number of papers on this item, including information on the illegal Soviet catch for the 1960/61 Antarctic season (SC/56/SH9), estimates of abundance and rates of increase for whales in the Antarctic from JARPA surveys (SC/56/SH11), satellite tracking of whales from the Antarctic Peninsula (SC/56/SH15), sightings of whales during the 2003/04 JARPA cruise (SC/56/O12), SOWER 2003/04 circumpolar survey (SC/56/IA13), a summary of four cruise reports for the Southern Ocean IWC-GLOBEC/CCAMLR collaboration (SC/56/E24), and the seasonal presence of whales in the western Antarctic Peninsula using passive acoustic data (SC/56/E26).

Mikhalev presented SC/56/SH9 that summarised catches of humpback whales by two Soviet whaling fleets in the 1960/61 Antarctic season. A total of 12,529 humpbacks were taken from Area IV, Area V and western Area VI but only 302 were reported to IWC. The Committee thanked Mikhalev and noted that the information presented in SC/56/SH9 was of great value to the assessment of Southern Hemisphere humpback whales. The Committee **recommended** that the biological data presented be provided to the Secretariat for validation and inclusion in the official IWC catch database.

10.3.1.3 FURTHER POPULATION DYNAMICS MODELLING

Two papers were presented under this item: SC/56/SH17 presented a Bayesian population assessment of the humpback breeding stock 'A' off the eastern coast of South America; and SC/56/SH20, that provided updated age-aggregated production modelling assessments of the humpback breeding stocks 'A' and 'C' (western Indian Ocean).

The Committee recognised that for the immediate future, assessments at the sub-stock level will require additional information and **recommended** that assessments at the stock level continue. It also **recommended** that more precise definitions of sub-stocks be clarified (potentially to be provided by the Working Group on Stock Definition) to aid in the evaluation of 'within-region' population structure within this management context. Overall, the Committee **agreed** that reallocation of catch data, where appropriate, is important and that discussions of the status of populations should be continued pending these revisions. Committee members involved in modelling will regularly review the results of recent and future studies that are relevant to assessment, as such data become available. They will contact relevant researchers, where appropriate, to ensure that any caveats and other considerations of reported studies are identified. The table produced by the intersessional Working Group summarising current knowledge of Southern Hemisphere humpback whale populations (IWC, 2004g) will be updated as better information becomes available.

10.3.1.4 ANTARCTIC HUMPBACK WHALE CATALOGUE

SC/56/SH14 presented updated information on the Antarctic Humpback Whale Catalogue (AHWC), which has collected identification photographs since 1987, and more recently, has been funded by the IWC. The collection contains photographs from 170 researchers and opportunistic sources. During the period of the most recent IWC contract, the AHWC catalogued 686 photographs representing 319 individuals from Antarctic and Southern Hemisphere waters. The total number of individuals in the AHWC currently stands at 1,979. From the latest submissions, 16 individuals were resightings from the same area, and 14 were matched between two areas. The latter including matches between the Antarctic Peninsula to Colombia (4), Ecuador (1) and Costa Rica (1). Within-area matches included animals seen off the Peninsula (7), Chile (5), Colombia (2), Gabon (1) and Western Australia (1). The longest interval between resightings was 18 years. All catalogue photographs have been digitised, and associated data are stored in a relational database. The AHWC is available online at *www.coa.edu/FileMaker%20Pro%204.0%20Folder/Web/alliedwhale/* although not all images are publicly available. The Committee **recommended** that the IWC continue to fund this work (see Item 21).

10.3.1.5 OTHER

SC/56/E12 reported on the evaluation of the risk of exposure to oil-borne aromatic hydrocarbons for whales off the coast of Gabon and SC/56/SH13 summarised preliminary results from a space-time imaging system to detect and track humpback whales from a land-based observation platform. The Committee welcomed SC/56/SH13 and recognised the value of this technique. The Committee also **recommended** that additional work be conducted in the Cape Vidal area to provide updated information on rates of increase.

10.3.2 Allocation of Soviet catch date to area

No items were received for this item.

10.3.3 Investigate use of abundance estimates from SOWER and JARPA in population dynamics models

One paper (SC/56/SH20) with information relevant to this topic was considered and is discussed under item 10.3.1.3.

10.3.4 Other species

10.3.4.1 FIN WHALES

SC/56/SH11 presented estimates of abundance for fin whales in Antarctic Areas based upon sighting data obtained by JARPA between the 1989/90 and 2002/03 seasons.

10.3.4.2 BLUE WHALES

The Committee discussed evidence for increases in Southern Hemisphere blue whale populations, focusing on the paper by Branch *et al.* (2004). The paper was based on a Bayesian analysis of data collected from IDCR/SOWER, JSV and JARPA programmes. The authors noted that blue whales were hunted to near-extinction last century, declining from 239,000 (95% interval 202,000-311,000) to a low of 360 (150-840) in 1973. The authors noted that obtaining statistical evidence for subsequent increases has proved difficult due to their scarcity. The Committee welcomed this work and thanked Branch for addressing many of the issues identified during discussion at SC last year. The Committee **agreed** that this research represents a considerable advance on previous work and supports the conclusions that: (1) on average, the Antarctic blue whale population is increasing at a mean rate of 7.3% per annum (1.4-11.6%); (2) had an estimated circumpolar population size of 1,700 (860-2,900) in 1996; and (3) that this population is still severely depleted with the 1996 population estimate estimated to be at 0.7% (0.3-1.3%) of the estimated pre-exploitation level.

SC/56/SH21 presented recent records of blue whales in the north western region of Chiloe island, Chile (the site of a former whaling ground). The Committee noted that sub-species differentiation of blue whales remains an important issue and requires further investigation (see IWC, 2004f, p.249). It was noted that there are previous abundance estimates of Southern Hemisphere blue whales from the 1960s which should be compared with the recently agreed estimates, particularly with regard to estimates of lowest historical population size. The Committee **requested** that an update on the status of acoustic and genetic data on blue whales from the SOWER cruises be provided with a view to potentially integrating new information into efforts to assess Southern Hemisphere blue whale stocks.

The Committee considered the work required to complete an assessment of Southern Hemisphere blue whale stocks, as summarised by the Working Group (Annex U). It was noted that the state of knowledge for Southern Hemisphere blue whales is considerably less advanced than for humpback whales, both in relation to population differentiation and estimates of numbers by breeding stocks. However, it was pointed out that recent work by Branch *et al.* (2004) has provided a considerable advance on previous work. The Committee **agreed** that the existing intersessional group on blue whales should continue its work and include any new information as it becomes available.

10.3.4.3 OTHER

SC/56/BC3 presented information on phylogenetic relationships among sei whales as determined by genetic analysis. In discussion, the possibility of examining additional sei whale material stored in formalin (such as earplugs and foetuses, etc) for genetic analysis was raised. The value of a global investigation of the population structure of sei whales was recognised and the Committee **recommended** that the availability and practicality of using such material be investigated. It **agreed** to pursue this by assembling a table of potential sources of samples.

10.3.5 Work plan

The sub-committee's discussion of its work plan is given in Annex H (item 7). The Committee's deliberations are given under Item 19.

10.4 Future SOWER cruises

This year, the third circumpolar set of Antarctic cruises was completed. These cruises represent the largest research programme that the Scientific Committee has been involved in. The cruises have developed over the years and now include both abundance estimation and a research component dedicated to blue whales. The cruises, directed by the Scientific Committee have been made possible by the generous contribution of vessels and assistance by the Japanese government (*ca* £1,500,000 per year) as well as contributions of around one-third of the Committee's research budget each year (*ca* £80,000). The cruises represent an excellent example of international collaboration to carry out research on abundance (fundamental to conservation and management) in an important and difficult to study cetacean habitat.

In response to a request from the Committee last year, the question of the future direction of these cruises was discussed at the Planning Meeting for the 2003/04 cruise. It was agreed that for the purposes of the discussion, it would be assumed that the Japanese Government would continue to provide vessels and assistance at the current level, even though it was recognised that at present, no decision had been taken and that this represents a major investment from the Japanese Government.

In reaching agreement on general objectives of a future programme, the following factors were taken into account:

(1) agreement that the estimation of absolute abundance and trends are extremely important factors in determining population status;
(2) a consideration of the balance between the need to incorporate new methods and technology and the need to maintain consistency for long-term monitoring;
(3) recognition of the problems encountered and the lessons learnt, particularly in recent years, when trying to interpret data on abundance and trends; and
(4) recognition that, given the very large area of the Antarctic (i.e. that it cannot be surveyed in one year), to estimate trends it is necessary to know why the animals are where they are and when.

The Committee **agreed** that the general objective for any future programme should be:

> To provide information to allow determination of the status of the populations of large whales that feed in Antarctic waters. The programme will primarily contribute information on abundance and trends in abundance (including of minke whales), learning from both the successes of past IDCR/SOWER cruises and the difficulties encountered in interpreting previous results.

The Committee believes that future options for cruises after the 2004/05 season should be considered carefully. It further believes that it may take an additional year or two of field experiments to both interpret previous cruise results and design an optimal future survey methodology. The Committee **recommended** that a Steering Group (Annex U) should be established to plan a workshop to be held adjacent to the Tokyo Planning Meeting to develop a

proposal for cruise plans that meet the above general objective for years beyond the 2004/05 season. Additional funds are requested to bring people with the necessary skills to this workshop (see Item 21).

Options for next year's cruise that meet these general objectives are presented in Annex G (Appendix 3). The Committee **recommended** the following cruise objectives for the 2004/05 season:

(1) investigate the relationship between minke whale abundance and the pack ice;
(2) carry out a series of experiments that would address (a) problems encountered with the analysis of previous cruises, and (b) the possibilities of using different sampling strategies on future cruises; and
(3) obtain an abundance estimate using a CPII track design that could help contribute towards an evaluation of the effect of track design differences on the abundance estimates obtained from CPII and CPIII.

The Committee **recommended** that an intersessional Working Group (Annex U) provide advice to the Tokyo Planning Meeting on the experiments to be carried out in 2004/05.

10.5 Other small stocks – bowhead, right and gray whales (Annex F)

10.5.1 Davis Strait/Baffin Bay and Hudson Bay/Foxe Basin bowhead whales

10.5.1.1 NEW SCIENTIFIC INFORMATION

SC/56/BRG5 presented results of a satellite-linked telemetry study of bowhead whales, tagged near Disko Island, West Greenland, in May 2002 and 2003. Nine whales were tagged and biopsied. Results suggest that whales thought to belong to the Baffin Bay-Davis Strait stock may share a wintering area with whales thought to belong to the Hudson Bay-Foxe Basin stock.

SC/56/BRG35 reported on results of satellite-linked telemetry, aerial surveys and genetics analyses. In 2003, nine whales were tagged in northern Foxe Basin. Seven of these whales moved through Fury and Hecla Strait and, of these seven whales, six summered in Prince Regent Inlet, an area traditionally thought to be a calf rearing area used by Baffin Bay-Davis Strait whales. Aerial survey results from 2002, reanalysed using DISTANCE were presented as were results from 2003. In 2003 two surveys were conducted: Admiralty Inlet and the east Baffin Island coast as well as the Gulf of Boothia, Foxe Basin and northwestern Hudson Bay. Estimates of numbers of whales, not corrected for submerged animals, suggest that total numbers summering in the eastern Canadian Arctic are likely to be in the low thousands. Previous estimates (Zeh *et al.*, 1993; Cosens *et al.*, 1997; Cosens and Innes, 2000) were in the low hundreds. Tagging and distributional data suggest that bowhead whales occupying west Greenland and eastern Canadian Arctic waters may consist of one population, segregated by age, sex and reproductive status. Genetic results do not reject a two population hypothesis. However, these results are preliminary and additional analyses of the genetics data are planned.

10.5.1.2 CATCH INFORMATION

Cosens reported that there have been no landings in 2004.

10.5.2 North Atlantic right whales

SC/56/BRG42 provided an update on the status of recent research and management activities on the North Atlantic right whale in the USA. This species is among the most endangered of all the large whales, with a remaining population estimated at between 300 and 350 animals. The population appears to be in decline, largely due to anthropogenic impacts, notably from entanglements and ship collisions (IWC, 2001d). Its conservation represents a high management priority for the IWC, the US National Marine Fisheries Service (NMFS) and the Government of Canada.

The report indicated that 17 calves have been documented to date in 2004 (including one neonatal mortality). There is already one documented non-calf mortality this year (i.e. a ship strike that took place in the Bay of Fundy). Ship strikes are thought to be the largest source of anthropogenic mortality for this species. The US has developed a comprehensive strategy to establish new operational measures for the shipping industry along the US Atlantic coast, as well as additional ship strike education and outreach programmes. It is noteworthy that shipping lanes in the Bay of Fundy were recently diverted from a major summer aggregation site. A single right whale was observed in July 2003 off the Cape Farewell Ground - a major historical habitat for right whales. It was not a previously known individual, suggesting that there is at least a small sub-population of animals inhabiting areas outside the heavily surveyed regions of the US and Canadian east coast.

The Committee **reiterated** last year's **recommendation** that it is a **matter of absolute urgency** that every effort be made to reduce anthropogenic mortality in the population to zero.

10.5.3 North Pacific right whales

SC/56/O13 reported North Pacific right whale sightings during the 2003 JARPN II survey. Six individuals were sighted in five groups. One biopsy sample was obtained, while photo-identification data were obtained from three animals. SC/56/RMP1 reported North Pacific right whale sightings during a sighting survey conducted in the Okhotsk Sea in July-September 2003. Twenty-six individuals were sighted in 21 groups.

10.5.4 Southern right whales

SC/56/BRG30 described rapid increases in the number of calving females off Brazil (calculated at an increase rate of 29.8% per year for 1997-2003 and 14% per year for the whole period). The Committee noted that the 95% confidence interval of the rate for 1997-2003 (15.7%, 44.0%) lies outside the feasible range of increase rates for this species. The authors of SC/56/BRG30 believed that a possible explanation for the increase is immigration from other nursery grounds such as Peninsula Valdés, Argentina, where the whales are being severely harassed by gulls.

SC/56/SH5 described trends in the southern right whale population wintering in South African waters between 1971 and 2003. Southern right whales on the south coast of South Africa have been monitored annually through aerial surveys since 1971. The coastal distribution has remained very similar throughout the 32-year period, with cow-calf

pairs tending to prefer different stretches of coast to other whales. Counts of cow-calf pairs on the surveys have increased exponentially at an estimated rate of 6.94 ± 0.30 (SE) % per year. It was estimated that there are more right whales in the Southern Hemisphere now than at any time during at least the last 150 years. Given that some of these populations are clearly no longer critically endangered, the justification for continuing to monitor them annually has been discussed in some quarters.

The Committee expressed their appreciation of the work of Best and his colleagues, as presented in this and many other papers. The Committee particularly noted the inherent value of such long term data-sets, noting that in addition to their obvious value, they also tend to have unforeseen future value. It **recommended** that if at all possible this data-set be continued. Such information will also remain necessary for providing management advice.

The Committee also reviewed the report of a photo-identification workshop in Adelaide, Australia, January 2004. Amongst other things it reported on the third recorded movements of right whales between New Zealand and Australia, i.e. between areas normally considered as separate management areas (see IWC, 2001e, pp.8-11).

SC/56/SOS6 reported that there is accumulating evidence from recent sightings surveys that the South Georgia area is an important feeding ground for southern right whales. Long-term data on breeding success of southern right whales from Peninsula Valdés, Argentina were compared with sea surface temperature anomalies between 1981 and 1999 from South Georgia. The results showed a strong relationship between right whale calving output and SST anomalies in the autumn of the previous year with warmer temperatures resulting in reduced breeding success.

Two southern right whales in one group were sighted as part of the 2003/04 JARPA survey in Area IV (SC/56/O12). Biopsy collection and photo-identification were performed in both cases.

10.5.5 Western North Pacific stock of gray whales

10.5.5.1 CATCH AND STRANDING INFORMATION

No catches or strandings were reported to the Committee for this stock.

10.5.5.2 NEW SCIENTIFIC INFORMATION

SC/56/BRG38 presented a comparison of western and eastern gray whales using mtDNA sequences and microsatellite data. The populations were significantly different with both sets of data, but when the samples were stratified by sex, only the females were significantly different. This raises the possibility that some eastern males enter the feeding grounds of the western population but do not interbreed. The number of mtDNA haplotypes (17) seen in the western population was unexpectedly high for a population of this size.

VNIRO (2004) provided a summary that included the information contained in SC/56/BRG46, BRG47 and BRG48. This report described the results of research and monitoring of the western gray whale population off the northeast coast of Sakhalin Island, Russia for 2003. The Russian programme of research and monitoring of the western gray whale population off the northeast coast of Sakhalin Island has been conducted since 2001. Results of aerial, vessel-based and shore-based/vehicle-assisted surveys carried out in 2003 showed the presence of gray whales in only two places, where they have been usually feeding in the summer-autumn season for the last three years. More information on gray whales in these areas can be found in Annex F.

Korean scientists presented a summary of a shore-based survey of western gray whales at Cape Homi, Korea, lasting 14 days. Although no sightings were made, useful information of possible sightings locations was obtained from fishermen. It is planned to repeat this survey and the Committee **encouraged** members to contact the scientists involved if they have suggestions for methodological improvements.

SC/56/BRG40 presented the results of research on the western gray whale population summering off northeastern Sakhalin Island, Russia as part of the continuing collaborative Russia-USA research programme. This programme has produced important new information on the present day conservation status of this critically endangered population. The population size is estimated to be approximately 100 individuals and non-calf and calf survival rates are 0.95 and 0.70, respectively. In addition to the clear biological difficulties that western gray whales are facing (detailed in Annex F), the recent onset of large-scale oil and gas development programmes near their summer feeding ground pose new threats to the future survival of the population.

SC/56/BRG39 noted that the recent onset of large-scale oil development programmes off Sakhalin Island pose new threats to the future survival of the 100 remaining western gray whales. Three major projects by SEIC (Shell 55%), Exxon and BP are in various stages of development. These projects effectively surround and in some cases encroach directly upon the feeding habitat of one of the smallest baleen whale populations in the world. The Sakhalin oil development clearly poses a serious threat to its future survival. Exxon and Shell have both postponed construction plans until summer 2005 but BP will drill a well this summer.

Vladimirov stated that all the threats and risks for the western gray whale population connected with the development of oil and gas fields in the Sakhalin shelf have been carefully reviewed by the Russian Federation State Environmental Expertise (RFSEE). Taking into account measures to mitigate the influence of activities related to developing oil and gas deposits on gray whales, and the research and monitoring programme, RFSEE considered all the potential influences and risks as acceptable. He noted that the presented Russian Research and Monitoring programme forms part of the implementation of a mitigation process. However, the Committee **agreed** that the potential for a catastrophic oil spill remains a serious concern for the whales and their habitat.

The Committee noted with **great concern** that the evidence is compelling that this population is in serious danger of extinction. The population is small (only about 100 whales) and appears to have biological problems (only 23 reproductive females, three or more years calving interval, male biased sex ratio, and apparent low calf survival). Furthermore, there is only a single known coastal feeding habitat (approximately 60km long and 5km wide) used by females and calves which faces an obvious and immediate threat from industrial activities, including noise,

vessel traffic and the potential for a catastrophic oil spill. Noting its similarly strong concerns for North Atlantic right whales, the Committee **recommended as a matter of absolute urgency** that measures be taken to protect this population and its habitat off Sakhalin Island.

Plans for the Russia-USA research collaboration and national research plans from Russia and Korea were presented. As in previous years, the Committee **strongly recommended** that the ongoing Russia-USA and Russian and Korean national programmes on western gray whale research and monitoring continue and expand into the future. Results from these programmes combined will be the only way to monitor and assess the status of this critically endangered population.

The Committee also **strongly recommended** that all range states develop or expand national monitoring and research programmes on western gray whales. The Committee noted particularly that the precise location and status of the breeding grounds of this highly endangered whale (presumably in Chinese waters) are still unknown.

10.5.6 Work plan

The sub-committee discussion on its work plan is given in Annex F. The Committee's deliberations on this matter are given under Item 19.

10.6 Other

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

The Committee has agreed to begin work on an in-depth assessment of sperm whales, recognising that this will take several years (IWC, 2003d, p.49). An intersessional Steering Group (Annex U) has:

(1) finalised plans for a research planning workshop;
(2) identified recent developments of research methods; and
(3) identified recent research results relevant to conducting an in-depth Assessment.

Its report has been endorsed and subsumed into the Committee's report below.

10.6.1.1 WORKSHOP PLANS

As suggested last year, a research planning workshop has been developed and it will be hosted by the University of New Hampshire and the New Bedford Whaling Museum in early March 2005; partial funding has been obtained from the US Marine Mammal Commission. Additional funding is being sought. Details regarding participants and the length of the workshop will be finalised by the Steering Group.

10.6.1.2 RECENT METHODOLOGICAL DEVELOPMENTS

Several research development methods have been identified. For example, results from the application of 'D-tags' focussing on sperm and beaked whale diving and predation mechanisms with suggestions as to how the information can be used to study feeding ecology can be found at: *www.whoi.edu/institutes/oli/activities/whale lecture.html*

Whitehead (2002) used the broad characterisations of oceanographic areas in an analysis of the global status of sperm whales. Similarly, SC/56/E30 defined a measure of relative habitat suitability and demonstrated a significant correlation between suitability categories and encounter rates of sperm whales in sighting surveys south of 60°S.

Leaper reported progress with acoustic methods to survey sperm whales using towed hydrophone arrays. A particular focus has been the need to cope with large group sizes. This work is being carried out mainly in the Mediterranean Sea.

10.6.1.3 RECENT RESEARCH RESULTS AND ACTIVITIES

SC/56/IA5 summarised the results of an extensive investigation of global sperm whale catches in the 18th and 19th centuries, updating and expanding the earlier study by Best (1983). The author used estimates of oil yield to obtain catch estimates. The sources were the unpublished Townsend abstracts in combination with published oil returns to estimate American catches, and British customs data from the Public Record Office (London) to estimate British catches. An important advance over the previous study was the author's attempt to disaggregate the global sperm whale catch data and assign catches to ocean basin, based on the proportions in Townsend (1935).

The importance of careful analysis was noted in the context of a number of ongoing catch history studies.

Similarly progress on a number of regional studies was noted. This includes a large-scale, ongoing research programme (SOLMAR) in the NW Mediterranean Sea and the Pelagos Sanctuary that includes the collection of visual and acoustic data from encounters with sperm whales.

Information on sperm whale feeding ecology obtained from animals sampled by JARPN was presented in SC/56/O13. Wang reported that he is compiling data on sperm whale observations and strandings around Taiwan.

Gunnlaugsson reported that a summary of NE Atlantic sighting surveys (SC/56/O5) suggested declining trends in sperm whale abundance along with increases in other large whales; in this regard he noted the need for information on surfacing rates of sperm whales. It is anticipated that the results of ongoing surveys of sperm whales in the eastern Caribbean Sea will be available soon. The Committee also noted the imminent completion of a five-year global biopsy sampling effort conducted from the research ship *Odyssey*, a programme expected to generate a large number of tissue samples (and other data) from sperm whales (see Godard *et al.*, 2003).

10.6.1.4 CONCLUSION

The Committee noted that considerable progress is being made on improving the basic knowledge of sperm whales. It looks forward to the report of the planned workshop as a useful way of integrating current understanding of this species.

10.6.2 Historic abundance estimation using genetic methods

In the light of the paper by Roman and Palumbi (2003) the Committee agreed to consider the general methodological issue of estimating *K* and/or pre-exploitation population size in the context of the Committee's assessment work, as well as provide its view on the conclusions of the paper by Roman and Palumbi (2003). The Committee was pleased that Palumbi was able to attend the meeting.

SC/56/O21 provided additional discussion to Roman and Palumbi (2003). The authors considered that estimating historical populations of whales is a critical part of the management machinery for future whale populations. Although methods to estimate historic whale populations have concentrated on interpretation of whaling

records, they noted that other approaches are possible and concentrated on use of the patterns of DNA variation in current populations that contain a record of past population abundance. This record can be interpreted based on several assumptions about mutation rate, demography and reproductive variance. They believed that the analyses presented indicated that humpback and fin whale populations exhibited too much genetic variation for the low pre-exploitation numbers generally assumed for these species. They suggested that this variability suggests higher values for historical population sizes that may be consistent with the written record of whaling, depending on assumptions made for both sets of analyses. The authors did not suggest that genetic tools supplanted previous work on written historical records, but rather that they added an independent data-set. They recommended that both written and genetic records should be more extensively analysed with modern statistical tools, and assumptions driving analysis of these records should receive continued attention. All historical reconstructions, including those based on DNA, depend on filtering data through sets of assumptions about the past. They concluded that the use of DNA variation provides a powerful tool to be used in combination with other methods to help more accurately estimate past abundance.

The Committee established a Working Group to consider Roman and Palumbi (2003) and SC/56/O21, in the context of the Scientific Committee's work on management. Its report is given as Annex S. The Annex provides details (with full references of published papers and papers prepared for this meeting) of a number of issues that may explain the discrepancy between the recently reported genetic-based abundance estimates of historic abundance of North Atlantic humpback, fin and minke whales and earlier estimates based upon other data. It also provides a number of recommendations for future work.

In discussion, several aspects of the genetic analysis in the papers, which add uncertainty and/or bias, were identified. These included reliance upon only a single maternally inherited locus and the application of an inter-specific estimate of the mitochondrial control region mutation rate to an intra-specific estimation. Poor sampling coverage due to unsampled populations as well as deviations from the assumptions of the population genetic model also bias estimates to an unknown extent.

A key concern regarding the use and interpretation of genetic-based estimates of historic abundance is that these cannot be assigned to a point in time narrow enough to assure that the estimates apply to the time period just prior to the onset of whaling that has been the reference point for management under, for example, the RMP. Computer simulations based upon the observed levels and distribution of genetic diversity of both mitochondrial and nuclear DNA indicate that a bottleneck in North Atlantic humpback whales of the magnitude proposed by Roman and Palumbi's study is unlikely to have occurred more recently than 600 years ago and no earlier than 2,000 years ago (SC/56/O25), substantially prior to the beginning of whaling for humpback whales in this region.

With respect to catch records, it was noted that the two papers (Roman and Palumbi, 2003; SC/56/O21) also contain misunderstandings of the manner in which historic abundance is estimated from the catch records. In this regard, the notional upper limits of pre-whaling abundance (i.e. current abundance plus the total estimated catch) were significantly lower than the genetic-based estimates presented. Details are given in SC/56/O22 and O26. It was noted that historical records are not sufficiently uncertain to explain the differences in estimates of pre-exploitation abundance from genetic data (Roman and Palumbi, 2003; SC/56/O21) and historical records (SC/56/O22). Further, there is no evidence of the substantial whaling effort that would have been required to produce such postulated declines.

Other issues raised included the fact that current amounts of suitable habitat and prey base seem insufficient to support the numbers suggested by the genetic-based abundance estimates. Finally it was noted that pre-whaling abundance is not an input parameter required for the RMP. Parsons commented that factors other than whaling should also be considered as important in determining the dynamics of these three populations (e.g. disease, climate change, etc).

In conclusion, the Committee welcomed the discussion surrounding the use of genetic methods to provide inferences on pre-exploitation abundance of whale populations simulated by Roman and Palumbi (2003) and thanked Palumbi for attending the meeting. In turn, Palumbi thanked the Committee for the opportunity to present his work and agreed with the recommendations for future work suggested in Annex S and given below.

As a result of its discussions, the Committee **agreed** that such genetic methods have the potential to be one of a suite of tools that can be used to examine pre-exploitation abundance. However, it noted that there are a number of limitations and uncertainties that must be considered when examining such data in a present-day management context as discussed above.

In view of this, the Committee **agreed** that the estimates of historic abundance provided in Roman and Palumbi (2003) and SC/56/O21 for the initial pre-whaling population sizes of humpback, fin and common minke whales in the North Atlantic have considerably more uncertainty than reported, and in particular cannot be considered reliable estimates of immediate pre-whaling population size. Particularly important in this regard is the mismatch between the time-period to which genetic estimates apply (i.e. the time period is difficult to determine and extremely wide) and the population sizes of whales immediately prior to exploitation. It also **agreed** that the paper provided no information to suggest that changes are required in either the RMP or AWMP approaches to management.

The Committee **agreed** that further work is necessary to assess if genetically-based estimates of 'initial' abundance can provide useful information for the management of cetaceans. These include investigation of:

(1) the effect of unsampled populations upon the estimates of genetic diversity reported by Roman and Palumbi (2003);
(2) the degree of bias in the estimate of genetic diversity due to deviations from mutation-drift equilibrium as observed in North Atlantic minke and fin whales;
(3) the ratio of effective to census population size in baleen whales;

(4) the mode and rate of changes in the baleen whale mitochondrial control region at a timescale relevant for translating intra-specific estimates of genetic diversity to effective population size;
(5) the genetic diversity at multiple unlinked nuclear loci in addition to mitochondrial loci;
(6) the overall variance of the final abundance estimate derived from genetic diversity;
(7) the statistical reliability of catch estimates based upon whaling records; and
(8) the maximum abundance possible given the available habitat and prey resources.

An intersessional Working Group was formed to facilitate progress on the eight investigations recommended above (see Annex U).

11. STOCK DEFINITION (ANNEX I)

11.1 Review progress on the TOSSM project

At last year's meeting, the Committee established a new project, TOSSM (Testing of Spatial Structure Models). The aim is to develop a simulation-based framework for testing methods of setting management boundaries based on genetic data (IWC, 2004a, pp.27-28). The question of how to appropriately set such boundaries, e.g. *Small Areas* in the RMP, is of great importance both in the Committee's own work and also in the more general context of marine conservation and management.

The Committee's 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. Further, 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 simulation testing to incorporate uncertainty that has been a feature of, for example, the IWC's work on the RMP and AWMP. This is not surprising, in view of the complexity of developing suitable genetically-specified simulation datasets.

It is worth emphasising 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). 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.

The TOSSM project is expected to have two phases, with the first phase concentrating on developing the basic simulation tools and investigating how well the candidate boundary-setting methods work in simple scenarios of population structure. Phase II will deal with more complex population structures and address any problems encountered in Phase I. This year, the Committee reviewed the progress on Phase I that has been made intersessionally by a small group convened by Martien.

The core product is a 'master' computer program which:

(1) generates a simulated dataset of genetic samples;
(2) provides this data to a candidate boundary-setting rule, which does its calculations and then passes its proposed boundaries, if any, back to the master program; and
(3) projects the populations forward in time using the proposed boundaries and a pre-specified catch-setting rule, to see what happens to abundance in the simulations population(s) and to catches.

There are six different modules to the program: the individual-based genetic simulator (the most complex part); the biology, population dynamics and population structure; the sampling module that actually produces a genetic dataset; the catch-setting algorithm; the actual boundary-setting method being tested; and the overall linking framework.

For the genetic simulator module, the existing program RMETASIM (Strand, 2002) has been identified as an appropriate basis. RMETASIM is part of the standard statistical programming language R; this makes for a straightforward overall framework within which it will be relatively easy for anyone to add or modify particular modules in the future. The main task intersessionally has been the validation and modification of RMETASIM for TOSSM, and this is almost complete.

One version of a population dynamics module has also been finished. It is based on gray whales, for which good data are available and which are thought to have population dynamics reasonably typical of baleen whales. The mutation rates used are based on the ranges published for humans, and in simulation tests this generated a genetic diversity comparable to that observed for gray whales. Other specifications appropriate to species with very different dynamics could be developed in future.

Except for the actual boundary-setting methods (which cannot be tested until the rest of the modules are ready), the remaining modules are almost complete. The catch-setting rule is currently a catch-cascading *CLA*, chosen partly because of its immediate relevance to the IWC and partly because its code is readily available. It is also planned to implement a simpler catch-setting rule than the *CLA* in the coming year, because a simpler rule might well lead to clearer insights into the basic performance of, and differences between, various boundary-setting methods.

The Committee **agreed** that excellent progress has been made so far, and thanked Martien and the other developers for their efforts. The specification and implementation of TOSSM is very complex, and represents a world first in terms of its focus on appropriate boundaries for practical use in management.

Plans for 2004/2005

The Committee welcomed plans for further work under TOSSM. For the coming year, it **agreed** that priority should be given to ensuring that all the modules work smoothly together, rather than towards detailed refinements of particular modules. There are several existing boundary-setting methods which should require little adaptation to test within TOSSM, including Boundary Rank (Martien and Taylor, 2001), SAMOVA (Dupanloup *et al.*, 2002), and a new method presented this year in SC/56/SD8. Testing of methods will concentrate initially on the two

simplest archetypes identified last year: no substructure at all (in which a 'good' boundary-setting method should suggest no boundaries), and two sub-populations linked by dispersal. More complex archetypes (IWC, 2004m) can be coded meanwhile. Tests will include simple summary statistics such as whether the biologically 'right' number of boundaries is selected, as well as performance criteria more directly linked to management. Intersessional work will be coordinated through the Steering Group convened by Martien. It is anticipated that initial results for the above methods and population structure scenarios will be available for next year's meeting.

11.2 Options for unit-to-conserve, including management implications

The point of this agenda item is to allow consideration of various possible definitions of unit-to-conserve, and their corresponding implications for management; see IWC (2002f, p.49). No papers were received this year. However, the Committee noted that the TOSSM project is deliberately structured to allow investigation of how different units-to-conserve would respond to management, and that results from the first phase of TOSSM should help to inform discussions of unit-to-conserve in future.

11.3 Application of genetic and non-genetic data to stock identification

In its discussions on bowhead whales this year, the Committee identified a number of issues related to quality of microsatellite data and caveats about its interpretation. Genetic data are discrete, with reasonably well-understood mechanisms of variation. However, there is some degree of noise and inaccuracy which can compromise and even bias results. Some of the problems are: database errors in linking samples to specific whales, compromised DNA from inadequate sample handling, inappropriate markers, null alleles, allelic dropout, stutter bands, and anomalous/intermediate allele sizes. There was insufficient time to discuss genetic data quality in detail this year, but the Committee **agreed** that it should be considered next year (Item 19). It **encouraged** the presentation of collaborative review papers.

A number of statistical issues were discussed relating to new and existing boundary setting methods, as given in Annex I (SC/56/SD2, SD8, SD9). SC/56/SD9 presented simulation results relating to the performance of Boundary Rank when sampling is spatially unbalanced along a cline; this scenario will be explored further in TOSSM.

SC/56/SD6 addressed the issue of how variation in vocalisation patterns is related to variations in genetics. The paper's goal was to identify particular acoustic features concordant with patterns of gene flow mediated by male fin whales, female fin whales, or both, in the North Pacific. Microsatellites, mtDNA and Y chromosome markers were compared to directly estimate male- and female-mediated gene flow. In fact, genetic distance showed significant *negative* correlation with acoustic distance when the influence of geographic distance was removed. Nevertheless, the ability to discriminate between the songs of different fin whale populations was high in many instances. The Committee recalled its previous discussions on using data other than genetics and tagging for identifying population structure (IWC, 2002f, pp.269-272); in particular, such data are most likely to be valuable when used in combination. Specifically with respect to vocalisations, it was noted that populations which have separated recently (in evolutionary terms) may sometimes be distinguishable acoustically long before there is the opportunity for detectable genetic differences to accrue; on the other hand, if migrant animals can learn songs rapidly, regional acoustic differences may not be indicative of genuine population structure. At a minimum, acoustic differentiation may prove useful in designing sampling or tagging schemes to further elucidate population structure.

Several papers described progress in the development of close-kin methods for studying population structure, which make use of pairs of individuals that can be genetically identified as close relatives. Examples were given for Gulf of Maine humpback whales, and for mother-foetus pairs in the Norwegian minke whale DNA register which can be used to infer paternity. Although issues such as sample sizes may be problematic in some populations, close-kin approaches have the potential to be particularly informative about dispersal rates on management timescales, especially when traditional frequency analyses have low power. The TOSSM project will allow testing of boundary setting methods using close-kin, as well as frequency-based methods. The Committee **encouraged** further updates on close-kin methods.

The Committee also noted recent significant advances in telemetry that are of value for studying population structure, in particular with satellite tags and pop-up archival tags (PATs). The logistics of attachment still need to be resolved for some species of interest to the Commission (e.g. minke whale); when attachment is feasible, though, satellite tags and PATs can provide data from the whole range of a population without the need to actively collect samples everywhere. Telemetry information describes movements over timescales of just a few years, and is potentially very relevant to management. One problem with genetic frequency data is the statistical power when considering the 'null' hypothesis of a single stock. Since it is generally not safe to interpret 'no significant difference' as meaning 'no population structure' based on genetic data alone, it is sometimes not obvious when it is safe to stop the process of progressively finer management sub-divisions. If it is apparent from telemetry data that animals are mixing on the harvest grounds over a spatial scale of hundreds of kilometres, then there is no reason to expect that differential depletion is possible on smaller scales.

The Committee **encouraged** further work on using tagging data to study population structure, both with and without additional genetic data; several relevant telemetry studies are in progress or imminent and it looks forward to the submission of more papers on this topic next year.

11.4 Work plan

The Working Group's discussions of its work plan are given in Annex I. The Committee's deliberations are given under Item 19.

12. ENVIRONMENTAL CONCERNS (ANNEX K)

12.1 Integration of sub-committee work plan with priority topics of other sub-committees

SC/56/E27 presented suggestions on ways to advance collaboration between the SWG and the assessment-related sub-committees and Working Groups. The high-priority long-term goal was that the quantitatively based population level management advice provided to the Commission should include information on the environment, both directly and via its influence on the visual sightings methods that form the core of the assessment tools.

The Committee recognises the need to maintain a balance between the independent aspect of the SWG's work (i.e. investigating environmental impacts on cetaceans) and the need to provide appropriate advice to other sub-committees and Working Groups, particularly given the existing SWG workload. The Committee noted the considerable progress being made by the SWG in terms of beginning to put some difficult issues into quantitative frameworks. This may have implications for several other sub-committees. For example, the SWG as possible should provide relevant sub-committees with information on anthropogenic removals not considered by other sub-committees (e.g. the number of large whales killed annually as a result of anthropogenic noise on a stock specific basis). In conclusion, the Committee **endorsed** the general approach outlined in SC/56/E27 and **recommended** that this approach be discussed with other sub-committees both at this meeting and intersessionally.

In this regard the Committee noted that the issue of sea ice and whale habitat was extremely important for several sub-committees, and **agreed** that this would be a good topic for a joint special session in 2005 (Annex K Appendix 8) as discussed under Item 21. Given the wide relevance of the issue of the impact of noise on cetaceans to the Committee (see Item 12.2.5), it **agreed** to maintain this as a standing priority item on the agenda, along with chemical pollution and habitat-related issues.

12.2 Habitat related issues

12.2.1 Pollution related matters

12.2.1.1 STEERING GROUP REPORT ON POLLUTION 2000+

SC/56/E35 summarised the recent (2003/2004) progress of the IWC POLLUTION 2000+ programme (Reijnders *et al.*, 1999), which was initiated to investigate pollutant cause-effect relationships in cetaceans. The status of the two sub-projects: bottlenose dolphins and harbour porpoise post-mortem calibration was described (see SC/56/E5, E15, E17 and E19). Details are given in Annex K. The work plan to complete Phase 1 is given as Annex K, Appendix 6.

The Committee continues to **strongly endorse** the continuation of the POLLUTION 2000+ programme, noting that it is already showing valuable results from Phase 1.

12.2.1.2 OTHER POLLUTION STUDIES

The SWG also considered a number of papers related to pollution studies. Details are given in Annex K. These included: SC/56/E7 and SC/56/E8, that concerned potential risks to Mediterranean cetaceans from organochlorines with endocrine disrupting capacity; SC/56/E1 that reviewed the completion of two major efforts to address OCs, heavy metals and radionuclides in bowheads; and SC/56/E12 that reported preliminary data of an evaluation of the risk of chronic exposure to oil-borne polycyclic aromatic hydrocarbons (PAHs) for the humpback whale population wintering off the coast of Gabon, an area of intensive oil exploitation.

As a result of *inter alia* discussion of SC/56/E20 (a risk assessment for bottlenose dolphins, the most commonly stranded cetacean in the USA), the Committee **endorsed** an integrated approach to determining risk and the need to obtain baseline information that can: (1) allow the investigation of temporal and spatial trends in both health and contaminants load; and (2) provide the means for correlating health data and environmental variables. It **recognised** the need for the coordination and development of specimen banks and **recommended** the establishment of an association of cetacean specimen banks. An intersessional correspondence group was established to explore this further (see Annex U).

12.2.2 Progress report on SO-GLOBEC/CCAMLR

The IWC has expanded its collaborative research in the Antarctic and now includes collaboration with the Convention on Antarctic Marine Living Resources (CCAMLR), the Southern Ocean Global Ecosystem Dynamics Program (SO-GLOBEC), the US National Science Foundation (NSF) and the Australian Southern Ocean Cetacean Ecosystem Program (SOCEP). The Committee **endorsed** the change of name from the 'SO GLOBEC Working Group' to the 'SO Collaboration Working Group'.

SC/56/E21 reported on the progress of this Working Group. Five research cruises were carried out during the 2003/04 season. IWC-supported observers participated on cruises in the Ross Sea and Weddell Sea. In addition, an IWC representative participated in planning meetings (Seattle) and multidisciplinary pre-analysis collaboration meetings (OSM:Portland) and reported progress in the GLOBEC International Newsletter. The 2003/2004 cruise reports from the SO collaboration were reported in SC/56/E24.

The Committee recognised the value of this work to its deliberations (e.g. the provision of new data on sea ice, the developing role of passive acoustic detection). It also noted the great benefit it receives from a relatively small contribution to these multidisciplinary research cruises. It therefore **strongly endorsed** the continued collaboration summarised in Annex K, Appendix 7. In particular, it **recommended** IWC support for the analysis, integration and reporting of data, in addition to field survey work. The Committee thanked Thiele for her role in coordinating IWC participation. The intersessional Steering Group coordinated by Thiele is given in Annex U.

12.2.3 State of Cetacean Environment Report (SOCER)

The Editors summarised SC/56/E29, which followed last year's agreed upon procedures and provided a review of the Pacific Ocean. The SOCER highlighted issues concerning marine debris, habitat degradation in the Great Barrier Reef, increasing concerns over the impact of pathogens on cetaceans, and 'new' contaminants such as perfluorinated organochemicals (PFOs). SOCER also highlighted the ongoing over-exploitation of many fish stocks that support cetacean populations. The Committee

agreed that the Arctic and Antarctic should be the priority regions for next year's SOCER. It also **agreed** that the report should not contain an editorial assessment of whether changes reported are 'positive' or 'negative'. Further, it was agreed that this document should not contain entries related to human health.

As agreed by the Committee, last year's SOCER was appended to the SWG report presented to the Commission. However, during the preparation of the Scientific Committee report for publication, the Convenors decided not to include SOCER along with other sections of the full report due to financial constraints. The rationale behind this was that the target audience of the report is the Commission and non-specialists. In addition, they believed that by appending it to the Committee's report to the Commission and having a dedicated page on the IWC website for this and all future SOCER reports, it would better reach its target audience. The *Journal* notes that the report is available on the IWC website. This year the Committee **agreed** that the SOCER be appended to its report (see Annex K, Appendix 5), so that it is made available to the Commission at their meeting. It also **recommended** that it be published in the supplement as well as being given a dedicated page on the IWC website, whilst recognising that the Convenors require some discretion in balancing the demands from all Committee groups to append items to their reports. It was agreed that individual Convenors should give greater consideration during sub-group meetings to assess priorities for inclusion of appendices in the supplement should space be limited.

12.2.4 Arctic issues

The IWC has identified the Arctic as an area of concern for cetaceans and the SWG has discussed in previous years the potential for future work, in particular for collaboration with large-scale oceanographic programmes. SC/56/E9 provided an update of a listing of planned or ongoing Arctic research programmes and SC/56/E10 explored in more detail the existing and potential for collaborations in two NSF programmes: the Western Arctic Shelf-Basin Interaction (SBI) and the Study of the Northern Alaska Coastal System (SNACS).

The Committee recognised the value of the information in these papers and **requested** Moore to continue to provide such information. It also **recommended** that relevant published information be submitted to the next SOCER, which has a focus on Arctic and Antarctic issues.

12.2.5 Anthropogenic noise

12.2.5.1 MINI SYMPOSIUM

Last year, the Committee noted the emergent threat of anthropogenic sound on cetaceans and other elements of marine ecosystems and also the potential for the Committee to assist in the development and interpretation of studies aimed at elucidating the potential impacts of anthropogenic noise on cetaceans. Several scientists with expertise in the fields of acoustics or marine mammal acoustics gave presentations. Clark chaired the mini-symposium as part of the SWG's sessions. Details are given in Annex K (item 6).

Presentations were given on the following topics:

(1) the effects of anthropogenic noise on marine animals and the possible synergistic effects between ambient ocean noise levels and other environmental stressors;
(2) physical acoustics and ambient noise in the ocean;
(3) audition and the physiology of hearing in cetaceans and the effects of intense sounds on cetacean hearing; and
(4) whale communication behaviour.

Potential impacts, including chronic and acute exposures, are increasing as a result of increased use of powerful sound sources (e.g. seismic airgun arrays, military sonars) and increasing levels of ambient noise from vessels (e.g. commercial shipping, fishing, recreational traffic). In some cases, sound sources radiate low-frequency sound over very large areas thereby exposing populations to low sound levels (< 120 dB re 1 μPa) over relatively long periods of time (chronic). In other cases, sound sources radiate mid- to high-frequency sound over relatively small areas and individual animals are exposed to high levels of sound (> 160 dB re 1 μPa) over relatively short periods of time (acute).

During the mini-symposium, examples and evidence were presented to illustrate that impacts from anthropogenic sound sources can operate over spatial and temporal scales that differ by several orders of magnitude. Two examples are: (a) low-frequency (< 1,000 Hz) ambient noise levels that have increased in the Northern Hemisphere by two orders of magnitude over the last 60 years (3dB/decade) thereby reducing the potential for long-range communication in mysticetes; and (b) sound exposures from mid-frequency sonars that coincide with mass strandings of beaked whales since sonar introductions in the 1960s. In addition, SC/56/E37 reviewed all 111 records of Cuvier's beaked whale strandings around Japan from the late 1980s to May 2004. During this period there were 10 mass strandings consisting of 47 whales, plus an additional mass stranding of Baird's beaked whales. All these mass strandings occurred inshore from where the US Navy conducts testing activities off Japan, and where Cuvier's beaked whales were hunted historically. Therefore mid-frequency sonars were implicated as the probable cause for these 11 mass strandings (see Annex K, table 1).

The Committee received two papers demonstrating impacts from seismic airgun surveys on mysticetes, including western gray whale displacement from its critical feeding habitat off Sakhalin Island, Russia (SC/56/BRG39) and humpback whale mortalities in a breeding habitat of humpbacks off Brazil (SC/56/E28). The Committee **commended** the Brazilian Government for working to protect critical marine mammal habitats from noise exposure; in one unique case and opportunity, it has undertaken ongoing consultation to define the Abrolhos Banks as a critical habitat for marine mammals. The Committee views with great **concern** the impacts on large whales in critical habitats from exposures to seismic sounds impulses, particularly with respect to severely threatened populations such as the western gray whale.

In conclusion, the Committee **agreed** that there is now compelling evidence implicating military sonar as a direct impact on beaked whales in particular. The Committee also **agreed** that evidence of increased sounds from other sources, including ships and seismic activities, were cause for serious concern. The potential for cumulative or synergistic effects of sounds, as found in other taxa, with non-acoustic anthropogenic stressors was noted.

Whilst noting that there is considerably more scientific work needed, the Committee emphasised that measures to protect species and habitats cannot always wait for scientific certainty, as encoded in the precautionary principle. This is especially true for cases involving the exclusion of an endangered population from its habitat.

As a result, the Committee **agreed** that noise should remain a standing priority item on its agenda.

12.2.5.2 RECOMMENDATIONS

The SWG made a number of research recommendations with respect to beaked whales and the use of military sonar. These are detailed in Annex K (item 6.4) and summarised below. The Committee **endorsed** these recommendations concerning:

(1) a full review of typical and atypical strandings[16], including beaked whales and other species that stranded at the same time;
(2) a full analysis of stranding data relative to military activities;
(3) thorough, standardised *post mortems* of entire animals at mass strandings;
(4) standardised responses and protocols for documenting and understanding mass stranding events;
(5) an investigation of the correlation of natural sounds (e.g. earthquakes, typhoons) with the mass strandings of beaked whales; and
(6) surveys for Cuvier's beaked whales off the Pacific coast of Japan where these whales were hunted and have mass stranded.

The Committee also **endorsed** the following, in the context of mitigation and monitoring protocols given its concern over seismic operations:

(1) effort be expended on the global identification and monitoring of critical habitats[17] for cetaceans;
(2) access be given to information on timing, distribution, extent (nautical miles or kilometres for 2D surveys, or square nautical miles or square kilometres for 3D surveys), sound source, and sound source characteristics for past and planned seismic surveys carried out within the range of critical habitats or potential critical habitats;
(3) descriptions and results of any marine mammal observer programmes or other faunal observation programmes carried out in conjunction with previous seismic surveys are provided;
(4) the continuous acoustic monitoring of critical habitats on sufficient temporal and spatial scales in relation to pre- and post-seismic activity;
(5) the independent monitoring of critical habitats (from survey vessel and independent platforms) to evaluate displacement from critical habitat and/or disruption of important cetacean behaviours in the critical habitat;
(6) increased effort to monitor strandings that occur at times and in places where seismic activity is conducted; and
(7) that seismic operators seek ways to mitigate their potential impacts (e.g. to reduce the power of their sources).

The Committee **commended** these recommendations to IWC member governments, and **requested** that they be transmitted to representatives of geophysical exploration and petroleum industries, and various committees and agencies (e.g. ASCOBANS, ACCOBAMS, JNCC, MMCC, NOAA-NMFS, NRC, IUCN, ICES, OSPAR[18]) and also to relevant forthcoming workshops (e.g. MMC and JNCC on impacts of noise on marine mammals, September 2004). Clark and Rojas-Bracho will provide the Secretariat with the necessary information on recipients.

Furthermore, the Committee **strongly recommended** that:

(1) the current protection afforded to the Abrolhos Bank, Brazil should be made permanent, due to its vital importance as a breeding ground for humpback whales in the western South Atlantic Ocean;
(2) all seismic surveys in areas that could have significant adverse demographic consequences for large whales should be planned so as to be out of phase with the presence of whales;
(3) in cases when seismic surveys do occur in a critical habitat (e.g. western gray whale feeding area off Sakhalin Island), additional guidelines for seismic surveys and independent scientific monitoring should be developed, and a strict monitoring and mitigation programme should be implemented - this should include independent and highly experienced shipboard marine observers and a monitoring system and platform that are independent of the seismic source vessel and seismic support vessels; and
(4) in situations when displacement of whales could have significant demographic consequences, seismic surveys should be stopped.

On the general topic of anthropogenic noise impacts on cetaceans, the Committee **recommended**:

(1) the convening of a workshop on the impacts of seismic exploration (including both industrial and academic activities) at its 2006 meeting;
(2) the integration and coordination of international research projects to study and describe acoustic ecologies;
(3) the establishment of a Working Group to derive a series of hypotheses to test for synergistic impacts on cetaceans;
(4) the inclusion of anthropogenic noise assessments and noise exposure standards within the framework of national and international ocean conservation plans (e.g. consideration during designation of critical habitats, marine protected areas and ocean zoning); and

[16] For this purpose, a mass stranding is an event when two or more animals but not a female-calf pair strand simultaneously in the same location. When whales mass strand at approximately the same time but not in the same location, these strandings are considered atypical. In the case of Cuvier's beaked whales, no typical or atypical mass strandings are recorded before the introduction of mid-frequency sonars in the early 1960s.

[17] For example, important areas for breeding, calving and feeding.

[18] JNCC (Joint Nature Conservation Commission.); MMCC (US Marine Mammal Commission.); NOAA-NMFS; NRC (Nat'l Res. Council); IUCN (Int'l Union for the Conservation of Nature); ICES (Int'l Council for the Exploration of the Sea); OSPAR (Convention for the Protection of the Marine Environ. in the Northeast Atlantic).

(5) support for multinational programmes to monitor ocean noise (e.g. IOOS) and the development of basin-scale, regional and local-scale underwater noise budgets.

12.2.6 Review progress on the intersessional workshop on habitat degradation

A revised proposal and agenda for this workshop was agreed by the Scientific Committee (Simmonds *et al.*, 2002). The Committee was pleased to hear from Simmonds, the convenor, that the Workshop will take place from November 12-15, 2004 at the University of Siena, Italy.

12.2.6.1 OTHER HABITAT ISSUES

Three papers were considered under this item, two dealing with killer whales (SC/56/E14 and SC/56/E32) and one with recent developments on research on ozone depletion and its interactions with climate change (SC/56/E11). Details are given in Annex K. The Committee **agreed** that ozone depletion may potentially have some effect on cetaceans and that this warrants further investigation, such as modelling ultraviolet and other environmental parameters in the Antarctic.

12.3 Work plan

The sub-committee's discussions of its work plan are given in Annex K. The Committee's deliberations are given under Item 19.

13. SMALL CETACEANS (ANNEX L)

13.1 Review status of franciscana

In recent years there has been growing concern regarding the sustainability of bycatches of franciscana (Secchi, 2002). As a result, this year the Scientific Committee conducted a review of the status of this species.

13.1.1 Distribution and stock structure

The franciscana is found along the Atlantic coasts of Brazil, Uruguay and Argentina, from approximately 18º to 42ºS. The Committee concluded that at least three genetically distinguishable populations of franciscanas exist, with the possibility of a fourth in the southern part of the range. As a result, the Committee **agreed** with the delineation of four Franciscana Management Areas (FMAs) by Secchi *et al.* (2003), as depicted in fig. 1 of Annex L. However, it recognised that boundaries between some of these FMAs are approximate and should be re-considered as new information becomes available. In particular, the Committee **recommended** that population structure be examined within FMAs III and IV. Given the strong population structure observed in part of its range, the Committee also **recommended** an assessment of the possible existence of franciscana sub-species.

13.1.2 Abundance

The Committee reviewed the results of three line-transect surveys of franciscana, all conducted in FMAs III and IV; no estimates of abundance are available for FMAs I or II. The Committee identified several concerns regarding the calculation of density and its subsequent scaling to obtain population size and concluded that these estimates of abundance could be either positively or negatively biased. The Committee concluded, therefore, that it was not appropriate to consider the results of these surveys as minimum estimates of abundance. The Committee suggested several ways in which these estimates could be improved and **recommended** that abundance surveys be conducted in FMAs I and II.

13.1.3 Life history

Information on the life history of franciscana has been derived from examination of stranded and bycaught animals. Most information has been obtained from FMA III. Life history parameters and reproductive seasonality appear to vary among areas. The results of preliminary modelling exercises (SC/56/SM20) suggest that the potential for population growth in this species may be insufficient to compensate for current levels of bycatch mortality, at least in FMA III. The Committee **recommended** that data be collected to allow estimation of life history parameters in other areas and that analytical methods be standardised to allow for more rigorous inter-population comparisons.

13.1.4 Ecology and habitat

The franciscana is found primarily in coastal waters, but the offshore limit of their distribution remains unknown. To date, there is no evidence of large-scale migratory movements, although some seasonal movements have been recorded (Bordino *et al.*, 1999). The Committee received no new information on threats to the franciscana, other than incidental takes in fisheries. It recognised, however, that a variety of anthropogenic activities could impact this coastal species.

13.1.5 Incidental catches

To date, most documented bycatches have occurred in coastal gillnets, although some incidental captures occur in other types of fisheries. Large bycatches have been reported from FMAs II, III and IV (SC/56/SM11; SC/56/SM17; Ott *et al.*, 2002). In most cases, the magnitude of bycatches has been estimated using data obtained from interviews with fishermen and analysis of logbooks; the Committee noted that this typically results in negatively biased estimates. The Committee **recommended** that estimates of franciscana bycatch be made where they do not currently exist, using observer programmes wherever possible. The Committee also **recommended** that bias in bycatch estimates derived from interview or logbook data should be evaluated using on-board observer programmes.

The result of a double blind experiment to reduce incidental mortality in coastal gillnets by using acoustic alarms, or pingers was reviewed (SC/56/SM12). The study used high frequency (70 kHz) pingers to produce sounds above the hearing range of the South American sea lion, where sea lions were attracted to lower frequency pingers used in a previous trial (Bordino *et al.*, 2003). In that trial, 10 kHz pingers significantly reduced the bycatch of franciscana, but increased depredation of catches and damage to nets caused by sea lions. The high frequency pingers caused a significant reduction in bycatch of franciscanas, without any reduction in catch of target species or damage to nets. These pingers offer a means to reduce the bycatch of franciscanas in gillnet fisheries, if conflicts between these fisheries and mobile trawlers (which carry off nets and pingers) can be resolved.

13.1.6 Status

Bycatch in gillnet fisheries occurs throughout the range of the franciscana. Aproximate annual removal rates due to bycatch were 3.3% for FMA III and 1.6% for FMA IV (see table 2 in Annex L). Bycatch in both areas exceeds the 1% removal level determined by the Committee as sufficient to warrant concern regarding the status of small cetaceans. Bycatches also occur in FMAs I and II, where there are no estimates of total abundance. Therefore, the Committee expressed concern about the status of franciscana throughout its range, but particularly in FMAs III and IV, where bycatches remove more than 1% of estimated abundance each year. The Committee also **recommended** that the IUCN should make further efforts to formally assess the franciscana as a species (currently designated as 'Data Deficient') and consider listings of individual populations.

The Committee referred to its endorsement of the concept of a series of regional workshops with the general objectives of developing a short- and long-term approach to the successful management and mitigation of the cetacean bycatch problems in a region, building upon work already undertaken by the Committee (see Item 18.2. and 21; Annex L).

Considering the results above of the status review of franciscana and the existing network of researchers in Brazil, Uruguay and Argentina, the Committee **endorsed** the proposal (Annex L) to hold the first regional by-catch workshop in Argentina during 2005 to focus on mitigation of franciscana bycatches. The Committee **recommended** that an intersessional Working Group be formed to develop a detailed plan for the workshop. Financial aspects are discussed under Item 21.

13.2 Progress on previous recommendations

IWC Resolution 2001-13 (IWC, 2002a) 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 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. 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. No new information was received from the Government of China at this year's meeting. However, the Committee learned of a newly designated natural reserve for the baiji and of planning for a meeting to be held in China later in 2004 to discuss baiji conservation. The Committee welcomed these initiatives and looked forward to reviewing any progress on baiji conservation measures at its next meeting.

13.2.2 Vaquita

The Committee has followed with considerable interest progress on conservation of the highly endangered vaquita; several members of the Committee also serve on the International Committee for the Recovery of the Vaquita (CIRVA). This year the Committee reviewed the report of the third meeting of CIRVA (SC/56/SM5). The Committee **reiterated** its endorsement of the fundamental conclusions drawn by CIRVA - that the current grave conservation status of this species is due to fisheries bycatch. The Committee noted at least six records of bycatch in the past seven months and, in general, was disheartened by the lack of any substantial progress in reducing bycatches since last year's meeting. Therefore, the Committee **urged** the Government of Mexico to implement the previous recommendations of CIRVA and to take immediate action to eliminate the bycatch of this species in the northern Gulf of California.

13.2.3 Harbour porpoise

The harbour porpoise has experienced declines in parts of its range, primarily as a result of fisheries bycatch. The Committee has had considerable involvement in the assessment of this species in the North Atlantic and has worked closely with ASCOBANS in the formulation of conservation programmes. This year the Committee reviewed plans for the project *Small Cetaceans of the European Atlantic and North Sea*, or SCANS-II, which has three primary objectives (SC/56/SM4). The first is to update estimates of abundance from the original SCANS survey area and to obtain estimates for previously unsurveyed areas throughout the European Atlantic margin. The second is to develop a management framework for assessing the impact of bycatches and setting safe bycatch limits, work that has been recommended previously by the Scientific Committee (IWC, 2002g, p.330). The third is to develop methods for monitoring small cetacean populations during periods between major decadal surveys. At last year's meeting, the Committee was informed that SCANS-II planned to include surveys of offshore waters to the limit of the European Atlantic fishing zone (IWC, 2004h, p.323). This offshore component is no longer part of SCANS-II, but will form the basis of a future proposal. The Scientific Committee **endorsed** the SCANS-II initiative, offered its continued assistance and encouraged the development of a proposal to gather funding of the offshore survey component.

The Committee also briefly reviewed an aerial survey conducted in 2002 to estimate the density of harbour porpoises in the Baltic Sea (SC/56/SM7). Only two sightings of single animals were made, yielding an estimate of 93 groups (95% CI=10 - 460 groups). The results of this survey underscore the poor conservation status of harbour porpoises in the Baltic. The Committee also learned of German surveys in the Baltic Sea and looked forward to receiving the results of this work next year.

13.2.4 Bycatch mitigation

The Scientific Committee has expressed concern about bycatches of common dolphins, and other small cetaceans, in gillnet and pelagic trawl fisheries that result in a large number of stranded animals along the coasts of southern England, France and Ireland (IWC, 2004h, p.322). The Committee briefly reviewed the results of a survey conducted during winter and early spring 2004 in the English Channel and Celtic Sea (SC/56/SM10). Short-beaked common dolphins were commonly observed and several dead common dolphins were observed floating at the surface. Examination of these carcasses revealed injuries consistent with fisheries bycatch. The Committee also briefly reviewed small cetacean bycatches in the California pelagic driftnet fishery (SC/56/SM1).

The use of pingers was required in this fishery in 1996. Bycatch rates of common dolphins in the years immediately following the introduction of pingers were comparatively low, but in recent years these rates have shown considerable variability and, in some years, occurred at rates comparable to the fishery prior to the implementation of pingers. The Committee **recommended** that the sources of this variation in bycatch rate be explored to determine whether the effectiveness of pingers has varied over time.

13.2.5 Other recommendations

The Scientific Committee reviewed the status of the Irrawaddy dolphin and other freshwater cetaceans in 2000. This year, the Committee learned of a proposal to transfer Irrawaddy dolphins from CITES Appendix II to Appendix I at the 13th Conference of Parties in Bangkok later in 2004. The proposal is intended to address an expected increase in demand for live specimens of this species in international trade. In 2000, the Scientific Committee recommended that, given the precarious conservation status of this species, all live captures should cease 'until affected populations have been assessed using accepted scientific practices' (IWC, 2001c, p.266). The Committee concluded that the CITES proposal was consistent with its previous assessment and **recommended** that all direct removals should cease until affected populations have been assessed using accepted scientific practices.

The Committee was also informed of a proposed plan by the government of India to construct a large number of canals and dams to transfer water from Himalayan to Peninsular rivers. These proposed barriers are within the Ganges dolphin's known or suspected historical range. In its review in 2000, the Committee noted that Ganges dolphins currently exist as a meta-population, with numerous sub-populations isolated to varying degrees by barrages and dams. The Committee expressed concern over the effects of the proposed project, particularly as it would further fragment the remaining meta-population, and **recommended** a full assessment of the effects of this project on the Ganges dolphins and other small cetaceans.

The Committee reviewed several new developments with narwhals and white whales. The abundance of the West Greenland stock of white whales has been reduced to approximately 20% of 1954 levels; continuation of recent catch levels poses a significant risk of extinction (Alvarez-Flores and Heide-Jørgensen, 2004). This finding **reinforces** last year's **recommendation** that this stock of white whales should be considered to be 'of highest conservation concern' and that efforts should be made to improve its status. As noted in IWC/56/11, the status of narwhal stocks was reviewed in February 2004 at a joint meeting of the Scientific Working Group of the Canada-Greenland Joint Commission on the Conservation and Management of Narwhal and Beluga (JCNB) and the NAMMCO Scientific Committee Working Group on the Population Status of Narwhal and Beluga in the North Atlantic. Estimated total abundance of narwhals in the Inglefield Bredning summering area in Northwest Greenland in 2002 was only 15% of the estimated abundance in 1986. Moreover, the joint meeting concluded that continued hunting at recent levels 'may result in the extinction of West Greenland narwhals in the near future' (IWC/56/11). The JCNB, which provides management advice for stocks of narwhal shared between Canada and Greenland has accepted this scientific advice and recommended substantial reductions in removal levels from West and NW Greenland narwhal stocks as well as a moratorium on narwhal hunting in Melville Bay. The Scientific Committee acknowledges the efforts of scientists involved in the assessment of these stocks, and expressed its concern for narwhals in this region.

The Committee also learned of live captures for bottlenose dolphins in the Solomon Islands and of resident killer whales in southeast Kamchatka, both conducted in 2003. No estimates of abundance, population structure or vital rates are available for either population. Furthermore, the relatively high number of re-sightings documented in SC/56/SM15 suggested that the population of resident killer whales in Kamchatka could be small. The Scientific Committee reiterated its **recommendation** that any live captures should be preceeded by a full assessment of status.

13.3 Takes of small cetaceans

The Scientific Committee reviewed its table of recent catches (Appendix 2 in Annex L) of small cetaceans. It noted, once again, that this table is incomplete and urged Contracting Governments to provide this information to the IWC. The Committee also noted that the species identity of small cetaceans harvested or taken as bycatch may be determined by genetic analysis of samples obtained during market surveys, at least in areas where such products are available for commercial sale (SC/56/BC5).

13.4 Work plan

The sub-committee's discussion of its work plan is given in Annex L. The Committee's deliberations are given under Item 19.

14. WHALEWATCHING (ANNEX M)

14.1 Whalewatching data collection

14.1.1 Report of Intersessional Correspondence Group

The intersessional correspondence group provided comments and advice used to further develop the prototype web-based Data Recording System (DRS) as discussed in Item 14.1.2.

14.1.2 Compendium of data forms used on whalewatching platforms

SC/56/WW2 reported on progress with the DRS discussed in previous years (e.g. IWC, 2003h, pp.382-384). New features include ethograms for a series of species and draft guidelines for taking quality photographs for photo-identification. The prototype DRS can be found at: *www.wdcs.org/drs*. The DRS was welcomed by several members as an excellent advance in the pursuit of using whalewatching vessels as platforms of opportunity to collect useful data. The authors were congratulated on achieving their intended goals and the Committee **agreed** that the development of the DRS should continue.

14.1.3 Other

SC/56/WW1 summarised the contribution of whalewatching platforms on the northern coast of Bahía State, Brazil for the collection of scientific data on

humpback whales. The creation of a Marine Protected Area was proposed to the Government and in June 2003 the Government established the North Coast Shelf Environmental Protection Area. The authors acknowledge the need for continued monitoring of whalewatching activities to detect and evaluate possible disturbances to the whales and to assist in the management of the MPA (Annex M, item 5.3).

SC/56/WW8 presented collated data collected from websites and requests to MARMAM in a worldwide directory that lists information on 80 research projects, showing the considerable, wide range of scientific research related to whalewatching. The Committee **agreed** that a list of key researchers be generated and that they be asked to submit papers or be considered to attend the Scientific Committee as members of the sub-committee. A small Working Group developed a log scheme for the Directory and suggested a working procedure. The Committee **recommended** that a copy of the log scheme (Annex M, Appendix 2) be included on the website of the IWC.

Last year the Committee had recommended that 'Contracting Governments, when possible, report and clearly identify the data obtained from whalewatching vessels in their Progress Reports under section 2.1.2 (Opportunistic, Platforms of Opportunity). In addition, clarification of whether data are collected by scientist(s) on whalewatching platforms or whalewatching operators/crew and methodology would be useful' (IWC, 2004i, p.339). It was noted that relatively little whalewatching research is represented in national Progress Reports. The Committee **agreed** to request that appropriate wording for the listing of this information be added to the IWC Progress Report template.

14.2 Review of report and recommendations from the whalewatching management workshop in South Africa

The Workshop on the Science for Sustainable Whalewatching discussed last year (IWC, 2004a, p.37), held in Cape Town, 6-9 March 2004, reviewed available scientific and management tools for regulating whalewatching operations.

The Committee **endorsed** the following recommendations from the Workshop:

(1) The value of experimental studies was noted and it was recommended that such studies be employed to measure the impacts of whalewatching whenever possible.
(2) The Cape Town Workshop reviewed new approaches and quantitative studies of relevance to the Scientific Committee. It was recommended that the sub-committee on whalewatching further explore and develop these new approaches and quantitative studies as highlighted in the Cape Town Workshop report.
(3) The Cape Town Workshop started to develop a framework for the management of whalewatching similar in concept to those codified in the FAO Code of Conduct for fisheries, in which three reference points were suggested: 'Target Reference Points (TRP)', 'Limit Reference Points (LRP)', and the 'Precautionary Reference Point (PRP)'. It was recommended that the Scientific Committee continue this approach when developing a framework for monitoring whalewatching.
(4) Monitoring population trends in free-ranging cetaceans and determining that they are impacted by whalewatching has proved to be very difficult. It was recommended that until more is known about its impacts, whalewatching should be conducted according to the Precautionary Principle to minimise the disruption of life history processes both of individuals and populations.
(5) Scientists should inform managers on a case-by-case basis about relevant research, and the appropriate critical parameters needed to monitor population status. Efforts should be made to assess the possibly different impacts of whalewatching on baleen whales that are migrating, on their feeding grounds, on their mating and calving grounds, or are residents. Whalewatching may also impact coastal and pelagic odontocetes in a variety of ways. It was recommended that a variety of case studies be examined so as to promote broad conclusions about assessing impacts of whalewatching on different taxonomic groups at a variety of life history stages.
(6) It was recommended that where possible, whalewatching guidelines should be based on criteria that are simple, practical and objectively measurable under field conditions. These criteria should be developed and tested experimentally and developed in response to scientific results.
(7) The Cape Town Workshop acknowledged the IWC 1997 General Principles for the Development of Regulatory Frameworks for Whalewatching (IWC, 1997a, p.105) noting that they were still applicable and suggested additional principles for consideration as detailed in Appendix 3. It was recommended that the Principles identified by the Workshop (Appendix 3) be included in the IWC General Principles for the Development of Regulatory Frameworks for Whalewatching and displayed on the IWC website.

The report of the Workshop is summarised in Annex M, Appendix 3. The full report will be made available through a web link on the IWC website.

The Committee expressed thanks to the convenors and participants of the Workshop and recognised the valuable contribution to its work.

14.3 National whalewatching guidelines and regulations

14.3.1 National guidelines and regulations for whalewatching

SC/56/WW4 described known whalewatching and whalewatching-like activities in Italian waters and suggested ideas for the implementation of comprehensive, national regulations. In order to facilitate the process of regulating whalewatching activities, the authors presented a collation of international and national guidelines, agreements and law, relevant to Italy, that might be used as the basis for national regulations and that could promote whalewatching in Italy as a sustainable use of cetaceans. Details are given in Annex M, item 7.1.

The various types and categories of Italian whalewatching activities were noted. The Committee

agreed that an Intersessional Working Group be formed to discuss definitions of whalewatching (Annex M, item 7.1).

SC/56/WW5 reviewed legislation, policies and guidelines relevant to the protection of whales, with regards to whalewatching, in Australian waters. To date, there are 30 legislative or policy documents concerned with the protection of cetaceans in Australian federal, state and territory waters. The authors believed that current management can be potentially confusing because of the number of legislations and cross-jurisdictions.

Recent studies that address the reduction of whalewatching impacts on cetaceans were presented in SC/56/WW6. These include: Lusseau (2003); Valentine *et al.* (2004), Kelly *et al.* (2004) and Berrow (2003a; b). The papers are summarised in Annex M, item 7.1. It was noted that much research on whalewatching had been published over the past year of direct relevance to the work of the sub-committee. The Committee **agreed** that an annual summary report or digest of published whalewatching research would be useful. Parsons agreed to collate the material for presentation to the sub-committee next year.

SC/56/WW10 reviewed and analysed the variation in whalewatching regulations and guidelines from 32 countries and territories (including 13 special areas of interest), organisations, operator associations and the IWC. The updated compendium detailing whalewatching regulations and guidelines from around the world (Carlson, 2004) is posted on the IWC website.

The results of a manifest content analysis of 58 whalewatching codes from around the world were presented in Garrod and Fennell (2004) and described in Annex M, item 7.2. The analysis revealed considerable variation among the guidelines and their provisions.

14.3.2 Review of effectiveness

SC/56/WW3 presented an updated review of whalewatching management in the UK presented at the Cape Town meeting. The authors noted that whalewatching is managed by a combination of regulatory measures and voluntary approaches (i.e. codes of conduct). A discussion of recent changes in UK law and management implications is presented in Annex M, item 7.2. The paper also drew attention to important reviews in literature including Corkeron (2004), Kelly *et. al*. (2004) and Garrod and Fennell (2004).

The Committee **agreed** that quantitative research on vessel impacts should be encouraged, and that it would be of value to have researchers pursuing such studies present their findings at future meetings.

SC/56/WW6 presented information on several studies addressing compliance with whalewatching regulations (Corbelli and Lien, 2003; Scarpaci *et al.*, 2003; Whitt, 2003). The studies are summarised in Annex M, item 7.2.

SC/56/WW9 examined compliance with voluntary speed guidelines by commercial whalewatching vessels around Stellwagen Bank National Marine Sanctuary, Massachusetts, USA. Results indicated that whalewatching vessels often ignored speed zone guidelines and that the degree of non-compliance increased as the distance to the whale increased. The Committee **agreed** discussions on the issue of the efficiency of regulations are making good progress.

14.4 Other

14.4.1 Review of risks to cetaceans from whalewatching boats

14.4.1.1 HIGH-SPEED VESSELS

There were no reports submitted on high-speed vessels.

14.4.1.2 OTHER

SC/56/WW7 evaluated the potential effects of vessel traffic on the Commerson's dolphin population of Bahía San Julian, Argentina. Results indicated that the levels of vessel activity in the area do not appear to have an effect on the analysed behaviour variables of the dolphin population.

SC/56/WW11 presented a summary of research on the potential impacts of whalewatching on the reproductive behaviour of male humpback whales in the Abrolhos National Marine Park, Brazil. The results suggest that a potential cetacean communication breakdown may occur from the effect of boat-generated noise associated with whalewatching activity. It was noted that little information exists on the impacts of vessels on large baleen whales or the link between the cessation of vocal behaviour and vessel activity. The Committee welcomed this work, **agreed** that use of acoustic techniques to assess impacts on large baleen whales in breeding areas was a progressive step forward and **encouraged** its continuation in Brazil and the initiation of similar projects in other large baleen whale breeding areas (e.g. Dominican Republic or Northern Philippines).

14.4.2 Review of potential impacts of 'swim-with' programmes on populations of cetaceans

An update of SC/55/WW4, a review of commercial swim-with-whale programmes, will be prepared for next year's meeting.

14.5 Work plan

The sub-committee discussions on its work plan are given in Annex M. The Committee's deliberations are given under Item 19.

15. DNA TESTING (ANNEX N)

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

SC/56/SD4 reported on the public sequence archive GenBank (National Center for Biotechnology Information, *www.ncbi.nlm.nih.gov/Genbank/index.html*). The archive contains 2,723 sequences. Currently, sequence data is missing or limited for many cetacean species, and it appears that more sequence information is privately held than is publicly available. For example, four putative species have no sequence data available; another 17 lack even a single control-region sequence (the main locus used for forensic identification); 20 lack a cytochrome *b* sequence; 34 species are represented by only one control-region sequence or cytochrome *b* sequence. Antarctic minke whales and dwarf minke whales, are not represented by a single control region or cytochrome *b* sequence. Archiving of sequence data is encouraged by many scientific journals through editorial policies that require authors to provide GenBank accession numbers with each manuscript submitted.

It was noted that the taxonomy employed by GenBank may not always be current and that therefore care should be taken to ensure that any sequences extracted from the archive are indeed of the species of interest.

The Committee **recommended** that members be urged to deposit sequences to be used in a published report in GenBank and include the GenBank accession numbers in the publication, whether or not this is required by the journal. At present the *Journal of Cetacean Research and Management* does not require deposit of sequences used in submitted papers; the Committee **recommended** that this be made part of the editorial policy of the journal. It further **recommended** that similar practices be established for public archiving of non-sequence genetic data, such as microsatellite loci, primers, alleles and profiles, where feasible. Such data are not presently accepted by GenBank, and some research may be necessary to identify a suitable archive. One potential provisional venue are the websites maintained by most major journals for supplementary data and information accompanying published papers.

SC/56/BRG34 reported research on quality of DNA samples from tissues collected in the Arctic. Tissue samples for genetic analyses of bowhead whales come from subsistence hunts in Alaska and Russia. Samples from near Barrow were collected by biologists, while those from more remote villages were provided by the hunters. To test the relative reliability of the different sources, DNA was quantified from 20 bowhead whale samples from remote villages, and from 20 random samples from the North Slope of Alaska (Barrow). The two sources were compared in several measures of data quality. Although the differences were not significant, perhaps due to low sample sizes, there were trends of lower DNA concentrations in samples coming from outside the North Slope, correlated with lower PCR success rate and higher homozygosity, possibly due to allelic dropout. These results, which could bias analyses of population structure, may be the result of differential handling of samples from the remote villages. They emphasise the importance of the chain of sample collection and treatment to good results in the laboratory. The conclusion after discussion was that some of the problems encountered in Alaska and similar situations may be alleviated by consistent use of an appropriate preservative and refrigeration of the samples.

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

The status of the Norwegian minke whale DNA-register was reported in SC/56/ProgRepNorway, covering the years 1997-2002. This is the first year that these statistics have been included in the national progress report. The Committee **welcomed** this response to the Commission's call for such reporting. It was noted that progress has been made toward achieving a fully diagnostic register; no samples were missing for the 625 whales landed in 2002. The number of missing samples in earlier years ranged from 3 to 11. No samples were reported from stranded whales.

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 assigned by the Commission.

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

SC/56/SD3 reported on a study where DNA-profiles from 288 mother-foetus pairs were compared for consistency. The aim was to check the quality of the 10 microsatellite profiles contained in the Norwegian minke whale DNA-register. The 288 mothers, as part of the DNA-register, had previously been analysed, and the foetuses were analysed in a blind experiment using the same laboratory and protocol as used for the DNA-register. Several inconsistencies between mother and offspring were found. In a second stage of the study the laboratory was informed about which females were the mothers of which foetuses, and this information was used to resolve the inconsistency. This second stage involved complete re-analysis of several individuals. Table 4 of SC/56/SD3 reported all errors found in the mother profiles as a result of this process. The causes of errors were not given. This information will be used to estimate error rates for the DNA-register, with the goal of improving the matching criterion used in the operation of the DNA-register.

No new information was available on the register maintained by Japan. The Committee **reiterated** that progress reports on development of the databases and standards for the register will aid the Committee in fulfilling its remit as assigned by the Commission.

15.4 Work plan

The terms of reference for the Working Group for next year will remain the same, unless the Commission requests other information in the interim.

16. SCIENTIFIC PERMITS (ANNEX P)

16.1 Review proposals to facilitate the review process

The Scientific Committee has noted (IWC, 2003d, p.63) that the existing guidelines, which have been developed over a number of years, inevitably include some duplication and overlap within the broad headings used. The Committee had therefore agreed to revisit this issue with the aim of providing a proposal to the Commission on restructuring the guidelines.

Three options were put forward with the aim of improving the existing mechanism, and specific text was provided to elaborate on these (SC/56/SCP1). The three options were to:

(1) continue the current procedure under the existing guidelines;
(2) compress the existing duplicating guidelines to simpler questions to be answered;
(3) propose a new procedure focusing on scientific matters only.

The discussion focused on the third option. Two specific issues gave rise to concern. First, if a new procedure were to be developed focusing only on scientific matters, there was disagreement over whether any assessment of the effects of research takes on stocks should explicitly be linked to the use of the RMP *implementation* process, or if

the examination should apply the best available method. The Committee has previously agreed that the effects of scientific permit catches on stocks should be examined assuming they were ongoing, as well for a shorter period, even if the proposal was initially presented as a feasibility study (IWC, 2001b, p.57). Some members had noted in 2002 that a catch level of 50 sei whales a year should not have been proposed without new, reliable information on which to base an assessment of impact, such as stock structure (IWC, 2003d, p.75). The proponents explained that the methods used for estimating sample size of sei whales were appended to SC/54/O2, which described the JARPN II research plan. They stated that this included distribution, density index, stock structure, biological parameters, abundance estimation and some other aspects of sei whale life history and ecology.

The second issue of concern was whether or not, in the absence of any current understanding of stock status, the Committee would be in a position to make an adequate assessment of the possible effects on the stock of proposed research takes. It was further noted that evaluation of the effects on stocks of scientific permit catches is especially difficult in cases where the stocks have not been assessed by the Committee in recent years and where there is no agreed abundance estimate. Some members proposed that when substantial takes are envisaged from such stocks, priority should be given for an in-depth assessment of the stock concerned as soon as possible. Proponents and some other members held the alternate view that Article VIII placed no such restrictions on research activities, and that the best currently available estimates of abundance were quite adequate for an assessment of the effects on stocks. These members therefore disagreed with the statement and proposal, noting that Article VIII provided Contracting Governments with an absolute right to issue Scientific Permits at their discretion and that an 'in-depth assessment' is not necessarily required to assess the effects on stocks of scientific permit catches.

In summary, one view expressed support for a new procedure confined to scientific aspects only, and another view was that given the intractable nature of these discussions, the Committee remain with the existing guidelines. An alternative suggestion was that the Committee should consider using independent reviewers, as had been done for the Southern Ocean Sanctuary Review, to try to develop a consensual approach to this issue. However, no agreement was reached on any proposal for changes in the procedure for reviewing special permit proposals. There was general agreement that lacking further guidance from the Commission, the Committee would not be able to agree recommended changes to the guidelines it currently uses to review proposals for scientific permit whaling. The Scientific Committee will therefore remove this item from its agenda unless the Commission instructs otherwise.

16.2 Review of results from existing permits

16.2.1 Japan – Antarctic minke whales

16.2.1.1 REVIEW OF RESULTS

SC/56/O12 described the most recent results of the JARPA programme. Work was conducted in Area IV and the eastern part of Area III between 30 November 2003 and 3 March 2004. One sighting vessel (SV), three sighting and sampling vessels (SSV) and one research base ship were engaged in the research. Area IV strata were surveyed in the order of west-north, east-north, east-south, west-south and Prydz Bay. Area IIIE was surveyed prior to Area IV for the purpose of collecting the W stock samples, as those whales may migrate early in the feeding season. The SV covered 7,000 n. miles and sighted 454 schools and 1,756 individual Antarctic minke whales. Three SSVs searched a total of 12,287 n. miles and sighted 638 schools and 1,494 individual Antarctic minke whales. A total of 473 individuals were targeted for sampling, of which only 440 individuals were sampled. The most common reason for sampling failure was that the targeted whale escaped into the pack ice. Mature females were dominant in the east-south and the west-south stratas in Area IV, mature males were dominant in Area IIIE and in the west-south stratum in Area IV. In Prydz Bay, mature males and females predominated. The fraction of immature animals was relatively high in the east-north stratum of Area IV. Maximum body length was 10.05m for females and 9.39m for males, while the minimum lengths were 4.9m and 4.9m, respectively. These results were not significantly different from previous JARPA cruises. The most characteristic result of the present survey was the large number of humpback whale sightings, which exceeded the number seen during any previous JARPA cruise.

Estimates of humpback abundance based on data in the 1989/90 and 2002/03 seasons were 4,426 (CV=0.20), 32,519 (CV=0.11), 2,759 (CV=0.16), 1,551 (CV=0.24), in Areas III-E, IV, V and VI-W, respectively. Instantaneous rates of increase of humpback whales were estimated as 18.1% (CV=0.21) and 12.2% (CV=0.21) in Areas IV and V, respectively (SC/56/SH11). Expansion of humpback whale distribution was observed in Area IV. Estimated abundances of fin whale were 3,382 (CV=0.52), 7,642 (CV=0.26), 3,031 (CV=0.33) and 474 (CV=0.32), in Areas III-E, IV, V and VI-W, respectively. Instantaneous rates of increase for fin whales were 29.8% (CV=0.10) and 12.9% (CV=0.25) in Areas IV and V, respectively. Further details on applied methods and results are given in Annex P.

Some members pointed out that the reported rates of increase were biologically implausible, while other members noted that observed rates of over 10% have been reported in other areas. However, the Committee **agreed** that there might be other factors contributing to the magnitude of the increase that was observed. Some factors, such as change in whale distribution in relation to JARPA survey design, need further considerations.

16.2.1.2 PREPARATION FOR REVIEW OF FINAL JARPA RESULTS

At its 2003 meeting, the Committee appointed a small group to prepare for review of final JARPA results (IWC, 2004l, p.410) but did not identify a convenor. This year, Zeh agreed to convene this Steering Group (Annex U).

The Committee **agreed** that it will undertake a full review of the JARPA programme when the complete set of results are available following the completion of the 16-year programme i.e. some time after the 2005 annual meeting of the Committee. The Steering Group will submit a progress report on preparations for consideration by the Committee next year.

Hatanaka reported that Japan will host a meeting reviewing JARPA results (limited to the first 15 years of

JARPA) open to interested scientists in early 2005 prior to the Ulsan meeting. It was agreed by the Committee that this meeting would be considered a non-IWC sponsored workshop. Hatanaka commented that recommendations from that workshop would be used to design a JARPA II proposal.

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

The offshore component of the 2003 full-scale survey under JARPN II sampled totals of 100 common minke, 50 Bryde's, 50 sei and 10 sperm whales (SC/56/O13). The coastal survey in 2003 had been planned as the second year of a two-year feasibility study. The first year survey was carried out in autumn 2002 in coastal waters off Kushiro and the 2003 coastal survey was conducted in the coastal waters off Sanriku, and 50 minke whales were killed as part of JARPN II. All whales from the coastal survey were landed at the JARPN II research stations. Biological samples were subsequently taken (SC/56/O14).

SC/56/O15, SC/56/O16, SC/56/O17 and SC/56/O18 included information on prey selection, prey consumption and interaction between the studied species and fisheries. SC/56/O24 reported progress in multi-species modelling. A comprehensive description of results and progress is given in Annex P.

A number of questions were raised during discussion including:

(1) whether uncertainty had been incorporated into the multi-species model;
(2) what sensitivity analyses for the input parameters had been made; and
(3) how sensitive the model was to assumptions about functional responses.

The proponents reported that sensitivity tests, which were a major component of the modelling approach, are currently being conducted.

The possibility of bias in the analysis originating from a more rapid passage time of krill through the digestive tract as compared to fish was discussed. In response, it was noted that only the fore-stomach was sampled, and different passage rates were unlikely. There was disagreement over whether passage of krill through the fore-stomach would be quicker than that of fish.

With regard to the ecosystem studies, some members noted that the model described in the reports mentioned above includes only four elements: three commercial fish species, krill, whales and a human fishery. These represent a very small fraction of the ecosystem components in this area, and the model also does not include any feedback mechanisms or second-order effects. Some members thus concluded that the resulting analysis can only be viewed as an over-simplification of the functional relationships within a true ecosystem.

Other members felt that it is unreasonable to criticise the developmental stage of ecosystem modelling as overly simplistic. They stated that JARPN II would include the development of sophisticated ecosystem models, and referred to progress made to identify keystone predators among many species or species groups in the area. They also noted that the MULTSPEC model does not require all of the components of an ecosystem to be specified to perform adequately. In discussion, it was clarified that it is difficult to include many species and complicated food webs in MULTSPEC. However, it is possible to incorporate the detailed dynamics of a subset of species with direct interactions between them into MULTSPEC. They noted that the species in the model were important fishery resources to Japan, which have a large biomass and occupy a significant portion of the upper trophic level of the ecosystem in the area.

Sei whale abundance was estimated based on the 2002 and 2003 JARPN II surveys. These results were compared to an abundance estimate for the period 1997-2001 using data from JARPN. Discussion of the validity of these estimates is provided in Annex P, and under Item 16.3.2.

Some elements in the research plan were defined by the proponents as feasibility studies: the logistics of sampling in the coastal area in 2002 and 2003 using small type whaling catcher boats; the sample size of minke whales in the coastal component; the sample size of sei whales and sampling of sperm whales in the offshore component. Based on the results from 2002 and 2003, the proponents concluded that:

(1) no substantial problem occurred during the coastal surveys using small type whaling catcher boats, therefore the coastal component of the JARPN II should continue using the same kind of vessels and methodology;
(2) the sample size of minke whales in the coastal component should be increased from 50 to 120, with 60 animals to be sampled in each of the early and the late seasons;
(3) the sample size of sei whales in the offshore component should be increased from 50 to 100 animals; and
(4) the sampling of 10 sperm whales should be continued (SC/56/O2).

There was no agreement on the acceptability of these conclusions. A discussion of the effect of the proposed removals is reported under Item 16.3.2.

16.2.3 Iceland – North Atlantic common minke whales

In August 2003, the Government of Iceland issued a permit for a take of 38 minke whales, and in June of 2004 another permit had been issued for a further 25 minke whales. However, permits authorising the take of the fin and sei whales had not yet been issued, and no decision had yet been taken on these species.

In 2003, a total of 37 common minke whales was taken including one struck and lost. Catching for 2004 is still underway. Further details and preliminary results from analyses of sampled whales, shipboard and aerial sighting surveys and a synoptic resource survey are outlined in Annex P.

A new technique to investigate food ingestion rate based on blood and urine samples was presented (SC/56/O11), and the methodology is detailed in Annex P. This analysis was preliminary and will continue to be elaborated. Some members thought that this represented a new means of analysing feeding ecology of whales through lethal sampling, and that as such it would be useful to implement in the JARPN II programme as well. Hatanaka agreed and added that the collaborative work with the University of Hokkaido on the molecular endocrinology to understand seawater adaptation of minke whales in the North Pacific

would provide a useful collaborative basis for work with Icelandic colleagues to develop a comprehensive study of minke whale feeding ecology.

Other members noted that the method relied on using allometry to extrapolate from smaller animals to larger ones, and that this had been shown to be problematic with respect to whales. Furthermore, saltwater ingestion confounds some of the results through Na^+ contamination, as it is very difficult to deduce how much seawater had been ingested.

When asked about the extent to which the Scientific Committee's previous comments on the proposed research had been taken into account, Víkingsson replied that a few new projects had taken into account comments from the Committee. The Committee also noted that the pilot project, as it is now referred to, had not yet been implemented for fin and sei whales.

16.3 Review of new or continuing proposals

The Scientific Committee considered three continuing proposals for scientific permit whaling. As in previous years, there was severe disagreement within the Committee regarding advice that should be provided on a number of issues, including: the relevance of the proposed research to management, appropriate sample sizes and applicability of alternate (non-lethal) research methods. The Committee **draws** the Commission's attention to the fact that a detailed review of scientific whaling proposals should not be interpreted as a consensus viewpoint.

Since the three proposals to consider this year had been previously reviewed by the Committee, and the only changes from the previous proposals were related to changes in proposed sample sizes, the primary focus at this meeting was to evaluate the sustainability of proposed and expected stock-specific removal levels associated with the scientific permit whaling.

The Committee noted it had no agreed procedure to evaluate the sustainability of a particular removal level associated with scientific permit whaling. Further, and as noted under Item 16.1, it is particularly difficult to evaluate the effects on stocks of scientific permit catches in the absence of any agreed current assessment of the stock(s) in question.

16.3.1 JARPA

The survey for the coming season will cover Area V and the western half of Area VI (VI-W) to focus on the issue of distribution of the stocks because previous results suggested additional stock structure in that sector. Additional sampling was also initiated to investigate yearly variation in that sector. The proposal, objectives, methodologies, sample size and effects on stocks and arrangements for participation by scientists from other nations as outlined in SC/56/O3 remain unchanged from the previous proposal. The schedule for the 2004/2005 JARPA survey is available in Annex P.

COMMENTS AND DISCUSSION

The Committee noted that the coming season is the last field season in a 16-year programme and that a comprehensive review of the entire programme is under preparation (Item 16.2.1.2). The Committee therefore referred to its previous discussion and comments (IWC, 2004a, p.39).

16.3.2 JARPN II

OVERVIEW OF THE PROPOSAL

SC/56/O1 presented a revised JARPN II research plan for the period starting in 2004, taking the feasibility components examined in SC/56/O2 into consideration. The objectives of the revised JARPN II are the same as in the original research plan. The objectives of JARPN II are to be reviewed every six years. Furthermore, the research area, survey components ('offshore' and 'coastal'), number of research vessels, searching method and sampling method have not changed. However, the offshore survey component will now be conducted for approximately three months in the period between May and September. The coastal survey component will be conducted twice each year (i.e. early and late surveys). Sample size will also be modified for common minke whales and sei whales according to the results of the feasibility considerations. A total of 220 common minke whales (100 from the offshore survey and 120 from the coastal survey), 50 Bryde's whales (offshore survey), 100 sei whales (offshore survey) and 10 sperm whales (offshore survey) will be sampled in sub-areas 7, 8, and 9. Regarding the coastal survey component, 60 common minke whales will be sampled in each of the early season and the late season. The HITTER method was used to evaluate possible effects on the common minke whale and sei whale stocks. The proponents concluded that the effect on the stocks would be negligible.

COMMENTS AND DISCUSSION

The Committee noted that the objectives, methodology, and arrangements for participation by scientists from other countries as outlined in SC/56/O1 are unchanged from the proposal it had previously reviewed. The Committee therefore referred to its comments and the discussion provided in IWC (2003d, pp.66-77). The revised programme proposed an additional take of 70 minke whales by the coastal survey and an additional take of 50 sei whales by the offshore survey. As noted above, the Committee confined its discussion on the effects on stocks implied by the proposed increased sample size of minke and sei whales. For the effects on stocks of Bryde's and sperm whales, the Working Group referred to its comments and discussion provided in IWC (2003d, pp.66-77).

Some members believed that increasing sample sizes of sei and minke whales on the basis of reducing the CV on diet data was not justified given the current inadequacies of ecosystem models.

Other members did not agree with this view and noted that the diet data had adequate statistical precision for use in developing more sophisticated ecosystem models, as well as for input into existing ecosystem models. These same members commented that an iterative process is used in model development. For this application, extremely precise parameter estimates are not necessary.

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 points of controversy) (IWC, 1986, 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 (IWC, 1986, p.133); and

(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 (IWC, 1987, 27-28).

WESTERN NORTH PACIFIC MINKE WHALES

O STOCK

Some members raised concerns regarding the proposed increase in catches of O stock common minke whales in JARPN II. They questioned the use of HITTER methodology to examine the effect of the proposed catch in light of last year's *Implementation Simulation Trials* (*IST*s) and the potential for the mixing of stocks. See Annex P for a comparison of scenarios chosen for the HITTER simulations in SC/56/O1 and the *IST* simulations (IWC, 2004b, p.118-139). Most of the single O stock trials (Baseline A) allowed a median catch per year of 140-160 whales (direct plus bycatch). Therefore, these members concluded that: (1) the proposed increase in scientific takes to 220 whales/year would exceed the *IST* recommendations of the Committee even in the absence of additional stock structure; and (2) there was only one set of trials that gave a total catch exceeding 200 whales/year. In this trial, it was assumed that $g(0)=0.5$, which essentially doubles the abundance estimate. It was recognised that no data had been collected from which to estimate $g(0)$. Furthermore, they disagreed with the use of only single O stock scenarios (as was done in SC/56/O1), and preferred the *IST* simulations, which considered multiple O stock scenarios (Baselines C and D). Further, these members suggested that stock structure was likely present and therefore the implementation should be robust to such structure. If Baseline C does reflect reality, a scientific take of 120 whales per year from coastal waters would likely lead to the severe depletion of a possible coastal O stock (in sub-area 7W). Finally, it was also noted that the HITTER analyses did not include *MSYR* values as low as those used in the *IST*s.

These same members disagreed with the argument made by the proponents that it was appropriate to compare the rationale for the number of takes related to need in aboriginal subsistence whaling to the rationale for the number of takes required to achieve adequate statistical precision associated with scientific permit whaling. That is, they noted that: (1) there are good criteria in place for defining need as used in the management of aboriginal whaling; and (2) scientific catches do not fit into this category.

The proponents and some other members defended the use of HITTER methodology to evaluate potential impacts from the proposed increase. It was their view that *IST*s and the RMP were neither designed for, nor required to evaluate the impacts from scientific permit catches. They noted the proposal should therefore not be criticised on that basis. These same members also indicated that the 100-years of take assumed in testing the performance of the RMP was not considered necessary for a research programme that would be reviewed every six years. Furthermore, a conservative 30-year projection was applied in the HITTER calculations.

The proponents and some other members also disagreed that all existing stock structure hypotheses deserved equal consideration in this assessment, particularly given that the plausibility of baseline stock structures had not yet been examined. It was the proponents' view that Baseline A was the only plausible stock structure scenario (Goto and Pastene, 2004a; b; c; d). Genetic analysis showed no significant differences between the stocks when they were divided according to Baseline C, along 147°E and 157°E lines. The proponents held that Baseline C was also not supported by the analysis of CPUE data (SC/56/IST16).

The proponents and some other members noted that it was appropriate to adjust the *MSYR* as was done in SC/56/O1 in light of recent biological information. They noted that the Committee had previously agreed that an $MSYR_{(mat)}$ of 4% had a 'high' plausibility ranking (IWC, 2004b, p.83) and that the minimum value used in their analysis was consistent with that value.

Some members questioned the assertion that scientific catches should be treated differently from commercial catches, and referred to the Committee agreement that the effects of scientific permit catches on stocks would be examined assuming they were ongoing, as well as for a shorter period, even if the proposal was initially presented as a feasibility study (IWC, 2001b, p.57).

J STOCK

The Committee noted that it was not able to make a definitive statement regarding the status of J stock at this time.

Some members expressed concerns regarding the proposed expansion of coastal takes of North Pacific minke whales, and feared that these catches posed a new risk to the depleted J stock, which is already subject to high levels of unregulated fisheries bycatch along the coasts of both Japan and Korea. The Scientific Committee has repeatedly expressed its concern about the impact of this bycatch and the potential for further depletion or extinction of the J stock in many of the RMP *IST*s. The in-depth assessment of western North Pacific minke whales, currently underway in the Scientific Committee, will address this problem as a priority.

These same members noted that the revised JARPN II analysis using the HITTER methodology resulted in a conclusion that both O and J stocks would increase in almost all cases. This conclusion is contradictory to the outcomes of previous *IST*s undertaken by the RMP sub-committee over the last several years and contradictory to the concern expressed by the Scientific Committee about the implications of those results for the status of the J stock (IWC, 2000, p.8). A more detailed comparison of results from the HITTER and *IST*s are presented in Annex P. The most important difference between HITTER and the previous RMP *IST*s is the abundance estimate of 15,137 applied to the J stock for the year 2003 and a relatively high level of implied recovery (42-78% depletion). This abundance estimate and bycatch numbers taken from Tanaka *et al.* (2002), and the implied probability of recovery, are not consistent with those used in the preparation for implementation and cannot be considered reliable without further consideration in the revised in-depth assessment.

These same members suggested that the Committee should use the results from the extensive *IST*s of the RMP implementation preparation (IWC, 2004b, pp.118-139) in evaluating the impact of scientific whaling catches on the J

stock. In almost all of these scenarios, the J stock was likely to decline under the current known or suspected levels of bycatch. These members believed that scientific whaling of the magnitude proposed on a depleted stock currently under protection would be a serious failing in management and contrary to the spirit of the Convention.

The proponents and some other members noted that the concern about the effects of an increased catch on J stock was based on the implied 30% depletion used in most of the *IST*s. The estimate produced by Tanaka *et al.* (2002) is the only one that is specific to this stock and so was considered valid for use in the HITTER calculation. Proponents noted that the revised J stock catch estimate of only 19 animals was unlikely to have a substantial effect on the stock compared to the estimated combined bycatch of 163 J stock animals in Korea and Japan.

On a separate issue, Butterworth (2003) described a preliminary analysis of population trajectories under an effort-related model for bycatch. His results were qualitatively different from the *IST* trials and he noted that they could potentially lead to more positive conclusions on the status of J stock. In view of the preliminary nature of this work there was no detailed discussion of the methods or results.

SEI WHALES

The Committee noted that there is no agreed estimate of abundance in recent years for the sei whale in the western North Pacific.

Some members disagreed that an estimate of abundance of 4,085 (CV=0.281) calculated for sei whales in sub-areas 8 and 9 from the 2002 and 2003 JARPN II dedicated sightings surveys, should be extrapolated to an estimate of 68,000 sei whales for the western North Pacific using pooled Japanese Scout Vessel (JSV) data from 1972-1988. They also disagreed that this number could be compared to a similarly calculated number from earlier surveys as a way of examining trends in abundance (an estimate of 4,909 (CV=0.405 for sub-areas 7, 8, and 9 extrapolated to 28,400 for the western North Pacific, SC/54/02) for two reasons. First, it was noted that the estimate of 4,909 included data from JARPN II, which the Committee had previously concluded were not acceptable for use in *Implementation Simulation Trials* because the survey design did not lead to estimates that are comparable with estimates from dedicated sighting surveys (IWC, 2003j). Second, they noted that the Committee has not endorsed the use in *IST*s of abundance estimates based on extrapolations from JSV data. Therefore, they did not consider the estimate of 68,000 animals to represent a legitimate estimate of abundance of the western North Pacific stock of sei whales, and strongly disagreed that these results provided any evidence that sei whales have increased in this area. They noted that the estimates of 28,400 and 68,000 are apparently not significantly different given their reported CVs.

Cooke noted that the Committee does not accept extrapolations of the kind used here as the basis for management. He referred to the Committee's last assessment of the western North Pacific sei whale stock in 1974. As part of that assessment, the exploited stock was estimated to have declined from about 30,000 in 1967 to under 10,000 in 1974. The HITTER stock assessments presented in SC/56/O19 using the extrapolated abundance of 68,000 whales are not consistent with this assessment. Although some increase in abundance since 1974 may have occurred, no comprehensive trend analysis of the available abundance data has been conducted to ascertain the extent of the recovery. He commented that until a full re-assessment of the stock has been conducted, no further increases in takes can be justified.

In response it was pointed out that evidence indicating the increase in density of sei whales in the survey areas was presented in the JARPN II research plan presented by the Government of Japan 2002 (SC/54/O2).

The proponents referred to other populations that had recovered, and considered it reasonable to expect an increase in sei whale abundance, given that 30 years have elapsed since the prohibition of commercial hunting. However, they also clarified that the evidence for an increase in sei whale abundance was based on more evidence than solely the difference between the 28,400 and 68,000 abundance estimates in question. Although the surveys differed methodologically, they considered there to be a clear increase in the sighting rate during the JSV sighting surveys. The proponents also pointed to the fact that nearly twice as many sei whales as minke whales were sighted during sighting/sampling activities in JARPN II in 2003. These observations suggested to them that sei whales, like minke whales, are abundant in the western North Pacific.

16.3.3 Iceland

SUMMARY OF THE PROPOSAL

The proposal remains the same as last year, except that the schedule for taking 200 minke whales in two years has been revised. The revised schedule implies that the sample of 200 minke whales will be completed in 2006.

COMMENTS AND DISCUSSION

The objectives, methodology and arrangements for participation by scientists from other countries remain unchanged from the original proposal. The revised plan for sampling minke whales reduces the numbers of whales sampled per year in 2004 and 2005. The Committee therefore referred to its comments and discussion provided in 2003 (IWC, 2004a, pp.39-47 and IWC, 2004j, pp.352-363).

17. WHALE SANCTUARIES (ANNEX O)

17.1 Complete the review of the Southern Ocean Sanctuary

Last year, the Working Group to Review Sanctuaries and Sanctuary Proposals initiated preparations for the review of the SOS (IWC, 2004k, p.370). The Committee agreed that a two-day intersessional meeting should be scheduled prior to the present Annual Meeting in order to review the SOS. In addition, it was suggested that non-IWC-affiliated scientists (independent external reviewers) with acknowledged international expertise on developing, managing and conducting research in sanctuaries or Marine Protected Areas (MPAs) be invited to attend the meeting to assist with the SOS review process.

Three reviewers were selected by the intersessional Steering Group and were requested to produce a report providing the following:

(1) an initial review of the SOS given its objectives and the criteria developed by the Commission and the Scientific Committee and approved by the Commission; and
(2) advice on how to introduce MPA scientific concepts into IWC Sanctuaries and Sanctuary Proposals, and on establishing monitoring programmes.

The external reviewers report (SC/56/SOS5), along with other relevant documents, were discussed at the intersessional meeting as part of the review held in Sorrento (28-29 June 2004). The meeting's report (SC/56/Rep2) was subsequently reviewed by the Working Group at the present meeting (Annex O).

In reviewing the SOS, the participants of the intersessional meeting **agreed** that:

(1) whales are not effectively protected from whaling in the SOS, because such Sanctuaries apply only to commercial whaling, and because (apart from stocks that migrate to the IOS) whales also migrate outside of the SOS boundaries; and
(2) the boundaries of the SOS were appropriately established for some, but not for all stocks.

While it is open to debate whether the current information available to assess stocks is due to the presence of the SOS, *per se*, the Committee **agreed** that there is insufficient information available to assess the stocks of most species of great whales in the Southern Ocean reliably. Although rates of increase and population size are available for a number of stocks (Annex O, table 1), these have resulted either from studies outside the SOS or beginning before the SOS was established.

Participants of the intersessional meeting agreed that it was not possible to completely evaluate the effectiveness of the SOS at the present time, because the present scientific objectives are not clear and are not associated with quantifiable performance measures. The Committee respectfully **requested** that the Commission considers clarifying the objective(s) of the SOS in order to allow the Committee to discriminate among designs that would, *inter alia*: protect whales; protect whale species diversity; and increase whaling yields outside the Sanctuary. The Committee developed a series of recommendations that, once the overall objectives of the SOS have been refined, will allow these objectives to be evaluated, and will facilitate evaluation in future reviews. These recommendations were originally agreed by the participants of the intersessional meeting (SC/56/Rep 2, item 5.1.2). The Committee **endorsed** them and they are given below.

(1) The purpose(s) of the SOS (and other IWC Sanctuaries) should be better articulated through a set of refined overall objectives (e.g. preserving species biodiversity; promoting recovery of depleted stocks; increasing whaling yield). In particular, the relationships between the RMP and the Sanctuary programme should be articulated.
(2) Appropriate performance measures both for Sanctuaries in general, and the SOS in particular, should be developed. These performance measures should link the refined objectives of the SOS with monitoring programmes in the field.
(3) Systematic inventory and research programmes should be established or further developed so as to build the required information base for a Sanctuary management plan and subsequent monitoring programmes.
(4) A Sanctuary management plan should clearly outline the broad strategies and specific actions needed to achieve Sanctuary objectives (e.g. how to protect *x*% of a given feeding area for stock *y*).
(5) A monitoring strategy that measures progress toward achieving the Sanctuary objectives should be developed and subsequently implemented. A key component of this monitoring strategy would be the development of tangible indicators to monitor progress.
(6) Review criteria that reflect the goals and objectives of the Sanctuary (as described above) should be established.
(7) The Sanctuary management plan should be refined periodically to account for ecological, oceanographic and possible other changes in an adaptive fashion.

The Chair presented the following recommendation agreed by the intersessional meeting on the incorporation of MPA scientific concepts into IWC Sanctuaries and Sanctuary proposals (SC/56/Rep2, item 6.2).

> Marine sanctuaries and reserves are a subset of Marine Protected Areas (MPAs). While marine reserves aim to provide protection from removal and disturbance, IWC Sanctuaries are waters closed to commercial whaling. The Working Group recognises the value of exploring the rapidly developing theory and application of MPAs in relation to the review of the IWC Sanctuaries. However, the application of MPA scientific concepts to IWC Sanctuaries requires further investigation. The Working Group further recognised that MPAs and IWC Sanctuaries can vary widely in their goals, objectives, scales and management implications. The Working Group **recommended** that the goals of IWC Sanctuaries should be clearly articulated in Sanctuary proposals and that Sanctuary adoption should include measurable criteria that can be evaluated and monitored using systematic inventory (as described in SC/56/SOS5) and research programmes that will be refined at periodic intervals. Finally, the Working Group seeks clarification from the Commission on more clearly measurable objectives for IWC Sanctuaries.

The Committee **endorsed** this recommendation.

17.2 Recommendations to facilitate the review of future proposals and future sanctuary reviews

The Committee **agreed** that the involvement of independent external reviewers in the review of the SOS had been largely positive. However, some members felt that in future, the reviewers should be provided with more information on the workings of the IWC, its Schedule and the Scientific Committee and its procedures, prior to their review. It was also noted that the instructions given to the external reviewers should be more specific.

Some members questioned whether the Scientific Committee should involve external experts in reviews of future Sanctuary proposals, or just future Sanctuary reviews. The Committee **agreed** that involvement of external reviewers should continue, both for future reviews and reviews of future Sanctuary proposals. Some suggestions were made to improve the partnership between the Scientific Committee and independent reviewers:

(1) such partnerships would benefit from the discussion in different organisations (including, but not limited to, those affiliated with IUCN) on high-seas conservation;
(2) the independent reviewers should represent broad geographic coverage in expertise; and
(3) the review would benefit from separate submissions from each reviewer, who should in any case be independent (as had been the case in the SOS review).

The Chair noted that for the SOS review, 15 scientists were initially nominated for the review group. Of these, many were not available for the meeting. Of those who were available, the three reviewers elected by the intersessional Steering Group were offered the choice of producing independent reviews, but in the interest of time, had decided to complete a joint review.

Recommendations for future reviews are encompassed within the agreed recommendation under SC/56/Rep2, item 5.1.2, point (6).

18. RESEARCH AND WORKSHOP PROPOSALS AND RESULTS

18.1 Review results from previously funded research proposals

There were no research or workshop proposals funded under this agenda item at last year's meeting.

18.2 Review proposals for 2004/2005

18.2.1 Proposal for a series of regional workshops to address cetacean bycatch issues

The IWC Scientific Committee and others have identified the incidental capture of cetaceans in fishing gear as one of the most important threats to the conservation and management of their populations (e.g. Perrin *et al.*, 1994; Hall and Donovan, 2002; Reeves *et al.*, 2003) and it is known to be a significant threat to survival in certain cases (e.g. the North Atlantic right whale, Caswell *et al.*, 1999; the vaquita, D'Agrosa *et al.*, 2000). In order to address the full management implications, reliable information is needed on bycatch numbers, stock identity and movements, the abundance of the affected population(s), and the population dynamics of the cetaceans (Perrin *et al.*, 1994).

In some areas, considerable advances have been made in the assessment and mitigation of cetacean bycatch since the pioneering IWC La Jolla workshop held in 1990 (Perrin *et al.*, 1994). In other areas, however, little progress has been made and, as a result, a growing number of cetacean species (both large and small) face critical conservation problems as a result of fisheries bycatch. There is a clear need to address these conservation problems in a timely manner, but the Scientific Committee noted that another workshop of the scope and scale of the 1990 La Jolla meeting may not be appropriate. Instead, given the case- and area-specific nature of the problem, a series of broad-based regional workshops would be more effective, focusing on regions where bycatch problems:

(1) have been given priority by the Scientific Committee as part of its normal review process; and
(2) are not already being addressed.

The general objectives of such workshops will be to develop a short- and long-term approach to the successful management and mitigation of the cetacean bycatch problems in the region, building upon work already undertaken by the Committee.

The precise nature of the Workshops will depend on the level of information already available (for example, in some cases an assessment of the problem may already have been undertaken so the primary focus may be determining appropriate mitigation and monitoring measures; in others, the assessment itself may also need to be undertaken). Development of an initial agenda and the establishment of a Steering Group should occur at the Scientific Committee meeting.

The workshops should be held in or close to where the bycatch problems are believed to be centred and participants should include appropriate Scientific Committee members and invited experts on the biology of this species, local scientists, fishery managers, representatives of the fishing industry and non-governmental organisations and government decision makers. An important component of this approach is that it will enhance local technical capacity and expertise.

The Committee recognised the sensitivity of this approach with respect to those workshops that may concentrate on small cetaceans. However, holding any such Workshops under IWC auspices is in no way intended to be a comment on the IWC's competence or otherwise to manage small cetaceans. Rather the Committee is acting in a facilitative and advisory capacity, given its considerable expertise. In this regard, the Committee notes that should a particular workshop concentrate solely on small cetacean species, it will be most appropriate for any financial IWC contribution to be obtained via the Small Cetaceans Voluntary Fund (see Item 21).

The Scientific Committee **endorsed** the concept of a series of regional workshops to address cetacean bycatches given in SC/56/SM22 and **recommended** collaboration with other organisations with an interest in this matter (e.g. the Convention on Migratory Species, the Committee on Fisheries of the UN Food and Agriculture Organisation, IUCN and relevant international and regional fishery organisations).

19. COMMITTEE PRIORITIES AND INITIAL AGENDA FOR THE 2005 MEETING

19.1 Committee priorities for SC/56 (2004)

At this year's Scientific Committee meeting, 13 sub-committees (including Standing Working Groups and *ad hoc* Working Groups) were established. As noted in the two previous years (IWC, 2004a, pp.50-51 and 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 at the 2002 annual meeting agreed to limit the number of primary topics such that the business of the Committee could be completed in the time allowed. As was the case last year, the annual meeting of the Committee was conducted over a 12-day period. The number of sessions for sub-committee deliberations was therefore limited 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, for a period of six days. By this accounting, the maximum number of sessions any one sub-committee could be allocated is 30.

After discussion among the convenors, the Chair developed the following guide to the number of sessions per sub-committee at this year's meeting. The allocation of sessions to a sub-committee took into account:

(1) the priority items agreed by the Committee last year and endorsed by the Commission;
(2) the highest priority items agreed by the Committee in the Plenary session;
(3) the need for reporting on research activities funded in 2003/04 by the Commission; and
(4) the number of sessions possible in the six days of sub-committee meetings. (This does not include the two-day pre-meeting (10 sessions) on the Southern Ocean Sanctuary review or the two-day pre-meeting (10 sessions) on the development of an *SLA* for the eastern North Pacific stock of gray whales.)

Sub-Committee	Sessions	Sub-Committee	Sessions
RMP	9	SM	9
AWMP	8	SD	6
BRG	10	SH	6
IA	12	Sanctuaries	3
BC	6	Scientific Permits	5
E	8	DNA	2
WW	6	Total sessions	90

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. However, it was recognised by all members of the Committee that there was insufficient time to meaningfully address all of the issues of relevance to the Commission. Therefore, difficult choices about which issues to address during the 2004 meeting were necessary.

19.2 Committee priorities for SC/57 (2005)

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 2005 meeting. The same criteria as last year were taken into account (IWC, 2004a, pp.51). The Committee recognised that priorities may have to be reviewed in light of decisions made by the Commission at IWC/56.

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 will probably not be addressed at next year's meeting.

Sub-Committee	Sessions	Sub-Committee	Sessions
RMP	11	SM	8
AWMP	10	SD	5
BRG	6	SH	7
IA	14	Scientific Permits	5
BC	7	DNA	2
E	9	Total sessions	90
WW	6		

Revised Management Procedure (RMP)

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

General issues

The Committee **agreed** on the following, in order of priority:

(1) finalise the guidelines and requirements for implementing the RMP (Annex D, Appendix 2):
   (a) develop the thresholds for defining 'acceptable' and 'borderline' performance for classifying the performance of RMP variants for *Implementation Simulation Trials*; and
   (b) develop a list of agreed stock structure archetypes (in conjunction with SD, as necessary);
(2) further develop the 'simple model filter';
(3) finalise the issue of spatio-temporal considerations; and
(4) finalise the issue of the CATCHLIMIT program for running it in a trials situation.

Implementation process

The Committee **agreed** on the following, in priority order:

(1) conduct an intersessional workshop to allow the Committee to be in a position to complete the *pre-implementation assessment* for western North Pacific Bryde's whales; and
(2) review progress on the development of stock structure hypotheses as part of the *pre-implementation assessment* for North Atlantic fin whales.

Aboriginal Whaling Management Procedure (AWMP)

The Committee **agreed** that the highest priority for the SWG is the development of an *SLA* or *SLA*s for the Greenlandic fisheries. The priority topics are:

(1) Greenland *SLA* development:
   (a) the 2004 aerial survey;
   (b) genetics simulation studies;
   (c) *SLA* exploration and development;
(2) undertake annual review of catch data and management advice for minke and fin whales off Greenland;
(3) undertake annual review of catch data and management advice for humpback whales off St Vincent and The Grenadines; and
(4) initiate planning for a bowhead whale *Implementation Review*.

Bowhead, right and gray whales (BRG)
In the plenary meeting, the issue was raised as to whether to consider issues related to southern right whales as part of the responsibilities of SH. It was agreed this item would be discussed during the Convenors' meeting following the Committee meeting. After discussion, it was agreed that all right whale issues (i.e., northern and southern populations) continue to be considered under a single sub-committee. Given the workload of BRG anticipated during the 2005 meeting, a priority item was agreed concerning southern right whales (see below). Therefore, the Committee **agreed** that it will:

(1) review any new information on bowhead whale stock identity;
(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) participate in a joint symposium on the effects of high latitude (Arctic and Antarctic) sea ice on cetaceans;
(5) undertake annual review of the status of the western North Pacific stock of gray whales;
(6) undertake a review of new information on southern right whales; and
(7) if there is time: review new information on small stocks of bowhead and northern right whales.

In-depth Assessment (IA)
The Committee **agreed** that obtaining Antarctic minke whale abundance estimates is its highest priority item for next year. Its topics will thus be in priority order:

(1) estimate abundance of Antarctic minke whales;
(2) participate in a joint symposium on the effects of high latitude (Arctic and Antarctic) sea ice on cetaceans;
(3) review workshop report on SOWER cruise plans beyond 2004/05;
(4) begin work on an in-depth assessment of western North Pacific common minke whales, with a focus on J stock, assuming the availability of an abundance estimate for this stock;
(5) continue to examine reasons for differences between minke abundance estimates from CPII and CPIII; and
(6) brief review of report from an anticipated non-IWC sponsored workshop on sperm whales.

Bycatches and other anthropogenic removals (BC)
The Committee **agreed** that this sub-committee will, as its highest priority:

(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, especially results from the workshop; and
(3) empirical analysis of the functional relationship of bycatch levels to fishing effort and to population abundance.

It is intended that the following topics will be priority items in 2006 given work expected to be completed by 2006 by other sub-committees; thus in 2005 if there is time it may also briefly consider:

(4) information and methods on estimates of cetacean mortality caused by vessel strikes; and
(5) information and methods on estimates of cetacean mortality caused by other human activities.

Southern Hemisphere whales other than Antarctic minke whales (SH)
The Committee **agreed** that the priority items in order will be:

(1) complete in-depth assessment of Southern Hemisphere humpback whales with a focus on the C, D and E stocks:
  (a) investigate the distribution and allocation of historic catches to:
    (i) proposed sub-areas of breeding grounds; and
    (ii) from the Antarctic Peninsula to Stocks A and G;
  (b) update the tables summarising the present state of knowledge and work required to continue a Comprehensive Assessment of Southern Hemisphere humpback whales; and
  (c) further investigation and clarification of proposed sub-areas for stocks on the breeding grounds; and
(2) preparation for assessment of blue whales in 2006.

Environmental concerns (E)
The Committee **agreed** that the priority items will be:

(1) sea ice and whale habitat: a joint special session with IA and BRG;
(2) review of the report of the Habitat Degradation Workshop.

It will also receive progress reports on:

(3) POLLUTION 2000+: finalise Phase 1 and prepare for Phase 2;
(4) Southern Ocean collaboration: planning and coordination of IWC participation and report back;
(5) SOCER: review of Arctic and Antarctic cetacean issues;
(6) Arctic issues: report on potential for future collaboration;
(7) issues related to impacts of anthropogenic noise on cetaceans; and
(8) issues related to habitat concerns.

Stock definition (SD)
The Committee **agreed** that the priority items will be:

(1) review progress on the TOSSM project;
(2) continue review of statistical and genetic issues related to population structure (including DNA quality issues);
(3) possible definitions of unit-to-conserve and the implications for management;
(4) progress on use of tagging data in studying population structure; and
(5) review list of stock structure archetypes provided by the RMP.

Whalewatching (WW)
The Committee **agreed** that the two major priority items will be:

(1) assessing the possible population level impacts of whalewatching on whales;
(2) development of the scientific foundation of whalewatching guidelines.

In addition, the following lesser priority items in order will be:

(3) review of published whalewatching guidelines and regulations;
(4) reports of the Intersessional Working Groups;
(5) review of risks to cetaceans from whalewatching vessels (high-speed and others); and
(6) review of potential impacts of swim-with programmes.

Small cetaceans (SM)
The Committee **agreed** that the priority items will be:

(1) review of status of the finless porpoise;
(2) review progress on previous recommendations; and
(3) review incidental catches and takes of small cetaceans by country.

Scientific Permits (P)
The Committee **agreed** that the priority items will be:

(1) review research results from existing permits (including plans for a major review of the JARPA programme); and
(2) review plans for new and continuing permit proposals.

DNA
The Committee **agreed** that the priority items will be:

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

20. DATA PROCESSING AND COMPUTING NEEDS FOR 2004/2005

The Committee identified and **agreed** the requests for intersessional work by the Secretariat given in Table 4.

Table 4
Computing tasks/needs for 2004/05.

AWMP
Work on *SLA*s.
Work resulting from any Intersessional meeting.

RMP
Further develop the 'simple model filter'.
Adjust the convergence criteria in the new CATCHLIMIT program to be robust when less precise integration is used.
Work resulting from Intersessional workshop for western North Pacific Bryde's whales.

Sightings data
Validation of the 2003/04 SOWER cruise data and incorporation into the sightings database.

Catch data
Finish encoding 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).
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.

21. FUNDING REQUIREMENTS FOR 2004/2005

Table 5 summarises the complete list of recommendations for funding made by the Committee. The total required to meet its preferred budget is £354,350 (excluding the £20,000 request for the Small Cetaceans Voluntary Fund). The Committee **recommended** all of these proposed expenditures to the Commission. However, it understands that the projected amount available for funding is £238,250. 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 5, the Committee **agreed** that the final column given in the table represents a budget that will allow progress to be made by its sub-committees and Working Groups on its priority topics. Progress will not be possible in some important areas, as outlined below and the Committee **requested** that the Commission or individual member governments provide additional funding in these areas. The Committee **strongly recommended** that at a minimum, the Commission accepts its reduced budget of £240,850, noting that this is only £2,600 (1%) more than the projected budget.

In this regard, the Committee is particularly grateful to the Government of Japan, who have made a very generous donation of £32,000 to further the work of the SOWER circumpolar cruises. Without this additional funding, the Committee's work on Antarctic minke whales would have been compromised. This is discussed further below.

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.

(a) Items recommended for funding under the reduced budget

Revised Management Procedure

(1) INTERSESSIONAL WORKSHOP

The Commission has agreed that the Scientific Committee should begin the *Implementation* process[19] for western North Pacific Bryde's whales. For the reasons documented under Item 6.1.3, the Committee has not yet completed the *pre-implementation assessment* stage. It recognised that it will be unable to make sufficient progress to complete this phase at the next annual meeting without an intersessional workshop. The Committee therefore **strongly recommended** that such a workshop be held, noting that the Government of Japan has kindly offered to host it. The funds requested are thus for the travel and subsistence of the necessary invited participants.

Aboriginal Whaling Management Procedure

(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 comprised invited participants and the costs represent a small portion of the true costs. The challenge facing the SWG with respect to the Greenlandic fisheries is a major one (see Item 8.3, 8.4

[19] See Annex D, Appendix 2 for an explanation of this process.

Table 5
Summary of budget requests for the coming year.

	Reference	Budget	
		Recommended	Reduced
RMP (Annex D)			
Intersessional Workshop on North Pacific Bryde's whales	Item 6.1	£10,000	£8,000
AWMP (Annex E)			
AWMP developers fund	Item 8. 4	£10,000	£8,500
Genetic simulation studies	Item 8.3.1	£12,000	£10,000
Intersessional workshop on Greenlandic issues	Item 8.3, 8.4	£10,000	£10,000
IA (Annex G)			
SOWER 2004/5	Item 10.3	£88,500	£66,000
Beyond SOWER 2004/5	Item 10.3	£9,000	£0
Estimating abundance of Antarctic minke whales - new methods and standard	Item 10.2.3	£3,000	£3,000
Estimating abundance of Antarctic minke whales - DESS	Item 10.2.3	£20,100	£12,100
Estimating trend in abundance of Antarctic minke whales - VPA analysis	Item 10.2.3	£20,000	£18,000
E/IA/BRG (Annexes F, G and K)			
Sea-ice and whale habitat	Item 12.3	£4,050	£4,050
E (Annex K)			
Porphyrin analyses POLLUTION 2000+, Phase I		£4,500	£0
SO-collaboration field work	Item 7.3	£22,000	
SO-collaboration, data validation, analysis, preparation of grant proposals	Item 7.3	£25,000	£45,000
SO-collaboration, spatial modelling development, data analysis	Item 7.3	£30,000	
Training scholarship, integrated data	Item 7.3	£22,000	£0
SOCER. Coordination, literature search and editing	Item 6	£3,000	£0
SH (Annex H)			
Antarctic humpback whale photo catalogue	Item 10.3.4	£5,200	£5,200
BC (Annex J)			
Co-ordination with FAO	Item 7.1.1	£1,500	£1,500
Workshop on the use of market sampling to estimate bycatch	Item 7.2.1	£14,500	£14,500
SM/BC (Annexes J and L)			
Workshop on mitigation of franciscana bycatches, Buenos Aires, 2005*	Item 13.4	£20,000	£0
All			
Invited participants		£40,000	£35,000
TOTAL		£374,350	£240,850

*This money is to come out of the small cetaceans fund.

and 8.5) and the Committee **strongly recommended** that at least the fund is kept at £8,500.

(3) GREENLAND RESEARCH PROGRAMME

The Committee is unable to provide advice on the effects of aboriginal subsistence whaling on the fin and common minke whale stocks off West Greenland. As discussed under Item 8.5, this is particularly critical for the fin whale. The Committee has stressed 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 primary difficulties facing the Committee relate to abundance estimation (being funded in 2004 by the Greenland authorities) and stock identity (the subject of this request). The money requested from the Commission will be to fund essential modelling work to inform both the interpretation of the existing data and the research needs for future data in a direct management context.

(4) AWMP INTERSESSIONAL WORKSHOP

There are three major areas of work being undertaken in the coming year:

(1) the 2004 aerial survey;
(2) genetics simulation studies;
(3) *SLA* exploration and development.

The interaction between these items (simulations informing data collection and *vice-versa*) is fundamental to progress being made. If progress is made as hoped, it will be essential to host an intersessional meeting to review the results. The Committee **strongly recommended** that funds be made available to fund the essential participants at the workshop. The venue and dates will be determined when more information on progress becomes available.

In-depth Assessments

(5) SOWER CIRCUMPOLAR CRUISE

Interpretation of the results of the completed CPII and CPIII surveys is essential to the work of the Committee in response to the Commission's resolution with respect to Antarctic minke whales. This cruise will provide valuable information to assist in this process. The Government of Japan has kindly offered the use of two research ships in 2004/2005 and the preferred budget in Table 5 reflects the remaining costs of the cruise. The reduced budget in Table 5 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). The Committee **strongly recommended** that the Commission funds this minimum level. It noted with great appreciation that Japan has made an additional donation to the research fund of £32,000. It believes that it is appropriate to spend £22,500 of this money on buying

equipment that will prove both valuable on this cruise and any future cruises (see below) and paying for the additional participants needed to finalise details of the experiments to be carried out.

(6) 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 these projects.

(I) 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 (£3,000) represents only a small part of the work being carried out on both the 'standard' and new approaches. The Committee **strongly recommended** that this work is funded.

(II) DESS-RELATED WORK

The IWC's DESS (Database Estimation Software System) is vital to the Committee's work on abundance estimation, both with respect to providing estimates of abundance for past cruises and for future work on the abundance of Antarctic minke whales. In order to best facilitate its work the Committee agreed to a number of items totalling some £20,100. Funds for work related to DESS and the standard analysis method to:

(i) import cruise data into DESS;
(ii) complete the 'standard dataset' to be analysed by all methods;
(iii) use the 'standard analysis' method on 2003/04 data, simulated data, and actual data for CPII and CPIII;
(iv) use the covariate methods in DISTANCE to analyse the simulated data.

However, it agreed that a sum of £12,100 was the minimum required to at least cover items (i)-(iii). The Committee **strongly recommended** that this work is funded.

(III) VPA ANALYSIS

This work has been recommended by the Committee and the data have been generously made available by the Institute of Cetacean Research (Tokyo) in accordance with Procedure B of the Data Availability Agreement last year. The funds will allow initial analyses of an Integrated Statistical Catch at Age Model for application to Antarctic minke whales in Area IV and V as part of the programme to define trends over the CPI to CPIII time periods. The Committee **strongly recommended** that this work be funded.

Environment, In-depth assessments, Bowhead, Right and Gray whales

(7) SEA-ICE SYMPOSIUM

The issue of the relationship between sea ice and cetacean distribution and abundance is of great interest to a number of sub-groups of the Committee. It **strongly recommended** a pre-meeting symposium on this topic as the most efficient way to address this topic. The funds will be used to pay for the travel and subsistence costs of specialists in this field of research.

Environment

(8) SO-COLLABORATION

Research on Southern Ocean whales and their ecosystem is recommended by IWC Resolutions 1998-3 and 1998-6. Support for this activity complements the considerable in-kind support the IWC receives for the SO collaborative cruises. Projects totalling some £99,000 were proposed this year. The Committee **agreed** that the training scholarship item should not receive funding this year under its reduced budget. It **agreed** that its reduced budget should allocate £45,000 to the three remaining items that are concerned with data collection and analysis and that the Steering Group given in Annex U should decide upon the most appropriate way to allocate these funds. Details can be found in Annex K.

Southern Hemisphere whales (other than Antarctic minke whales)

(9) 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). The Committee **strongly recommended** that this core funding is approved.

Bycatch

(10) LIASON 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 in terms of assessment and RMP related work to determine total removals. As a result of contacts made last year it is clear that increased cooperation can be of great mutual benefit. The Committee **strongly recommended** that this collaboration be encouraged and the trips funded.

(11) WORKSHOP ON THE USE OF MARKET SAMPLING TO ESTIMATE BYCATCH

The Committee has been unable to reach agreement over the utility of market based approaches to estimating bycatch levels in an RMP context. The objectives of the workshop are:

(1) to review available methods that have been used to provide estimates of large cetacean bycatches via market samples, including a consideration of their associated confidence intervals in the context of the RMP; and
(2) to provide advice as to whether market-sampling-based methods can be used to reliably estimate bycatch for use in addressing the Commission's objectives regarding total removals over time and, if so, the requirements for such methods.

It should be noted that the terms of reference for the proposed workshop limits interest in the question of markets only to the context of an evaluation of whether market data can be used to provide reliable estimates of bycatches. The Committee **strongly recommended**

funding this methodological workshop. The costs are for invited participants.

Scientific Committee

(12) INVITED PARTICIPANTS FUND

The Committee drew attention to the essential contribution made to its work by the funded Invited Participants. The slightly increased budget this year reflects the increased travel costs to Korea for the meeting of the Committee in 2005. The IWC-funded IPs play an essential role in the Committee's work. They represent excellent value as they receive only travel and subsistence costs and thus donate their time, which is considerable.

(b) Recommended items not included under the reduced budget (but still supported by the Scientific Committee)

(1) BEYOND SOWER 2004/05

The third circumpolar SOWER cruise series was completed this year. The programme has formed a major part of the Committee's Antarctic work. The Committee began discussions of a possible future programme and has agreed as a general objective:

> To provide information to allow determination of the status of the populations of large whales that feed in Antarctic waters. The programme will primarily contribute information on abundance and trends in abundance (including of minke whales), learning from both the successes of past IDCR/SOWER cruises and the difficulties encountered in interpreting previous results.

Given agreement on the general objective, the next stages are to:

(1) determine and specify priorities/sub-objectives;
(2) determine appropriate methods to achieve these;
(3) establish a timeline for this work; and
(4) produce an initial proposal.

This represents a considerable body of important work and the Committee **agreed** that the best way to achieve this would be to hold an intersessional workshop in conjunction with the Tokyo Planning Meeting for the 2004/2005 cruise. It also **agreed** that it would be appropriate to use £9,000 of the £32,000 of the generous donation towards SOWER work given by the Government of Japan for this purpose.

(2) 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. Resolution 2000-7, IWC, 2001a, pp. 56-57). The results will provide a model for all cetacean species. However, completion of Phase 1 has been severely hampered by a lack of funds and its success has been due to considerable external or 'in-kind' funding. This money would allow porphyrins in the urine of known bottlenose dolphins to be analysed, thus allowing a more complete set of data to be available for Phase 1. If money is not forthcoming, it is probable that this opportunity will be lost. The Committee **urged** individual member governments to consider funding this important work.

(3) PREPARATION OF SOCER

The Commission (Resolution 2000-7) has encouraged work in this area. A Working Group within the SWG produced a 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 report of some events and developments in the marine environment relevant to cetaceans. The requested funding (£3,000) would support staff salary for coordination and editing, literature searching and compilation.

Bycatch/Small cetaceans

(4) SERIES OF REGIONAL WORKSHOPS ON BYCATCH ISSUES: (1) WORKSHOP ON FRANCISCANA BYCATCHES

The Committee **agreed** that bycatch problems of either large whales or small cetaceans require case-specific solutions; a full assessment of any bycatch problem requires input from people with additional types of expertise to cetacean biologists (including fishery biologists and managers) and from 'stakeholder' groups (such as fishermen and conservation organisations). To further this, it **agreed** it should coordinate a series of broad-based regional workshops to be held under IWC auspice (see Item 18.2.1), focussing on regions where bycatch problems:

(1) have been given priority by the Committee as part of its normal review process at annual meetings; and
(2) are not already being addressed (e.g. North Atlantic right whales where such workshops are taking place).

The general objectives of such workshops will be to develop a short- and long-term approach to the successful management and mitigation of the cetacean bycatch problems in the region, building upon work already undertaken by the Committee. The Committee recognised the sensitivity of this approach with respect to those workshops that may concentrate on small cetaceans. However, it hopes that all Commission members will recognise the benefits of this approach (both from the perspective of fishermen and the cetaceans) to cetacean management and conservation; holding such Workshops under IWC auspices is in no way intended to be a comment on the IWC's competence or otherwise to manage small cetaceans. The Committee **agreed** that should a particular workshop concentrate solely on small cetacean species, it is most appropriate for any financial IWC contribution to be obtained via the Small Cetaceans Voluntary Fund. Given that the first proposed workshop is for the franciscana, it therefore **strongly urged** member governments to consider making donations to this fund.

It also recommended collaboration with other relevant organisations (e.g. CMS, FAO, IUCN and relevant international and regional fishery bodies).

22. WORKING METHODS OF THE COMMITTEE

22.1 Relationship between the Committee and its sub-groups

During the meeting, the question of the relationship between the full Committee and its sub-groups was raised, particularly in the context of reviewing sub-group reports. As a result the Committee **agreed** the description given below.

The authoritative body is the full Scientific Committee. In order to most efficiently address its broad agenda, the Committee forms a number of sub-committees and Working Groups (generically called sub-groups). Some are 'Standing' and have been established on the instruction of

the Commission, some are *ad hoc*, established for a particular item, whilst the majority are sub-committees that tend to appear consistently over a number of years with occasional major shifts. All of these are subservient to the whole. Sub-groups make recommendations to the Committee – it is the Committee that makes recommendations to the Commission.

For pragmatic reasons, items of substance tend to be discussed first in sub-committees, where there is more time and a 'concentration' of directly interested scientists. In an ideal world perhaps, everyone who is interested in a particular item would attend the relevant sub-group. In practice, there are too many simultaneous meetings for this to happen, although the Convenors try to minimise conflicts in the daily schedules.

Occasionally, the full Committee does not agree with the conclusions or recommendations of a sub-group. Although one hopes that this would be rare it is entirely proper – the Plenary is not obliged to rubber stamp a sub-group report or else discussions of such reports would be meaningless. This is handled quite simply by: (1) explaining the reasons for the change in the Plenary report; and (2) including a footnote to the relevant section of the sub-group report.

However, at various times in its history, the Committee has struggled with how to deal not with major changes by the Committee but rather with comments by an individual or small group of individuals. The concern has been that by including such comments in the full Plenary report, they are effectively 'given far greater weight' than similar comments made in the sub-committee itself.

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

(1) every attempt is made to achieve consensus on sub-group conclusions and recommendations – in particular sufficient time must be made available for a full presentation to the Committee of major issues in a sub-committee report (e.g. development of a new *SLA*, provision of catch limits, modifications to annotations to the RMP);
(2) if the Chair rules that there is insufficient time to debate an issue, this must be clearly stated before discussion starts or during the discussion and reflected in the Plenary report;
(3) general discussion that does not alter sub-group conclusions or recommendations shall be briefly reported along the lines of 'There was additional discussion of the conclusions/recommendations but the Committee **endorsed** the view of the sub-group.' Statements under individuals names should not be allowed in the body of the report but they may request to have a statement included in a 'Minority Annex' – the Plenary report will merely record that 'a minority statement (or statements) is (are) given in Annex Z'.
(4) if the general discussion results in the Committee being unable to agree as a body to a conclusion/recommendation, the report will reflect the discussion with a brief rationale under 'Some…. Others …Yet others' culminating with a statement that 'under such circumstances, the Committee was **unable to endorse** the sub-committee conclusion/ recommendation'.

22.2 Data availability

Last year, the Committee agreed a data availability protocol (IWC, 2004a, p. 57). It was noted at the time that in its first year, flexibility would be needed with respect to deadlines. For a number of reasons, this turned out to be the case for the bowhead whale and it was agreed by the DAG[20] to use the same deadlines for the Bryde's whale case. It is not anticipated that such flexibility will be required in the future.

The Committee **agreed** that the data availability protocol had worked well in its first year as witnessed, for example, by the number of papers submitted to the RMP and BRG sub-committees as a result of Procedure A[21]. It considered the experience of the first year and **endorsed** a number of general improvements proposed by the DAG. The first is that to improve communication with the DAG, one primary contact person will be nominated, the Vice-Chair (arne.bjorge@imr.no) although correspondence should also be copied to the Chair (douglas. demaster@noaa.gov) and the Head of Science (greg@iwcoffice.org).

The Committee also noted that the DAG will also make more use of the new IWC website, which will have a page dedicated to data availability. It will include the following items:

Item	Comment
Process	The Rules for Data Availability will be available as a downloadable pdf file.
Deadlines	To the extent possible, these should be as specified in the Scientific Committee report. There may be cases where the precise dates of intersessional meetings have not been set. Once known, these will also be put on the website.
Data	A list of the data available for each broad subject (e.g. western North Pacific Bryde's whale *pre-implementation assessment*) and which procedure it is available under will be included.
Applications	A brief summary of each application (e.g. date, name of requester, data requested) will be given.
Protocols	Where an agreed protocol for use under Procedure B[1] has been developed, it will be included (e.g. that for the Institute of Cetacean Research in Tokyo).
Agreements	Copies of the standard agreement letter will be included. It will include the statement that is to be included on all papers submitted as a result of the agreement by non-data-owners (see below).

[1]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).

The Committee also briefly considered a number of other issues. In terms of the Rules for Data Availability themselves, it **agreed** that no changes were required although it noted that consideration of the nature of the sanctions referred to under item (8) in the 'Conditions for data recipients' was still needed.

In terms of assisting the overall process and the work of the DAG, the Committee **agreed** that:

(1) when the Committee draws up lists of the data to be available under Procedure A, it should also give details

[20] Comprising DeMaster, Bjørge and Donovan.
[21] This applies to data required for the process outlined in IWC (2003d pp.11-12) for the RMP, the AWMP (see IWC, 2003f, pp.161-166) and other information used to provide advice on aboriginal subsistence catch limits before the relevant *SLA*s have been completed.

of the relevant data holder(s) i.e. name, institute, mailing address, e-mail;
(2) those requesting data be encouraged to consider cooperative studies with the data holders and other applicants for the data;
(3) principal investigators (those likely to author/co-author papers) may allow people for whom they are directly responsible (e.g. technicians) to work on the data without these being considered 'Third Parties' under item (1) of the conditions for data recipients, noting that the principal investigator is the responsible person under such circumstances;
(4) given the iterative nature of the process outlined in Annex D Appendix 2 for the RMP and *Implementation Review* process of the AWMP, the length of the agreement between the data holders and the principal investigators should be the considered to be the length of the process, unless that person is no longer a member of the Committee;
(5) when the Committee is developing a request under Procedure B, this should include an expected timetable for the work;
(6) papers submitted to meetings must contain the following statement at the top of the title page – *'The data used in this paper were made available under the Rules for Data Availability of the IWC Scientific Committee – this paper cannot be cited except in the context of IWC Scientific Committee meetings unless permission is given by the authors and the data holders'*.

The Committee also noted that the sub-committee on the RMP should give further consideration to how to deal with cases where data that are held by persons/institutes not involved in the Committee's work do not agree to make data available or do not respond to requests.

22.3 Rules of Procedure

In 2002, the Committee proposed changes to the Rules of Procedure regarding the appointment of a new Committee Chair and Vice-Chair (IWC, 2003i). The Commission asked for them to be reconsidered before final adoption (IWC, 2003a). The Committee has done so and **agreed** to reiterate its recommendation that the Rules included in Annex T be incorporated into its Rules of Procedure.

23. ELECTION OF OFFICERS

The Committee **agreed** that there was no need for elections this year. Assuming the Commission supports the Committee's proposed changes to the Rules of Protocol, the Committee will use the new procedure next year to elect new officers. The Chair reminded members to discuss potential nominees within their delegations intersessionally.

24. PUBLICATIONS

The year 2003 was another productive year with respect to the IWC's scientific publications and the *Journal* continues to attract increasing numbers of submissions. This year, in addition to the 500 page supplement, volume 5 was completed and the first issue of Volume 6 and the supplement have been published. Volume 5 contained a total of 32 papers involving some 120 authors from 24 countries. Papers have been published on the full variety of subjects considered by the Committee. Donovan thanked the Publications staff for their hard work.

Donovan reported that despite slower progress than anticipated, 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 present.

With respect to ISI listing, he was disappointed to note that ISI say they have not received three regular copies of the *Journal* at their review office. These have in fact been sent regularly since the inception of the *Journal* in 1999. Each member of the Committee who can do so is requested to send a letter to: Mariana Boletta, Senior Editor, Science Editorial Development, Thomson ISI, 3501 Market Street, Philadelphia, PA 19104 USA (mariana.boletta@ thomson.com) stating that they have regularly received issues of the Journal since its inception.

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.

24.1 Guidelines for authors

The Committee **agreed** that two additions should be made to the Guide for Authors. The first concerns a requirement to deposit sequences used in submitted papers with GenBank and include the GenBank accession numbers in the publication; the Committee **recommended** that this be made part of the editorial policy of the journal. The Committee also **agreed** that the Editorial Board should develop precise wording that encapsulates the concept of a requirement that submitting authors include a statement that any research conducted on animals has complied with all relevant national laws and institutional guidelines pertaining to the acquisition and use of data and to the use of animals in research.

25. OTHER BUSINESS

There were no additional items raised under this agenda item.

26. ADOPTION OF REPORT

The report was adopted at 17:30 on Saturday 11 June. The Committee expressed its appreciation:

(1) to the Chair for his fair and good-humoured handling of the meeting;
(2) the Italian government for provision of the outstanding facilities and logistic support; and
(3) to the Secretariat staff for their usual efficiency, charm and hard work.

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